

FOCUS

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Lifting the Graves Avenue Bridge to Success

Out with the old and in with the new. Instead of following the traditional script of closing a bridge to first demolish it and then build a new substructure and superstructure, the Florida Department of Transportation (FDOT) used prefabricated bridge elements and self-propelled modular transporters (SPMTs) to cut months off the project schedule for construction of the new Graves Avenue Bridge in Volusia County.

Using SPMTs, FDOT lifted the old Graves Avenue Bridge in Volusia County in January 2006 and in 22 minutes moved it to the side of I-4, where the old concrete bridge spans were demolished. SPMTs are multi-axle, computer controlled vehicles that can move in any horizontal direction, while maintaining their payload geometry and keeping equal axle loads. SPMTs also have vertical lift.

The Graves Avenue project is the first time that the SPMT technique has been used in the United States to replace a bridge over an Interstate highway.

Two new concrete bridge spans were built alongside I-4, instead of over the Interstate, reducing the need for road closures and disruptions to traffic. The first 43-m (143-ft) long span was installed over the westbound lanes of I-4 on June 4, 2006, with the second span installed over the eastbound lanes on June 10. Weighing nearly 1,300 tons each, the completed bridge spans were lifted and moved using SPMTs. "This accelerated construction technique allowed us to build the bridge's substructure and superstructure at the same time," says Amy Scales, Resident Engineer for FDOT's District 5. "We saved about 4 months over the course of this bridge

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The new Graves Avenue Bridge is installed in Volusia County, FL, in June 2006. The prefabricated bridge spans were lifted and moved using self-propelled modular transporters.



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Graves Avenue Bridge, continued from page 1

project, greatly reducing the impact to drivers.” Instead of the weeks or months of lane closures and rolling roadblocks experienced with traditional bridge building techniques, FDOT detoured I-4 traffic for only 2 weekend nights and used rolling roadblocks during the overnight hours of 2 nonconsecutive nights. The new bridge opened to traffic on August 7.

FDOT and the Federal Highway Administration (FHWA) hosted a delegation of about 100 transportation officials from across the United States and Canada at a conference held June 9–11, 2006, in DeLand, Florida. Participants learned more about the use of SPMTs for bridge construction and observed the installation of the final span of the Graves Avenue Bridge. “The use of SPMTs provides an effective and efficient solution for bridge replacements on high-volume roads, significantly reducing traffic disruptions and increasing worker safety due to the reduced onsite construction



SPMTs are multi-axle computer controlled vehicles that can move in any horizontal direction and also have vertical lift.



Rhode Island's Providence River Bridge was prefabricated and then transported using two barges to the bridge site in August 2006.



The Rhode Island Department of Transportation (RIDOT) recently used SPMTs for the installation of its new Providence River Bridge. The bridge's superstructure was prefabricated at the former Quonset Point naval base a dozen miles away and transported using two barges to the bridge site. The transport went smoothly and the new bridge was set in place just 3 hours after leaving Quonset on August 28, 2006. SPMTs were used to load it onto the barges and to install it at the site.

A showcase held in Rhode Island in August 2006 provided representatives from transportation agencies in New England an opportunity to learn more about the technology. Presentations were made by RIDOT; FHWA; the project contractor, Cardi Corporation; and Mammoet Corporation, the SPMT manufacturer. To view photos and a video of the Providence River Bridge move and installation, visit www.dot.state.ri.us/projects/construction/195PRBlift.htm. For more information on the Providence River Bridge, contact John McAvoy at FHWA, 401-528-4577 (email: john.mcavoy@fhwa.dot.gov).

Checking Your Highway Network's Health

time,” says Benjamin Tang of FHWA’s Office of Bridge Technology. While initial project costs can be higher, this can be offset by the reduced construction time and subsequent savings on personnel and traffic maintenance costs, as well as reductions in user costs. FDOT estimates that using the SPMTs cost an additional \$560,000, but that the shorter construction schedule resulted in \$3 million in user cost savings.

“The project went well and we would use SPMTs again. The technology is not for every project, but depending on the roadway, it can be worth it to speed up construction and get drivers back on the road sooner,” says Scales.

