

FHWA R&T Now ~ September 2012~

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

GENERAL/ADMINISTRATIVE

FHWA Mobilizes to Implement SHRP2

With the extension of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users through fiscal year 2012 and the passage of the Moving Ahead for Progress in the 21st Century Act (MAP-21), implementation of the Second Strategic Highway Research Program (SHRP2) is officially underway. To date, approximately \$93 million has been made available to FHWA and the American Association of State Highway and Transportation Officials (AASHTO) to implement the SHRP2 program. The recently signed 2-year transportation authorization, MAP-21, includes a provision to fund SHRP2 implementation from a percentage of State Planning and Research (SP&R) funds to be determined by a three-quarter majority of the States.

In September, AASHTO polled the States. The majority have agreed to contribute 4 percent of SP&R funds to SHRP2 implementation for the next 2 years (approximately \$58 million each year). This is in addition to the anticipated contribution from FHWA (approximately \$15-19 million).

While the Transportation Research Board (TRB) continues to manage the ongoing research, FHWA and AASHTO have prioritized all expected research results and agreed to a joint 3-year implementation plan that extends from 2012 through 2014. The plan calls for approximately six SHRP2 products (or product groupings) to begin implementation each year, based on the assessed priority and readiness of each product. The plan also includes specific programmatic activities necessary to support the overall implementation effort. The plan was presented to the SHRP2 Implementation Advisory Committee in June. In close collaboration with AASHTO and TRB, FHWA technical staff is convening implementation planning workshops for the 2012 products. Each workshop will involve key end users of the product. The end users will provide input for the development of a comprehensive product implementation plan. After finalizing each plan's strategies and budget, product deployment will officially begin.

In many cases, showcasing the product's applicability and benefits to other potential users and stakeholders through demonstrations will be an important strategy of the product implementation plan. A process is currently being developed to publicize SHRP2 demonstration opportunities and allow State Departments of Transportation, tribal governments, Federal Land Management Agencies, Metropolitan Planning Organizations, and local governments to apply for demonstration funding.

For more information, contact Ken Jacoby, 202-493-3186, ken.jacoby@dot.gov.

ADVANCED RESEARCH

EAR Program Initiates Research in Modeling Cement Hydration Kinetics

FHWA entered into a cooperative agreement with Princeton University to focus on clearly defining the causes of the onset and end of the induction period of alite, which controls set, strength, and subsequent microstructural development in concrete. Researchers will use new experimental methods capable of measuring chemical and microstructural changes on the nanometer to micron scale during hydration. The goal is to use this insight to improve the ability of the National Institute of Standards and Technology's

(NIST) HydratiCA model to predict hydration kinetics and microstructure in the presence of supplementary cementitious material such as fly ash, slag, and metakaolin, as well as organic admixtures. This understanding is expected to lead to an improvement of the boundary nucleation and growth model to permit prediction of hydration kinetics and setting behavior in a software tool that is powerful but simple enough to be used in the field. The award follows a Broad Agency Announcement (BAA) for Exploratory Advanced Research (EAR) proposals issued in spring 2011.

For more information about the project, contact Richard Meininger, 202-493-3191, richard.meininger@dot.gov. For information about the EAR Program, contact David Kuehn, 202-493-3414, david.kuehn@dot.gov.

EAR Program Begins Study in Video Decoding and Feature Extraction Automation for Highway Research

FHWA entered into a contract with University of Maryland to develop a system that provides continuous, ultra-high definition, real-time simultaneous monitoring, tracking and analysis of multiple events or characteristics in the fields of view of cooperating cameras. The envisioned system will be capable of autonomously recording vehicle types, including make and model identification, speeds, abnormal vehicle patterns, and accidents. The system will track observed events such as congestion using wide field of view, high-resolution, cooperating cameras mounted on low-cost servo-stabilized steerable camera platforms. This will enable traffic surveillance and monitoring systems that use multiple cameras to simultaneously detect and track multiobject motion and conduct anomaly detection and classification in real time. The award follows a BAA for EAR proposals issued in spring 2011.

For more information about these projects, contact David Gibson, 202-493-3271, david.gibson@dot.gov. For information about the EAR Program, contact David Kuehn, 202-493-3414, david.kuehn@dot.gov.

