

**RITA**

*John A. Volpe  
National Transportation Systems Center*

# The Volpe Center Year in Review

# 2009

SERVING THE NATION AS A  
LEADER IN GLOBAL MULTIMODAL  
TRANSPORTATION INNOVATION



U.S. Department of Transportation

**Research and Innovative  
Technology Administration**



# Table of Contents

INTRODUCTION	1
<b>MULTIMODAL SYSTEMS RESEARCH AND ANALYSIS</b>	<b>3</b>
Laying the Groundwork for New Connections Among Transit Providers	3
Chicago Metropolitan Agency for Planning Advances Regional Vision Through Strategic Guidance on Transportation	4
Volpe Center Supports Federal Interagency Group on Transportation, Land Use, and Climate Change	5
Study Aims to Improve Transit on Long Island	6
Volpe Center Supports High-Priority, High-Speed Intercity Passenger Rail Activities	7
<b>SAFETY MANAGEMENT SYSTEMS</b>	<b>9</b>
CSA 2010 Improves Motor Carrier Safety	9
Cloud Computing Environment for “Cash for Clunkers” Program	10
New Staffing Tool and Reporting System Developed for FAA	11
<b>ENVIRONMENTAL AND ENERGY SYSTEMS</b>	<b>13</b>
New Tools Support Integrated Assessment of Aviation Environmental Effects	13
Joint Rule Proposed for New Fuel Economy Standards	14
Developing National Park Air Tour Management Plans	15
Future Plastics and Composite-Intensive Vehicles Increase Fuel Efficiency	16
<b>FREIGHT LOGISTICS AND TRANSPORTATION SYSTEMS</b>	<b>17</b>
Volpe Center’s 25-Year Commitment Earns Distinction “Guardian of the Seaway”	17
MSSIS an Overwhelming Success: Expands to Arabian Gulf, Africa, South America	18
UK Ministry of Defence Royal Air Force Streamlines Passenger and Cargo Tracking	19
Volpe Assists New York Tri-State Region Emergency Operations and Planning	20
Defining New Airborne Network Security Standards for NextGen	21

<b>PHYSICAL INFRASTRUCTURE SYSTEMS</b>	<b>23</b>
Volpe Center Crashworthiness Experts on Call	23
Fire-Suppression System Successfully Extinguishes Fire on U.S. Coast Guard Patrol Boat	24
Saving Lives at Rail Intersections and Rights-of-Way	24
High-Speed-Rail Grade Crossing: First of Its Kind to Be Installed in U.S.	25
Safer Public Transit Through the Drug and Alcohol Compliance Program	26
<b>COMMUNICATIONS, NAVIGATION, AND SURVEILLANCE (CNS) AND TRAFFIC MANAGEMENT SYSTEMS</b>	<b>27</b>
Volpe Center Supports Transformation of Nation’s Air Traffic System	27
ADS-B Program Enables NextGen	28
National Architecture to Provide More Effective and Efficient Positioning, Navigation, and Timing	28
Massport Pioneers Vessel-Monitoring System for Air Traffic Controllers	29
Volpe Center Develops Simulation Standards Targeting Increased Aviation Safety	30
Mitigating the Effects of Aircraft Wake Turbulence Enhances Global Air Safety	31
Volpe Center Supports NextGen and Air Space Systems Research	32
<b>HUMAN FACTORS RESEARCH AND SYSTEMS APPLICATIONS</b>	<b>33</b>
Volpe Center Supports U.S. DOT’s Efforts to Take Safety Commitment to Next Level	33
Technical Support to Crash Warning Interface Metrics Program	34
Experts Focus on Transportation Operator Fatigue	34
Volpe Center Brings Its Transportation Perspective to the National Occupational Research Agenda	35
<b>ADVANCED VEHICLE AND INFORMATION NETWORK SYSTEMS</b>	<b>37</b>
Volpe Center Evaluates State-of-the-Art Vehicle Safety Systems	37
Alternative-Fuel Trams for National Wildlife Refuges	38
Innovative Transportation Solutions Are Focus of Work at National Parks	40
A Leader in Emergency Transportation: Volpe Center Supports Hurricane Preparedness	40
Public Safety Partnership Tested by Exercise Tremor	41

<b>ORGANIZATIONAL EXCELLENCE</b>	<b>43</b>
Robert Johns Named as Volpe Center Director	43
Volpe Workforce Ready for Tomorrow’s Challenges	44
Volpe Workload Grows as Overhead Is Reduced in Fiscal Year 2009	44
Excellence in Acquisition	44
New Brochure: How to Start Work with the Volpe Center	45
Small Business Innovation Research Program Recognizes Innovation and Initiates Web Portal	45
Volpe Go Green Initiatives Underway on Campus	46
<b>VOLPE CENTER: MAKING A DIFFERENCE IN OUR COMMUNITY AND OUR WORLD</b>	<b>47</b>
<b>EDUCATIONAL OUTREACH</b>	<b>47</b>
Volpe Makes a Difference in the Lives of Cambridge Kids	47
Kendall Square Learning Project: A Grassroots Success Story	48
Volpe Hosts Career Day Open House for New England Community	48
Building Partnerships to Educate and Empower	48
Students from Summer Transportation Institutes Visit Volpe Center	49
<b>A TRADITION OF CHARITABLE GIVING</b>	<b>49</b>
Volpe Continues Proud Tradition: The Combined Federal Campaign	49
Volpe Supports Feds Feed Families	49
<b>PART OF A GLOBAL COMMUNITY</b>	<b>50</b>
Volpe Joins Earth Hour’s Call to Action on Climate Change	50
MassRecycle Names Volpe Center 2009 Institution Green Binnie Award Winner	51
City of Cambridge Recognizes Volpe Contributions	51
<b>2009–2010 JOHN A. VOLPE TRANSPORTATION INTERNSHIP RECIPIENT</b>	<b>53</b>
<b>PUBLISHED AND PRESENTED</b>	<b>55</b>
<b>2009 CUSTOMERS</b>	<b>62</b>
<b>U.S. DOT SECRETARY’S AWARDS</b>	<b>63</b>
<b>RITA AWARDS</b>	<b>64</b>



# Introduction

Since joining the Volpe Center in the fall, I have been increasingly impressed with our staff and with their ability to address critical national transportation priorities. As 2009 comes to a close, we have the opportunity to take a look at the innovative contributions that are currently underway at the Volpe Center. Our staff and the work they do are at the heart of what makes Volpe so important to the transportation landscape. With over 300 ongoing projects, it is impossible to provide an all-encompassing multimodal portfolio of our work. The work described here provides a snapshot of the Volpe Center, illustrating not only our progress in 2009, but also our continual commitment to finding innovative solutions to transportation problems.

As part of the Research and Innovative Technology Administration (RITA), the Volpe Center is positioned to support RITA's unique role within DOT—looking across the modes and to the broader transportation community to identify synergies and opportunities for collaboration in support of the Department's priorities. We look forward to supporting RITA Administrator Peter Appel's efforts to identify and explore ways to not only enhance research, innovation, and technology but also to pursue rapid and broad dissemination of the knowledge and products being generated as we work collaboratively towards solutions for our transportation system.

Modern transportation issues are complex, often cutting across modes and requiring diverse technical expertise. In recognition of the need for cross-modal collaboration, the Volpe Center is organized into eight Centers of Innovation, each driven by key issues facing transportation today. Each Center of Innovation has capabilities and expertise ready to support the key priorities that U.S. Transportation Secretary Ray LaHood has publicly articulated – creating a national transportation system that improves safety and public health, fosters livable communities, promotes a state of good repair and long-term economic competitiveness, and achieves environmental sustainability.

2009 has been an exciting year for the Volpe Center. We have received several awards including the Regional Laboratory Award from the Federal Laboratory Consortium Northeast for our support to national and regional technology transfer activities. We have received a number of important visitors, among them Secretary of Transportation Ray LaHood and Deputy Secretary John Porcari. During their visits, the Secretary and Deputy Secretary learned more about the Center's diverse portfolio: our work with human factors and distracted driving, our Rail Safety and Crashworthiness Program, our Global Maritime Domain Awareness Program, our work on the Next Generation Air Traffic Control System, and our research into issues that will impact livable communities in the future. The Secretary later stated that "it looks like government is working up at the Volpe Center."

The accomplishments highlighted in this Year in Review exemplify the Volpe Center's vital role as a technical resource for the transportation community. The Volpe Center is continuously working with the Department of Transportation and other transportation stakeholders to improve the state of our nation's transportation systems. I look forward to working with you on transportation innovations that move our country forward.



ROBERT JOHNS

ASSOCIATE ADMINISTRATOR AND DIRECTOR

VOLPE NATIONAL TRANSPORTATION SYSTEMS CENTER





# Multimodal Systems Research and Analysis

The Multimodal Systems Research and Analysis Center of Innovation (COI) contributes to the realization of an integrated multimodal national transportation system. We support the development, management, operations, and financing of multimodal infrastructure. We also identify and evaluate solutions to capacity problems, particularly those concerning modal transfer sites. Our work enables decision-makers in government and industry to understand tradeoffs between competing goals in order to deliver a world-class transportation system that ensures people and goods will reach their destinations safely, on time, and with minimal environmental impact.

## Laying the Groundwork for New Connections Among Transit Providers

In alignment with national policy directives, transit and planning agencies across the country are deploying regional-level Intelligent Transportation Systems (ITS) technology. This technology accommodates projected population growth and increased transportation service needs. The majority of U.S. metropolitan planning regions have developed ITS architectures, or planning frameworks, for the broad range of public and private stakeholders in each region. The ITS architectures provide guidance on how the agencies can collaborate to develop, apply, and connect various transportation technologies to create agencywide and regional systems. As the Federal Transit Administration (FTA) facilitates the coordination and integration of the goals and activities of diverse transit stakeholders, it has engaged the Volpe Center to provide key technical support.

The Volpe Center team is reviewing and cataloguing data from the over 3,100 transit service providers that it has identified to date. The team is also developing a concise report with recommendations for how FTA regional offices can further support the effective interlinking of these numerous and varied transit services.

At the end of this project, FTA will disseminate Volpe Center-compiled booklets that list the public transportation service providers by county, State, and region as well as by applicable ITS architectures. In addition, it will provide a summary of the level of involvement and use of the regional ITS architectures.



Cycling infrastructure is often key in creating livable communities.

With the cataloging of public transportation agencies operating in the United States, FTA can better serve agencies seeking the appropriate type and level of technologies to become more accessible, integrated, efficient, and flexible. *(Sponsored by FTA)*

## Chicago Metropolitan Agency for Planning Advances Regional Vision Through Strategic Guidance on Transportation



The Volpe Center has been providing strategic advice to the Chicago Metropolitan Agency for Planning (CMAP) in its comprehensive planning campaign for metropolitan Chicago, GO TO 2040. The GO TO 2040 campaign is intended to enhance regional decision-making about quality-of-life issues, including transportation, jobs, and education. The Volpe Center team has assisted CMAP in designing scenarios for stakeholders to use in evaluating

Aerial view of Chicago.

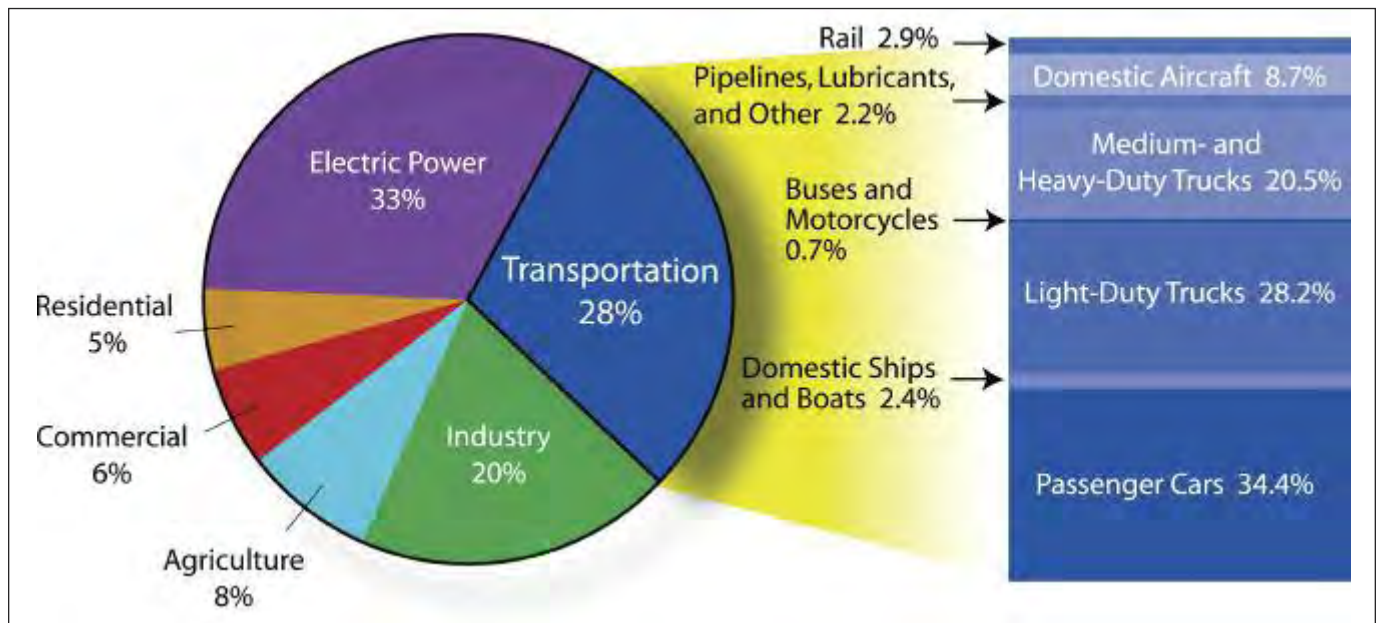
alternative futures for the Chicago metropolitan area. We have delivered six “action strategy” papers, on the following topics based on the best practices of peer organizations: climate change and energy, goods movement, security/energy management, public-private partnerships, alternative fuels and advanced vehicle technologies, and interregional transportation. CMAP has used the recommendations in these papers to refine alternative future scenarios. The Volpe Center team also has advised CMAP on how to develop evaluation measures for major capital projects and has summarized innovative applications for transportation performance indicators. Four complementary strategic documents highlight the breadth and depth of GO TO 2040:

- Development of Evaluation Measures for Major Capital Projects: Measures that CMAP can employ to evaluate major capital projects, including consideration of Federal transportation funding eligibility.
- Climate Change and Energy Strategy Paper: Volpe Center team compilation and recommendation of a synthesis of other organizations’ best practices to aid CMAP in designing effective climate- and energy-related initiatives.
- Innovative Applications for Transportation Performance Measures by Peer Agencies: Case studies that highlight translatable practices for using data to track achievement of performance goals.
- Interregional Transportation Planning Action Strategy Paper: Best practices that CMAP might adopt in order to assume a strategic and effective role in interregional transportation partnerships.

CMAP seeks innovative, multidisciplinary approaches to identify and implement transportation solutions. These solutions reflect the full range of factors affecting success, a directive well aligned with the Volpe Center's expertise. Joint projects cover a broad range of topics, and the technical and organizational support that the Volpe Center provides advances the missions of CMAP and U.S. DOT. *(Sponsored by CMAP)*

## Volpe Center Supports Federal Interagency Group on Transportation, Land Use, and Climate Change

Both the nation and the Federal government face enormous challenges in confronting climate change and greenhouse gas emissions (GHG). A number of Federal agencies share responsibility for identifying and mitigating the contributing factors to climate change/GHG emissions and their impact on society. The Federal Highway Administration (FHWA) sought the Volpe Center's assistance in strengthening this interagency coordination. FHWA also laid the ground-



U.S. GHG emissions in 2007.

work for the formation of the Federal Interagency Working Group on Transportation, Land Use, and Climate Change. The group aligns Federal programs and resources to support stakeholders in achieving greenhouse gas reductions through land-use and transportation-planning decisions. These decisions have resulted in a reduction in vehicle-miles traveled by cars and trucks. The Volpe Center has been providing facilitation and analytical support to the Working Group.

