



Multimodal Systems Research & Analysis

Safety Management Systems

Environmental & Energy Systems

Freight Logistics & Transportation Systems

Physical Infrastructure Systems

CNS & Traffic Management Systems

Human Factors Research & System Applications

Advanced Vehicle & Information Network Systems

Physical Infrastructure Systems Center of Innovation

**Volpe National Transportation Systems Center
U.S. Department of Transportation
Research and Innovative Technology Administration**

Innovation for a Nation on the Move

Trends and Issues

The Nation's fixed and mobile transportation infrastructure is in need of renewal and expansion. New approaches are required to ensure the viability of an aging infrastructure. There is a growing awareness of and concern about the ability of the infrastructure to withstand and recover from natural and human-made disruptions.

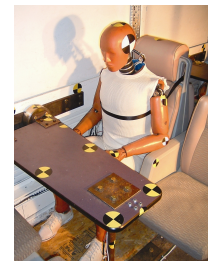
Vehicle impact energy management is receiving increased priority in response to a series of high-visibility rail crashes. It is essential that new work be developed and new research programs be initiated to respond to these needs.

COI Profile

In the face of ever-increasing demand and accumulated loads, the Physical Infrastructure Systems COI maintains cognizance and provides technical support in the inspection, maintenance, and rehabilitation of the existing and future transportation infrastructure, including vehicles, guideways, and intermodal facilities. Maintains an internationally recognized knowledge base and provides technical support, including utilization of new materials, engineering concepts, and institutional approaches to ensuring the resilience of existing and future transportation infrastructure in response to natural and man-made disturbances.

Project Snapshots

• Developing Crash Energy Management (CEM) strategies for the Federal Railroad Administration (FRA). CEM controls the collision dynamics to keep the colliding interfaces in line and upright, preserves space for occupants to ride down the collision or derailment, and reduces the hazards from secondary impacts within the cars.



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• Collaborated with FRA and industry on the Next-Generation Rail Tank Car Project, to design a rail tank car that will meet or exceed performance requirements while improving safety and security, including full-scale impact tests to evaluate the crashworthiness of rail tank cars under accident-loading conditions.

• Providing technical support to FRA on the transportation of hazardous materials by railroad tank cars. Supported efforts to understand metal fatigue and fracture in the current fleet of rail tank cars, structural behavior of rail tank cars in collision and derailment scenarios, and standards for future rail car designs.

• Provides technical support to FRA in developing revisions to the track safety standards that describe minimum conditions that allow operations of trains at speeds up to 150 mph. These standards cover all aspects of track construction from the roadbed to the track structure and geometry and include requirements for inspection, training, and qualifications.



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• Supports the Department of Defense (DoD) and Department of State in Iraq reconstruction efforts, including the development of specifications, procurement and delivery of railroad construction and maintenance-of-way equipment to Iraq Republic Railway, and development of a digital microwave radio communication network for a communications-based train control system.



- Supports the DoD National Airspace System modernization program through the development and deployment of large-scale, complex systems, and the provision of life-cycle support. This is part of a joint effort with the Federal Aviation Administration (FAA) to modernize current air traffic control (ATC) systems.

- Supported FRA by evaluating technologies and methods to enhance railroad safety, improve operational efficiency, and reduce congestion. Supports FRA's rulemaking process through the development of probabilistic risk assessment models for evaluating railroad safety performance with or without the new systems, such as Positive Train Control (PTC).



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- Provided technical expertise to FRA on safety aspects of railroad right-of-way (ROW) crossings. ROW crossings present a significant hazard and are the site of the greatest number of collisions and injuries in the railroad industry. Identified technologies, methodologies, and hardware that will increase safety and continue the downward trend of collisions and fatalities.

- Provided, to FRA and the Federal Transit Administration, analysis and reduction of risk through operational planning, training, technology deployment, and outreach to rail and transit systems with safety, security, and emergency management programs.

- Completed engineering designs and prototypes of a suitable replacement for the Halon 1301 fire suppression system, which uses a fire suppression chemical with no adverse impacts on the ozone layer for the U.S. Army's Watercraft Program.



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- Developed the process for, and conducted the deployment of, over 100 air traffic control voice switching systems, and over 60 automation systems against a set of constantly shifting requirements for the U.S. Air Force.

About the Research and Innovative Technology Administration

The Research and Innovative Technology Administration (RITA) coordinates U.S. DOT's research programs and is charged with advancing the deployment of cutting-edge technologies to improve our Nation's transportation system. RITA was established as a U.S. DOT Operating Administration by the Norman Y. Mineta Research and Special Programs Improvement Act of 2004.

About the Volpe Center

An innovative, Federal, fee-for-service organization, the Volpe Center, part of the U.S. DOT's RITA, is an internationally recognized center of transportation and logistics. The Volpe team represents a world-class transportation resource with multidisciplinary expertise in all modes of transportation. The Volpe Center plays a unique role in looking across the transportation enterprise to anticipate future transportation issues and challenges. The Center also has a highly skilled team of acquisition professionals. For nearly 40 years, the Volpe Center has lent critical support to all U.S. DOT's modal administrations and offices, other Federal agencies, state and local governments and organizations, foreign governments and entities, and the private sector.

The Volpe Center is organized into eight Centers of Innovation (COI). Each COI applies its technical capabilities to U.S. DOT strategic goals and national transportation priorities. The COIs expand U.S. DOT's horizon and show how innovation can arise from creative and collaborative use of internal and external assets. The COIs include:

- **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**

For more information

Name: Robert M. Dorer
Director, Center of Innovation for Physical Infrastructure Systems
Email: Robert.Dorer@dot.gov
Phone number: 617-494-3481

<http://www.rita.dot.gov>

<http://www.volpe.dot.gov>