

FHWA R&T Now ~ March 2013~

A news update of research, technology, and development from the U.S. Department of Transportation (USDOT), Federal Highway Administration (FHWA)

GENERAL/ADMINISTRATIVE

SHRP2 Implementation Update

FHWA is working closely with the American Association of State Highway and Transportation Officials (AASHTO) and the Transportation Research Board (TRB) to implement the priority products included in a joint 3-year plan for the Second Strategic Highway Research Program (SHRP2). The plan calls for approximately six SHRP2 Solutions (or product groupings) to begin implementation each year, based on the assessed priority and readiness of each product. Implementation plans have been finalized for the first set of priority products. These plans include technical briefings, training, as well as opportunities for States to deploy and evaluate the products.

In February, FHWA and AASHTO announced a SHRP2 Implementation Assistance Program that solicits States and other transportation agencies to advance SHRP2 Solutions and to engage in implementing and deploying the six SHRP2 products. The program includes proof of concept pilots, lead adopter incentives, and user incentives tailored to each product. Numerous outreach efforts (including informational Webinars and the launch of a SHRP2 implementation assistance Web site, www.fhwa.dot.gov/goshrp2) have served to promote the Implementation Assistance Program. The solicitation period closes on March 22, and awards will be announced later in the spring.

On March 28 and 29, AASTHO's SHRP2 Implementation Task Force will reconvene to reassess the priorities in the SHRP2 3-year Implementation Plan. FHWA and AASHTO will then prepare a joint revised plan and budget for moving forward.

For more information, contact Carin Michel, 410-962-2530, carin.michel@dot.gov.

Petri Heads Hearing on Administration's Implementation of MAP-21

On March 14, 2013, Tom Petri, who represents Wisconsin's 6th Congressional District in the U.S. House of Representatives and is the chairman of the Subcommittee on Highways and Transit of the Transportation and Infrastructure Committee, led a hearing focused on the implementation of reforms and requirements included in the Moving Ahead for Progress in the 21st Century Act (MAP-21).

MAP-21 is the current surface transportation law, which was enacted last July and expires at the end of Fiscal Year 2014. The law includes a number of reforms and mandates to help streamline the project approval process, consolidate U.S. Department of Transportation programs, and improve program accountability.

"Ensuring that the Department of Transportation is making progress in implementing MAP-21 provisions, and preparing for the next surface transportation reauthorization are both Committee priorities this Congress," Petri said. "I look forward to hearing from the Department on its efforts to implement major reforms such as project delivery and program consolidation required by MAP-21."

Witnesses at the hearing included Federal Highway Administration Administrator Victor M. Mendez; Federal Transit Administration Administrator Peter M. Rogoff; Federal Motor Carrier Safety Administration Administrator Anne S. Ferro; and National Highway Traffic Safety Administration Administrator David L. Strickland.

For more information, including the testimony and live Web cast link, visit <http://transportation.house.gov/hearing/implementing-map-21-progress-report-us-dot-modal-administrators>.

ADVANCED RESEARCH

Advancing Multiscale Modeling Techniques

Mix design methods for infrastructure materials used to be highly empirical and depend on representative tests and traditional modeling techniques to evaluate properties and assess behavior. Because of scaling effects and environmental and structural differences between the laboratory and field, these methods may not accurately predict material performance. “Mechanical and Structural Nanoscale Modeling” is an FHWA Exploratory Advanced Research (EAR) Program study in partnership with Virginia Polytechnic Institute and State University, aimed at improving multiscale modeling techniques. The EAR Program has published the fact sheet, “Predicting Materials Behavior: Advancing Multiscale Modeling Techniques” (Publication No. FHWA-HRT-12-070), which provides the details of this study.

This document is available at www.fhwa.dot.gov/advancedresearch/pubs/12070/index.cfm.

For more information about the EAR Program, contact David Kuehn, 202-493-3414, david.kuehn@dot.gov.