EAR Program Commences Research in New Technology Solutions for Wayfinding and Navigation Guidance for People with Vision Impairment and Other Disabilities

FHWA entered into a cooperative agreement with the City College of New York to explore and develop situation awareness and assistive navigation technologies to provide blind or visually impaired persons with obstacle avoidance and intelligent wayfinding capabilities in indoor environments by using wearable sensors (e.g., cameras, three-dimensional orientation sensors, and pedometers). In a proposed second phase, the technology will be improved and research will be extended to outdoor pedestrian environments to provide blind users with waypoint navigation, path planning, and advanced warning of events through interaction with Global Positioning System (GPS), Geographic Information System (GIS), and Intelligent Transportation Systems (ITS) infrastructure.

FHWA has also entered into a contract with TRX Systems, Inc. to begin a project with potential for technical innovation and commercial application in the field of navigation aid for the blind or visually impaired. The project has five main objectives. The first is to provide navigation aid that can track the location of a blind person anywhere, including areas where GPS is not available or reliable (for example, indoors or in urban areas with tall buildings). The second is the ability to look ahead in time and space to plan the route to get to a destination and adaptively update the route based on vision system recognized obstacles to be avoided (for example, people or construction within the path). In robotics, this concept is known as Event Horizon. The third objective is the ability to take gestural input and provide natural route guidance based on tactile stimulus instead of relying solely on auditory or visual instructions. The fourth objective is to use computer vision techniques to verify that the user has reached the correct destination, as well as to find stairs, elevators, buttons, hallways, and doors in the visual scope to help with the navigation. The fifth objective is to take input from and provide input to intelligent traffic systems (for example, to communicate with drivers by sending them alerts when they are getting close to a blind person crossing the street). These awards follow a BAA for EAR proposals issued in spring 2011.

For more information about the project under the agreement with the City College of New York, contact Mohammed Yousuf, 202-493-3199, mohammed.yousuf@dot.gov. For more information about the project under the agreement with TRX Systems, Inc., contact Charlene Wilder, 202-366-1077, charlene.wilder@dot.gov. For information about the EAR Program, contact David Kuehn, 202-493-3414, david.kuehn@dot.gov.

EAR Program Seeks Industry Partners for Anti-Fuel Theft System

As part of the EAR Program sponsored project, “Safeguarding Truck-Shipped Wholesale and Retail Fuels,” the Department of Energy Oak Ridge National Laboratory sent a request for information to companies representing telematics, commercial vehicle electronics, and petroleum equipment manufacturing. The information will assist in determining if and how to proceed with field trials. The Office of Highway Policy Information, Tennessee Division Office, and departments of transportation in Maryland, Mississippi, Nevada, and Tennessee are providing technical assistance to support the research. For more information, visit www.fhwa.dot.gov/advancedresearch/pubs/12020/index.cfm.

INFRASTRUCTURE

Researchers Develop Field Device for Bridge Scour Testing

Researchers at the FHWA J. Sterling Jones Hydraulics Research Laboratory are developing a scour testing field device that could make foundation construction less difficult and less expensive. The device will have a confined column of continuously flowing water directed downward and then horizontally across the soils that are to support pier foundations. To determine the erosion rate, the shear strength of the flow will be reduced with the depth of advancing scour to reflect the natural decay of the scouring mechanism. Researchers are currently testing a second generation, lab-scale device consisting of an outer circular pipe column with a concentric cutting head centered within the column. In initial testing, the cutting head has performed well. Initially, the prototype will be used for field calibration. If results are favorable, it can be used to test the erosion and scour potential of a wide range of soils types to depths of 20 meters. The project is made possible through an FHWA Pooled-Fund solicitation with contributions from California, Colorado, Kansas, North Carolina, New York, Texas, Utah, Wisconsin, and the FHWA Federal Lands Highway. To read more about it, visit www.pooledfund.org/Details/Study/438.

For more information, contact Kornel Kerenyi, kornel.kerenyi@dot.gov, 202-493-3142.

