

FHWA R&T Now ~ November 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 resulting from the Second Strategic Highway Research Program (SHRP2). The centerpiece of the implementation strategy is the SHRP2 Implementation Assistance Program, launched in February 2013 to help transportation agencies begin to deploy SHRP2 products. Participants include State departments of transportation, metropolitan planning organizations, tribal agencies, and FHWA Federal Lands Divisions.

Currently nine products from the first two rounds of the Implementation Assistance Program are being put into practice (on approximately 135 different transportation projects in 38 States and the District of Columbia). The solicitation period for the third round will open in January 2014, offering opportunities to implement five new SHRP2 products. Preliminary Webinars on those products will be conducted in December.

The Precast Concrete Pavement Webinar (SHRP2 Solution R05) will be held December 12, 2013 at 2 p.m. eastern standard time (EST); to register, [click here](#). The Identifying and Managing Utility Conflicts Webinar (SHRP2 Solution R15B) will be held December 13, 2013 at 2 p.m. EST; to register, [click here](#). The GeoTech Tools Webinar (SHRP2 Solution R02) will be held December 16, 2013 at 12 p.m. EST; to register, [click here](#). The Freight Demand Modeling and Data Improvement Webinar (SHRP2 Solution C20) will be held December 16, 2013 at 2:30 p.m. EST; to register, [click here](#). The Using Existing Pavement in Place and Achieving Long Life Webinar (SHRP2 Solution R23) will be held December 17, 2013 at 2 p.m. EST; to register, [click here](#).

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

ADVANCED RESEARCH

EAR Program Awards Four Projects to Research Sensor Systems for Highway Infrastructure

FHWA's Exploratory Advanced Research (EAR) Program awarded four projects to research sensor systems for highway infrastructure under a Broad Agency Announcement. This research could refine the industry's knowledge of deterioration and lead to new management models. It might also lead to changes in designs for retrofitting structures or pavements or designs for new structures and pavements. The awards total close to \$2.9 million in Federal funds and around \$0.4 million in matching funds.

The awards include a cooperative agreement with the University of Delaware to study electrically conductive carbon nanotube networks embedded into a polymer matrix as a low-power alternative to existing structural health monitoring systems; a cooperative agreement with Michigan State University to develop a multimetric sensing system and data interpretation procedures for determination damage identification and quantification, and to dramatically transform the economics of bridge preservation/management and improve the serviceability of bridges; a contract with Drexel University to focus on the design, development, and validation of a revolutionary suite of wireless multipurpose sensors for the health monitoring of transportation infrastructure; and a contract with the

University of Nevada, Reno to develop self-sensing adaptive bearing that uses a wireless magneto-rheological elastomer sensor that combines self-sensing with adaptive stiffness and vibration damping in a single system to sense transient displacement and load in monitoring bridge responses to environmental disturbances (such as traffic or high wind at support locations) while producing variable stiffness properties for protection of bridges against various types of loading conditions.

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

EAR Program Awards Two Projects for Long-Range Environmental Screening

FHWA's EAR Program awarded two projects totaling about \$0.8 million in Federal funds and \$0.1 in matching funds for long-range environmental screening under a Broad Agency Announcement. One award includes a cooperative agreement with Montana State University to enable in situ monitoring of water quality near highways (for example, during spring stormwater runoff) by applying a self-organized and sustainable sensing system powered by novel microbial fuel cells using bacteria abundant in streams. Another award went to the University of California, Davis for the creation of Web-connected, wired, and wireless camera systems for wildlife detection associated with ad hoc (for example, street under-crossings and culverts) and purpose-built wildlife crossing structures that will be viewable almost instantly on the Web via a wireless data transportation service (as opposed to weeks or months later using existing technology).

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

Workshop to Focus on Corrosion Management for Sustainable Bridges

FHWA's EAR Program and Office of Infrastructure Research and Development (R&D) are supporting a workshop to gain input for a strategic plan and roadmap to guide FHWA's research for enhanced corrosion management for sustainable bridges. Cosponsored by the EAR Program and the National Center for Education and Research on Corrosion and Materials Performance, the workshop will be held December 10–12, 2013 at the University of Akron in Akron, OH. Because of limited space, the event is by invitation only.

