

FOCUS

March
2013

INSIDE

- 2** Pavement Management Roadmap: Achieving the long-term vision for pavements
- 4** Building a better concrete pavement
- 5** SHRP 2 Implementation Assistance Program now accepting applications
- 5** Join the Asset Management Book Club
- 6** Highway technology calendar
- 7** Infrastructure innovation webinars

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



U.S. Department
of Transportation

**Federal Highway
Administration**

Meet the New Steel Bridge Design Handbook

Find the information you need to make decisions about the selection, design, fabrication, and construction of steel bridges with the Federal Highway Administration's (FHWA) new *Steel Bridge Design Handbook* (Pub. No. FHWA-IF-12-052).

The publication was first released by the United States Steel Corporation (U.S. Steel) in the 1970s as the *Highway Structures Design Handbook*, serving as the "go to" practitioner's reference for information on such topics as economy, fabrication, fatigue, steel properties, and composite beam design. Since the original publication, some topics had been revised, new topics introduced, and several design examples published by U.S. Steel and the National Steel Bridge Alliance (NSBA). Developed in partnership with NSBA, the new Handbook represents the first full update. "The goal of providing a comprehensive, nationally recognized, up-to-date reference tool for bridge engineers has been achieved," said Brian Kozy of FHWA's Office of Bridge Technology.

The 19-volume Handbook supports and expands upon the philosophies, methodologies, and provisions of the *AASHTO LRFD Bridge Design Specifications* released by the American Association of State Highway and Transportation Officials (AASHTO). These specifications use the Load and Resistance Factor Design (LRFD) methodology.

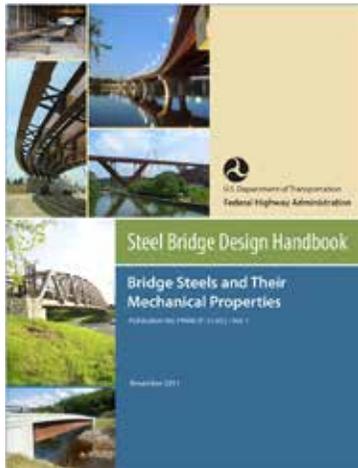
Topics covered in the Handbook are:

- **Volume 1**—Bridge Steels and Their Mechanical Properties.

- **Volume 2**—Steel Bridge Fabrication.
- **Volume 3**—Structural Steel Bridge Shop Drawings.
- **Volume 4**—Structural Behavior of Steel.
- **Volume 5**—Selecting the Right Bridge Type.
- **Volume 6**—Stringer Bridges: Making the Right Choices.
- **Volume 7**—Loads and Load Combinations.
- **Volume 8**—Structural Analysis.
- **Volume 9**—Redundancy.
- **Volume 10**—Limit States.
- **Volume 11**—Design for Constructability.
- **Volume 12**—Design for Fatigue.
- **Volume 13**—Bracing System Design.
- **Volume 14**—Splice Design.
- **Volume 15**—Bearing Design.
- **Volume 16**—Substructure Design.
- **Volume 17**—Bridge Deck Design.
- **Volume 18**—Load Rating of Steel Bridges.
- **Volume 19**—Corrosion Protection of Steel Bridges.

Also featured in the Handbook are six detailed design examples, including a three-span continuous straight I-girder bridge, a two-span continuous straight wide-flange beam bridge, and a three-span continuous curved tub-girder bridge. The design examples cover such topics as steel framing, loads, structural analysis, limit states, and sample calculations.

continued on page 2 >



The Handbook's many topics and design examples provide bridge engineers with the technical information needed to support sound decisionmaking when building steel bridges. "The primary audience for the Handbook is the large number of young engineers in the new generation who are tasked with the design of steel bridges and may not have immediate access to experienced senior engineers to help them through the bridge design process," said Kozy. "The broader audience is all bridge engineering professionals, who will benefit from the sharing of valuable knowledge and perspectives as we move toward safer, more economical, and more durable bridge construction."