Today, more than a dozen departments and agencies from the Departments of Agriculture, Commerce, Energy, Housing and Urban Development (HUD), Interior, and Transportation (DOT), as well as the Environmental Protection Agency (EPA), participate in the Working Group's activities. Agency representatives meet monthly to develop and pursue cooperative activities that support improved land-use planning, and to coordinate multimodal travel demand management, and natural resource conservation practices. The Working Group also coordinates new activities, such as DOT's Livability Initiative and the joint HUD/DOT/EPA Sustainable Communities Partnership.

The Working Group developed an action and strategies plan, which was presented to the members of its senior management at a summer 2009 meeting in Washington, DC. The plan focuses on two key areas that the Working Group has identified: integrated regional planning and development, and intermodal gateway mobility planning. *(Sponsored by FHWA)*

## Study Aims to Improve Transit on Long Island

Local town officials from the eastern Long Island towns of Southampton, East Hampton, Riverhead, Southold, and Shelter Island jointly commissioned the Volpe Center to analyze options to improve regional bus and rail service. This was in response to a suggestion from the local transportation advocacy group, Five Towns Rural Transit, for enhanced transit service in

the region. The Long Island Railroad provides commuter rail service connecting the region with western Long Island and New York City. Suffolk County Transit provides local bus and paratransit service.

For this project, the Volpe Center developed a feasibility study that includes two main concepts. The first concept is termed the coordinated rail-bus concept and is based on a significantly expanded local bus network that connects buses to local rail stations. A number of train stations would need to be reopened or upgraded and a significant number of new buses procured. Total concept costs could reach \$175 million. The second concept is less expensive and would phase in upgrades and service expansions on the basis of demand. Point-to-point bus service would be emphasized, and rail service would be improved within the constraints of the existing rail infrastructure.



A typical Long Island Railroad commuter rail platform, Southold Station.

This year, the Volpe Center presented results from its analysis of two concepts for improved public transportation on the East End of Long Island. Various groups attended the summit, including representatives of the five East End towns and regional transportation agencies, local elected officials, transit advocates, and other stakeholders. The Volpe Center is continuing its analysis in concert with the local community. This includes a review of environmental issues and a proposed management structure for the service. *(Sponsored by Town of Southampton, NY)*

## Volpe Center Supports High-Priority, High-Speed Intercity Passenger Rail Activities

Following the passage of the landmark American Recovery and Reinvestment Act (ARRA) of 2009, the Volpe Center team worked closely with the Federal Railroad Administration (FRA) to implement the new High-Speed Intercity Passenger Rail (HSIPR) grant program. With \$8 billion in ARRA funds for grant awards, HSIPR represents a unique opportunity to impact the intercity passenger rail mode and is a very high-priority activity for U.S. DOT. The Volpe Center supported FRA in planning the application evaluation process and participated in the eligibility and merit evaluation panels. The Volpe Center had primary responsibility for developing evaluation criteria and norms and for designing the guidebooks and forms used by the evaluation panels. Twelve Volpe Center team members from various divisions in three COIs—Multimodal Systems Research and Analysis, Energy and Environmental Systems, and Physical Infrastructure Systems—participated as panel members and subject-matter experts in determining eligibility and in the merit evaluations of over 250 grant applications.

Closely related to the HSIPR work was the Volpe Center's support to FRA in its activities mandated in the Passenger Rail Investment and Improvement Act of 2008. The Volpe Center team was involved in the development of metrics and standards for assessing the performance of Amtrak routes. The Center also represented FRA at an American Association of State Highway and Transportation Officials (AASHTO) Standing Committee on Rail Transportation special workshop for developing a standardized approach to estimating benefits from investments in rail projects. The workshop was part of AASHTO's 2009 National Meeting. Its goal was to facilitate the sharing of perspectives between FRA and state partners, since they have complementary roles in implementing recent rail legislation. *(Sponsored by FRA)*



# Safety Management Systems

The Safety Management Systems Center of Innovation (COI) is a national resource for safety management expertise, responding to challenging and complex transportation safety questions throughout all modes of transportation. The data analysis work that we perform enables key transportation stakeholders in the public, private, and nongovernmental sectors to take informed and effective actions to reduce the number and severity of transportation-related deaths, injuries, and property damage.

## CSA 2010 Improves Motor Carrier Safety

The Federal Motor Carrier Safety Administration (FMCSA) has taken a fresh look at how it evaluates the safety performance of motor carriers and drivers. Comprehensive Safety Analysis (CSA) 2010 is a major FMCSA initiative to increase the effectiveness of the agency's compliance and enforcement program. CSA 2010 aims to reduce the injuries and fatalities associated with commercial motor vehicle crashes by identifying unsafe behaviors at an early stage and intervening to resolve these issues before they lead to crashes.

CSA 2010 covers the full spectrum of safety issues, ranging from how data are collected, evaluated, and shared to how enforcement officials can intervene most effectively and efficiently to improve safety on our roads. FMCSA's current model is very labor intensive and covers only a small fraction of the nation's approximately 700,000 interstate carriers.

Improvements in available data and tools have enabled FMCSA to introduce CSA 2010. CSA 2010 provides (1) a more comprehensive safety measurement system, (2) a broader array of progressive interventions, (3) a safety fitness determination methodology that is based on performance data and not necessarily tied to an on-site compliance review, and (4) supporting information technology systems. FMCSA has made significant progress in developing and testing this approach. An operational model field test in eight states began last year and will run through June 2010. The complete CSA 2010 model will be rolled out on a state-by-state basis.

The Volpe Center is providing significant technical support to CSA 2010, including designing a new measurement system and operational model test; developing performance measures, information systems, and new implementation and safety fitness determination processes; and supporting outreach and communication efforts. *(Sponsored by FMCSA)*





© iStockphoto.com/pixelprof

“Cash for Clunkers” resulted in more than 690,000 disposed vehicles in the United States.

## Cloud Computing Environment for “Cash for Clunkers” Program

This summer’s Car Allowance Rebate System (CARS), commonly referred to as “Cash for Clunkers” and managed by the National Highway Traffic Safety Administration (NHTSA), gave buyers up to \$4,500 toward new, more fuel-efficient vehicles for trading in their old gas-guzzling cars or trucks. When the program ended in August, dealers had submitted sales and financial data on more than 690,000 disposed vehicles, totaling nearly \$3 billion in rebates.

The entire CARS processing system was created, implemented, tested, and then activated on extremely short notice. NHTSA turned to the Volpe Center to support development of the Cloud Computing and Colocation (COLO) Hosting System architecture for receiving and processing these data. NHTSA will use this environment to match vehicle disposal data with the original dealer invoices.

Volpe Center activities included server setup, patching, and maintenance; interface with agencies; technical documentation; and infrastructure support. The development cycle is currently in the second of three phases and will ultimately lead to a flexible, complex architecture, CARS Computing Architecture Version 2.0, which will remain for the next three to four years until all disposal data are investigated and reconciled. The results of NHTSA’s and the Volpe Center’s first cloud computing project will be used as a template for future endeavors. *(Sponsored by NHTSA)*



## New Staffing Tool and Reporting System Developed for FAA

The Volpe Center has developed the Federal Aviation Administration's (FAA) Office of Aviation Safety (AVS) Staffing Tool and Reporting System (ASTARS), a new automated staffing analysis model. FAA will use it to assess conditions in the oversight environment and to identify staffing requirements. ASTARS will ensure an appropriate level of safety oversight, first for aviation safety inspectors in AVS and later for the entire AVS staff and additional FAA offices. This year, the Volpe Center delivered Version 1.0 of ASTARS to the FAA Flight Standards Service Office. On October 1, ASTARS was deployed online nationwide for AFS managers to use.

The deployment satisfied the Congressional mandate to develop and implement a new demand-driven sufficiency and risk-based staffing model by the start of fiscal year 2010. The mandate resulted from a National Academy of Sciences report citing critical deficiencies in FAA's previous staffing models, which relied on resource allocation approaches. In contrast, ASTARS is based on a sufficiency model that accounts for the actual workload of an office on the basis of the quantity and complexity of the equipment being inspected, the safety requirements and risk posture of the function, and historical and calculated labor-hour requirements for individual tasks. Algorithmic formulae apply business rules and policies and additional data to calculate annual work hours and staff requirements by position—information that is necessary to ensure coverage of safety requirements. This information is then used to determine office staffing requirements and to justify additional positions as needed in the annual Congressional budget process. ASTARS now provides FAA with a staffing tool that can assess current staff levels, predict future staffing needs, examine the consequences of staffing decisions, and evaluate potential staffing impacts that may result from the implementation of new internally or externally driven initiatives. *(Sponsored by FAA)*



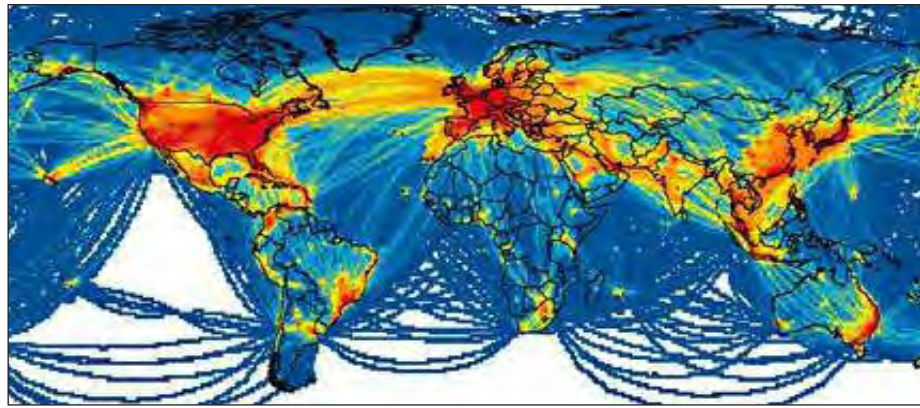
# Environmental and Energy Systems

The Environmental and Energy Systems Center of Innovation (COI) provides critical data to support energy independence, innovations in the movement of people and goods, and transportation-related climate-change adaptation and mitigation. We offer technical and analytical expertise in climate variability, air, noise, environmental compliance, engineering and remediation, and hazardous materials. The results of these efforts equip transportation decision-makers at all levels of government and industry to design energy and environmental policy that drives reductions in carbon and other greenhouse gas (GHG) emissions, promotes energy independence, and prepares our nation for the potential impacts of climate variability and climate change.

## New Tools Support Integrated Assessment of Aviation Environmental Effects

The Federal Aviation Administration (FAA) recommended to Congress, in its report *Aviation and the Environment*, that “The nation should develop more effective metrics and tools to assess and communicate aviation’s environmental effects ... The tools should enable integrated environmental and economic cost/benefit analysis” A major part of responding to this mandate is the development of a comprehensive suite of software tools that will allow for a thorough, integrated assessment of the environmental effects of aviation and improved estimates of fuel burn. FAA is in the midst of a multiyear effort that will result in the development of an entirely new suite of tools, including the Aviation Environmental Design Tool (AEDT). AEDT is slated for public release in 2013.

The Volpe Center leads the management, design, development, and integration of AEDT, which will replace FAA’s existing aviation-noise, emissions, and pollutant-dispersion computer modeling tools. AEDT is capable of providing comprehensive environmental analysis of the aviation system as well as estimates of tradeoffs and interdependencies associated with technical, operational, and policy options designed to reduce aviation environmental impacts. It is currently being used to support environmental analyses for the Next Generation Air Transportation System (NextGen) and the International Civil Aviation Organization’s Committee on Aviation Environmental Protection (CAEP). Upon release, it is planned that AEDT will be the centerpiece of an unprecedented broader suite of environmental consequence and cost/benefit tools to be used to support the development of NextGen and associated U.S. environmental policy changes.



Global CO<sub>2</sub> emissions from commercial aviation.

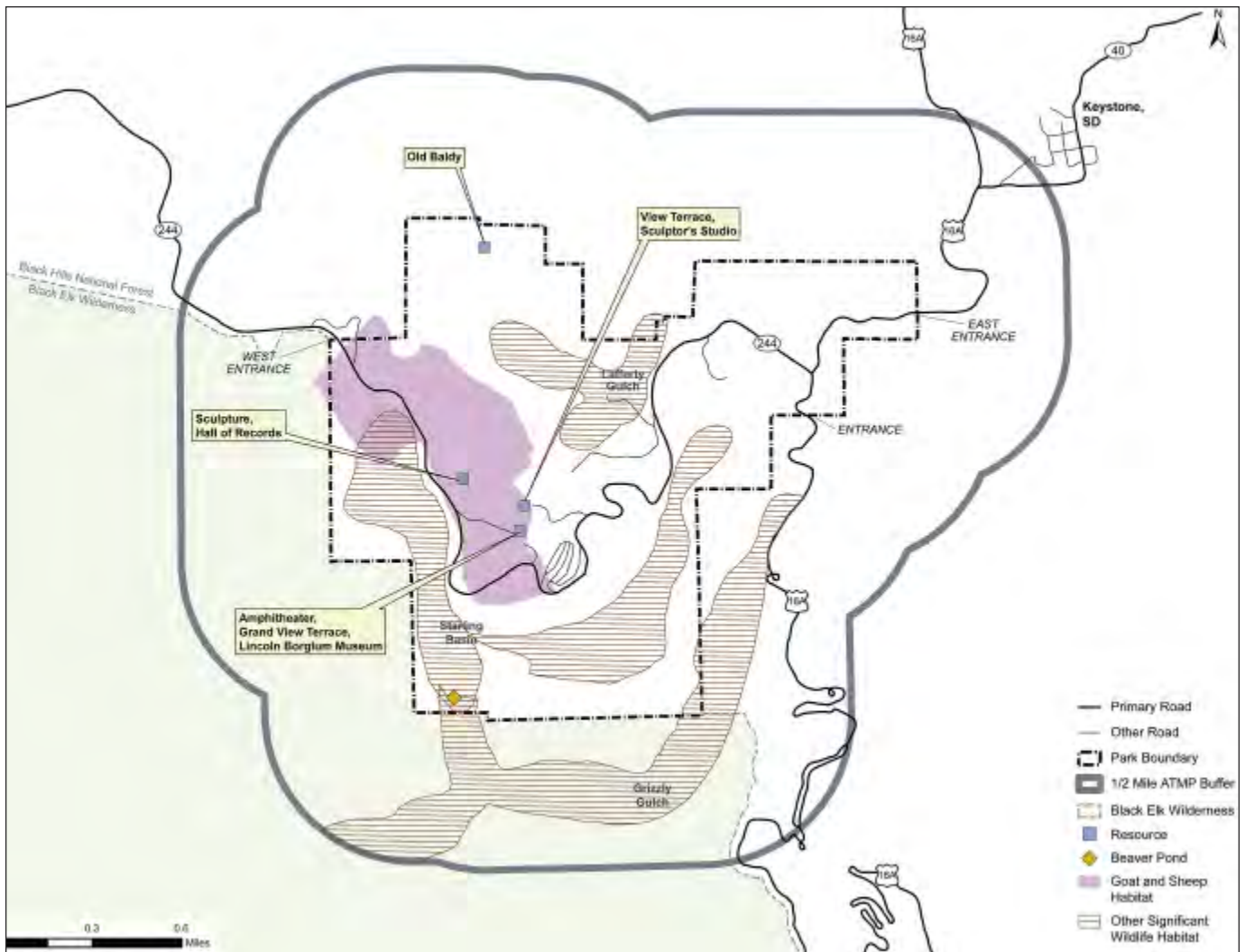
The Volpe Center developed a new method to compute fuel burn for Boeing aircraft, using the Boeing Climb-Out Program. This method improves fuel-burn modeling in the terminal area as compared with actual airline-reported fuel-burn data. Work has begun to expand aircraft fleet coverage of the database and to implement the new terminal area fuel-burn method into AEDT for use in FAA, NextGen, the Atlantic Interoperability Initiative to Reduce Emissions, and CAEP analyses.