Subject matter experts from fields related to corrosion; structural engineering; reliability and performance assessment; materials; and construction/rehabilitation and inspection/monitoring will determine technological needs and research to address these needs. Workshop attendees are expected to address various types of bridges, including reinforced concrete, steel, prestressed concrete, posttensioned, and pretensioned bridges. Attendees are likely to discuss topics regarding models for degradation processes and forecasting; models for systems health monitoring, performance assessment, and service life; design, preservation, rehabilitation, and reconstruction; coatings and materials; inspection and monitoring, including nondestructive evaluation and nondestructive testing and sensors; and cathodic protection and electrical methods.

For additional information about the workshop, contact Lou Triandafilou, 202-493-3059, lou.triandafilou@dot.gov. For more information about the EAR Program, contact David Kuehn, 202-493-3414, david.kuehn@dot.gov.

Workshop Held on Utilizing Data Sources for Transportation Human Factors Research

On November 6 and 7, 2013, FHWA's Turner-Fairbank Highway Research Center in McLean, VA hosted the workshop, "Utilizing Various Data Sources for Surface Transportation Human Factors Research." Sponsored by FHWA's Office of Safety R&D and EAR Program, the workshop included presentations by an international panel of

human factors experts within industry and academia and a tour of the research tools at FHWA's Human Factors Laboratory.

The workshop focused on using various data sources such as driving simulators, field studies, and field operational tests. It also considered the use of data from naturalistic driving studies for research related to the behavior of drivers and other road users; the interaction between drivers and infrastructure and roadway; and the interaction between drivers and vehicles.

Attendees explored methodologies that can be used to combine various data sources and types to enhance researchers' understanding of human factors issues in transportation. At the conclusion of this workshop, FHWA was able to identify a set of topics that could be developed as future "requests for proposals" on research demonstrating the value of using data from various sources.

For additional information about the workshop, contact David Yang, 202-493-3284, david.yang@dot.gov. For more information about the EAR Program, contact David Kuehn, 202-493-3414, david.kuehn@dot.gov.

Fact Sheet: Designing a New National Household Travel Survey: Innovations in Collecting and Analyzing Long-Distance Travel Information

FHWA is seeking new approaches to the design of the next national long-distance travel study—advanced methods of capturing and analyzing travel data to support effective, defensible transportation decisionmaking. To further that search, the EAR Program has funded the study, "Design of a Completely New Approach for a National Household Travel Survey Instrument," which is being conducted by the Battelle Memorial Institute in collaboration with the Urban Institute and the University of Maryland.

A fact sheet discussing the project is available at www.fhwa.dot.gov/advancedresearch/pubs/13081/index.cfm.

For questions about the project, contact Patrick Zhang, 202-366-1941, patrick.zhang@dot.gov. For more information about the EAR Program, contact David Kuehn, 202-493-3414, david.kuehn@dot.gov.

Fact Sheet: Paving the Way for Greener Highways: Extending Concrete's Service Life Through Multiscale Crack Control

"Service Life Enhancement and Reduction in Carbon Footprint of Highway Structures," an EAR Program project conducted at the University of California, Berkeley, is concerned with slowing the deterioration of highway infrastructure, reducing carbon emissions, conserving resources, and repurposing industrial waste. Funded by FHWA in 2010, the project aims to realize multiple benefits by employing deterioration reduction through micro and macro crack control—a unique experimental approach.

A fact sheet discussing the project is available at www.fhwa.dot.gov/advancedresearch/pubs/13079/index.cfm.

For questions about the project, contact Terry Arnold, 202-493-3305, terry.arnold@dot.gov. For more information about the EAR Program, contact David Kuehn, 202-493-3414, david.kuehn@dot.gov.

Fact Sheet: Understanding Long-Distance Traveler Behavior: Supporting a Long-Distance Passenger Travel Demand Model

Long-distance trips in the United States can take 2 days or 2 weeks and may involve cars, buses, planes, or all three. Whether for business, to see family, or visit a national park, such a variety of trip characteristics requires a detailed

understanding of traveler needs. Exploring new ways to model long-distance traveler behavior and better identify the required supporting infrastructure is the goal of “Foundational Knowledge to Support a Long-Distance Passenger Travel Demand Modeling Framework,” an FHWA EAR Program study awarded to Resource Systems Group.

