the VOLPE center
U.S. Department of Transportation
Research and Innovative Technology Administration

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HIGHLIGHTS

IN THIS ISSUE

Volpe Center Crashworthiness Experts On-Call

The Volpe Center's Rail Equipment Crashworthiness Team conducts research to generate technical information that can serve as the basis for Federal regulations, industry standards, and railroad specifications. This information relates to passenger- and freight-equipment crashworthiness and occupant-protection features. The team's activities include investigations of train accidents, development of improved crashworthiness strategies, impact tests of baseline and improved-design equipment, and analyses of car-crush, and train and occupant dynamics.

Rail Equipment Crashworthiness team member Mike Carolan at the scene of the September 12, 2008 collision in Chatsworth, California. (Volpe Center photo)

Beginning in 1999, the team has been on-call to investigate severe passenger train collisions. To date they have investigated 14 accidents. Recent investigations include:

- A Metrolink commuter train and a Union Pacific freight train near Chatsworth, California—September 12, 2008.
- Two Massachusetts Bay Transportation Authority (MBTA) Green Line trains in Newton, Massachusetts—May 28, 2008.
- A freight car and an MBTA commuter train in Canton, Massachusetts—March 25, 2008.
- An Amtrak passenger train and a freight train in Chicago, Illinois—November 30, 2007.

An important component of these investigations is to determine the sequence of events leading up to the accident, including reconstruction of train motion and occupant kinematics.

The Volpe Center team is currently working with the Federal Railroad Administration to develop standards for crashworthy light-rail-style equipment for mixed-use service with conventional passenger and freight equipment.

COI Spotlight– Physical Infrastructure Systems

In this issue of *Highlights*, we begin our series "COI Spotlight," which gives an overview of each new Center of Innovation (COI) within the Volpe Center. As of December 2008, the Volpe Center is now organized into eight COIs. Collectively, the COIs focus on cross-cutting transportation, research, education, and multimodal issues. Individually, each COI applies its technical capabilities to U.S. DOT strategic goals and national transportation priorities. Featured this month is the Physical Infrastructure Systems COI, headed by Director Robert M. Dorer.

In the face of increasing transportation network demands and the effects of increased utilization of facilities, the Physical Infrastructure Systems COI maintains cognizance and provides technical support in the design, operation, inspection, maintenance, and rehabilitation of the existing and future transportation infrastructure, including equipment, vehicles, vessels, and rights-of-way, to include waterways, terminals, and intermodal and network facilities.

This technical support adheres to the U.S. DOT goals of safety, mobility, and capacity of the transportation enterprise. It meets this challenge through a staff with an internationally recognized knowledge base in fundamental and applied engineering disciplines including civil, mechanical, electrical, and industrial as well as various

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Centers of Innovation

- **Multimodal Systems Research and Analysis**
- **Safety Management Systems**
- **Environmental and Energy Systems**
- **Freight Logistics and Transportation Systems**
- **Physical Infrastructure Systems**
- **Communication, Navigation, Surveillance (CNS) and Traffic Management Systems**
- **Human Factors Research and System Applications**
- **Advanced Vehicle and Information Network Systems**

Safer Public Transit through Drug and Alcohol Compliance Program

The Omnibus Transportation Employee Testing Act of 1991 mandates the Secretary of Transportation to issue regulations for combating prohibited drug use and alcohol misuse in the transportation industry. The Federal Transit Administration (FTA) is responsible for implementing rules for all organizations that provide "mass transportation" services to the public. One of the major areas for FTA's Office of Safety and Security is providing oversight, technical assistance, training, and educational programs for drug and alcohol abuse.

FTA began auditing drug and alcohol testing programs in March 1997. Since 2002, the Volpe Center has managed the FTA Drug and Alcohol Compliance Program, an important ongoing oversight effort that helps ensure the safest operational environment possible on the Nation's buses, trains, and ferries.

The objective of this program is to monitor the drug and alcohol testing programs of FTA funding recipients and their safety-sensitive subrecipients and contractors, to determine the level of compliance with Federal regulations, and to provide technical assistance and training focused on deficiencies and noncompliance trends that have been identified.

