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

Research, Development and Technology Annual Funding Fiscal Years 2007-2009

A Report to Congress

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1. Purpose of Report

The Department of Transportation (DOT) Research, Development and Technology (RD&T) program fosters innovations leading to effective, integrated, and intermodal transportation solutions. Through RD&T, the Department anticipates and responds to changes in the complex transportation environment and stimulates innovations on behalf of the American public.

As stated in Section 5201 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), RD&T is a basic Federal responsibility when:

- It is of national significance.
- There is a clear public benefit and private sector investment is less than optimal.
- It supports a stewardship role in assuring the efficient use of Federal resources.
- It presents the best means to support national policy goals.

The National Surface Transportation Policy and Revenue Study Commission recently reinforced the critical role of Federal transportation RD&T leadership, setting "Research, Development, & Technology: A Coherent Transportation Research Program for the Nation" as one of ten program areas in which Federal surface transportation investment should be concentrated. The Commission stated:

> *Research plays an essential role in the development of technology and science. It has made possible much of the progress in transportation over the last century through the development of new materials, production methods, design and planning tools, and data management techniques. The Federal role in transportation research, development, and technology (RD&T) is particularly vital because . . . The Federal government is best suited to monitor the vast scope of research activities underway across the Nation and the world, targeting funds to research gaps.*[1]

The Department's *RD&T Annual Funding Report* describes actual and proposed funding for RD&T as required by SAFETEA-LU Section 5208(a). The programs included in this report meet the criteria listed above and support both DOT strategic goals and the RD&T strategies identified in the Department's *Transportation RD&T Strategic Plan 2006-2010*.[2]

[1] *Transportation for Tomorrow*, National Surface Transportation Policy and Revenue Study Commission, December 2007, p.31.
[2] http://www.rita.dot.gov/publications/transportation_rd_t_strategic_plan/

This Fiscal Year (FY) 2009 edition of the *RD&T Annual Funding Report* consists of the following sections:

Section 2. A Department-wide overview of RD&T funding for the period FY 2007 through FY 2009.

Section 3. The RD&T funding in DOT's research-performing operating administrations.

Section 4. The Department's strategy for ensuring the effectiveness and performance of its RD&T programs.

Appendix A. Detailed 3-year funding tables for operating administration RD&T programs.

Appendix B. Operating administration support for DOT goals.

Appendix C. The RD&T strategies identified in DOT's *Transportation RD&T Strategic Plan 2006-2010*.

Appendix D. The acronyms used in the report.

2. RD&T Funding Overview

The Department's RD&T program supports both national goals and the unique mission requirements of the following DOT research-performing offices and administrations:

- Federal Aviation Administration (FAA)
- Federal Highway Administration (FHWA)
- Federal Motor Carrier Safety Administration (FMCSA)
- Federal Railroad Administration (FRA)
- Federal Transit Administration (FTA)
- National Highway Traffic Safety Administration (NHTSA)
- Office of the Secretary of Transportation (OST)
- Pipeline and Hazardous Materials Safety Administration (PHMSA)
- Research and Innovative Technology Administration (RITA)

This section of the *RD&T Annual Funding Report* presents an overview of the Department's RD&T budget for FY 2007 through FY 2009, including a breakdown by types of research and support for DOT strategic goals.

Funding Summary

Table 1 and Figure 1 on the following page show actual and requested RD&T funding for FY 2007–2009. The total FY 2009 request is up approximately 12 percent from the actual level in FY 2007 and about 7 percent from FY 2008. Within the operating administrations, RD&T funding is down compared to FY 2008, with the exception of FAA, FHWA, and RITA. The largest percentage reductions are in OST (27 percent); PHMSA (22 percent); and FMCSA (13 percent). The greatest percentage increase is in FAA's request, which is 23 percent higher than the actual level in FY 2008 to support development of the Next Generation Air Transportation System (NextGen). The FY 2009 requests from FHWA and RITA are 6 percent higher. About 80 percent of the Department's entire FY 2009 request will support RD&T in FAA and FHWA.

Section 3, Appendix A, and Appendix B provide additional details on RD&T funding within the operating administrations.

