TBIRC
Timber Bridge Information Resources Center

CROSSINGS

NEWSLETTER OF THE NATIONAL TIMBER BRIDGE INITIATIVE

Editor - Tinathan Coger *Issue 18* *February 1995*

Building on Past Success of the Timber Bridge Initiative

The National Timber Bridge Initiative is being expanded to incorporate other wood-in-transportation structures into the Timber Bridge Initiative. This action reflects a conscious effort by the U.S. Forest Service to broaden timber bridge technology into other areas of transportation-related uses such as pedestrian walkways, railways, docks and marine facilities, sign and light posts, culverts, sound barriers, retaining walls, and railings.

Building on the successes of the Timber Bridge Initiative, the expanded program will develop and demonstrate technologies that can be utilized in a full range of transportation applications to improve the Nation's transportation infrastructure. This broadening of the existing Timber Bridge program increases its potential to create jobs and stimulate industrial development opportunities for counties, cities, and towns in rural America.

Goal of the Expanded Timber Bridge Initiative

As in the past, the goal of the expanded Timber Bridge Initiative is stewardship through conservation — the management, protection, and use — of America's forests. Proper levels of technical assistance in implementing wood transportation technologies can lead to improved and expanded markets. These markets create economic expansion opportunities for wood processing industries, including those focusing on under-utilized tree species — a way to improve the overall quality of the forest resource.

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To Our Friends and Partners:

I would like to take this opportunity to thank all of you for your support of the Timber Bridge Initiative and the help you have provided for many communities in need of bridges.

Personal health considerations make it necessary for me to relinquish my position as the Program Director of the Timber Bridge Information Resource Center. During the last 3½ years, we have accomplished the goals and objectives outlined in the 1990 Farm Bill. In doing so, we have striven for honesty and quality of service to you, our constituents. I believe we have succeeded.

The involvement of local, county, state and federal agencies with the support of Resource Conservation and Development Councils, and other supportive groups, has enabled this program to provide you the technical services needed to help your programs grow.

I have met and assisted many county managers, local engineers, state highway officials and private citizens whose leadership provided the focus and momentum to get things done in our rural areas and urban centers. Your leadership has caused others to become active in community transportation efforts, which in turn has affected the national efforts of the Timber Bridge Initiative.

It is your support that has made this program successful, and I thank you for allowing me to share your success through the Timber Bridge Initiative.

Sincerely,

Stephen C. Quintana

STEPHEN C. QUINTANA
Former Program Director, TBIRC

During the Interim:

The Timber Bridge Initiative will have a temporary manager, *Mr. Edward Cesa*, until the position of Program Director is filled. Mr. Cesa is an exceptional person. I have no doubt that he and the TBIRC staff will provide the services you may need in your program. You may contact Mr. Cesa by calling the TBIRC at (304) 285-1591.

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Objectives of the Expanded Timber Bridge Initiative

In order to effectively implement the broadened Timber Bridge Initiative activities, the following steps need to be taken:

1. Expand research, development, and technical assistance in technologies which support wood in transportation.
2. Improve the understanding and awareness of wood in transportation by working with federal, state, and local departments of transportation.
3. Implement regional pilot projects.
4. Link these pilot projects to Rural Development and Stewardship.

Actions Needed

Actions to be taken to accomplish the objectives of the expanded program include:

- Information assessment
- Applied research
- Identification of income-producing opportunities
- Business plan development
- Marketing strategy development
- Direct technical assistance
- Capital investment

Roles

Role of TBIRC: The Timber Bridge Information Resource Center (TBIRC), located in Morgantown, WV, is the cornerstone of the program. The TBIRC serves as the Center of Excellence for Timber Bridge Information Resources. In this capacity, the TBIRC will work as the primary source of information on modern timber bridge technology; the point of contact with many universities and educational institutions; the developer of project selection criteria in conjunction with field coordinators; and the clearinghouse for information and partnership databases.

Role of FPL: The Forest Products Laboratory (FPL) located in Madison, WI, works closely with the TBIRC to link new research with identified needs and to customize research results for specific applications. The FPL serves as the Center of Excellence for Wood Engineering Research and Technology.

In addition to cooperating with the Federal Highway Administration on timber bridge research, the FPL monitors experimental bridges and provides leadership in revising design standards to ensure more efficient wood-in-transportation applications.

