FHWA R&T Now

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

May/June 2015

GENERAL/ADMINISTRATIVE

FHWA Acting Administrator Visits Turner-Fairbank

On May 5, 2015, FHWA Acting Administrator Gregory Nadeau received a warm welcome at Turner-Fairbank Highway Research Center (TFHRC), where he attended presentations and demonstrations at various laboratories, including the Saxton Transportation Operations Laboratory, the Structures Laboratory, the Concrete Laboratory, and the Human Factors Laboratory.

FHWA Acting Administrator Gregory Nadeau is shown the benefits of ultra-high performance concrete.

At the Saxton Laboratory—which is equipped with a data resources testbed, a concepts and analysis testbed, and a cooperative vehicle-highway testbed—researchers explained how the lab supports a broad range of research needs, including testing connected automation applications. At the Structures Laboratory, Ben Graybeal, who leads the bridge and foundation engineering research team, discussed the benefits of ultra-high performance concrete. At the Concrete Laboratory, Jack Youtcheff, who heads the pavement materials team, demonstrated a prototype asphalt binder quality control tester. The Acting Administrator also experienced how the Human Factors Laboratory's Highway Driving Simulator tracks and records a driver's eye movements along a virtual highway.

The Highway Driving Simulator at Turner-Fairbank.

For more information about Turner-Fairbank's Laboratories, visit www.fhwa.dot.gov/research/tfhrc/labs/.

U.S. Department of Transportation
Federal Highway Administration

Report Underscores FHWA's Essential Role

The Transportation Research Board's (TRB) Research and Technology Coordinating Committee (RTCC) recently released "Transportation Research Board Special Report 317: The Essential Federal Role in Highway Research and Innovation." The committee developed this special report to inform legislators and other stakeholders of necessary background and context for decisions about future Federal funding of FHWA's Research, Development, and Technology (RD&T) program.

In the committee's judgment, reductions in FHWA's human and financial resources for the RD&T program will hamper the agency's ability to continue to fulfill its essential roles and responsibilities. The report states that other participants in national highway RD&T are unlikely to fill any void that would be created. Successful innovations described in the report have reduced the time needed to deliver highway improvements, increased throughput, and improved safety while reducing costs.

FHWA has an essential role in fostering national deployment of innovations based on its own research and development and that of other highway research programs, the report points out. FHWA's role is also critical in the Nation's RD&T program through its investment in long-term, high-risk research which fills gaps not covered in other highway-related research programs. The report emphasizes that FHWA should have the resources to perform its essential role in RD&T and that it has the national perspective, leadership, and ability to carry out these responsibilities.

To access the TRB Special Report, visit www.nap.edu/catalog/21727/transportation-research-board-special-report-317-the-essential-federal-role. For more information, contact Jack Jernigan, 202-493-3363, jack.jernigan@dot.gov.

INFRASTRUCTURE

Turner-Fairbank Hosts Subcommittee on Hydrology

Turner-Fairbank recently hosted the spring quarterly meeting of the U.S. Geological Survey's (USGS) Advisory Committee on Water Information (ACWI)—Subcommittee on Hydrology (SOH). Participating agencies included USGS, the Federal Emergency Management Agency, the National Oceanic and Atmospheric Administration, the U.S. Army Corps of Engineers, and FHWA.

The SOH is responsible for analyzing relevant issues and facts related to the availability and reliability of surface-water information. The subcommittee drafts proposed position papers and recommendations on surface-water quality to ACWI for deliberation and approval as advice to the Federal Government. Its membership is comprised of Federal, State, local, and private organizations that collect, analyze, disseminate, or use information about precipitation, water usage, streamflow, and related data. The membership also includes those who develop monitoring technology, guidelines, and standards.

Kornel Kerenyi, a hydraulics research engineer on FHWA's Office of Infrastructure Hazard Mitigation Team, presented an overview of the hydraulics research program. Brian Beucler, a senior hydraulics engineer on FHWA's Office of Bridges and Structures' Hydraulics and Geotechnical Team, presented technical guidance and methods for assessing the vulnerability of coastal transportation facilities to extreme events and climate change. The guidance and methodology are included in Volume 2 of FHWA's Hydraulic Engineering Circular 25.

For more information, contact Kornel Kerenyi, kornel.kerenyi@dot.gov, 202-493-3474, or Brian Beucler, brian.beucler@dot.gov, 202-366-4598.

Concrete Lab Celebrates Renovation

In April, FHWA's Concrete Laboratory at TFHRC celebrated a major renovation during an open house. The lab, which features state-of-the-art instruments for conducting research on all facets of concrete material, now boasts a new walk-in environmental chamber that allows researchers to maintain temperature and humidity within strict ranges during curing and testing. Durability related properties can be assessed with instruments such as a freeze-thaw chamber, resonance frequency tester, titrator, surface resistivity meter, and automated imagining for the sorptivity setup.

