

## ***FHWA R&T Now*** ~ March 2011 ~

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

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### **GENERAL/ADMINISTRATIVE**

#### **Planning for the Implementation of the Second Strategic Highway Research Program (SHRP 2)**

The Transportation Research Board (TRB) continues to manage the Second Strategic Highway Research Program (SHRP 2) and has been convening implementation-planning workshops to help prepare for the deployment of the first research results. FHWA liaisons and technical staff are fully engaged in both the workshops and the SHRP 2 Technical Coordinating Committees, as they evaluate the projects and recommend initiatives for implementation or further research during 2011.

Congress extended the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) surface transportation authorization through September 30, 2011. Congress also extended the continuing resolution passed in December 2010, which amended Section 510 of Title 23 to allow the Secretary of Transportation to use SHRP 2 funds for implementation of research products related to SHRP 2. This provision allows resources for FHWA to begin to be engaged in SHRP 2 development, demonstration, evaluation, and technology transfer activities. FHWA is in the process of assessing the alignment of emerging SHRP 2 products with FHWA's current program areas and identifying potential priorities for deployment within those programs.

FHWA continues its close collaboration with TRB, the American Association of State Highway and Transportation Officials (AASHTO), and the National Highway Traffic Safety Administration (NHTSA) to educate and position its agencies, State departments of transportation, and industry for deployment of SHRP 2 research results. This multiorganizational approach to implementation activities will ensure that proper preparations are made for the establishment of a formal SHRP 2 Implementation Program upon reauthorization.

For more information, contact Margie Sheriff, 202-366-1747, [margie.sheriff@dot.gov](mailto:margie.sheriff@dot.gov).

### **ADVANCED RESEARCH**

#### **Exploratory Advanced Research (EAR) Program Awards Research on Agent-Based Modeling and Simulation for Transportation**

The object of this research, conducted by the University of Maryland, is to develop an innovative agent-based approach for integrated driver- and traveler-behavior modeling with applications for transportation systems management, capital investment evaluation, transportation planning, and beyond. The proposed scope of work focuses on agent decision types, including en route diversions, pre-trip route choice, departure time choice, and mode choice, which provide the crucial linkages between traditional traffic simulation, travel demand, and innovative agent-based models. Data required for building the driver and traveler agents will be collected through interactive laboratory experiments, driving simulators, and traditional-, Web-, and global-positioning-system-based surveys. Agent behavior rules will be empirically estimated with rule-based artificial intelligence methods and possibly utility-based methods when detailed agent behavior data are not available. The award is a result of a national broad agency announcement for Exploratory Advanced Research (EAR) proposals issued in May 2010.

For more information about the project, contact Brian Gardner, 202-366-4061, [brian.gardner@dot.gov](mailto:brian.gardner@dot.gov).

For more information about the EAR Program, contact David Kuehn, 202-493-3414, [david.kuehn@dot.gov](mailto:david.kuehn@dot.gov).

### **FHWA EAR Program Partners on Cyber-Physical Systems**

Researchers who received awards under the EAR Program are included in a National Science Foundation invitation-only workshop on “Developing Dependable and Secure Automotive Cyber-Physical Systems from Components.” The workshop held in Troy, Michigan on March 17-18 provides information on how research of cyber-physical systems can improve safety, mobility, and fuel efficiency. Cyber-physical systems integrate in-vehicle, infrastructure-based, and combined vehicle-infrastructure hardware and software component systems. For more information about the workshop, visit: <http://varma.ece.cmu.edu/Auto-CPS-2011/Index.html>.

For more information about the EAR Program, contact David Kuehn, 202-493-3414, [david.kuehn@dot.gov](mailto:david.kuehn@dot.gov).

## **INFRASTRUCTURE**

### ***Long-Term Pavement Performance Program Highlights: Accomplishments and Benefits 1989–2009***

The need for information on how pavements perform over time came to the forefront in the early 1980s, as the deterioration of highways built two or three decades earlier became a concern for highway agencies. The mission to study performance data systematically nationwide and to promote extended pavement life was advanced by TRB, AASHTO, and FHWA. To view the *Long-Term Pavement Performance (LTPP) Program Highlights* publication, visit:

<http://www.fhwa.dot.gov/publications/research/infrastructure/pavements/ltp/10071/index.cfm>

### ***Long-Term Pavement Performance Program—Accomplishments and Benefits 1989–2009—Summary Report***

The Long-Term Pavement Performance (LTPP) Program began in 1987 as part of SHRP. Its primary purpose was to establish a national long-term pavement database to support pavement research and improved pavement performance. When SHRP ended as planned in 1992, the LTPP Program continued under FHWA with the participation of highway agencies in all 50 States, the District of Columbia, Puerto Rico, and 10 Canadian Provinces.

