

M A S S INTERCHANGE

Volume 14, Number 2

Spring 2000

Wooden Bridges are Back! Using New Technology

by Rob Rizzo, Program Director, Wood in Transportation, The Forest & Wood Products Institute

Everyone remembers driving through an old covered bridge. The wooden deck rattles and jumps around, the noise of traveling over a wooden structure becomes pronounced, and one can't help but quietly speculate on the soundness of the massive structure.

Today's modern, high tech wooden bridges are on the opposite end of the spectrum from the old covered bridges of the past. Designed and engineered to meet the standards of the American Association of State Highway and Transportation Officials (AASHTO) and the American Institute of Timber Construction (AITC), modern timber bridges are hardly noticeable to the traveling public. A layer of bituminous concrete is typically applied as the wearing surface, and modern timber bridges don't need the protection from the elements that the roof and wall systems of historic covered bridges once provided. Actually, the only connection between the old and new bridges is that both serve to transport people from point A to B.

Recognizing the need to better utilize Massachusetts wood products, the Forest & Wood Products Institute at Mount Wachusett Community College in Gardner

established the Massachusetts Wood in Transportation Program (MA WIT) in 1999 and hired Rob Rizzo as the full time Director of the Program. The idea is not a new one. The USDA Forest Service administers a National Wood in Transportation Program out of Morgantown, WV, and many states such as Pennsylvania, Michigan and Maine have years of

experience building modern timber bridges. Research is being conducted throughout the county by colleges, universities, and at the USDA Forest Service's Forest Products Lab in Madison, Wisconsin.

The Modern Timber Bridge

What exactly makes today's bridges so

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*Clark Wright Road Bridge, Middlefield, MA
36' HS20 loading - Built in 1999 by MassHighway*

LTAP Local Technical Assistance Program

(413) 545-2604 <http://baystate.ecs.umass.edu>

Ultra-Thin Whitetopping

Got ruts in your city's intersections or washboarding in your country's roads? If so, Ultra-Thin Whitetopping (UTW) can be a candidate for resurfacing deteriorating asphalt pavements.

UTW is a relatively new technique that involves placing a thin (50 to 100 millimeters) concrete overlay to restore asphalt concrete pavements which have cracked and/or rutted. UTW is one of the candidates for rehabilitation of any area where rutting, washboarding and shoving of asphalt is a problem.

The technique was developed specifically for low-volume roads, parking areas and light duty airports. In UTW the concrete overlay is thinner than conventional whitetopping and forms a bond with the underlying asphalt, which creates a composite action. Short joint spacing significantly improves the overlay's performance.

The first experimental application of UTW was constructed on an access road in Louisville, Kentucky in 1991. Since then

over 170 UTW projects have been constructed across the United States.

The advantages of UTW

- UTW requires less time to construct and repairs last much longer.
- UTW provides a durable, wearing surface.
- UTW is cost competitive.
- UTW surfaces reflect light; thus street lighting can be reduced.
- UTW provides a cooler surface with environmental benefits.

UTW construction

The four steps to constructing UTW include:

- Prepare the surface so that it will bond the two layers. This is most often done by milling and cleaning or blasting it with water or abrasive material.
- Place, finish and cure concrete overlay using conventional techniques. The concrete mix is matched to the project's

traffic conditions and requirements for opening the road to traffic. Many projects include synthetic fibers used to increase post-crack integrity of the panels. Proper curing is critical. Because the overlay is thin, it can lose water rapidly due to evaporation. Curing compound is applied at twice the normal rate.

→Cut saw joints as early as possible to control cracking.

→Open to traffic.

What's new in UTW?

To help state and local highway agencies make decisions about using UTW, the Federal Highway Administration (FHWA) and the American Concrete Pavement Association (ACPA) launched a joint research effort to evaluate critical design factors affecting the performance of UTW.