FAA has set the goal of identifying and analyzing uncertainties of source-data algorithms and assumptions for each core computational AEDT module, including Aircraft Acoustics, Aircraft Emissions, Aircraft Performance, Ground Emissions, and Fleet and Operations. The process used in the first round of assessment will serve as a template for future module-level assessments, with the ultimate goal of evaluating the entire integrated system. *(Sponsored by FAA)*

## Joint Rule Proposed for New Fuel Economy Standards

This fall, the National Highway Traffic Safety Administration (NHTSA) and the Environmental Protection Agency (EPA) issued a joint proposal to increase Corporate Average Fuel Economy (CAFE) standards during model years 2012–2016 and to establish the first national GHG emission standards under the Clean Air Act. The new CAFE standards will require manufacturers' passenger-car/light-vehicle fleets to meet an estimated average of 34.1 miles per gallon by 2016. These rules were developed in response to President Obama's call for a National Fuel Efficiency Policy that would combine ambitious but achievable fuel-economy and GHG emission goals.

The Volpe Center has been providing NHTSA with the development and application of a modeling system and related information in order to support the development and evaluation of options for new CAFE standards since 2002. This year, the Center supported both NHTSA and an interagency team in developing a harmonized program of Federal CAFE and GHG emission standards. Also, the Center worked extensively with the other Federal agencies to estimate the direction of the light vehicle market, the effectiveness and cost of available fuel-saving technologies, and related economic factors. These estimates were then applied to a Volpe-developed CAFE modeling system that estimates the costs, effects, and benefits of the proposed new CAFE standards. The harmonized standards will avoid the proliferation of a patchwork of State regulations, leading to greater reductions in fuel consumption and emissions at lesser cost to the automotive industry and driving public. *(Sponsored by NHTSA)*



## Developing National Park Air Tour Management Plans

The Volpe Center works collaboratively with the FAA and the National Park Service (NPS) in responding to the National Parks Air Tour Management Act by developing Air Tour Management Plans (ATMPs) to mitigate or prevent significant adverse impacts from commercial air tours on natural and cultural resources, visitor experiences, and tribal lands within the Parks. Park-specific ATMPs will be used to ensure National Environmental Policy Act (NEPA) compliance and to regulate commercial air tours over 80 National Parks. The Volpe Center is conducting site audits based on acoustical monitoring and modeling, and prepares environmental compliance and NEPA documentation.

Related support includes: 1) quantifying park soundscapes; 2) enhancing computer modeling capabilities through aircraft source noise database expansion and advanced noise propagation research; and 3) assessing the effects of aircraft overflights on visitor experience. Improved methods developed in these efforts will also support other agency projects related to aviation noise. *(Sponsored by FAA and NPS)*

GIS maps of National Park resources are part of the environmental analysis of commercial air tours over National Parks. This Volpe team-generated image illustrates sensitive wildlife habitat areas at Mount Rushmore National Memorial.

## Future Plastic and Composite-Intensive Vehicles Increase Fuel Efficiency

Congress directed the NHTSA to promote the development of more fuel-efficient vehicles that do not compromise safety and to “examine the possible safety benefits of lightweight plastic and composite intensive vehicles.” NHTSA engaged the Volpe Center to explore this topic by working with other vehicle safety stakeholders in the government and the private sector to identify, summarize, and evaluate the existing knowledge base and to determine additional research needs and priorities to accomplish this goal.

Initial studies led to the release of a Volpe Center report, *A Safety Roadmap for Future Plastics and Composite-Intensive Vehicles (PCIVs)*, which covers research needs for the next 15 years. In addition, it identifies a number of potential collaborators in this research, including the American Chemical Council–Plastics Division and the U.S. Council for Automotive Research (USCAR) Freedom Car Partnership Automotive Lightweight Materials R&D Consortia, as well as standards setting organizations, such as the Society of Automotive Engineers and the American Society for Testing and Materials. The Volpe Center hosted a workshop with attendees from U.S. DOT and the broader stakeholder community. Participants identified knowledge gaps, developed a consensus on research and technology priorities, discussed the metrics and milestones necessary for assessing the crashworthiness of PCIV materials, and refined the potential safety challenges and opportunities for using additional lightweight materials in vehicles. A key conclusion was that safety research for future PCIVs must be strategically focused on providing adequate tools and data to the automotive industry to allow them to confidently design and produce economically viable commercial light and fuel efficient vehicles with crash-safety-performance-equivalent or superior to today’s vehicles. The summary and proceedings of this workshop are now available online.

Ongoing Volpe Center research is addressing the knowledge gaps that the Roadmap has identified. Volpe Center team members collaborated with NHTSA to prepare a paper on this project for presentation at the International Enhanced Safety of Vehicles Conference in Stuttgart, Germany, in the summer of 2009. (*Sponsored by NHTSA*)

# Freight Logistics and Transportation Systems

The Freight Logistics and Transportation Systems Center of Innovation (COI) maintains expertise in all aspects of local, regional, national, and global freight logistics and transportation infrastructure. Issues addressed for global logistics and transportation systems includes: safety and security, congestion, economic and energy concerns, and environmental stewardship. With increasing international trade and demand for freight transportation, our expertise enables the critical development of technologies that safely increase the capacity of these systems.

## Volpe Center's 25-Year Commitment Earns Distinction "Guardian of the Seaway"

The Saint Lawrence Seaway held its 50th Anniversary Celebration last summer in Massena, New York. The Seaway is a U.S.-Canadian waterway that has carried over 2.5 billion tons of cargo, valued at over \$375 billion, since its opening by President Dwight D. Eisenhower and Queen Elizabeth II in 1959. The Volpe Center is honored to have supported U.S. DOT's Saint Lawrence Seaway Development Corporation (SLSDC) for over 25 years in developing prototypes and deploying advanced systems to enhance navigational safety and operational efficiency along the Seaway. Thousands of ships worldwide rely on Volpe Center technology to pass safely through the Seaway each year. Past accomplishments include the development of a differential buoy-positioning system, an oil-spill-prediction-model user interface, and more notably, North America's first vessel-tracking and information system based on Automatic Identification System (AIS) technology.

During the 50th Anniversary Reception and Awards Dinner, the SLSDC administrator presented the Guardian of the Seaway Award to the Volpe Center for the deployment of the Saint Lawrence Seaway AIS Network. This award recognizes the Volpe Center's role in contributing to the integrity of the Saint Lawrence Seaway, a critical gateway for regional commerce. The Volpe Center continues to provide technical assistance to the Seaway by maintaining the operational readiness of the deployed AIS Network. *(Sponsored by U.S. DOT's SLSDC)*



The *Nanticoke*, shown here passing through the Saint Lawrence Seaway, is a self-unloader bulk carrier owned and operated by Canadian Steamship Lines (CSL). The vessel trades on the Great Lakes–St. Lawrence Seaway system.



Since 2006, the MSSIS network membership has grown to over 60 countries, significantly enhancing levels of safety and economic stability on the global seas.

## MSSIS an Overwhelming Success: Expands to Arabian Gulf, Africa, South America

The Volpe Center, on behalf of the U.S. Navy Sixth Fleet, initiated efforts in 2006 to produce a Maritime Domain Awareness (MDA) network known as the Maritime Safety and Security Information System (MSSIS). The unclassified and low-cost shared network is now used to track the movements of vessels around the world. This effort continued the Volpe

Center's historical contributions to the development of MDA networks, such as its groundbreaking work on the Panama Canal and the Saint Lawrence Seaway.

The original goal of MSSIS was to enhance maritime security in the European Command Area of Responsibility through a comprehensive situational awareness display of vessels equipped with AIS. Another critical goal was to foster cooperation among the United States and its allies by allowing active partnership in the network. By 2007, the system was already an overwhelming success, with 29 member nations agreeing to share AIS data over MSSIS. In 2008 and 2009, the network expanded its coverage to include nations in the Arabian Gulf, Africa, and South America. The system currently tracks over 20,000 vessels in over 60 countries. MSSIS continues to be a valuable tool, providing support for international military operations and exercises as well as search-and-rescue missions. MSSIS also has opened new diplomatic avenues for the United States, resulting in a heightened international understanding of the need for increased MDA. Along with aiding traffic flow, MSSIS is essential for combating drug smuggling, human trafficking, piracy, and global terrorism.

In addition to growing the MSSIS network membership to over 60 countries, several significant milestones were reached during 2009. These include numerous enhancements to Transview, the Volpe Center-developed MSSIS display client; the incorporation of non-AIS data such as RADAR tracks; and the completion of a rigorous information security certification process for the MSSIS server suite and component software applications. MSSIS also is being applied to other areas. For example, the Volpe Center is supporting the National Marine Fisheries Service in developing the capability to identify vessels exceeding speed limits in right-whale migration zones.

The Volpe Center's Global MDA team was awarded the prestigious Innovations in American Government Award from Harvard University's Kennedy School of Government Ash Institute for Democratic Governance and Innovation, for its efforts in enhancing levels of safety and economic stability on the global seas. Harvard's Innovations in American Government Program is a significant force in recognizing and promoting excellence and creativity in the public sector.

Since the initial deployment, the Volpe Center has been critical to discussions on the benefits of global MDA with countries across the globe. "This is the future. This is the thousand-ship navy, except there are no ships," said retired U.S. Navy Admiral Harry Ulrich. *(Sponsored by U.S. Navy Sixth Fleet)*



## UK Ministry of Defence Royal Air Force Streamlines Passenger and Cargo Tracking

The UK Ministry of Defence's Royal Air Force (RAF) now has detailed passenger and cargo data at the click of a mouse. This is the most recent functionality built into the Remote Access Management Portal (RAMP), a project under development by a joint Volpe Center-RAF team to enhance RAF operations. The current passenger- and cargo-tracking systems offer data in different formats, making it difficult to present information from both sources in a single tool. However, Volpe Center engineers have answered the challenge by developing a system that presents data from these two distinct systems in a single web-based interface. While viewing an intuitive map display, operators can select icons representing en-route aircraft and can instantly see the flight's passenger list and cargo inventory.

Volpe Center engineers created the interface using data-brokering technology, which they pioneered in the 1990s in support of the U.S. Air Force. A data broker acts as a universal interpreter for otherwise incompatible data systems, translating between systems where possible and alerting involved parties when data transmission may contain gaps. This system integration is one of the newer features that the Volpe Center has provided as part of longstanding research and information system support to RAF.

The RAF partnership began 20 years ago, when the Volpe Center was coordinating a project to make use of valuable yet previously idle data. The ingenuity of the Volpe Center team caught the attention of the UK Ministry of Defence, which soon thereafter initiated a working relationship. The Volpe Center and RAF team have since managed projects collaboratively through a new development methodology called agile development. This is a process by which RAF outlines a deliverable, the Volpe Center team rapidly develops a prototype, and the partners then engage in dynamic refinement. With the commitment by both parties to small, flexible, highly collaborative teams, this arrangement has proven effective recently in providing an interim cargo-management software solution. The Volpe Center-RAF team's success points toward efficient timelines, lower costs, and critical technological advances as the relationship continues. *(Sponsored by UK Ministry of Defence)*



Volpe engineers have designed a web-based interface to display passenger and cargo data of in-flight aircraft.

## Volpe Assists New York Tri-State Region Emergency Operations and Planning

This year, the Volpe Center supported four stakeholder agencies in the New York City Tri-State Region in developing a Security Cooperation and Emergency Operations Plan (SCEOP) for regional surface transportation. The project addressed emergency operations and planning for events such as major transportation accidents and disruptions, public health emergencies, major technology failures, terrorism, severe weather, and evacuations.

The four stakeholders were New York Metropolitan Transit Authority, New Jersey Transit, Connecticut DOT, and the Port Authority of New York and New Jersey (PANYNJ). PANYNJ was responsible for overall project management and acted on behalf of the four agencies as the conduit for Department of Homeland Security funding.

The Volpe Center began with an assessment of each agency's existing and planned security and emergency operations to gather vital information about the agencies' full spectrum of existing and planned security and emergency operations. The Volpe Center also performed an examination of best practices of security and regional emergency management coordination from around the globe. Finally, a gap analysis of these inputs resulted in individual agency SCEOPs and a regional SCEOP.

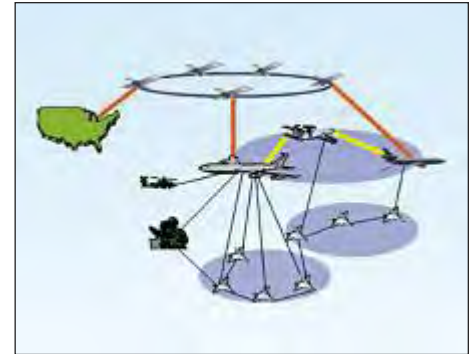
The plan documents the requirements for systems capabilities: asset management, shared situational awareness, and tactics, techniques, and procedures to coordinate regional resources and responses to major events. This will help leaders in the New York City Tri-State Region to mitigate event impacts ranging from delays and disruptions to loss of life. *(Sponsored by PANYNJ)*



Emergency response exercises are an integral part of emergency preparedness.

## Defining New Airborne Network Security Standards for NextGen

The next generation of commercial and military aircraft will become increasingly reliant on information networks for communications, control, navigation, fleet management, and even passenger entertainment. To ensure that potential cybersecurity issues are effectively addressed, the Volpe Center hosted a two-day interagency meeting on Airborne Network Information Assurance with sponsors and stakeholders in FAA, the U.S. Air Force (USAF), the Department of Defense (DoD), and the UK government. The Volpe Center is supporting FAA and the Air Force in defining new airborne-network security standards for next-generation aircraft.



A key component of NextGen will be the development of new airborne network security standards to support an integrated civil and DoD Net-Centric Operations aviation infrastructure.

The meeting had the following objectives: (1) to discuss future cybersecurity challenges for emerging aircraft operating in the Next Generation Air Transportation System (NextGen) national airspace environment; (2) to cultivate and enhance working relationships among FAA, DoD, and international agencies involved in airborne-network security; and (3) to develop and coordinate airborne-network cybersecurity requirements for future programs.

The Air Force Electronic Systems Center's chief technology officer and DoD NextGen's chief architect delivered the keynote address, "NextGen Chief Architect Vision." Those in attendance at the meeting were senior representatives from the FAA NextGen Joint Program Development Office, the FAA NextGen chief systems engineer for security, the Air Force organizations responsible for information security and aircraft certification, the DoD Air Mobility Command, the Defense Information Systems Agency, DoD's Technical Support Working Group, and the UK Communications-Electronics Security Group.

