

# WOOD IN TRANSPORTATION

Historical Review  
15 Year US Forest Service  
Timber Bridge Program  
Demonstration/Technology Transfer  
Perspective

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# WOOD IN TRANSPORTATION

## Purpose of Presentation:

- To provide an overview of the USDA Forest Service's Wood In Transportation Program from a Demonstration/Technology transfer perspective.
- 1989 thru 2004

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## Key Topics

- A. Background and Related Items**
- B. Research**
- C. Demonstration Projects**
- D. Technology Transfer**

# WOOD IN TRANSPORTATION

## Key Topic

### **A.** Background and Related Items

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## Focus:

- **To revitalize local economies by finding means and methods for using local wood, particularly under-utilized wood, for highway bridges and related applications**
- **Improve Stewardship of our Nation's forest**

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United States  
Department of  
Agriculture

Forest Service

Northeastern Area  
State & Private Forestry

Forest Resources  
Management

Morgantown, WV

NA-TP-02-94

## Recycling Municipal Trees

A Guide for Marketing Sawlogs  
from Street Tree Removals  
in Municipalities



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## Budget

**\$2.4 million early years of program**

**\$1.7 million in middle years**

**\$1.0 million towards the end of  
program**

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## Partnerships

- County & local gov'ts
- State & federal gov'ts
- Universities
- Resource Conservation and Development Councils
- Private industry
- Foreign governments & organizations





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## Program Components:

- **Research**
- **Demonstration Projects**
- **Technology Transfer**

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## Key Topics

### **B.** Research

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## Key Topics

### **C.** Demonstration Projects

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## Demonstration Projects

**Annual Competitive Grants Program**

**About \$750,000 per year**

**Request for Proposals**

**Review & selection process**

**Implementation**

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Projects selected for funding are based on:

- **structural adequacy**
- **longevity**
- **serviceability**
- **environmental sensitivity**
- **economics**
- **approved design standards**

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## Demonstration Projects

- **Emphasis on using local timber species, ie. hardwoods in eastern US and secondary softwood species**
- **Hardwoods – red maple, red oak, cottonwood, mixed hardwoods, black locust**
- **Secondary softwoods – red pine, ponderosa pine, eastern hemlock, yellow-cedar, white spruce**

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## Demonstration Projects

- **Single Structure Projects**
- **Special Projects**
- **Commercialization Projects**

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## Single Structure Projects

- **Vehicular Bridges**  
**over 200 projects**  
**funded**

**White County, GA, southern pine  
glulam timber bridge**





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## Single Structure Projects

- **Pedestrian Bridges**  
over 100 projects  
funded

2002 Olympic Pedestrian Bridge  
Heber City, Utah



# WOOD IN TRANSPORTATION

2002 Olympic  
Pedestrian Bridge  
Heber City, Utah

## Specifications:

- Year Constructed: 2001
- Length – 125 ft. Width – 12 ft.
- Design Live Load: 85 psf
- Wood Species: Coast Douglas fir
- UME supplied glulam/FRP beams



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## Rattlesnake Creek Bridge, Missoula, MT

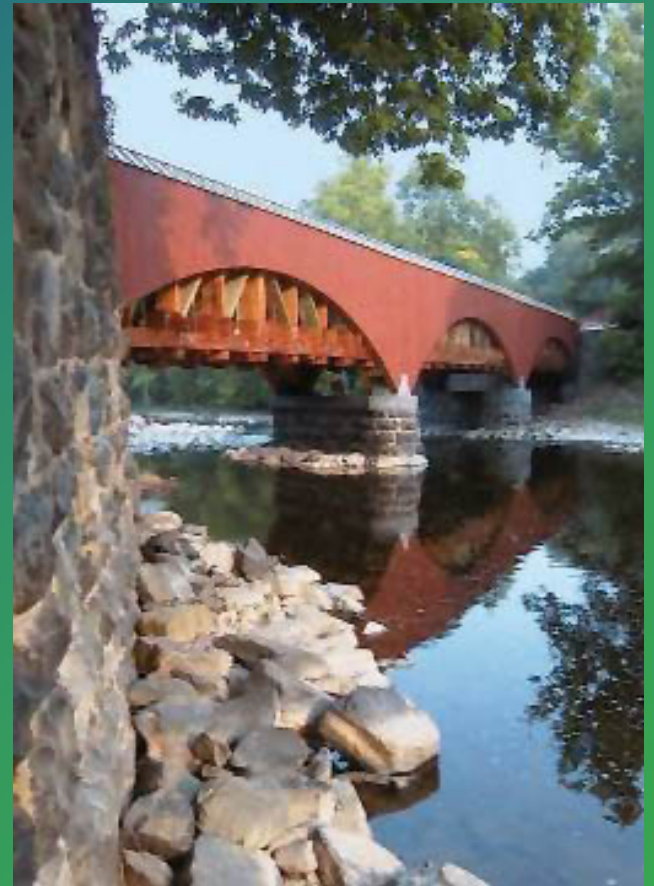
- **Small diameter ponderosa pine and lodgepole pine**
- **Wood fiber - plastic composite decking**



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## Special Projects

- **Over 100 Projects funded**



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## Bar Harbor Pier Project, Maine



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## Student Design Competition



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## Commercialization Projects

- **1996 – demonstration projects**
  - **greater focus on economics by funding multi-structure projects**
- **Projects showcase wood-in-transportation technology**
  - **provide useful design and cost information**

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## Commercialization Projects

- 31 projects funded
- 2 highlighted completed projects:
  - *Ida County, Iowa*
  - *West Virginia Division of Highways*



