

the  
**VOLPE**  
center

# Points of Pride

John A. Volpe National Transportation Systems Center  
FY 2006



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



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## Letter from the Director

*As we start another fiscal year at the Volpe Center, I commend all our employees for their contributions to our mission of improving the transportation enterprise. The Center's talented staff is dedicated to making a difference by identifying and enabling creative and practical responses to the full range of our customers' concerns.*

This compilation of Fiscal Year (FY) 2006 accomplishments illustrates the Volpe Center's vital role as a unique Federal resource within the U.S. Department of Transportation's (DOT) Research and Innovative Technology Administration (RITA). As a Federal entity, we have provided objectivity and a true understanding of our customers' missions. Often teaming with our customers, we are trusted advisors on long-term projects as well as rapid-response tasks, and we have shown that starting new work with us is straightforward.

With a systems perspective and awareness of relevant issues, we at the Volpe Center provide our customers with innovative solutions to transportation problems. Complementing our knowledge of the latest technologies and our ability to use these technologies creatively is our understanding of the social and economic factors that affect the transportation enterprise.

We are proud of all the projects we undertake at the Center, so selecting the Points of Pride presented here was not an easy task. These projects are only a small part of our overall portfolio, yet they exemplify our ability to offer pragmatic solutions and to respond to new or continuing requirements quickly.

Each accomplishment is aligned with the Department's strategic national transportation goals of safety; reduced congestion; global connectivity; environmental stewardship; security, preparedness and response; and organizational excellence. For the purpose of this document, activities are listed under one strategic area; however, many projects, programs, and initiatives benefit the objectives of more than one (DOT?) national goal. The Center is committed to helping its clients achieve these goals through safer, simpler, smarter transportation solutions.

The Volpe Center's many years of experience are a source of continuity, stability, and institutional memory for many long-term customers and a valuable resource for new ones. In June, the DOT Secretary and the RITA Administrator both attended a special ceremony at the Volpe Center to mark our 35th anniversary. Both speakers congratulated the Center on its long history of support to DOT and the innovative ways in which the Center has contributed to addressing pressing national transportation issues.

It is gratifying to realize that our employees' sense of commitment and public service extends beyond their official employment at the Center and that they are always willing to respond to the needs of others and to offer support to the local community. For example, with an 82 percent participation rate, the Volpe Center's 2005 Combined Federal Campaign raised over \$123,000.

The Volpe Center community is also involved in several educational outreach efforts where staff volunteer their time. The Kendall Square Learning Project is an after-hours program that provides classes in English as a Second Language (ESL) primarily to immigrants in the community; Volpe Center staff also participate in a volunteer reading program, Lunch Buddies, in collaboration with the nearby Kennedy-Longfellow School; other staff members participate in the tutor-mentor program and the Science Olympiad at the Cambridge Rindge and Latin High School; and another group takes part in the Reading for the Blind and Dyslexic program where they read and record books.

The Points of Pride described in this document epitomize the Volpe Center's tradition of providing outstanding support to the DOT, other organizations in the Executive Branch (other Federal, state, and local agencies, and some international entities), and the broader transportation community.

Curtis J. Tompkins

Director and RITA Associate Administrator



## Volpe Center Supports DOT Goals

# SAFETY

## Enhance public health and safety by working toward the elimination of transportation-related deaths and injuries

### AVIATION

#### Voice Enhanced Safety Logic

Safety remains FAA's number one priority and success story, with trends in both commercial and general aviation showing consistent improvement. One way that FAA addresses this priority is by continually working to improve runway safety. Airport surface safety systems such as the Airport Movement Area Safety System (AMASS) are used to provide an early warning to air traffic controllers of a possible runway accident. Currently, AMASS requires that one or both aircraft be moving before a warning will be issued. Often, one or both of the aircraft are moving at high rates of speed prior to the warning being issued. Consequently, the options available to FAA controllers to avoid an accident are limited.

To address these safety concerns, the Volpe Center, on behalf of FAA, has developed a concept called Voice Enhanced Safety Logic (VESL). VESL is a voice recognition tool that will monitor air traffic control frequencies for specific air traffic commands such as "cleared for takeoff" or "cleared to land." The voice recognition software will convert the voice command into information for the safety logic to identify a potential runway accident. Once a controller clears an aircraft for takeoff, the safety logic will designate the runway as "hot" prior to the aircraft moving. If any other aircraft/vehicle enters the "hot" runway or if a controller issues a takeoff clearance on an intersecting runway, an

alert will immediately be issued. Since this alert will sound prior to actual aircraft movement, the controller has a greater opportunity to avert a potential collision. *(Sponsored by DOT/FAA)*

#### Runway Status Lights System

Runway Status Lights (RWSL) will play a major part in reducing future runway incursions, which is FAA's current number one safety priority. The Volpe Center has been a key player for implementation of RWSL at the San Diego International Airport (SAN). RWSL is installed at critical airport runway intersections and will provide pilots with a red stoplight when a runway is occupied or in use. The lights are directly driven by airport surface radar and address a National Transportation Safety Board (NTSB) call for a positive indication of runway occupancy to air crews, independent of air traffic control.

The Volpe Center was an integral part of the FAA team to install and integrate the lights with airport surface radar and airport operations. In FY 2006, the Volpe Center improved the software and readiness of the system for Operational Evaluation. This evaluation of RWSL at SAN will start in October 2006. *(Sponsored by DOT/FAA)*

#### Airspace Simulation and Analysis Tool Capability Development

The Volpe Center is developing a Monte Carlo-based computer simulation capability to enable rigorous analysis and certification of terminal procedures, equipment, and airspace in the

National Airspace System (NAS) for the FAA Flight Standards Office. This simulation capability will play a critical role as FAA seeks to safely implement new terminal arrival procedures based on Automatic Dependent Surveillance-Broadcast (ADS-B) technology to meet the expected capacity gains anticipated for the Next Generation Air Transportation System. Unique elements of this capability are the stochastic (i.e., random but with known probability distributions) models of almost every component of the NAS—mechanical, electronic, and human—including navigation aids, surveillance systems, pilots, aircraft, air traffic controllers, and weather, combined with known, discrete artifacts such as runway size and configuration, and obstacles. Due to the complexity and aviation safety-critical nature of the simulation development effort, the Volpe Center consulted with FAA, industry, and Massachusetts Institute of Technology experts to plan it. *(Sponsored by DOT/FAA)*

### **Fire Life Safety Upgrades to the Honolulu International Airport Air Traffic Control Tower**

The Volpe Center, on behalf of FAA's Western Pacific Region, recently completed Fire Life Safety (FLS) upgrades at the Honolulu International Airport Air Traffic Control Tower (ATCT). These upgrades have significantly enhanced the occupational safety of air traffic controllers and other tower occupants in the event of fire emergency, through the hardening of emergency egress routes and the upgrading of fire detection and notification systems. ATCTs are unique structures whose type of occupancy and design does not match traditional building codes. The goal of this work was to bring the ATCT into compliance with an alternate Occupational Safety and Health Administration (OSHA) standard written specifically for ATCTs.

The Volpe Center handled all aspects of this "turnkey" projects from initial field surveys to identification of noncompliance issues, to design, including development of plans and specifications and on through to construction, and final compliance certification. The project was logistically complex and technically

challenging, requiring working in tight spaces under stringent (and often changing) work activity restrictions and security requirements aimed at minimizing adverse impacts to air traffic control operations. *(Sponsored by DOT/FAA)*

### **Aviation Safety Metrics**

One way that FAA can determine if the overall level of safety in the system is improving is by monitoring the magnitude of these errors over time. The Volpe Center is developing a method of measuring separation standard conformance that will provide FAA with a tool to monitor this aspect of system performance. In addition to measuring performance over time, this measure could also be used to assess the effects of changes (in equipment, procedures, etc.) in the National Airspace System. This project provides FAA with a measure that assesses the degree to which separation standards were violated as the result of controller error. Currently, air traffic controllers must keep airplanes a prescribed distance from each other. Occasionally, an error occurs and airplanes come closer together. FAA strives to minimize errors to the extent possible. *(Sponsored by DOT/FAA)*

### **Aircraft Wake Turbulence**

Flight restrictions intended to minimize wake turbulence encounter are major limitations to more intensive use of existing runways. To mitigate this limitation, FAA and NASA chose to address the restriction on the use of Closely Spaced Parallel Runways (CSPRs) (where centerlines are separated by less than 2500 feet) for approaches under reduced ceiling/visibility conditions. Only a single arrival stream is permitted, essentially halving CSPR capacity.

Lambert–St. Louis Airport (STL) was selected for evaluating a proposed procedure involving simultaneous approaches to both runways under reduced ceiling/visibility. The procedure is limited to large-class aircraft (e.g., Boeing 737). The Volpe Center conducted an extensive measurement program, beginning in the summer of 2003 and still continuing. Wakes have been measured at seven altitudes, using lidars (laser radar), sodars (acoustic radar), and arrays of

propeller anemometers. Volpe Center staff analyzed these data from both wake behavior and aircraft safety perspectives. Results of these analyses have been presented to sponsors at nine reviews, and refined results have been presented to regulatory and industry stakeholders.

Based largely on the Volpe Center's findings, a waiver to the CSPR approach rule was requested by FAA's STL Air Traffic Manager. Should the waiver be approved and the resulting operations prove beneficial, FAA Air Traffic Managers intend to implement the same procedure at other major U.S. airports that have CSPRS—e.g., Atlanta, Boston, and Newark. *(Sponsored by DOT/FAA)*

### **Runway Visual Range**

Airports having Instrument Landing Systems (ILS) require highly reliable means of monitoring visibility at critical locations near ILS-instrumented runways. This capability is automated using Runway Visual Range (RVR) systems that report values of RVR to controllers who then establish the category of flight conditions at the airport and communicate with pilots. For nearly two decades, the Volpe Center has provided RVR-related services to FAA consisting of scientific, engineering, and technical contributions as well as support in the procurement and operation of RVR systems.

RVR is determined based on a combination of measurements of atmospheric extinction coefficient, background luminance, and runway light conditions. The traditional means of obtaining extinction coefficient is via the transmissometer. Although fundamentally sound, transmissometers are less desirable for use at airports than sensors based on the more modern forward scatter technology, which require less space and are more easily maintained.

Approximately 12 years ago, the Volpe Center provided FAA with expertise that led to the replacement of transmissometers with approximately 1,000 forward scatter meters at all major airports in the NAS. These systems have proven highly reliable and cost-effective.

The Volpe Center is now working with FAA in developing and procuring a lower-cost forward scatter meter RVR system for deployment at new ILS installations. The Center hosted a six-month operational test of candidate RVR systems at the Otis Weather Test Facility (WTF) on Cape Cod, Massachusetts; conducted inspection visits to candidate vendors' facilities; and served as subject-matter expert on the proposal evaluation team. *(Sponsored by DOT/FAA)*

### **Aviation Safety Systems**

The Volpe Center is working closely with FAA aviation safety staff in performing ongoing analysis and developing information systems to enhance, expand, and integrate its aviation safety decision support systems. Aviation safety inspectors (ASIs) use the systems to organize and support their inspection activities of air operators, aircraft, air agencies, and air personnel.