Michael Redington, Eve Rutyna, and Frank Foderaro of the Physical Infrastructure Systems Center of Innovation have been part of the Drug and Alcohol Compliance Program since it began. They supervise the FTA team of compliance auditors performing comprehensive audits of hundreds of transit systems across the country. These audits ensure that transit systems adhere to all U.S. DOT and FTA regulations, making the country's public transit systems safer for millions of daily riders.

FTA drug and alcohol audits have provided public-transit providers with a great deal of insight into how to comply with related Federal regulations. They have also strengthened the FTA Drug and Alcohol Compliance Program and have helped to achieve the U.S. DOT strategic goals of Safety and Security.

> By improving the randomness of testing, the Volpe Center has helped improve detection of and deterrence to illicit drug use and alcohol misuse that has saved lives.
>
> – Gerry Powers, Manager, FTA Drug and Alcohol Compliance Program

COI Spotlight–continued

transportation and management specialty areas.

> By aligning our technical experts in the transportation infrastructure competency area, the Volpe Center has positioned itself to more effectively respond to our current and future customers' needs.
>
> – Robert M. Dorer, Director Physical Infrastructure Systems COI

The goals of this COI are to ensure the resilience, renewal, and expansion of the Nation's aging transportation enterprise in response to both expected life cycle and safety-critical issues as well as unanticipated operational scenarios that may impose constraints on safety, mobility, and capacity.

The Physical Infrastructure Systems COI assists its customers in staying abreast of innovations and enhanced operational methods and processes in these areas.

COI customers include the Office of the Secretary and the modal agencies within the U.S. DOT, the Department of Defense (DoD), the Department of State (DOS), and the Department of Homeland Security/U.S. Coast Guard. The robust portfolio of project areas includes:

- Crash-energy management including anticipating trends in design, implementation, and evaluation of operational safety performance utilizing a hazard analysis approach.
- Rail rights-of-way including technical and operational analysis of current trends, and technologies in education, enforcement, and engineering.
- Emergency operational requirements enhancement and implementation.
- Design and implementation of next-generation technologies and methods in equipment, network, and infrastructure design and operations.
- Maritime and transit safety.
- National airspace system development and deployment.
- Marine systems, rail and transit propulsion technologies, and communication subsystems for train control systems.

Baghdad Central Station with microwave tower in background. The COI is helping rebuild Iraqi infrastructure in support of DoD and DOS. (Photo courtesy of Mafeks International, LLC)

Saving Lives at Rail Intersections and Rights-of-Way

Railroad grade crossings present a significant hazard to motor vehicle users, trespassers, and pedestrians, as well as to rail passengers and crew. In 2006, there were a total of 2,927 incidents at railroad grade crossings, both public and private, resulting in 369 fatalities and 1,036 injuries. Additionally, according to the Federal Railroad Administration's (FRA) Office of Safety Analysis, there were 989 trespass casualties: 518 fatalities and 471 injuries. With the increased development of high-speed passenger-rail corridors, the risk posed by railroad right-of-way (ROW) infrastructure will become even greater, since rail passengers will be more susceptible to injury and fatality.

The Volpe Center provides technical research support to FRA in the Highway Rail Intersection (HRI) and ROW Program. Volpe Center technical experts examine all areas related to ROW, including highway-rail intersections and trespass. One major effort focuses on acquiring a better understanding of the risks presented by ROW in order to determine how best to decrease or eliminate these risk factors. Research also covers visual and audio warnings, motor-vehicle and train-presence detection, crossing geometry, and crossing gate and flashing-light technologies.

This multiyear railroad ROW infrastructure safety program also encompasses system operations analysis; technology development, assessment, and implementation; and advanced technology opportunities. The primary objective is to identify technologies, methodologies, and hardware that will help to increase safety and continue the downward trend of collisions and fatalities.

A trespass detection and deterrent system installed on a railroad bridge in Pittsford, New York. This equipment allows railroad security to remotely monitor ROW and respond to incidents effectively. (Volpe Center photos)

Volpe Center at Transportation Research Board 88th Annual Meeting

The Volpe Center staff were key contributors at the Transportation Research Board's 88th Annual Meeting January 11-15, 2009 in Washington, DC.

