Accelerating Infrastructure Innovations

FOCUS

May 2009

INSIDE

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U.S. Department of Transportation

Federal Highway Administration

Bridge Preservation: The Time Is Now

New bridge preservation initiatives nationwide are advancing efforts to enhance bridge performance, deter or correct deterioration, extend service life, and increase safety. The goal of a bridge preservation program is to increase the service life of a bridge using cost-effective, timely strategies, without having to reconstruct it. "With today's aging bridges and budgets that cannot keep up with demands, bridge preservation is a key component in maintaining and preserving the Nation's transportation infrastructure," says Ken Jacoby of the Federal Highway Administration (FHWA).

The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) Technical Corrections Act, enacted June 6, 2008, changed the Federal Highway Bridge Replacement and Rehabilitation Program to the Highway Bridge Program and placed greater emphasis on the importance of proper, timely bridge preservation. Highway Bridge Program funds can now be used for replacement, rehabilitation, painting, performing systematic preventive maintenance, seismic retrofitting, or applying anti-icing or deicing treatments to eligible highway bridge projects.

Bridge preservation initiatives underway include expansion of the Transportation System Preservation Technical Services Program (TSP•2) to include a new bridge preservation technical services component, including support of regional bridge preservation and maintenance partnerships.

TSP•2 was established in 2006 to serve as a clearinghouse for transportation system preservation technical information and expertise and to facilitate communication among transportation practitioners. The program is sponsored by the American Association of State Highway and Transportation Officials (AASHTO) and hosted by Michigan State University through a contract for the TSP•2 Center in Okemos, Michigan. The first phase of the AASHTO program focused on pavement preservation. In October 2008, AASHTO approved expansion of the program to include bridge preservation.

Online TSP•2 bridge preservation resources available at www.tsp2.org include a bridge news archive, library of technical documents, bulletin boards to post questions and comments, and information on regional bridge preservation partnership groups. Partnerships have been formed for the Northeast, Southeast, Midwest, Southwest, and Pacific Northwest regions, with a Rocky Mountain Group being planned as well. TSP•2 will also be expanded to provide a full line of services similar to those provided in the pave-

> "Bridge preservation is a key component in maintaining and preserving the Nation's transportation infrastructure."

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Bridge Preservation,
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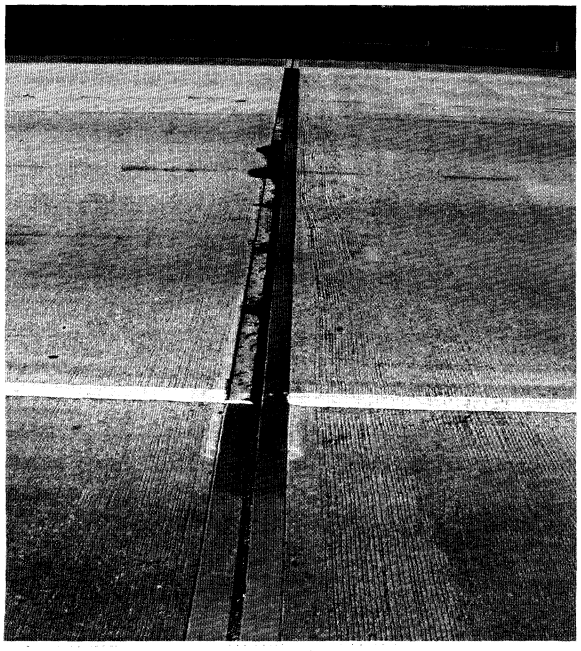
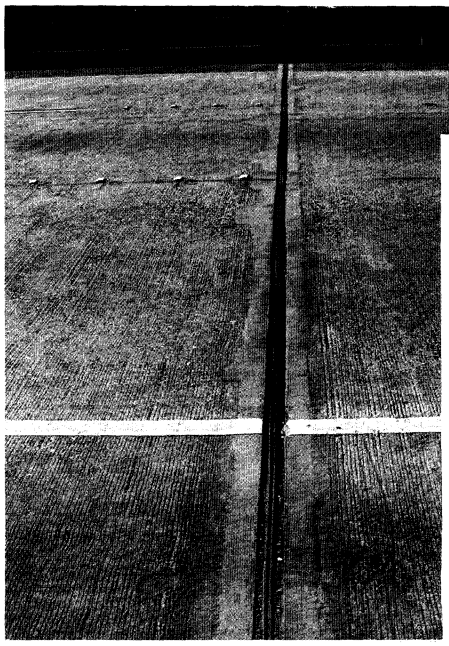