The System Approach for Safety Oversight (SASO) Program, which is in the process of defining its requirements and design, will expand and integrate current functions, including major programs and initiatives that the Volpe Center supports. The SASO is a multiyear program aimed at redesigning the oversight processes of the FAA Flight Standards Service (AFS) and the U.S. aviation industry by implementing a comprehensive set of world-class system safety practices.

The functionality of the following aviation safety systems, developed by the Volpe Center, will be incorporated into the SASO:

- Safety Performance Analysis System (SPAS)—Accommodates inspectors' information needs by highlighting potential problem areas, using safety performance measures and providing timely, reliable access to existing data.
- Air Transportation Oversight System (ATOS)—Supports ASI surveillance of the major air carriers, enabling FAA to identify safety trends and to correct problems at their roots, thereby preventing accidents.
- Flight Standards Automation Subsystem (FSAS)—Compiles automated information systems used by the Flight Standards Service to

plan, record, and track aviation surveillance, certification, and other safety-related activities.

- Flight Standards Information Management System (FSIMS)—Provides FAA with a web-based electronic library of aviation-safety-related publications and a portal to other related documents. The new Electronic Handbook, currently being defined, will combine three inspector handbooks into one FSIMS-managed document.
- Enforcement Information System (EIS)—Maintains data on FAA enforcement actions against airlines, pilots, mechanics, designees, and other certificated aviation personnel and entities. The Volpe Center's key project goal is to migrate EIS from a mainframe environment into a readily accessible web-based FAA application.

*(Sponsored by DOT/FAA)*

## **RAIL**

### **Federal Railroad Administration R&D Evaluation**

The Volpe Center supported the FRA Office of Research and Development (R&D) to respond to recommendations from the Transportation Research Board (TRB) Committee for Review of the FRA R&D Program. The project focus, based on the Committee's recommendations, has been to provide a rational linkage between railroad safety data (i.e., fatalities and injuries) and the direction of FRA Safety R&D. To confirm this linkage, the Volpe Center efforts include assembling and analyzing rail safety data from FRA and other sources, developing rating techniques for FRA R&D projects, and providing the linkage between the data and the projects. This report captured FRA's R&D accomplishments in more than 12 areas, from System Safety to Crashworthiness Research. The Volpe Center led coordination with FRA and industry program managers.

In July and August 2006 meetings organized by the U.S. House's Transportation and Infrastructure Subcommittee on Railroads, the Volpe Center's role in supporting research and

training in safety related programs was appraised by speakers from FRA, the Association of American Railroads (AAR), and the United Transportation Union (UTU). These testimonies mentioned the Volpe Center by name six times and highlighted the Center's initiatives in the following areas:

- Reducing human factor-related accidents
- Developing the railroad industry's "close call" reporting database
- Improving track safety
- Improving HAZMAT transportation safety
- Improving tank car integrity
- Improving highway-rail grade crossing safety
- Identifying technology for rail dark territory
- Conducting risk assessments and tests of optimized train control systems
- Developing guidelines on collision hazard analysis
- Developing Crash Energy Management (CEM) systems
- Improving fire safety
- Improving emergency response capability
- Workers' security training

*(Sponsored by DOT/FRA)*

### **Evaluating the Risk of Rail Transport of Hazardous Materials**

The Volpe Center has provided technical support to FRA in its Rail Equipment Safety Research Program for over 20 years. One part of this research program is a project on the Structural Integrity of Railroad Tank Cars. During the past year, the Volpe Center has developed and is implementing a research plan and assessment methodology to support FRA in evaluating the risk of rail transport of hazardous materials.

The work addresses safety recommendations made by the NTSB regarding a train derailment and subsequent release of hazardous materials that occurred in Minot, North Dakota, on January 18, 2002. One of the primary focal points of this work is the evaluation of the fracture toughness of the steels used in cars built before 1989. The Volpe Center's work on this

project began in March 2004, shortly after the NTSB released its investigation report on the accident. The plan addresses some of the most complex issues in materials engineering, collision and derailment dynamics, and risk management. *(Sponsored by DOT/FRA)*

### **Passenger Rail Equipment Crashworthiness**

In March 2006, a full-scale train-to-train test of specially modified rail cars was conducted at the Transportation Technical Center in Pueblo, Colorado, in support of FRA's research into strategies for improving the crashworthiness of commuter and intercity rail passenger trains. A test of conventional equipment had been conducted in 2003, resulting in crushing more than 20 feet of the leading cab car and overriding the standing impacted train. The modified equipment demonstrated that by distributing the crush to unoccupied spaces within the train the survivable impact speed could be more than doubled. Crash Energy Management, as a design strategy, has been incorporated in the latest specifications for rail cars being purchased by Metrolink, the commuter rail operating authority in greater Los Angeles. FRA has asked the Volpe Center to assist Metrolink and the selected car builder, Rotem, in meeting the crash energy management goals for the new equipment. The results of this research have been used to develop the crashworthiness requirements for the Acela, Amtrak's high-speed trainset; the passenger equipment crashworthiness regulations issued by FRA in 1999; and the crashworthiness requirements in the American Public Transport Association (APTA) Manual of Standards and Recommended Practices. The results of this research are currently being used by the Railroad Safety Advisory Committee/Passenger Safety Working Group to develop recommendations for regulations.

The goal of the Passenger Rail Equipment Crashworthiness Research is to develop and evaluate practical concepts for increasing survivability in passenger train accidents. Principal activities include field investigation of passenger train accidents to determine the causes of injury and fatality, design development of

alternative strategies for increased occupant protection, and full-scale impact testing to compare the effectiveness of conventional and improved crashworthiness strategies. *(Sponsored by DOT/FRA)*

### **Track Geometry Requirements for High-Speed Rail**

The Volpe Center has been supporting FRA in the area of Vehicle Track Interaction for more than 25 years. The goal of this research is to reduce the number of track-geometry-related derailments by establishing track geometry limits and maintenance and inspection requirements.

During FY 2006, the Volpe Center, in support of FRA's Railroad Safety Advisory Committee (RASC) Track Vehicle Interaction Working Group, has conducted numerous simulation studies to predict the dynamic response of representative vehicles in order to identify critical geometry irregularities resulting in unsafe wheel forces and acceleration. The results are being used as the technical basis for developing track geometry limits for high-cant deficiency operations. As part of this effort, the Volpe Center also developed a process for using simulations to qualify vehicles for particular operating conditions. This simulation process, which involves predicting response over a series of defined minimally compliant geometry variations, is being recommended for use in FRA Track Safety Standards in place of expensive instrumented wheelset testing under certain conditions. The work is closely coupled with an effort to develop the next-generation vehicle track interaction simulation tool. FRA is providing funding to the University of Illinois at Chicago to develop this tool, and the Volpe Center has been providing critical detailed reviews of the code and established benchmark criteria to evaluate performance. *(Sponsored by DOT/FRA)*

### **Design Standards for Passenger Railcar Wheels**

The American Public Transportation Association (APTA) is developing safety standards for railroad passenger equipment. Many of these are based on former Association of American

Railroads (AAR) standards, for which AAR has discontinued support. The Volpe Center, under sponsorship from FRA, is participating in the development of prototype design and application standards to ensure that wheels used in passenger operations perform safely under the conditions to which they are exposed in service. Volpe Center staff are applying analysis techniques used under previous FRA research programs in the development of the new standards. The first phase of the effort involved drafting a proposed recommended practice, which allows the selection of wheels appropriate for the envisioned rail service. This work was completed and presented to the full Passenger Rail Equipment Safety Standards (PRESS) Task Force in June 2006. The second phase will require the development of an analytical methodology to be applied by manufacturers in order to qualify new passenger car wheel designs. This methodology will replace a currently used AAR standard, which was originally designed with freight operations in mind. The new standard will take into account wheel loading and train handling characteristics, which are more representative of those observed in passenger applications. *(Sponsored by DOT/FRA)*

### **Confidential Close Call Reporting System**

A chain of events or circumstances, any one of which might have been prevented if the series of events had gone another way, precedes nearly all transportation-related fatalities and injuries. In many of these cases, operators are aware of these “close calls” or “near misses” and may have information that could prevent future mishaps. Volpe Center staff worked with railroad industry stakeholders from FRA, the Bureau of Transportation Statistics, railroad carriers, and labor organizations to develop a demonstration program to evaluate the effectiveness of a close-call reporting system. Consensus among key stakeholders was critical to the project moving forward because close-call reporting succeeds only when stakeholders volunteer information about close calls. This system will enable the railroad industry to take action to prevent hazardous events before they occur. Currently,

three freight railroads, Union Pacific, Burlington Northern Santa Fe, and Canadian Pacific, have volunteered to participate in this project. The Close Call Reporting System expects to begin receiving reports this coming fall. *(Sponsored by DOT/FRA)*

## **TRANSIT**

### **Drug and Alcohol Management Information System**

The Volpe Center provided key technical and logistical support to FTA’s first-ever Drug and Alcohol National Conference, which was held in Las Vegas, Nevada and attracted over 400 attendees from the transit and drug and alcohol testing industries nationwide. The conference was designed to provide essential facts and information to facilitate employers’ compliance with DOT’s 49 CFR Part 40 and FTA’s 49 CFR Part 655 and to provide time-tested and proven best practices. The attendees traveled from 43 states, the District of Columbia, and the Virgin Islands. They included representatives from many of the Nation’s largest transit systems and national contractors as well as from 17 state Departments of Transportation. The event included speakers from FTA, other government entities, and the private sector. The success of this conference has spurred FTA to have the Volpe Center conduct a second annual conference with an even larger number of attendees (500) in the spring of 2007 in New Orleans. *(Sponsored by DOT/FTA)*

### **Transit Safety Statistics**

The Transit Safety and Security Statistics Program consists of the analysis and dissemination of the transit safety and security data collected through the newly enhanced National Transit Database (NTD) Safety and Security Module. This is accomplished through the production of periodic reports with normalized data, trend data, and basic statistical information. The Volpe Center adds value to the NTD data through statistical analysis and dissemination of findings through the FTA

Safety and Security Websites and annual report publications.

The objective is to provide FTA and industry stakeholders with the basis for identifying key safety and security problems and determining the effectiveness of countermeasures. Stakeholders include Congress, NTSB, the Office of the Secretary of Transportation, the states and the Office of Management and Budget, and transit professionals.