FHWA's Concrete Laboratory at TFHRC

The lab has a dynamic sheer rheometer and isothermal calorimeter for examining early-age properties of cementitious materials, including ordinary cement, supplementary cementitious materials such as fly ash, and alternative cementitious materials containing little or no cement. An automated image measurement system can measure aggregate shape, texture, and angularity. Over the past few years, researchers in the lab have been collaborating with academia, industry, and other Federal agencies through formal cooperative research and development agreements and informal partnerships.

For more information please contact Ahmad Ardani at ahmad.ardani@dot.gov, 202-493-3422.

C-LTPP Data Incorporated into LTPP InfoPave™

The Canadian Long-Term Pavement Performance Program's (C-LTPP) data have been incorporated into the U.S. Long-Term Pavement Performance Program (LTPP) Web portal, known as LTPP InfoPave™. The C-LTPP data along with numerous related reports can be found under the Non-LTPP tab on the InfoPave Web site. All of the data have been combined into multiple databases, consisting of four major data modules: Descriptive, Historical, Materials, and Monitoring. Registered users can sign in to access the data. By allowing C-LTPP data to be available through InfoPave, FHWA is making it easier to apply the data from Canada's separate LTPP experiment in combination with the U.S. LTPP data to answer important questions about pavement performance.

For more information about FHWA's Long-Term Pavement Performance Program, visit www.fhwa.dot.gov/research/tfhrc/programs/infrastructure/pavements/ltpp/.

Turner-Fairbank Advances PRS for Concrete Pavements

Research conducted at TFHRC is advancing performance-related specifications (PRS) for jointed plain concrete pavements. The Illinois Toll Authority in Chicago has decided to implement PRS on its next nine projects on the eastern segment of Interstate 90.

The decision follows pilot work conducted under an FHWA contract by Applied Research Associates (ARA), a research and engineering firm headquartered in Albuquerque, NM. ARA used PaveSpec 4.0 to develop the PRS, which compares as-designed to as-constructed concrete pavements to determine the quality level and ultimately the pay factors, including incentives and disincentives. Construction is expected to begin soon. All nine projects have been awarded contracts. ARA will continue to work with the Toll Authority to finalize special provisions for PRS in 2016.

For more information, contact Richard Duval, 202-493-3365, richard.duval@dot.gov.

FHWA Participates in NDE Communication Group's Annual Meeting

On April 7 and 8, 2015, Hoda Azari, a program manager in FHWA's Office of Infrastructure Research and Development, participated in the Nondestructive Evaluation (NDE) Communication Group's annual meeting in Alexandria, Virginia. Participants included subject matter experts from the U.S. Department of Transportation (including FHWA and the Federal Aviation Administration); the Department of Defense (including the Army, Navy, and Air Force); the Department of Commerce (including the National Institute of Standards and Technology); the Department of Energy (including the Argonne National Laboratory and Lawrence Livermore National Laboratory); the National Institutes of Health (NIH); the National Aeronautics and Space Administration (NASA); and the National Science Foundation (NSF).

Representatives of each agency provided a technical briefing on NDE techniques and intellectual approaches to problems in areas focusing on medical diagnosis, materials science, and infrastructure. On behalf of FHWA, Azari delivered a presentation about using the RABIT™ bridge deck assessment tool, which can rapidly detect and document common deterioration types in concrete bridge decks.

For more information, contact Hoda Azari, 202-493-3064, hoda.azari@dot.gov.

FHWA and Oklahoma State Conduct Study on Super Air Meter

FHWA's Concrete Laboratory at TFHRC in collaboration with Oklahoma State University recently conducted a comprehensive study on the Super Air Meter (SAM), a device that can measure the total air void of fresh concrete and provide an indication of air void spacing and distributions. Adequate air void spacing and distributions are necessary parameters for concrete to resist the adverse impact of freeze-thaw action.

Super Air Meter

Developed under the direction of Tyler Ley, a structural engineering professor at Oklahoma State University, the device is a modified type B pressure meter with a new capability of reading much higher pressure and guiding the operator on how to conduct the test. The primary objective of the study was to examine the feasibility of using SAM as a quick scanning tool in assessing air void quality of fresh concrete mixtures.

For more information, contact Ahmad Ardani, 202-493-3422, ahmad.ardani@dot.gov.

SAFETY

Summary Report: Making Driving Simulators More Useful for Behavioral Research

FHWA's Exploratory Advanced Research (EAR) program and its Office of Safety Research and Development recently released research results related to improving the usefulness of driving simulators in behavioral research.

Highway Driving Simulator

The EAR-funded project aimed to help engineers and researchers choose the appropriate simulator platform and level of fidelity to address particular design questions. Study results show that using a high-fidelity simulator, with particular attention to rendering the roadway's visual complexity, will lead drivers in the simulator to behave comparably to those observed on actual roadways. Another critical study goal was to identify a mathematical transformation that can equate simulator data to real-world outcomes. The research team developed and demonstrated a proof of concept approach to characterizing simulator fidelity to allow for comparison between driving behavior in simulators and the real world. Project researchers also developed a set of tools that provide the foundation for future work relating simulator results with the real world.

To access the summary report, visit www.fhwa.dot.gov/advancedresearch/pubs/15016/index.cfm. For more information, contact Brian Philips, 202-493-3468, brian.philips@dot.gov.

