RESEARCH & TECHNOLOGY
TRANSPORTER

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U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION

SAFETY

FOIL Helps Train Firemen to Rescue Trapped Motorists

Each year, there are more than 11 million auto accidents nationwide, resulting in more than 3 million injuries and more than 40,000 deaths. In some of these auto accidents, passengers become pinned or trapped in their cars. Fire department rescue squads are then called upon to extricate these motorists and transport them to medical facilities for treatment.

Firemen hone their rescue skills using crash-tested vehicles at TFHRC's Federal Outdoor Impact Laboratory.

The Federal Highway Administration (FHWA) has been helping firemen become better at removing pinned or trapped passengers from their cars. How? Through an FHWA community outreach program, firemen from two fire stations of the Fairfax County Fire and Rescue Department in Virginia have been practicing removing pinned and trapped motorists from wrecked cars at the Federal Outdoor Impact Laboratory (FOIL), located at the Turner-Fairbank Highway Research Center (TFHRC) in McLean, VA. Normally, firemen practice using their rescue techniques and equipment on junked cars at the Fire and Rescue Academy. However, for the last 5 years, firemen have been using crash-tested vehicles from the FOIL to provide them with more challenging training exercises, since these crash-tested automobiles approximate the conditions most automobiles are in once firemen arrive on the scene.

Periodically, firemen train at the FOIL to become better skilled in the equipment and techniques they would use in emergency situations. They practice swiftly removing roofs and doors, and work to become more proficient using the "Jaws of Life," which quickly pry off doors for swifter access to trapped drivers. The firemen also practice using saber saws, hydraulic jacks, and other rescue tools necessary to gain access to pinned or trapped drivers.

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The *Research and Technology Transporter* communicates FHWA research, development, and technology accomplishments, findings, information, and technology transfer opportunities. Its audience is transportation engineers and professionals in State and local highway agencies, State DOTs, Local Technical Assistance Programs, Divisions, Resource Centers, Core Business Units, academia, and the research community. The eight-page newsletter is published monthly by FHWA's RD&T service business unit. Editorial offices are housed at the Turner-Fairbank Highway Research Center. Comments should be sent to the managing editor at the address below. Field offices are encouraged to submit articles for publication via the appropriate agency technology leader from the editorial board listed below. The newsletter can be viewed online at www.tfhrc.gov. Subscriptions to the *Transporter* are free. Send your request to Judy Dakin at the address below, or send e-mail to judy.dakin@fhwa.dot.gov.

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OPERATIONS

TFHRC Sponsors Seminar on Work Zone Traffic Control

A seminar on Work Zone Traffic Control was held at the Turner-Fairbank Highway Research Center (TFHRC) on Sept. 19. TFHRC's Office of Operations R&D sponsored the seminar, which was open to both federal employees and contractors.

The seminar was designed to better acquaint participants with the application of the minimum Federal requirements for temporary traffic control in work zones—necessary for the safety of motorists, workers and pedestrians.

This seminar referred to the recent release of the Millennium Edition of the Manual on Uniform Traffic Control Devices (MUTCD). Although changes in the MUTCD were discussed, the course also focused on the application of these standards, and how they differ from State to State. It also provided an overview of Temporary Traffic Control (TTC) in work zones, the component parts of a TTC zone, as well as the proper use and application of traffic-control devices, pavement markings, and tapers.

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Controlling traffic in work zones was the subject of a seminar at TFHRC.

New Signal-Timing Video Now Available

The new Federal Highway Administration (FHWA) Arterial Signal-Timing Video, "It's About Time, Traffic Signal Management: Cost Effective Street Capacity and Safety," demonstrates the importance and benefits of maintaining optimized and current traffic signal-timing plans and investing resources in traffic signal systems. The video, which contains testimonials from those who have already made the investment, debuted on Aug. 21 at the Institute of Transportation Engineers' annual meeting in Chicago, IL.