Ad hoc analyses are often very high visibility due to the sensitivity of the information or the requestor. As an example, annual strategic DOT and FTA performance measures and outcomes are validated. Rapid, quality responses by Volpe Center staff have been a hallmark of this ongoing initiative over the years. *(Sponsored by DOT/FLA)*

## **MOTOR VEHICLE**

### **Rollover Crashes**

NHTSA has recently initiated a special study of rollover crashes to address data requirements, the causes of rollover crashes, and opportunities for avoidance and mitigation. The Volpe Center supports this initiative by assisting with the design of the study, analyzing the current state of the rollover problem, evaluating recent trends in crashes, and assessing the effectiveness of the newer vehicle safety features which address rollover. In performing this work, the Volpe Center partners with staff from NHTSA's statistical, research, and rulemaking organizations. Rollover crashes, which are considerably more complex than, for example, rear-end collisions, represent a disproportionately large number of highway fatalities. Although they account for only 3 percent of vehicles in crashes, they lead to approximately one third of all occupant deaths. Some vehicle safety features (e.g., electronic stability control) recently introduced in the motor vehicle fleet may be contributing to a reduction in harm. *(Sponsored by DOT/NHTSA)*

### **Roadway Departure Crash Warning System**

The Volpe Center recently completed an independent evaluation of a Roadway Departure Crash Warning System (RDCW), which was done using data gathered in a Field Operational Test (FOT), estimating safety benefits, gauging driver acceptance, and determining system performance and capability. The RDCW warns drivers when they are in danger of unintentionally departing from their lane or the road or are approaching a curve at an unsafe speed. To meet these goals, the Volpe Center—in collaboration with NHTSA and the University of Michigan Transportation Research Institute and its commercial partners—prepared an independent evaluation plan, designed system characterization and FOT experiments, conducted the characterization experiment, developed a series of software tools for processing and integrating data, established an evaluation database, analyzed driver surveys and focus group data, and prepared a final report. The Volpe Center presented preliminary results of the evaluation at a NHTSA-sponsored “public meeting” in April 2006 and is currently editing the report in response to reviewers’ comments. *(Sponsored by DOT/NHTSA)*

### **Intersection Violation Warning System Evaluation**

This project supports the Cooperative Intersection Collision Avoidance System (CICAS) initiative by DOT's Intelligent Transportation Systems (ITS) program. By working cooperatively with industry partners and public agencies, DOT seeks to develop and demonstrate cooperative intersection-vehicle collision avoidance systems that address crossing-path crashes resulting from maneuvering through intersections or red light/stop sign violations. One of the main objectives of this initiative is to demonstrate and quantify the effectiveness of cooperative intersection collision avoidance systems. The Volpe Center will conduct an independent evaluation of a cooperative intersection-vehicle collision avoidance system that addresses crossing path crashes caused by red light or stop

sign violations. The Center will assess key system deployment factors based on data collected from a field operational test, which include safety, user acceptance, system capability, mobility, institutional issues, and other factors that are deemed important to stakeholders. In addition, the Center will support verification testing of the system during the design phase of the program. *(Sponsored by DOT/NHTSA)*

### **Child Safety Research Project**

The Volpe Center supported and participated in a collaborative assessment of case studies of young children injured in automobile side impact crashes. NHTSA is considering rulemaking regarding child safety in side impact crashes, with particular attention to toddlers as represented by the three-year-old test dummy. A team that included representatives from the Volpe Center, NHTSA's Structures and Restraints Research Division, Crash Injury Research Engineering Network (CIREN), Human Injury Research Division, and Vehicle Research Test Center, as well as the National Crash Analysis Center at George Washington University, analyzed a dozen case studies. The group's report will summarize the injuries incurred and will assess the utility of various countermeasures. *(Sponsored by DOT/NHTSA)*

### **Side Impact Testing and Data Analysis**

Motor vehicle accidents result in more than 40,000 fatalities and 3,000,000 injuries in the U.S. each year. To reduce deaths and serious injuries to motor vehicle occupants, NHTSA has been conducting research to assess harm-reducing concepts. Such an assessment depends upon the understanding of the mechanisms that generate the forces that act on, and the response of, these occupants during collisions.

The Volpe Center provided support to NHTSA in the areas of vehicle crash tests and data analysis. In FY 2006, the Volpe Center provided test support and data analysis in the area of side impact occupant protection. A total of 32 side impact tests were conducted using adult male and small female side impact dummies. The reports, data, and film were evaluated for quality control

to ensure utility to NHTSA. The data served as a basis for understanding the performance and the overall effectiveness of air-bag systems and the performance of different sized dummies in similar vehicle models. In addition, the data provided a foundation for the proposed upgrade of the Federal Motor Vehicle Safety Standard (FMVSS 214). *(Sponsored by DOT/NHTSA)*

### **Preventing Alcohol Impaired Crashes**

NHTSA needs to identify new technologies that could be placed in vehicles to detect alcohol-impaired drivers and prevent vehicle operation. This is a national concern because two-fifths of motor vehicle fatalities are attributable to alcohol-related crashes and the proportion has remained virtually unchanged for the past decade. The Volpe Center interviewed experts and examined emerging as well as available technologies for their suitability for unobtrusive in-vehicle use. The Volpe Center identified viable concepts of operation for in-vehicle systems to detect alcohol impairment and prevent vehicle operation. As part of this work, Volpe Center staff described how to implement technology-based countermeasures and addressed concerns such as privacy, public acceptance, and legal issues. *(Sponsored by DOT/NHTSA)*

## **MOTOR CARRIER**

### **Identifying and Targeting High-Risk Drivers**

Research on Commercial Motor Vehicle (CMV) crashes has highlighted driver behavior as an increasingly important factor. Since there was no centralized source of data on the regulatory compliance and safety performance histories of CMV drivers available to FMCSA and state enforcement personnel, the Volpe Center, in support of FMCSA, developed the Driver Information Resource (DIR), a web-based lookup capability providing crash and inspection histories on 3.8 million CMV drivers. These histories are developed by an innovative process of matching names and commercial drivers' license (CDL) numbers to 13 million crash and inspection "event" records in FMCSA databases.



During DIR beta testing, the response from FMCSA and state enforcement field testers was overwhelmingly positive. Given the success of the tests and this feedback, the FMCSA fast-tracked the release of DIR. The Volpe Center accelerated the implementation schedule and released DIR ahead of schedule in July 2006. DIR is now available to all FMCSA and state enforcement personnel by means of secure access on the Volpe Center-developed website, Analysis and Information Online (A&I Online).

The Volpe Center is also using DIR to support other FMCSA projects, including:

- Conducting analyses on the relationships of regulatory compliance and crash risk
- Addressing SAFETEA-LU requirements for providing driver information to motor carriers to enable better hiring decisions
- Laying the foundation to support new safety measurement systems to identify unsafe individual CMV drivers and motor carriers

As a result of the DIR initiative, the FMCSA now has the tools and data to increase focus on CMV driver behavior in its safety programs that support the agency's mission of reducing crashes, injuries, and fatalities involving large trucks and buses. *(Sponsored by DOT/FMCSA)*

### **Motor Carrier Safety Program Effectiveness Measurement**

With the advent of performance-based budgeting in the 1990s, FMCSA needed to measure the impact of its programs as part of the annual budget submission process. The Volpe Center took on this challenge by developing two analytical models; the Intervention and Compliance Review Effectiveness Models that measure the effectiveness of commercial motor vehicle (CMV) roadside inspections, CMV traffic enforcement stops, and Compliance Reviews (on-site safety audits). The two models provide estimates on the number of crashes avoided and the associated injuries and fatalities prevented as a result of these safety programs. In addition to supporting FMCSA's annual performance report and budget submissions, they are used for FMCSA and state customized analyses. For

example, states use the customized results for allocating resources, applying for Federal grants, and justifying budget requests from their legislatures. The impacts of the safety programs on particular subsets of the motor carrier population (e.g., hazardous material and passenger carriers) can also be estimated. As a result of this innovative pioneering work, FMCSA now has the quantitative means of assessing the value of its safety programs.

*(Sponsored by DOT/FMCSA)*

### **COMPASS Program Information Technology Support**

In the past year, the Volpe Center provided exceptional leadership in its efforts to support the FMCSA's COMPASS program. COMPASS is a comprehensive overhaul of the way FMCSA and its partners collect, manage, and convey safety information designed to modernize and streamline this agency's safety business processes. COMPASS will result in more effectively and efficiently reaching the agency's goal of reducing highway fatalities due to truck and bus accidents. The architecture for the safety information systems that are the core elements of COMPASS resides at the Volpe Center. The Volpe Center has created the COMPASS Integration Environment (CIE) that consists of the COMPASS Quality Assurance and Pilot production systems. The infrastructure to support the complex communications requirements for this architecture has also been created by the Volpe Center team. In addition, the Center has generated the COMPASS Integrated Configuration Management Plan. All of the architecture, such as the repository and technical infrastructure to support the repository, has been developed. As part of this modernization effort, the Volpe Center worked closely with FMCSA to modify the existing FMCSA information systems to allow access using the new COMPASS portal. The first part of this effort was to modify FMCSA's Motor Carrier Management Information System (MCMIS) to allow users to log on to the application using the new FMCSA portal website. This was completed and released as part of the

COMPASS Pilot in July. The Volpe Center is currently working on implementing the same capabilities for the Enforcement Management Information System (EMIS) and the Licensing and Insurance (L&I) System. *(Sponsored by DOT/FMCSA)*

### **National Household Goods Motor Carrier Consumer Complaints**

Among the regulatory responsibilities of the FMCSA is the oversight of household goods carriers' safety and consumer protection. In the Safe, Accountable, Flexible, Efficient Transportation Equity Act—A Legacy for Users (SAFETEA-LU), Congress set forth specific requirements for FMCSA to establish a National Consumer Complaint Database (NCCDB) on household goods motor carriers that would include:

- The ability to file and log consumer complaints relating to household goods moving companies for use by DOT and the states
- A procedure for the public to have access to aggregate complaint information related to specific household goods moving companies
- A procedure for household goods moving companies to challenge duplicate or fraudulent complaints

FMCSA gave the Volpe Center responsibility for managing the project, designing and developing the system and accompanying websites, and training call center and FMCSA personnel. The system has been developed and is being beta tested. After being implemented in late 2006, it will be available to the public, household goods moving companies, and FMCSA personnel.

In addition to meeting the SAFETEA-LU requirements, the system will allow consumers,

commercial motor vehicle drivers, and others to report possible safety violations and will provide data for FMCSA to use in selecting carriers for safety audits. *(Sponsored by DOT/FMCSA)*

## **PIPELINE**

### **Safety Monitoring and Reporting Tool**

The Safety Monitoring and Reporting Tool (SMART) is an information technology project which provides the PHMSA Office of Pipeline Safety with an integrated information source for identifying pipeline safety trends (through analysis of incident/accident information), targeting solutions (through analysis of inspection and resource data using a resource allocation module), and measuring performance (to determine if the resource allocation, budgeting, and regulations are working). The Volpe Center is developing SMART as a web-based tool, integrating all aspects of existing pipeline information systems, as well as new business processes with a "pipe-centric" focus. SMART improves oversight of the pipeline industry by providing an easy-to-use single point of access to pipeline information, reducing the reporting burden on pipeline operators by fully implementing electronic data collection where possible using the Internet, and sharing that information with state pipeline safety agencies and other Federal agencies. SMART also enables better management decisions by integrating geospatial data from the National Pipeline Mapping System (NPMS) with pipeline incident, compliance, inspection, and other pipeline safety information. *(Sponsored by DOT/PHMSA)*

# REDUCED CONGESTION

## Reduce congestion and other impediments to using the Nation's transportation system

### **National Strategy to Reduce Congestion**

The Volpe Center has provided key support for all of DOT's efforts to develop and promote the National Strategy to Reduce Congestion on America's Transportation Network. Known as the Congestion Initiative, this is an interagency effort to reduce the economic and social impacts of congestion in the U.S. transportation system. Phase I of the Congestion Initiative included preparing a detailed diagnosis of the underlying causes of congestion; developing a comprehensive catalog of pricing, infrastructure investment, and operational measures to reduce and manage congestion in the U.S. transportation system; and identifying metropolitan areas where deploying these measures could be most effective. Phase II of the Initiative focuses on developing Urban Partnership Agreements between the DOT and one or more metropolitan areas, which will encompass congestion pricing demonstrations, new Bus Rapid Transit service initiatives, expanded use of telecommuting and flexible working hours, and efforts to relieve major traffic bottlenecks. Subsequent phases will promote measures to reduce congestion in the U.S. air traffic control and airport systems, intercity freight corridors, and at major coastal ports.