Since 1989, the LTPP Program has monitored nearly 2,500 pavement test sections throughout the United States and Canada. Approximately 950 test sections are still being monitored today. By collecting and analyzing data from these pavement test sections over time, researchers are gaining insight on how and why pavements perform as they do. This enables researchers to learn how to build better, longer lasting, and more cost-effective pavements. To view the LTPP summary report, visit:

<http://www.fhwa.dot.gov/publications/research/infrastructure/pavements/ltp/10072/index.cfm>

### **LTPP Computed Parameter Dynamic Modulus Study**

LTPP recently completed the LTPP Computed Parameter Dynamic Modulus Study, which developed estimates of the dynamic modulus of hot-mix asphalt layers on LTPP test sections following the models used in the *Mechanistic-Empirical Pavement Design Guide*. In addition, LTPP\*, a user-friendly software, was

developed to facilitate dynamic modulus computations. The software can be obtained from the LTPP Customer Support Service Center at [ltppinfo@dot.gov](mailto:ltppinfo@dot.gov) or at 202-493-3035.

For more information on the software and study findings, please refer to the TechBrief, *LTPP Computed Parameter: Dynamic Modulus* at:

<http://www.fhwa.dot.gov/publications/research/infrastructure/pavements/ltpp/11018/index.cfm>.

### ***China Earthquake Reconnaissance Report: Performance of Transportation Structures in the May 12, 2008, M7.9 Wenchuan Earthquake***

On May 12, 2008, a magnitude 7.9 earthquake occurred in Wenchuan County in Sichuan Province, China. Shortly after the earthquake, FHWA's Turner-Fairbank Highway Research Center (TFHRC) contacted its Chinese counterpart, the Research Institute of Highway from the Ministry of Communication of China, to arrange a visit to the affected areas for transportation system reconnaissance. For various reasons, the plan for the earthquake reconnaissance was not finalized until late July 2008. The U.S. transportation system reconnaissance team visited the earthquake-affected areas from July 20–24, 2008. This report is a summary of the team's findings and the lessons learned from the earthquake event.

<http://www.fhwa.dot.gov/publications/research/infrastructure/structures/11029/index.cfm>

### ***User Guidelines for Waste and Byproduct Materials in Pavement Construction***

The primary purpose of this guideline document is to assist those who have an interest in using or increasing their understanding of the types of waste and byproduct materials that may be recovered and used in pavement construction applications.

<http://www.fhwa.dot.gov/publications/research/infrastructure/pavements/97148/index.cfm>

## **SAFETY**

### **FHWA and NHTSA Collaborate to Develop New Small Car Finite Element Model**

Since 1992, the FHWA and NHTSA have collaborated in the development of 18 finite element vehicle models for use in a variety of crash-simulation studies. All of these models, once validated, have been made freely available to encourage wider use of finite element analysis in safety research.

The most recent of these vehicle models is the 2010 Toyota Yaris sedan. The vehicle was purchased and systematically reverse engineered—torn apart, parts laser scanned, elements defined, material properties identified, and elements re-meshed—to create a detailed (850,000 element) computer model of that vehicle.

It is expected that the initial version of the Yaris model will be released in April 2011. The model will help hardware designers to develop the next generation of safer roadside hardware by using crash simulation. Ongoing work on the Yaris will focus on fully modeling the vehicle's interior to support NHTSA occupant safety research efforts. This model is expected to serve a variety of FHWA and NHTSA analysis needs for the next 8–12 years. The Yaris sedan conforms to the small test vehicle specification required in the new roadside hardware crashworthiness standards, the *Manual for Assessment of Safety Hardware* (MASH); thus, it will be used to evaluate how well existing or proposed new roadside barriers will perform under MASH criteria.

For more information, contact Ken Opiela, 202-493-3371, [kenneth.opiela@dot.gov](mailto:kenneth.opiela@dot.gov).