Role of NFS: National Forest Systems (NFS) Washington Office and Regional Office Engineering staffs will provide functional and technical assistance and support as needed, and/or appropriate, in the development of pilot projects.

Role of Coordinators: Program coordinators are responsible for local program implementation. They serve as the main contact for the Timber Bridge Initiative and are the key linkages among the National Forest System, State and Private Forestry, and local partners.

Accomplishments of the National Timber Bridge Initiative

The primary direction of the Timber Bridge Initiative is to diversify local economies by:

1. Improving rural transportation networks
2. Expanding the range of markets for wood products
3. Creating service industries for wood bridge construction

This direction is being achieved through four distinct, yet interrelated goals:

- **Demonstration Timber Bridges:** To stimulate awareness of viable, efficient alternatives to traditional bridge construction techniques and materials.
- **Research:** To optimize the balance between existing and developing technology in the use of wood as a construction material.
- **Technology Transfer and Information Management:** To develop and manage information about wood in transportation and transfer this information and technology to a wide range of users.
- **Rural Revitalization:** To stabilize and revitalize the economic well-being of rural economies through service industry development and market expansion.

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Accomplishments of the National Timber Bridge Initiative

The primary objectives of the program in Fiscal Year 1994 continued to be "...diversify local economies by improving rural transportation networks; expand the range of markets for wood products; and create service industries for wood construction." This direction is being achieved by addressing the four primary goals of the Initiative.

- In Fiscal Year 1994, there were 29 demonstration vehicular and pedestrian timber bridge proposals approved for construction. Under the Initiative, there are now 319 vehicular and pedestrian bridges approved. From October 1993 through September 1994, there were 21 demonstration bridges constructed. As of September 1994, a total of 185 demonstration bridges have been completed, 164 vehicular and 21 pedestrian.

- Since 1989, fifty four (54) Special Studies have been funded; 11 in 1992, 13 in 1993, and 20 in 1994. Publications on five (5) special projects are complete with 10 in progress.

- An estimated 14,000 state and county officials, engineers, and involved citizens have participated in 59 conferences or workshops. The TBIRC sponsored eleven (11) timber bridge conferences in Fiscal Year 1994 to link wood bridge technology with local governments and manufacturers.

- TBIRC through the TBI has stimulated a variety of activity for the use of hardwoods in structural applications. Today, ten (10) hardwood and softwood species groups have been approved for timber bridge structural use which were not traditionally used.

  - Beech-Birch-Hickory
  - Mixed Maples
  - Mixed Oaks
  - Northern Red Oak
  - Spruce-Pine-Fir South
  - Red Maple
  - Red Oak
  - White Oak
  - Redwood
  - Eastern Soft-woods

  Visual grading has extended the time for approval of hardwood materials, because there are few inspectors with qualifications for visual structural grading available.

- The Forest Products Laboratory and several other partners continue to analyze and demonstrate the benefits of machine stress rating hardwood materials for bridge construction.

- Technology Transfer through the newsletter, Crossings, has reached about 5,000 recipients, and approximately 106,000 brochures and related technical information on timber bridges have been mailed.

- More innovative timber bridges have been funded to demonstrate the latest cost-effective technologies and development of modular prefabricated bridges. The Timber Bridge Information Resource Center and the Forest Products Laboratory have emphasized cost effectiveness in wooden bridge construction.

- Forest Products Laboratory research has monitored innovative bridge designs under field conditions, evaluated wood guard-rail systems, and established research plans in cooperation with the Federal Highway Administration and universities. Research on crash tested guide rails have been completed at the FPL and West Virginia University - Constructed Facilities Center. Both test evaluations are done and a written report is being developed.

- Linkages between the Timber Bridge Information Resource Center and the Rural Transportation Assistance Program of the Federal Highway Administration (FHwA) continue to work well. The FHwA training on bridge inspection is in progress for implementation of the new inspection requirements. TBIRC has sent over 700 design manuals in support of their effort. It is anticipated that over 1,000 manuals will be distributed for this endeavor.

- Composite materials and new designs are providing new opportunities. Combining wood, metals, and fiber reinforced products can provide light-weight and strong composite materials that could support recycling efforts. New concepts being considered for future demonstration timber bridges include:

  Fiberglass, kevlar, and carbon-based products which are being evaluated for study and development as reinforcement for structural wood products.