Louisiana's Bridge Preventive Maintenance Program includes such activities as bridge deck joint repair and replacement. At left is a bridge before joint replacement, while on the right is the new bridge deck joint.

ments area. AASHTO is developing a technical services contract to establish a bridge preservation help desk, for example, which transportation agencies can call or visit online for personalized technical assistance. Education, outreach, and other support services will also be provided.

The TSP•2 is supported by an AASHTO voluntary fund. Any AASHTO member can join the program. Membership costs $20,000 per agency per year, which includes both the bridge preservation and pavement preservation programs. These funds also cover the cost of travel to bridge preservation and pavement preservation partnership meetings for two State representatives. The TSP•2 will fully support meeting organization and facilitation costs. FHWA has approved a waiver of the non-Federal match for the use of State Planning and Research funds for TSP•2 contributions. For more information on TSP•2, visit www.tsp2.org.

The TSP•2 activities support the goals of the AASHTO Highway Subcommittee on Maintenance's draft Bridge Preservation Strategic Plan. These goals include improving bridge preservation and maintenance practices, facilitating the exchange of technical information on state of the practice and new products and methods for bridge preservation and maintenance, assisting States in implementing bridge preservation and maintenance practices, supporting improvements to the knowledge base related to bridge preservation and maintenance, and developing partnerships among related transportation stakeholders. The TSP•2 activities also fully support the efforts of AASHTO's Bridge Preservation Committee under the AASHTO Subcommittee on Bridges and Structures.

Also building partnerships is the new Bridge Preservation Association (BPA), which will bring together both industry and transportation agency stakeholders to advance bridge preservation and maintenance practices, procedures, products, and technologies. "We want to encompass all aspects of the structure that can be maintained through preservation strategies, from the deck to the stream bed," says BPA President Tom Donnelly of Cargill SafeLane.

Also building partnerships is the new Bridge Preservation Association (BPA), which will bring together both industry and transportation agency stakeholders to advance bridge preservation and maintenance practices, procedures, products, and technologies.

The association plans to establish subcommittees to address specialized bridge areas, including corrosion protection, bearings, deck wearing surfaces, and foundations. "We will bring industry and agency experts together to work on key issues, evaluate technologies, and develop

best practices and specifications," says Donnelly. "We hope to partner with and support the TSP•2 program, especially as it works with the regional bridge partnerships around the country." For more information on the BPA, visit www.bridgepreservationassociation.org.

FHWA is also looking at forming a Bridge Preservation Expert Task Group (BP ETG) later this year. The BP ETG would bring together representatives from States, industry, academia, and FHWA to work on bridge preservation initiatives. *Focus* will provide updates on the new ETG's activities as more information becomes available.

Also supporting the advancement of bridge preservation is FHWA's Transportation System Preservation Research, Development, and Implementation Roadmap, which outlines 38 pavement preservation and 25 bridge preservation need statements. Released in 2008, the roadmap was developed in partnership with industry, AASHTO, and the Transportation Research Board (TRB). Its need statements have been ranked and prioritized to facilitate their adoption into the short-term and long-term research funding programs of FHWA, TRB, and State transportation agencies. The top priorities for bridges include improving inspection techniques for steel prestressing strands, cables, and ropes; quantifying the information necessary to guide bridge preservation decisions; and identifying best practices to preserve bridge decks. For more information or to download a copy of the roadmap, visit www.tsp2.org.