The Volpe Center supported Phase I by providing the diagnosis of the underlying causes of congestion, developing a comprehensive framework for cataloging measures to reduce congestion and evaluating their potential effectiveness, and developing and applying criteria to select metropolitan areas where these measures could be most effective. The Volpe Center continues to support Phase II by designing and evaluating potential congestion

pricing demonstrations for metropolitan areas where local officials have expressed their willingness to consider participating in Urban Partnership Agreements and by developing outreach materials to support DOT officials' discussions with local officials. *(Sponsored by DOT/OST & FTA)*

### **Air Traffic Flow Management—ETMS Release**

The Airspace Flow Program (AFP), deployed in version 8.2 of the Enhanced Traffic Management System (ETMS) on June 6, 2006, greatly reduced the number of flight delays and brought an estimated \$900 million in cost savings to the airlines and the flying public, according to FAA. The AFP allows air traffic controllers to delay only those flights that are expected to encounter extremely bad weather. As a result, the new program minimizes the crippling effects of the sudden thunderstorms that frequently affect the Nation's airspace system during the summer when travel volume is at its highest. "This program allows us to work around severe weather in highly congested airspace with greater precision and efficiency than in the past," according to FAA Administrator Marion Blakey. "As a result, we will cut delays, keep passengers safe, and make summer travel easier." The Volpe Center team was responsible for developing and deploying this new capability on time and within budget. According to our FAA customer, "The Volpe team overcame every obstacle and worked hand-in-hand with other development teams to bring the entire package together. Thanks for a job well done!" *(Sponsored by DOT/FAA)*

## **Air Traffic Flow Management—Traffic Situation Display**

Traffic Flow Management supports the strategic planning and collaborative management of air traffic demand. In 2004, the FAA initiated the Traffic Flow Management–Modernization (TFM-M) program. In order to manage TFM-M resources properly, FAA needed to quantify the use of functionality within ETMS. The Traffic Situation Display (TSD) Usage Metrics analysis task provides insight into how users are getting information from TSD and what processes they are selecting. This information is needed for TFM-M and for the current ETMS to develop more efficient code by eliminating those processes that are rarely used.

The first accomplishment consisted of releasing a specially engineered version of ETMS software to collect usage data in late February 2006. The second accomplishment was the development of initial queries to allow Volpe Center analysts to present the information in the TSD Metrics Quick Analysis Report delivered to FAA in April 2006.

FAA has been pleased with this new line of products from the Volpe Center and has requested an expansion of the analysis tasks. Database views are being developed to provide long-term database access. Future analyses will provide a more comprehensive understanding of the TSD user interface process. This information will be useful in guiding the priority of future enhancements. *(Sponsored by DOT/FAA)*

## **Cobb County Driver Satisfaction Study**

The Volpe Center, on behalf of FHWA's Intelligent Transportation Systems Joint Program Office, conducted a before-and-after customer satisfaction survey of drivers on an urban arterial treated with an adaptive signal system. The primary hypothesis of this study was that it is possible to develop customer satisfaction measures that are a reliable determinant of roadway quality. A signal system upgrade in Cobb County, Georgia, offered the opportunity to test this hypothesis. In addition to providing a test of the methodology, the study also measured

whether there were changes in driver satisfaction with roadway quality as a result of the deployment of the adaptive signal system control.

The study found no observable improvement in roadway performance due to the adaptive signal system. A likely reason for these findings is that the corridor was already performing at an optimal level with respect to traffic signal coordination under the initial signal timings. Overall, these results indicate that for roadway types similar to the one evaluated in this study, the SCATS adaptive signal system control may not increase drivers' day-to-day satisfaction with their roadway experience if the corridor is already optimally timed. From a methodological standpoint, the findings suggest that it is indeed possible to reliably measure driver satisfaction with roadway quality. Based on the team's assessment of the robustness of the method, a set of guidelines was developed to assist in designing and implementing similar driver evaluations. *(Sponsored by DOT/FHWA/ITSJPO)*

## **Universal Transit Farecard Standards Program**

The American Public Transportation Association (APTA) Universal Transit Farecard Standards (UTFS) program seeks to develop a series of documents that provide industry guidance for the creation of an open architecture payment environment. Such a system would promote greater access and convenience to the public transportation network and enable integration of independent payment systems. The Volpe Center, in support of FTA, has been performing program facilitation, communications, strategy, and outreach between the key leaders to accomplish the program goals.

Key goals of the program are to:

- Promote economies of scale for agencies and enable more competitive procurements
- Provide a platform to support agency independence and vendor neutrality
- Strive for a platform that maximizes compatibility with current automated payment systems, thereby reducing integration costs for agencies with legacy systems

- Strive for an open architecture environment for hardware and software utilizing commercially available products
- Foster development of a multimodal, multi-application environment which includes nontransportation applications
- Provide information for informed decisions and development of partnership strategies

Leaders for this standards effort from public transit agencies include Bay Area Rapid Transit (BART), Chicago Transit Authority (CTA), Port

Authority of New York and New Jersey, Port Authority Trans Hudson Railway (PATH), Central Ohio Transit Authority (COTA), Washington Metropolitan Area Transit Authority (WMATA), and Portland TriMet. The work is accomplished through a consensus process incorporating dozens of volunteers from throughout the public and private sectors of the transit industry. *(Sponsored by DOT/FTA)*



# GLOBAL CONNECTIVITY

## Facilitate an international transportation system that promotes economic growth and development

### **National Positioning Navigation Timing Architecture**

Space-based navigational systems (GPS in particular) use satellites to provide Positioning Navigation Timing (PNT) information. U.S. Space-Based PNT policy states that the U.S. must continue to improve and maintain GPS, augmentation systems, and back-up capabilities to meet growing national, homeland, and economic security requirements as well as those from the civil, commercial, and scientific communities.

However, the extent of dependence on systems such as GPS or possible alternative systems for PNT is not explicitly understood. Absence of an approved PNT architecture results in uncoordinated research efforts, lack of clear developmental paths, potentially wasteful procurements, and inefficient deployment of PNT resources. For example, possible alternatives or improvements to GPS to avoid a single-point failure are not currently being considered from an overall architectural perspective.

U.S. DOT RITA leads the development of a National PNT Architecture effort for DOT on behalf of the civil community. The Volpe Center works closely with the National Security Space Office (NSSO), which has been assigned the overall lead of the National PNT Architecture Development Team. As the lead for the civil community, the Volpe Center ensures that civil PNT needs are identified through data gathering and concept development efforts.

The Volpe Center also works with the NSSO to document the current state of the PNT architecture as a baseline and then to evaluate

alternative future mixes of global (space and non-space-based) and regional PNT solutions. These solutions will include PNT augmentations and autonomous PNT capabilities to address national priorities identified by the civil community and DoD. FY 2007 efforts will involve performing architecture alternative analyses, results assessment, and transition planning. *(Sponsored by DOT/RITA)*

### **FAA Terminal Facilities Support**

Volpe Center supports the FAA in the areas of program management, schedule management, and systems engineering for the replacement of ATCTs and Terminal Radar Approach Control (TRACON) facilities. FAA's Terminal Facilities Sector is responsible for the establishment, replacement, and modernization of terminal air traffic control facilities to ensure that cost-effective infrastructure platforms exist for the control of air traffic in the National Airspace System. In FY 2006, the Volpe Center supported the Terminal Facilities Sector in the establishment of a new ATCT/TRACON at the Phoenix Sky Harbor International Airport, the initial planning for the Fort Sill Army Radar Control Center/Oklahoma City TRACON transition project, and the development of life-cycle cost estimates for new ATCT and TRACON replacement projects. *(Sponsored by FAA)*

### **Engineering, Integration, and Installation—USAF PACAF**

Late in FY 2006, the Volpe Center, in support of USAF Pacific Airforce Command (PACAF), began relocating all equipment and operations from old control tower and Radar Approach Control (RAPCON) facilities to new structures

throughout the western Pacific region. The Volpe Center will provide engineering, integration, and installation (EI&I) support for the migration of all systems associated with these operations. These systems range from radios to voice switches to navigational controls to the radar displays for both surveillance and tracking radar. Each facility will require a detailed requirements analysis to identify all systems that need to be relocated and all systems or components that will need to be upgraded or acquired, and each of these projects will be different based on local equipment and operations. Detailed engineering drawings of the design and a master plan will be created to move and test each system. One of the significant challenges of this effort is to minimize or eliminate disruptions to ongoing air operations while maintaining flight safety. The initial work is being performed at the USAF Kunsan Air Base RAPCON facilities in the Republic of Korea.  
*(Sponsored by USAF/PACAF)*

**Engineering, Integration, and Installation—  
USAF, DoD, NAS**

In FY 2006, the Volpe Center supported the USAF Electronic Systems Center (ESC) on the DoD NAS Program. This program, whose goal is to make DoD ATC facilities interoperable with FAA ATC facilities, is a long-term project to replace the DoD's terminal radars, voice switching systems, and terminal automation systems, as well as to consolidate several existing informational displays in a single unit.

The Volpe Center has contributed to this upgrade through engineering and installation

support at over two-thirds of the 177 USAF and Air National Guard (ANG) Bases worldwide. For the past seven years, the Center has played a major role in requirements definition, system engineering, site engineering, and analysis of communications, surveillance, and automation systems for the NAS program office.

