

FOCUS

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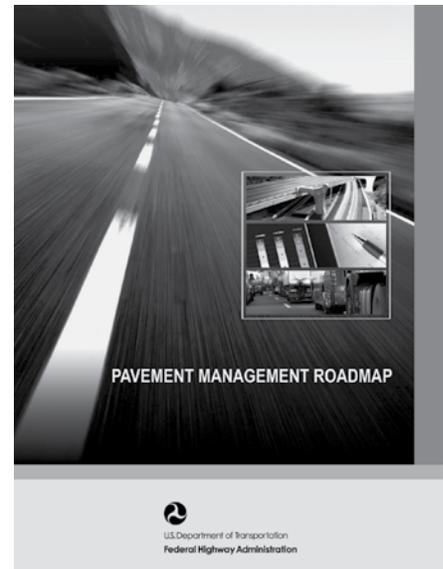
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Pavement Management Roadmap: *A Roadmap to Preserving Our Pavement Investments*

With greater demands being placed on today's roadway networks, coupled with reduced funding levels at transportation agencies across the country, what will the next 10 years mean for your agency's pavement investments? The Federal Highway Administration's (FHWA) new *Pavement Management Roadmap* (Pub. No. FHWA-HIF-11-011) looks at the long-term vision for pavement management and the research, development, and technology transfer initiatives that are needed to help agencies realize that vision and preserve their valuable investments.

Over the past decade, the transportation community has witnessed an increased emphasis on the use of asset management principles to better allocate resources and make decisions based on system performance objectives. Asset management provides a coordinated approach to managing infrastructure assets over the course of their entire life cycle, thus improving performance, increasing safety, and providing greater value to the community. With an asset management approach, optimal decisions on what would be the most effective mix of preserving, maintaining, renewing, or replacing infrastructure components are based on accurate data, economic analysis, and sound engineering. Decisions are also supported by performance measures and performance-based goals.

"The availability of quality data has had a tremendous impact on an agency's ability to compare different investment options and to make sound business decisions that consider



both engineering and economic factors," said Nastaran Saadatmand of FHWA's Office of Asset Management.

This new emphasis on asset management has meant a changing role for pavement management. While in the past, pavement management tools and techniques were primarily used to assess and report pavement conditions, prioritize capital improvements, and estimate funding needs, today's pavement management data can more broadly support an agency's asset management strategy by enabling the development of strategic performance objectives for the highway system.

To help agencies make this shift and more fully utilize their pavement management systems, the *Roadmap* identifies the steps need-

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www.fhwa.dot.gov/publications/focus/index.cfm



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ed to address current gaps in pavement management and establish research and development initiatives and priorities. FHWA developed the *Roadmap* through three regional workshops held in Phoenix, Arizona; Dallas, Texas; and McLean, Virginia, in 2010. Stakeholders participating in the workshops included representatives from State and local highway agencies, Canadian government agencies, academia, and private industry.

Twenty-three short-term needs (over the next 5 years) and 24 long-term needs (over the next 5 to 10 years) were identified and prioritized by participants. Meeting these needs would require more than \$14.5 million in funding. Needs were grouped by four theme areas:

1. Use of Existing Tools and Technologies.
2. Institutional and Organizational Issues.
3. The Broad Role of Pavement Management.
4. New Tools, Methodologies, and Technology.

Top short-term needs outlined in the *Roadmap* include communicating pavement management information and benefits, developing and using effective performance measures, improving the skills of pavement managers, developing automated condition data processing tools, and developing methods to quantify the benefits of pavement management. “The short-term priorities emphasize the need for improved access to information about best practices and better methods to communicate the importance of pavement management to transportation agencies,” said Saadatmand. “Stakeholders also emphasized the importance of improving data quality and consistency.”