ACPA, in cooperation with the Virginia Ready Mix Concrete Advisory Council and ACPA's Northeast Chapter, will arrange for the design of the concrete mixes and for the construction of the UTW pavement sections. FHWA will test the material properties for all pavement layers, test the pavements with Turner Fairbank Highway Research Centers (TFHRC) Accelerated Loading Facility (ALF), and provide the data for a cooperative evaluation of the design method by ACPA and FHWA. For more information on the UTW project go to the TFHRC Web site at <http://www.tfhrc.gov>.

Additional resources

Below are several national resources on the Web, followed by some state-specific information.

The American Concrete Pavement Association information on UTW at their Web

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modern? The first thing that one notices about new wooden structures is that all lumber is treated. There are many treatments available, but to ensure long life, the wood must be treated under pressure. The pressure process allows deeper penetration of chemical components into the wood and closer control of retention levels. The choice of preservatives depends on how and where wood will be used. All treatments are approved by the Environmental Protection Agency (EPA), and meet the strict standards of the American Wood Preservative Association (AWPA).

Timber bridges are typically made by glue

necessarily need to be made exclusively from wood. Pennsylvania has initiated the hybrid bridge. Current projects involve re-decking old bridges that have good steel beams with this timber technology. According to Joe Dudick, the Director of the Pennsylvania Rural Development Council, "It's less labor intensive and a faster process than pouring a whole new concrete deck. The bulk of the time to rebuild one of these hybrid bridges is spent removing the existing deck, preparing the existing beams, and pouring any new concrete for backwalls. The glu-lam manufacturer builds the timber deck in a set of panels that fit down over the steel beams. Setting the deck only takes a few days. The panels, which are four-feet wide by the width of the

regular maintenance, these decks will last at least fifty years."

The Massachusetts Approach

The MA WIT Program has developed a strategic plan that includes utilizing low value, overabundant native forest products such as red maple and eastern hemlock. By doing so, foresters will be encouraged to manage the forest and maintain it in a sustainable state. The Program also provides technical and financial assistance to the cities and towns of the State while working on improving rural transportation networks.

The Massachusetts Program is currently designing four maple glu-lam bridges to AASHTO HS20 specifications. These bridges will be constructed on Department of Environmental Management (DEM) and Metropolitan District Commission (MDC) properties. They will serve to demonstrate that local native forest products can successfully be utilized to manufacture safe, economical, and long-lasting structures, and that they can be built with local crews in a short length of time. MA WIT is also partnering with MassHighway in three other bridge projects that will replace failing structures.

Strong components of the Massachusetts Program are the partnerships that are being developed within the Commonwealth with MassHighway being a major one, the region and throughout the country. They realize the number of small rural bridges that are in need of repair and replacement. MassHighway Bridge Engineers serve on the MA WIT Advisory Board, and will participate in deciding what projects are suitable for wood technology. The Massachusetts Office of Business Development is working with the Program to contribute the necessary financial expertise to expand manufacturing capabilities of native forest products within Massachusetts. The Department of Environmental Manage-



Guardrail in process on Clark Wright Road Bridge

laminating one-inch to one-and-a-half-inch thick pieces of lumber together to make a solid block. Research has demonstrated that the result is actually stronger than the original board. A major advantage of glu-lam over solid wood design is that manufacturers can cut out the defects in lumber before gluing the pieces together. Timber bridges don't

bridge and five to six inches thick, are built to exacting specifications. All the crew needs to do is lift them up with a front end-loader or other piece of equipment and set them in place. At this point, the bridge could be driven over, but typically, the deck is paved over with bituminous concrete to provide a smooth surface." Dudick further explained, "With

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ment and the Department of Food and Agriculture are participating because they recognize the need to better utilize our renewable forest resources. Gordon Boyce, Marketing and Utilization Specialist for DEM, explains "We are growing red maple three times faster than it is being harvested within the State. A lot of red maple remains underutilized because of existing markets, and anything we do to improve the situation will be a benefit to all forest landowners within the State."