The group discussed plans to work with Wichita State University, an FAA Center of Excellence and University Transportation Center, to develop simulation models of Airborne Network Information Assurance scenarios. As a result of this meeting, an Air Force Civil Airborne Network Information Assurance Working Group will be formed to coordinate and collaborate on future initiatives. *(Sponsored by USAF)*



# Physical Infrastructure Systems

As the nation places increasing demands on an aging transportation system, the Physical Infrastructure Systems Center of Innovation (COI) seeks new approaches to renew, maintain, and expand this infrastructure. Volpe Center engineers provide technical support in the inspection, maintenance, and rehabilitation of existing and future vehicles, guideways, and intermodal facilities. Our group's internationally recognized expertise in the utilization of new materials and in the creation of novel engineering concepts and robust institutional approaches ensures the resilience of the nation's transportation infrastructure.

## 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 related to passenger- and freight-equipment crashworthiness and occupant protection. 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 as well as train and occupant dynamics.

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

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



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

develop standards for crashworthy light rail style equipment used in conjunction with conventional passenger and freight equipment. *(Sponsored by FRA)*

## Fire-Suppression System Successfully Extinguishes Fire on U.S. Coast Guard Patrol Boat



Patrol boat *Cuttyhunk*.

At 12:15 hours on May 20, the U.S. Coast Guard (USCG) 110-foot patrol boat *Cuttyhunk* was underway at full speed, patrolling off the coast of the State of Washington. Without warning, there was a crank-case explosion in the port main engine. A rupture hole formed on the engine side, spilling oil onto the starboard engine and starting a fire.

The *Cuttyhunk* crew shut down the engine plant, sounded the fire alarm, and activated the Volpe Center-engineered FM 200 fire-extinguishing system from the pilot house. The system immediately extinguished the engine-room fire. The resulting damage was minimal due to the crew's training and quick response.

The Volpe Center engineered the fire-suppression system for the 110-foot patrol-boat fleet, including the *Cuttyhunk*. Tasks included inspection, functional testing, and training, as well as obtaining Manufacturer Certification at the USCG yard during the *Cuttyhunk's* major overhaul in November 2007.

The FM-200 fire-extinguishing system is used by both USCG and the U.S. Army and is a suitable replacement for halon gas, which is now a banned ozone-depleting chemical. FM 200 systems extinguish fires in an enclosed space by cooling the flame and interrupting the combustion process. These systems are ideal for fires originating in a vessel's engine room. The fire-protection extinguishing agent was designed to be released either remotely from the pilot house, locally in the FM 200 cylinder storage room, or from the individual cylinders. A backup system provides a second shot of extinguishing agent into the protected space.

The *Cuttyhunk* fire is the first known incident of fire at sea in which the Volpe Center's FM 200 system was used. The system performed exactly as designed, protecting the lives of the crew and preventing further damage. The Volpe Center has over 15 years of experience in designing, installing, and commissioning fire-protection systems on board approximately 60 U.S. Army watercraft and USCG vessels, including eight 110-foot cutters. *(Sponsored by USCG)*

## Saving Lives at Rail Intersections and Rights-of-Way

Railroad grade crossings present significant hazards 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 public and private railroad grade crossings, 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 Intercity Passenger Rail (HSIPR) 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. A major effort focuses on acquiring a better understanding of the risks that ROW presents 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 railroad ROW infrastructure safety program also encompasses system operations analysis; technology development, assessment, and implementation; and advanced technology opportunities. Its primary objective is to identify technologies, methodologies, and hardware that will help to increase safety and continue to decrease the numbers of collisions and fatalities.

Last July, the Volpe Center hosted FRA's Third Research Needs Workshop on Highway-Rail Grade Crossing Safety and Trespass Prevention. The workshop addressed research needs related to technology, human factors, methodology, and education to facilitate the reduction of highway-rail grade crossing and trespass collisions and fatalities. *(Sponsored by FRA)*

## High-Speed-Rail Grade Crossing: First of Its Kind to Be Installed in U.S.

This year, Volpe Center team members accompanied a group of highway-rail grade crossing engineers from Transport Canada (TC) on a site visit of the School Street four-quadrant-gate grade crossing/vehicle-presence-detection system on the National Railroad Passenger Corporation's (Amtrak) Northeast Corridor (NEC) high speed-rail (HSR) line in Mystic, Connecticut. The four-quadrant gate grade crossing is the first with a four-gate system to be installed on the Amtrak Northeast Corridor (NEC) HSR line in Connecticut and the first of its kind to be installed in the United States. FRA Region I and Volpe Center team members facilitated the site visit.

The crossing uses inductive-loop vehicle-presence-detection technology to sense when a vehicle is inside the grade crossing gates and within the rail track infrastructure. When this occurs, the two exit gates are automatically raised, allowing the vehicle to depart safely from the crossing. The system also alerts oncoming trains to the vehicle's presence and will invoke an automatic train stop if the operator fails to stop the train.

Volpe Center rail systems and safety experts have a long history of cross-border cooperation and knowledge-sharing with Canadian officials. Volpe Center team members serve on Canadian research and development committees and cooperate extensively to accentuate their knowledge-sharing activities. During this site visit, the Volpe Center team and TC observed revenue-service



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.



An Amtrak train passes the School Street crossing on the Northeast Corridor HSR line in Mystic, CT.

operation of the enhanced warning devices at the School Street grade crossing. This technology was specifically designed to provide enhanced safety at HSR grade crossings and is unique to the NEC.

The Volpe Center had previously evaluated the technology in support of FRA and was able to provide TC with considerable background information and insight during the School Street site visit. This research may lead TC to deploy the technology at grade crossings on Canadian HSR lines.

The Volpe Center has been instrumental in establishing the viability of the four-quadrant gate/vehicle-presence-detection grade crossing technology. Since the Volpe Center's experts demonstrated the viability of the technology during the initial deployment at the School Street crossing, it has been installed at five other crossings on the Amtrak HSR

corridor between Stonington and New London, Connecticut. *(Sponsored by FRA)*

## Safer Public Transit Through the Drug and Alcohol Compliance Program

The Volpe Center manages the Federal Transit Administration (FTA) Drug and Alcohol Compliance Program, an important ongoing oversight effort that helps to 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 focusing on identified deficiencies and noncompliance trends.

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

The Volpe Center supervises a 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 afforded public transit providers a great deal of insight into how to comply with related Federal regulations. They also have strengthened the FTA Drug and Alcohol Compliance Program and have helped to advance U.S. DOT's transportation safety and security goals. *(Sponsored by FTA)*



# Communication, Navigation, and Surveillance and Traffic Management Systems

The Communication, Navigation and Surveillance and Traffic Management Systems Center of Innovation (COI) supports systems that alleviate air traffic congestion, thereby improving safety as well as environmental and on-time performance. We specialize in research and systems development, focusing critical expertise on the Next Generation Air Transportation System (NextGen). Our work develops and supports internationally recognized real-time communication, navigation, surveillance, and operations systems, resulting in improved flow of air traffic around the world.

## Volpe Center Supports Transformation of Nation's Air Traffic System

In order to meet the projected increase in demand for future aviation service, Congress enacted legislation that created the Joint Planning and Development Office. This office manages a public-private partnership for planning NextGen implementation by 2025.

NextGen is designed to reduce congestion, accommodate growth in commercial aviation, and benefit the environment. New systems will analyze and display real-time, detailed flight and weather data to create common situational awareness and inform decision-making among air traffic personnel and pilots. NextGen will also benefit the environment through reductions in carbon emissions, fuel consumption, and noise.

In partnership with the Federal Aviation Administration (FAA) and other key stakeholders, the Volpe Center is applying its expertise in engineering, operations, human factors, environmental and energy technology, and safety management systems to help design, develop, and deploy cutting-edge aviation systems.

The Volpe Center has been making significant contributions to major NextGen initiatives since the program's inception. The Volpe Center team is supporting efforts to accelerate NextGen components that will yield near-term benefits and is providing key support on critical mid- and long-term NextGen programs. *(Sponsored by FAA)*

## ADS-B Program Enables NextGen

FAA's Automatic Dependent Surveillance-Broadcast (ADS-B) Program is targeted at significantly improving the safety and efficiency of the U.S. commercial and general aviation enterprise. ADS-B involves digital messages that aircraft transmit to radio stations as well as to other aircraft. Radio stations also broadcast radar, weather, and other data from the National Airspace System (NAS) to create a robust aviation information network. ADS-B is a transformational program that will enable the NextGen.



Atlantis is a floating oil and gas production facility that British Petroleum operates in the Gulf of Mexico. It is also the site of an ADS-B VHF Communication Radio Transceiver as well as an Automated Weather Observation System Station.

and to reduce the risk of ADS-B system deployment. The Volpe Center is demonstrating that ADS-B provides controllers with surveillance information that supports current separation standards in en-route areas.

The Volpe Center also leads the program's information and physical security work. Initial ADS-B application regions are demonstrating new operational capabilities. In the Gulf of Mexico, the Volpe Center was instrumental in the selection of and negotiation for deployment sites on oil-exploration and production platforms. Since radar cannot scan across the Gulf, this area has been treated as oceanic airspace with aircraft-separation minimums of 10 to 15 minutes. With ADS-B radio stations located on petroleum platforms, these minimums will be reduced. *(Sponsored by FAA)*

FAA's Surveillance and Broadcast Services Office manages the implementation of ADS-B, establishes standards and rules for aircraft and ground equipment systems, and directs the development of radio stations and their integration into the NAS. The Volpe Center provides key support to FAA by performing technical tasks and managing a team of 120 engineers, operational specialists, and analysts.

Volpe Center engineers developed and regularly maintain the Midwest Prototype ADS-B system that is being used to obtain initial measures of ADS-B benefits

## National Architecture to Provide More Effective and Efficient Positioning, Navigation, and Timing

Under the U.S. Space-Based Positioning, Navigation, and Timing (PNT) policy, U.S. DOT has been assigned a number of responsibilities, including leadership in the development of PNT requirements for civil applications from all U.S. Government (USG) civil departments and agencies, promotion of U.S. civil-sector-based PNT services and capabilities for transportation safety in cooperation with other departments and agencies, and representation of civil departments and agencies in the development of the Global Positioning System (GPS). U.S. DOT has given oversight for carrying out the Department's PNT responsibilities to the Research and Innovative Technology Administration (RITA).

This year, the Volpe Center has continued its ongoing support of RITA's PNT policy. As a member of the PNT Architecture team, RITA/the Volpe Center has developed a plan with particular emphasis on the NextGen program for transitioning from the "As-Is" to the "Should-Be" architecture by the 2025 timeframe. Testimony was given to the National Security and Public Affairs Subcommittee of the House Committee on Oversight and Government Reform on possible near-term (two-year) GPS availability gaps. Potential GPS backup capabilities are being explored as part of a national PNT architecture study. The Volpe Center was a participant in the International Committee on Global Navigation Satellite Systems Working Group discussions in St. Petersburg, Russia, in mid-September. The committee met for the purpose of promoting cooperation on matters of mutual interest related to civil-satellite-based PNT and value-added servers, as well as compatibility and interoperability among Global Navigation Satellite Systems (GNSS).

The overarching goal of the PNT Architecture team is to overcome identified GPS capability gaps and to achieve evolutionary, integrated space-based, terrestrial, and autonomous solutions in the 2025 timeframe. This will ensure the continuity of government-provided PNT service.

*(Sponsored by RITA, FAA)*

## Massport Pioneers Vessel-Monitoring System for Air Traffic Controllers

Airplanes travel low over the Boston Harbor Channel south of Logan Airport to land on Runway 4R, passing through space shared with ocean-going and other tall vessels. This intersection requires continuous coordination of air traffic operations between flight arrivals and tall vessels navigating the channel.

Concerned about possible interference with air traffic, the Massachusetts Port Authority (Massport), seeking to upgrade the technology that air traffic controllers use to monitor local ship movements, enlisted the technical expertise of the Volpe Center. The Volpe Center team provided Massport's manager of aviation planning with recommendations and technical assistance. Massport then built a project team with FAA and Pro Sensing, Inc. The result was the installation of a high-resolution dual-radar system, the first in the United States to provide air traffic controllers with ship location and height information on a visual display.

Massport recently announced completion of the monitoring and reporting system, marking a major step forward in safety. Logan's air traffic controllers now possess a greatly improved level of ship traffic situational awareness in any level of daylight or in conditions of poor visibility due to weather. *(Sponsored by Massport)*



Massport's radar system is the first in the U.S. to provide air traffic controllers with a visual display of ship location and height information.



## Volpe Center Develops Simulation Standards Targeting Increased Aviation Safety

This year, the Volpe Center released the first version of a NAS simulation and analysis capability. The effort, in support of FAA, focuses on providing a quantitative safety analysis of simultaneous parallel approaches at airports. The goal is to develop a simulation capability that

A liquefied natural gas tanker is escorted through Boston Harbor to a discharge facility. The passage of this and other large vessels must be coordinated with as many as 35 flight arrivals per hour onto Logan Airport Runway 4R.

enables a rigorous analysis and certification of procedures, equipment, and airspace in the NAS in order to optimize individual airports' operational procedures and improve aviation safety.

The simulation tool is designed to be intuitive and easy to use while achieving a high level of precision in replicating real-world entities such as radar and aircraft. This precision is the product of complex mathematical models as well as detailed operational procedures. The tool runs on a personal computer yet is flexible enough to model various aircraft and airports in different environmental conditions with multiple surveillance and navigation systems. It is even able to account for human performance characteristics.

The simulation tool is the result of an extensive effort by the Volpe Center's technical team. The Monte Carlo-based computer simulation capability employs stochastic models of nearly every component of the NAS: mechanical, electronic, and human. These components, including navigation aids and surveillance systems, pilots and air traffic controllers, and weather and aircraft types, are combined with known, discrete artifacts such as runway size and airport configuration.

The simulation tool also utilizes Volpe Center-developed airframe-type-specific kinematic aircraft models, a high performance random-number generator, and a precise WGS 84 compliant elliptical earth model to create a robust tool with photo-realistic airport depictions and real-time 3-D animation. The second phase of development includes the following enhancements: additional NAS navigation and surveillance systems, high-fidelity aircraft flight models, and land and hold short operations and converging-runway operational scenarios. *(Sponsored by FAA)*

## Mitigating the Effects of Aircraft Wake Turbulence Enhances Global Air Safety

The Volpe Center supports FAA in the research and development of procedures that mitigate the effects of aircraft-wake-avoidance operating requirements and increase airport operational safety. Volpe Center team members collect, analyze, and interpret aircraft-wake and related meteorological and flight-trajectory data in order to demonstrate the safety and effectiveness of proposed new aircraft and flight procedures.

The Volpe Center Wake Turbulence program builds on over a decade of project experience:

- San Francisco Airport (SFO): The Volpe Center collected and analyzed aircraft-wake and related data for 250,000 approaches, leading to development of the Simultaneous Offset Instrument Approach (SOIA) procedure now in use at SFO during low-visibility conditions.
- St. Louis Airport (STL): The Volpe Center evaluated a simultaneous approach/landing procedure on closely spaced parallel runways over a three-year period. The procedure was approved in 2007 and led to the approval of similar procedures at Boston, Philadelphia, Cleveland, and Seattle airports in 2008.
- St. Louis (STL), Houston (IAH), and Frankfurt, Germany (FRA): The Volpe Center collected extensive departure data to evaluate the lessening of restrictions on departures behind heavy aircraft by taking advantage of wind speed and direction. FAA now has an approved program to develop a system, Wake Turbulence Mitigated Departures (WTMD), for installation at 10 U.S. airports.