This year the Volpe Center team has conducted over 40 site surveys for the Airfield Automation System (AFAS), installed the key site system, and led an extremely successful key site test of that system. The Volpe Center team efforts on this project resulted in an ESC quarterly award for the AFAS team. The team also completed the deployment of the ETVS systems, installing the last of more than 100 such systems this spring. The Center has led the development of the DASR Advanced Signal Data Processor, which will debut for both the DoD and FAA in September of this year at FAA's technical center. Further, the team is leading the development of requirements to deploy STARS and DASR to overseas sites, including the incorporation of Mode S into both the radar and automation systems. Finally, Volpe Center representatives chair the joint DoD-FAA DASR-STARS interoperability working group; this group has developed and refined the process for optimizing these systems as a single entity rather than as individual components, resulting in the best possible air picture for air traffic controllers.  
*(Sponsored by DoD/USAF)*



# ENVIRONMENTAL STEWARDSHIP

## Promote transportation solutions that enhance communities and protect the natural and built environment

### **Corporate Average Fuel Economy Research and Analysis**

The Volpe Center supports NHTSA on Corporate Average Fuel Economy (CAFE) rulemakings and related activities that require supporting analyses. The CAFE regulations exist to regulate and improve the average fuel economy of cars and light trucks (trucks, vans, and sport utility vehicles) sold in the U.S. The Volpe Center developed a modeling system, the CAFE Compliance and Effects Modeling System, that calculates fuel savings and compliance costs. The Center is currently expanding the system to support more refined fuel consumption analysis.

NHTSA worked closely with the Volpe Center in setting new light-truck CAFE standards and used its analysis in the accompanying Regulatory Impact Analysis. These standards were published in April 2006.

CAFE rulemakings are high-stake political undertakings that affect corporate profits and national energy use and dependence. It is essential for the underlying analysis to be viewed as credible and objective. The high-quality analytical work that the Volpe Center performed under intense time pressure was crucial to the achievement of NHTSA's regulatory objectives. *(Sponsored by DOT/NHTSA)*

### **DOT's Center for Climate Change and Environmental Forecasting —Strategic Plan**

As global warming becomes a more critical issue for our society, it is essential for the

transportation community to develop strategies to reduce transportation-related greenhouse gases and to mitigate the effects of climate change on the transportation network. The U.S. DOT established the Center for Climate Change and Environmental Forecasting (CCCEF) in 1999 as a focal point of technical expertise within DOT to address these challenges. The Volpe Center recently led the effort to develop a new Strategic Plan for the CCCEF. Volpe Center staff interviewed over 30 key stakeholders from government, industry, academia, and advocacy groups. The Center also facilitated two workshops with senior executives representing all the transportation modes.

The plan, which will guide research, partnerships, and outreach for the CCCEF through 2010, promotes comprehensive multimodal approaches to transportation-related climate change issues and helps position DOT as a leader in addressing these issues. *(Sponsored by DOT/ Center for Climate Change and Environmental Forecasting)*

### **Eco-Logical: An Ecosystem Approach to Developing Infrastructure Projects**

Over the last several decades, an understanding of how infrastructure can negatively impact wildlife habitat and ecosystems has grown. Awareness of how to better avoid, minimize, and mitigate these impacts has also matured. The Volpe Center led an interagency group of resource agencies—the Federal Highway Administration, Bureau of Land Management, Environmental Protection Agency, Fish and Wildlife Service, U.S. Army Corps of Engineers,

U.S. Department of Agriculture Forest Service, National Park Service, NOAA Fisheries, and several state DOTs—to develop an unprecedented guide for making infrastructure development more sensitive to wildlife and ecosystem conservation. The Volpe Center team was the key author of *Eco-Logical: An Ecosystem Approach to Developing Infrastructure Projects*, which presents a framework for multiple agencies to integrate their planning and establish partnerships to achieve cost-effective infrastructure development without compromising ecosystem conservation. Moving beyond the traditional project-by-project approach to infrastructure development toward the ecosystem approach defined in *Eco-Logical* can achieve a wide range of benefits, including efficient project development; safer, improved infrastructure; more cooperative conservation; and improved watershed and ecosystem health. *(Sponsored by DOT/FHWA)*

### **Alternative Transportation Programs and Systems for National Parks and Public Lands**

During FY 2006, the Volpe Center completed several assignments to help improve the overall management and operation of park roads and Alternative Transportation Systems by the NPS to afford visitors the access and mobility needed to enjoy national park attractions in ways that preserve natural and cultural resources for the enjoyment of future generations.

In January 2006, the Volpe Center compiled the first-ever inventory of Intelligent Transportation Systems (ITS) in planning or use at national parks across the country. This inventory serves as a baseline for future program strategies and as the basis for a number of ITS strategies with respect to NPS park roads and alternative transportation programs. As of 2005, over 15 percent of national park units have reported having deployed ITS applications or having plans to do so. The most prevalent applications relate to traveler information systems; several major national parks, such as the Grand Canyon and Acadia, are featured within statewide “511” traveler information systems that provide

regional travel and transportation information telephonically when that number is dialed.

During FY 2006, the Volpe Center continued efforts to assist national park units in assessing current and prospective financial conditions of transportation services offered for visitor use. In July 2006, a summary analysis identified over \$155 million annually in capital and operating costs at 15 national parks that depend, in various degrees, on revenue from 15 funding sources, many of which have uncertain futures due to budget reduction pressures. This preliminary effort has prompted a more comprehensive review of NPS alternative transportation systems and the associated financial underpinnings.

The Volpe Center also assisted NPS in efforts to strengthen its asset management systems and practices. In January 2006, the Center delivered a report that summarized current directions and future considerations for integrating NPS pavement, bridge, safety, and congestion management systems to avoid unnecessary duplication, minimize the data collection and reporting burden on park units, and facilitate planning and investment tradeoff analysis.

In addition, the Volpe Center is supporting the NPS Transportation System Working Group (TSWG) in an effort to define and implement an asset management system element within the overall NPS Facility Management Software System, which is being introduced to monitor the condition and maintenance repair needs of all national park facilities. In September 2006, the Center prepared a white paper for the TSWG describing current practices in transit asset management and potential applicability to the NPS as part of an ongoing effort to define NPS transportation asset management system goals, objectives, and capabilities. *(Sponsored by NPS, FLM, DOT/FHWA, and FTA)*

### **Ballast Water Discharge Standard Rulemaking Program**

The Volpe Center provided technical support to the U.S. Coast Guard (USCG) in the preparation of a National Environmental Policy Act (NEPA) compliance process for the Ballast Water

Discharge (BWD) Standard Rulemaking Program. The objective of the program is to prevent or reduce the introduction of aquatic Nonindigenous Species (NIS) via shipping activities in U.S. waters. Ballast water is a major pathway for the introduction of NIS. When introduced, NIS can negatively impact aquatic ecosystems, fisheries, infrastructure, human health, and economic systems.

The Volpe Center, with the collaboration of internationally recognized scientists in the fields of aquatic invasive species ecology and mathematical ecology, assessed the potential consequences of the rulemaking. The high degree of complexity and limited knowledge of aquatic ecosystems, along with the large variability in the transport of organisms by means of ballast water, make it extremely difficult to predict NIS introduction and impacts. Based on a detailed study of the current state of scientific knowledge regarding the aquatic NIS invasion process and the prediction of invasion and impacts, the Volpe Center developed and implemented a scientifically valid methodology to analyze the impacts of the rulemaking. The Volpe Center prepared a technical report summarizing the analytical methodology and results and is currently preparing a Programmatic Environmental Impact Statement to accompany the rulemaking. *(Sponsored by DHS/USCG)*

### **Tire/Pavement Noise and Quieter Pavement Applications**

Between 1970 and 1998, \$1.8 billion was spent on the construction of highway barriers to reduce noise along U.S. roadways. Budget-conscious state DOTs and FHWA are researching innovative alternatives to barrier construction for highway noise abatement. “Quiet pavements” have emerged as one of the more promising approaches.

With tire/pavement interaction noise being the dominant source of vehicle noise at highway speeds, the use of “quiet pavements” as an alternative to noise barrier construction is an important area of research. Volpe Center staff has been extensively involved with national and

international tire/pavement noise research and are recognized for their expertise in research planning, noise measurements, and their general knowledge base.

In FY 2006, Volpe Center staff supported the “quiet pavements” program by (1) helping to design and conduct a workshop targeted at establishing a national roadmap for quiet pavements research, (2) helping to guide research plans and field measurements for several U.S. states, (3) participating in several expert panels to help guide projects for the National Cooperative Highway Research Program, (4) participating in the development of standard practices for tire/pavement noise measurements, and (5) conducting noise measurement research to help quantify the benefit of “quiet pavements.” *(Sponsored by DOT/FHWA)*

### **New International Airplane Noise Standard**

Between 1982 and 1999, \$4.3 billion was spent on noise-mitigation activities at U.S. airports. The allocation of these expenditures is based on the FAA’s Integrated Noise Model (INM), which was designed and developed by the Volpe Center. In 1998, the Society of Automotive Engineers initiated a research effort to update the overground propagation algorithms in their international standard for computing aircraft noise in the vicinity of airports, which is the basis for INM. The Volpe Center was selected to lead a group of researchers, which included FAA, NASA, UK’s Civil Aviation Authority, Boeing, Airbus, Wyle Laboratories, and Marsh & Nustad Enterprises LLC.

This eight-year research effort culminated in March 2006 with the adoption of SAE AIR 5662, a new international standard for computing overground propagation of sound from aircraft. The updated algorithms of AIR 5662 have been implemented in INM as well as several similar noise models around the world. The use of the updated version of INM will lead to more informed decisions by planners and policymakers on local, national, and international issues pertaining to noise in the vicinity of airports. *(Sponsored by DOT/FAA)*

### **Aviation Environmental Design Tool (AEDT)**

In its 2004 Report to Congress, *Aviation and the Environment*, the Bush Administration recommended 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. ...”. As a result of this recommendation, the FAA has launched a multi-year effort, which will result in the development of an entirely new suite of tools, including the Aviation Environmental Design Tool (AEDT).

The Volpe Center leads the management, design, and development of AEDT, which will integrate existing AEE aviation noise, emissions, and dispersion computer modeling tools. Center staff work closely in this development effort with the

ATAC Corp., CSSI Inc., Wyle Laboratories, the Massachusetts Institute of Technology, and the Georgia Institute of Technology. It is anticipated that this effort will lead to the development of an unprecedented suite of tools, which will be used by the International Civil Aviation Organization (ICAO) for the establishment of international environmental policy.

In FY 2006, an early version of AEDT was used as a capability demonstrator to replicate a previous study conducted by ICAO, which looked at various international policy options for the reduction of oxides of nitrogen emitted from civil aircraft. AEDT was also used in FY 2006 to conduct a preliminary assessment of the environmental benefits (including fuel burn) of continuous descent approach. (*Sponsored by DOT/FAA*)

# SECURITY, PREPAREDNESS AND RESPONSE

## Balance transportation security requirements with the safety, mobility, and economic needs of the Nation and be prepared to respond to emergencies that affect the viability of the transportation sector

### **Emergency Response—Hurricanes Katrina and Rita**

Following the devastation of Hurricane Katrina, Volpe Center staff deployed immediately to Louisiana, where they played a key role in providing transportation services in response to Katrina's devastation and in planning and executing evacuation in the face of Hurricane Rita's 28-foot storm surge.

After the hurricanes, the Federal Emergency Management Agency (FEMA) activated a new emergency support function: Long-Term Community Recovery. Volpe Center staff served as DOT's overall coordinator for this function, leading a combined field and support team that included staff from all the modal administrations and coordinating with FEMA and state and local agencies participating in the disaster recovery.