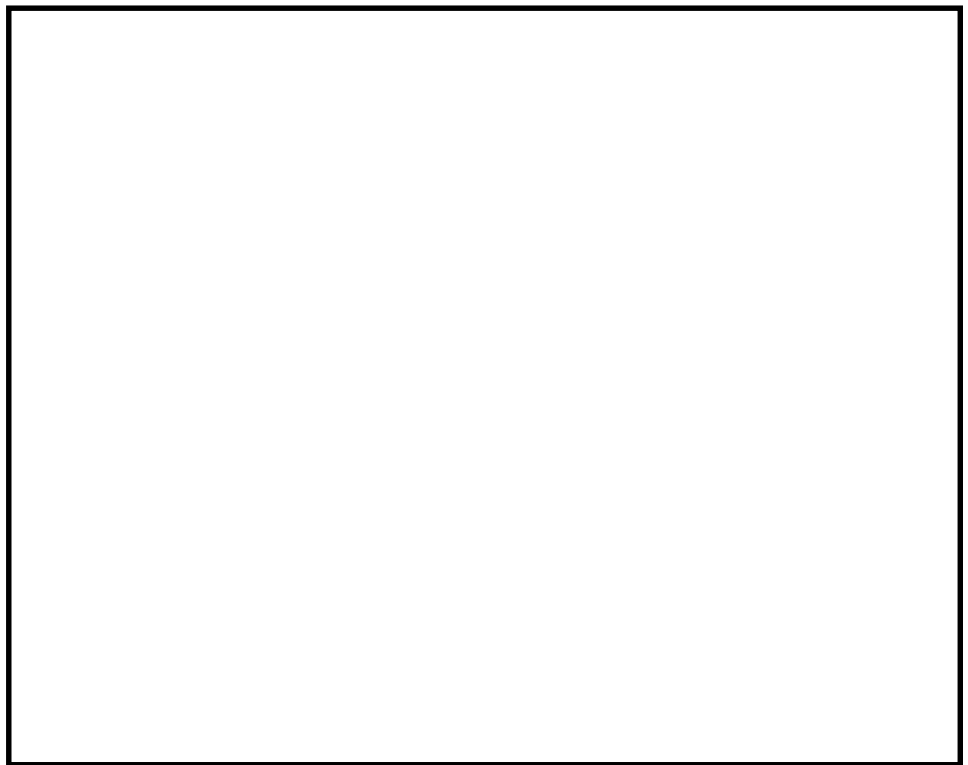
The Program provides technical assistance to local DPW personnel throughout the State. The goal is to encourage the correct use of wood products to ensure longevity, and more importantly to first determine if wood technologies are appropriate for a particular project. In conjunction with the technical support, the Program will provide financial assistance to cities and towns. The Massachusetts Legislature has authorized up to five million dollars for the Program within the Transportation Bond Bill to be used for capital projects.

Other Applications

Vehicular bridges become the obvious topic of discussion when modern timber structures are mentioned. In fact, modern wood structures can be used in a variety of applications including guard and bridge rails, sound barriers, pedestrian bridges, box culverts, retaining walls, docks and marine facilities, salt sheds, walkways, boardwalks, and sign and light posts. In recent years, developments in new technologies have improved pressure treatments, finger joining, and glue laminating.

When combined with the new modern technologies, wood has many attributes that make it an ideal choice for many infrastructure projects:

- Wood is unaffected by de-icing



*Pumpkin Hollow Road Bridge, Great Barrington, MA
59' long -- Built in 1997 using high tech glu-lam materials*

- chemicals such as salt.
- It is manufactured from a local renewable resource.
- Utilizing local wood products has the potential to create jobs and stimulate economic development opportunities.
- Local DPW crews can build with or without specialized tools.
- Projects can be constructed at any time of the year, including winter.
- Bridges can remain open during construction.
- It can be used in conjunction with other materials.
- It is cost effective, requires low maintenance, and provides longevity to many roadway infrastructure projects within Massachusetts.
- Standard plans are available and can be adapted to fit local conditions.

