

FHWA R&T Now

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

November/December 2017

POLICY & PARTNERSHIPS

FHWA Awards \$15.5 Million to Six States

The Federal Highway Administration (FHWA) recently announced it will award \$15.5 million in Surface Transportation System Funding Alternatives (STSFA) grants to six States that are exploring new ways to fund highway and bridge projects.

STSFA was established under the Fixing America's Surface Transportation (FAST) Act, which was signed into law in December 2015 and authorized 5 years of critically needed funding and key programs to improve the Nation's freight transportation system and U.S. economic competitiveness.

According to FHWA officials, alternatives to conventional financing are seen as imperative due to the Highway Trust Fund's gradual inability to keep pace with increasing construction and repair costs nationwide. "To ensure the U.S. road system is the best in the world, we can no longer rely solely on the Federal gas tax and the Highway Trust Fund," said Acting FHWA Administrator Brandye L. Hendrickson. "New sources of funding for the design, construction, and repair of our Nation's roadways have never been more necessary, and these grants will help open the door to new financial innovations."

The STSFA grants fund projects to test the design, implementation, and acceptance of user-based alternative revenue tools. FHWA officials selected seven proposals from six States, including California, Colorado, Delaware, Missouri, Oregon, and Washington. The departments of transportation in these States will carry out the projects. Some of the States will work with partners, which include the I-95 Corridor Coalition, the Western Road User Charge Consortium, and the Washington State Transportation Commission.

The seven projects will investigate and evaluate various user-based approaches to raising revenue, including onboard vehicle technologies to charge drivers based on miles traveled and multistate or regional approaches to road user charges. They will address common challenges involved with implementing user-based fees such as public acceptance, privacy protection, equity, and geographic diversity. The projects will also evaluate the reliability and security of the technologies available to implement mileage-based fees.

For more information, contact Nancy Singer, 202-366-0660, nancy.singer@dot.gov.



Report Examines National Household Travel Survey Outcomes

FHWA recently published the report, “Federal Highway Administration Research and Technology Evaluation: National Household Travel Survey Program Final Report” (FHWA-HRT-16-082). This publication examines outcomes associated with the National Household Travel Survey (NHTS) program, namely the extent of NHTS survey usage, the impact of the NHTS Program on policy, project, and regulatory decisionmaking, and the responsiveness of the NHTS Program to its user community.

Although it is difficult to trace the specific impacts of the NHTS data, researchers found many examples demonstrating that NHTS data inform a range of policy and legislative decisions, both within transportation and in other fields (e.g., health, energy). In some cases, NHTS provides context and understanding for how, when, and why Americans travel, as well as trends in travel. This context helps make the case for particular policy or legislative initiatives.

In other cases, NHTS is an important data input to a model or statistical analysis, which is used, in turn, to influence policy or legislation. At the State and local levels, NHTS has its greatest impact in developing, calibrating, or validating travel demand models that are used to inform transportation planning and project selection.

The report identifies challenges and lessons learned regarding survey planning, survey administration, and outreach. Recommendations to improve program effectiveness are also included. It is available to download via www.fhwa.dot.gov/publications/research/randt/evaluations/16082/index.cfm.

For more information, contact John Moulden, 202-493-3470, john.moulden@dot.gov.

EXPLORATORY ADVANCED RESEARCH

Research to Advance Mechanisms for Exploring Novel Transportation Solutions

The Office of the Assistant Secretary for Transportation has published summary reports of a workshop aimed at assessing the state of technology for new modal systems. FHWA’s Exploratory Advanced Research (EAR) Program convened the workshop with support from the John A. Volpe National Transportation Systems Center (Volpe Center).

As detailed in the report, “Novel Modes Workshop,” participants addressed potential technological trends and government policy and research roles that could affect the current highway, transit, and rail systems. They also addressed an opportunity to provide fair and open access to innovators in the business and academic sectors.

Another report, “Novel Surface Transportation Modes,” is aimed at advancing an understanding of novel surface transportation concepts and facilitating interaction and information sharing among the U.S. Department of Transportation, State and local governments, and private sector innovators. The report also explores the public sector’s role in enhancing transportation innovation.