The Volpe Center participates in key industry working groups to develop procedures that enhance air travel safety. Volpe Center team members participated in two international working groups examining safety issues related to new jumbo aircraft. One working group studied the Airbus A380, and the other focused on the Boeing 747. Both groups examined appropriate separation of aircraft on the basis of their generation of and susceptibility to wakes. *(Sponsored by FAA)*

## Volpe Center Supports NextGen and Air Space Systems Research

The Volpe Center entered into a new agreement with the National Aeronautics and Space Administration (NASA) Ames Research Center to support NextGen and the Airspace and Airportal projects. This work complements the Center's ongoing support to FAA NextGen efforts.

The Volpe Center and other NextGen project participants from the Departments of Defense, Homeland Security, and Commerce, as well as FAA, NASA, and the White House Office of Science and Technology, are supporting the development of NextGen. The Volpe Center team is providing technical expertise and collaborating with the Ames and Langley Research Centers and NextGen team experts in developing nominal and off-nominal scenarios for use in modeling and simulating current NAS and NextGen concepts.

Volpe Center experts will aid in developing new operational scenarios based on a common set of external factors representing:

- Identification and classification of existing operational scenarios, including those developed by NASA and the Joint Planning and Development Office, which coordinates specialized NextGen efforts of Federal agencies.
- The current air transportation system as well as NextGen.
- All phases of flight and ground operations.
- Nominal and off-nominal conditions.



The Re-Route Impact Assessment tool displays a re-route around convective weather.

To ensure the most efficient and safest air transportation system possible, the Volpe Center is also providing expertise in the review of NextGen air traffic management airborne and surface concepts and the performance of system evaluations, benefit analyses, and safety assessments. *(Sponsored by NASA)*

# Human Factors Research and System Applications

As an internationally recognized research and development team, the Human Factors Research and System Applications Center of Innovation (COI) improves transportation safety, security, and productivity. The Volpe Center team pioneers new and increasingly complex relationships between humans and current automation technologies, designing technology and procedures for human use in support of other projects at the Center and across all modes of transportation. We seek to minimize or eliminate operator errors, improve related policy, and refine underlying engineering.

## Volpe Center Supports U.S. DOT's Efforts to Take Safety Commitment to Next Level

In October, Secretary of Transportation Ray LaHood convened the first meeting of the newly created U.S. DOT Safety Council, formed to tackle critical transportation safety issues facing the Department's 10 operating administrations. "Now is the time to identify and address the top safety issues that cut across our agencies," LaHood said. "The Council will take our commitment to safety, which is our highest priority, to the next level." Before taking office, LaHood noticed that the Department's agencies were pursuing many important safety initiatives without a formal process for sharing data, best practices, and strategies. He established the Safety Council to serve a broadbased safety leadership role and to help break down organizational stovepipes, enabling an even stronger safety culture.

The goals of the Safety Council are to further enhance the safety focus throughout all of the Department's agencies and to improve the impact of the Department's safety programs. Transportation Deputy Secretary John Porcari chairs the Council, which comprises the heads of the Department's 10 agencies. The Council will be action-oriented and data-driven, emphasizing open dialogue about common issues and providing a forum for fresh ideas and different perspectives. "The Council will enhance the Department's safety culture, which should then resonate out into industry," said Porcari. The Volpe Center participated in the Council's inaugural meeting and is providing strategic staff support. *(For RITA and the Office of the Secretary of Transportation)*



Pictured above, on a recent visit to the Volpe Center, from left to right: Peter H. Appel, Administrator, Research and Innovative Technology Administration; John D. Porcari, U.S. Deputy Secretary of Transportation; Robert Johns, Director, Volpe Center; and Polly Trottenberg, Assistant Secretary for Transportation Policy. The Deputy Secretary chairs the new Safety Council.



## Technical Support to Crash Warning Interface Metrics Program

The Volpe Center is providing technical support to the National Highway Traffic Safety Administration's (NHTSA) Crash Warning Interface Metrics (CWIM) program. CWIM's objectives are: (1) to evaluate the potential need for standardization of in-vehicle driver-crash warning system interface designs, and (2) to study

U.S. Secretary of Transportation Ray LaHood tours the Volpe Center Human Factors Lab. From left to right: Kim Cardosi, Mary Stearns, Danielle Eon, and Steve Popkin of the Volpe Center; and Jill Zuckman and Secretary LaHood of the U.S. Department of Transportation.

the effectiveness and driver acceptance of active and passive lane-departure-prevention systems through vehicle simulation research. Empirical research on driving simulators is underway at the National Advanced Driving Simulator at the University of Iowa in Ames. This research evaluates the possible need to standardize advanced crash warning system interface characteristics, particularly those constituting the aural warning elements of systems that prevent vehicle lane departures.

These data will help to determine the effectiveness and acceptability of active and passive lane-departure warning systems. Passive warning systems warn the driver via a variety of signals or cues, whereas active warning systems can also intervene, when the driver fails to respond adequately to the warning, by taking partial control of the vehicle. Results will also be coordinated with a separate yet closely related NHTSA test track study on forward-collision warning systems at the Vehicle Research and Test Center in Ohio. These systems will measure driver behavior in both nondistracted and distracted simulator conditions.

The Volpe Center independently reviews CWIM deliverables, which include the project test plan, the literature review and technology survey that support the plan, data derived from the simulation procedure, statistical analyses of the data, and reports that describe the study and its conclusions.

*(Sponsored by NHTSA)*

## Experts Focus on Transportation Operator Fatigue

National and international leaders in research, transportation management, and labor, as well as regulators and program evaluators from all modes of transportation, convened in Boston in March to participate in a highly successful conference on fatigue management in transportation operations. Sponsored by the Human Factors Coordinating Committee (HFCC), a representative body within U.S. DOT that addresses multimodal issues, the three-day 2009 International Conference on Worker Fatigue Management in Transportation Operations focused on disseminating information on the latest fatigue-related research, technology, and countermeasures. It also centered on facilitating the use of this information and the evaluation methods needed in order to achieve better fatigue management in transportation. Human fatigue has been on the National Transportation Safety Board's (NTSB) Most Wanted List of Safety Improvements since the list's inception in 1990.



FRA and Volpe Center team members, in support of HFCC, led efforts to convene experts from around the world to address this critical topic. The U.S. Coast Guard (USCG), the Department of Defense, NTSB, and Harvard University Medical School also collaborated on conference planning and execution.

HFCC's focus on operator fatigue started almost a decade ago, through the initiation of its Operator Fatigue Management Program. This work is in addition to the research and demonstration activities carried out by U.S. DOT's operating administrations. During this time, HFCC has sponsored the development of fatigue management tools that are now freely available to the transportation industry and related organizations. *(Sponsored by HFCC)*

## **Volpe Center Brings Its Transportation Perspective to the National Occupational Research Agenda**

This year, the National Institute for Occupational Safety and Health (NIOSH) convened an expert panel from around the country to review and finalize the draft National Occupational Research Agenda (NORA) document, which lays out the strategic, intermediate, and activity goals for the transportation, warehousing, and utility sector. A Volpe Center staff member serves as an external U.S. DOT-sector council member, a co-lead for the railroad-specific agenda, and a member of the transit- and aviation-specific agendas. NORA covers four areas: traumatic injuries, musculoskeletal disorders, health and wellness, and exposures, and two cross-cutting areas: human fatigue and economic impacts. The Volpe Center will work with both NIOSH representatives and the Department's human factors program managers through HFCC to develop an implementation plan that will advance the most relevant of these goals within the next two to three years. *(Sponsored by NIOSH)*



# Advanced Vehicle and Information Network Systems

The Advanced Vehicle and Information Network Systems Center of Innovation (COI) has been at the vanguard of research, development, and deployment of Intelligent Transportation Systems (ITS). Specifically, our team identifies, assesses, and deploys advanced technologies and new operational strategies to reduce the frequency and consequences of crashes. This COI has played a key role in enabling our sponsors to overcome institutional, financial, and technical barriers to successful ITS implementation.

## Volpe Center Evaluates State-of-the-Art Vehicle Safety Systems

The Volpe Center serves as the independent evaluator of the Integrated Vehicle-Based Safety Systems (IVBSS) project. This is the first large-scale field operational test initiative for both light-vehicle and heavy-truck platforms focused on safety system integration. IVBSS technologies warn drivers in crash imminent situations, helping to prevent rear end, lane change, and road departure crashes. IVBSS is a cooperative effort by an industry team led by the University of Michigan Transportation Research Institute and U.S. DOT. The team includes representatives from the National Highway Traffic Safety Administration (NHTSA), the Federal Motor Carrier Safety Administration (FMCSA), and the Research and Innovative Technology Administration Intelligent Transportation Systems Joint Program Office (RITA ITS/JPO).



IVBSS driver-vehicle interface in a heavy truck platform.

The IVBSS research initiative seeks to accelerate the introduction and commercialization of integrated vehicle-based crash warning systems for light vehicles and heavy trucks. The objective is to assess potential safety benefits and driver acceptance of the integrated safety systems, which are expected to prevent conflicting warnings, reduce false alarms, enhance consumer and fleet-operator acceptance, and boost product marketability.

The Volpe Center is responsible for the independent evaluation of IVBSS technologies, which seeks to achieve a detailed understanding of system safety benefits, determine driver acceptance of the system, and characterize system performance. The evaluation is based on data collected from



Volpe Center multimedia data viewer.

field operational tests of equipped heavy trucks and light vehicles. The heavy-truck field test, which started in February, using 10 trucks and 20 drivers from Conway Freight, will end in December 2009. The light-vehicle field test was launched last April and is scheduled for completion in April 2010. Sixteen passenger cars were equipped with IVBSS, and 108 subjects were recruited to participate in that test. Prior to the start of the two field tests, the Volpe Center ensured the readiness of both vehicle platforms by conducting two system verification tests on a test track and on public roads; it then assessed the results of two extended pilot tests, which served as a dress rehearsal for the field tests.

The Volpe Center has designed and built a large database to house and process the field-test data. As part of the safety benefit assessment, the Volpe Center team programmed and verified data-mining algorithms that identify driving conflicts from numerical data. These conflicts represent vehicle

movements, critical events, and driver maneuvers that map to pre-crash scenarios leading to rear-end, lane-change/merge, and roadway-departure crashes. Also, the Volpe Center developed a data-viewing tool that displays numerical data and five channels of video data simultaneously. The tool will allow analysts to investigate events of interest and record their observations in an integrated data logger. This is required in order to conduct a detailed analysis of the timing and appropriateness of the system alerts and to understand the context of the driving situations as well as the driver response. The data logger incorporates information about alert validity, driver distraction, eyes off the road, target type, target maneuver, and vehicle path. The Volpe Center is currently analyzing the field-test data. Results of the heavy-truck field test and the light-vehicle field test will be published in December 2010 and March 2011, respectively. *(Sponsored by NHTSA, FMCSA, and RITA/JPO)*

## Alternative-Fuel Trams for National Wildlife Refuges

As part of its mission to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people, the Department of Interior's (DOI) U.S. Fish and Wildlife Service (USFWS) is expanding the use of low-environmental-impact and alternative-fuel tram vehicles at some of its 550 national wildlife refuges. Leveraging funds were made available through the Federal Transit Administration's Transit in the Parks (TRIP) program. USFWS headquarters, in coordination with its Region 5 office and the Patuxent Research Refuge in Maryland, asked the Volpe Center to conduct a technology assessment of existing products and a market assessment of potential procurements of hybrid, alternative-fuel, and low-environmental-impact tram vehicles.

Since 1994, the Patuxent Research Refuge has successfully maintained and operated an all-electric, open-air tram to provide visitors with interpretive tours. In addition to not producing any emissions, the tram is attractive to staff at other refuges and Federal lands for a variety of other reasons.

This vehicle:

- Carries approximately 40 riders.
- Operates at low noise levels and slow speeds.
- Meets accessibility guidelines of the Americans with Disabilities Act (ADA) of 1990.
- Provides short-haul service yet is able to carry significant loads.
- Operates on a variety of unpaved surfaces.
- Can be stored without degradation for several months during off-seasons.
- Has appropriate systems (public address, seating, lighting) for hosting interpretive tours.

The Volpe Center study began in September 2008. The technology assessment was broken down into four major steps: (1) develop “typical operating environments” that represent the varied regional conditions in which a USFWS tram would operate; (2) compile a catalogue of suitable existing tram vehicles and components (propulsion systems, batteries, suspensions, chassis, etc.); (3) compare these products to determine whether to proceed by procuring existing vehicles, creating customized vehicles from existing components, or developing a new, specialized vehicle suitable to the USFWS environment; and (4) formulate “technical considerations” to guide the potential development of a new vehicle.

The market assessment reviewed the low-environmental-impact tram-vehicle needs of the other Federal Lands Management Agencies (FLMAs) and assessed their current tram-vehicle fleets as well as future fleet plans. The Volpe Center team compiled FLMAs’ desired low-environmental-impact-vehicle characteristics and determined how best to meet their needs: by procuring existing vehicles, creating custom-build vehicles from existing components, or designing a new vehicle. The market assessment incorporated such activities as telephone discussions, data analysis, and a Webinar during which field staff could share information and discuss their needs. Study findings and results are now available. *(Sponsored by USFWS)*



An all-electric, open-air tram at the Patuxent Research Refuge.



Bicycle racks at Nauset Light Beach, Eastham, MA.

## Innovative Transportation Solutions Are Focus of Work at National Parks

Throughout the year, the Volpe Center continued to assist DOI in developing and implementing innovative solutions to transportation issues on federally owned and managed lands.

Volpe Center team members traveled to several Cape Cod towns to participate in the Parking and Transit Study for the Cape Cod National Seashore. They investigated existing and

potential parking-area locations for Federal and town-owned beaches and erosion threats to parking areas, and they created a photographic library of these sites. This information will be incorporated into the final Volpe Center report presenting future parking and transit alternatives for site visitors. The Volpe Center team also participated in the mid-year meeting of the Transportation Research Board (TRB) Committee on Transportation Needs of National Parks and Public Lands, held in Woods Hole, Massachusetts. The meeting was planned in collaboration with the Volpe Center. Discussion centered on alternative-transportation activities in public lands, in particular Cape Cod National Seashore and wildlife refuge locations. *(Sponsored by DOI)*

## A Leader in Emergency Transportation: Volpe Center Supports Hurricane Preparedness



Bay St. Louis Beach Boulevard in Bay St. Louis, Mississippi during a recent hurricane.

Since hurricane season in the Atlantic Ocean began on June 1, transportation users and service providers have had to pay heightened attention to tropical weather forecasts and the potential for damaging storms along the Gulf and Atlantic Coasts. A leader in emergency transportation and home to the largest trained regional emergency transportation cadre in the United States, the Volpe Center contributed to two important national meetings on hurricane preparedness this year. Knowledge gained from these conferences was used to enhance regional emergency transportation response cadre training, which was offered at the Volpe Center last summer.

Earlier this year, the Volpe Center had the opportunity to meet other Federal, State, and local government colleagues at the 31st National Hurricane Conference in Austin, Texas. Volpe Center team members attended training and workshops on improving hurricane preparedness, response, recovery, and mitigation in order to save lives and property in the United States as well as the Caribbean and Pacific islands. Workshop topics included transportation, evacuation, business, industry and economic stability, public awareness/media, and sheltering and mass care. The Hurricane Gustav and Ike After Action Meeting focused on response and recovery activities in Texas and Louisiana in the wake of these two storms.

The Volpe Center serves as U.S. DOT's Region 1 and 2 Regional Emergency Transportation Representative and Transportation Emergency Support Function (ESF) lead for the Northeastern United States under the Federal Emergency Management Agency's (FEMA) National Response Framework. During Hurricanes Gustav and Ike in 2008, Volpe Center staff served as the lead manager at the Baton Rouge LA Joint Field Office for the ESF-1.

