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CROSSINGS

NEWSLETTER OF THE WOOD IN TRANSPORATION PROGRAM

Editor - Tina than Coger *Issue 26* *May 1997*

Gainey Ranch Bridges Pavement Overlay

In 1983 to 1984, four timber bridges were constructed on two separate roads over a normally dry wash in the Gainey Ranch area of Scottsdale, Arizona. Two bridges were constructed on Doubletree Ranch Road and the other two bridges were constructed on Mountain View Road. By 1990, reflective cracking in the original asphalt roadway surface had become severe enough to require remediation. In January 1993, the decks of these bridges were resurfaced with an "Asphalt Rubber" pavement over a "Stress Absorbing Membrane Interlayer" described later in the article.

After four years of service, the performance of the asphalt rubber overlay is superior to the original system.

Bridge Description: Both of the Doubletree Ranch Road bridges are three span structures, with a 92-foot by 35.5-foot deck, including a single sidewalk. Beams are continuous in the sidewalk section and simply supported in the roadway. Each Mountain View Road bridge is a single span structure, with a 75-foot by 35.5-foot deck, skewed 15 degrees.

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Fiscal Year 1997 Wood In Transportation Grants Awarded

The Wood In Transportation Program Evaluation Panel met during the week of January 28, 1997, at Morgantown, West Virginia, to review and recommend for funding the Fiscal Year 1997 Wood In Transportation grant applications. Panel members were:

Steve Bratkovich, Wood In Transportation Coordinator, USDA Forest Service, Northeastern Area Representative

Sheila Duwadi, Federal Highway Administration

Merv Eriksson, Engineer, USDA Forest Service, Region 1

Nelson Hernandez, Engineering, Washington Office

Lola Hislop, Engineer, USDA Forest Service, Forest Products Laboratory

Jack Justice, Federal Highway Administration

Karen Kenna, Wood In Transportation Coordinator, USDA Forest Service, Region 8

John Pasquantino, Legislative Affairs, USDA Forest Service, Northeastern Area Representative

Michael Ritter, Engineer, USDA Forest Service, Forest Products Laboratory

John Sebelius, USDA Forest Service, Cooperative Forestry, Washington Office

J. Keith Schnare, Wood In Transportation Coordinator, USDA Forest Service, Region 4

Robert Westbrook, Wood In Transportation Coordinator, USDA Forest Service, Region 8

John Zirkle, Engineer, USDA Forest Service, Region 8

Edward Cesa, Acting Program Manager and Facilitator, USDA Forest Service, Northeastern Area

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Description of WIT grants awarded ... page 6

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One hundred and one proposals were evaluated, and nine were selected for funding for Fiscal Year 1997. The total dollar amount awarded for these projects was $296,940. This amount was cooperatively matched with approximately $616,472 from state and local resources. Proposals were reviewed and rated for their technical merit, including key items such as structural integrity, rural development benefits, and cost competitiveness.

The proposals funded this year will continue to demonstrate and document how local timber resources and labor can be used to improve our Nation's transportation infrastructure. The commercialization projects will focus on commercializing modern timber bridge technology that has been developed during the last eight years of the program.

Projects Selected for Funding

Vehicular Bridges

New Mexico, Grant County

Pedestrian Bridges

Georgia, Chatham County
Rhode Island, Kent County
Tennessee, Unicoi County

Special Projects

Kansas, Franklin County
Indiana, State-wide
New Jersey, State-wide

Commercialization Projects

Florida, Bay County
Iowa, Johnson County

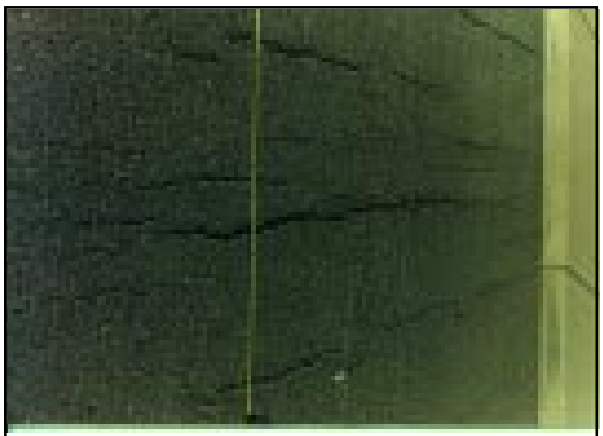
For additional information about these projects, see page 6.

Gainey Ranch Bridges Pavement Overlay ... *continued from page 1*

Superstructure construction consists of 5 1/8-inch x 4-foot glulam deck panels over glulam beams spaced at 5-foot 3-inches on center. Deck panels were connected to each other with steel "H" shaped brackets to distribute vertical loads between panels. The original wearing surface was 2 ½- inch typical asphalt concrete with synthetic fiber underlayment. The bridges were originally owned by the Gainey Ranch Community Association whose intent was to dedicate them to the City of Scottsdale.

