TBIRC
Timber Bridge Information Resource Center

CROSSINGS

NEWSLETTER OF THE NATIONAL TIMBER BRIDGE INITIATIVE

Editor Tinathan Royce *Issue 5* *August 1991*

Timber Bridge Information Center

On June 24, 1991, Mr. Stephen C. Quintana reported to the National Timber Bridge Information Resource Center (TBIRC) at Morgantown, West Virginia to assume the responsiblities of Program Director of the Timber Bridge Information Resource Center.

Mr. Quintana (Steve) has been with the Forest Service since 1985. He spent three years as the Regional Structural Engineer and three years as the Facilities Engineer in the Cibola National Forest at the Southwestern Region. In his last position as Regional Structural Engineer, Steve was responsible for the Structures Program which included bridges, tramways, facilities, and coordinator of the timber bridge programs. He has also worked for private consultants, city, state and other Federal agencies.

Steve earned a Bachelor of Science at New Mexico State University in Las Cruces, New Mexico and a Masters in Business Administration at Colorado State University in Fort Collins, Colorado. He is a registered Professional Engineer in New Mexico.

AASHTO Guide Specifications for the Design of Stress-Laminated Wood Decks Available

The American Association of State Highway and Transportation Officials (AASHTO) has published the Guide Specifications for the Design of Sress-Laminated Wood Decks. This title supplements the 1989 edition of Standard Specifications for Highway Bridges and includes the specifications necessary to design stress-laminated solid sawn wood decks. To obtain your copy of the Guide, contact AASHTO, 444 N. Capitol St., N.W., Suite 225, Washington, DC 20001. Phone: (202) 624-5800. The guide is $5.00 per copy plus shipping and handling.

We at the Timber Bridge Information Resource Center thank the members of the AASHTO subcommittee for their support of wood products as a bridge material. Several years of technological research in stress-laminated wood decks have provided the basis for development of these guide specifications. We also extend our thanks to the researchers, designers and entrepreneurs who have participated in the construction of experimental and demonstration bridges which were used in support of the development of these guide specifications. No doubt, as investigations of alternate design systems and materials continue, the bridge construction costs in both rural and suburban areas will be reduced; a goal toward which we are committed.

— Stephen C. Quintana
Program Director
Timber Bridge Information Resource Center
Morgantown, West Virginia

Case History — Page 3

YOUR UNIVERSITY AT WORK

The University of Connecticut - A comprehensive study of the prestressed tensioning level of stressing rods in stress-laminated timber bridges was recently conducted by the University of Connecticut. In this study, a model was developed to predict the loss of prestress due to creep. The use of disc springs as anchor plates on the stressing rods was shown to reduce the loss of prestress due to creep and also provided a simple, inexpensive method for measuring the prestress force in the rod. The effect of seasonal temperature changes on the prestress level was also examined and shown to be significant.

Normalized prestress forces versus time are shown in Figure 1 for tensioning rods with 12 and 6 disc springs and a regular anchor plate (no springs). It was found that the loss of prestress force with time could be accurately modelled by a power law creep model. Using measured data from the first day only, it was possible to predict the prestress level after 50 days with 5% using this creep model.

It is seen in Figure 1 that the tensioning rods equipped with disc springs have higher retention of prestress force than the rod with a regular anchor plate (75% for 12, 70% for 6, and 65% for no springs after 50 days). Another significant advantage of the disc springs is they can easily be used to determine the prestress force in the bridge. Prior to installation on the bridge, a calibration curve for the springs was developed by measuring the height of the spring versus applied load in a controlled laboratory test. After installation on the bridge, the height of the springs are measured and the calibration curve is used to determine the prestress force.

The jagged appearance of the prestress force curves were caused by daily temperature changes between morning and afternoon readings. Although daily temperature changes are small, the effect of a seasonal temperature change on the prestress level was found to be significant. Using the daily temperature data, it was estimated that a seasonal temperature drop of 80 degrees Fahrenheit could result in a loss of 52%, 42%, and 35% of the final prestress force (40 kips) for the rods with no springs, 6 springs, and 12 springs respectively. Additional results from this study appear in the ASCE Journal of Structural Engineering, Vol 116 (11), November 1990.

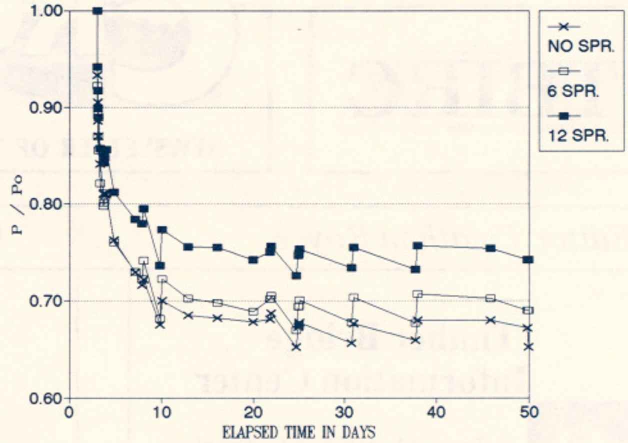


Figure 1

— ***Michael L. Accorsi***
Assistant Professor of Civil Engineering
University of Connecticut
Storrs, Connecticut

A Three Level Approach to Technology Transfer

The recent publication of the USDA's Timber Bridges Design, Construction, Inspection, and Maintenance manual along with "The Timber Bridge Initiative" will go a long way in implementing new timber technology for the replacement of our nation's bridges. However, a majority of the effort must come from local resources and should take place at three different levels: government decision-makers, design engineers and constructors or technologists.