IEEE Workshop on Multimodal and Alternative Perception for Visually Impaired People

A workshop on Multimodal and Alternative Perception for Visually Impaired People (MAP4VIP) will be held at the Institute of Electrical and Electronics Engineers International Conference on Multimedia and Expo, scheduled for July 15–19, 2013 in San Jose, California. Directed by the principle investigator of an EAR project on “Intelligent Situation Awareness and Navigation Aid for Visually Impaired Persons,” the workshop will bring together researchers and practitioners from numerous disciplines, including those focused on computer vision, neuroscience, multimedia computing, sensor technologies, and assistive technology applications.

The participants are expected to discuss the fundamental issues in visual perception, computational intelligence, neuroscience, and visual prosthesis for helping the blind and visually impaired and those working in visually challenged environments. The workshop should provide the multimedia community with a better understanding of human perception, the human brain, and human-machine interaction issues for assisting visually impaired and challenged individuals. Specific topics include computer vision, sensing, and learning algorithms; visual prostheses and human-computer interaction; and neuroscience/biomechanical/psychological/societal studies.

Workshop information is available at www.icme2013.org/workshops.php.

For more information, contact Mohammed Yousuf, 202-493-3199, mohammed.yousuf@dot.gov.

INFRASTRUCTURE

Chloride Contaminated Grout Studies Complete

In response to findings of chloride contaminated grout in a post-tensioned (PT) concrete bridge in Texas and similar problems with several bridges in Florida, FHWA initiated a multiphased program to address concerns about potential corrosion. The program involved conducting two studies at Turner-Fairbank Highway Research Center (TFHRC).

The first study focused on developing recommended guidance for grout sampling, testing, data analysis, and interpretation of results. This resulted in a draft guide, which includes recommendations for courses of action to be taken by State transportation departments when grout deficiencies are identified. The guide is complete and is expected to be published soon.

The second study, which was completed in December 2012, examined the effects of chlorides on the long-term performance of post-tensioning systems. The research included a six-month period of accelerated corrosion testing on full-scale components and PT strand/duct systems under varying levels of chloride concentration, relative humidity, and temperature. A draft report documenting the results of this study and its conclusions is being reviewed and finalized. This study provides the basis on which an acceptable “chloride threshold” can be determined, and assists in predicting the long-term performance and potential for corrosion in PT systems that may be subjected to elevated levels of chloride.

FHWA’s Office of Bridges and Structures (HIBS) is using the results of the second study to develop and recommend actions to mitigate future performance concerns for tendons with chloride contaminated grout. HIBS is also developing and deploying training and quality control and assurance procedures in cooperation with the industry and AASHTO to help prevent a similar issue from occurring again.

For more information, contact Paul Virmani, 202-493-3052, paul.virmani@dot.gov.

Ultrasonic Culvert Inspection System

TFHRC’s Hydraulics Laboratory has been working with the Southwest Research Institute (SwRI) to develop a field prototype for inspecting culverts. There are an estimated 2,000,000 culvert units supporting the Nation’s highway infrastructure. Thousands of culvert pipes are damaged every year in floods, costing millions to repair and/or replace. This damage can also cause traffic delays. The focus of this research is the development of an inexpensive, easy-to-deploy system for use in both water-filled and dry culverts (as compared to the traditional and costly rover-based systems). The prototype floatable system is about 2 feet (0.6 meters) in length and consists of an ultrasonic-based system designed to image culverts.

So far, three generations of laboratory prototypes have been developed and validated at the TFHRC Hydraulics Laboratory. On February 27, 2013, researchers tested a first generation field prototype at a full-size corrugated-metal culvert pipe inside TFHRC. They tested a pipe in dry and wet conditions (using water from a nearby fire hydrant). SwRI is scheduled to present the final results via a Web conference scheduled for March 26. Researchers will discuss the probe commercialization plan and possible next phase advancements, including incorporation of the rovers/robotics transport mechanism for dry culvert applications.

For more information, contact Frank Jalinoos, 202-493-3082, frankjalinoos@dot.gov.