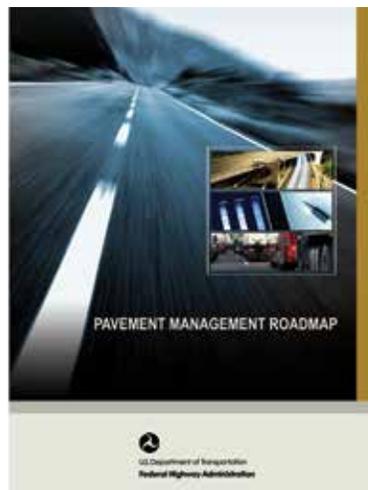
To download the Handbook volumes at no cost, visit www.fhwa.dot.gov/bridge/steel/pubs/if12052. The Handbook is also available on the NSBA Web site at www.steelbridges.org. For more information on the Handbook, contact Brian Kozy at FHWA, 202-493-0341 (email: brian.kozy@dot.gov). *

Pavement Management Roadmap: *Achieving the Long-Term Vision for Pavements*

It's the roadmap to your pavement's future. In 2010, the Federal Highway Administration (FHWA) introduced the *Pavement Management Roadmap* (Pub. No. FHWA-HIF-11-011), a long-term vision for pavement management and the research, development, and technology transfer initiatives needed to help transportation agencies achieve that vision. Over the past year, FHWA launched an implementation campaign designed to increase awareness of the *Roadmap* and move forward in accomplishing its goals.

Asset management provides a coordinated approach to managing infrastructure assets over the course of their life cycle, thereby improving performance, increasing safety, and providing greater value to the community. A new emphasis on asset management in recent years has also meant a new role for pavement management.

"Today asset management managers rely on pavement management data to develop a strategic program of projects that will make progress toward achieving the State's targets for asset condition and performance of the National Highway System," said Nastaran Saadatmand of FHWA.



To help agencies more fully utilize their pavement management systems (PMS), the *Roadmap* identifies the steps needed 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, metropolitan planning organizations, academia, and private industry.

The *Roadmap* contains 23 short-term needs (over 5 years) and 24 long-term needs (over 5 to 10 years). Meeting these needs would require more than \$14.5 million in funding. Needs are 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.

Implementation activities include setting up a network of *Roadmap* research sponsors, which held an initial meeting in October 2012. Participants included representatives from State transportation agencies, academia, and FHWA. This network will share information, pool resources to advance the needs and projects outlined in the *Roadmap*, and prevent duplication of effort.

FHWA has also launched a *Pavement Management Roadmap* Web site. Visitors to the site can download the *Roadmap* and related documents, including project reports and the Roadmap Marketing Plan. Also featured are updates on *Roadmap*



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Highway agencies rely on pavement management data to develop a strategic program of highway maintenance and rehabilitation projects.

goals and activities, information on how States are implementing PMS, and links to related publications and Web sites. Visitors have the opportunity to submit questions and comments about the *Roadmap* and how they can be involved in implementing its goals. To start using the site's many resources, visit www.fhwa.dot.gov/pavement/management/roadmap.

Research projects being conducted across the country are helping to achieve the *Roadmap's* vision and advance pavement management. Results from these initiatives are being shared nationwide through the *Roadmap* network and Web site. Projects include the Development of Cost-Effective Pavement Treatment Selection and Treatment Performance Models, sponsored by the Louisiana Department of Transportation and Development (LADOTD) and Louisiana Transportation Research Center. Conducted by researchers at the University of Louisiana at Lafayette and funded at \$267,395, the study's goal is to develop pavement treatment performance models to support the cost-effective selection of pavement rehabilitation and maintenance treatments. These treatments include chip seals, crack seals, micro surfacing, and both thin and thick overlays.

"Pavement performance models for each distress type have been developed based on each pavement type and for each pavement treatment. Pavement treatment trigger values are also being calibrated based on the optimum time for treatment application," said Mohammad Jamal Khattak of the University of Louisiana at Lafayette. Once these analyses are completed, a comprehensive software package will be developed and integrated into LADOTD's existing PMS. This new software will assist highway engineers in determining the optimum treatment type and timing based on life-cycle cost analyses.

In Ohio, a recently completed \$380,883 study on Benefit Cost Models to Support PMS Decisions is helping the Ohio Department of Transportation (ODOT) to improve its pavement management processes. Tools developed from the project are being rolled into a PMS, the Deighton Total Infrastructure Management System (dTIMS CT). The system includes data on pavement design history, rehabilitation actions, costs, and performance in terms of pavement condition and ride quality. Among the new tools are

Research projects being conducted across the country are helping to achieve the *Roadmap's* vision and advance pavement management.

condition forecasting models, optimization routines, decision tree logic that is user specified, and treatment history that includes cost. System tools provide decisionmakers with the ability to predict future pavement condition, assess treatment strategies, and perform a "what if" analysis of both financial impact and the effect on the traveling public.