Volpe Center teams demonstrated initiative in solving problems as they arose. Recognizing the need to provide transportation for the thousands of displaced residents, Volpe Center staff, in support of FEMA, designed and implemented *LASniff*, a bus service to transport workers from Baton Rouge to jobs in New Orleans. To help FEMA provide access to essential services for evacuees, Volpe Center transportation planners worked quickly to establish a concept of operations, which led to development of a state-wide bus system for evacuees, *LAMoves*.

The demonstrated ability of the Volpe Center staff to provide intermodal transportation support to the hurricane response effort through disaster planning, response, and recovery highlights its potential to assist Federal, state, and local governments as they seek to be better prepared to respond to future emergency situations. The Center's contributions incorporate best practices from incident management disciplines in the public and private sectors. *(Sponsored by DHS/FEMA)*

### **U.S. Coast Guard Legacy Fleet Maintenance Effectiveness Program**

The U.S. Coast Guard operates five classes of cutters and four classes of aircraft in its Deepwater operations. Effective assets in their day, these platforms are technologically obsolete and require excessive maintenance. The Deepwater Project was established to modernize and replace this aging fleet as well as its supporting command-and-control and logistics systems. Because the current acquisition plan indicates that some legacy cutters are to remain in commission for up to 20 years, the Coast Guard's Engineering and Logistics Center asked the Volpe Center to help develop plans to keep these cutters operating at maximum efficiency through their remaining life. The Volpe Center helped the Coast Guard develop a list of maintenance actions needed to achieve that goal over a two-year period, 2003-2005.

This year the Volpe Center evaluated several scenarios for accomplishing the work and recommended the most cost-effective alternative. It also established a performance baseline for each of the 76 cutters involved in the project. Volpe Center staff will monitor cutter performance over the next ten years to determine the cost-effectiveness of the MEP. *(Sponsored by DHS/USCG)*

### **U.S. Navy Sixth Fleet Automatic Identification System**

The Volpe Center has been involved in the development of Maritime Domain Awareness (MDA) networks since its groundbreaking work at the Panama Canal with the Communications Tracking and Navigation (CTAN) system. Currently, the Volpe Center is engaged in the development of an MDA network known as the Maritime Safety and Security Information System (MSSIS) for the U.S. Navy Sixth Fleet. The goal of the network is to develop a comprehensive vessel traffic situational awareness picture of Automatic Identification System (AIS)-equipped vessel traffic in the European Command (EUCOM) Area of Responsibility (AOR). A secondary goal of the network is to foster cooperation among U.S. Allies by allowing them to be active partners in the MSSIS network. The MDA situational awareness picture is comprised of real-time AIS-derived vessel traffic information gathered from both shoreside and afloat receive stations. Data from the network is displayed on the Volpe Center-developed MDA software known as Transview. Recently, the MSSIS network provided U.S. commanders with real-time vessel traffic situation awareness during the evacuation of Americans from Lebanon. In 2007, the Volpe Center will expand the MSSIS to include the U.S. Navy Second Fleet vessel and its AOR. *(Sponsored by DoD/Navy)*

### **New DOT Headquarters Security System Implementation**

The Volpe Center is designing, procuring, and installing a security system for the new DOT Headquarters in Washington, DC. The system is an IP-based Access Control, Digital Video Recording, and Closed Circuit Television

(CCTV) Systems and Command, Control and Monitoring Center. The objective is to implement an integrated security system that is compatible with Homeland Security Presidential Directive-12 (HSPD-12), which directs all Federal agencies to provide the capability for a common identification card that will allow Federal employees and contractors to gain access to both federally controlled facilities and computers. The system will consist of approximately 200 access control card readers; 150 exterior and interior fixed and pan/tilt/zoom CCTV cameras; 19 turnstiles; two command, control, and display command centers; credentialing for over 5,500 employees; multiple intrusion detection points; and parking garage access control, surveillance, and emergency call boxes. The 1.35-million-square-foot building is the first new cabinet-level building to be designed and constructed in the Nation's capital in more than 30 years. It is also the first major Federal building to be built with HSPD-12 compliance as its guiding security principle. Volpe Center personnel have played a key role in defining requirements and guidance regarding physical security infrastructure installation and equipment specifications, HSPD-12 design and implementation, and program management. In FY 2006, 95 percent system design was completed. *(Sponsored by DOT/OST)*

### **Nuclear Ship Savannah Decommissioning Project**

The U.S. Maritime Administration (MARAD) owns and maintains the nuclear ship *Savannah*, the world's first nuclear-powered merchant ship. The ship was operated from 1962 to 1970, after which its nuclear power plant was defueled and partially decommissioned in accordance with the best practices of the day. In 2002, MARAD determined that it could no longer securely maintain the remnants of the ship's nuclear reactor and initiated a program to properly decommission the reactor vessel and all associated ancillary equipment and material. Due to the technical complexity and uniqueness of the decommissioning effort, MARAD's Office of Ship Operations, Savannah Technical Staff Office, has assembled a team of engineering and

project management experts to assist it and has chosen the Volpe Center to be a vital member of this team.

The Volpe Center is providing a variety of environmental, engineering, and other technical services to support the *Savannah* decommissioning. During FY 2006, the Volpe Center has participated on the Savannah Decommissioning Audit and Review Committee, completed the draft environmental assessment for decommissioning, provided review and comment on the Savannah Nuclear Characterization Report and MARAD's decommissioning rough order-of-magnitude cost estimate, and developed port operation criteria. It has also evaluated various ports for the decommissioning, participated in the proposal evaluation of MARAD's solicitation for contractor support in decommissioning management and oversight, and developed engineering designs for the installation of fire protection and security monitoring systems. *(Sponsored by DOT/MARAD)*

#### **Support to U.S. DOT's Pandemic Preparedness Planning**

During Deputy DOT Secretary Maria Cino's visit to the Volpe Center in October 2005, she indicated that it was a top priority to ensure that the U.S. DOT, the Federal Government, and state and local organizations were prepared to deal with an outbreak of avian flu. The Deputy

Secretary, at the request of then-Secretary Norman Mineta, convened a Departmental Task Force on the Avian Flu to support development of a National Strategy for Pandemic Influenza. The Deputy Secretary encouraged the Center to lend support to the U.S. DOT Task Force and to reach out to state and local governments on preparedness issues. She also encouraged ideas on how best to support the Department as it prepares for a potential outbreak. The Volpe Center worked to inform decision makers within U.S. DOT of its vast experience relevant to *emergency preparedness* (international best practices; connecting communities; developing Federal, state, and local playbooks for dealing with a pandemic; lessons learned from national disasters; state and local planning; training curriculum/outreach; *detection* (passenger tracking, CDC transportation disease migration project); *response* (knowledge base related to evacuation and quarantine issues; economic impacts of pandemic on transportation and the economy; and *recovery* (planning for and implementing)). In an effort to share technical information within the organization and with the broader transportation community, the Volpe Center's Client-sponsored Training User's Group (CTUG) conducted a special lecture series on "*The Avian Flu: Preparing for a Pandemic and Transportation Impacts.*" *(Sponsored by DOT/OST)*





# ORGANIZATIONAL EXCELLENCE

## Advance the Department's ability to manage for results and achieve the goals of the President's Management Agenda

### On Behalf of Our Clients

#### Professional Capacity Building

A key component of DOT's Strategic Plan is the establishment of a strong DOT leadership role in transportation workforce development. The Volpe Center is helping DOT to provide this leadership through its Professional Capacity Building (PCB) programs, which provide information, technical assistance, tools, and training to transportation professionals.

In addition to flagship programs for Intelligent Transportation Systems (ITS) and transportation planning, the Volpe Center has helped FHWA to establish successful PCB programs in roadway safety and environmental stewardship. The Center is now helping FHWA to address professional gaps in two other high-priority areas, public-private partnerships (PPPs) and security and emergency response.

The Volpe Center partnered with the American Association of State Highway and Transportation Officials to conduct the most comprehensive survey to date on current practices and needs among states regarding PPPs. Based in part on information from the survey, the team is now developing a toolkit of PPP resources. In security and emergency management, the Volpe Center has helped FHWA to launch a pooled fund to develop training for state DOTs. The Center is also developing a database of training and a series of webinars for national audiences.

In addition, the Volpe Center was instrumental in establishing a council that brings together managers of capacity building programs across the DOT. The council encourages managers to share experiences, exchange information and best practices, identify opportunities for enhanced knowledge management, and better integrate training, technical assistance, and information dissemination among programs. *(Sponsored by DOT/FHWA)*

#### FAA Telecommunications Infrastructure Modernization

The Volpe Center has been actively participating in the process of transitioning the telecommunications infrastructure, which supports the Enhanced Traffic Management System (ETMS) from the legacy Leased Interfacility NAS Communications System (LINCS) and onto the new, modernized network of the FAA Telecommunication Infrastructure (FTI) contract. The ETMS system is located at over 80 FAA operational facilities, with the primary processing site located and operated at the Volpe Center. The ETMS program has been making use of LINCS services over the last 10 years for interfacility telecommunications needs. The transition work consisted of deriving transition plan details, testing the transition plan, and finally transitioning the telecommunications services. A major milestone occurred on April 11, 2006, when FAA was able to order decommissioning of a major LINCS node located at the Volpe Center. The decommissioning of the LINCS node will save

the FAA an estimated \$500,000 per year.  
*(Sponsored by DOT/FAA)*

### **Transportation Security Administration Training Evaluation**

Within the Transportation Security Administration (TSA), the mission of the Operational and Technical Training Division (OTT) is to develop and deliver technical training that helps to enable the TSA workforce, and others involved in transportation security, to perform their duties in protecting the Nation's transportation systems. The Volpe Center was tasked by OTT in October 2005 to conduct a program evaluation of its technical training development and delivery program. The evaluation was in response to the requirements of the Government Performance and Results Act (GPRA) of 1993, which was enacted to improve the confidence of the American people in the capabilities of all Federal agencies by systematically holding them accountable for achieving program results. In Phase 1 of the evaluation (completed in April 2006), the Volpe Center created an overall definition of OTT's program using a program logic model construct that defined the inputs, activities, outputs, outcomes, and impacts. The program definition provided OTT with a baseline definition that will enable it to better manage its training program and meet the GPRA starting point of having annual program goals and measuring program performance toward achieving them. *(Sponsored by DHS/TSA)*

### **Telecommunications Information Management System**

The Volpe Center continues to support the FAA's Telecommunications Information Management System (TIMS) with responsibility for the design, development, operation, maintenance, and user training of TIMS. TIMS provides a single, centralized national data repository of FAA telecommunications ordering, funding, and inventory information along with a consistent set of automated tools to support the telecommunications business processes of the FAA. In FY 2006, the Volpe Center upgraded the TIMS database and tool suite of software

applications to the current versions of Oracle and PowerBuilder; developed software to process and load FAA-approved address information provided by the FAA Telecommunications Infrastructure (FTI) and used by the TIMS Ordering application; supported the required TIMS Level 1 Security Certification and Authorization Package (SCAP) process; and developed software to process and load information from the FAA's National Cutover Service Acceptance Database pertaining to telecommunications services being transitioned to the FAA's FTI contract. *(Sponsored by DOT/FAA)*

### **Lease Information Management System**

The Lease Information Management System (LIMS) assists the FAA in management of leased land and space contracts. The FAA manages over 10,000 non-GSA leases for facility land sites, buildings, easements, and rights-of-way. One-third of these leases require rental payment of over \$75 million annually. The Volpe Center developed the LIMS to manage the funding of land and space acquisitions. Reports and data displays provide immediate access to the terms and conditions of each lease, easement, or owned land property record. The LIMS has been an important tool for the FAA in its data cleanup activities, resulting in major improvements in the accuracy of information available to support decisions by FAA headquarters and field program analysts and program managers.