States already moving forward with bridge preservation include Louisiana. The Louisiana Department of Transportation and Development (LADOTD) launched a Bridge Preventive Maintenance Program in 2006 (see June 2008 *Focus*). The program's goal is to apply a systematic procedure in choosing bridge structures for preventive maintenance activities that are in good overall condition but are exhibiting deficient bridge elements. The following preventive maintenance activities are approved under Louisiana's program:

- Deck joint repair and replacement.
- Bearing repair and replacement.
- Localized deck repairs.
- Deck sealing.
- Grid deck section repair or localized section replacement.
- Concrete repair on pedestals, bents, caps, piling, piers, and columns.
- Bridge deck drainage.

LADOTD let three initial projects in June 2008, including a concrete deck overlay project on U.S. 90 in the New Orleans area; deck joint replacements on I-49, LA 1, and U.S. 71 in Alexandria; and deck spall repairs on I-10 near Henderson. Four additional projects have been let since then, with five more forthcoming. "The projects have gone really well to date. Our districts have all been very enthusiastic about the program," says program manager Danny Tullier of LADOTD. As a member of the steering group for the Southeast Bridge Preservation Partnership, Louisiana is sharing its experiences with other States.

As part of its Bridge Preventive Maintenance Program, LADOTD is in the process of implementing the Pontis® Bridge Management System. Originally developed by FHWA, Pontis is now available from AASHTO as an AASHTOWare® product. The software can be used to store highway bridge inventory and inspection data. It provides a systematic procedure for allocating resources to preserve and improve highway bridges by considering both the costs and benefits of maintenance policies versus investments in improvements or replacements. LADOTD expects to have Pontis fully implemented by summer 2010. To learn more about Louisiana's Bridge Preventive Maintenance Program, contact Danny Tullier at LADOTD, 225-379-1355 (email: Danny.Tullier@la.gov). For more information on Pontis, visit www.aashtoware.org (choose "Software" and then select "Pontis").

For more information on bridge preservation, contact your local FHWA division office; Ken Jacoby at FHWA, 202-366-6503 (email: ken.jacoby@fhwa.dot.gov); or Wade F. Casey at FHWA, 202-366-4606 (email: wade.casey@fhwa.dot.gov). Information is also available online at www.fhwa.dot.gov/preservation. To see the current FHWA guidance on using Federal-Aid Highway Bridge Program funds for preventive maintenance activities, visit www.fhwa.dot.gov/preservation/100804.cfm.

Online Bridge Preservation Resources

Transportation System Preservation Technical Services Program—www.tsp2.org

Bridge Preservation Association—www.bridgepreservationassociation.org

FHWA—www.fhwa.dot.gov/preservation

Pontis® Bridge Management System—www.aashtoware.org

FHWA Webinar Spotlights Advancements in Bridge Inspection

The Washington State Department of Transportation's specially designed vehicle uses video cameras to perform bridge deck inspections.

The topic of advancements in bridge inspection drew nearly 200 participants to a bridge inspection Web conference held by the Federal Highway Administration's (FHWA) National Highway Institute (NHI) on March 11, 2009. The conference was sponsored by NHI Innovations, a free monthly Webinar series held in partnership with FHWA's Highways for LIFE program. Technologies highlighted during the conference included fatigue crack detection using electrochemical fatigue sensors (EFS) and video inspection of bridge decks.

Webinar participants represented State transportation agencies, Local Technical Assistance and Tribal Technical Assistance programs, FHWA, and the private sector. Seventy-two percent of participants indicated they had not used the highlighted technologies before, while nearly 99 percent of participants noted they would like to see more Webinars discussing bridge inspection topics.