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- Timber Bridge design criteria presented to the American Association of State Highway and Transportation Officials (AASHTO) for approval are as follows:
  - *Stressed Deck System*
    — Approval Design Guide 1991
  - *Stressed "T" System*
    — Approval Projected Spring 1995
  - *Stressed "Box" System*
    — Approval Projected Spring 1995
  - *Stressed "LVL & PSL" System*
    — Approval of Design Guide Fiscal Year 1994 with publication in Spring Fiscal Year 1995

- The national Civil Engineering journals and professional book clubs now contain advertisements for timber products and software. In addition, there is a structural engineering review manual for the professional engineers' licensing examination.
- State timber bridge programs, or programs that allow for use of timber materials, have been established in Pennsylvania, West Virginia, Mississippi, Georgia, Iowa, Alabama, Louisiana, Michigan, Illinois, Connecticut, New Hampshire, Maine, Missouri, Florida, Washington, and Oregon.

Demonstration Timber Bridges Funded Through the Timber Bridge Initiative

Goal	1989 Final	1990 Final	1991 Final	1992 Final	1993 Final	1994 Final	Total
			...Dollars in thousands...				
Demonstration Bridges:	80	49	49	45	27	39	289
Federal Funds	$1,984	$2,010	$1,996	$1,902	$ 909	$ 935	$ 9,736
Cooperative Funds	3,600	2,200	4,658	3,984	2,111	1,884	18,437
Subtotal	**$5,584**	**$4,210**	**$6,654**	**$5,886**	**$3,020**	**$2,819**	**$28,173**
Pedestrian Bridges:	-	-	-	12	10	8	30
Federal Funds	-	-	-	$100	$ 96	$ 74	$ 270
Cooperative Funds	-	-	-	149	516	426	1,091
Subtotal				**$249**	**$612**	**$500**	**$1,361**
Total Number of Bridges	80	49	49	57	37	47	319
Total Dollars	**$5,584**	**$4,210**	**$6,654**	**$6,135**	**$3,632**	**$3,319**	**$29,534**

How a Wood Preservative Becomes A Wood Preservative

The standards for processing and evaluating pressure-treated wood are established in the United States by the American Wood-Preservers' Assosiation (AWPA).

Before an experimental treatment is listed in the AWPA standards, it must be accepted by a Preservatives Committee, which looks into formulation effectiveness against wood destroying organisms, and a Treatments Committee, which considers the processing necessary to achieve adequate performance. Then the treatment must pass a vote of the membership -- representatives from chemical manufacturers, treating companies, and research institutions, as well as treated wood users and interested parties. Before being used commercially, a preservative must also be registered with the Environmental Protection Agency (EPA) and with the states in which treating occurs.

Compliance with AWPA standards can be verified by independent inspection agencies contracted voluntarily by the treater or specified by the product purchaser.

Though the marketplace is dominated by only a few preservatives, the 1994 AWPA Standards list more than 20 accepted formulations. All are restricted to particular species of wood, and some are not appropriate for all exposures.

The principle preservatives in commercial use fall into three categories: creosote, pentachlorophenol, and waterborne preservatives (primarily CCA -- chromated copper arsenate).

Over the past two years, more new preservatives have been submitted for AWPA listing than in any like period in memory. However, at this time, preservative experts believe no alternative yet proposed has the efficacy and low cost to replace creosote, penta, and CCA in the ground-contact and water-immersed applications in which these proven preservatives are being used.

— **Huck DeVenzio**
Hickson Corporation
Smyrna, Georgia

Editor's Note: For more information on the standards for processing and evaluating pressure-treated wood, contact:

American Wood Preservers' Association
P. O. Box 286
Woodstock, MD 21163-0286
(410) 465-3169

"Revolutionary" Fiber-Reinforced Glulam to Receive Patent

A U.S. patent will soon be issued for a new, high-strength, fiber-reinforced glue-laminated (glulam) beam. The beam is a marriage of adhesive, wood, and plastic. The new technology introduces a high-strength, fiber-reinforced plastic which supplements the tensile laminates in glulam beams. The new product has major economic advantages because the reinforcement allows smaller cross sections, utilization of lower grade lumber, and reduced costs for transportation and chemical treatment.

According to the developers, the fiber-reinforced plastic will result in design strength enhancements of up to 115%, compared with conventional glulam beams.

