

FHWA R&T Now ~ July 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).

In February, FHWA and AASHTO launched a new Implementation Assistance Program to help transportation agencies begin to deploy SHRP2 products. In May, selected recipients for the initial round of assistance were announced from 34 States and the District of Columbia. Currently 6 products from the first round are being put into practice on approximately 108 different transportation projects across the Nation. Participants include State departments of transportation, metropolitan planning organizations, tribal agencies, and FHWA Federal Lands Divisions.

Riding on the success of the initial round of implementation assistance, FHWA and AASHTO have announced the second round of the SHRP2 Implementation Assistance Program, which includes 15 lead adopter incentives and 9 user incentives for 4 SHRP2 products. In July, informational Webinars were held for each of the products in preparation for the open application period from August 2 to September 6, 2013.

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

ADVANCED RESEARCH

Findings Available from EAR Workshop on Positioning and Navigation - 1

Findings are now available from the “Vehicle Positioning, Navigation, and Timing: Leveraging Results from EAR Program-Sponsored Research” workshop, which was held November 20, 2012 at the Turner-Fairbank Highway Research Center.

Convened by FHWA’s Exploratory Advanced Research (EAR) Program and Office of Operations Research and Development, the workshop examined dependable, precise, and commercially affordable positioning and navigation for roadways and included a panel of Government program managers and researchers involved in positioning and navigation. The event brought together experts involved with research, development, deployment, or regulation of vehicle positioning and navigation for increased safety, mobility, and efficiency in transportation systems.

Experts shared information about the results of EAR Program-sponsored research on vehicle positioning and navigation, addressed potential follow-up applied research, and discussed continued fundamental research gaps. Findings are presented in the workshop report, “Vehicle Positioning, Navigation, and Timing: Leveraging Results from EAR Program-Sponsored Research,” available at www.fhwa.dot.gov/advancedresearch/pubs/13052/13052.pdf.

For technical information about the project, contact Jim Arnold, 202-366-8422, james.a.arnold@dot.gov. For more information about the EAR Program, contact David Kuehn, 202-493-3414, david.kuehn@dot.gov.

Casual Carpooling Focus Group Study Available - 2

Findings from the casual carpooling focus group that was sponsored by the EAR Program and Office of Transportation Management are now available. The focus group was held to explore the phenomenon of casual carpooling from the perspective of individuals who participate in such systems as drivers and passengers. Focus groups were held in three of the largest and longest running casual carpooling systems in the Nation: Washington, DC; Houston, TX; and San Francisco, CA.

Conducted in tandem with a scan trip evaluation in November and December 2010, the study brought together a group of academics and transportation professionals to explore the mechanics, logistics, and success of the practice by visiting casual carpooling lines and observing and comparing practices among the three locations. Findings and conclusions drawn from the focus group study and scan trip evaluation will be used to identify possible future research on the potential for and value of expansion or replication of casual carpooling.

Results of the focus group study are available at www.fhwa.dot.gov/advancedresearch/pubs/13053/index.cfm. Findings from the scan trip are available at www.fhwa.dot.gov/advancedresearch/pubs/13053/index.cfm and in the appendix, available at www.fhwa.dot.gov/advancedresearch/pubs/13023/index.cfm.

For more information about casual carpooling, contact Allen Greenberg, 202-366-2425, allen.greenberg@dot.gov. For more information about the EAR Program, contact David Kuehn, 202-493-3414, david.kuehn@dot.gov.

Congestion Pricing Experiments and the Effects on Driver Choices - 3

FHWA Transportation Specialist Karen White discussed experimental and behavioral economics tools for highway research at the National Congestion Pricing Conference, held July 9–10, 2013 in Seattle, WA. The presentation provided information from the EAR-funded project, “Experiments on Driving under Uncertain Congestion Conditions and the Effects on Traffic Networks from Congestion Pricing Initiatives,” which examines how driver risk preferences influence choice of route and travel departure times.

Project information is available at www.fhwa.dot.gov/advancedresearch/pubs/10061/index.cfm. For more information about the project, contact Karen White, 202-366-9474, karen.white@dot.gov. For more information about the EAR Program, contact David Kuehn, 202-493-3414, david.kuehn@dot.gov.

Fact Sheet: Lane-Level Vehicle Positioning: Integrating Diverse Systems for Precision and Reliability - 4

This fact sheet details an EAR-funded project at the University of California, Riverside, which investigated approaches for fusion of data from different sources in order to deliver highly accurate, real-time positioning information required for new driver assistance applications.

The document is available at www.fhwa.dot.gov/advancedresearch/pubs/13059/index.cfm.

For technical information about the project, contact Jim Arnold, 202-366-8422, james.a.arnold@dot.gov. For more information about the EAR Program, contact David Kuehn, 202-493-3414, david.kuehn@dot.gov.