Table 1. RD&T Funding Summary ($000)

Operating Administration	FY 2007 Actual	FY 2008 Enacted	FY 2009 Request
FAA	261,510	299,461	369,324
FHWA[3]	554,195	544,964	577,394
FMCSA	12,458	11,584	10,122
FRA	37,304	38,574	36,722
FTA	61,700	66,372	61,097
NHTSA	113,329	116,144	110,089
OST	14,893	13,884	10,105
PHMSA	11,751	11,014	8,674
RITA	2,695	9,633	10,237
Total	**1,069,835**	**1,111,630**	**1,193,764**

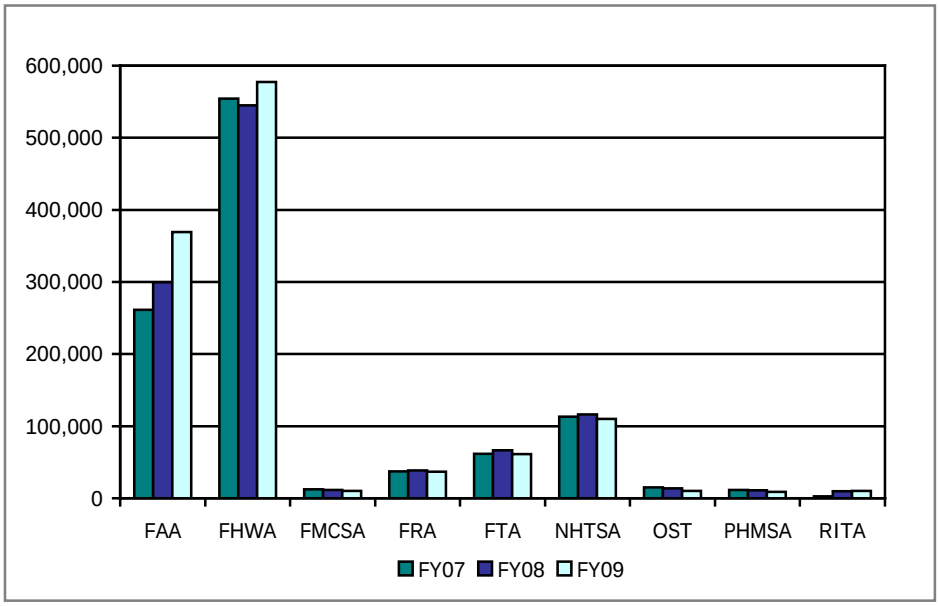

Figure 1. RD&T Funding FYs 2007–2009 ($000)

[3] Of the FHWA total request for FY 2009, 42 percent is under the stewardship of FHWA. The remaining 58 percent includes $110 million for Intelligent Transportation Systems and $69.7 million for University Transportation Centers, both of which are administered by RITA, as well as $156.2 million for State Planning and Research, which are Federal-Aid Highway funds apportioned to the States for research.

RD&T Funding by Research Activity

The Department's RD&T request comprises the following three types of activities:

Research and Development (R&D). Includes basic research (research without a specific application); applied research (research to support a specific need); and developmental research (design, development, and improvement of prototypes and processes).

Technology Investment. Comprises demonstration projects and other related activities associated with R&D.

Facilities. Acquisition, design, construction, and repair of physical facilities used for R&D.

Figure 2 shows the breakdown of RD&T funding by these budget categories.

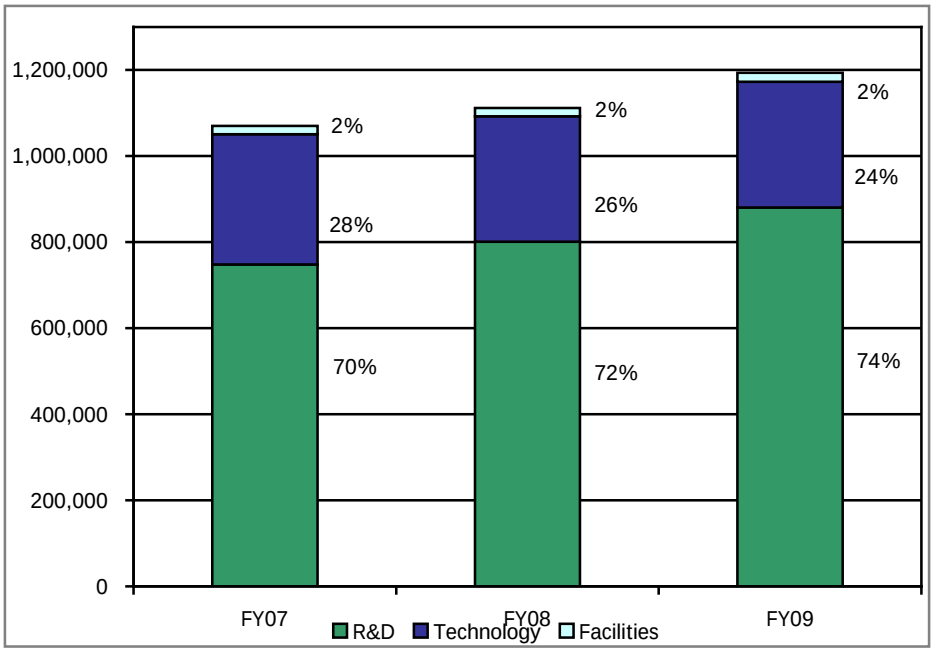

Figure 2. RD&T Funding by Research Activity ($000)