For further information regarding the MA WIT Program, contact:

Rob Rizzo, Program Director
Wood in Transportation
The Forest & Wood Products Institute
Mount Wachusett Community College
444 Green Street
Gardner, MA 01440-1000
978-632-6600 x137
r_rizzo@mwcc.mass.edu
www.mwcc.mass.edu/html/fwp.html

For further information on the USDA Forest Service National WIT Program, check out their website at www.fs.fed.us/na/wit.

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USING A CHAIN SAW

*By: David Goforth, Agriculture Extension Agent
NC A&T State University*

It is surprising how often you wind up using a chain saw even on a small property. The wind storms last fall dropped a tree on one neighbor's house. Ice storms this winter dropped a tree on another friend's house as well as a couple across my driveway.

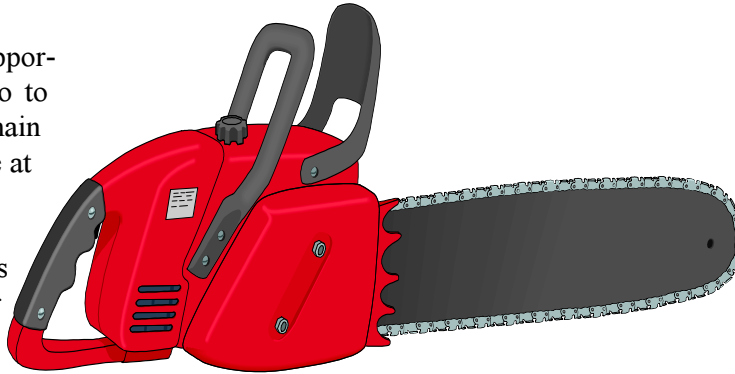
In all three cases I had the opportunity to help saw and also to observe others handle a chain saw. What I saw scared me at times.

Chain saws are sort of like cars and guns in that every user figures they have all of the answers. It is sort of a masculine thing. It's funny when Tim Allen does it on Home Improvement but the humor is lost on a roof top after an ice storm.

Check yourself on the following safety items. Maybe you already have all of the answers. However, the guys I worked with didn't know these techniques.

Have you ever seen anyone use the throwing method for cranking a chainsaw? Basically, it is letting gravity take the saw one way and pulling the rope the other way. Its very effective in getting the saw started. However, for those of us too wimpy to hold a chain saw at arm's length, which includes at least 99% of the popu-

lation, the saw has to swing to a stop. I'll admit it doesn't have to swing very far when you drop it straight down. However, this still translates into very little control, especially when you happen to be standing 15 feet in the air on the highest point on the roof.



Putting the saw on the ground (or the roof in this case) would have been safer but it would have been a lot of trouble.

When I got ready to crank my saw I clamped the back handle between my legs right above my knees. With one hand on the front handle and the other on the crank, I had total control of the saw.

When I cut up the tree in my driveway there was still a sheet of ice on the ground. Walking around with a saw running didn't seem real bright to me although it didn't seem to bother the others. Of course, you couldn't very well shut the saw down every time you changed positions either.

The solution is to engage the chain before you take a step. Evidently, this is a novel idea to many people. Since the major function of the chain brake is to stop the chain in case of a kickback, a lot of people don't think to use it for any other reason. However, a quick snap of the wrist is all it takes to lock down the blade. (Actually, your wrist stays in the same place while your hand moves backwards sort of like catching second gear in a VW.) Then when you have finished moving and are ready to use the blade, reach up with a couple of fingers and disengage the chain brake. Given the simplicity, it makes sense to do it every time you walk any distance whether or not you are walking on ice.

Third, let me point out the first cut on the traditional three cut method should be at a slight upward angle from the ground. This keeps the tree from bouncing as bad as it would if you made the first cut parallel to the ground.

Finally, realize there is always something else to learn. There are people who can make a tree zigzag around an obstacle on the way to the ground. I think I understand the technique but I have never tried it because I don't play around with a chain saw. Safety is my main priority. I hope its yours.