Fact Sheet: Greener Protection for Steel Bridges—Testing Nano-Enhanced Corrosion-Resistant Coatings - 5

This fact sheet discusses the EAR project, “Green Advanced Coatings for Application on Steel Structures and Bridges,” which aims to slow deterioration of steel infrastructure with safe, corrosion-resistant coatings. The project will develop a model to assist bridge owners in setting optimal rehabilitation schedules for steel bridges. City College of New York is conducting the research, which was funded by FHWA in 2009.

The document is available at www.fhwa.dot.gov/advancedresearch/pubs/13064/index.cfm.

For technical information about the project, contact Paul Virmani, 202-493-3052, paul.virmani@dot.gov. For more information about the EAR Program, contact David Kuehn, 202-493-3414, david.kuehn@dot.gov.

INFRASTRUCTURE

TechBrief: FHWA LTBP Workshop to Identify Bridge Substructure Performance Issue -1

This TechBrief provides an overview of the proceedings and findings of the “FHWA Workshop to Identify Bridge Substructure Performance Issues,” held March 4–6, 2010 in Orlando, FL. The purpose of the workshop was to consider overall bridge performance and identify geotechnical performance metrics that may correspond to good and poor performance. The issues identified and the recommendations made at the workshop are being used in the design and implementation of the Long-Term Bridge Performance (LTBP) program.

The document is available at www.fhwa.dot.gov/publications/research/infrastructure/bridge/13049/index.cfm.

For more information, contact Hamid Ghasemi, 202-493-3042, hamid.ghasemi@dot.gov.

TechBrief: Lightweight Concrete: Mechanical Properties -2

This TechBrief presents results from lightweight concrete (LWC) mechanical property tests conducted as part of a prestressed girder and reinforced concrete beam analysis. These results are included in an LWC database, which this document summarizes. The document also offers potential LWC revisions to the American Association of State Highway and Traffic Officials (AASHTO) *Load-and-Resistance Factor Design (LRFD) Bridge Design Specifications*.

It is available at www.fhwa.dot.gov/publications/research/infrastructure/bridge/13061/index.cfm.

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

Report: Ultra-High Performance Concrete: A State-of-the-Art Report for the Bridge Community -3

Because of its excellent strength and durability, ultra-high performance concrete (UHPC) offers new opportunities for highway infrastructure projects. This report documents state-of-the-art research, development, and deployment of UHPC components within U.S. highway transportation infrastructure and internationally, where much of the development and deployment of UHPC has occurred. The report also addresses what is needed to enable wider implementation of this concrete.

The document is available at www.fhwa.dot.gov/publications/research/infrastructure/structures/hpc/13060/.

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

TechBrief: Curl and Warp Analysis of the LTPP SPS-2 Site in Arizona -4

Variability in the roughness levels of jointed portland cement concrete (PCC) pavements can often be observed over short periods of time. This TechBrief discusses a study that demonstrated specialized analyses for quantifying the effect of curl and warp on the roughness of jointed PCC pavements using profile data from the Long-Term Pavement Performance (LTPP) Specific Pavement Studies (SPS)-2 site in Arizona.

The document is available at www.fhwa.dot.gov/publications/research/infrastructure/pavements/ltp/13040/index.cfm.

For more information, contact Larry Wiser, 202-493-3079, larry.wiser@dot.gov.

TechBrief: Pavement Remaining Service Interval -5

At the heart of pavement management decisions is the prediction of future construction events, but many issues exist with the current remaining service life (RSL) terminology. The major source of uncertainty is the use of the term “life” to represent different points in the construction timeline. The path to consistency involves adopting terminology of time remaining until a defined construction treatment is required (i.e., RSL is replaced by remaining service interval (RSI)). The term RSI has the ability to unify the outcome of different approaches for determining

needs by focusing on when and what treatments are needed as well as the service interruption created. This TechBrief introduces the RSI concept and its implementation process.

The document is available at www.fhwa.dot.gov/publications/research/infrastructure/pavements/13039/index.cfm.

For more information, contact Nadarajah Sivaneswaran, 202-493-3147, n.sivaneswaran@dot.gov.

Report: Smart Pavement Monitoring System -6

This report documents the development of a novel self-powered sensor system for continuous structural health monitoring of new/reconstruction or resurfacing of asphalt and concrete pavements. The system consists of a wireless integrated circuit sensor that consumes less than 1 microwatt of power and interfaces directly with and draws its operational power from a piezoelectric transducer. Each sensor node is self-powered and capable of continuously monitoring and storing the dynamic strain levels in pavement structure. Data from all the sensors are periodically uploaded wirelessly through radio frequency (RF) transmission using a RF reader either manually operated or mounted on a moving vehicle. The integrated wireless sensor can provide many benefits to highway agencies by helping facilitate more effective pavement maintenance and rehabilitation/preservation decisionmaking by detecting possible damage, monitoring mechanical load history, and predicting the fatigue life of the monitored pavements.