The video is part of FHWA's Arterial Operations Toolbox, which contains information to help traffic engineers acquire tools and available software packages to optimize traffic signals and effectively operate their arterials. The Toolbox is available online and can be accessed from the FHWA Operations Web site at www.ops.fhwa.dot.gov. Since this is a virtual toolbox, pertinent information will be added and updated. To obtain a copy of this video and an accompanying trifold brochure, please contact:

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INFRASTRUCTURE

Symposium on Predicting Pavement Fatigue Damage Held in Laramie, WY

The Western Research Institute, in cooperation with the Federal Highway Administration (FHWA), hosted a 2-day "Fatigue Damage Prediction Symposium" in Laramie, WY from July 18–20. The symposium was organized to bring together the world's leading researchers in the field of fatigue damage in asphalt pavements. Individual symposium sessions focused on four aspects of fatigue damage prediction: modeling, validation, and fatigue damage in mixtures and in binders. Many of the researchers also attended two sessions on fatigue damage prediction, which were presented as part of Western Research Institute's 38th Annual Petersen Asphalt Research Conference on July16–18.

Fatigue damage may well be the most important distress mode for asphalt pavements, since it is typically responsible for the largest single expense item in State highway agency asphalt pavement rehabilitation budgets. Fatigue in asphalt pavements is usually defined as cracking (fracture) of the pavement due to repeated mechanical loading from traffic, especially heavy trucks. The process is similar to bending an object repeatedly in one's hands until it breaks. (In contrast to fatigue cracking, thermal cracking results from one or more cold weather cycles of shrinkage and expansion of a road, resulting in temperature-produced stresses that exceed the strength of the pavement). Understanding the causes of fatigue is important not only to researchers, but also to practitioners. And understanding the other distress modes, such as rutting and low-temperature cracking, in addition to understanding fatigue cracking, allows the general practitioner to predict the life and the general performance of pavements. And the ability to predict pavement performance permits better design methods, enables the development of performance-related specifications, and allows development of relationships between pavement quality and pay factors.

Although many questions remain about the modeling and the prediction of fatigue cracking, symposia like the one held in Laramie contribute to the asphalt community's understanding of the distress. Participants at the symposium clearly demonstrated the creative tension that now exists between scientists who are interested in theory and modeling, which are clearly needed to understand what is going on, and those practitioners who wrestle daily with the problem of fatigue damage and require immediate solutions.

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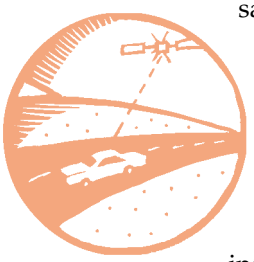
FHWA Working to Improve Weather Forecasting Using NDGPS

The benefits of a Nationwide Differential Global Position System (NDGPS) are many: emergency 911 systems will use it to build geographic databases to better serve those in need; emergency response services will use it to locate drivers of vehicles who require emergency assistance; and public transit will use it to more accurately monitor and maintain their fleets, keeping passengers updated as to arrivals and departures. Already more accurate than the civilian GPS signal, known as the Standard Positioning Service, the NGDPS possesses an accuracy of approximately one meter (3 feet), and accuracy is expected to improve to 2 to 20 centimeters (0.8 to 8 inches) over the next few years. But this improved accuracy has resulted in another application for NDGPS: the ability to better forecast weather.

Scientists and engineers at the Forecast Systems Laboratory (FSL) at the National Oceanic and Atmospheric Administration (NOAA) are now building the prototype of an operational NDGPS-integrated perceptible water vapor (IPWV) observation system for the National Weather Service. This modified NDGPS system is being built in collaboration with the Federal Highway Administration (FHWA), the Coast Guard, and the National Geodetic Survey/Continuously Operating Reference Station (NGS/CORS). Despite the limited number of systems now in operation (about 72), it has already been shown that including GPS data in modern weather prediction models improves weather forecast accuracy, especially under conditions of active weather—precisely when it's needed most.