“Novel Modes Workshop” is available at www.transportation.gov/sites/dot.gov/files/docs/subdoc/66/novelmodeswkshop-web.pdf.

“Novel Surface Transportation Modes,” is available to download at www.transportation.gov/sites/dot.gov/files/docs/research-and-technology/283896/novelsurfacetransportationmodes-web.pdf.

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



INFRASTRUCTURE

Report Discusses Methodology to Assess Riprap at Bridge Abutments and Piers

FHWA recently published the report, “Advanced Methodology to Assess Riprap Rock Stability at Bridge Piers and Abutments” (FHWA-HRT-17-054), which describes an advanced, numerical modeling procedure for analyzing the stability of riprap at bridge abutments and piers.

Riprap is one of the most common materials used to protect bridge abutment and pier foundations from scour. A key element of the design of riprap countermeasures is rock sizing, which is based on equations generally derived from simplified laboratory experiments. The report details a study in which an advanced modeling approach is developed and applied to evaluate rock stability. The advantage of this approach is that it can incorporate site-specific conditions that complicate riprap design.

The research described in this report was conducted at FHWA’s Turner-Fairbank Highway Research Center (TFHRC) J. Sterling Jones Hydraulics Laboratory. It will be useful for designers and engineers responsible for protecting bridge foundations.

The publication is available to download via www.fhwa.dot.gov/publications/research/infrastucture/structures/bridge/17054/index.cfm.

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

Case Study Highlights Benefits of e-Construction

FHWA’s recent TechBrief, “Addressing Challenges and Return on Investment (ROI) for Paperless Project Delivery (e-Construction)” (FHWA-HRT-16-068), summarizes a program case study that highlights the transformation and automation of the Pennsylvania Department of Transportation (PennDOT) construction process through the development of advanced mobile applications, automated

workflows, and their integration with collaboration tools and payment systems to improve overall efficiency.

PennDOT projects significant monetary benefits due to operational and time-saving efficiencies achieved through implementation of e-Construction practices. This TechBrief provides an overview of e-Construction as a national practice, summarizes PennDOT’s history and approach to technology implementation, and describes the investment and benefits realized during a 3-year period. It also aligns with FHWA’s research project, Addressing Challenges and ROI for Paperless Project Delivery, which assesses how transportation agencies are transitioning to a more electronic/paperless project delivery system (e-Construction) and documents the costs, benefits, and challenges during the transition. This publication is offered as a general aid for those organizations considering starting similar programs or enhancing existing ones and provides a case study of how State transportation departments may expand their use of e-Construction practices.

e-Construction is 1 of 12 innovations in FHWA’s third round of the Every Day Counts (EDC-3) initiative. As part of the EDC-3 initiative, FHWA has initiated a research project to document the costs, benefits, and challenges of implementing e-Construction. This case study describes PennDOT’s e-Construction practices and is part of the overall research project to develop implementation guidance. This guidance will include an approach to calculating an ROI that agencies will then be able to tailor to their own construction program based on their specific processes.

The document is available to download via www.fhwa.dot.gov/publications/research/infrastucture/pavements/16068/index.cfm.

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



New Research Evaluates Transportation System Resilience

FHWA's report, "Post Hurricane Sandy Transportation Resilience Study in NY, NJ, and CT" (FHWA-HEP-17-097), provides an assessment of the metropolitan region transportation system's resilience to climate, sea level rise, and extreme weather. The report includes a discussion of a study that leverages lessons learned from Hurricane Sandy and other recent events, as well as future climate projections to identify strategies to reduce and manage extreme weather vulnerabilities amid the uncertainties of a changing climate. It also includes information on damage and disruption from Hurricane Sandy on the region's transportation systems, along with that of Hurricane Irene, Tropical Storm Lee, and Halloween Nor'easter Alfred.

The report also contains a compilation of climate projections that were used to inform the study and assessments of the vulnerability and risk to the transportation system at three scales:

- An assessment of the exposure of the transportation system to climate stressors at a regional scale, with information that can be used by transportation agencies in the region to advance more detailed vulnerability and risk assessments.
- A vulnerability and risk assessment in three subareas: two multimodal corridors (one in Connecticut and one in New Jersey) and a coastal network of critical transportation facilities (in New York).
- Engineering-informed assessments of climate vulnerabilities and risks and evaluation of potential adaptation strategies for a selection of transportation facilities—roads, bridges, tunnels, rail, and ports—that can be considered for these and similar facilities.