Given the size of Ohio's pavement network and the number of competing project candidates, the number of feasible alternatives analyzed by the PMS could be quite large. The study aimed to enhance the system by developing a procedure that would quickly narrow down the project alternatives and present the optimal choices. "This was a highly successful project," said Andrew Williams of ODOT. "We can do a lot of things now we only dreamed of a few years ago." The enhanced system can forecast pavement distress, for example, and then use decision logic to assist ODOT engineers in determining the best treatment. ODOT is scheduled to start using the new system in spring 2013. "This was a great case of exploring research options that rolled into an enterprise solution," said Williams.

Advancing the *Roadmap's* goal of showcasing best practices for pavement management, a new *Pavement Management Guide* was developed under National Cooperative Highway Research Program Project 20-07, replacing a 2001 version of the guide. Updates include an increased emphasis on using preventive maintenance treatments as part of a pavement preserva-

continued on page 8 >

Building a Better Concrete Pavement

Workshop Offers Practical Guide to Quality

Achieve better, longer lasting concrete pavements through an effective quality assurance (QA) process.

A free 2-day workshop for State transportation agencies and contractors offered by the Federal Highway Administration (FHWA), “Quality in the Concrete Paving Process” provides a practical overview of the steps that lead to high performing, more durable pavements.

“The workshop features real-world examples and emphasizes that everyone involved in a project must understand how their role affects the overall quality of the pavement,” said Gary Crawford of FHWA.

FHWA’s Mobile Concrete Laboratory (MCL) will visit the host State to collect data on a current concrete paving project (if one is available) prior to a scheduled workshop. Data collected will be incorporated into the workshop so that the principles covered can be illustrated with local examples. The MCL’s visit also provides an opportunity to demonstrate innovative concrete pavement technologies to State and contractor staff.

Topics covered in the workshop include quality assurance concepts, materials, prepping and mixture production, paving, construction inspection, and project acceptance. Workshops can host up to 30 participants. Attendees will receive a participant manual, Field Quality Guide, Testing Guide, and a flash drive containing all workshop materials and other reference manuals, including

the American Concrete Pavement Association Concrete Pavement Field Reference Series.

For more information or to schedule the workshop in your State, contact Gary Crawford at FHWA, 202-366-1286 (email: gary.crawford@dot.gov), or Jim Grove at FHWA, 515-294-5988 (email: jim.grove@dot.gov). *



Top and left: FHWA’s Mobile Concrete Laboratory will visit States hosting the “Quality in the Concrete Paving Process” workshop to collect data on a current paving project. *Right:* The workshop offers a practical overview of how to build high performing, more durable pavements.

SHRP 2 Implementation Assistance Program Now Accepting Applications

The Federal Highway Administration (FHWA) and American Association of State Highway and Transportation Officials (AASHTO) are accepting applications for the new SHRP 2 Solutions Implementation Assistance Program. This initiative will help transportation agencies begin deploying products developed under the second Strategic Highway Research Program (SHRP 2) (see January/February 2013 *Focus*). Research projects conducted under SHRP 2 have resulted in an array of advanced tools and technologies for improving highway safety, renewal, reliability, and capacity.

Products included are:

- Innovative Bridge Designs for Rapid Renewal (Product R04).
- Managing Risk in Rapid Renewal Contracts (Product R09).
- Innovative Strategies for Managing Complex Projects (Product R10).
- Preservation Options for High-Volume Roadways (Product R26).
- Implementing Eco-Logical (Product C06).
- Organizing for Reliability Tools (Products L01/L06).

Implementation assistance is available for hosting a pilot project, serving as a “lead adopter” or Lead State for the technology, or using the new product. Approximately \$10.5 million in funding is available, with the amount of awards varying by product and level of assistance. Depending on the product, State departments of transportation and metropolitan planning organizations are eligible for the awards. Selection criteria include geographic location, current or past interest in implementing similar products, and a demonstrated ability to implement new products or processes.