A fact sheet discussing the study is available at www.fhwa.dot.gov/advancedresearch/pubs/13095/index.cfm.

For questions about the study, contact Brad Gudzinis, 202-366-5024, brad.gudzinis@dot.gov. For more information about the EAR Program, contact David Kuehn, 202-493-3414, david.kuehn@dot.gov.

INFRASTRUCTURE

Workshop Focused on Characterization of Bridge Foundations

In 2013, FHWA approved a new research program for the characterization of bridge foundations. To narrow the focus of the program and solicit key stakeholder input, the workshop, Characterization of Bridge Foundations, was held April 30–May 1, 2013 in Arlington, VA. The cross-discipline workshop included plenary sessions to offer participants a national perspective on the issue, summaries of geotechnical and hydraulic hazards, and discussions on the impact of changes in service loads and foundations reuse. The event also featured breakout sessions where hydraulics, geotechnical, and structural experts from FHWA brainstormed with stakeholders.

A workshop report that presents an overview of the event and documents results and conclusions is being prepared. Knowledge gained from the workshop will be considered by FHWA as it develops a multiyear R&D strategic plan and roadmap for the new Characterization of Bridge Foundations Program.

At the Transportation Research Board 93rd Annual Meeting in 2014, a follow-up workshop (Event Number 160) and panel discussion (Event Number 395) on foundation reuse has been scheduled. This activity was sponsored by six geotechnical committees at the Transportation Research Board.

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

Protocols for Condition Assessment of Prestressed Concrete Girders Using NDE and Physical Testing

Prestressed concrete bridge girders pose a unique and difficult obstacle when it comes to condition assessment of prestressing strands embedded within the concrete. The detection and characterization of corrosion of embedded prestressing strands is best accomplished using nondestructive technologies. There are various technologies that are capable of evaluating the potential for corrosion, such as electrical resistivity and half-cell potential, but these techniques only provide information pertaining to the likelihood of corrosion, not the rate of corrosion nor the extent. Ground penetrating radar is capable of detecting the corrosion of strands and deterioration of surrounding concrete, but it is not capable of determining the extent of that corrosion. Other technologies that have been shown to be effective at characterizing the extent or loss of steel sections are typically magnetic-based technologies.

The Long Term Bridge Performance Program has undertaken a study to develop protocols for the implementation of nondestructive evaluation (NDE) technologies and physical testing to be used for evaluating the performance of in-service prestressed concrete girders. Two decommissioned prestressed girders were erected and subjected to accelerated corrosion (using a salt spray solution for the purpose of evaluating the effectiveness of technologies for condition assessment) in order to develop field assessment protocols. Periodic nondestructive and physical testing has been performed over an extended period and subsequent forensics are currently underway to validate all physical and nondestructive test results and facilitate protocol development.

For more information contact Robert Zobel, 202-493-3024, at robert.zobel@dot.gov.

Recruiting of LTPP Warm Mix Asphalt Pavements Starts Soon

FHWA is excited to begin recruiting test projects for the newest experiment of the Long-Term Pavement Performance (LTPP) Program. The Specific Pavement Study experiment, SPS-10, is designed to study how well warm mix asphalt pavements perform over the long-term. FHWA will be asking State and local highway agencies to construct SPS-10 projects in support of this national experiment. Nominations will be accepted between January and May of 2014. Project construction is slated for 2014 and 2015.

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

LTPP InfoPave to Debut at TRB Annual Meeting

LTPP InfoPave has completed its public beta testing and is ready to make its debut at the TRB Annual Meeting in January. It will be the primary Web site for data and other information about the LTPP program. By using the latest in computer technology, this Web-centric interface is designed to improve access to LTPP data and its many resource documents.

LTPP InfoPave can be accessed at www.infopave.com. For more information, contact Aramis Lopez, 202-493-3145, aramis.lopez@dot.gov

TechBrief: Development of Non-Proprietary Ultra-High Performance Concrete for Use in the Highway Bridge Sector

This TechBrief discusses a study to facilitate the use of ultra-high performance concrete (UHPC) among U.S. suppliers and contractors, accelerate its application in U.S. construction, and promote a more resilient and sustainable future U.S. infrastructure. In pursuit of these goals, the objective of this research was to develop a nonproprietary cost-effective UHPC characterized by compressive strength exceeding 20 ksi (138 megapascals), pre- and post-cracking tensile strength above 0.72 ksi (5 megapascals), and sufficient durability properties. The mix designs were optimized in their efficiency considering workability, mechanical performance, and cost effectiveness. In support of cost effectiveness, locally available materials were used from selected areas in the United States.