The system uses ground-based GPS meteorological observation instruments installed at the NDGPS tower sites. It is relatively inexpensive, since each site basically consists of a barometer, a thermometer, and other devices that collect and transmit the GPS and meteorological data in near-real time. The NDGPS stations will be providing water vapor-caused, satellite signal-delay data. The connected GPS Surface Observation Systems (GSOS) ground instruments will collect the data and use it to calculate accurate water vapor information. This information is updated every 30 minutes and can be accessed from the project's Web site, at http://www.gpsmet.noaa.gov. These data are also delivered to researchers within NOAA/FSL and to the National Centers for Environmental Prediction (NCEP), at http://www.ncep.noaa.gov. These data are currently being incorporated or soon will be incorporated into various weather forecast models for research purposes.

FHWA NDGPS site at Whitney, NE, equipped with NOAA surface meteorological sensors. Shared use of Government resources saves both time and money.

For some time, FSL has been using GPS data to measure the delays in the transfer of signals from the GPS satellites caused by water vapor in the atmosphere. Water vapor is difficult to observe with conventional weather observing systems because it varies quickly over short distances, and it only manifests itself when it changes from a gas (vapor), to a liquid (rain), to a solid (snow and ice) and back. Work on

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the NDGPS has yielded the ability to measure the slowing of satellite signals by water vapor with unprecedented accuracy.

A dozen NDGPS sites are currently in the process of being retrofitted to include weather observation tools, and FHWA has transferred funds to FSL to support creation of an additional 22 GPS Surface Observation Systems.

NOAA scientists are confident that data collected through the NDGPS stations will be used in the next-generation National Weather Forecasting Model. NOAA views its collaboration with FHWA and other government agencies as a unique and beneficial opportunity to use NDGPS data for a low-cost improvement in weather forecasting. All that would be required is the addition of a barometer and thermometer to a GPS site, and the ability to retrieve the GPS and meteorological data in near real-time.

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DOT-Sponsored Testing Results in DSRC Industry Standard

On Aug. 24, data from recent communications technology tests managed by the Office of Operations R&D was presented to the Dedicated Short-Range Communication (DSRC) Writing Group of the American Society for Testing and Materials (ASTM). Based on the results, one particular technology system, a wireless local-area network (LAN) that allows rapid communication between roadside transmitters and a moving automobile, was chosen by the ASTM Writing Group as the technology standard.

This was a result of testing conducted on two proposed systems that would meet the requirements for this new communications system. The testing was jointly conducted Aug. 7 and 8 at Maryland International Raceway by a communications engineering company in Annapolis, MD, and the Johns Hopkins University Applied Physics Laboratory. Specially prepared and instrumented vehicles were used to test whether or not communications between roadside units and units onboard the vehicles could be maintained while the vehicles were traveling at a high rate of speed. Even at speeds of up to 186 km/h (116 mi/h), satisfactory communications between the vehicle and roadside units were consistently obtained.

This testing was sponsored by the DOT Intelligent Transportation System program and was managed by the Office of Operations R&D, which has been supporting the development of the DSRC system. This system is intended to link vehicles with roadside communications signals that will keep drivers updated with the latest road information. Once completed, the DSRC will enable drivers to receive warnings about approaching emergency vehicles, vehicles stopped in the roadway, and other road hazards. The system will also be able to change traffic signals to accommodate emergency vehicles, implement intersection collision avoidance systems, and facilitate other public and private on-road and roadside services within the next few years.

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Helping to develop a new DSRC industry standard are, from left to right: Melvin Newcombe, Engineer/Crew Chief; Broady Cash, Project Leader/Selection Committee Chairman; Charles Diehlman, Engineer/Driver/Technician; Fred Cwik, ITS Unit Manager/Driver; and Tyrone Adams, Programmer/Communications Coordinator. The test team is standing near the test vehicle.

FHWA-NIST Plan to Continue Collaboration

There is a long history of collaboration and common work, both formal and informal, between the Federal Highway Administration (FHWA) and the National Institute of Standards and Technology (NIST). Some of these collaborations date back to when FHWA was known as the Bureau of Public Roads and NIST was known as the Bureau of Standards.