Report: Field Evaluation of Detection-Control System

Over the past several years, an average of 21 percent of the fatalities and roughly 50 percent of the serious injuries on the U.S. roadway system occurred at intersections. Strategies to address intersection safety are diverse and targeted. For isolated rural, high-speed signalized intersections, dilemma zone related angle and rear-end crashes are a major concern. The dilemma zone is defined as a length of roadway on the approach to an intersection, or a time period while driving toward the intersection, within which drivers have difficulty deciding whether to stop or to continue moving when presented with a yellow signal indication.

This report examines one solution to the above problem called detection-control system (D-CS). D-CS is intended for use at isolated, full-actuated intersections on high-speed roadways where the major road approach has an 85th-percentile speed (or posted speed limit) of 45 mi/h or higher. D-CS requires lane-by-lane vehicle detection on major approaches, and presence detection on minor approaches. Field tests show that D-CS can effectively reduce dilemma zone induced red light running and the frequency of reaching the designated maximum green time for the major road green phase (max-out).

To access the report, visit www.fhwa.dot.gov/publications/research/safety/14058/index.cfm. For more information, contact Wei Zhang, 202-493-3317, wei.zhang@dot.gov.

OPERATIONS

USDOT Conducts Workshop on Vehicle Automation Technologies

On May 6, 2015, the U.S. Department of Transportation (USDOT) conducted a workshop on vehicle automation at its headquarters in Washington, D.C. The workshop featured recent technological advances that can enable vehicle automation and discussions on how these advances relate to the USDOT vehicle automation program. The workshop also included a group discussion on needs, challenges, and research gaps.

For more information, contact Mohammed Yousuf, mohammed.yousuf@dot.gov, 202-493-3199.

Reports Available on INFLO Prototype

Two reports on the Intelligent Network Flow Optimization (INFLO) prototype are available through the National Transportation Library. The report, *System Design Document for the INFLO Prototype,* features the high level system design document for the prototype development and demonstration of the INFLO application bundle, with a focus on speed harmonization and queue warning applications. These applications comprise a tightly integrated bundle that is a key research activity within the dynamic mobility

applications portion of the connected vehicle program. The report, *Report on Architecture Description for the INFLO Prototype,* documents the architecture description for the implementation of the INFLO prototype bundle within the dynamic mobility applications portion of the connected vehicle program. The intent is to describe, at a high level, the architectural components that make up the INFLO system and their respective interfaces.

To access the *Report on Architecture Description for the INFLO Prototype,* visit http://ntl.bts.gov/lib/54000/54800/54845/INFLO-Architecture-Description-FINAL-508-compliant_FHWA-JPO-14-170.pdf. To access the System Design Document for the INFLO Prototype, visit http://ntl.bts.gov/lib/54000/54800/54846/INFLO-System-Design-FINAL-508-compliant_FHWA-JPO-14-169.pdf. For more information, contact Govind Vadakpat, 202-493-3283, g.vadakpat@dot.gov.

ATTRI Workshop Addresses Mobility Challenges

On April 30, 2015, the U.S. Department of Transportation (USDOT) presented a stakeholder engagement workshop designed to gather user needs for the Accessible Transportation Technologies Research Initiative (ATTRI), which conducts research to improve the mobility of travelers with disabilities through the use of intelligent transportation systems (ITS) and other advanced technologies. ATTRI is a USDOT joint program and research initiative led by FHWA and the Federal Transit Administration, with support from the ITS Joint Program Office, the National Institute on Disability, Independent Living, and Rehabilitation Research, and other federal partners.

The workshop was interactive with breakout sessions and addressed the travel needs of people with disabilities, older adults, and veterans. Participants reviewed findings from three recent ATTRI Webinars and contributed to an assessment on technology solutions and user needs. The initiative is focused on developing technological solutions to remove barriers associated with visual, hearing, cognitive, and mobility disabilities.

For more information, contact Jodi Rizek, 614-424-7976, rizekjm@battelle.org.

RECENT PERIODICALS

***Public Roads*—March/April 2015**

This issue includes: On the Frontlines of Innovation; Leading with Innovation at the Helm; Putting Safety Solutions to the Test; The Science and Art of Putting Drivers under the Microscope; and Clearing Crashes on Arterials.

The issue is available online via www.fhwa.dot.gov/publications/publicroads/15marapr/index.cfm. For more information, contact TaMara McCrae, tamara.mccrae@dot.gov.

***Innovator:* Accelerating Innovation for the American Driving Experience—May/June 2015**

This issue includes: Agencies Pursue Paperless Approach to Project Delivery; Innovation Catalyst; High-Friction Surface Treatments Yield Positive Results; Improving Collaboration and Quality Environmental Documentation; Reports Tell Every Day Counts Success Story; Pile-Driving Breakthrough Makes Underwater Construction Quieter; States Innovate!; and Calendar.

The issue is available online via www.fhwa.dot.gov/hfl/innovator/e-version/issue_48/. 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

_____
_____

Please forward this newsletter to others you think might find it interesting and/or useful. Suggestions may be submitted to: FHWA_Now@fhwa.dot.gov.