## **OPERATIONS**

### **FHWA's New Laboratory Is Up and Running at TFHRC**

FHWA's new Transportation Operations Laboratory (TOL) was just recently designated as an Intelligent Transportation Systems test bed. The TOL consists of a data resources test bed, concepts and analysis test bed, and cooperative vehicle-highway test bed. A powerful example of the TOL's utility involves communication among vehicles, infrastructure, and mobile devices. Traffic signals can communicate their phases and timing to vehicles and pedestrians who carry mobile devices. The vehicles anonymously transmit their positions, travel times, and other data to traffic management centers, which in turn communicate advisory messages to drivers through dynamic messaging on road signs or inside the vehicles via warning tones. Traffic signals will "talk" to other cars and traffic signals about where they are and how fast they are going. This concept could lead to revolutionary decreases in delays and a reduction in the number of crashes that occur during stop-and-go traffic.

For more information, contact Joseph Peters, 202-493-3269, [joe.peters@dot.gov](mailto:joe.peters@dot.gov).

### **Selection of High-Priority Mobility Applications Announced at the 2011 Annual TRB Meeting**

In January 2011, USDOT announced the selection of 10 high-priority mobility applications for coordinated research activities focused on applications development and testing under the Dynamic Mobility Application (DMA) Program. As a first step, the DMA Program will seek to partner with the research community to further develop these 10 transformative concepts and to refine data and communication needs. These needs will inform related efforts in the Real-Time Data Capture and Management Program in support of application development to collect, assemble, and provide relevant data resources integrating data from wirelessly connected vehicles, travelers, and roadside-wayside infrastructure. The resulting well-organized data and associated descriptors (collectively known as *data environments*) will include data from field tests and advanced simulation models and be made broadly available. Later, in Phase 2 of the mobility program, selected mobility applications will be identified for further development, testing, and benefits assessment utilizing these open data environments.

For more information, contact Ben McKeever, 202-493-3270, [ben.mckeever@dot.gov](mailto:ben.mckeever@dot.gov).

[http://www.its.dot.gov/press/2011/mobility\\_app.htm](http://www.its.dot.gov/press/2011/mobility_app.htm)

### ***Synthesis of Congestion Pricing-Related Environmental Impact Analyses Report***

This report presents a summary and analysis of current practices as well as a set of recommended practices for conducting before-and-after evaluations of congestion pricing projects. This study focuses on the environmental impact areas most commonly considered in literature: air quality, noise, and environmental justice—sometimes termed *equity*—that considers how impacts distribute across different types of people, especially low-income and minority groups. Because environmental impacts are driven by the broader travel impacts of congestion pricing projects, this study also investigated state of the practice and assessed gaps in travel evaluation methodologies, including traffic, transit, and traveler behavior.

Published literature providing detailed environmental evaluation methodology information is not plentiful, and there are very few critical assessments of the state of the art, limitations, and best practices. This study intends to address that gap and provide recommendations that will inform future congestion pricing projects.

For more information, contact Gene McHale, 202-493-3275, [gene.mchale@dot.gov](mailto:gene.mchale@dot.gov).

<http://www.ops.fhwa.dot.gov/publications/fhwahop11008/index.htm>

### **Applications for the Environment: Real-Time Information Synthesis (AERIS) Team Identifies Potentially Transformative Applications to Improve Environmental Performance**

The Multimodal Intelligent Transportation Systems (ITS) team for Applications for the Environment: Real-Time Information Synthesis (AERIS) met at TFHRC on March 14 for a retreat to identify potentially transformative strategies and applications that could use ITS-connected vehicle technologies to improve environmental performance. The AERIS team conducted foundational research and identified a number of ITS strategies and applications that promise to improve environmental performance. The team reviewed how these applications, and others proposed by the team, might be developed and bundled to achieve benefits at scales that would be considered transformative. For this analysis, strategies and applications were reviewed on the basis of their projected potential for achieving environmental improvements in terms of carbon production, emissions, and fuel consumption. These initial transformative applications will be reviewed internally within USDOT and then later in a planned workshop where external stakeholders can participate. Later, tracks of the AERIS Program will then evaluate these applications through comprehensive modeling and analysis activities. The AERIS team will then recommend possible additional investments by the ITS Program that could enable development and deployment of the most promising applications.

For more information, contact Bob Ferlis, 202-493-3268, [robert.ferlis@dot.gov](mailto:robert.ferlis@dot.gov).