The long-term needs include ones that will require research to improve existing practices. Priority long-term needs include

The screenshot shows the FHWA Asset Management website. The main content area is titled 'Pavement Management' and includes several sections:

- Program Areas:**
 - Program Support:** The group provides technical assistance and information sharing to States and other practitioners in the field of pavement management. Current activities include Demonstration Project 108a on Multiyear Prioritization, Demonstration Project 108b on Engineering Applications of Pavement Management Data, and updating the pavement management software coding.
 - Participation in National Efforts:** FHWA is an active participant with several national transportation organizations, including AASHTO, Transportation Research Board (TRB), the American Society of Civil Engineers (ASCE), and others. The pavement management group represents the agency in activities related to pavement management systems. Some of the ongoing efforts include the AASHTO provisional standards for measuring pavement smoothness, faulting, and cracking. The group also participates in numerous workshops and conferences promoting the use of management systems.
 - Research and Development:** The Pavement Management Group conducts and supports studies of emerging methods and technologies in the measurement and use of network, road pavement data. Current activities include developing methods of analyzing pavement performance from pavement management data and exploring the relationship between preventive maintenance and pavement management data. The group is an active participant in the research leading to the development of a rutting wheel deflucimeter.
- Technical Guidance:**
 - Part 500 - Management and Monitoring Systems, 23 CFR 500, December 16, 1999 (RUC 97 4)
 - 23 CFR 302 Non-Regulatory Supplement, Federal-Aid Policy Guide, April 8, 1999, Transmittal 202
- Software:**
 - Pavement Health Track
- Technology Transfer:**
 - Use of EMS Data for Performance Monitoring with Superpave as an Example
- NHI Training:**
 - 13105 Analysis of PMS Data for Engineering Applications
 - 13108 Transportation Asset Management
- Research:**
 - Use of EMS Data for Performance Monitoring with Superpave as an Example
- Publications:**
 - Pavement Health Track Technical Information, 2010
 - Pavement Health Track, Hands-On Workbook, 2010
 - Pavement Health Track Users Guide, 2010
 - Performance Evaluation of Various Rehabilitation and Preservation Treatments, 2010
 - Technical Determination of Concrete Pavement Thickness Nondestructively Using the Magnetic Imaging Tomography Technique, FHWA-HIF-09-023 2009

The sidebar on the right contains 'More Information' with links to the National Highway Institute, Office of Asset Management's Pavement Management Group, Office of Pavement Technology, and Resource Center. It also lists 'Contacts' for Tom Van and Nastaran Saadatmand.

Additional pavement management resources are available online at www.fhwa.dot.gov/pavement/mana.cfm.

identifying methods of defining and calculating the effect of pavement preservation treatments on pavement life, defining the impact of pavement management investment levels on benefits, using pavement management data to support design activities, developing performance models that consider a series of pavement preservation treatments, and developing a method for effective modeling of structural condition.

The *Roadmap* also looks at the steps required to make the identified pavement management priorities a reality, noting that “the successful implementation of the *Roadmap* demands a focused, cooperative approach among national and international organizations.”

“The implementation of the *Pavement Management Roadmap* will rely on the creativity and resourcefulness of all those

“The implementation of the *Pavement Management Roadmap* will rely on the creativity and resourcefulness of all those working in the pavement management community.”

working in the pavement management community,” said Saadatmand. Preliminary recommendations include establishing a Pavement Management Roadmap Steering Committee as a subcommittee under the Transportation Research Board (TRB) Committee on Pavement Management. Also recommended is that funding support be identified for two to three priority initiatives each year through the American Association

of State Highway and Transportation Officials and TRB.

The *Roadmap* is available online at www.fhwa.dot.gov/infrastructure/asmtgmt/index.cfm, along with an accompanying *Executive Summary* (Pub. No. FHWA-HIF-11-014). For more information on the *Roadmap*, contact Nastaran Saadatmand at FHWA, 202-366-1337 (email: nastaran.saadatmand@fhwa.dot.gov). *

Designing the Next Generation of Wildlife Crossings

For participants in the first ARC International Wildlife Crossing Infrastructure Design Competition, it was all about taking a walk on the wild side. Collisions between wildlife and vehicles have increased by 50 percent in the past 15 years, costing the United States \$8 billion annually and making the search for solutions more important than ever. The competition creatively took on this challenge, with the goal of ensuring the safety and mobility of both motorists and wildlife by allowing them to coexist through innovative engineering and architectural solutions.