The LIMS provides future fiscal year budget requirements based on lease terms and conditions, generates workload management reports for lease renewals, develops summary information on facilities covered by leases, and stores digital images of each lease document for retrieval whenever appropriate. FAA Logistics/Real Estate management, as well as remote field offices, have immediate on-line access to document images, a workload management and reporting tool, and a database of accurate information on lease contracts and facilities via a web-enabled browser-based application. The LIMS provides screen displays of summary information, a suite of standard

reports, a user-defined ad hoc query generation process, and budget estimate reports for the five-year budget call process. Those reports define future funding level requirements for submission to Congress, ensuring that the FAA can meet its fiscal responsibilities for leasing and land purchases.

During FY 2006, the Volpe Center added a line of business code for each contract or facility document in the LIMS database. The addition of these codes made it possible for each line of business to generate reports with lease data and budget projections for the contracts and facilities for which they are responsible. Special studies included rental and land acquisition costs for specific facility types in support of the national facility. *(Sponsored by DOT/FAA)*

### **State Pipeline Processing System**

The State Pipeline Processing System (SPPS) streamlined the integration of grants.gov (mandated for grant processing throughout the Federal Government) for the state pipeline safety grant program. The Volpe Center developed training programs and documentation necessary to aid the states in meeting this requirement while continuing to assist the Pipeline and Hazardous Material Safety Administration's (PHMSA) Office of Pipeline Safety in processing pipeline safety grants in an efficient manner. The SPPS project operates a web-based system, which integrates the information necessary to support the State Pipeline Safety Offices as well as PHMSA in its management of those interfaces with the state organizations. The change was effected without a single state dropping out of the program due to cost impacts outweighing benefits. SPPS continues to operate with the Volpe Center providing user help and operational maintenance and also developing enhancements and improvements to the original SPPS functionality. *(Sponsored by DOT/PHMSA)*

### **Safety and Fitness Electronic Records e-Authentication**

In FY 2006, FMCSA was selected to pilot the e-Authentication process and enable DOT to meet its e-Government requirements. The e-

Authentication process is an electronic gateway for delivering Federal services to businesses, consumers, and other government entities utilizing electronic credentials for validation of individual identity. This is one of the 24 e-Government initiatives outlined in the President's Management Agenda and, since OMB and GSA oversaw the project, it provided visibility for DOT throughout the Federal government. FMCSA requested technical support from the Volpe Center to implement e-Authentication using the Safety and Fitness Electronic Records (SAFER) project, thus leveraging the Center's expertise in information technology security and software authentication architecture. As a result, FMCSA became the first agency in the Department that successfully implemented e-Authentication and one of the first government agencies to go live on the General Services Administration's e-Government portal. An aggressive deployment successfully demonstrated a cutting-edge authentication process for DOT, providing invaluable knowledge that will aid it in deploying e-Authentication throughout the agency. *(Sponsored by DOT/FMCSA)*

### **Support to the U.S. DOT Small Business and Innovative Research Program**

The Volpe Center has administered the Department of Transportation's Small Business and Innovative Research (SBIR) program for the past 23 years. The Center encourages the participation of the small business community in developing creative capabilities that address high-priority research requirements of DOT. This stimulates technological innovations which help to create new products, services, and jobs for the Nation through an annual solicitation where the topics address a wide area of agency-specific concerns. The 2006 annual solicitation received 89 proposals addressing nine research topics from 27 states.

In addition to the formal program, the Center provides additional support to the small business community by referrals to other DOT procurement opportunities, the TRB Innovations Deserving Exploratory Analysis (IDEA)

program, the ten other agency SBIR programs, and SBA resources. Through these efforts, the Volpe Center has helped to make SBIR a truly national program that reaches all 50 states.

*(Sponsored by DOT/OST)*

## **Volpe Center Management Initiatives**

### **Customer Satisfaction Survey**

As a fee-for-service organization with voluntary customers, the Volpe Center has sought customer feedback regarding its delivery of products and services. In October 2005, the Volpe Center embarked on its third round of customer satisfaction surveying. An independent contractor was hired to interview all active customers, primarily face-to-face, at both the project and senior levels. Volpe Center management provided input through focus forums to ensure productive survey instruments. Center staff analyzed the raw data to (1) alert senior managers of instances requiring immediate customer intervention, (2) share customer-specific findings and areas for improvement by means of agency or office-level summary reports, (3) respond to specific management inquiries by mining feedback results, (4) track customer follow-up actions, and (5) identify themes for corporate-level improvements. The Center is well on its way to completing this initiative, which ensures timely, unbiased, actionable data for its project teams and important customer trend data, one of its key performance metrics.

### **Internal Control of Business Processes**

Responding to an Office of Management and Budget (OMB) government-wide call for Federal agencies to strengthen internal controls over financial reporting, in FY 2006 the Volpe Center performed a number of assessments/evaluations of internal controls over our key business processes. Major activities included a Center-wide self-assessment of our controls in place; evaluations of controls of five key business processes and their subprocesses; and sample transaction testing within each key business process. The key business processes documented, evaluated, and tested included

accounts payable, payroll and human resources, travel management, cash management, and acquisition management. Independent random sample transaction testing for these business processes did not identify any exceptions, deficiencies, or problem areas.

### **Project Management Improvements**

Volpe Center customers and our then-Washington, DC headquarters [Research and Special Programs Administration (RSPA)] had in the past expressed concern about our lack of standardized project management practices, insufficient tools to support the project manager, and inconsistent communication to our sponsors on project status. The Center has worked closely with the project staff to institute standard project management processes, tools, and practices. Senior management holds twice-monthly program reviews of high-interest projects to be able to provide cross-organizational support. These forums also promote strategies to disseminate project management practices across the Center and to institute improvements-related business processes, for example, in work acceptance, finance, and acquisition.

During the last year, Volpe Center project managers completed Project Management Plans to outline the deliverables, schedule, and detailed budgets of their projects. All projects are consistently reporting monthly progress reports to their customers. In addition, effective quality assurance processes are being implemented so that customer deliverables are of the highest quality. Learning forums have been expanded to help everyone become more proficient with the best project management practices. There are monthly lunch and learn sessions as well as a monthly newsletter.

The Center has chosen Microsoft Enterprise Project Management as the primary integrative tool for project plans, schedule, and financial status. The system will become operational at the end of this fiscal year; over 100 Center project managers have been trained and are using the system. MSEPM will have integrative functionality with the Financial Data Mart to

streamline processes further for the project manager. An MSEPM user group has been formed to get ideas for future system enhancements and to share tools and tips on using Microsoft Project.

### **Transfer of Accounting Services**

As part of a mandated effort aimed at getting the DOT Finance organization to green status, the Volpe Center transferred several accounting functions to the FAA Enterprise Service Center (ESC) in Oklahoma City. During FY 2006, the Accounting Branch of the Financial Management Division led the successful transition of the Center's Accounts Payable, Travel Processing, Accounts Receivable, and Financial Statement Preparation functions to the FAA-ESC. Multiple meetings were held both in Oklahoma City and in Cambridge to develop a transition plan, train ESC staff, transfer documentation, and monitor ESC performance. The transition was accomplished without a disruption in service to the Volpe Center and external customers despite a significant change in finance staff during the transition period.

### **Audit of FY 2005 Financial Statements**

The Volpe Center had an audit of the balance sheet as of September 30, 2005, performed by Williams, Adley, and Company. The firm also reviewed the balance sheet as of September 2004 and its related statements of net costs, changes in net position, budgetary resources, and financing for the years ending September 30, 2005 and 2004. The 2005 balance sheet audit resulted in a "clean" opinion with no material weaknesses found; that is, "The balance sheet as of September 30, 2005, is presented fairly, in all material respects, in conformity with accounting principles generally accepted in the United States of America."

### **Transportation Information Project Support Contract**

The Transportation Information Project Support (TRIPS) Contract was awarded to the Computer Sciences Corporation (CSC). The TRIPS Contract, valued at \$178 million, was awarded on February 7, 2006, and became effective May 1,

2006, following a 90-day transition period. The contract is an indefinite delivery/indefinite quantity (IDIQ) contract with a maximum period of performance of five years. It is a performance-based contract with cost-plus-award fee and firm-fixed price provisions. The TRIPS Contract serves as a key component of the Volpe Center's staffing strategy by providing high-caliber information systems and information technology professionals capable of meeting the Center's programmatic requirements.

### **Work Acceptance Website**

A "Work Acceptance" subsite on the Volpe Intranet site was developed and posted this year. The home page contains a description of the Work Acceptance process, including the criteria that must be met in order for work to be accepted by the Volpe Center. The site describes how funding is received from sponsors by means of a Project Plan Agreement (PPA) under a General Working Agreement or through a Reimbursable Agreement (RA), explains what documentation is needed to obtain Work Acceptance approval, and provides points of contact to consult when there are questions about preparation of a PPA or an RA. Separate links take the PPA/RA initiator immediately to the section of the website that explains the preparation process and provides links to templates, samples, and forms. The Work Acceptance website is continually monitored so that all posted information and documentation is kept up to date.

### **New Incentive Awards Program**

The Volpe Center made considerable progress in meeting government requirements in a more cost-effective manner. A union/management team developed a new incentive awards program that complements the recently implemented Volpe Center Performance Appraisal System. The incentive awards program implements a true pay for performance system consistent with the goals of the President's Management Agenda for Human Capital. The program minimizes the amount of paperwork and effort required to

initiate and approve Performance Awards and Quality Salary Increases.

### **Recruitment of High-Caliber Technical Staff**

In support of the President's Management Agenda and the Volpe Center Strategic Goals and Business Plan, several Human Resources (HR) initiatives were undertaken to attain a flexible and diverse workforce with the technical skills and competencies to support the Center's core business capabilities and provide a pipeline of future leaders.

- Two SES Office Directors, one Deputy Office Director, and seven Division Chief positions were filled on a permanent basis.
- Recruitment efforts are underway to fill two Deputy Office Director positions and seven Division Chief positions.
- Standard evaluation factors were developed for Technical Division Chief positions to streamline the recruitment processes and ensure that required competencies were measured effectively.
- The approval criteria that Center managers apply to external recruitment and/or internal promotion of nonsupervisory GS-14/15 positions were revised. This ensures that the Center's core business capabilities are properly measured.
- HR staff worked closely with the FHWA Automated Staffing Unit to use "Category Rating" as a pilot program within DOT for recruiting Division Chief and nonsupervisory technical positions. The program is designed to increase the number of candidates provided to selecting officials who fit the Center's business model. Category Rating was used in the recruitment process to fill four Division Chief vacancies, seven technical vacancies, and pending selections of a Deputy Director and a Division Chief.