Funding within these categories has been fairly constant over the 3-year period covered by this report, with 70 to 74 percent for R&D, 24 to 28 percent for technology investment, and 2 percent for facilities. In FY 2009, 74 percent of the FY 2009 RD&T request ($881 million) is for R&D, including basic and applied research; 24 percent ($292 million) for technology demonstrations and related efforts; and 2 percent ($21 million) for upgrading or maintaining the Department's research facilities.

Support for DOT Strategic Goals

In addition to overseeing their respective transportation sectors, DOT's operating administrations share a commitment to advancing DOT goals and the RD&T strategies identified in the *Transportation RD&T Strategic Plan* (see Appendix C).[4] Figure 3 shows the portion of the FY 2009 RD&T request that will address each DOT goal.

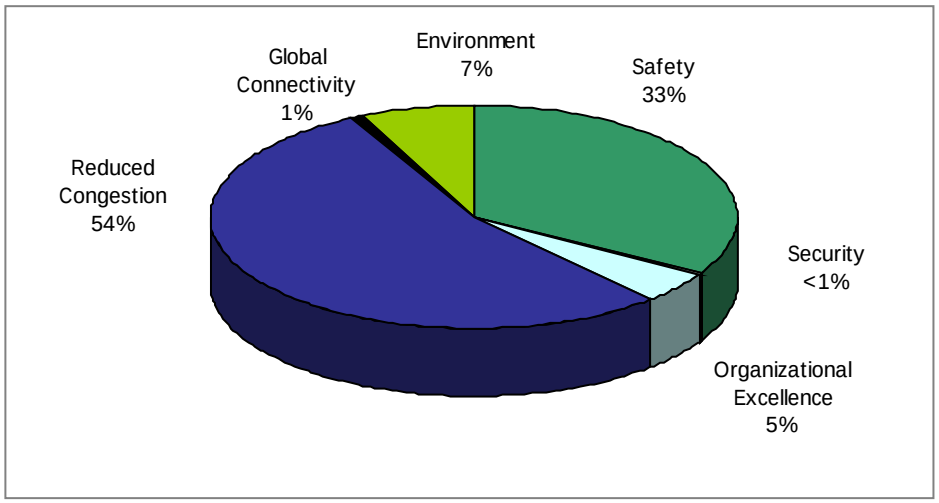

Figure 3. FY 2009 RD&T Request by DOT Goal

Over half of the FY 2009 request supports DOT's reduced congestion goal, a total of $645 million. Thirty-three percent, or $397 million, supports safety RD&T. Environmental stewardship accounts for 7 percent of the request, or $81 million, and organizational excellence for 5 percent, or $58 million. Global connectivity totals 1 percent of the RD&T request, or about $10 million. Security RD&T represents less than 1 percent, or $3 million. Section 3 and Appendix B provide further details on operating administration RD&T support for DOT goals.

[4] http://www.rita.dot.gov/publications/transportation_rd_t_strategic_plan/

FY 2009 Highlights: Crossmodal RD&T

Intelligent Transportation Systems (ITS) ($110M). The DOT's largest crossmodal initiative, this program supports the advancement of ITS through investments in major initiatives, exploratory studies, and deployment support. Increasingly, the ITS program targets investments to initiatives that have the potential for significant payoffs in terms of improving safety, reducing congestion, and enhancing productivity. Under the policy direction of RITA, the ITS Joint Program Office leads the program and coordinates activities among FHWA, FMCSA, FRA, FTA, and NHTSA. The current program is organized around nine major R&D initiatives and the Deployment Support Program. The Major Initiatives are large multi-year programs focused on a particular transportation issue with specific milestones and end goals. The Deployment Support Program consists of several programs all focused on providing the necessary tools, guidance, and training to support the deployment and operation of ITS by State and local governments.

University Transportation Centers (UTC) Program ($77M). Managed by RITA and funded by FHWA and FTA, the UTC program conducts basic and applied research to advance the body of knowledge in transportation; supports education programs to expand the transportation workforce; and provides capacity building to transportation professionals. SAFETEA-LU authorized the most significant expansion of the program to date, increasing funding and the number of UTCs from 33 to 60. In FY 2009 the Department will sponsor workshops to showcase UTC research and produce an annual report describing program accomplishments.