1990 Asphalt Condition: In addition to the joints between deck panels, each deck member had developed shrinkage splits parallel to the grain of the wood. In the arid southwest Sonoran Desert area where summer temperatures soar above 115°F, wood moisture contents typically stabilize at 5 to 7 percent. This low humidity environment can lead to excessive shrinkage of the wood members which are typically fabricated from material in the 12 to 16 percent moisture content range.

By 1990, shrinkage of the glulam deck panels contributed to the damage of the wearing surface of the bridges. Multiple cracks had penetrated the asphalt, reflecting deck joints, shrinkage cracks, and the deck-to-deck connectors. As shown in the photo below, typical crack spacing was under two feet.



Bridge surface showing cracks.

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Gainey Ranch Bridges Pavement Overlay - *continued from page 2*

The City of Scottsdale refused to accept the bridges until the reflective crack condition had been corrected.

Proposed Remediation: Gainey Ranch Community Association retained Gervasio & Assoc., Inc., a Phoenix Civil/Structural Engineering Consultant, to study the problem and recommend remediation. Their search led them to current and former City of Phoenix Materials Managers, Joe Cano, P.E., and Russell Schnormeier, P.E., who had jointly conducted 20 years of research on over 200 city miles overlaid with asphalt rubber, consisting of an "Asphalt Rubber" wearing surface over a "Stress Absorbing Membrane Interlayer" (SAMI).

This overlay system was originally developed as an alternative to "chip sealing," because loose chips were damaging windshields. The following advantages were also evident:

- Reflective cracking (old pavement) is retarded 8-12 years,
- Secondary cracking is stopped for up to 15 years,
- Spalling around potholes and larger cracks is retarded,
- The pavement is waterproofed,
- Rideability is improved, and
- Sound is reduced by 10 decibels.

The following repairs were recommended for the Gainey Ranch Bridges:

- Install a Stress Absorbing Membrane Interlayer (SAMI). This is a 3 step process.
    1. The original asphalt surface is milled, leaving 1 inch of the original asphalt surface.
    2. Fill all cracks and spray hot asphalt rubber at a rate of 0.65 to 0.75 gallons per square yard.
    3. Install a layer of 3/8-inch pea gravel, precoated with asphalt rubber.
- Install a 1-½ inch "Hot-Asphalt Gap Graded Rubber Hot Mix" per City of Phoenix special provisions. This mix consists of paving-grade asphalt and ground tire rubber, ranging from 20 to 24 percent by weight of the total mixture, mixed between 250 and 450 degrees Fahrenheit.

Rubber Asphalt Repairs: Low bidder for the work was Ace Asphalt of Phoenix, AZ, who bid each bridge at $10,500 (total of $42,000). When "Asphalt Rubber" is provided, special set-up is required at the asphalt plant. Because this project was small, there was a two- to three-month delay so that the contractor could "tag-along" with a larger project. Work was completed in January 1993, and accepted by the City of Scottsdale.

In May 1997, Fred M. Nelson, P.E., of Gervasio & Associates, revisited the sites and found improved, but mixed results.

- At Mountain View Road, pavement was in excellent condition with virtually no cracks above the bridge decks.

Mountain View Bridge after resurfacing

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Gainey Ranch Bridges Pavement Overlay ... *continued from page 3*

- At Doubletree Ranch Road, reflective cracks had reoccurred along deck joints, spaced 8 to 12 feet, a moderate improvement over the original wearing surfaces.

Doubletree Bridge after resurfacing

Summary: In conclusion, the asphalt rubber overlay system's increased flexibility has proven to be a moderate to exceptional solution to mitigate severe cracking in conventional asphalt concrete pavement overlays which reflect severe wood deck shrinkage movement, typical in the dry and torrid southwest Sonoran Desert.

— **Fred Nelson, P.E.**
Gervasic & Assoc. Inc.
Phoenix, AZ

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Field Performance of Timber Bridges – 11. Spearfish Creek Stress-Laminated Box-Beam Bridge

A report on the Spearfish Creek Bridge constructed in 1992 in Spearfish, South Dakota, is now available. This publication summarizes the first 3 1/2 years of the five-year performance monitoring period for the single-span, stress-laminated, box-beam superstructure. It also provides information on the design, construction, and field evaluation of the wood moisture content, force level in the stressing bars, behavior under static loading, and overall structure condition.

According to the report, field evaluations, indicate that the bridge is performing satisfactorily with no structural or serviceability deficiencies. However, two bridge restressings have been performed because of excessive bar force loss.

This report was published by the USDA Forest Service, Forest Products Laboratory. The study was a cooperative effort between the South Dakota Department of Transportation; the City of Spearfish, South Dakota; the Federal Highway Administration; and the Forest Products Laboratory.

For a copy of the report, please contact the National Wood In Transportation Information Center at 304-285-1591.

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Engineered Lumber Trends

This summer, a new monthly newsletter titled *"Engineered Lumber Trends"* begins publication. It is designed to serve producers, distributors, specifiers, and end-users with current information on market conditions, new products, major projects using engineered lumber, and new technical information.