To learn more about SPMTs and prefabricated bridge elements and systems, visit www.fhwa.dot.gov/bridge/prefab. The site includes a video clip from the I-4 bridge installation. Also featured is FHWA’s *Framework for Prefabricated Bridge Elements and Systems Decision-Making*. This publication gives transportation departments and contractors a quick and simple tool to use in deciding on whether to use prefabrication for a particular bridge project (see March 2006 *Focus*). For more information, contact Benjamin Tang at FHWA, 202-366-4592 (email: benjamin.tang@fhwa.dot.gov). To learn more about the Graves Avenue Bridge replacement, contact Amy Scales at FDOT, 386-943-5729 (email: amy.scales@dot.state.fl.us). *

How healthy is your pavement network? Are you using your funds strategically to achieve the most value for your highway expenditures? How much will your system deteriorate if you defer preservation work?

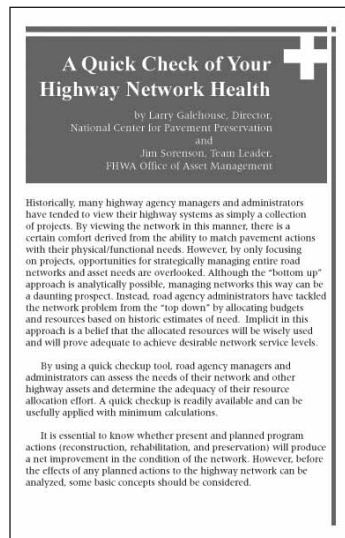
A new brochure available from the Federal Highway Administration (FHWA) and the National Center for Pavement Preservation (NCPPI) offers highway agencies guidance on strategically managing their entire pavement networks, asset needs, and available budgets. In the past, agencies allocated budgets and resources based on historic estimates of need and equitable distribution. *A Quick Check of Your Highway Network Health* (Publication No. FHWA-IF-07-006) provides a tool for highway agency managers to assess the needs of their pavement networks and determine the adequacy of their resource allocations. This tool generally uses information at hand or data generated by the agency’s management systems.

The simple checkup tool examines the effect of current planned reconstruction, rehabilitation, and preservation work on pavement life and deterioration and provides agencies with information sufficient to either improve network condition or maintain the status quo by preventing further deterioration. For example, an agency would first evaluate reconstruction and rehabilitation work by examining the lane miles, design life, and lane-mile cost for each proposed project or planned strategy. Pavement

preservation treatments would then be evaluated by examining the life extension offered by the treatment. These less costly treatments, including concrete joint resealing, thin hot-mix asphalt overlays, microsurfacing, chip seals, crack seals, and others can extend the life of roads in good condition. The agency can then decide how best to allocate funds among reconstruction, rehabilitation, and preservation to achieve the greatest improvement in its overall network condition.

“Integrating reconstruction, rehabilitation, and preservation in the proper proportions will substantially improve network conditions for the taxpayer while safeguarding the highway investment,” says Larry Galehouse, Director of the NCPPI. The checkup tool approach allows decisionmakers to see the effects of resource allocations on the health of their pavement networks. “It is about managing the system condition with the budgets provided or demonstrating the need for additional funds,” says Jim Sorenson of FHWA’s Office of Asset Management.

To obtain a copy of the brochure or for more information on the quick check-up tool, contact Joe Gregory at FHWA, 202-366-1557 (email: joseph.gregory@fhwa.dot.gov), or the National Center for Pavement Preservation at 517-432-8220 (email: ncpp@egr.msu.edu). Information is also available at www.pavementpreservation.org. *



Highways for LIFE Announces 2006 Projects

Highway projects in Iowa, Minnesota, and South Carolina have been selected as recipients of the 2006 Federal Highway Administration's (FHWA) Highways for LIFE (HfL) program grants. Each State will receive \$1 million to help incorporate new technologies and approaches that will cut construction time while improving quality, safety, and durability.

The Iowa Department of Transportation (DOT) will use the grant for reconstruction of the 24th Street Bridge interchange in Council Bluffs. The overhead structure that carries 24th Street traffic over Interstate 29/80 will be replaced in two phases. The interchange ramps, 24th Street, and westbound Interstate 29/80 will also be reconstructed to the extent required to accommodate the proposed bridge location, roadway width, length, and grade. Iowa estimates that the project would normally take two construction seasons using standard construction processes, but is accelerating the schedule to accomplish the work in half that time. Construction will begin in the fall of 2007 and be completed by the fall of 2008.

"The Highways for LIFE program goals matched the goals we have for our highway program. There were many innovations that could be used on the project that would result in a project that was safer, had a shorter construction schedule, and that would result in a longer lasting structure," says Sandra Larson, Director of Iowa DOT's Research and Technology Bureau.