## Public Safety Partnership Tested by Exercise Tremor

An earthquake rattles Boston. Transit service is disabled. The Northeast Corridor (NEC) is shut down, and bus service is unavailable. The Massachusetts Turnpike, a major artery into the city, is closed from Boston to the Newton tolls. The tower at Logan International Airport is down, and the city is in the dark.

Exercise Tremor is a homeland security training initiative developed by the Federal Emergency Management Agency (FEMA). In 2009, it was executed in New England in order to familiarize Federal, State, and local emergency personnel with their roles and responsibilities in the event of an earthquake. This proactive preparedness-and-response exercise provided an opportunity to test protocols and also to test the nation's National Response Framework with all New England partners who have emergency support roles.

As FEMA's lead for emergency support related to transportation, the Volpe Center assists Federal agencies, State and local governmental entities, and other organizations requiring transportation capacity in performing response missions following a major disaster or emergency. The Center also serves as a critical coordination point between response operations and restoration of the transportation infrastructure. *(Sponsored by FEMA)*



This collapsed California freeway is an example of the effects an earthquake can have on infrastructure.





# Organizational Excellence

The Volpe Center exceeded expectations this year in successfully transitioning to new leadership, developing human capital, cultivating new work, delivering innovative acquisition services, providing key resources to the small-business community, and standing out as an exemplary environmental steward. The Center renewed its Federal workforce significantly and achieved the second-highest annual total of New Obligation Authority (NOA) in its history. A new online, customer-oriented tool, “How to Start Work with the Volpe Center,” provided helpful guidance for both current and prospective sponsors interested in working with the Center. The Center also initiated a helpful new Internet portal for the Small Business Innovative Research (SBIR) program. The Center’s volunteer Green Team extended its organizational excellence by providing environmental stewardship within the local community, undertaking and receiving recognition for an increasing number of initiatives that reduce our environmental footprint.



The new director of the Volpe Center, Robert Johns.

## Robert Johns Named as Volpe Center Director

In September 2009, Robert C. Johns was named the new director of the Volpe Center. Mr. Johns had previously served, since 2001, as director of the Center for Transportation Studies (CTS) at the University of Minnesota. During Mr. Johns’ tenure at CTS, he more than doubled the revenue attracted to the University of Minnesota for transportation research, education, and outreach, and led CTS to the top echelon of university transportation centers in the United States.

Prior to joining the University of Minnesota in 1988, Mr. Johns held research and management positions with the Santa Fe Railway, the Minnesota Department of Transportation, and the Metropolitan Council of the Twin Cities. Mr. Johns also has over 20 years of experience in leading Transportation Research Board (TRB) committees and is currently chair of the Technical Activities Council, which oversees the 200 technical committees at TRB. He received a bachelor of science in engineering operations from Iowa State University and an MBA and master’s degree from the University of Iowa.

“Bob Johns stood out as a leader who brings a strong combination of deep transportation knowledge, research experience, management skills, and extensive ties within the national and global transportation communities. He brings entrepreneurial leadership in building multimodal and interdisciplinary research programs along with his strong management and organizational development expertise,” said Peter H. Appel, administrator of U.S. DOT’s Research and Innovative Technology Administration (RITA).



Dr. Robert Bertini, standing at center, with new Volpe Center employees: Angel Williams, Arlen Spiro, Jennifer Michaels, Kent Hymel, Paul Minnice, Ken Miller, and Garrett Hagemann, all currently working in the Multimodal Systems Research and Analysis COI.

## Volpe Workforce Ready for Tomorrow's Challenges

The Volpe Center closed the fiscal year with the largest increase in technical staff in several years. Over 55 new team members were hired, with more than 40 filling technical positions. The Federal Career Intern Program was instrumental in attracting new junior-level staff from 30 different colleges and universities in a range of technical disciplines spanning economics, community planning, operations research analysis, information technology, and aerospace, civil, and mechanical engineering. In addition, the Volpe Center continued its robust Student Co-op Employment program, with over 25 new hires in 2009.

## Volpe Workload Grows as Overhead Is Reduced in Fiscal Year 2009

In 2009, the Volpe Center received over \$242 million in NOA funding from its sponsors, representing the second-largest amount of annual new work in its history.

In addition, the Center's indirect project- and acquisition-overhead rates both came in well below the provisional rate established at the start of the fiscal year. In total, the Center's indirect costs accounted for only 15 percent of its total obligations. As a result of these decreased overhead rates, the Center is returning just under \$4 million to customer projects. In most cases, projects can use these returned funds for ongoing work at the Center.

## Excellence in Acquisition

The Volpe Center is a recognized leader in acquisition innovation, with a proven track record of a commitment to excellence. During fiscal year 2009, the Volpe Center obligated \$184 million, representing 1,400 procurement transactions. This noteworthy accomplishment represents the highest amount of contract dollars obligated during the past several years. Of significant importance is the four-year, \$68 million task order competitively awarded to a new major onsite contractor providing transportation research analysis and communication services. The contractor transition was successfully completed with minimal disruption to ongoing Volpe Center projects. Another key milestone was formal acceptance of all 33-microwave radio communication sites in Iraq, which marked completion of the Iraqi Republic Railways Digital Microwave Radio Communications Network, a three-year project valued at \$41.4 million.

The Volpe Center's robust acquisitions workforce certification program made great strides in implementing the new government-wide training and certification requirements for Contracting Officer Technical Representatives (COTRs). Of the 81 Volpe Center COTR applicants for whom information was submitted to DOT Headquarters for approval, 75 percent have received certification. The Volpe Center has assembled a highly skilled, responsive, and responsible team of acquisitions professionals with experience in executing and managing large, multifaceted procurements to fulfill technical requirements across a wide spectrum, using a variety of procurement methodologies and business process innovations.

## New Brochure: “How to Start Work” with the Volpe Center

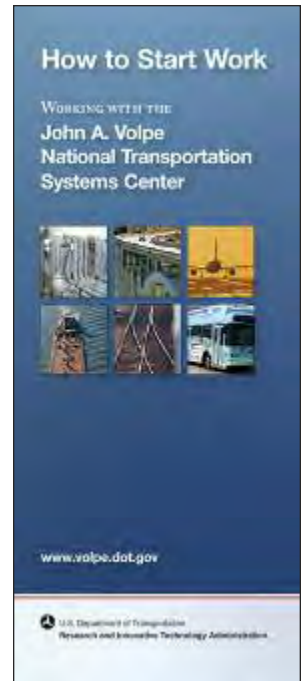
The Volpe Center now offers an online guide for agencies interested in initiating projects with the Center. “How to Start Work” provides information to Federal, State, local, and international agencies who are interested in engaging a multidisciplinary team with expertise in transportation and logistics initiatives that advance the nation’s transportation system. The guide is tailored to address the needs of different agencies: it includes a question-and-answer section and lists contacts for specific inquiries. The link <http://www.volpe.dot.gov/withus/start.html> provides more detailed information and a downloadable brochure.

## Small Business Innovation Research Program Recognizes Innovation and Initiates Web Portal

The Small Business Innovation Research (SBIR) program is a highly competitive program that encourages small businesses to explore their technological potential and provides them with the incentive to profit from commercialization. By including qualified small businesses in the nation’s research and development (R&D) arena, high-tech innovation is stimulated and the United States gains entrepreneurial spirit as it meets its specific R&D needs.

This year, U.S. DOT’s SBIR Program Office at the Volpe Center launched the Commercialization Assistance Program (CAP), a customized market and technology research portal featuring a variety of tools to assist SBIR contract awardees as they move through the R&D phase to reach market commercialization. Some portal resources also can be made available to those considering submitting proposals to the SBIR program. Next year, the SBIR Program Office will introduce a redesigned website that provides guidance to both small businesses and Federal researchers.

The Volpe Center conducts two SBIR program solicitations a year, inviting small businesses to submit research proposals that address high-priority goals within U.S. DOT. The current solicitation has identified 14 research topics, including human factors for NextGen, low-cost detection technologies for rail grade crossings, driver-behavior and crash-avoidance monitoring systems for vehicles, and development of a comprehensive signal analysis tool and radio-frequency ID licensing systems for motor vehicles.



New brochure:  
“How to Start Work”  
with the Volpe Center.

## Volpe Go Green Initiatives Underway on Campus

The Volpe Center recently achieved a number of green initiatives, particularly in energy efficiency and recycling. The Volpe Center Green Team has fostered a culture of recycling and reuse through information campaigns; installation of recycling receptacles in hallways, conference rooms, and common areas; and a campus-wide clean-up event.



The “fruits” of the Volpe Center staff labors at the May 2008 campus-wide clean-up day.

Last year, the Volpe Center’s recycling rate for paper, plastic, glass, and aluminum increased from 2 percent to over 40 percent. This figure translates to the diversion of more than 60 tons of total recyclables from landfills. It also represents 900 trees saved, conservation of 370,000 gallons of water, and a reduction of 185 metric tons of CO<sub>2</sub> emissions—the equivalent of emissions from 42 automobiles.

Recently, the Green Team began an effort to compost yard waste and recycle “hard to-recycle” items, such as recordable media and computer peripherals. The team is also conducting a comprehensive waste audit to identify additional waste reduction opportunities and to provide training to Facilities staff and contractors.

The Volpe Center also brought in NSTAR to perform an energy audit identifying additional opportunities for energy conservation. While NSTAR’s audit team determined that the Volpe Center’s energy consumption is better than that of 75 percent of contemporary buildings, it also gave many recommendations to further improve its energy conservation.

The Green Team is also pursuing a rigorous environmental performance improvement process through the U.S. Green Building Council (USGBC). The Volpe Center has registered for certification in USGBC’s Leadership in Energy and Environmental Design (LEED) for excellence in operations and maintenance. LEED is a third-party certification program and is the nationally accepted benchmark for the design, construction, and operation of high-performance green buildings. LEED certification requirements will help the Volpe Center to meet and exceed Federal facility requirements. This will mean attaining an ENERGY STAR building/campus rating of 65, reducing potable water consumption by 20 percent, and recycling at least 50 percent of consumable materials.

Before the Volpe Center can apply for LEED certification, much work must be done to incorporate the best green practices for facilities management, ranging from indoor air quality practices to procurement practices benefiting the environment. Full implementation is well ahead of the 2015 deadline mandated by the Federal government.





ESL volunteers from the Kendall Square Learning Project have taught many students during the past 18 years.

### Kendall Square Learning Project: A Grassroots Success Story

The Kendall Square Learning Project (KSLP) began its 18th year in September, with volunteers from the Volpe Center community offering classes in English as a Second Language (ESL) at no cost to students. The students come to the Center two evenings every week to develop their English-language and life skills. During class, they might decipher idioms from a newspaper, review the process for paying bills, or share a student-authored essay.

Since its inception as a nonprofit in 1992, KSLP has engaged over 60 volunteers from the Volpe Center community and the Greater Boston area. The program has reached over 400 students, representing five continents and a spectrum of occupational backgrounds that range from engineering to biology to accounting. To learn more about the program or to get involved, visit <http://kslp.volpe.dot.gov>.



Career Day Open House participants find out more about a current Volpe Center project.

### Volpe Hosts Career Day Open House for New England Community

In February, the Volpe Center hosted a Career Day Open House promoting student co-op and internship opportunities as well as entry- and professional-level positions. Volpe Center team members from throughout the COIs were on hand to speak to prospective applicants and to give demonstrations of their work showing how the Center's diverse portfolio supports U.S. DOT strategic goals. The event was a huge success, with over 80 visitors in attendance.

### Building Partnerships to Educate and Empower

Showing children what a parent or mentor does during the workday can be life-altering, especially when the value of their education can be demonstrated in relation to a job. The experience provides them with an opportunity to envision their future and what it might be like to become a professional in the area of transportation.



Children of Volpe Center employees pause for a picture during Take Our Sons and Daughters to Work Day. They had a fun day at the Center learning about the exciting transportation work their parents do.

The Volpe Center welcomed over 35 children and relatives of Volpe Center team members, DOT Regional Offices, and contractors to the 2009 Take Our Daughters and Sons to Work® program. This year's theme was Building Partnerships to Educate and Empower. The Volpe Center technical team partnered with the Center's Equal Employment Opportunity (EEO) manager to give the children an exciting day.

This year's program was designed to extend beyond the usual job-shadowing of parents. In the morning, the children saw two presentations: one on the Enhanced Traffic Management System, called "Watch the Traffic in the Sky," and another on the Libby Asbestos Project. During the afternoon, the children participated in an interactive presentation on the environment, entitled "What Did Earth Day Mean to Me?." They also engaged in several simulator exercises, such as "I'll fly a plane!," "I'll operate a locomotive!," and "I'll drive a car on a runway!."

## Students from Summer Transportation Institutes Visit Volpe Center

The Volpe Center and the Federal Highway Administration (FHWA) co-hosted high-school students who are part of the Summer Transportation Institute (STI) programs at Merrimack College and the University of Massachusetts–Boston and Amherst. STI is a four-week intensive program sponsored by U.S. DOT, Massachusetts Highway Department, and Merrimack College. The Institute helps to develop a diverse and robust workforce for the transportation industry by exposing tenth-, eleventh-, and twelfth-grade students to transportation careers. Students toured the Human Factors Laboratory, participated in an interactive presentation on human factors in transportation, viewed a demonstration on air traffic flow management, and heard about job opportunities with the Federal government.



Summer Transportation Institutes student testing the Airport Surface Low-Cost Driving Simulator in the Volpe Center's Human Factors Laboratory.

## A Tradition of Charitable Giving

### Volpe Continues Proud Tradition: The Combined Federal Campaign

The Volpe Center continued its proud tradition of being a major contributor to the Combined Federal Campaign (CFC). CFC is the world's largest and most successful annual workplace charity campaign, with more than 300 campaigns throughout the United States and abroad helping to raise millions of dollars. These funds support eligible nonprofit organizations that provide health and human service benefits. CFC's mission is to promote and support philanthropy.

The Volpe Center's 2009 campaign theme was 500 Reasons to Give. "There are 500 Federal employees working at the Volpe Center, and we each have our own reason to give," said Director Robert Johns. During a kickoff event, the Volpe Center opened its doors to 13 Boston-area charities. Representatives from the Carroll Center for the Blind, the Posse Foundation, Outdoor Explorations, and Silent Spring Institute addressed the Volpe community. They provided compelling stories about how compassion, either in the form of a CFC donation or volunteer time, can profoundly impact people's lives. The Volpe Center is a leader in the Massachusetts Bay area, winning a CFC Hall of Fame award for outstanding Center-wide participation and contributions.

### Volpe Supports Feds Feed Families

The Volpe Center participated in a new Federal-community initiative launched this year. Feds Feed Families is a national, government-wide effort that the Office of Personnel Management leads in partnership with the Chief Human Capital Officers Council. The program was initiated at a time when our nation's food pantries needed unprecedented support. Stock was diminishing at an alarming rate, and pantries were facing severe shortages of nonperishable items.

Feds Feed Families had the goal of collecting one million pounds of food. Federal employees were encouraged to donate five pounds of food items through a summer food drive. By September 1, over 350,000 pounds of food had been collected nationwide for food pantries.

The Volpe Center gave generously, donating 474 pounds of food to Cambridge's Margaret Fuller Neighborhood House, a nonprofit organization providing services to over 1,500 children, youths, families, and other individuals each year.

The East End House received the Volpe Center's second round of donations. Center employees donated 190 pounds of nonperishable foods and baby items to the multiservice community center and social service agency in Cambridge.

For its final round of donations, the Center donated 170 pounds of food to the Food for Free Committee, Inc., a local nonprofit addressing hunger by salvaging fresh food that might otherwise go to waste, then distributing it to reach those in need. Food for Free also provides food through monthly home deliveries to low-income seniors and people with disabilities. Through the Field of Greens program, Food for Free also distributes organic vegetables to emergency food programs.