This report is intended to inform transportation agency efforts to address changing climate conditions and extreme weather events from a regional planning level to facility level assessments.

It is available to download via www.trb.org/main/blurbs/176828.aspx.

For more information, contact Heather Holsinger, 202-366-6263, heather.holsinger@dot.gov.

OPERATIONS

Researchers Complete Early Cooperative Automation Testing at Aberdeen Test Center

FHWA's Enabling Technology Team in its Office of Operations Research and Development recently completed 4 days of testing cooperation automated driving technology at the Aberdeen Test Center at the U.S. Army's Aberdeen Proving Ground in Aberdeen, Maryland.

Working closely with engineers and researchers from the Saxton Transportation Operations Laboratory, Volpe National Transportation Systems Center, and the U.S. Army, the team conducted tests that were focused on evaluating redesigned capabilities built into Cadillac® SRXs equipped with a new FHWA Cooperative Automated Research for Modeling and Analysis (CARMA) platform build-on Robot Operating System.

These first tests were focused on the CARMAs ability to command the vehicles' brake and throttle, which are critical for testing any cooperative dynamic driving task. Activities included a driver-training course on safety and operational procedures, the installation and use of the Army's data acquisition system, test preparations and execution, discussions of findings, and documenting issues and what will be needed to improve the CARMA platform and tablet interface following agile systems engineering.

In future weeks, comprehensive data from the tests will be available for analysis. The next iteration of testing will occur on a monthly basis until July 2018.



For more information, contact Taylor Lochrane, 202-493-3293, taylor.lochrane@dot.gov.

HIL Tools Enable Real Test Vehicles to Interact with Virtual Ones

FHWA has led the research and development of innovative applications of connected automation which offer the potential of significant mobility, safety, and environmental benefits. One of the major challenges in testing and demonstrating the benefits of these innovative technologies is the small number of test vehicles available for experiments. This leads to a lack of connected and automated vehicle (CAV) field data for the development of valid CAV modeling tools for State and local transportation agencies.

One approach to overcoming these challenges is to use emerging hardware in the loop (HIL) tools that allow real test vehicles to interact with virtual vehicles from traffic simulation models, providing an evaluation environment that can replicate actual deployment conditions at early stages of CAV development.

In late 2016, FHWA kicked off an effort to conduct HIL testing of eco-approach and departure (EAD) and cooperative adaptive cruise control (CACC). This effort will:

- Continue to assess the potential impacts of CAV applications—specifically EAD and CACC—using emerging HIL tools.
- Conduct closed field tests at TFHRC and outside facilities (potentially the Federal Law Enforcement Testing Center, etc.).
- Develop microsimulation models and model logic to accurately emulate CAV hardware and performance based on the HIL tests and analysis. Calibrated network(s) and specialized interface software needed to simulate CACC and EAD applications will be combined with an HIL platform. This will allow CACC- and EAD-equipped test vehicles to operate through interaction with virtual traffic and traffic control signals.

Additional information on the results of the HIL field tests and model development will be periodically available as the project progresses. Final research results will become available in early 2019.

For more information, contact Christopher Melson, 202-493-3271, christopher.melson@dot.gov.

Report Offers Overview of Practices and Considerations on Shared Streets

FHWA's report, "Accessible Shared Streets: Notable Practices and Considerations for Accommodating Pedestrians with Vision Disabilities" (FHWA-HEP-17-096), offers a review of notable practices and considerations for accommodating pedestrians with vision disabilities on shared streets. It focuses on streets where pedestrians, bicyclists, and motor vehicles are intended to mix in the same space.

The publication includes a description of shared streets, an overview of vision disabilities, and the strategies people with vision disabilities use to navigate in the public right-of-way. It details the specific challenges pedestrians with vision disabilities face when navigating shared streets. It also provides an overview of relevant U.S. guidance, a toolbox of strategies for designing shared streets that improve accessibility for pedestrians with vision disabilities, and ideas on how accessibility for pedestrians with vision disabilities can be addressed in the planning and design process.