Helene Bowman of FHWA's New Jersey division office described how EFS was used in 2006 to detect cracking on the Route 72/Manahawkin Bay Bridge in Ocean County, New Jersey. Built in 1959, the 731-m-long (2,400 ft) bridge has 17 spans and a continuous, cantilevered steel girder system with pin suspended spans. A major retrofit of the bridge was performed in 1995. In recent years, cracks caused by out-of-plane distortion have been occurring in floorbeams and connection angles. EFS is a nondestructive method for detecting fatigue cracking that uses sensors, an electrolyte, and a voltage-inducing data collection device. The technology includes analysis software.

The New Jersey Department of Transportation (NJDOT) used EFS at 17 locations between spans 2 and 12 of the Route 72 bridge. Five locations on the Route 72 bridge showed little to no crack growth during the EFS evaluation, while the remaining 12 locations had active growth. A close visual reinspection was conducted in 2007, with results from the EFS evaluation correlated in 14 locations. In two locations, crack growth not predicted by EFS was occurring, while crack growth that had been predicted by EFS was not occurring in one location. FHWA's Turner-Fairbank Highway Research Center in McLean, Virginia, is conducting an independent evaluation of the EFS technology, with field tests to be held this summer. NJDOT has indicated that it would use the technology again, though no applications are currently planned.

Jody Bywater of the Washington State Department of Transportation (WSDOT) discussed the agency's use of video cameras to perform bridge deck inspections. The video cameras are contained in a specially designed vehicle that takes digital images of the bridge deck, with each image covering an area roughly the width of a lane, 3.8-m-wide (12.5 ft) by 8.04-m-long (26.4 ft). Hairline cracks are the smallest crack size that can be detected in the final processed digital images. After reviewing the video images, signs of distress such as open cracks and spalling in the deck surface or superstructure are triggers for conducting a more indepth inspection of the deck.

The initial cost of the inspection vehicle was $750,000. However, the vehicle belongs to WSDOT's pavement management office and is essentially rented at hourly rates for the purpose of video deck inspection at a much smaller cost. The benefits of the technology include savings on manpower and equipment, improved quality of inspections with less impact from weather conditions, and reduced impact to the traveling public. The video technology also limits the exposure of bridge inspectors to hazardous traffic conditions.

Michael Brokaw of the Ohio Department of Transportation (ODOT) described ODOT's use of a pocket ultrasonic thickness (Pocket UT™) gauge to assess gusset plates on bridges. The Pocket UT gauge has allowed ODOT to gather thickness data faster and better detect areas of corrosion. "The device has saved time and money and given us better confidence in the data," said Brokaw. In March 2008, ODOT used the Pocket UT gauge to inspect a three-span deck truss bridge near Columbus. Using the pocket gauge reduced inspection time by about 25 percent, while also cutting costs by about 25 percent. Brokaw noted that while the gauge cost $17,000, "it has already paid for itself."

Also featured during the Web conference was an initiative to improve the reliability of bridge inspections in Oklahoma. Calvin Karper of FHWA's Oklahoma division office detailed how the Oklahoma Department of Transportation (ODOT) has established a systematic quality assurance (QA) approach. In 2002, ODOT formed a Bridge Ratings Team (BRT) to manage the QA process. The team includes ODOT team leaders and program managers, an FHWA bridge engineer, county bridge coordinators, and an ODOT data manager. In 2003, the BRT had all staff involved in bridge inspection at ODOT inspect the same three bridges. The results were highly variable. After the BRT also experienced difficulty in coming to consensus on the bridge ratings, team members recommended changes to Oklahoma's *State Bridge Inspection Manual,* including adding photographs to help explain condition states and better defin-

ing terms such as "impending pothole" and "deep pitting."

This new process has continued, with the bridge inspection exercise conducted in odd numbered years and the *State Bridge Inspection Manual* updated the following year to include recommendations resulting from the exercise. Karper noted that "this process has dramatically improved the quality of our inspections and data."