## Part of a Global Community

### Volpe Joins Earth Hour's Call to Action on Climate Change



Volpe Center joins Earth Hour's Call to Action on Climate Change.

Boston Mayor Thomas Menino invited the Volpe Center to help raise awareness about climate change. In turn, the Volpe Center asked employees to turn off all nonessential lighting and to power down their offices before they left work on the eve of Earth Hour 2009. Earth Hour is an international climate-change-awareness campaign organized by the World Wildlife Fund. The campaign asked individuals, businesses, governments, and communities to turn off their lights between 8:30 and 9:30 p.m. on March 28 to demonstrate their concern about global warming.

Earth Hour's global wave of participation comprised 2,838 cities and towns in 83 countries across all seven continents. It included 829 icons and landmarks, among them the Empire State Building in New York City, the Golden Gate Bridge in San Francisco, the Bird Nest and Water Cube in Beijing, the Opera House in Sydney, the Arc de Triomphe in Paris, and the Petronas Towers in Kuala Lumpur.

The Volpe Center community was proud to join others around the world, from small island nations of the South Pacific to densely populated cities of the Americas, in a moment of global solidarity, to make an important statement about the future of the planet.



## MassRecycle Names Volpe Center 2009 Institution Green Binnie Award Winner

The Volpe Center received a 2009 Green Binnie Award from MassRecycle, the Massachusetts Recycling Coalition. The award acknowledges individuals and organizations for outstanding contributions to recycling in the State. Recipients were honored at MassRecycle's 20th Anniversary Celebration and Annual Recycling Awards in November.

The Volpe Center was recognized for developing a comprehensive program that has increased its waste-diversion rate from 4 percent to 67 percent since 2006. The program started on a small scale, with white office paper, toner cartridges, computers, and monitors, and has expanded over the years to include mixed paper, cardboard, CDs and DVDs, batteries, furniture, and construction and demolition waste. In 2008, the Center began composting yard debris for eventual return to planting beds.

Reuse has also become an integral part of the Volpe Center's operations. Office supplies are collected and redistributed as needed. In 2008, the Center donated five tons of items to local charities. All payroll and timesheet paperwork is now electronic. This year, Volpe Center Green Team members conducted a "dumpster dive," examining one day's worth of trash to determine future areas for improving waste reduction. Benefits from the waste diversion are impressive: estimates for 2008 and 2009 are that the Volpe Center saved \$7,100 from recycling, diverted 132 tons of waste from landfills, and prevented 1,318 trees from being cut down.

## City of Cambridge Recognizes Volpe Contributions

The City of Cambridge named the Volpe Center as the Go Green winner in the large-business category for waste reduction in 2009. As part of its Go Green Month Celebration each May, the City recognizes local businesses and institutions for outstanding environmental efforts through its Go Green Business Awards, in categories including city employee, climate change, community sustainability, energy, stormwater management, and waste reduction and recycling. If the Center achieves a 70 percent recycling goal in the future, the facility will rank with the top 1 percent of those nationwide that are achieving this goal. Put in perspective, only one city in the United States has a recycling rate of 70 percent.



Volpe Center recycling program logo.



2009-2010

## John A. Volpe Transportation Internship Recipient

The John A. Volpe Transportation Internship, named in honor of the second U.S. Secretary of Transportation, provides tuition reimbursement and paid work opportunities at the Volpe Center to selected outstanding graduate students in the engineering, scientific, and social science disciplines who have expressed a strong interest in working in the field of transportation.

Gabriel López-Bernal is the recipient of the 2009–2010 John A. Volpe Transportation Internship. Mr. López-Bernal is currently pursuing a master's degree in urban and environmental policy and planning with a concentration in regional planning, transportation, and land-use issues at Tufts University. He holds a bachelor's degree in civil engineering from the University of Florida in Gainesville.

Since February 2009, Mr. López-Bernal has worked as a student trainee (community planner) in the Multimodal Systems Research and Analysis Center of Innovation at the Volpe Center, where he has contributed to a wide range of projects, including the SafeTrip 21 program; the Cape Cod, Fort McHenry, and New Bedford National Park studies; and the Federal Highway Administration's Surface Transportation Environment and Planning (STEP) Cooperative Research Program.



Gabriel López-Bernal, recipient of the 2009-2010 John A. Volpe Transportation Internship, standing in front of a photograph of John A. Volpe, the second U.S. Secretary of Transportation.



## 2009 Published and Presented

Barami, Bahar. 2009. "The Logistics of Global Security." **44th Annual Conference of the International Society of Logistics (SOLE)**, Dallas, Texas, Aug. 19, 2009.

Barr, Lawrence; Popkin, Stephen; and Heidi Howarth. 2009. "**An Evaluation of Emerging Driver Fatigue Detection Measures and Technologies.**" FMCSA-RRR-09-005, June 2009. [http://www.fmcsa.dot.gov/facts-research/research-technology/report/Emerging\\_Detection\\_Measures\\_508.pdf](http://www.fmcsa.dot.gov/facts-research/research-technology/report/Emerging_Detection_Measures_508.pdf)

Bien-Aimé, Patrick. 2009. "**North Carolina 'Sealed Corridor' Phase I, II, and III Assessment.**" DOT-VNTSC-FRA-09-08; DOT/FRA/ORD-09/17, Oct. 2009. <http://www.fra.dot.gov/downloads/Research/ord0917.pdf>

Boeker, Eric. 2009. "The Effects of Behind Start of Take-off Roll Modeling in INM and AEDT: A Case Study." **Inter-Noise 2009 Conference**, Ottawa, Ontario, Canada, Aug. 24–27, 2009.

Brecher, Aviva; Brewer, John; Summers, Stephanie; and Sanjay Patel. 2009. "Characterizing and Enhancing the Safety of Future Plastic and Composite Intensive Vehicles (PCIVs)." **21st International Conference on the Enhanced Safety of Vehicles**, Stuttgart, Germany, June 15–17, 2009. <http://www-nrd.nhtsa.dot.gov/pdf/esv/esv21/09-0316.pdf>

Bürki-Cohen, Judith; Sparko, Andrea; Jo, Young Jin; and Tiau Go. 2009. "Effects of Visual, Sear, and Platform Motion During Flight Simulator Air Transport Pilot Training and Evaluation." **15th International Symposium of Aviation Psychology**, Dayton, Ohio, April 28–30, 2009.

Carolan, Michael, and Michelle Muhlander. 2009. "Strategy for Alternative Occupant Volume Testing." **ASME 2009 Rail Transportation Division Fall Conference**, Fort Worth, Texas, Oct. 20–21, 2009. RTDF2009-18025.

Carroll, AA, and Marsha Haines. 2009. **2003 Highway-Rail Grade Crossing Safety Research Needs Workshop. Volume I: Summary of Results.** April 2009. DOT-VNTSC-FRA-07-07. <http://www.fra.dot.gov/downloads/research/ord0909-I.pdf>

Carroll, AA, and Marsha Haines. 2009. **2003 Highway-Rail Grade Crossing Safety Research Needs Workshop. Volume II: Appendices.** April 2009. DOT-VNTSC-FRA-07-07. <http://www.fra.dot.gov/downloads/research/ord0909-II.pdf>

Chandra, Divya. 2009. "Review of Safety Reports Involving Electronic Flight Bags." **15th International Symposium of Aviation Psychology**, Dayton, Ohio, April 28–30, 2009. <http://www.volpe.dot.gov/hf/docs/efbisap.pdf>

Chandra, Divya. 2009. "Utility and Recognition of Lines and Linear Patterns on Electronic Displays Depicting Aeronautical Charting Information." **15th International Symposium of Aviation Psychology**, Dayton, Ohio, April 28–30, 2009. <http://www.volpe.dot.gov/hf/docs/isap.pdf>

Chandra, Divya. 2009. **“Utility and Recognition of Lines and Linear Patterns on Electronic Displays Depicting Aeronautical Charting Information.”** Jan. 2009. DOT-VNTSC-FAA-09-03. <http://www.volpe.dot.gov/hf/docs/lalpr09.pdf>

daSilva, Marco; Ayres, Greg; and Wassim Najm. 2009. **“Crash Problem Definition and Safety Benefits Methodology for Stability Control for Single-Unit Medium and Heavy Trucks and Large-Platform Buses.”** Oct. 2009. HS811 099. <http://www.nhtsa.dot.gov/staticfiles/DOT/NHTSA/NRD/Multimedia/PDFs/Crash%20Avoidance/2009/811099.pdf>

Donohoe, Caroline. 2009. **“Low Cost Simulator Applications for the Airport Environment.” Aviation Human Factors and Safety Management Systems Conference: Real-World Flight Operations and Research**, Dallas, Texas, March 31–April 1, 2009.

Doran, Neslihan, and Jordan Multer. 2009. **“Field Evaluation of a Wireless Handheld Computer for Railroad Roadway Workers.”** Jan. 2009. DOT-VNTSC-FRA-08-05; DOT/FRA/ORD-09/02. <http://www.volpe.dot.gov/hf/docs/feoawhcfrrw.pdf>

Fleming, Gregg, et al. 2009. **“Impact of the Reduced Vertical Separation Minimum on the Domestic United States.”** *Journal of Aircraft*, 46(1)148-156, 2009. [http://www.volpe.dot.gov/air/docs/vert\\_sep.pdf](http://www.volpe.dot.gov/air/docs/vert_sep.pdf)

Gil, Monica; Multer, Jordan; and Michelle Yeh. 2009. **“Effects of Active Warning Reliability on Motorist Compliance at Highway-Railroad Grade Crossings.”** Nov. 2007. DOT-VNTSC-FRA-09-04; DOT/FRA/ORD-09/06. <http://www.fra.dot.gov/downloads/Research/ord0906.pdf>

Gilbo, Eugene, and Scott Smith. 2009. **“Probabilistic Prediction of Aggregate Traffic Demand Using Uncertainty in Individual Flight Predictions.”** *AIAA Conference on Guidance, Navigation, and Control*, Chicago, Aug. 10–13, 2009.

Hall, Timothy. 2009. **“Colorado Wide Area Multilateration (WAM) Separations Standards Targets of Opportunity and Flight Test Analysis.”** *28th Digital Avionics Systems Conference (DASC)*, Orlando, Florida, Oct. 25–29, 2009.

Hall, Timothy. 2009. **“Synthetic Mathematical Thought.”** *2009 Joint Mathematics Meeting Conference*, Washington, DC, Jan. 7, 2009.

Hellman, Adrian, and Tashi Ngamdung. 2009. **“Illinois High-Speed Rail Four-Quadrant Gate Reliability Assessment.”** Oct. 2009. DOT-VNTSC-FRA-09-07; DOT/FRA/ORD-09/19. <http://www.fra.dot.gov/downloads/Research/ord0919.pdf>

Horton, Suzanne; Carroll, Anya; Chaudhary, Mina; Ngamdung, Tashi; Mozenter, Jonathan; and David Skinner. 2009. **“Success Factors in the Reduction of Highway-Rail Grade Crossing Incidents from 1994 to 2003.”** DOT-VNTSC-FRA-09-01; DOT/FRA/ORD-09/05. <http://www.fra.dot.gov/downloads/Research/ord0905.pdf>

Howarth, Heidi; Di Domenico, Tara; Barr, Lawrence; Popkin, Stephen; and Kevin Green. 2009. **“Assessment of a Drowsy Driver Warning System for Heavy-Vehicle Drivers Part II: Driver Acceptance, Fleet Management and Deployment.”** April 2009. DOT HS 811 117. <http://www.nhtsa.dot.gov/staticfiles/DOT/NHTSA/NRD/Multimedia/PDFs/Crash%20Avoidance/2009/811117.pdf>

Jeong, David, and Jeffrey Gordon. 2009. **“Evaluation of Rail Test Frequencies Using Risk Analysis.”** **ASME Joint Rail Conference**, Pueblo, Colorado, March 2–5, 2009. JRC2009-63009. <http://www.volpe.dot.gov/sdd/docs/2009/09-63009.pdf>

Jeong, David; Tyrell, David; Carolan, Michael; and A.B. Perlman. 2009. “Improved Tank Car Design Development: Ongoing Studies on Sandwich Structures.” **ASME Joint Rail Conference**, Pueblo, Colorado, March 2–5, 2009. JRC2009-63025. <http://www.volpe.dot.gov/sdd/docs/2009/09-63025.pdf>

Jeong, David; McKeighan, P.C.; and J.W. Cardinal. 2009. “Mechanical Properties of Tank Car Steels Retired from the Fleet.” **ASME Joint Rail Conference**, Pueblo, Colorado, March 3–5, 2009. JRC2009-63060. <http://www.volpe.dot.gov/sdd/docs/2009/09-63060.pdf>

Lappin, J.E. 2009. “End User Needs and Values.” **88th Annual Meeting of the Transportation Research Board**, Washington, DC, Jan. 11–15, 2009. (P09-1710)

Lee, Cynthia. 2009. “Overview of On-going Federal Aviation Administration and National Park Service Collaborative Research Efforts in Support of the National Parks Air Tour Management Act.” **157th Meeting of the Acoustical Society of America**, Portland, Oregon, May 19–21, 2009.

Lee, D.B. 2009. “Benefits and Unintended Impacts in Benefit-Cost Analysis Accounting.” **88th Annual Meeting of the Transportation Research Board**, Washington, DC, Jan. 11–15, 2009. (P09-0682)

Lee, H.S-H. 2009. **“The Aerodynamic Effects of Passing Trains to Surrounding Objects and People.”** April 2009. DOT-VNTSC-FRA-04-05; DOT/FRA/ORD-09/07. <http://www.fra.dot.gov/downloads/research/ord0907.pdf>

Lee, M.T., and Jordan Multer. 2009. **“Visualizing Railroad Operations: A Tool for Planning and Monitoring Railroad Traffic.”** Jan. 2009, DOT-VNTSC-FRA-08-04; DOT/FRA/ORD-09/01. <http://www.volpe.dot.gov/hf/docs/vroatfprt.pdf>

Llana, Patricia. 2009. “Structural Crashworthiness Standards Comparison: Grade Crossing Collision Scenarios.” **ASME 2009 Rail Transportation Division Fall Conference**, Fort Worth, Texas, Oct. 20–21, 2009, RTDF2009-18030.