Helping to accelerate the schedule will be the use of full-depth precast concrete deck panels that can be fabricated offsite and installed overnight, sparing drivers months of delays and reducing safety hazards for workers. Iowa DOT recently participated in a bridge project with Boone County, Iowa, that used precast pier caps, abutment caps, and deck panels. The experience gained in that project will be beneficial as Iowa embarks on the larger 24th Street project, notes Norm McDonald, Director of Iowa DOT's Bridges and Structures Office. "The 24th Street Bridge will be the first State-owned girder bridge to use full-depth precast deck panels," says McDonald.

Iowa will also use high performance concrete and high performance steel to improve quality, increase durability, and speed up construction. A structural

health monitoring system will monitor structural stresses during construction and for about 18 months after the project is completed. In addition, A + B (cost plus time) bidding will allow Iowa to select the most efficient bid by considering both construction cost and duration.

Iowa DOT's extensive community outreach on the project to date has included public meetings, distribution of a newsletter, and a meeting with businesses that will be impacted by the reconstruction. A project Web site and user survey are also being planned.

In Minnesota, the HfL funds will be used for the reconstruction of approximately 3.2 km (2 mi) of Trunk Highway (TH) 36 in North St. Paul. The proposed upgrades, including work on resurfacing, grading, bridges, retaining walls, drainage, and lighting, will improve the safety and capacity of the roadway by converting this segment of TH 36 to a freeway facility.

"This project was already being planned when we heard about Highways for LIFE," says Tom Ravn, Innovative

Iowa, Minnesota, and South Carolina will each receive \$1 million to help incorporate new technologies and approaches that will cut construction time while improving quality, safety, and durability.



An aerial view of the 24th Street Bridge interchange in Council Bluffs, IA (shown at bottom left of photo).

Contracting Director for the Minnesota Department of Transportation (Mn/DOT). “Highways for LIFE really fit into what we wanted to do in terms of trying new things and incorporating innovations into the project.”

Mn/DOT will close the highway segment completely for reconstruction for 5 months starting in April 2007. After the road is reopened in September 2007, work will continue with some off-peak lane closures until the expected project completion date in June 2008. The full closure will cut nearly a year off the normal construction time. Mn/DOT will also use A + B (cost plus time) bidding to reduce contract time, as well as lane rentals to cut down on the number of lane closures. After the 5-month complete roadway closure, the contractor will be charged a fixed fee for lane closures. “This will reduce the impact and annoyance to the public,” says Ravn. Additional project innovations will include using intelligent compaction rollers and lightweight deflectometers to improve the quality of grading operations.

Public outreach is an important part of the project. Mn/DOT announced the road closure a year in advance and has held 10 public information meetings, as well as extensive one-on-one meetings with key stakeholders. “While there is some concern by local businesses, most public feedback has been positive to date,” says Ravn. Additional outreach that is planned includes open houses, a workshop to assist local businesses with impacts during construction, direct mailings, and a project Web site. Mn/DOT will also conduct a user satisfaction survey at the completion of the project.

The South Carolina Department of Transportation’s (SCDOT) selected project will replace four structurally deficient bridges on SC-377 over the Black River in Williamsburg County. The project will

begin at the intersection of US 521 and SC 377 and stretch for approximately 2.4 km (1.5 mi) toward Kingtree. Truck traffic will be detoured due to the condition of the existing bridges. For safety and efficiency reasons, it is urgent for SCDOT to complete construction as rapidly as possible and shift the detoured truck traffic back to the designated truck route. “We had heard about the Highways for LIFE program and started to think about a project that we could submit. With having to detour trucks on this project, we wanted to get them back on the road as soon as possible,” says Bener Amado, SCDOT Bridge Project Engineer. “The planned innovations will speed up construction time.”

To encourage the contractor to use efficient production methods and achieve the shortest possible construction time, the project contract will use a project-specific A+B+C (cost plus time plus quality) bidding provision, which will consider not only the lowest cost bid but also factor in the time needed to complete the project and the desired quality level. A special contract provision will also specify a “no excuses incentive” completion date for the project. This incentive will be paid only if the project is substantially completed by the specified date.

Additional project innovations will include conducting a road safety audit and developing and implementing a new performance-based standard specification for pavement rideability. SCDOT is also working with a fabricator and the University of South Carolina to develop self-consolidating concrete (SCC) mixes and spe-

“Highways for LIFE really fit into what we wanted to do in terms of trying new things and incorporating innovations into the project.”

cial provisions so that SCC can be used in several bridge beams on the project. “This will be the first time we have used SCC in South Carolina,” says Amado. SCC does not require vibration to achieve full consolidation, cutting down on the labor needed and speeding up construction. An SCC mix has a high degree of workability and remains stable both during and after placement.