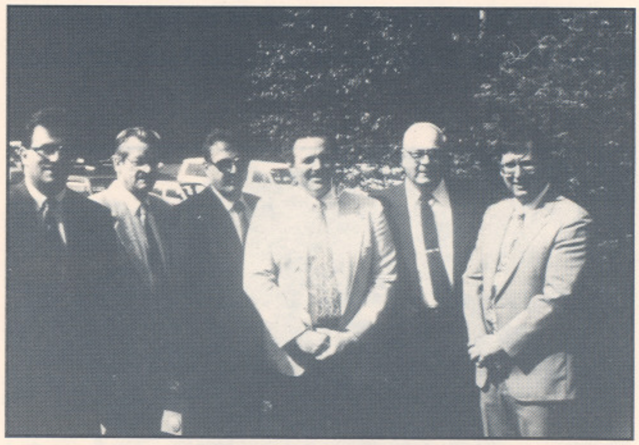
By continuing to offer general workshops and design seminars at local universities in Connecticut, we are exposing more and more people at the administrative and design engineering levels to this new technology. The third level is educating engineers and technologists in the construction sector (both public and private) in new and more efficient methods of installing and maintaining timber bridges.

This task can be done in part in university programs, by implementing timber structures courses into the undergraduate curriculum. At Central Connecticut State University, the construction engineering technology students take an entire course in timber structures. Both engineering and technology four year programs should expose our future designers and constructors to the value of building with timber. Currently, most university curricula do not.

— ***Edward F. Sarisley***
Construction Engineering Technology
Central Connecticut State University
New Britain, Connecticut

CASE HISTORY

Pennsylvania - On May 31, 1991, the first timber bridge constructed from Pennsylvania's Demonstration Program was dedicated and officially opened to traffic in Monroe Township, Clarion County. This bridge will be known as the "Leon A. Shook Memorial Bridge," named after a Township Supervisor who died just prior to the completion of this project. This bridge is the world's first "Mozingo type", hardwood/steel composite timber bridge. (For more detail on this design type, see Crossings, Issue 3, February 1991, "Bilayer Stressed Timber Bridge Decks".)



Bridge Dedication: *(Left to right)* ***Charles Goodhart, Ed Polaski, Bob Michaelega, John Crist, Ralph Mozingo, and Bill Pogash***
Photo courtesy of Bill Pogash

The basis for this bridge type was research conducted by Professor Ralph Mozingo, at Penn State University. The basic research was funded through Pennsylvania's Ben Franklin Partnership Fund. Aside from Penn State University, other major contributors to the research project were Burke-Parsons-Bowlby Corporation, Bethlehem Steel Corporation and Dwidag Incorporated. Widmer Engineering of Beaver Falls, PA was selected as the design firm for this project. Vince

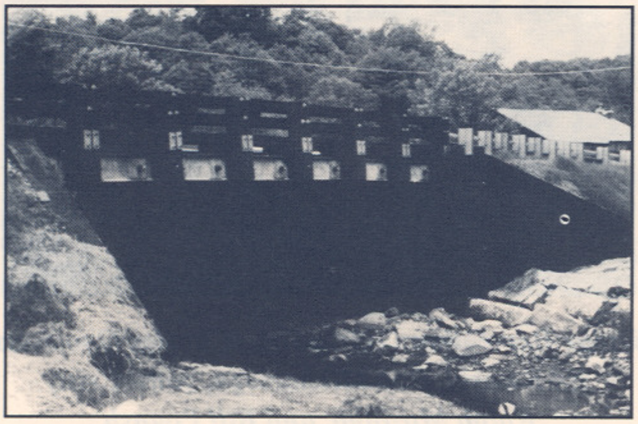
continued on page 4

CASE HISTORY

continued from page 3

Borelli from Widmer Engineering worked closely with Professor Mozingo and PennDOT engineers to complete this unique design. Decker Incorporated from Elmira, New York was awarded the contract to construct the bridge. The bridge was constructed on-site by Burke-Parsons-Bowlby Corporation in Dubois, PA.

The bridge is a two lane, 44 ft. structure. It is constructed of red oak timbers and lagging. The deck was constructed of 2" x 16" boards laid on edge with full depth steel sandwich plates incorporated into the deck system. A total of approximately 30,000 BF of timber was used in this project. The deck includes a total of approximately 33,000 Lb of galvanized structural steel sandwich plates. In all, the deck includes about 4% steel by volume.



Leon A. Shook Memorial Bridge

Photo courtesy of Bill Pogash

Leon A. Shook Memorial Bridge

Photo courtesy of Bill Pogash

The bridge will be monitored for a three year period to ensure that it is responding as designed. The monitoring program is a joint effort of PennDOT, West Virginia University (our contractor through research), and the USDA-Forest Products Laboratory. The result of the monitoring effort will be details for the municipality on future maintenance requirements.

— William J. Pogash
Pennsylvania Department of Transportation
Harrisburg, Pennsylvania

Contributions, questions or comments may be sent to: Tinathan A. Royce; USDA-Forest Service; P. O. Box 4360; Morgantown, WV 26505; Phone: 304-291-4905; FTS: 923-4905 or FAX: 304-599-7041; DG: S24L08A.