Baystate's Commitment to Safety

Each year Baystate Roads Program tries to hold at least one chain saw workshop to promote safety employing Tim Ard, President of Forest Applications Training, Inc., as instructor. Tim is also the organizer of Arborgames Competitions and has held a variety of other positions such as owner of a chain

saw dealership and instructor for Husqvarna Forest and Garden Corp. He has provided training of safety and the use of chain saws and related equipment in 38 states for over 13 years. Tim's ability to effectively impart knowledge to novices or those with years of experience is well documented in the superb evalu-

ations at our classes.

This year South Hadley and Yarmouth hosted the two-day workshops for a limited number of students from nearby towns. The goal is for these graduates to share safer working habits with their fellow employees.

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site. Go to <http://www.pavement.com>. Information includes an article, "U.S. Experience with Ultra-thin Whitetopping" by Lawrence W. Cole and James W. Mack as well as a UTW load-carrying capacity calculator.

The Indiana Ready Mixed Concrete Association offers a slide presentation on UTW at their Web site. Go to <http://www.irmca.com/utw/index.html>.

An article on UTW by the Pennsylvania Concrete Promotion Council can be found at <http://www.paconcrete.com/ultrathin.html>.

Information on a UTW project in Traverse City, Michigan can be found at <http://www.irmca.com/utw/pavement.htm>.

A Minnesota DOT research project on UTW is described at <http://mnroad.dot.state.mn.us/newsletters/gauge151.html>.

The Tennessee Ready-Mixed Concrete Association Web site offers information and a typical mix design for UTW at <http://www.trmca.org/index.htm>.

A description of a research project sponsored by the Pennsylvania DOT and FHWA can be found at <http://restructure.fhwa.dot.gov/ptp/Whitetop/whitetop.htm>.

A *Public Roads* article from the September/October 1998 issue, "Ultra-thin Whitetopping" by Charles J. Churilla can also be found at <http://www.tfhrc.gov/pavement/utwweb/article.htm>.

If you have any questions, please contact:
Art Stenberg, Executive Director
Massachusetts Concrete & Aggregate
Producers Association
8 North Main Street
Attleboro, MA 02703
Phone: 508-223-4010
Fax: 508-223-5242

GASB

On June 30, 1999 the Governmental Accounting Standards Board (GASB) published Statement 34, Basic Financial Statements -- and Management's Discussion & Analysis -- for State and Local Governments. GASB Chairman Tom Allen said: "Statement 34 is the most significant change in the history of governmental accounting. It represents a dramatic shift in the way local governments present financial information to the public." Among the major revisions of the standard, governments will be required to report on the overall state of their financial health, not just its individual "funds", provide the most complete information ever available about the cost of delivering services to their citizens; include for the first time information about the government's public infrastructure assets; and prepare an introductory narrative section analyzing the government's financial performance. The new GASB standard will take effect for **larger** agencies in fiscal years beginning after **June 15, 2001**, **medium-sized** agencies have until fiscal years beginning after **June 15, 2002**, and **smaller** ones until fiscal years beginning after **June 15, 2003**.

The National Assn. of State Auditors, Comptrollers and Treasurers and the Assn. of Government Accountants hosted a video conference on May 3 to provide guidance on this reporting model for state and local government agencies which has the potential to revolutionize how public agencies account for their infrastructure assets. Visit the website to learn more and to see if your agency is prepared to implement these changes:

http://www.sso.org/nasact/GASB%2034/about_gasb_statement_34.htm

WORKSHOP ON BENEFICIAL USE OF COMPOST FOR TRANSPORTATION AND HIGHWAY ACTIVITIES

A workshop will be held at the University of Massachusetts at Amherst on July 26, 2000 to discuss the current situation regarding the use of the composting process for waste management, and for uses of the manufactured compost product. In particular, the use of compost for transportation and highway activities will be examined. An assessment will be made of present activities in Massachusetts.

The workshop will be of interest to regulators, highway superintendents; and environmental engineers, scientists and managers concerned with waste management, the composting process and the use of compost.

