

FHWA R&T Now ~ September 2013~

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

GENERAL/ADMINISTRATIVE

FHWA Launches RD&T Agenda Web Site

FHWA recently launched a Web site for its research, development, and technology (RD&T) agenda. The Web site offers stakeholders an easily accessible, high-level overview of FHWA's RD&T program and presents FHWA's research and technology (R&T) agenda from two perspectives; one that concerns national RD&T challenges and one that concerns strategic RD&T objectives.

The Web site explains how FHWA's research and program offices jointly address the six major, national-level highway R&T challenges facing the United States. These challenges include advancing highway safety, enhancing system performance, improving the mobility of people and goods, maintaining infrastructure integrity, promoting environmental sustainability, and preparing for the future.

The Web site also presents FHWA's R&T research program by traditional discipline and topic areas—infrastructure, operations, safety, policy, planning and environment, Federal lands, exploratory advanced research, and innovative program delivery—and describes how each office's strategic objectives drive their respective R&T portfolios.

“We see the FHWA R&T Agenda Web site as a critical element in our efforts to make the R&T program more transparent and receptive to the needs of the States and other stakeholders,” says Michael Trentacoste, FHWA's Associate Administrator for Research, Development, and Technology.

The Web site is available at www.fhwa.dot.gov/research/fhwaresearch/agenda. For more information, contact John Moulden, 202-493-3470, john.moulden@dot.gov.

ADVANCED RESEARCH

New Brochure Explains EAR Program

A new brochure that explains FHWA's Exploratory Advanced Research (EAR) Program, which focuses on long-term, high-risk research with a high payoff potential, was just published. The EAR Program matches opportunities from discoveries in science and technology with the needs of specific industries. The uncertainties in the research approach and outcomes challenge organizations and researchers to be innovative problem-solvers, which can lead to new research techniques, instruments, and processes that can be applied to future high-risk and applied research projects.

The brochure is available at www.fhwa.dot.gov/advancedresearch/pubs/13071/index.cfm.

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

Workshop Focused on Aging of Composites

In coordination with the National Science Foundation (NSF), FHWA's Office of Infrastructure R&D and EAR Program convened a 2-day workshop that featured leading engineering scientists and design engineers in the field of fiber reinforced polymer (FRP) composite materials for highway infrastructure. Understanding the durability response of composite materials in terms of their degradation mechanisms is vital for the safe and economical field implementation of FRPs. The workshop, which was by invitation only, was held at the National Transportation Safety Board Training Center in Ashburn, VA, September 25–26, 2013. The main objective of the event was to

identify possible new methods for understanding the aging and durability behavior of composite materials and to establish a research, development, and evaluation program dealing with durability and design issues by leveraging the collection of longitudinal performance data funded by NSF and others.

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.

Technologies to Help Vision-Impaired Pedestrians Find their Way

FHWA's EAR Program is sponsoring research on "Intelligent Situation Awareness and Navigation Aid for Visually Impaired Persons" to develop an assistive system for blind and severely visually impaired citizens so they can navigate and travel independently. The study is being completed in two phases. Phase I will explore assistive navigation technologies to provide blind or visually impaired people with obstacle avoidance and intelligent wayfinding capabilities in indoor environments. Phase II will extend the research to outdoor pedestrian environments to provide blind users with waypoint navigation, path planning, and advanced warning of special events.

More information is available at www.fhwa.dot.gov/research/resources/visionimpaired.cfm. For questions about the research, contact Mohammed Yousuf, 202-493-3199, mohammed.yousuf@dot.gov. For more information about the EAR Program, contact David Kuehn, 202-493-3414, david.kuehn@dot.gov.

Fact Sheet: Creating Productive Roadways: Developing an Advanced Energy Production, Storage, and Distribution System

Using the public right-of-way and roadway infrastructure as a source for energy production, storage, and distribution is the goal of "A Roadway Wind/Solar Hybrid Power Generation and Distribution System: Towards Energy-Plus Roadways," an EAR Program study awarded to the University of Nebraska-Lincoln. The project aims to develop an intelligent power system that can provide cost-effective, highly efficient, and reliable renewable electric power production, storage, and distribution.