### **Management/Technical Staff Development and Succession Planning**

Human Resources/Human Capital initiatives have been integral to achieving the Center's Business Plan and Strategic Goals, which in turn

support the Department's Organizational Excellence Goal and the PMA goal for the Strategic Management of Human Capital.

In support of the Center's Strategic Goal to Continuously Develop the Center's Human Capital, the expected outcomes are high-caliber and high-performing employees and improved employee engagement. The HR support to these goals resulted in:

- Providing approximately one-third of the Center's training budget for Project Management Certification training and training on the enterprise project management system
- Developing and implementing a revitalized management and executive development program, which included rolling out a new Pre-Leadership Development Program for employees at the GS-12 and GS-13 levels whereby approximately 40 employees competed for 12 slots
- Articulating the structure and progression of the Center's management succession plan, which includes components of filling positions, developing management and leadership skills, and accountability through performance management.

The design and implementation of each of these activities involved integrating best practice research, union and management interests, and goals and inputs from employee surveys.

### **Small Business Administration's Small Business Program Surveillance Review**

Representatives from the Small Business Administration (SBA) conducted a Small Business Program Surveillance Review at the Volpe Center in July 2006 under the authority of the Small Business Act in order to assess the quality of our small business program, evaluate our small business program's impact on small business, enable the SBA to recommend changes to improve small business participation in our acquisition process, and share effective techniques that the Volpe Center uses to promote small business participation with other contracting activities as applicable. The SBA review team reviewed a representative sample of

27 Volpe Center contractual files, which were previously identified by the SBA out of the possible 98 files available for review. At the Surveillance Review Exit Briefing with senior management, the SBA review team leader stated that the Volpe Center's Small Business Program was excellent and the Volpe Center should be very proud of this accomplishment. The SBA review team leader also stated that he had conducted many reviews in his 15 years with the SBA and that the Volpe Center had the *best contracting activity* he and his team had ever reviewed.

### **Transportation Safety Institute e-Gov Assistance**

Representatives from the Volpe Center assumed responsibility for transitioning the Transportation Safety Institute (TSI) to the Department's PRISM system. TSI had been using FAA's contract document generation system ACQUIRE, but it was advised that the system would be retired and thus no longer available beginning in April 2006. TSI contacted the Volpe Center and asked for our assistance in setting up the PRISM system for its use. An interagency agreement was entered into between TSI and the Volpe Center under which the Center would provide the following services: conduct a site survey to identify PRISM training needs and system requirements; establish a TSI subsite to PRISM; arrange and execute training for TSI acquisition staff and requisitioners; provide PRISM system administration. As a result of these efforts, there was a smooth, efficient, transfer from TSI's legacy software to the Department's PRISM system. The Director of TSI presented the principal participant of the Volpe Center team with a certificate of appreciation in which describes them as "very enthusiastic" and "highly competent." This was accomplished with little lead time.

### **Enhanced Systems Security Posture**

During FY 2006, the Volpe Center implemented major system and process improvements to enhance its overall Information Technology (IT) security posture. Improvements included installation of new Symantec Intrusion

Prevention Systems (IPS) and implementation of comprehensive IT system vulnerability scanning identification and remediation procedures. High vulnerabilities of the Volpe Center IT system are now effectively resolved in accordance with DOT guidelines more than 99 percent of the time.

### **Real Property Management**

In support of Presidential Executive Order 13327, Federal Property Management, Volpe Center staff is working as part of two DOT groups developing DOT real property reporting guidelines and real estate management policy. The Volpe Center will be responsible for keeping the real property database called the Real Estate Management System (REMS) current for RITA until a replacement is chosen for RITA's real property manager. As a result of a third-party review of Volpe Center Facilities Division financial information in FY 2006, the General Services Administration determined that the Volpe Center is following proper real estate management practice. It was determined that the Volpe Center is currently charging 25 percent less for its space than the DOT pays for its Nassif building headquarters space in Washington, DC.

### **Human Capital Survey**

On January 31, the Volpe Center Executive Council and NAGE Union announced the establishment of a Volpe Center Human Capital Advisory Group (HCAG) as a joint labor and management endeavor. The HCAG, whose members represent a wide perspective of interests and backgrounds from across the Center, is empowered to recommend workforce management strategies and actions based on research and employee feedback on the Center's work environment, which will contribute to maximizing organizational performance.

The HCAG's major accomplishment thus far has been the development and administration of a Center Human Capital Survey in June to assess the level of engagement of employees and to assist in identifying performance management strategies that drive employee performance

effectively. The survey focused on specific human capital levers that drive employee performance and retention: Leadership and Communication, Work Environment and Operations, Performance Culture, Job Satisfaction, and Career Development and Training. Center employees' support of the HCAG is indicated by the impressive 50 percent survey participation rate. In turn, the HCAG's commitment to keep staff updated on its progress is demonstrated by its ongoing and candid communications, which include a webpage; updates on the survey results, interim actions, and next steps; and an all-employee briefing in September. The HCAG will be holding focus groups to further explore issues and solicit solutions, which will be formalized in the Center's FY 2007/08 Business Plan.

### **Reducing Energy Cost Increases**

FY 2006 began with a 50 percent increase in the price of electricity, an 11 percent increase in building occupants and computers, and pressure to sign on to a costly ten-year contract with the Center's unregulated steam supplier. In response, the Center accelerated energy cost-saving initiatives through (a) energy conservation, (b) electricity price market timing, and (c) steam supply alternatives. This required collaboration between the administration, Facilities, and Acquisition divisions, as well as the cooperation and support of the RITA Federal, contractor, and DOT tenant employees occupying the Volpe Center facility.

For conservation, the Center (1) lowered the temperature two degrees during the heating season; (2) replaced inefficient motors and pumps that move water to our cost-effective cooling towers and chillers; (3) replaced or weather-stripped all outside doors in the largest building; (4) encouraged employees to shut off lights and periodically reported back to all occupants on monitored results; (5) provided computer users with information on energy-saving "sleep" modes and accelerated energy-efficient replacement of processors, monitors, and printers; (6) eliminated one of the three vehicles in the motor pool; (7) promoted the

Charles River Transportation Management Association voluntary ride-sharing and the "emergency ride home" services; (8) promoted the Center's "transit benefit" and "teleworking" programs; and (9) improved the Center's parking for bicycles and motorcycles.

Faced with post-Katrina panic buying of gas used to produce electricity, the Center lowered its electricity contract cost increase by getting GSA approval to be the sole agency to delay signing of the Boston-area Federal electricity contract. As a result, the Center's electricity price was five percent lower than even that of the biggest local Federal agency.

To improve the negotiation position with the current monopoly supplier of steam, the Center obtained GSA-delegated authority to negotiate a long-term steam contract while simultaneously preparing detailed plans for producing its own steam at a net savings of 35 percent.

The energy conservation and market timing initiatives saved the Center about \$130K (11 percent of total energy costs) in FY 2006 and helped reduce the energy that employees used for commuting. The development of a practical "steam production alternative" should result in additional net cost avoidance of about \$150K annually beginning in FY 2008.



# Volpe Center Customers

## Thanks to Our Fiscal Year 2006 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 Materials Safety  
Administration  
Research and Innovative Technology  
Administration  
Transportation Safety Institute  
Saint Lawrence Seaway Development Corporation  
Surface Transportation Board

### **Other Federal**

Central Intelligence Agency  
Defense Threat Reduction Agency  
Department of Agriculture  
U.S. Forest Service  
Department of Commerce  
National Oceanic and Atmospheric  
Administration  
Department of Defense  
U.S. Air Force  
U.S. Army  
U.S. Navy  
Department of Health and Human Services  
Centers for Disease Control and Prevention  
Department of Homeland Security  
Transportation Security Administration  
Federal Emergency Management Agency  
U.S. Coast Guard  
Department of the Interior  
Bureau of Indian Affairs  
National Park Service  
Environmental Protection Agency

National Aeronautics and Space Administration  
U.S. Postal Service

### **State and Local**

California Department of Transportation  
City of Baltimore, Department of Transportation  
City of Boston, Massachusetts  
City of Flagstaff, Arizona  
City of St. George, Utah Municipal Airport  
District of Columbia, Department of  
Transportation  
Fairfax County, Virginia  
Georgia Department of Transportation  
Maine Department of Transportation  
Massachusetts Bay Transportation Authority  
Massachusetts Port Authority

### **Foreign Entities**

Airservices Australia  
DFS Germany  
NAV CANADA  
United Kingdom Ministry of Defence

### **Other Customers**

American Public Transportation Association  
INOVA Fairfax Hospital (Honda)  
Lower Manhattan Development Corporation  
Alliance of Automobile Manufacturers  
Sensis Corporation  
Wake Forest University (Toyota)



# DOT Secretary's Award Ceremony, November 10, 2005

## Volpe Center Recipients

### Individual Awards

#### Secretary's Award for Meritorious Achievement

Silver Medal: Annalynn Lacombe

#### Secretary's Award for Excellence

Gregg W. Hollenbeck

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

John D. Smith

#### Secretary's Award for Volunteer Service

John B. Hopkins

### Team Awards

#### Competitive Sourcing

Ina E. Armstrong  
Donna M. Brickley  
Michael N. Coltman  
Susan M. Connors  
David M. Daley  
Mary E. Doherty  
Harry F. Dondero  
Robert M. Dorer  
MaryBeth Hines  
Lydia J. James  
Merle A. Kalenoski  
Susan M. Killoren  
Elaine T. Lyte  
Danielle E. Mogolesko  
Marilyn M. Mullane  
John P. O'Donnell  
Joyce M. Ranney  
Carmen L. Rickenback  
Brunilda G. Santos  
Elizabeth C. Speranza  
Jeanne E. Fuller—retired  
John S. Hitz—retired  
Peter J. Jones—retired  
Sheila J. MacLean—deceased

#### Hurricanes Katrina and Rita Emergency Response

Terrance M. Sheehan  
John C. Brewer  
McCharles A. Craven  
Ryan Cummings  
Jonathan A. Jerome  
Michelle A. Priante  
William R. Sullivan  
Matthew D. Rabkin  
Alison R. Shedd  
Natasha Arnapolskaya  
Frances B. Fisher  
Gerard J. Flood  
Robert J. Hallett  
Matthew B. Isaacs  
David W. Jackson  
Melissa M. Laube  
Elizabeth C. Machek  
Tashi G. Ngamdung  
Steven M. Peck  
Theresa M. Perrone  
Lauren A. Piccolo  
Eric J. Plosky  
Carson Poe  
Benjamin K. Rasmussen  
Gary T. Ritter  
David J. Spiller

#### Amtrak Acela Brake Disc

Brian P. Marquis