TechBrief: Influence of Differential Deflection on Staged Construction Deck-Level Connections

The objective of this research project was to determine the impact of differential movement across a staged construction connection. Specifically, the research investigated bond strength of reinforcing bars embedded within freshly cast connection grouts as impacted by differential movement of rebar with respect to embedment material.

www.fhwa.dot.gov/publications/research/infrastructure/structures/bridge/12055/index.cfm

For more information, contact Kornel Kerenyi, 202-493-3142, kornel.kerenyi@dot.gov.

Report: Estimation of Key PCC, Base, Subbase, and Pavement Engineering Properties From Routine Tests and Physical Characteristics

This report describes the basis for selecting material parameters that need predictive models, provides a review of current Long-Term Pavement Performance program data, and proposes several statistically derived models to predict material properties.

www.fhwa.dot.gov/publications/research/infrastructure/pavements/ltp/12030/index.cfm

For more information, contact Jorge Pagán-Ortiz, 202-493-3021, jorge.pagan@dot.gov.

Report: User's Guide - Estimation of Key PCC, Base, Subbase, and Pavement Engineering Properties From Routine Tests and Physical Characteristics

This document is a user's guide for the abovementioned report, "Estimation of Key PCC, Base, Subbase, and Pavement Engineering Properties From Routine Tests and Physical Characteristics" (Publication Number: FHWA-HRT-12-030).

www.fhwa.dot.gov/publications/research/infrastructure/pavements/ltp/12031/index.cfm

For more information, contact Jorge Pagán-Ortiz, 202-493-3021, jorge.pagan@dot.gov.

Report: Sample Guide Specifications for Construction of Geosynthetic Reinforced Soil-Integrated Bridge System (GRS-IBS)

This report provides guidelines for GRS-IBS construction. It serves as the technical basis for agency-developed standard specifications. Local experience and practice shall be incorporated as applicable.

For more information, contact Mike Adams, 202-493-3025, mike.adams@dot.gov.

www.fhwa.dot.gov/publications/research/infrastructure/structures/12051/index.cfm

Report: Submerged Flow Bridge Scour Under Clear Water Conditions

This study was conducted in response to requests from State DOTs for new design guidance to predict bridge contraction scour when the bridge is partially or fully submerged. The study included experiments at the J. Sterling Jones Hydraulics Laboratory and analysis of data from Colorado State University. This report will be of interest to hydraulic engineers and bridge engineers involved in bridge foundation design.

For more information, contact Jorge Pagán-Ortiz, 202-493-3021, jorge.pagan@dot.gov.

www.fhwa.dot.gov/publications/research/infrastructure/structures/bridge/12034/index.cfm

SAFETY

2013 National Roadway Safety Awards Call for Nominations

The U.S. Department of Transportation, FHWA, and Roadway Safety Foundation are now accepting applications for the 2013 National Roadway Safety Awards, which recognize roadway safety achievements related to improvements in infrastructure, operations, and programs.

Additional details, instructions, and application packets are available at <http://safety.fhwa.dot.gov/roadwaysafetyawards/>. All nominations must be received by March 31, 2013 to be considered.

For more information, contact Karen Timpone, 202-366-2327, karen.timpone@dot.gov.

FHWA Releases 2012 Version of Interactive Highway Safety Design Model

On September 28, FHWA released version 8.0.0 of the Interactive Highway Safety Design Model (IHSDM), a suite of software analysis tools for evaluating safety and operational effects of geometric design decisions. The 2012 release includes a Crash Prediction Module (CPM) that implements the American Association of State Highway and Transportation Officials' (AASHTO) Highway Safety Manual (HSM), Part C: Predictive Method. New for 2012 is a Beta version of crash prediction capabilities for mainline freeways segments, based on draft HSM materials developed under National Cooperative Highway Research Project 17-45. The CPM also covers two-lane rural highways, multilane rural highways, and urban and suburban arterials. Another major enhancement is a site-based data input and analysis capability that provides users with more flexibility in how data are entered. IHSDM includes five other evaluation modules applicable to rural two-lane highways: policy review, design consistency, intersection review, traffic analysis, and driver/vehicle. The software is available for free download at www.ihsdm.org.