For more information or to apply, visit www.fhwa.dot.gov/goshrp2. All applications must be submitted by March 22, 2013. Awards will be announced starting in mid April. FHWA and AASHTO expect to announce a second round of implementation opportunities this summer.

To learn more about SHRP 2 and the individual products, visit <http://SHRP2.transportation.org>. Additional information is available by contacting Carin Michel at FHWA, 410-962-2530 (email: goSHRP2@dot.gov), or Pam Hutton at AASHTO, 303-263-1212 (email: phutton@aaashto.org). *



Join the Asset Management Book Club

Take a journey through the many facets of transportation asset management with the new online Asset Management Book Club.

Sponsored by the Federal Highway Administration (FHWA) and American Association of State Highway and Transportation Officials (AASHTO), this series of free Webinars will review the content of the AASHTO *Transportation Asset Management Guide: A Focus on Implementation* and share experiences from practitioners. Released in 2011, the Guide provides strategies transportation agencies can use to both preserve their highway assets and realize the greatest value from their resource allocations.

With an asset management approach, decisions on what would be the most effective mix of maintaining, repairing, 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.

Webinars will be held from 2–3:30 p.m. (eastern daylight time) on the following dates:

- March 27, 2013
- April 24, 2013
- May 22, 2013
- June 26, 2013
- July 24, 2013
- August 28, 2013
- September 25, 2013

Advance registration is required for each individual Webinar. To register, visit www.fhwa.dot.gov/asset/bookclub.cfm. For more information, contact Nastaran Saadatmand at FHWA, 202-366-1337 (email: nastaran.saadatmand@dot.gov). To obtain a copy of the Guide, visit the AASHTO Bookstore at https://bookstore.transportation.org/item_details.aspx?id=1757. *

Highway Technology Calendar

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

2013 Design-Build in Transportation Conference

March 18–20, 2013, Orlando, FL

Join transportation leaders in discussing lessons learned in the use of the design-build project delivery method for transportation projects. Discussions will cover choosing the right delivery method, contracting approaches, innovative financing solutions, risk allocation, and performance contracting.

Contact: Jerry Yakowenko at the Federal Highway Administration (FHWA), 202-366-1562 (email: gerald.yakowenko@dot.gov), or visit www.dbtranspo.com.

Seventh National Seismic Conference on Bridges and Highways

May 20–22, 2013, Oakland, CA

Conference sessions will focus on understanding and mitigating damage to the Nation's highway infrastructure from earthquakes and other natural hazards. Sponsors include FHWA; the California Department of Transportation; Transportation Research Board; American Association of State Highway and Transportation Officials; University at Buffalo, The State University of New York; and the Multidisciplinary Center for Earthquake Engineering Research.

Contact: Phillip Yen at FHWA, 202-366-5604 (email: wen-huei.yen@dot.gov), or visit <http://7nsc.info>.

Second National Covered Bridge Conference

June 5–8, 2013, Dayton, OH

The FHWA National Historic Covered Bridge Preservation Program is sponsoring the conference in partnership with the National Park Service and U.S. Forest Service. Themes include research and rehabilitation projects, best practices for rehabilitation, and continuing threats and challenges to covered bridges, including damage caused by Hurricane Irene and Tropical Storm Lee in 2011. Participants will have the opportunity to tour several historic covered bridges.

Contact: Everett Matias at FHWA, 202-366-6712 (email: everett.matias@dot.gov), or visit www.woodcenter.org/2013-national-covered-bridge-conference.

Fiftieth Annual Petersen Asphalt Research Conference

July 15–17, 2013, Laramie, WY

Organized by the Western Research Institute (WRI), the conference presents current research aimed at understanding and improving asphalt per-

formance. Topics range from fundamental compositional research to applied field engineering. Participants are invited to take part 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@dot.gov). Information is also available at www.petersenasphaltconference.org.

2013 Pavement Performance Prediction Symposium

July 18, 2013, Laramie, WY

Presented by WRI in cooperation with FHWA's Turner-Fairbank Highway Research Center, the symposium will take an in-depth look at a single asphalt-related topic.