If you would like more information, or want to subscribe to the newsletter, please contact:

The Irland Group
RR # 2, Box 9200
Winthrop, Maine 04364
Phone: (207) 395-2185
FAX: (207) 395-2188
E-Mail: Irland @aol.com

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Vehicular Bridges

New Mexico, Grant County — The City of Bayard, New Mexico, will construct a vehicular bridge in Grant County, New Mexico, near the Gila National Forest. The single-span, glue-laminated bridge will utilize Douglas-fir. It will be 33 feet long and 34 feet wide.

Pedestrian Bridges

Georgia, Chatham County — A pedestrian bridge will be built by the Chatham County Engineering Department in Savannah, Georgia, to provide better access to a city park. The glue-laminated southern pine bridge will be 40 feet long and 4 feet wide.

Rhode Island, Kent County — The Town of Coventry, Rhode Island, will construct a timber deck on an unused railroad bridge on the Conventry Greenway. The laminated deck will be 250 feet long and 14 feet wide. It will be used by pedestrians, bikers, and horseback riders.

Tennessee, Unicoi County — A pre-engineered truss bridge will be built by the Town of Erwin, Tennessee. This pedestrian bridge, made from southern pine, will be 60 feet long and 8 feet wide. It will cross Martin's Creek in Erwin Linear Park.

Special Projects

Kansas, Franklin County — The Lake Region Resource Conservation and Development Council (RC&D) was awarded a Special Project grant to build a timber dropbox. This project is a cooperative effort between the Lake Region RC&D; the Natural Resource Conservation Service; and the Franklin County, Kansas, Conservation District. The major objective of this project is to control gully erosion in Franklin County, Kansas.

Indiana — The Indiana Hardwood Lumbermen's Association received a Special Project grant to demonstrate the benefits of using portable timber bridges for crossing streams during harvesting operations. This project will promote Best Management Practices, increase productivity in harvesting operations, improve water quality, and promote increased usage of timber bridge structures across the state.

New Jersey — A Special Project grant will partially fund a hands-on design and construction manual for recreational trail bridges. Conklin Associates, a consulting civil engineering firm, will develop a manual that includes engineering information, construction methods, explanatory text, photographs, and plans for a variety of recreational trail bridges.

Commercialization Projects

Florida, Bay County — The Bay County Board of County Commissioners in Panama City, Florida, was awarded a Commercialization Project grant to replace an old bridge. This pilot project will demonstrate stress-laminated timber bridge technology. The design guide, *Standard Plans for Southern Pine Bridges*, which was published by the USDA Forest Products Laboratory, will be used in the design phase of the project.

Iowa, Johnson County — The Johnson County Board of Supervisors in Iowa City, Iowa, was awarded a Commercialization Project grant to construct five identical bridges. The superstructure for these bridges will consist of a glue-laminated bridge deck made from cottonwood on steel girders. The goal of the project is to develop a standard design for an economical and usable cottonwood bridge that can be built by county highway personnel. The design will utilize a standard 35-foot-long by 24-foot-wide bridge deck that can be installed primarily with typical highway equipment.

NEW PUBLICATIONS

Portable Timber Bridges: an Eco-friendly Solution for Stream Crossings

This publication was developed to document an effort that began in West Virginia in 1989. The goal of the project was to design and build several experimental portable timber bridges. Three different designs, based on stress-laminated technology, were developed and tested at West Virginia University. This project demonstrated that portable timber bridges, used for temporary acress during harvesting operations, can be easy to manufacture, transport, and install.

For a copy of this publication, please contact the National Wood In Transportation Information Center, 180 Canfield Street, Morgantown, WV 26505; Phone: 304-285-1591 or *the Appalachian Hardwood Center, Division of Forestry, West Virginia University, Morgantown, WV 26506-6125; Phone: 304-293-7550*

Utilization of a portable timber bridge

Wood Double-Diffusion Treatment Plant

This publication briefly describes one of more than 400 Wood In Transportation projects that the USDA Forest Service has been involved with since 1989. This project, the Tyonek Double-Diffusion Treatment plant, is a new wood products facility that currently employs six people. This plant has enabled a rural community to take research knowledge collected over the last 50 years and combine it with local renewable timber resources and labor to improve their community's transportation infrastructure.

For a copy of this publication, please contact:

- *National Wood In Transportation Information Center, 180 Canfield Street, Morgantown, WV 26505; Phone: 304-285-1591*
- *Ken Kilborn, USDA Forest Service, 3301 C Street, Suite 522, Anchorage, AK 99503-3956; Phone 907-271-2862*
- *Kevin Curtis, Tyonek Native Corporation, 1689 C Street, Suite 219, Anchorage, AK 99501; Phone: 907-272-0707.*

Article contributions, questions or comments may be sent to Ed Cesa, Acting Program Manager, National Wood In Transportation Information Center 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; or E-mail to tcoger@mserve.fsl.wvnet.edu.