Competition sponsors included the Montana State University's Western Transportation Institute, Woodcock Foundation, Edmonton Community Foundation, Colorado Department of Transportation (CDOT), American Association of State Highway and Transportation Officials, National Park Service, U.S. Forest Service, and the Federal Highway Administration (FHWA).

The importance of wildlife crossings has been demonstrated in Banff National Park in Alberta, Canada, where a series of 22 underpasses and two overpasses has resulted in an 80 percent reduction in wildlife fatalities. Species using the crossings include wolves, grizzly bears, elk, lynx, mountain lions, and moose.

"We wanted to create the next generation of wildlife crossings," said Rob Ament of the Western Transportation Institute. "The goals for the competition also included reducing overall costs, thinking about crossings in a more aesthetic manner, designing more modular crossings, and increasing sustainability."

Competitors were asked to propose design concepts for a wildlife crossing at West Vail Pass on I-70 in Colorado, about 145 km (90 mi) west of Denver. The only east-west Interstate in Colorado, I-70 is a

critical transportation corridor. At the same time, it can be a barrier to the movement of wildlife in the Rocky Mountain region. Designers had to account for many challenges unique to the West Vail Pass area, including snow and severe weather, high elevation and steep grades, a six-lane roadway, a bike path, and high traffic volumes, as well as multiple species of wildlife.

"The goal was to identify more innovative, less expensive, broadly relevant structures that would better protect both wildlife and drivers and improve the overall safety of the roadway," said Roger Surdahl of FHWA's Central Federal Lands Highway Division office. "We also hoped to attract broad international participation in the competition and at the same time generate enthusiasm in the transportation field to envision the solutions these crossings offer."

After receiving 36 submissions from 9 countries, the competition jury selected 5 finalists in November 2010. "Some very useful new ideas were generated by all of the finalists," said Ament. At the 90th Transportation Research Board Annual Meeting in Washington, DC, on January 23, the jury unveiled the winning design by HNTB with Michael Van Valkenburgh Associates of New York City.

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The winning design for the first ARC International Wildlife Crossing Infrastructure Design Competition features a single 100-m (328-ft) concrete span. The bridge is planted with a variety of vegetation types to attract different species to cross.

Safer Driving, Safer Work Zones: National Work Zone Awareness Week 2011

Safer driving. Safer work zones. For everyone.” With the goal of reminding drivers how important it is to keep highway workers, themselves, and their passengers safe, National Work Zone Awareness Week (NWZAW) 2011 will kick off April 4 with an event at the Intercounty Connector project site in Maryland. In 2009, 667 workers and motorists were killed in highway work zones and more than 40,000 were injured. “We want to get the message out to the public that 85 percent of those killed in work zones are drivers and their passengers. How they drive in work zones has a direct impact on their own safety, as well as the safety of workers,” said Chung Eng of the Federal Highway Administration (FHWA).

NWZAW began in 1999 when FHWA, American Traffic Safety Services Association (ATSSA), and the American Association of State Highway and Transportation Officials signed a Memorandum of Agreement pledging to increase public awareness of work zone safety issues through a national media campaign. Since then, agencies and organizations around the country have sponsored high-visibility outreach efforts, including “Go Orange” campaigns in numerous States, where public buildings are lit in orange and citizens are encouraged to wear the color to show support for NWZAW. In California, fallen workers are honored at an Annual Workers Memorial. Tennessee, meanwhile, has sponsored a “Between the Barrels” education initiative for teenagers, while the Virginia Department of Transportation (VDOT) has urged drivers to consider work zones “no phone zones.” Virginia has also established the VDOT Workers Memorial on Interstate 64.

Supporters of this year’s event include State transportation departments, the American Road and Transportation Builders Association (ARTBA), and the Associated General Contractors of America. More details about NWZAW 2011 will be posted at www.atssa.com and www.ops.fhwa.dot.gov/wz/outreach/wz_awareness.htm as information becomes available.