In recent weeks, Research, Development, & Technology (RD&T) leadership and researchers have taken steps to ensure that collaboration between FHWA and NIST continues by convening meetings with their NIST peers. These meetings were conducted in a continuing effort to share knowledge, support existing research collaboration, and explore opportunities to expand partnerships with NIST. During these meetings, RD&T identified some existing areas of collaborative research that will be maintained and enhanced as relationships with NIST are developed further. What follows is a list of those existing FHWA-NIST collaborations at the Turner-Fairbank Highway Research Center (TFHRC). RD&T requests that other FHWA offices contact RD&T about existing or planned cooperation with NIST so that a complete picture of ongoing FHWA-NIST collaborations might be created.

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NIST

Some of the more recent FHWA-NIST collaborations include:

- The CONMAT (Construction Materials) program.
- Nuclear NDT instrumentation
- Earthquake engineering, including the UJNR (U.S.-Japan Cooperative Research Program in Natural Resources) Joint Annual Meeting of the Panel on Wind and Seismic Effects.
- Pavement marking quality standards.
- Development of national/international recommendations, including the development of recommendations for determining the effective luminous intensity of flashing light signals.
- The Hilbert-Huang Transform.
- Neural Networks, a series of workshops and lectures that may lead to the development of a driver sleep-warning system.

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Transportation Technology Transfer Symposium Convenes in St. Petersburg, FL

More than 400 technology transfer (T^2) practitioners from 55 countries convened at the International Symposium on Transportation Technology Transfer in St. Petersburg, FL from July 29–August 2.

Under the theme "The Technology of Technology Transfer," the symposium was hosted by Region 4 Local Technical Assistance Program (LTAP) centers and was sponsored by Federal Highway Administration (FHWA), LTAP, the World Road Congress (PIARC), the Transportation Research Board (TRB), the Bureau of Transportation Statistics (BTS), the Organisation for Economic Co-operation and Development (OECD), and the Pan American Institute of Highways (PIH).

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The symposium, which brought together U.S. and international T² experts from around the world, offered meetings and conferences where these T² experts could share innovative practices, improvements in efficiency, and advances in current technology transfer practices and techniques. Such conferences and meetings included the 2001 National LTAP Conference, the Conference on Accessing Transportation Information Resources Worldwide, the Third General Assembly and Centers Meeting of PIH, and the PIARC Committee on Technology Exchanges and Development (C-3) meeting.

In addition to the numerous T² discussions, conferences, and presentations, speaker Art Mortell, who has been motivating audiences for the past 30 years, presented a funny, yet functional lecture on the "human elements" of technology transfer at the First Joint Session.

Plans are already being made to hold a similar meeting in five years. For more information, please contact:
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PROFESSIONAL DEVELOPMENT

Office of Professional Development Launches Workforce Web Site

The Federal Highway Administration's (FHWA) Office of Professional Development (OPD) launched a Web site focusing on transportation workforce development on Sept. 12.

"The Web site serves as a focal point for our partners in the transportation community to post and scan workforce information," said Joe Toole, director of Professional Development. "This way, all of us in transportation can efficiently exchange ideas and practices to advance our workforce efforts."

The Web site, located at http://www.nhi.fhwa.dot.gov/transworkforce, is an essential communication and coordination tool, in light of seismic shifts anticipated in the nation's workforce. Forty to fifty percent of the national workforce is projected to retire in the next 5 to 15 years. In addition, a recent Rockefeller Institute of Government study shows that 42 percent of the 15.7 million State and local government employees are between ages 45 and 64. And 40 percent of these employees will be eligible for retirement in the next 15 years.

Inevitably, the transportation sector will compete with other industry sectors for qualified workers. Thus, workforce cooperation in the transportation community—across the private and public sector—will be crucial to the industry's success.

In that vein, the Web site is intended to serve as a forum for dialogue and help coordinate solutions. The Web site will include information on transportation workforce issues, and will also suggest measures to improve workforce planning, recruiting, retention, and professional development programs among private and public sector organizations. For more information, visit http://www.nhi.fhwa.dot.gov/transworkforce.
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