Volpe Center technical experts delivered papers and presentations and chaired numerous committees. There was abundant interaction with customers and colleagues at the nearly 600 sessions, resulting in valuable knowledge-sharing of cutting-edge approaches throughout the breadth of international transportation.

Information gleaned at the meeting will be brought to bear in the real world project work that Volpe Center performs for its diverse clientele.

Volpe Center activities included:

- Integration and Co-Benefits of Climate Change Mitigation Policies-Benefits and Unintended Impacts in Benefit-Cost Analysis Accounting, presented by Douglass B. Lee
- Impact of Weather on Large Truck Crashes, presented by Michael Rossetti
- Union Pacific's Changing At-Risk Behavior (CAB) Final Report, presented by Joyce Ranney and Michael Zuschlag
- Vehicle Miles Traveled 101: What Is VMT? How Is It Measured? What Are the Sources?, presented by Don Pickrell
- Transit's Role in Reducing Green-house Gas Emissions: Innovative Applications of Performance Measures, chaired by William Lyons
- Highway/Rail Grade Crossings Committee, chaired by Anya Carroll
- Rail Group Executive Board, chaired by Robert Dorer
- Transportation Economics Committee, chaired by Douglass Lee

The Research and Innovative Technology Administration (RITA) had a booth at the exhibit hall and the Volpe Center was well represented. Volpe Center looks forward to applying information learned from the many TRB technical sessions and to continuing professional dialogues with new international colleagues.

U.S. Transit Ridership Spikes

2.8 billion transit trips were taken in the third quarter of 2008, an increase of 6.5% over the third quarter of 2007 — the largest quarterly increase in 25 years.

– American Public Transportation Association Ridership Report

Volpe Center Making a Difference in the Lives of Cambridge Kids

The Volpe Center Lunch Buddies Reading Program recently celebrated its eleventh anniversary. Lunch Buddies is a collaborative effort between the Volpe Center and the neighboring Kennedy-Longfellow Elementary School in East Cambridge. Volpe Center employees volunteer their lunch breaks to read to second- and third-graders every two weeks during the school year. Since its inception, Lunch Buddies has attracted 308 Volpe Center volunteers. The program enhances children's interest in reading, exemplifies the school's commitment to early literacy, and provides Volpe Center staff with an opportunity to give back to the community.

At the end of each academic year, individual parties are held for the two classes. The second-graders' party took place at the Kennedy-Longfellow School, while the third-graders visited the Volpe Center, where they were treated to a Rail Equipment Crashworthiness Research demonstration, which showed them how Volpe Center projects can make a difference in the world around them as well as how math and science can prepare them for exciting careers in transportation. A parting gift of a book from each Volpe Center buddy ensured a good start to their summer vacations.

Volpe Center reading buddies are always welcome at the Robert F. Kennedy Elementary School! (Volpe Center photo)

Lunch Buddies has been the recipient of many awards, including those bestowed by the U.S. DOT Secretary, the RITA Administrator, the Volpe Center Director, the City of Cambridge, and the Cambridge School Volunteers (CSV). At its annual Awards Program in May 2008, CSV recognized the Volpe Center's long-term commitment to the children of Cambridge with a certificate of appreciation, and the nine Volpe Center volunteers who have been Lunch Buddies for all ten years were recognized for their dedication to the program.

While the students relish the time that they spend with their buddies, Volpe community volunteers are equally enamored with their young charges. As one long-time volunteer said, "This is by far the easiest volunteer program that one can participate in—thirty minutes twice a month—and both the Volpe buddy and the child win. The school year flies by and you realize you have made a difference in a child's life."

Volpe Center Highlights

For information on *Highlights*, contact:
volpehighlights@dot.gov

For general comments or questions, contact:
Volpe Center Information
617.494.2224
askvolpe@dot.gov

Volpe National Transportation Systems Center
55 Broadway
Cambridge, MA 02142-1093

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Innovation for a Nation on the Move