For work zone safety resources, States, contractors, and others can turn to products developed through FHWA’s Work Zone Safety Grant program. From 2006 to 2009, \$17.2 million in grant funds were distributed to provide highway work zone safety training and develop guidelines to prevent and reduce work zone injuries and fatalities. Grants were competitively

awarded to the Laborer’s Health and Safety Fund of North America/ARTBA, ATSSA, Wayne State University in Michigan, and the Illinois Institute of Technology.

A wealth of guidelines, products, publications, and training resources are now available for States and contractors to use, including more than 40 guidelines and publications, 24 training modules, and 2 software applications. Approximately 46,000 workers across the country have

benefited from training developed through the grant to date.

Available products range from the Work Zone Positive Protection Toolbox to Guidelines on Managing Speeds in Work Zones to a field guide on *Work Zone Safety: Temporary*

“We want to get the message out to the public that 85 percent of those killed in work zones are drivers and their passengers.”



The goal of National Work Zone Awareness Week 2011 is to remind drivers that safer driving means safer work zones for everyone.

Traffic Control for Maintenance Operations. A series of pamphlets looks at such topics as operator safety, flagger safety, electrical hazards, and night work risks. Training materials, meanwhile, range from presentations on the “Safe Installation and Removal of Traffic Control Devices” and “Shadow Vehicles for Work Zones” to complete suites of training products, including the “Roadway Safety + Basic Awareness Course” and “Roadway Safety + Runovers/Backovers Course.” For a complete list of the products and resources available and information on how to obtain them, visit www.workzonesafety.org/fhwa_wz_grant.

FHWA also offers a Work Zone Safety and Mobility Peer-to-Peer (P2P) program, which matches agencies with experienced transportation professionals who can provide guidance on how to address common challenges in implementing work zone management strate-

gies. To be matched with a peer, call 866-P2P-FHWA (866-727-3492), or send an email to workzoneP2P@dot.gov. There is no cost to participate in the program.

Detailed work zone safety resources are posted online at the National Work Zone Safety Information Clearinghouse (www.workzonesafety.org). This one-stop “cyber library” provides comprehensive information on laws and regulations, best practices, current research, products, public awareness campaigns, and training materials. Some resources are available in languages other than English, including French, Spanish, Russian, Arabic, Chinese, and Japanese.

To learn more about FHWA’s work zone safety and mobility resources, visit www.ops.fhwa.dot.gov/wz. Information is also available by contacting Chung Eng at FHWA, 202-366-8043 (email: chung.eng@fhwa.dot.gov). *



For work zone safety resources, States and contractors can turn to products developed through FHWA’s Work Zone Safety Grant program, including guidelines, publications, and training modules.

Next Generation Wildlife Crossings,

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HNTB’s design features a single 100-m (328-ft) concrete span across the highway. “Not having a center pier or pillars makes it safer for drivers,” said Ament. The bridge is planted with a variety of vegetation types, including a pine-tree forest and meadow grasses, to attract different species to cross. The modular precast concrete design means that much of the bridge can be constructed offsite and moved into place, shortening construction time and minimizing disruption to the traffic flow.

Competition organizers compared the winning team’s concept cost estimate (and a second adjusted cost estimate recommended by CDOT engineers familiar with West Vail Pass) to the last two overpasses built in Banff. The unit costs for the winning concept were estimated to be nearly 50 percent lower.

“The winning design combines complex ecology and engineering with practical intelligence by taking ordinary technology and recasting it in a new way,” said Nina-Marie Lister, a professor at Ryerson University in Toronto, Canada, and an adviser to the competition. “The jury chose this design because it is not only feasible, but because it has the capacity to transform what we think of as possible—a novel design solution to a growing problem that could serve as a model for the world.”

HNTB received a \$40,000 prize for its design, while the other finalists received \$15,000.