To download an audio file from the bridge inspection Web conference, visit www.nhi.fhwa.dot.gov (click on "Register for NHI Innovation Series" and then select the March 11 "Bridge Inspection" seminar).

The Transportation Research Board (TRB) also recently sponsored a Webinar on the "Importance of Bridge Inspection and Management." Held on March 29, 2009, Webinar topics included "Bridge Inspection Practices," "Monitoring Scour Critical Bridges," and "Guidelines for Implementing Quality Control and Quality Assurance for Bridge Inspection." To download slides from the Webinar, visit onlinepubs.trb.org/onlinepubs/Webinars/InspectingBridgesSlides.pdf.

"Bridge inspection has been in the spotlight since the collapse of the I-35W bridge in Minneapolis. Through events such as the recent FHWA and TRB Webinars, we are spreading the word about some of the more advanced technologies and practices that are in use today," says Tom Everett of FHWA.

For more information on bridge inspection, contact Tom Everett at FHWA, 202-366-4675 (email: thomas.everett@fhwa.dot.gov). FHWA is in the process of updating all of its bridge inspection training courses offered through NHI. As the new courses become available, *Focus* will provide updates in future issues.

The Fundamentals of Life Cycle Cost Analysis

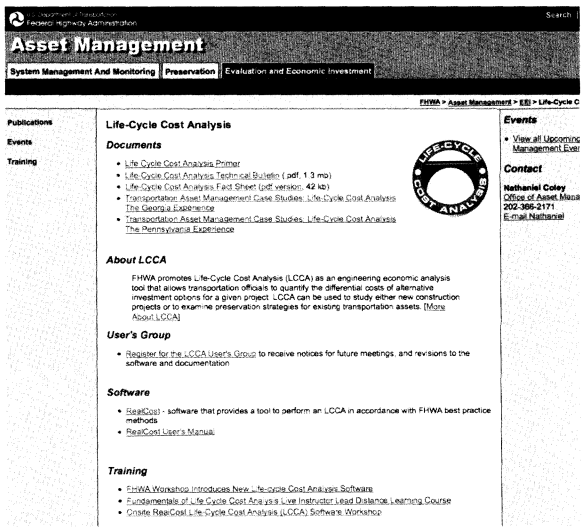
et to know the "Fundamentals of Life Cycle Cost Analysis" in the Federal Highway Administration's (FHWA) new online course. Available through FHWA's National Highway Institute (NHI), this free 6-hour training (Course No. FHWA-NHI-131113) is comprised of two live Web conference presentations and a Web-based independent study module.

The course covers the basic terminology, concepts, and processes of life cycle cost analysis (LCCA). "This course provides a critical foundation in LCCA, as well as prepares participants for FHWA's follow-up Real Cost LCCA Software Onsite Implementation Workshop," says Nathaniel Coley, Jr., of FHWA.

Both deterministic and probabilistic LCCA are presented in the course. Topics discussed include factors to consider when calculating user costs for a transportation project, including operating conditions, the effects of traffic and congestion, and cost components. Also featured is how to use probability and simulation to better understand risk in the decisionmaking process, as well as how to quantify risk and mitigate its effects. Additional topics include data preparation, variability, Monte Carlo simulation, and other statistical tools. A demonstration of how to apply LCCA is provided, using FHWA's RealCost LCCA software.

The training is targeted at design, maintenance, and materials engineers; finance managers; programming personnel; management systems personnel; and planners and materials engineers. Proficiency in basic math skills is required. Participants needing to review basic math skills should consider completing NHI's free online Transportation Curriculum Coordination Council Math Module (Course No. FHWA-NHI-134072) before signing up for the Fundamentals of Life Cycle Cost Analysis course.