Overall concrete quality can also be improved, as problems associated with vibration, such as under vibration, over vibration, or damage to the air void structure, are eliminated.

SCDOT has held a Public Information Meeting on the project and is now addressing public comments. A special contract provision will require the contractor to provide timely notification to local media of project activities that will be disruptive to traffic, as well as project milestones.

HfL is accepting applications until January 30, 2007, for fiscal year (FY) 2007 construction projects. An updated application form for FY 2007 is available on the HfL Web site at www.fhwa.dot.gov/hfl and at www.Grants.gov (click on “Find Grant Opportunities” and then search for “Highways for LIFE”). State departments of transportation should coordinate with their FHWA division office to submit an application. For more information, contact your local FHWA division office. For additional information about HfL, contact Mary Huie at FHWA, 202-366-3039 (email: mary.huie@fhwa.dot.gov), or visit www.fhwa.dot.gov/hfl. *

SHRP II: Continuing the Legacy of Strategic Highway Research

Nearly 20 years after the Strategic Highway Research Program (SHRP) began in 1988, resulting in sweeping advances in the way State highway agencies design, build, and repair pavements, the newly launched SHRP II is continuing the legacy of strategic, short-term research aimed at improving performance and safety for U.S. highway users.

As authorized under the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), the \$150 million, 5-year program will focus on applied research in four areas to meet the following goals:

- Prevent or reduce the severity of highway crashes by understanding driver behavior (Safety).
- Address the aging infrastructure through rapid design and construction methods that cause minimal disruption and produce long-lived facilities (Renewal).
- Reduce congestion through incident reduction, management, response, and mitigation (Reliability).
- Integrate mobility, economic, environmental, and community needs in the planning and designing of new transportation capacity (Capacity).

The program will develop recommended procedures, practices, and applications to advance the Nation's highway system in the key focus areas. "These are the critical issues that we're

hearing people around the country discuss," says Ann Brach, Deputy Director of SHRP II at the Transportation Research Board (TRB).

The program issued its first series of requests for proposals (RFPs) for projects addressing safety, renewal, reliability, and capacity in the fall of 2006. Projects will include "Encouraging Innovation in Locating and Characterizing Underground Utilities," "Performance Specifications for Rapid Highway Renewal," "Strategies for Integrating Utility and Transportation Agency Priorities in Highway Renewal Project," and "A Plan for Developing High-Speed, Nondestructive

Testing Procedures for Both Design Evaluation and Construction Inspection." The project awards will be announced this winter. RFPs for 2007 projects will be issued in March and July of 2007.

For additional information on SHRP II, contact Ann Brach at TRB, 202-334-1430 (fax: 202-334-3471; email: SHRP2@nas.edu), or visit www.trb.org/SHRP2. Updates will also be featured in TRB's weekly *Transportation Research* e-newsletter. To subscribe to the newsletter, send an email with the subject header of "TRB E-Newsletter" to Rhouston@nas.edu. *Focus* will also continue to provide updates on the progress of SHRP II. *



SHRP II will develop recommended procedures and applications to advance the Nation's highway system.

M-E Pavement Design Guide Workshops Available Online

Webcasts of three workshops on the new *Mechanistic-Empirical (M-E) Pavement Design Guide* are now available online. Organized by the Federal Highway Administration's (FHWA) Design Guide Implementation Team (DGIT) and hosted by the Connecticut Department of Transportation, the workshops familiarized participants with various aspects of the *M-E Pavement Design Guide* and its accompanying software.

An abbreviated version of the Traffic Data Inputs for M-E Pavement Design workshop was Webcast on September 18, 2006, and is available for viewing at www.ct.gov/dot/TDW. The workshop covers the traffic inputs required by the design guide software, as well as how to extract data using the software.

The Climatic Inputs for M-E Pavement Design workshop is available online at www.ct.gov/dot/CIW. Webcast on September 19, 2006, the workshop discusses the Enhanced Integrated Climatic Model used in the design guide, analyzes current State design methods for climatic effects, and looks at reducing climatic effects through materials selection and design. Also featured is a demonstration of the M-E design guide software. The workshop was presented in 12 other locations throughout the United States in 2006.

The third Webcast features a workshop on Use of Pavement Management System Data to Calibrate M-E Pavement Design. Held in Connecticut on September 20, 2006, the workshop showcased recommendations from a review of eight State highway agencies' pavement

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Highway Technology Calendar

The following events provide opportunities to learn more about products and technologies for accelerating infrastructure innovations.