Human Factors ($48M). The DOT Human Factors Coordinating Committee identifies and coordinates human factors research and ensures the appropriate application of the science of human factors to the design, development, implementation, and evaluation of transportation systems. Involving work in FAA, FHWA, FMCSA, FRA, and NHTSA, human factors RD&T in FY 2009 will address the development of guidelines, tools, and training to enhance error capturing and mitigation capabilities in the flight deck and maintenance environments; safety benefits of driver-assistance technologies; reducing alcohol- and drug-impaired driving, speeding, and aggressive driving and increasing use of occupant restraints; commercial vehicle driver factors that may increase crash risk; human factors issues associated with use of the Highway Driving Simulator; and introduction of the Human Systems Integration processes and techniques into rail operations.

Hydrogen Fuels and Safety R&D ($7M). Led by RITA and coordinated by DOT's Hydrogen Working Group, this initiative supports RD&T needed to safely and reliably transition the transportation system to a hydrogen economy. Involving research in FAA, FHWA, FTA, NHTSA, OST, and RITA, the program addresses hydrogen safety, operational reliability, security, transportation, and distribution, in cooperation with other agencies and with university and industry partners. Funding in FY 2009 will support the following activities: developing guidelines for the design and operation of hydrogen delivery and transport systems; conducting research on fuel cell vehicle system performance including crash, leakage, and electrical isolation detection; addressing policy issues associated with hydrogen infrastructure, safety codes, and standards; and conducting research to develop and evaluate non-destructive testing and safety inspection technologies for a hydrogen economy.

Remote Sensing ($6.8M). The Department's remote sensing program develops new applications of commercial remote sensing and spatial information technologies for use in infrastructure development and construction. Managed by RITA and funded by FHWA, the program will establish a national policy for and validate applications of these technologies in cooperation with a consortia of university research centers, industry partners, and State agencies. Work in FY 2009 will focus on new methods for monitoring the quality of infrastructure construction and condition assessment; application of space-based technology tools for freight flow management and congestion mitigation; and new and faster methods of collecting data for corridor planning and environmental impact assessment.

3. Operating Administration Funding Details

This section of the *RD&T Annual Funding Report* presents additional information on RD&T funding in each of the Department's research-performing administrations, including 3-year funding trends and support for DOT strategic goals. Detailed funding tables are in Appendix A and Appendix B.

Federal Aviation Administration

The FAA's mission is to provide the safest, most efficient aerospace system in the world. Key elements are the regulation of civil aviation and commercial space transportation activities to promote safety and the safe, efficient, environmentally sound use of airports and airspace by civil and military users. This broad mission requires an extensive RD&T program carried out in cooperation with industry, academia, other Federal agencies, and international partners. Program components include research in space and air traffic system technology, aviation weather products, airport technology, aircraft safety, commercial space transportation safety, human factors, and environment and energy.

Funding Trends FY 2007–2009

Figure 4 shows FAA RD&T funding for the 3-year period covered by this report. Funding details are in Appendix A. (For FY 2009 Air Traffic Organization includes Facilities and Equipment and some expenses related to Operations from the FY 2008 request.) The figure reflects the structure of FAA's RD&T budget and includes the program components described above.

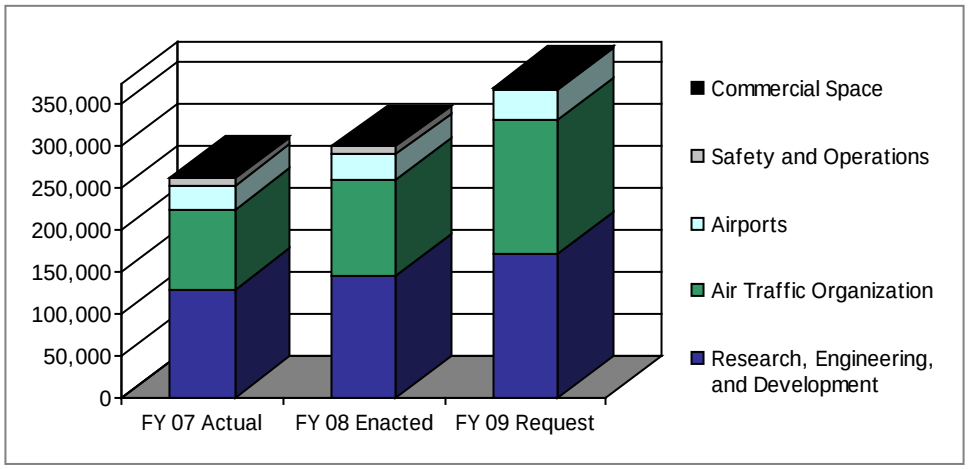

Figure 4. FAA RD&T Funding ($000)