For more information on scheduling the course, contact the NHI scheduler at 703-235-0534 (email: NHITraining@fhwa.dot.gov), or visit www.nhi.fhwa.dot.gov. Sessions are currently scheduled to begin June 9, July 28, August 11, and September 15. To learn more about this course or the FHWA RealCost LCCA Software Onsite Implementation Workshop, contact Nathaniel Coley, Jr., at FHWA, 202-366-2171 (email: nathaniel.coley@fhwa.dot.gov). For additional LCCA resources and details on the RealCost software, visit www.fhwa.dot.gov/infrastructure/asstmgmt/lcca.cfm. The free software can be downloaded from the site, along with FHWA's *Life-Cycle Cost Analysis Primer* (Pub. No. FHWA-IF-02-047) and other LCCA publications.



Visit www.fhwa.dot.gov/infrastructure/asstmgmt/lcca.cfm for life cycle cost analysis resources.

Highway Technology Calendar

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

Warm-Mix Asphalt and Recycling Symposium
June 8–10, 2009, Sacramento, CA

Symposium topics will include shingle recycling, building perpetual pavements using a rubblized concrete base, and Federal Highway Administration (FHWA) and State perspectives on recycled asphalt pavement. The second day of the symposium will focus on warm-mix asphalt, including best practices at the plant and paving site, emissions reductions, and accelerated performance testing. The symposium is sponsored by the National Asphalt Pavement Association and FHWA.

Contact: Audrey Copeland at FHWA, 202-493-0341 (email: audrey.copeland@fhwa.dot.gov), or visit www.hotmix.org.

Twenty-Sixth Annual International Bridge Conference (IBC)
June 14–17, 2009, Pittsburgh, PA

The IBC will feature more than 100 technical presentations, 17 workshops, and 3 seminars covering all aspects of bridge engineering. More than 150 exhibitors will also showcase current technologies. FHWA is sponsoring workshops on Accelerated Bridge Construction, Sharing Bridge Management Practices, State of the Practice in Bridge Load Rating and Posting, and the Long-Term Bridge Performance Program. FHWA is also sponsoring seminars on Highway Tunnel Inspection, Maintenance, and Operation; and Load Rating of Gusset Plates of Connections of Steel Truss Bridges.

Contact: Myint Lwin at FHWA, 202-366-4589 (email: myint.lwin@fhwa.dot.gov); or visit the conference Web site at www.eswp.com/bridge.

Eighth International Conference on the Bearing Capacity of Roads, Railways, and Airfields
June 29–July 2, 2009, Champaign, IL

The conference will cover issues relating to the bearing capacity and mechanistic-based design of highway and airfield pavements and railroad track structures. Sponsors include FHWA, Federal Aviation Administration, Federal Railroad Administration, Transportation Research Board (TRB), and the Illinois Department of Transportation.

Contact: Cheryl Richter at FHWA, 202-493-3070 (email: cheryl.richter@fhwa.dot.gov), or visit www.BCR2A.org.

2009 Petersen Asphalt Research Conference and Pavement Performance Prediction Symposium
July 13–17, 2009, Laramie, WY

Current research aimed at understanding and improving asphalt pavement performance will be featured at the conference. The 3-day conference is followed by a 2-day symposium, which focuses on key aspects of pavement performance. Participants may register for both the conference and symposium or either one separately. The conference and symposium are organized by the Western Research Institute (WRI).

Contact: Steve Salmans at WRI, 307-721-2306 (email: ssalmans@uwyo.edu); or Terry Arnold at FHWA, 202-493-3305 (email: terry.arnold@fhwa.dot.gov). Information is also available at www.petersenasphaltconference.org.

Precast/Prestressed Concrete Institute (PCI)/FHWA National Bridge Conference
September 12–15, 2009, San Antonio, TX

The conference will present state-of-the-art information on precast concrete design, fabrication, and construction. Featured topics will include accelerated construction, designing for seismic forces, high-performance concrete, and innovative precast concrete structures.