For more information on the competition and to view the winning design, as well as designs by the four other finalists, visit www.arc-competition.com. More information is also available by contacting Rob Ament at Western Transportation Institute, 406-600-6348 (email: rament@coe.montana.edu), or Roger Surdahl at FHWA, 720-963-3768 (email: roger.surdahl@fhwa.dot.gov). *

Highway Technology Calendar

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

First Transportation and Development Institute Congress: Integrated Transportation and Development for a Better Tomorrow March 13–16, 2011, Chicago, IL

Organized by the Transportation and Development Institute of the American Society of Civil Engineers, the conference will bring together transportation and development researchers, engineers, planners, designers, construction managers, and contractors to discuss integrated strategies for smart development. Discussion topics will include transportation operations and safety, pavement and transportation materials, advanced technologies in transportation systems, airport planning and design, and smart development and sustainability. The conference will also feature a technical tour to an engineering project in the Chicago area.

Contact: Sam Tyson at the Federal Highway Administration (FHWA), 202-366-1326 (email: sam.tyson@fhwa.dot.gov), or visit www.tdi-congress.org.

Green Roads Summit March 24, 2011, Las Vegas, NV

The summit will look at a range of green construction topics, including recycling and reuse, stormwater management, fleet operation, and regulatory issues. Emerging trends, rating and evaluation systems, and performance metrics will all be highlighted. Sponsors include FHWA, the U.S. Environmental Protection Agency, Associated General Contractors of America, and the Construction Materials Recycling Association.

Contact: Jason Harrington at FHWA, 202-366-1576 (email: jason.harrington@fhwa.dot.gov), or visit www.conexpoconagg.com/Education/General/GreenRoadsSummit.

2011 Design-Build in Transportation Conference March 28–30, 2011, Kansas City, MO

Join transportation leaders in discussing lessons learned in the use of the design-build project delivery method for transportation projects. The discussions will cover choosing the right delivery method, contracting approaches, risk allocation, and performance contracting. The conference is cosponsored by FHWA, the American Association of State Highway and Transportation Officials (AASHTO), and various industry groups.

Contact: Jerry Yakowenko at FHWA, 202-366-1562 (email: gerald.yakowenko@fhwa.dot.gov), or visit www.designbuildtransportation.com.

Forty-Eighth Annual Petersen Asphalt Research Conference July 11–13, 2011, Laramie, WY

Organized by the Western Research Institute (WRI), the conference will present current research aimed at understanding and improving asphalt performance. Topics covered range from fundamental compositional research to applied field engineering. Attendees are also invited to participate in an open mic discussion.

Contact: Steve Salmans at WRI, 307-721-2306 (email: ssalmans@uwyo.edu), or Jack Youtcheff at FHWA, 202-493-3090 (email: jack.youtcheff@fhwa.dot.gov). Information is also available at www.petersenasphaltconference.org.

2011 Pavement Performance Prediction Symposium July 14, 2011, Laramie, WY

Presented by WRI in cooperation with FHWA's Turner-Fairbank Highway Research Center, the symposium will take an in-depth look at the effects of asphalt binder, mix design, and construction on the durability of pavement.

Contact: Steve Salmans at WRI, 307-721-2306 (email: ssalmans@uwyo.edu), or Jack Youtcheff at FHWA, 202-493-3090 (email: jack.youtcheff@fhwa.dot.gov). Information is also available at www.petersenasphaltconference.org.

Tenth International Conference on Low-Volume Roads July 24–27, 2011, Orlando, FL

Sponsored by the Transportation Research Board, the conference will feature the latest information about low-volume road management, design, construction, safety, maintenance, and other topics. Attendees will also have the opportunity to participate in a half-day field trip to observe and study low-volume road issues.

Contact: For more information, send an email to TRBMeetings@NAS.edu, or visit www.trb.org/LowVolumeRoadsconference/LVR10.aspx.

Second International Conference on Warm Mix Asphalt October 11–13, 2011, St. Louis, MO

Sponsored by the National Asphalt Pavement Association and FHWA, the conference will provide a progress report on the implementation of warm-mix asphalt. Featured topics will include mix design, long-term performance, accelerated performance testing, effects on binder properties, and innovative temperature reduction processes. The conference will be of interest to engineers, researchers, contractors, and transportation agency personnel.