A fact sheet discussing the project is available at www.fhwa.dot.gov/advancedresearch/pubs/12063/index.cfm.

For more information about the project, contact Eric Weaver, 202-493-3153, eric.weaver@dot.gov. For more information about the EAR Program, contact David Kuehn, 202-493-3414, david.kuehn@dot.gov.

Fact Sheet: Next Generation Vehicle Positioning and Simulation Solutions—Using GPS and Advanced Simulation Tools to Improve Highway Safety

This fact sheet discusses two projects—"Integrated Global Positioning System and Inertial Navigation Unit (GPS/INU) Simulator for Enhanced Traffic Safety" and "Next Generation Vehicle Positioning in GPS-Degraded Environments for Vehicle Safety and Automation Systems"—awarded under the EAR Program. The projects are investigating key technological factors: high-precision vehicle positioning and advanced traffic simulation and evaluation tools.

The fact sheet is available at www.fhwa.dot.gov/advancedresearch/pubs/13065/index.cfm.

For more information on the project, "GPS/INU Simulator for Enhanced Traffic Safety," contact James Arnold, 202-493-3265. For more information on the project, "Next Generation Vehicle Positioning in GPS-Degraded Environments for Vehicle Safety and Automation Systems," contact David Gibson, 202-493-3271, david.gibson@dot.gov. For more information about the EAR Program, contact David Kuehn, 202-493-3414, david.kuehn@dot.gov.

INFRASTRUCTURE

TFHRC Open House Features Intelligent Compaction and Sustainable Pavement Technologies

On September 3 and 5, 2013, FHWA's Office of Infrastructure R&D held an open house at Turner-Fairbank Highway Research Center (TFHRC) to provide stakeholders with an opportunity to explore intelligent compaction and sustainable pavement technologies.

Researchers displayed intelligent compaction construction equipment and demonstrated its use in the construction of research test pavements. They installed an intelligent compaction retrofit instrumentation kit on a double drum asphalt roller and a single drum soil roller.

FHWA is implementing intelligent compaction technology through the second round of its Every Day Counts (EDC) initiative, which aims to deploy innovation that can shorten project delivery, enhance roadway safety, and protect the environment.

The full-scale pavements that are being constructed at TFHRC's Pavement Test Facility are designed to provide recommended limitations for combining increased recycled content with reduced temperature warm mix asphalt production (an initiative of the first round of EDC).

Those participating in the event included FHWA's Eastern Federal Lands; FHWA's Office of Infrastructure; the Virginia Department of Transportation and FHWA Division; the Washington D.C. Department of Transportation and FHWA Division; the American Association of State Highway and Transportation Officials (AASHTO); and the American Road and Transportation Builders Association (ARTBA). Partners included Virginia Paving Incorporated; Caterpillar Incorporated; Alban CAT; SITECH; and Trimble.

Indoor presentations were recorded as part of ARTBA's Local Transportation Virtual Conference program and can be accessed via www.lotransvirtualconference.org/artba. For more information on intelligent compaction activities, contact Richard Duval, 202-493-3365, richard.duval@dot.gov. For more information on the Sustainable Pavement Accelerated Pavement Testing Experiment, contact Nelson Gibson, 202-493-3073, nelson.gibson@dot.gov.

LTPP InfoPave Released for User Review and Input

The Long-Term Pavement Performance (LTPP) program's recent efforts to develop a new Web-based user interface program to disseminate the vast resource of LTPP data and information has taken form and is now being released for user review and input. During this beta testing phase, the LTPP program invites State engineers and managers to explore all of the benefits LTPP InfoPave has to offer.

LTPP InfoPave can be accessed at www.infopave.com. For more information, contact Debbie Walker, 202-493-3068, deborah.walker@dot.gov.

New Profilers Capture Data on the Road

The LTPP program has taken delivery of four new, state-of-the-art inertial profiling units. The profilers were manufactured to meet LTPP's stringent acceptance criteria. The new devices replace LTPP profilers that logged more than 1.2 million miles. A week-long training exercise held in April paved the way for the program to incorporate the new devices into production mode.

For more information, contact Debbie Walker, 202-493-3068, deborah.walker@dot.gov.