Structural Design with Lightweight Concrete

The performance of modern lightweight concrete has been demonstrated to surpass the performance levels predicted by AASHTO’s Load and Resistance Factor Design (LRFD) Bridge Design Specification. At TFHRC, FHWA’s structures research group is assisting AASHTO in the development of revised specifications that will address updated performance expectations as well as broader shortcomings with the current organization of the relevant specifications. The revisions will be based on the existing body of knowledge, including the 100 structural tests completed at TFHRC since 2007. The researchers presented the framework of revisions to AASHTO’s Standing Committee on Bridges and Structures (SCOBS) Concrete Structures Technical Committee T-10 in September and will deliver full details in 2013. Supporting documents include National Technical Information Service (NTIS) Reports PB2013-102358 and PB2013-102359.

For more information, contact Ben Graybeal, 202-493-3122, benjamin.graybeal@dot.gov.

Long-Term Bridge Performance Program Update

On March 18, 2013, the long-term data collection phase began within the Mid-Atlantic cluster in cooperation with partners from Delaware, Maryland, New Jersey, Pennsylvania, Virginia and West Virginia, the District of Columbia, and Rutgers University, a contractor. The Long-Term Bridge Performance (LTBP) team has identified the

performance parameters to be monitored on the initial 24 bridges for periodic testing and evaluation. The team is currently meeting with the owners from the remaining 13 clusters to identify the number and location of bridges that will be subjected to detailed data collection and evaluation.

The team will take advantage of an innovative new way to help assess the condition of concrete bridge decks with an automated robot that can save time and money. This robot, a research product of the LTBP program, combines a number of advanced, customized imaging technologies to give its human counterparts more accurate, real-time information about the deck's overall health. The robot will undergo further validation and evaluation over the next 9 months through testing of the Mid-Atlantic cluster bridges. The LTBP program was successful in holding a number of key meetings with the Transportation Research Board LTBP Committee, three expert task groups, industry groups, and State coordinators.

For more information, contact Hamid Ghasemi, 202-493-3024, hamid.ghasemi@dot.gov.

LTTP Develops New MEPDG Default Traffic Datasets and LTTP-PLUG Software

The Long-Term Pavement Performance (LTTP) program has evaluated the applicability and identified the limitations of the existing Mechanical-Empirical Pavement Design Guide (MEPDG) global traffic loading defaults. The research-quality weigh-in-motion (WIM) data from the LTTP Specific Pavement Study (SPS) Traffic Data Collection Pooled-Fund Study was used to develop improved global default axle loading values. In addition, the LTTP-Pavement Loading User Guide (LTTP-PLUG) was developed as a stand-alone guide and database software application to provide guidance in developing axle loading defaults and selecting defaults for MEPDG use for sites that lack site-specific WIM data or have data of limited quality. This application can work with LTTP and user-provided WIM data summaries and produces axle load distribution input files for use with the National Cooperative Highway Research Program (NCHRP) 1-37A and DARWin-ME™ software products. Beta testing of LTTP-PLUG will run until June 14, 2013.

For more information, contact Aramis Lopez, 202-493-3145, aramis.lopez@dot.gov.

LTTP Will Soon Monitor WMA Pavements

The LTTP program initiated a new WMA project in the summer of 2012 to evaluate WMA performance in the short- and long-term. The documentation that will be developed under this project will be used to solicit, construct, test, and monitor WMA pavements as part of the LTTP program. The LTTP program will be starting recruitment for the new WMA experimental sites in late summer of 2013.

For more information, contact Aramis Lopez, 202-493-3145, aramis.lopez@dot.gov.

Rapid-Strengthening Ultra-High Performance Concrete

Ultra-high performance concrete (UHPC) has garnered interest from the highway infrastructure community for its ability to create strong, robust, field-cast connections between prefabricated structural components. Recent research completed at TFHRC evaluated the compressive mechanical response of a rapid-strengthening UHPC formulation exposed to a range of curing conditions. The results provide an indication of anticipated performance for field-cast UHPC as well as relationships between time, curing temperature, compressive strength, and modulus of elasticity. A summary of the study can be found in Tech Brief HRT-12-064, and the full results are presented in NTIS Report PB-2012-112545.

For more information, contact Ben Graybeal, 202-493-3122, benjamin.graybeal@dot.gov.