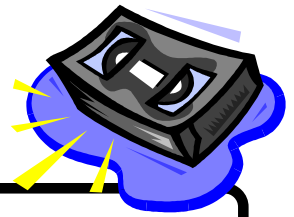
For course information contact:

Dr. Michael S. Switzenbaum
Department of Civil &
Environmental Engineering
University of Massachusetts
Amherst, MA 01003-5205
Phone: (413) 545-5393
Fax: (413) 545-2202
email: switzenbaum@ecs.umass.edu





Publications and Videos



PUBLICATIONS

Planning and Financing Capital Improvement Programs, APWA presentation, 1996

D&C-37A Development of a Procedure to Rate the Application of Pavement Maintenance Treatments, Specifications for Chip Seals, Slurry Seals, & Crack Sealing, 1992

D&C-37B Development of a Procedure to Rate the Application of Pavement Maintenance Treatments, Rating Tree Procedure for Chip Seals & Crack Sealing, 1992

UNS-18 Field Guide for Unpaved Rural Roads, 1997

PLA-46 Standardized Scope of Work & Manhour Estimate, MHD, 1991

T&P-01 Handbook for Successful Supervision for Local Road Supervisors, FHWA, 1990

ASP-93 Performance Testing of Hot-Mix Asphalt Aggregates, US Army Corps of Engineers, 1999

National Highway Institute Course Workbooks

Techniques for Pavement Rehabilitation, FHWA-HI-93-056

Design & Operation of Work Zone Traffic Control, FHWA-HI-96-037, (NHI Course 38003)



Please FAX your requests by code number to Baystate Roads at 413-545-6471 or call 413-545-2604.

FHWA is in the process of completing the first major revision of the Manual on Uniform Traffic Control Devices (MUTCD) in over twenty years. The manual contains standards and guidance for the design and use of signs, pavement markings, traffic signals, and other traffic control devices. FHWA has published the proposed MUTCD amendments in the Federal Register for public comment. Public comments must be received by June, 2000. The proposed amendments can be found on the MUTCD home page at www.mutcd.fhwa.dot.gov. For more information, contact Linda Brown at FHWA, 202-366-2192 (fax: 202-366-8712).

Upcoming Baystate Workshops

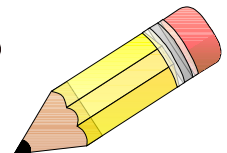
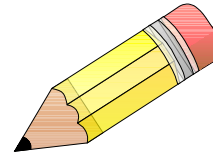
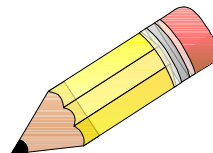
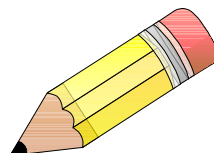
Effective Writing Skills for Administrative Assistants

July 18 -- Holiday Inn, Worcester

July 20 -- Sheraton Resort, Hyannis

July 25 -- Andover Inn, Andover

July 27 -- Hotel Northampton, Northampton



Congratulations to the newest Baystate Roads Scholars on your fine achievement. Keep saving those certificates and you, too, could be listed here!



Bruce Martin
Whitman DPW

Edward Kukkula
Townsend DPW

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The Baystate Roads Program, which publishes *Mass Interchange* each quarter, is a Technology Transfer (T2) Center created under the Federal Highway Administration's (FHWA) Local Technical Assistance Program (LTAP). FHWA is joined by the Massachusetts Highway Department, the Department of Civil and Environmental Engineering at the University of Massachusetts/Amherst, and local public works departments in an effort to share and apply the best in transportation technologies.

In addition to publishing *Mass Interchange*, the Baystate Roads Program facilitates information exchange by conducting workshops, providing reports and publications and videotapes on request, and offering one-to-one technical assistance on specific roadway issues. Because the program relies on input from many sources, inquiries, articles, and ideas are encouraged.

LTAP Local Technical Assistance Program

To contact the Baystate Roads Program call (413) 545-2604 or FAX 413-545-6471.

BAYSTATE ROADS PROGRAM

Department of
Civil & Environmental Engineering
University of Massachusetts
214 Marston Hall
Amherst, MA 01003-5205

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