Geosynthetics 2007 Conference and Trade Show

January 16–19, 2007,
Washington, DC

This biennial conference will bring together approximately 1,500 participants from government, academia, and the private sector. The theme for this year's conference is "GeoSolutions for the Environment, Homeland Security, and Transportation." Two days of the conference (January 18–19) will focus on the use of geosynthetics for transportation. Conference topics will heighten awareness about the benefits of using geosynthetics, with information on geosynthetic materials, research, performance, testing, design, engineering, construction, and field experience. The accompanying exhibition will feature current geosynthetic materials, products, software, equipment, and services.

Contact: Corey Bobba at the Federal Highway Administration (FHWA), 703-948-1406 (email: corey.bobba@fhwa.dot.gov), or visit www.geoshow.info.

Transportation Research Board (TRB) 86th Annual Meeting

January 21–25, 2007,
Washington, DC

Transportation professionals from around the world will gather at the meeting to share their knowledge and

perspectives on current developments in transportation research, policy, and practice. The spotlight theme for 2007 is "Transportation Institutions, Finance, and Workforce: Meeting the Needs of the 21st Century."

Contact: For information, visit the TRB Annual Meeting Web site at www.trb.org/meeting. Questions about the meeting can be emailed to TRBMeetings@NAS.edu.

Polymer Composites Conference IV

March 20–22, 2007,
Morgantown, WV

The conference will highlight the successful application of composites in infrastructure renewal and look at their design, construction, performance, and cost effectiveness. Participants will discuss recommended practices for installation, repair procedures, and maintenance materials. Featured topics will also include case studies from highway agencies, various applications, guide specifications, and environmental issues. The conference is sponsored by the Constructed Facilities Center at West Virginia University, FHWA, and the West Virginia Department of Transportation.

Contact: Gangarao Hota at West Virginia University, 304-293-7608, ext. 2634 (fax: 304-293-7459; email: CFC@mail.wvu.edu).

National Conference on Pavement Management

May 6–9, 2007, Norfolk, VA

Conference topics will include the history and development of pavement management, engineering applications of pavement management data, integrating pavement management systems (PMS) and pavement preservation programs, and using PMS data to calibrate the new *Mechanistic-Empirical Pavement Design Guide*. The conference is sponsored by FHWA, the Virginia Department of Transportation, Virginia Transportation Research Council, and the Virginia Tech Transportation Institute.

Contact: Thomas Van at FHWA, 202-366-1341 (email: thomas.van@fhwa.dot.gov).

2007 American Association of State Highway and Transportation Officials (AASHTO) Value Engineering Conference

July 17–20, 2007, Seattle, WA

Sponsored by the AASHTO Value Engineering Technical Committee, FHWA, and the Washington State Department of Transportation (WSDOT), the conference will feature the Nation's best practices for value engineering.

Contact: Adele McCormick at WSDOT, 360-705-7298 (fax: 360-705-6885; email: VEConf@wsdot.wa.gov), or Jon Obenberger at FHWA, 202-366-2221 (email: jon.obenberger@fhwa.dot.gov). Information is also available online at www.wsdot.wa.gov/partners/aashtove. *

FOCUS

Focus (ISSN 1060-6637), which is published monthly by the U.S. Department of Transportation's Federal Highway Administration (FHWA), covers the implementation of innovative technologies in all areas of infrastructure.

Its primary mission is twofold: (1) to serve the providers of highway infrastructure with innovations and support to improve the quality, safety, and service of our roads and bridges; and (2) to help promote and market programs and projects of the various offices of FHWA's Office of Infrastructure.

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M-E Design Guide Workshops,

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management systems (PMS) and discussed how PMS data can be incorporated in the design guide software. The Webcast can be viewed at www.ct.gov/dot/PMS.

Looking ahead, the DGIT is developing a 2-day Local Calibration Workshop to provide assistance to States on local calibration, pavement evaluation and PMS, and preparation of materials input catalogs and design specifications to use with the M-E design guide. The workshop will debut in 2008. A 4-day training course on the Analysis of New and Rehabilitated Pavement Performance with the M-E

Pavement Design Guide Software is also being developed through FHWA's National Highway Institute. The course will give participants hands-on experience with the software. A pilot course will be held in spring 2007.

For more information on the M-E design guide or design guide implementation resources, visit www.fhwa.dot.gov/pavement/dgit/index.cfm; email the DGIT at DGIT@dot.gov; or contact Gary Crawford at FHWA, 202-366-1286 (email: gary.crawford@fhwa.dot.gov). *

Check out FOCUS online at
www.tfhr.gov/focus/focus.htm

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