### **FHWA Researcher to Speak at Easter Seals Webinar on Transportation Accessibility**

In April, Mohammed Yousuf, from FHWA's Office of Operations Research and Development, will be speaking at two Webinars hosted by the Easter Seals Project Accessible Community Transportation in Our Nation (ACTION). Yousuf will be discussing technologies that could be used in enhancing transportation to make it more accessible for those with disabilities. The first Webinar, "Research Today to Increase Accessibility Tomorrow: The Cutting Edge of Wayfinding Technology," will be held on April 13, 2011. The second Webinar, "Implementing Wayfinding Technology in Public Transit: The BART System from Three Perspectives," will be held on April 20, 2011. Easter Seals Project ACTION promotes universal access to transportation for people with disabilities under Federal law by partnering with transportation providers, the disability community, and others.

For more information, contact Mohammed Yousuf, 202-493-3199, [mohammed.yousuf@dot.gov](mailto:mohammed.yousuf@dot.gov).

[http://projectaction.easterseals.com/site/PageServer?pagename=ESPA\\_homepage](http://projectaction.easterseals.com/site/PageServer?pagename=ESPA_homepage).

### **Disability Association Promotes FHWA's Disabilities Workshop on Technology Innovations**

After a very successful workshop sponsored by FHWA on Technological Innovations in Transportation for People with Disabilities, the American Association of People with Disabilities circulated a story about the workshop to disability leaders through the *Justice for All* e-news and blog service. The link can be viewed at <http://tiny.cc/1i963>.

FHWA's Office of Operations R&D, under the EAR Program, conducted the workshop on February 23, 2011, at TFHRC. The workshop was held for technology and disability experts outside the transportation industry to discuss how technological advancements in transportation could help empower people with disabilities to become more mobile. There were 30–40 experts in attendance, some with actual disabilities, from various companies and organizations that champion accessibility, mobility, and safety in transportation for people with disabilities. The workshop participants discussed technologies, such as mobile computing, computer vision, artificial intelligence, and robotics, which could be used in innovative ways to help those

with vision impairment and other disabilities, to be more independent. The topics discussed can be used to help shape new research, initiatives, and applications for the future.

For more information, contact Mohammed Yousuf, 202-493-3199, [mohammed.yousuf@dot.gov](mailto:mohammed.yousuf@dot.gov).

## **RECENT PERIODICALS**

### ***FOCUS* Newsletter—March 2011**

This issue includes: Pavement Management Roadmap: A Roadmap to Preserving Our Pavement Investments; Designing the Next Generation of Wildlife Crossings; Safer Driving, Safer Work Zones: National Work Zone Awareness Week 2011; Highway Technology Calendar; and, Training in Action at the National Highway Institute.

<http://www.fhwa.dot.gov/publications/focus/11mar/11mar00.cfm>

For more information, contact Lisa Pope, [lgpope@woodwardcom.com](mailto:lgpope@woodwardcom.com).

### ***FOCUS* Newsletter—January/February 2011**

This issue includes: An Innovative Solution for Rock Slope Stabilization; New FHWA Course Introduces the Asphalt Mixture Performance Tester; Developing the Next Generation of Bridges: The Long-Term Bridge Performance Program; Diagnosing and Mitigating ASR in Transportation Structures; Design-Build in Transportation on Display at Annual Conference; and, Highway Technology Calendar.

<http://www.fhwa.dot.gov/publications/focus/11jan/11jan00.cfm>

For more information, contact Lisa Pope, [lgpope@woodwardcom.com](mailto:lgpope@woodwardcom.com).

### ***Transportation and Climate Change* Newsletter—Winter 2010–2011**

This issue includes: EPA Issues 2010 Fuel Economy Trends Report Success in Stewardship Newsletter Features FHWA's Climate Change Adaptation Activities; Pew Center Releases Report Highlighting Options to Reduce Greenhouse Gas Emissions from Transportation; Pew Reports on Federal Agency Adaptation Activities; National Weather Service Offers Storm Surge Interactive Maps; NRDC Rates State Transportation Policies Based on Greenhouse Gas Reduction Potential; and 2010 Tied as Warmest Year on Record.

<http://www.fhwa.dot.gov/hep/climatechange/newsletter/ccnews0211.htm>

## **Links**

**TFHRC:** <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](mailto:FHWA_Now@fhwa.dot.gov)