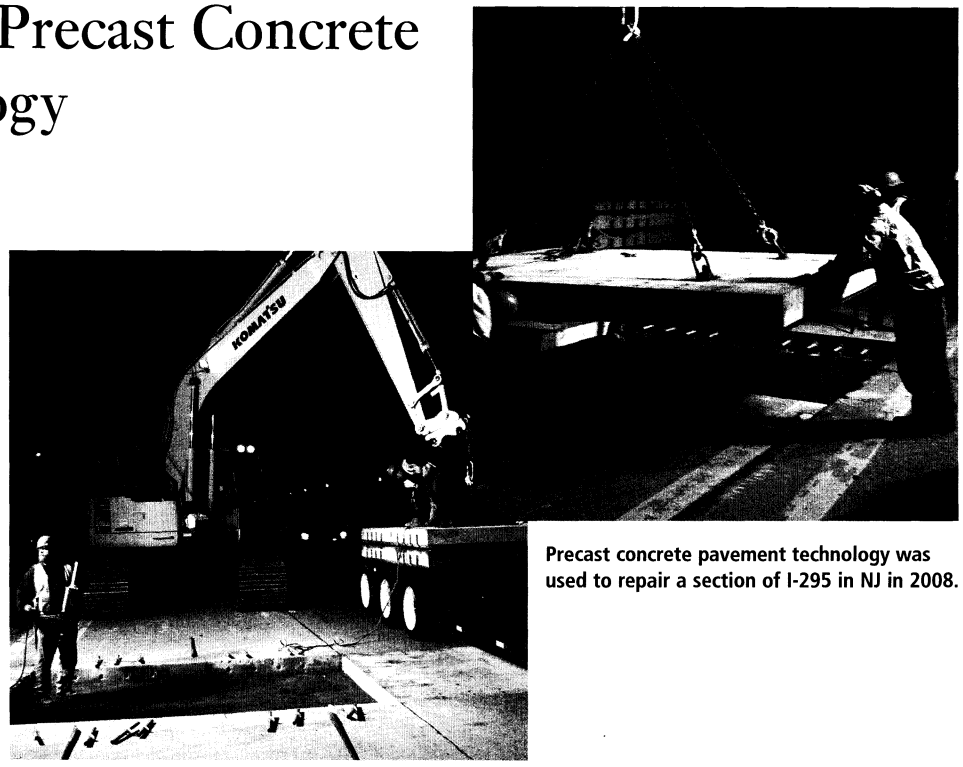
Contact: For more information, visit www.pci.org (click on "News and Events" and then select "PCI–FHWA National Bridge Conference").

Eighth National Conference on Transportation Asset Management: Putting the Asset Management Pieces Together
October 19–21, 2009, Portland, OR

The conference will highlight emerging issues in transportation asset management, including trade-off analysis, optimization, system management, and safety. Three thematic tracks will be featured: Safety, Pavement Management, and Data and Information Infrastructure. Practical examples of asset management implementation within a State, region, or local community will also be spotlighted.

Contact: Tom Palmerlee at TRB, 202-334-2907 (email: tpalmerlee@nas.edu); or Francine Shaw-Whitson at FHWA, 202-366-8028 (email: francine.shaw-whitson@fhwa.dot.gov). Information is also available online at www.trb.org/conferences/2009/asset.

Rapid Repair with Precast Concrete Pavement Technology



Precast concrete pavement technology was used to repair a section of I-295 in NJ in 2008.

Two new TechBriefs developed by the Federal Highway Administration's (FHWA) Concrete Pavement Technology Program (CPTP) highlight the innovative use of precast concrete pavement technology to meet the need for rapid pavement repair, rehabilitation, and construction. The precast technology can be used for intermittent repairs or full-scale rehabilitation.