Fact Sheet: Identification of Nondestructive Evaluation Needs for the United States Highway Infrastructure

In September 2012, FHWA's Office of Infrastructure Research and Development (R&D) held a 2-day workshop to develop a list of prioritized needs for the nondestructive evaluation of U.S. highway infrastructure. The list will be used to determine new research and development activities required to create a new strategic vision and roadmap for the program. This document presents the list of needs identified at the workshop by nondestructive evaluation and structural health monitoring experts.

This document is available at www.fhwa.dot.gov/publications/research/infrastructure/pavements/13056/index.cfm

For more information, contact Shane Boone, 202-493-3064, shane.boone@dot.gov.

TechBrief: Material Characterization of Field-Cast Connection Grouts

Prefabricated bridge element and system construction concepts frequently rely on field-cast grouts to complete the connections between discrete precast concrete elements. A variety of grouts are available, each with unique performance attributes. This TechBrief discusses a study on the performance of a representative sample of grouts in terms of relevant material properties. The study reports on the performance of eight specific grouts representing five different types of grout. Although many of these grouts could be used in a post-tensioned connection system, the tests investigated the performance of the grouts in a non-post-tensioned condition.

The document is available at www.fhwa.dot.gov/publications/research/infrastructure/structures/bridge/13042/index.cfm.

For more information, contact Ben Graybeal, 202-493-3122, benjamin.graybeal@dot.gov.

TechBrief: Surface Resistivity Test Evaluation as an Indicator of the Chloride Permeability of Concrete

This TechBrief discusses a study focused on investigating the correlation of the surface resistivity test with the widely used the rapid chloride permeability test in evaluating the ability of concrete to resist chloride penetration, including high-volume fly ash mixtures.

The document is available at www.fhwa.dot.gov/publications/research/infrastructure/pavements/13024/index.cfm.

For more information, contact Ahmad Ardani, 202-493-3422, ahmad.ardani@dot.gov.

SAFETY

FHWA Releases Version 8.1.0 of Interactive Highway Safety Design Model

FHWA's Office of Safety R&D recently released version 8.1.0 of the Interactive Highway Safety Design Model (IHSDM) to support the proposed freeway chapter of AASHTO's Highway Safety Manual (HSM), Part C: Predictive Method. This updated 2012 Public Release can be downloaded for free at www.ihsdm.org.

The 8.1.0 version expands and improves software features by adding a Calibration Utility for freeway segments via the IHSDM Administration Tool (or Admin Tool). The "Calibrate Using Site Data" option is intended to assist agencies in implementing the calibration procedures described in the Appendix of the proposed freeway chapter, which is currently in process under AASHTO's balloting (or production) phase.

Existing registered IHSDM users can use their IHSDM username and previously assigned password to access and download this update. Also, a "call home" feature has been updated to remind and guide users (who launch an earlier version of IHSDM) through the latest software updates. New users are encouraged to click on the "download registration" link at www.ihsdm.org. Here users can find additional information related to case studies/user applications, past Webinar materials, and frequently asked questions.

IHSDM Technical Support is available at 202-493-3407, IHSDM.support@dot.gov. For training course information, visit <http://nhi.fhwa.dot.gov>.

For more information, contact Clayton Chen, 202-493-3054, clayton.chen@dot.gov

Three Papers Accepted for Driving Assessment Conference

Researchers from FHWA's Office of Safety R&D will present papers on cooperative adaptive cruise control, active traffic management sign comprehension, and traffic sign detection and identification at the 7th International Driving Symposium on Human Factors in Driver Assessment, Training and Vehicle Design to be held June 17–20, 2013 in Bolton Landing, New York.

Cooperative adaptive cruise control permits vehicles and infrastructure to communicate, providing the capability to maintain safety while increasing travel lane capacity. The paper, "Cooperative Adaptive Cruise Control: Critical Human Factors Issues and Research Questions," identifies research areas and questions that may guide future research to evaluate the safety, efficacy, and acceptance of this new technology.

Another paper, "Active Traffic Management Sign Comprehension," discusses a study that used laboratory procedures to examine driver comprehension of and preference for various variable speed limit and lane control sign messages. The results indicate that while participants sometimes make errors interpreting some advisory messages, they generally correctly interpret lane control and speed limit active traffic management signs.