TechBrief: FHWA LTBP Workshop to Identify Bridge Substructure Performance Issues

This TechBrief provides an overview of the proceedings and findings of the "FHWA Workshop to Identify Bridge Substructure Performance Issues," which was 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 TechBrief 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.

Report: Geosynthetic Reinforced Soil Performance Testing—Axial Load Deformation Relationships

The use of geosynthetic reinforced soil (GRS) for load bearing applications such as bridge abutments and integrated bridge systems has expanded among transportation agencies looking to save time and money while delivering a safe and improved product to the traveling public. GRS has been identified by FHWA as a proven, market-ready technology, and is being actively promoted through its EDC initiative. This report presents a database of 19 performance tests performed by the FHWA. It also presents findings, conclusions, and suggestions regarding various design parameters related to the performance of GRS, such as backfill material, reinforcement strength, reinforcement spacing, facing confinement, secondary reinforcement, and compaction.

The report is available at www.fhwa.dot.gov/publications/research/infrastructure/structures/13066/index.cfm

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

Report: Composite Behavior of Geosynthetic Reinforced Soil Mass

Many studies have been conducted on the behavior of GRS structures, but the interactive behavior between the soil and geosynthetic reinforcement in a GRS mass has not been fully elucidated. This report highlights a study that investigated the composite behavior of a GRS mass.

This report is available at www.fhwa.dot.gov/publications/research/infrastructure/10077/index.cfm.

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

TechBrief: Friction Angles of Open-Graded Aggregates from Large-Scale Direct Shear Testing

AASHTO classifies open-graded aggregates according to the M43 gradation based on standard sizes for processed aggregates. Despite common use of these aggregates, their strength characteristics have not been systematically measured or used in design. Instead, engineers frequently use a default friction angle of 34°, leading to potential conservatism in retaining wall and foundation design. The primary purpose of this TechBrief is to present research results on the strength properties of standard open aggregates tested in a large-scale direct shear device to improve the state of practice for the design of structures using these materials.

The TechBrief is available at www.fhwa.dot.gov/publications/research/infrastructure/structures/bridge/13068/index.cfm.

For more information, contact Jennifer Nicks, 202-493-3075, jennifer.nicks@dot.gov.

SAFETY

FHWA Releases 2013 Version of Interactive Highway Safety Design Model

On September 30, 2013, FHWA released version 9.0.0 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 new version includes a Crash Prediction Module (CPM) that provides a faithful implementation of the AASHTO's Highway Safety Manual (HSM), Part C: Predictive Method. It includes a Beta version of crash prediction capabilities for freeway ramps, collector-distributor (C-D) roads, and ramp terminals, which are 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, urban and suburban arterials, and freeway segments. Another highlight of the CPM is the Calibration Utility, which was developed after 2011 and has been added to the IHSDM Administration Tool (Admin Tool). The Calibration Utility, intended to assist agencies in implementing calibration procedures described in the Appendix to Part C of HSM, features step-by-step instructions and hands-on exercises

illustrated in a tutorial lesson. 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.

TechBrief: Field Evaluation of a Restricted Crossing U-Turn Intersection

A restricted crossing U-turn (RCUT) intersection is a promising treatment used to mitigate right-angle crashes where two-lane minor roads intersect with rural four-lane divided highways. This TechBrief includes comparisons of the operations of an unsignalized RCUT intersection in Maryland with a roughly comparable conventional stop-controlled intersection on the same corridor. It also summarizes the results of several crash analysis approaches for intersections converted from conventional designs to RCUT designs along two four-lane divided highway corridors in Maryland.

It is available at www.fhwa.dot.gov/publications/research/safety/hsis/12037/index.cfm.

For more information, contact Joe Bared, 202-493-3314, joe.bared@dot.gov.

Summary Report: Safety Evaluation of Converting Traffic Signals from Incandescent to Light-Emitting Diodes

Light-emitting diodes (LEDs) are primarily installed to reduce energy consumption and decrease maintenance. In addition, LEDs are expected to last much longer compared to incandescent bulbs and tend to age gradually. However, a recent study revealed several potential problems with LEDs, including their inability to melt snow and issues related to visual discomfort caused by glare at night. This summary report presents a safety evaluation of converting traffic signals from incandescent bulbs to LEDs.