Contact: Steve Salmans at WRI, 307-721-2306 (email: ssalmans@uwyo.edu), or Jack Youtcheff at FHWA, 202-493-3090 (email: jack.youtcheff@dot.gov). More information on the selected topic will be available at www.petersenasphaltconference.org. *

Infrastructure Innovation Webinars

These free Webinars provide a quick introduction to the latest infrastructure innovations and technologies.

Transportation Asset Management (AM) Webinar Series

Asset Management Business Models and Barriers to Implementation

March 13, 2013, 2–3:30 p.m.
(eastern daylight time)

Presentations will explore the strengths and limitations of specific AM business models and share lessons learned in overcoming barriers to implementation. Discussions will focus on integrating organizational units, systems, and data with agencies' AM business models. State agency representatives will also discuss how strong AM practices can help in building the case for needed funding.

Asset Management and Risk Management

May 8, 2013, 2–3:30 p.m.
(eastern daylight time)

The Webinar will explore how transportation agencies successfully inte-

grate principles of risk management into their asset management framework. Presentations will examine ways in which agencies link components of risk management and asset management to improve strategic and operational performance.

The Webinar series is sponsored by the American Association of State Highway and Transportation Officials (AASHTO) and the Federal Highway Administration (FHWA). For more information or to register, visit <http://tam.transportation.org/Pages/Webinars.aspx>. Videos and slides from previous Webinars in the series are posted on the registration page. Previous sessions covered Asset Management and Safety and Asset Management and Performance Management. Information is also available by contacting Steve Gaj at FHWA, 202-366-1336 (email: stephen.gaj@dot.gov).

Asset Management Book Club

All Webinars are from 2–3:30 p.m. eastern daylight time.

March 27, 2013

April 24, 2013

May 22, 2013

June 26, 2013

July 24, 2013

August 28, 2013

September 25, 2013

In 2011 AASHTO published the *Transportation Asset Management Guide: A Focus on Implementation*, which encourages transportation agencies to use asset management principles. Sponsored by FHWA and AASHTO, this Webinar series will review the content of the guide and share experiences from practitioners. To register, visit www.fhwa.dot.gov/asset/bookclub.cfm. Advance registration is required for each individual Webinar. For additional information, contact Nastaran Saadatmand at FHWA, 202-366-1337 (email: nastaran.saadatmand@dot.gov).*



For additional asset management resources, visit www.fhwa.dot.gov/asset.

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-13-011
HIF-1/03-13(WEB)E

Pavement Management Roadmap,

continued from page 3

tion program. Advances in technology that have improved data quality and integration are also featured in the guide, as well as information on performance management and asset management principles. To purchase a copy of the new guide, visit the American Association of State Highway and Transportation Officials Bookstore at <https://bookstore.transportation.org>.

An FHWA project on "Optimization of and Maximizing the Benefits from Pavement Management Data Collection" supports the *Roadmap* goal of developing improved methodologies for evaluating data quality. The project will analyze the balance between the cost and resources needed for data collection and analysis and the resulting benefits gained from applying the data to pavement management decisions. Funded at \$485,072, project tasks include identifying an optimum set of pavement condition data items, the effect of sampling and data quality on pavement management decisions, and the recommended frequency of data collection for an effective PMS. Also being developed are best practices and guidelines for integrating design, material, and construction information within a PMS. FHWA expects to release a final project report in 2013.

FHWA also launched a \$600,000 project in October 2012 that will evaluate and validate the traffic speed deflector (TSD) and rolling wheel deflector. "The study will assess the technology's ability to provide a reliable and robust network level structural assessment for pavements," said Nadarajah Sivaneswaran of FHWA. To complement the project, FHWA will lead a transportation pooled fund study to demonstrate the TSD device to State transportation agencies and spotlight how it can be used in pavement management applications. The TSD is currently being used in Europe and Australia, with deployment also beginning in South Africa.

More information on these and other *Pavement Management Roadmap* research projects is available at www.fhwa.dot.gov/pavement/management/roadmap. As additional project results are available, they will be added to the *Roadmap* Web site at www.fhwa.dot.gov/pavement/management/roadmap/activities.cfm. To learn more about how your agency or organization can get involved in supporting the *Roadmap* initiative, visit www.fhwa.dot.gov/pavement/management/roadmap/involvement.cfm, or contact Nastaran Saadatmand at FHWA, 202-366-1337 (email: nastaran.saadatmand@dot.gov). *