Precast Concrete Panels for Repair and Rehabilitation of Jointed Concrete Pavements (Pub. No. FHWA-HIF-09-003) discusses the use of precast pavement systems that can be fabricated or assembled off site, transported to the project location, and installed on a prepared foundation. The system components require little or no field curing to achieve strength before the road is opened to traffic. As the precast panels are manufactured in a controlled environment off site, they can potentially be more durable than cast-in-place repairs and less susceptible to construction and material variability. The rapid installation also minimizes lane closures and the resulting congestion and increases worker safety. Highlighted in the TechBrief are a field study of the technique conducted in Michigan and a demonstration project carried out by the Ministry of Transport in Ontario, Canada.

Precast Prestressed Concrete Pavement for Reconstruction and Rehabilitation of Existing Pavements (Pub. No. FHWA-HIF-09-008) describes the development of precast prestressed concrete pavement (PPCP) technology and provides recommendations for ensuring the successful installation of a precast system, including design, panel fabrication, and installation considerations. Also featured are PPCP projects in California, Delaware, Iowa, Missouri, and Texas. The TechBrief notes that "the short-term performance of the installed PPCP systems indicates that PPCP systems can provide rapid construction and rehabilitation that will be durable."

In addition to the FHWA-supported activities, several companies in the United States have initiated independent development activities to refine precast concrete pavement technologies. These technologies have certain proprietary features and require licensing for product use. More information on the various technologies is included in each TechBrief.

The TechBriefs are available online at www.fhwa.dot.gov/pavement/pub_listing.cfm.

Another source of information on precast concrete pavement systems (PCPS) is the American Association of State Highway and Transportation Officials' Technology Implementation Group (TIG) on PCPS. Formed in 2006, the TIG has developed a series of generic specifications for both jointed and PPCP systems that cover design, fabrication, and construction. The TIG has also developed a proposed approach for State transportation departments to use in approving PCPS from any manufacturer prior to final design or construction. These generic specifications are available at www.aashtotig.org (select "Precast Concrete Paving Slabs"). For more information, contact TIG chair Timothy LaCoss at FHWA's New York division office, 518-431-4125, ext. 260 (email: Timothy.LaCoss@fhwa.dot.gov).

CPTP is a national effort to improve the long-term performance and cost-effectiveness of concrete pavements. Primary goals include reducing congestion, improving safety, lowering costs, improving performance, and fostering innovation. The program is managed by FHWA, in partnership with State highway agencies, industry, and academia. For more information about CPTP and the many resources and products it has available, visit www.fhwa.dot.gov/pavement/concrete. For additional information on the TechBriefs or precast concrete pavement technology, contact Shiraz Tayabji at Fugro Consultants, Inc., 410-997-9020 (email: stayabji@aol.com), or Sam Tyson at FHWA, 202-366-1326 (email: sam.tyson@fhwa.dot.gov).

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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Publication No. FHWA-HRT-09-013

HIF-1/05-09(10M)E

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ARRA Updates Available Online

As of May 20, 2009, 50 States and territories have obligated $11,808,759,130 of the $26,810,000,000 of American Recovery and Reinvestment Act of 2009 (ARRA) funding issued for transportation infrastructure. To date, 3,430 transportation projects have been authorized. The latest figures on the obligation of ARRA funds can be found on the Federal Highway Administration's (FHWA) home page at www.fhwa.dot.gov. More information on ARRA is available at the FHWA ARRA Web site (www.fhwa.dot.gov/economicrecovery).

The ARRA site features implementation guidance, an overview of ARRA provisions, apportionment tables for highway infrastructure investment funds, questions and answers on ARRA issues, and steps that State and local agencies can take to expedite the delivery of economic recovery funds. Additional resources include ARRA reporting forms, information on risk management, and details on work zone safety and mobility considerations for ARRA projects. Recordings from FHWA Web conferences on ARRA topics can also be downloaded from the site. FHWA will continue to update the Web site regularly to provide the latest information on ARRA implementation. Questions regarding the material posted on the site can be sent to Bob Bi[redacted] at FHWA, [redacted]ion on [redacted].gov.

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

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