In addition, the report includes information from case studies of completed shared streets in the United States that highlight accessibility features and lessons learned, as well as a bibliography that includes sources specifically referenced in the body of the document and other sources that inspired the content and may be useful for shared street designers.

This publication can be downloaded via www.trb.org/main/blurbs/176827.aspx.



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

Researchers Recognize Progress, Success, and Vision of FHWA's RWMP

In the report, "2017 Road Weather Management Performance Measures Update" (FHWA-HOP-17-048), researchers discuss the progress, success, and overall vision of FHWA's Road Weather Management Program (RWMP), which serves as a potential resource and communication product to further advance the importance and widespread implementation of road weather technologies.

More than a decade ago, the RWMP established a set of performance measures to assess its program effectiveness in improving the performance of the transportation system during adverse weather conditions. Since then, assessments of the performance measures have been completed and documented in 2009, 2012, and 2015. Over the years, the program has aimed to maintain overall consistency in the types of performance measures to allow for a more complete, long-term assessment of a program. However, additional performance measures were added in 2015 to address some gaps due to changes in program objectives and recent advances in road weather management capability and technology. As a result, 27 performance measures were evaluated in 2015.

While previous updates reported each performance measure individually, researchers used an alternative approach to present the results in this report to convey a general and more concise evaluation of the RWMP's progress and success by mapping performance measures to at least one of the following categories: (1) road weather management impacts; (2) application of road weather management tools and technologies; (3) road weather management capacity building; and (4) partnerships and stakeholder collaboration. Overall, this 2017 report presents the latest results update and lists recommendations on

future focus areas for the RWMP. The report also serves as a resource and outreach product to further advance the importance and widespread implementation of road weather technologies.

This publication is available to download via <https://ops.fhwa.dot.gov/publications/fhwahop17048/fhwahop17048.pdf>.

For more information, contact Barry Zimmer, 202-366-4082, barry.zimmer@dot.gov.

SAFETY

New Database Compiles Key Data from Each State's SHSP

FHWA recently launched the Strategic Highway Safety Plan (SHSP) Database, which provides an abundance of information about data-driven approaches States are using to decrease roadway fatalities and serious injuries. The database compiles key data from each State's SHSP in one easy-to-use database.

This new resource, which can be used as a quick reference guide to inform safety programs, includes information about emphasis area strategies and action plans; safety partners within the 4E's (engineering, education, enforcement, and emergency medical services); approaches States are using to update, implement, and evaluate plans; and much more. Users can search the database by Key Components (e.g., vision and mission statement, emphasis area, and lead agency); Special Topics (e.g., emphasis area action plans and local and rural roads); Emphasis Area Categories (e.g., infrastructure and behavioral); or by using a Keyword Search.

To access the database, visit <https://rspcb.safety.fhwa.dot.gov/shspsearch/statesearch.aspx>.

For more information, contact Tara McLoughlin, 202-366-2176, tara.mcloughlin@dot.gov.



RECENT PERIODICALS***Public Roads—Autumn 2017***

This issue includes: Roundabouts Coming Full Circle; America's Glory Road; Delivering the Goods; Getting Around Town; and Rivers, Rainfall, and Resilient Roads.

It is available online via

www.fhwa.dot.gov/publications/publicroads/18autumn/index.cfm.

For more information, contact Lisa Shuler,
lisa.a.shuler@dot.gov.

Innovator: Accelerating Innovation for the American Driving Experience—November/December 2017

This issue includes: Collaborative Hydraulics; 10 Ways to Take Your STIC to the Next Level; State Transportation Innovation Councils Recognized for Excellence; Combining e-Construction and Partnering for Project Success; Innovation Impact; FHWA Awards Support Demonstration Projects; and States Innovate

The issue is available online via

www.fhwa.dot.gov/innovation/innovator/issue63/3dlssue/.

.

LINKS

Turner-Fairbank Highway Research Center:

www.fhwa.dot.gov/research/

Resource Center:

www.fhwa.dot.gov/resourcecenter/

National Highway Institute:

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.