A consortium of industry and academic participants has been developing the new, alternative, glulam technology. The reinforced beam uses high-strength fibers such as carbon and aramids embedded in a plastic matrix. Verification and testing of about 100 reinforced beams has been completed at Oregon State University in Corvallis, OR, in the Departments of Civil Engineering and Forest Products. The new technology is being incorporated in glulam beams, and sold under the trademark FiRP™ Glulam.

The new state-of-the-art production provides a beam that makes much more efficient use of wood fiber. With increased design properties and stiffness, it is a beam that is stronger, lighter, and less expensive than conventional glulam. It also extends the forest resource by using less wood in the lay-up of the beam.

One of the first applications of the new FiRP™ Glulam beams was the Taylor Lake Bridge (reported in Wood Design Focus, Volume 4, No. 2) near The Dalles, east of Portland, OR. Analysis of the glulam applications in this bridge indicate that the FiRP™ Glulam beams were about 30% lighter and 25% less expensive than conventional glulams.

The U.S. Patent and Trademark Office has officially allowed the patent application, which is titled "Aligned Fiber Reinforcement for Structural Wood Members." The inventor is Daniel Tingley, Executive Director of the Wood Science and Technology Institute in Corvallis, OR. Tingley says, "This is truly a new frontier in glulam technology. Tests indicate that the reinforced beams have from 50 to 85% higher design capacity than conventional glulam, and they cost up to 25% less than conventional glulam beams."

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"Revolutionary" ...

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Additional cost savings (from 25% to 60%) can be achieved through reduced freight, preservative treatment, and handling costs. Dead-weight design load with reinforced beams is reduced from 40 to 60% for large structures and long spans.

The technology can be applied to wood I-joists, open-web joists with wood flanges, laminated veneer lumber, parallel strand lumber, and plywood and other wood-based panel products. All of these applications are included in the patent application.

The FiRP™ Glulams are currently being manufactured by American Laminators of Drain, OR, and Timberweld Manufacturing of Columbus, MT. Matt Mathias, executive vice president of the American Institute of Timber Construction (AITC), said that the Institute is assisting with the development of standards for new FiRP™ Glulam. AITC is the national technical trade association of the structural laminated timber industry.

Western Wood structures in Tualatin, OR, a firm with 30 years of experience in structural glulam timber construction, is using the new technology for bridges and other structures. The company received international attention for its use of conventional glulam timber in the erection of the Tacoma Dome in 1983. Marshall Turner of Western Wood Structures says the new technology "launches structural wood producers into a new arena of applications."

For more information on the new glulam technology, contact Melissa Weaver at Fiber Technology, PO Box 858, Drain, OR 97435. Telephone: (503) 836-2026, Fax: (503) 836-7123. (From: AITC, 7012 S. Revere Pkwy., Suite 140, Englewood, CO 80112).

This article is reprinted from Wood Design Focus, Volume 4, Number 4. Permission to reprint it was granted by Daniel Tingley, Executive Director of the Wood Science and Technology Institute in Corvallis, OR.

Modern Timber Bridge Teleconference Planned

A teleconference on Modern Timber Bridges will be held on **Thursday, May 4, 1995**, from **6:30 to 9:00 pm**. The program will originate from Mississippi State University. Teleconference speakers will discuss how to cost a bridge, cost effectiveness of modern timber bridges in Mississippi, the longevity of timber structures on the railroads and inspection/maintenance of timber bridges. The primary audiences for this teleconference are county engineers, local government officials, wood industry representatives and anyone interested in modern timber bridges as an alternative in highway transportation. A toll-free phone line will be available for audience questions during the teleconference. If you would like to receive the transmission of the teleconference in your state, **contact Ann Sansing, Cooperative Extension Service, Mississippi State University, 601-325-2160**. There will be a fee of $25.00 per downlink site for out-of-state coordinators. Questions regarding the teleconference program can be directed to Dr. Bob Daniels, Extension Forester, MSU Forestry Department, 601-325-3150. Mark your calendars, contact your local audiences and be there on May 4, 1995!

Article contributions, questions or comments may be sent to the Program Director or Ms. Tinathan A. Coger, Information Assistant; USDA Forest Service; 180 Canfield Street; Morgantown, WV 26505; Phone: 304-285-1591 or 304-285-1596; or FAX: 304-285-1505; DG: S24L08A.

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