The document is available at www.fhwa.dot.gov/publications/research/safety/13070/index.cfm

For more information, contact Ana Maria Eigen, 202-493-3168, ana.eigen@dot.gov.

Report: Traffic Control Device Conspicuity

The conspicuity of a traffic control device (TCD) is the probability that the device will be noticed, but there is no agreed-upon measure of what constitutes this. This report discusses four studies focused on the conspicuity of TCDs. Researchers examined how driver behavior and performance are affected by messaging features within the right-of-way in a variety of contexts. The goal was to use new information in the development of evidence-based guidance that supports more effective communication to roadway users.

This report is available at www.fhwa.dot.gov/publications/research/safety/13044/index.cfm.

For more information, contact David Yang, 202-493-3284, david.yang@dot.gov.

Report: Simulator Study of Signs for a Complex Interchange and Complex Interchange Spreadsheet Tool

This report documents a FHWA project that identified potential improvements to current signing practices for complex interchanges and developed a spreadsheet decision tool for defining and quantifying interchange complexity. The report is of interest to engineers, planners, and other practitioners who are concerned about implementing signing treatments for freeways, as well as city, State, and local authorities who have a shared responsibility for ensuring public safety.

The document is available at www.fhwa.dot.gov/publications/research/safety/13047/index.cfm

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

OPERATIONS

Report: Synthesis of Traveler Choice Research: Improving Modeling Accuracy for Better Transportation Decisionmaking

The choices of travelers are central to the performance of a transportation system, but little is known about what influences such choices or the impact they have on system performance. This report details an assessment of current research and practices in traveler choice. It also establishes a foundation for the development of traveler choice models that can be incorporated into existing transportation analysis tools. The report will be useful for both traveler choice researchers and organizations considering transportation management strategies that influence traveler choice.

The report is available at www.fhwa.dot.gov/publications/research/operations/13022/index.cfm.

For more information, contact Joe Peters, 202-493-3269, joe.peters@dot.gov.

Report: Large Field Test of New Stereo Detection System for the Pedestrian Signal Phase for the Visually Impaired

The objective of this report is to validate a new tool to assist the physically and visually impaired in safely crossing streets. This was accomplished by conducting a large field test in four cities in four States. These study results will help officials determine whether pedestrian detection systems can be operated safely without interfering with other traffic control tools. Proposed configurations may extend the pedestrian signal timing phase or omit a pedestrian phase when no pedestrians are present. The final system configuration results indicate that the stereo pedestrian system works without interfering with other systems. This report provides details and raw data for the tests so that decisionmakers may make their own evaluations.

The report is available at www.fhwa.dot.gov/publications/research/operations/12047/index.cfm

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

Report: The Effective Integration of Analysis, Modeling, and Simulation Tools

Simulation models used in transportation analysis are not well integrated among different domains (e.g., operations, safety, and environment) and for different levels of analysis (i.e., macro, meso, and micro). This report discusses a project that involved developing a prototype data hub and data schema using the Network EXplorer for Traffic Analysis (NeXTA) open-source software tool. This report, which documents findings and recommendations from the research, is aimed at model users, managers at modeling agencies, software developers, and researchers who are interested in advancing integrated modeling practices.

The document is available at www.fhwa.dot.gov/publications/research/operations/13063/index.cfm.

For more information, contact Joe Bared, 202-493-3314, joe.bared@dot.gov.

RECENT PERIODICALS

***Public Roads*—September/October 2013**

This issue includes: Roadmap to the Future; Setting Speed Limits for Safety; Fill Those Empty Seats!; and Predicting the Future?

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

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

FOCUS Newsletter September 2013

The September issue includes: New Era for Continuously Reinforced Concrete Pavement; Construction Peer Network: Collaborating to Improve Highway Construction Practices; Ultra-High Performance Concrete: The State-of-the-Art; SHRP2 Research Reports Available Online; Infrastructure Innovation Webinars; and Highway Technology Calendar.

The issue is available online via www.fhwa.dot.gov/publications/focus/13sep/13sep00.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