Llana, Patricia; Rancatore, Bob; Van Ingen-Dunn, Caroline; and Chris Bradley. 2009. **“Occupant Protection Experiments in Support of a Full-Scale Train-to-Train Crash Energy Management Equipment Collision Test.”** July 2009. DOT-VNTSC-FRA-09-06; DOT/FRA/ORD-09/14. <http://www.fra.dot.gov/downloads/Research/ord0914.pdf>

- Lyons, Matthew; Jeong, David; and Jeffrey Gordon. 2009. "Fracture Mechanics Approach to Estimate Rail Wear Limits." **ASME 2009 Rail Transportation Division Fall Conference**, Fort Worth, Texas, Oct. 20–21, 2009. RTDF2009-18035.
- Lyons, William. 2009. "Integrated Approaches to Regional Transportation Planning: Applications of Performance Measures for Sustainability in the U.S." **Sustainable Transportation Performance Measures in the U.S. and Europe Seminar**, Copenhagen, May 20, 2009.
- Marquis, Brian, et al. 2009. "A Nonlinear Rail Vehicle Dynamics Computer Program SAMS/Rail Part 1: Theory and Formulations." **ASME Joint Rail Conference**, Pueblo, Colorado, March 2–5, 2009. JRC2009-63045.
- Marquis, Brian, et al. 2009. "A Nonlinear Rail Vehicle Dynamics Computer Program SAMS/Rail Part 2: Validation of BETA Release." **ASME Joint Rail Conference**, Pueblo, Colorado, March 2–5, 2009. JRC2009-63044.
- Marquis, Brian, et al. 2009. "A Nonlinear Rail Vehicle Dynamics Computer Program SAMS/Rail Part 3: Application to Predict Railroad Vehicle–Track Interaction Performance." **ASME Joint Rail Conference**, Pueblo, Colorado, March 2–5, 2009. JRC2009-63046.
- McGovern, Seamus. 2009. "Capacity Improvement Analytical Tools and Benchmark Development for Terminal Operations." **28th Digital Avionics Systems Conference**, Orlando, Florida, Oct. 25–27, 2009.
- McGovern, Seamus. 2009. "Stochastic Airspace Simulation Tool Development." **28th Digital Avionics Systems Conference**, Orlando, Florida, Oct. 25–27, 2009.
- Mokkapati, Chimmarao; Tse, Terry; and Alan Rao. 2009. **A Practical Risk Assessment Methodology for Safety-Critical Train Control Systems**, July 2009. DOT/FRA/ORD-09/15; DOT/FRA/RDV-09-01. <http://www.fra.dot.gov/downloads/research/ord0915.pdf>
- Muhlander, Michelle; Tyrell, David; and Patricia Llana. 2009. "Dynamic and Quasi-Static Grade Crossing Collision Tests." **ASME Joint Rail Conference**, Pueblo, Colorado, March 2–5, 2009. JRC2009-63035. <http://www.volpe.dot.gov/sdd/docs/2009/09-63035.pdf>
- Najm, Wassim, and A.M. Eigen. 2009. "Detailed Analysis of Target Crashes for Pre-crash Sensing Applications." **21st International Conference on the Enhanced Safety of Vehicles**, Stuttgart, Germany, June 15–17, 2009. <http://www-nrd.nhtsa.dot.gov/pdf/esv/esv21/09-0248.pdf>
- Najm, Wassim, and A.M. Eigen. 2009. "Prioritization of Crash Scenarios for Pre-crash Sensing Applications." **SAE World Congress and Exhibition**, Detroit, April 20–23, 2009. SAE paper 2009-01-1248.
- Pickrell, D.H. 2009. "Vehicle Miles Traveled 101: What Is VMT? How Is It Measured? What Are the Sources?" **88th Annual Meeting of the Transportation Research Board**, Washington, DC, Jan. 11–15, 2009. (P09-0551)
- Poe, Carson. 2009. "Business Models for Implementing Geospatial Technologies in Transportation Decision-Making." **AASHTO Annual Geospatial Information Systems for Transportation Symposium**, Oklahoma City, Oklahoma, April 7–8, 2009.



- Poe, Carson, and Stephen Earsom. 2009. **“Carbon Sequestration Pilot Program: Implementation and Next Steps.”** Progress report, Feb. 2009. [http://climate.dot.gov/documents/FINAL\\_C-Seq\\_Report\\_021109.pdf](http://climate.dot.gov/documents/FINAL_C-Seq_Report_021109.pdf)
- Rainville, Lydia; Hsu, Victoria; and Sean Peirce. 2009. **“Electronic Fare Collection Options for Commuter Railroads.”** Sept. 2009. FTA-MA-26-7109-2009.01. <http://www.fta.dot.gov/documents/ElectronicFareCollectionOptionsforCommuterRailroads.pdf>
- Raposa, Amanda. 2009. “Analysis of Ambient Data Measured in the National Parks Under High-Wind Conditions.” **Inter-Noise 2009 Conference**, Ottawa, Ontario, Canada, Aug. 24–27, 2009.
- Rasmussen, Ben; Peirce, Sean; and W.M. Lyons. 2009. **“Action Strategy Paper: Inter-regional Transportation Planning.”** Prepared for the Chicago Metropolitan Agency for Planning, June 2009. <http://www.goto2040.org/ideazone/default.aspx?id=16302>
- Read, David. 2009. “Atmospheric Layering.” **Working Group 1 (Aircraft Noise) of the ICAO’s Committee for Environmental Protection.** Paris, April 28–30, 2009.
- Read, David. 2009. “Guidance Material on the Calculation of EPNL (Effective Perceived Noise Level).” **Working Group 1 (Aircraft Noise) of the ICAO’s Committee for Environmental Protection**, Paris, April 28–30, 2009.
- Read, David. 2009. “Miscellaneous Editorial and Technical Changes to Annex 16 Appendix 2.” **Working Group 1 (Aircraft Noise) of the ICAO’s Committee for Environmental Protection**, Paris, April 28–30, 2009.
- Rochat, J.L., and Aaron Hastings. 2009. “Investigating Use of OBSI Data to Implement Pavement Effects in FHWA Traffic Noise Model.” **88th Annual Meeting of the Transportation Research Board**, Washington, DC, Jan. 11–15, 2009. (P09-0511)
- Rochat, Judith, and David Senzig. 2009. “Noise Benefits of Asphalt Pavements—Trends at Ages Up to 52 Months.” **Noise Control Engineering Journal**, 57(2):104–111, March 2009.
- Roof, Christopher. 2009. “Atmospheric Absorption Update.” **General Meeting of SAE Committee A-21 Aircraft Noise Measurement and Aircraft Noise/Aviation Emission Modeling**, Arlington, Virginia, March 17–19, 2009.
- Rossetti, Michael, and M.M. Johnsen. 2009. “Impact of Weather on Large Truck Crashes.” **88th Annual Meeting of the Transportation Research Board**, Washington, DC, Jan. 11–15, 2009. (P09-0502)
- Roth, Emilie, and Jordan Multer. 2009. **“Technology Implications of a Cognitive Task Analysis for Locomotive Engineers.”** Jan. 2009. DOT-VNTSC-FRA-08-06; DOT/FRA/ORD-09/03. <http://www.volpe.dot.gov/hf/docs/tiocrafle.pdf>
- Seliga, Thomas, and Timothy Hall. 2009. “Possible Enhancements of Airport Operations Based on Runway Visual Range Visibility Measurements.” **28th Digital Avionics Systems Conference (DASC)**, Orlando, Florida, Oct. 25–29, 2009.

Seliga, Thomas; Hazen, D.A.; and L. Salcedo. 2009. "Evaluation of Extinction Coefficient Algorithms for Optimizing Reported Visibility Conditions for Air Traffic Control Applications." **25th Conference on International Interactive Information and Processing Systems (IIPS) for Meteorology, Oceanography, and Hydrology**, Phoenix, Arizona, Jan. 10–16, 2009.

Senzig, David. 2009. "Fuel Consumption Modeling in Support of ATM Environmental Decision-Making." **Joint Meeting of FAA and EUROCONTROL on Air Traffic Management**, Napa, California, June 25–29, 2009.

Senzig, David . 2009. "New Fuel Consumption Methods in AEDT (Aviation Environmental Design Tool)." **General Meeting of SAE Committee A-21 (Aircraft Noise Measurement and Aircraft Noise/Aviation Emission Modeling)**, Arlington, Virginia, March 17–19, 2009.

Senzig, David; Fleming, Gregg; and Ralph Iovinelli. 2009. "Modeling of Terminal-Area Airplane Fuel Consumption." **Journal of Aircraft**, 46(4):1089–1093, July-Aug. 2009.

Sussmann, T.R., et al. 2009. "Estimation of Rail Stress from Real-Time Vertical Track Deflection Measurement." **ASME Joint Rail Conference**, Pueblo, Colorado, March 2–5, 2009. JRC2009-63050.

Sussmann, T.R., and Mario Ruel. 2009. "Turning Substructure Data into Information." **88th Annual Meeting of the Transportation Research Board**, Washington, DC, Jan. 11–15, 2009. (P09-1384)

Van Dyke, Karen. 2009. "National Positioning, Navigation, and Timing Architecture." **Institute of Navigation 2009 International Technical Meeting**, Anaheim, California, Jan. 26–28, 2009.

Volpe National Transportation Systems Center. 2009. "Global Positioning System (GPS) Civil Monitoring Performance Specification." April 2009. DOT-VNTSC-FAA-09-08. <http://pnt.gov/public/docs/2009/CMPS2009.pdf>

Wayson, Roger. 2009. "First Order Approximation (FOA) Development Update." **7th Annual Aviation Emissions Characterization Roadmap Meeting**, Washington, DC, June 9–10, 2009.

Wayson, Roger. 2009. "Adopting the Florida Department of Transportation Traffic Noise Model for Rail Noise." **88th Annual Meeting of the Transportation Research Board**, Washington, DC, Jan. 11–15, 2009. (P09-1152)

Yeh, Michelle, and Danielle Eon. 2009. "**Surface Moving Map Industry Survey**," Aug. 2009. DOT-VNTSC-FAA-09-15. SMM Industry Survey (added 10/19/09).

Yeh, Michelle; Multer, Jordan; and Thomas Raslear. 2009. "An Application of Signal Detection Theory for Understanding Driver Behavior at Highway-Rail Grade Crossings." **53rd Annual Meeting of the Human Factors and Ergonomics Society**, San Antonio, Texas, Oct. 19–23, 2009.

Zhang, Yan, and Seamus McGovern. 2009. "Mathematical Models for Human Pilot Maneuver in Aircraft Flight Simulation." **American Society of Mechanical Engineers International Mechanical Engineering Congress and Exhibition**, Lake Buena Vista, Florida, Nov. 13–19, 2009.

Zuschlag, Michael; Chandra, Divya; Hellenberg, John; and Stephen Estes. 2009. "Symbols for Cockpit Displays of Traffic Information." **28th Digital Avionics Systems Conference (DASC)**, Orlando, Florida, Oct. 25–29, 2009.

Zuschlag, Michael; Kendra, Andrew; Olson, Wes; and Bill Kaliardos. 2009. "Impact of Traffic Symbol Directional Cues on Pilot Performance During a Traffic Alert and Collision Avoidance System Event." **28th Digital Avionics Systems Conference (DASC)**, Orlando, Florida, Oct. 25–29, 2009.

# Thank You to Our 2009 Customers

## U.S. Department of Transportation

Federal Aviation Administration  
Federal Highway Administration  
Federal Motor Carrier Safety Administration  
Federal Railroad Administration  
Federal Transit Administration  
Maritime Administration  
National Highway Traffic Safety Administration  
Office of the Secretary of Transportation  
Pipeline and Hazardous Material  
Safety Administration  
Research and Innovative Technology  
Administration  
    ITS Joint Program Office  
    Transportation Safety Institute  
    Bureau of Transportation Statistics  
Saint Lawrence Seaway Development  
Corporation  
Surface Transportation Board

## Other Federal

Central Intelligence Agency  
Department of Agriculture  
Department of Commerce  
    National Oceanic and Atmospheric  
    Administration  
    National Institute of Standards  
    and Technology  
Department of Defense  
    U.S. Air Force  
    U.S. Army  
    U.S. Navy  
    U.S. Transportation Command  
Department of Homeland Security  
    Federal Emergency Management Agency  
    Transportation Security Administration  
    U.S. Coast Guard  
Department of the Interior  
    Bureau of Indian Affairs  
    Bureau of Land Management  
    National Park Service

## Department of Justice

Architecture and Transportation  
Barriers Compliance Board  
U.S. Access Board  
Environmental Protection Agency  
National Aeronautics and Space Administration  
U.S. Forest Service  
U.S. Postal Service

## State and Local

Chicago Metropolitan Agency for Planning  
Columbia River Pilots  
Massachusetts Bay Transportation Authority  
Massachusetts Port Authority  
New York State Department of Transportation  
New York State Thruway Authority  
Port Authority of New York and New Jersey  
State of Arizona  
Town of Southampton, New York

## Foreign Entities

United Kingdom  
    Defence Science and Technology  
    Laboratory  
    Ministry of Defence  
NAV Canada

## Other

American Concrete Pavement Association  
American Public Transportation Association  
American Trade Initiatives, Inc.  
Illingworth & Rodkin, Inc.  
INOVA Healthcare Services  
Maureen and Mike Mansfield Foundation  
University of Florida  
Wake Forest University Health Sciences  
Wyle Laboratories, Inc.

# U.S. DOT Secretary's Awards

## Volpe Center Recipients

### Secretary's Award for Excellence

Judith Bürki-Cohen  
Walter Zak

### Secretary's Award for Transportation Safety

Robert Adduci  
Karina Jacobson  
David Tyrell

### Secretary's Award for Outstanding Achievement in Equal Employment Opportunity/Affirmative Action

Atinuke (Tinu) Diver

### Secretary's Award for Partnering Excellence

Kevin Green  
Ryan Harrington  
Don Pickrell

### Secretary's Team Award

#### Maritime Safety and Security Information System Team

Kam Chin  
Rodney Cook  
McCharles Craven  
Bryan Long  
Jessica Montana  
Daniel Nim  
David Phinney  
Brendon Providence  
Henry Wychorski

# RITA Awards

## **Administrator's Award for Outstanding Achievement**

**Core Planning Team Member for the Distracted Driving Summit**

Stephen Popkin

## **Administrator's Leadership Award**

Judith Bürki-Cohen

## **Administrator's Award for Excellence in a Support Function**

Joseph Monaghan

## **Administrator's Team Award**

**Volpe Center Iraqi Railway Communication Project**

Orin Cook  
Glenn Goulet  
James Lamond  
Daniel Leone  
Felicia McBride  
Fred Mottley  
David Scali

## **Administrator's Rising S.T.A.R. (Striving to Advance RITA) Award**

Atinuke (Tinu) Diver

## **Administrator's Peer Award**

Elizabeth Leon  
Thomas Truong

## **2009 RITA Best Paper of the Year Award**

Eugene P. Gilbo and Scott B. Smith

For their exceptional paper "Probabilistic Prediction of Aggregate Traffic Demand Using Uncertainty in Individual Flight Predictions," in support of RITA's mission and the priorities of the U.S. Department of Transportation.

## **2009 RITA Best Presentation of the Year Award**

Carson Poe

For his exceptional presentation, "Business Models for Implementing Geospatial Technologies in Transportation Decision-Making," in support of RITA's mission and the priorities of the U.S. Department of Transportation.

## About RITA

The Research and Innovative Technology Administration (RITA) coordinates the U.S. Department of Transportation's (DOT's) research programs and is charged with advancing the deployment of cross-cutting technologies to improve our nation's transportation system. RITA was established by the Norman Y. Mineta Research and Special Programs Improvement Act of 2004 and brings together important data, research and technology transfer assets of the U.S. DOT, including:

- Bureau of Transportation Statistics (BTS)
- Intelligent Transportation Systems (ITS)
- National Transportation Library (NTL)
- Positioning, Navigation and Timing (PNT)
- Research, Development and Technology (RD&T)
- Transportation Safety Institute (TSI)
- University Transportation Centers (UTCs)
- John A. Volpe National Transportation Systems Center (Volpe Center)

## About the Volpe Center

An innovative, Federal, fee-for-service, Center of Excellence, the Volpe Center is a leader in global multimodal transportation innovation. Part of the U.S. DOT's RITA, the Volpe Center's mission is to improve the nation's transportation system. Since 1970, the Volpe Center has lent critical support to all of the U.S. DOT's modal administrations and offices, in addition to other Federal, state, local, and international agencies and entities and the private sector.



U.S. Department of Transportation  
**Research and Innovative Technology Administration**

**John A. Volpe National Transportation Systems Center**

**55 Broadway  
Cambridge, MA 02142-1093  
[www.volpe.dot.gov](http://www.volpe.dot.gov)**