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## Commercialization Project Ida County, Iowa

- **Farm country in northwest Iowa**
- **725 miles of roads**
- **175+ bridges**
- **8,365 county residents**

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Commercialization project included:

- **4 glulam cottonwood decks supported by steel beams**
- **1 glulam cottonwood deck supported by wood beams**

**Focus on using locally-grown cottonwood**

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## Bridge design details:

- **HS-20-44 live loads; span lengths of 25 ft, 35 ft**
- **Out-to-out width 26 ft with travel width of 24 ft**
- **Cottonwood deck panels – 7 inch thick glulam**

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## Bridge design details (cont.):

- **Minimum of five steel beams spaced at 5.6 ft on center with flange widths of 10.2 in. Beams were salvaged.**
- **Treatment – Pentachlorophenol**
- **Wearing surface – asphalt**
- **Installation – Ida County Secondary Roads crew**
- **Abutments – steel H piling and sheet**

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## Costs for 25 ft. Bridge

<b>Design &amp; Related Work</b>	<b>5,028</b>
<b>Substructure</b>	<b>26,976</b>
<b>Superstructure</b>	<b>24,954</b>
<b>Site/Approach Work</b>	<b>2,965</b>
<b>Surfacing</b>	<b>1,616</b>
<b>TOTAL</b>	<b>\$61,539</b>

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## Commercialization Project West Virginia Division of Highways

- **Numerous low-volume roads and bridges not maintained by any government entity**

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## Commercialization Project West Virginia Division of Highways

- **1998 West Virginia Legislature began the Orphan Road and Bridge Program**
  - ***3,216 orphan roads adopted***
  - ***769+ miles serving 25,000 families***
  - ***Over 25 bridges completed***

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## Bridge design details:

- HS-20-44 live loads; average length is 25 ft, average width is 14 ft
- Superstructure includes steel beams supporting plank timber deck
- Wood type is southern pine or red oak; treated with chromated copper arsenate
- Wearing surface – none

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## Bridge design details (cont.):

- **Railing system – curbing**
- **Abutments – primarily gabion baskets filled with stone**
- **Installation – Division of Highways maintenance crews within one week**
- **Average cost – \$25,000 per bridge**

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Gabion Basket Abutments



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Steel Stringers

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Pressure Treated Plank Deck

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## *Results*

**Projects become more effective as cooperators learn to improve the process with each additional bridge designed and constructed.**

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## Michigan's Timber Bridge Program

- Over 20 structures completed
- Emphasis on using red pine
- Stress-lamination technology



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## Michigan's Timber Bridge Program



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## Michigan's Timber Bridge Program

- **Best Management Practices**
- **Serves as a guide for engineers and highway officials**
- **Minimize environmental risks**

**Best Management Practices  
for the Use of  
Preservative-Treated Wood  
in Aquatic Environments  
in Michigan**

*With Special Provisions and Design Criteria for Engineers  
2002*

*Adapted from Western Wood Preservers Institute and  
Canadian Institute of Treated Wood's Best Management Practices Guide*



*Developed under the Authority of the Michigan Timber Bridge Initiative*

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## Key Topic

### **D. Technology Transfer & Information Management**

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## Technology Transfer

- **National Wood In Transportation Information Center, Morgantown, West Virginia – provides technical and educational information to bridge engineers and highway officials**



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## Technology and Information Transfer

### **Development & distribution of pubs:**



- **National Wood In Transportation Information Center, Morgantown, WV**
- **Forest Products Laboratory, Madison, WI**
- **Federal Highway Administration, Washington, DC**

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Wood In Transportation Home Page - Microsoft Internet Explorer


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Address <http://localhost/WIT/index.htm> Go Links >>

 **Welcome!** 

## National Wood In Transportation Program

*Interactive Website*



This site provides information on projects that the Program has funded since 1989. Please provide us [feedback](#) about this site after searching for your individual informational needs.

<b>Summary Program Information</b>	<b>Project Information</b>	<b>Structure Information</b>
<i>Funding history, matching funding, etc by project type and geographic location</i>	<i>Project location, number of structures, contact information, etc.</i>	<i>Structure type, superstructure cost, structure design, wood species, etc</i>

Website designed and managed by the National Wood In Transportation Information Center and the West Virginia University Department of Accounting, both located in Morgantown, WV.

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WIT Funded Projects - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites History Mail Print Edit Discuss Real.com

Address [http://localhost/WIT/Project\\_Results.cfm](http://localhost/WIT/Project_Results.cfm) Go Links

### Wisconsin Wood In Transportation Funded Projects

	State	Congressional District	WIT Number	Federal ID Number	Project Type	Project Status	Number Structures	Federal Funding	Cooperator Funding
<a href="#">[View Contact Info]</a>	Wisconsin	7	NA-012-89-VEH	NA-89-0223	Vehicular Bridges	Complete	1 <a href="#">[Details]</a>	\$ 28,000	\$ 28,400
<a href="#">[View Contact Info]</a>	Wisconsin	2	NA-038-91-VEH	NA-91-0189	Vehicular Bridges	Complete	1 <a href="#">[Details]</a>	\$ 60,000	\$ 133,395
<a href="#">[View Contact Info]</a>	Wisconsin	7	NA-027-91-VEH	NA-91-0190	Vehicular Bridges	Complete	1 <a href="#">[Details]</a>	\$ 21,697	\$ 156,507
3 Projects								\$ 109,697	\$ 318,302

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Done Local intranet

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Questions and/or Comments

Where do we go from here?