The document is available at www.fhwa.dot.gov/publications/research/infrastructure/pavements/12072/index.cfm.

For more information, contact Fred Faridazar, 202-493-3076, fred.faridazar@dot.gov.

TechBrief: Guidelines for Sampling, Assessing, and Restoring Defective Grout in Prestressed Concrete Bridge Post-Tensioning Ducts -7

This TechBrief discusses a study aimed at providing recommended guidance for grout sampling, testing, data analysis, and the interpretation of results. The study proposes courses of action by State transportation departments where grout deficiencies are identified. Grout is a cementitious material typically used to provide corrosion protection to the prestressing strands used in post-tensioned (PT) concrete bridges. Based on collected information and data analysis, State transportation departments can evaluate if grout deficiencies are present in the tendons of their PT bridges and determine the significance of those deficiencies.

The document is available at www.fhwa.dot.gov/publications/research/infrastructure/bridge/13027/index.cfm.

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

OPERATIONS

Truck Platooning and Automation Aimed at Increasing Safety and Productivity -1

Because of its potential to increase safety and productivity, truck platooning via cooperative adaptive cruise control (CACC) continues to be of interest to FHWA. It is one of several automation-related areas recently posted in a Broad Agency Announcement opportunity as part of FHWA's Exploratory Advanced Research Program.

This platooning can move forward by extending current automation capabilities of standard cruise controls, thereby preventing or reducing truck-related crashes and improving the effective capacity of the Nation's roads.

FHWA's speed harmonization initiative explores another form of CACC through traffic management center (TMC) assistance. Through tests with experimental vehicles, TMCs are showing they can assist drivers by broadcasting advisory speeds to cruise controls to avoid stop-and-go congestion.

FHWA's Office of Operations Research and Development plans to test algorithms and connectivity at the Saxton Transportation Operations Laboratory, and, in collaboration with the Virginia Department of Transportation, test a

prototype on Virginia roads. Simulations are ongoing and the current schedule projects substantive results from field experiments will be available in fiscal year 2014.

For a link the Broad Agency Announcement, visit www.fhwa.dot.gov/research/resources/new_ea_proposal_request.cfm. For more information, contact Joe Peters, 202-493-3269, joe.peters@dot.gov.

Optimization Algorithm Tests Yield Positive Results for Drayage Operations -2

FHWA's Office of Freight Management is testing an optimization algorithm for drayage operations that will include incorporating specific drayage process restrictive factors and business rules. The objective function of the optimization algorithm is to minimize total traveling time, reduce the number of trucks, minimize bobtail traveling time, maximize loaded moves, and maximize truck productivity.

A major component of the application is the optimization module that will produce an itinerary that renders the overall maximum amount of loaded moves for the drayage company. The deployment test of the drayage optimization algorithm began in May 2013 and will continue until the end of August 2013. After about one month of algorithm tests, the results are a fleet size reduction of 16 percent; an orders per truck increase of 9 percent; a total miles reduction of 1 percent; and a bobtail miles reduction of 12 percent. These results also generate public benefits in fuel consumption reduction and air quality.

For more information, contact Randy Butler, 202-366-9215, randy.butler@dot.gov.

RECENT PERIODICALS

Public Roads—July/August 2013 -1

This issue includes: Design at the Crossroads; Implementing Innovations; Busting the Trust; North Carolina Steps Boldly Out of Its Comfort Zone; and Successfully Managing Traffic Incidents Is No Accident.

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

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

FOCUS Newsletter June 2013 -2

The June issue includes: Bringing Asphalt Pavement Technology to Your Door; Intelligent Compaction: The Smarter and More Efficient Way to Pave; Designing a Better Bridge with Ultra-High Performance Concrete; An Online Introduction to Drilled Shaft Inspection; Infrastructure Innovation Webinars; and Highway Technology Calendar.

The issue is available online via www.fhwa.dot.gov/publications/focus/13jun/13june00.cfm.

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

Innovator: Accelerating Innovation for the American Driving Experience—July/August 2013 -3

This issue includes: Highway Professionals Explore Innovations Virtually; States Progress on ABC Use; Iowa Combines Innovations on Rapid Bridge Replacement; New Guide Helps Agencies Use Marketing Research to Drive Decision; States Innovate; Innovator Moving to Electronic Publication; ABC Slashes Traffic Impacts on New York Project; and Calendar.

The issue is available online via www.fhwa.dot.gov/hfl/innovator/issue37.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