This document is available at <http://www.fhwa.dot.gov/publications/research/infrastructure/structures/bridge/13100/index.cfm> .

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

SAFETY

Report: Assessment of The Geographic Information Systems' (GIS) Needs and Obstacles in Traffic Safety

This report summarizes a study that identifies the level of use of Geospatial Information Systems (GIS) for safety decisionmaking at the State and local level, and uses the results to outline opportunities for FHWA to promote and bolster the use of this technology to improve highway safety. The study utilized a series of resources, including peer exchanges, a comprehensive literature review, and the input of a technical working group. This led to the development of a marketing, communications, and outreach plan, which included recommended actions for FHWA

to incorporate into its safety programs, which will support the use of GIS for improved highway safety decisionmaking at the State and local level.

This report is available at www.fhwa.dot.gov/publications/research/safety/13096/index.cfm.

For more information, contact Craig Thor, 202-493-3338, craig.thor@dot.gov.

Report: Driver Expectations When Navigating Complex Interchanges

This report will be useful to traffic-safety researchers and traffic engineers responsible for highway design and public safety. Although there has been previous research performed on signage in general, research specifically on interchange signage has been limited. There is little consensus on a best way to design signs for interchanges, and, in general, the current data on sign design is incomplete. This report discusses a project aimed at addressing some of these information needs. The project yielded several overall conclusions related to driver expectations at complex interchanges. Namely, most drivers have problems at complex unfamiliar interchanges and feel stressed when they are surprised, are required to perform multiple lane changes in a short distance, or do not receive the information they expect. Several recommendations for sign designs are offered to help address these conditions.

The report is available at www.fhwa.dot.gov/publications/research/safety/13048/index.cfm.

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

Report: Cooperative Adaptive Cruise Control: Human Factors Analysis

Traffic is an increasing concern in many urban areas, and traffic congestion is growing at a faster rate than can be alleviated solely by additional road construction. Various intelligent transportation systems technologies aim to increase and improve transportation via nontraditional means. This report examines a technology called cooperative adaptive cruise control, which aims to increase traffic throughput by safely permitting shorter following distances between vehicles. The report is likely to be useful to human-factors, operations, safety, and transportation researchers as a starting point to further define and execute critical research studies. These studies are expected to help facilitate the safe implementation of this mobility-enhancing technology in future years.

The report is available at www.fhwa.dot.gov/publications/research/safety/13045/index.cfm.

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

RECENT PERIODICALS

***Public Roads*—November/December 2013**

This issue includes: Breakthroughs to the Future; Saving the Past; Training Millions of Responders; Protecting the Planet One Road at a Time; and A Look Back at Moving Forward.

It is available online via www.fhwa.dot.gov/publications/publicroads/13novdec2013/index.cfm.

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

***FOCUS* Newsletter October 2013**

The October issue includes: A Nationwide Checkup on Infrastructure Health; The Future of Pavement Management; AAR: Get the Facts; LTPP InfoPave to Debut at TRB Annual Meeting; Infrastructure Innovation Webinars; and Highway Technology Calendar.

The issue is available online via www.fhwa.dot.gov/publications/focus/13oct/13oct00.cfm.

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

Innovator: Accelerating Innovation for the American Driving Experience—September/October 2013

This issue includes: Every Day Counts Offers Help in Managing Local Projects; Data Sharing Saves Time on Highway Projects; Technology Partnerships Project to Test Pavement Marking Safety; FHWA Awards Grants for Innovative Highway Projects; States Innovate!; Get Weekly Updates on Every Day Counts; Adaptive Signals, Modified Intersections to Reduce Congestion; and Calendar.

The issue is available online via www.fhwa.dot.gov/hfl/innovator/issue38.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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Suggestions may be submitted to: FHWA_Now@fhwa.dot.gov