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

OPERATIONS

Report Offers Guidance on Traffic Analysis Tools

In November, FHWA released *Guide on The Consistent Application of Traffic Analysis Tools and Methods* (Pub. No. FHWA-HRT-11-064), a report focused on identifying and addressing consistency in the selection and use of traffic analysis tools. Intended for professionals operating in State departments of transportation and other agencies responsible for transportation project development and delivery, the document offers recommendations on the management, planning, and conduct of traffic analysis that will promote greater traffic analysis tool consistency over the typical project development life cycle. It is available at www.fhwa.dot.gov/publications/research/operations/11064/index.cfm.

For more information, contact Randy VanGorder, 202-493-3266, Randall.VanGorder@dot.gov.

Eco-Experiments Suggest Fuel Savings

On August 23, FHWA's Office of Operations R&D hosted experiments at the Turner-Fairbank Highway Research Center (TFHRC). Researchers used TFHRC's intelligent intersection to provide Signal Phase and Timing (SPaT) and Geometric Intersection Description (GID) data to a test vehicle equipped with an onboard dedicated short-range communication modem, onboard computer processor, and a display device to provide the driver with speed advice. The onboard computer received SPaT and GID messages from the intersection; interpreted the received information, current vehicle speed, and location with an algorithm designed to improve environmental performance; and suggested a vehicle speed for approach and departure legs at the intersection. Preliminary results showed fuel savings between 10 and 20 percent and a reduction of harmful emissions by about 12 percent. The experiments were directed by the University of California, Riverside and sponsored by the U.S. Department of Transportation Intelligent Transportation Systems initiative, Applications for the Environment: Real-Time Information Synthesis (AERIS). This initiative is aimed at identifying transformative concepts to improve environmental performance. Researchers were able to assess the practicality of implementation and gather data that can be used to calibrate and validate future AERIS computer modeling efforts.

To see a video of a test of eco signal operations at UC Berkeley's Richmond Field Station, visit www.fhwa.dot.gov/multimedia/research/advancedresearch/index.cfm.

For more information about the AERIS testing, contact Peter Huang, 202-493-3484, peter.huang@dot.gov

Stereo Vision Test Encouraging for Pedestrian Detection

In March, Migma Systems conducted a field test of its stereo pedestrian detection system in four cities under FHWA's Small Business Innovative Research program. Seventeen systems were installed at midblock crossings and intersections. The field test demonstrated stereo vision would reliably detect pedestrians in real-world environments under various weather conditions and extreme temperatures. When pedestrians are detected at crosswalk ramps, the system can activate regular pushbuttons and accessible pedestrian signal (APS) pushbuttons. In the four cities the overall positive detection rate for the APS actuation zone is more than 98 percent while the average number of false calls per day is less than three. The technology is especially promising for slow moving elderly, impaired, and visually disabled pedestrians.

For more information, contact David Gibson, 202-493-3271 david.gibson@dot.gov.

RECENT PERIODICALS

Public Roads—September/October 2012

This issue includes: Bridging the Bay; The New Frontier in Accessible Transportation; Federal-Aid Essentials; Making Walking Safer for Arizonans; and Expediting Environmental Approvals.

It is available online via <http://www.fhwa.dot.gov/publications/publicroads/12septoct/index.cfm>

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

FOCUS Newsletter September 2012

The September issue includes: Federal-Aid Essentials for Local Public Agencies; EDC 2: The Next Wave of Highway Innovation; Achieving the Bridges of Tomorrow: The Long-Term Bridge Performance Program; Accelerating Innovation with the 2012 Highways for LIFE Projects; Infrastructure Innovation Webinars; and Highway Technology Calendar.

The issue is available online via <http://www.fhwa.dot.gov/publications/focus/12sep/12sep00.cfm>

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

Innovator: Accelerating Innovation for the American Driving Experience—July/August 2012

This issue includes: EDC Exchanges Bring Technology to Local Level; Innovator Becomes FHWA's Go-To Source for Innovation News; Pavement Recycling Produces Big Savings in Virginia; Innovation Advocate Jim McMinimee Passes Away; Agencies Use Audits to Make Roads Safer for Travelers; Accelerated Construction Cuts Bridge Closure From Months to Days; Online Videos Show How Technologies Work; Vermont Paving Project Highlights Three Innovations; and Calendar.

The issue is available online via <http://www.fhwa.dot.gov/hfl/innovator/issue31.cfm#a8>

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