The paper, "Traffic Sign Detection and Identification," presents two experiments focused on the conspicuity of speed limit and warning signs. Based on the study results, it is recommended that sign backgrounds be considered when locating signs, and that if the background does not provide adequate contrast, conspicuity enhancement strategies should be considered.

For more information, contact Brian Philips, 202-493-3468, brian.philips@dot.gov.

Collecting and Analyzing Stakeholder Feedback for Signing at Complex Interchanges

FHWA's Office of Safety R&D has launched a research project to consider factors impacting the effective design of signage at complex intersections. The position of signage and the grouping of signs that provide different information to the driver may be important factors for intersection designers to consider. Researchers will work with roadway engineers and other stakeholders to identify other significant factors related to the design of signage at complex intersections. A key deliverable will be a work plan for conducting additional research on driver expectations at complex interchanges.

For more information, contact Jim Shurbutt, 202-493-3420, jim.shurbutt@dot.gov.

Fact Sheet: Office of Safety Research and Development Fact Sheet

FHWA's Office of Safety R&D helps reduce highway crashes and related fatalities and injuries by developing and implementing safety innovations through a program of nationally coordinated research and technology development. This fact sheet describes research specific to the Highway Safety Information System; the Interactive Highway Safety Design Model; the Evaluation of Low-Cost Safety Improvements Pooled Fund Study and Development of Crash Modification Factors; motorcycle crash causation; Geographic Information System safety analysis tools; driving simulation and human factors field investigations; signs and markings; pedestrian safety; roadway safety; and vehicle-to-infrastructure technology development.

This document is available at www.fhwa.dot.gov/publications/research/safety/12066/index.cfm.

For more information, contact Lincoln Cobb, 202-493-3313, lincoln.cobb@dot.gov.

RECENT PERIODICALS

Public Roads— March/April 2013

This issue includes: Every Day Counts: The Second Phase; Innovative Partnerships Help Inventory Traffic Signs; Postwar Houses: A Transportation Timebomb?; Understanding Driver Behavior in Work Zones; and Taking the Next Step.

It is available online via www.fhwa.dot.gov/publications/publicroads/13marapr/index.cfm.

Public Roads—January/February 2013

This issue includes: Linking Drivers and Roads; An Eight-Lane, Four-Bore Hole in One; Why Drivers Do What They Do; From Milepost to Milestone: Innovative Mitigation; and America's Byways Pay Off in Authentic Experiences, But How About Dollars?

It is available online via www.fhwa.dot.gov/publications/publicroads/13janfeb/index.cfm.

For more information, contact Paula Magoulas, paula.magoulas@dot.gov.

FOCUS Newsletter March 2013

The March issue includes: Meet the New Steel Bridge Design Handbook; Pavement Management Roadmap: Achieving the Long-Term Vision for Pavements; SHRP2 Implementation Assistance Program Now Accepting Applications; Building a Better Concrete Pavement; Join the Asset Management Book Club; Infrastructure Innovation Webinars; and Highway Technology Calendar.

The issue is available online via www.fhwa.dot.gov/publications/focus/13mar/13mar00.cfm

For more information, contact Lisa Pope, lgpope@woodwardcom.com.

Innovator: Accelerating Innovation for the American Driving Experience—January/February 2013

This issue includes: Pennsylvania's IdeaLink Propels Employee Ideas to the Top; States Consider New Every Day Counts Innovations; New York's Diverging Diamond Draws Public Praise; EDC's Role in MAP-21; Arkansas Project Demonstrates Roller-Compacted Concrete; States Innovate; and Calendar.

The issue is available online via www.fhwa.dot.gov/hfl/innovator/issue34.cfm.

For more information, contact Kathleen Bergeron, kathleen.bergeron@dot.gov.

Links:

Turner-Fairbank Highway Research Center: <http://www.fhwa.dot.gov/research/>

Resource Center: <http://www.fhwa.dot.gov/resourcecenter/>

National Highway Institute: <http://www.nhi.fhwa.dot.gov/home.aspx>

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