Contact: Matthew Corrigan at FHWA, 202-366-1549 (email: matthew.corrigan@fhwa.dot.gov), or visit www.warmmixasphalt.com.

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Training in Action at the National Highway Institute

Find out how the Federal Highway Administration's (FHWA) National Highway Institute (NHI) is demonstrating *Training in Action* every day with the 2011 edition of NHI's online magazine, available at www.nhi.fhwa.dot.gov/downloads/other/training_in_action_2011.pdf.

Since it opened its doors in 1970, NHI has delivered high-quality training to the transportation workforce. The NHI catalog now features hundreds of courses and workshops in 16 categories, including Web-based courses that transportation professionals can attend without leaving their office.

Training in Action highlights NHI's new and improved Web site, which debuted in 2010. An enhanced design and new features such as "My Training" have improved the site's accessibility and functionality, making it easier to search for NHI courses, download the course catalog, and register for sessions. Among other benefits, "My Training" allows users to directly launch Web-based and Web conference training, request official transcripts, and view and download electronic materials ordered from the NHI Store.

Other highlights explored in the magazine include NHI's new partnerships with the American Society of Civil Engineers' Geo-Institute and the Deep Foundations Institute. The partnerships will provide enhanced geotechnical engineering training focused on designing and constructing transportation structures.

Web-based training opportunities have also been expanded, allowing participants to save both time and money. Through a partnership with the Transportation Curriculum Coordination Council (TCCC),

NHI now offers more than 80 Web-based courses in four technical categories, including Construction and Maintenance and Highway Safety. These TCCC courses have reached nearly 20,000 participants since 2008.

As part of a growing focus on the concept of "livability," many NHI courses are designed to help State transportation agencies reduce their environmental footprints. *Training in Action* takes a look at some of the latest courses that offer state-of-the-practice strategies to help transportation professionals make their projects more sustainable, including Transportation and

Land Use (Course No. FHWA-NHI-151043) and Design and Implementation of Erosion and Sediment Control (Course No. FHWA-NHI-142054).

NHI's international training efforts in 2010 are also featured, including the first full-length NHI course held in Kuwait and information about NHI's 2-week training session for engineers from South Korea on new developments in the Pavements and Materials program area.

To download the 2011 edition of *Training in Action*, visit www.nhi.fhwa.dot.gov/downloads/other/training_in_action_2011.pdf. *

Visit www.nhi.fhwa.dot.gov to learn more about training in action at the National Highway Institute.

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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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Highway Technology Calendar,

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Fifth Asphalt Shingle Recycling Forum October 27–28, 2011, Dallas, TX

Organized by the Construction Materials Recycling Association, the forum will cover all aspects of the opportunities offered by shingle recycling. Using recycled asphalt shingles in hot-mix asphalt and other construction applications can save money and conserve natural resources, while maintaining quality.

Contact: Audrey Copeland at FHWA, 202-493-3097 (email: audrey.copeland@fhwa.dot.gov), or visit www.shinglerecycling.org.

National Bridge Management, Inspection, and Preservation Conference October 31–November 4, 2011, St. Louis, MO

Building upon FHWA's successful 2007 National Bridge Preservation Workshop, the conference will feature separate tracks for

bridge management, inspection, and preservation topics. "Making the Case for Bridge Preservation" and "Next Generation Bridge Inspection" will also be featured themes. The conference is sponsored by FHWA and AASHTO.

Contact: For more information, visit www.TSP2.org/bridge.

Industrial Byproducts Conference November 1–2, 2011, Austin, TX

Sponsored by FHWA, the Industrial Resources Council, and the Rubber Manufacturers Association, the conference will highlight the use of industrial byproducts in road construction.

Contact: Jason Harrington at FHWA, 202-366-1576 (email: jason.harrington@fhwa.dot.gov), or visit www.RMA.org. *



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www.fhwa.dot.gov/publications/focus/index.cfm