As shown, FAA's FY 2009 RD&T request is up $108 million (41 percent) compared to actual FY 2007 funding and up $69 million (23 percent) from FY 2008. Air Traffic Organization (formerly Facilities and Equipment) RD&T funding is up $47 million (41 percent) compared to FY 2008, in large part reflecting the inclusion of funding for NextGen system development, demonstrations, and infrastructure development. Funding for Research, Engineering and Development (RE&D) is up $24 million (16 percent) compared to FY 2008, also reflecting the inclusion of funding to support the NextGen program. Airport RD&T is also up $5.6 million (20 percent).

Support for DOT Goals

Figure 5 shows how FAA's FY 2009 RD&T request will support DOT strategic goals. As shown in the figure, 42 percent of FAA RD&T will support improved safety; another 42 percent, reduced congestion; 10 percent, environmental stewardship; and 6 percent, organizational excellence. Details for FAA RD&T programs are in Appendix B.

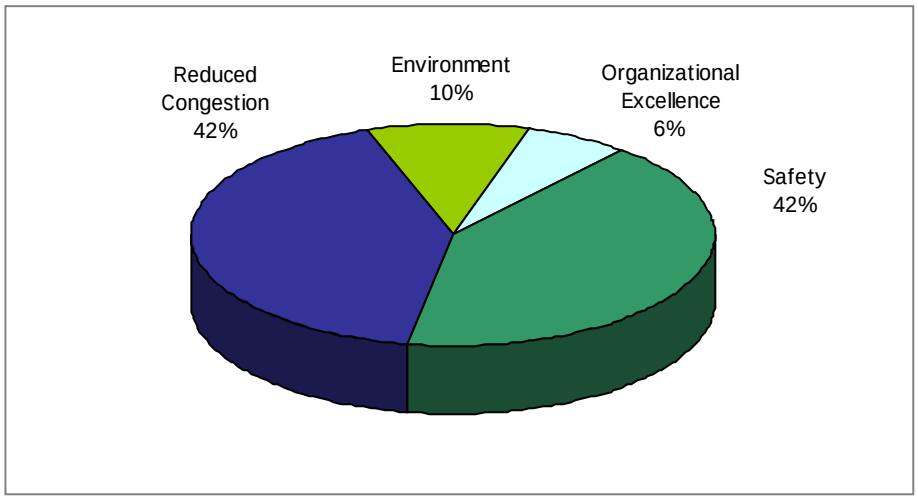

Figure 5. FAA RD&T Request by DOT Goal

FAA RD&T Accomplishments and Highlights

FY 2007 Accomplishments

Fast, Flexible, Efficient. Completed delivery of new Advisory Circular 150/5320-6E "Airport Pavement Design and Evaluation" and developed a new pavement design program, the FAA Rigid and Flexible Iterative Elastic Layer Design 1.0.

Clean and Quiet. Completed demonstration of a comprehensive suite of environmental software tools; demonstrated a methodology to consider alternative-fuels lifecycle emissions.

Human Factors, Human-Centered Design, and Human Protection. Completed human factors design of new en route controller workstations; developed performance standards for air traffic controller occupations; and completed assembly and baseline fire testing of a New Large Aircraft fire test mock-up at Tyndall Air Force Base.

Safe Aerospace Vehicles. Initiated new program on four unmanned aircraft system technical areas.

Situational Awareness. Completed research on Light Emitting Diode (LED) versus incandescent light source brightness perception to ensure visibility.

System Knowledge. Completed series of simulation studies employing different techniques to validate the "Big Airspace" concept.

FY 2009 Highlights

Aviation Safety. $115 million for research, including the development of improved fire safety test criteria; a focus on damage tolerance and fatigue issues of composite airframes; and the use of Aviation Safety Information Analysis and Sharing to analyze aircraft hazards.

Airport Technology. $34 million to support completion of a demonstration of an information-based cockpit display for the engine lubrication system and to continue FAA/NASA/industry-sponsored quality control program for modeling aircraft problems; includes $15 million for the Airport Cooperative Research Program, which carries out applied research on problems shared by airport operating agencies.

Wake Turbulence. $10 million to support the incorporation of wake transport/decay and aircraft navigation performance analysis results into FAA wake encounter and collision risk models and to complete two airport-specific procedure modifications to enable dependent instrument landing system approaches to closely-spaced parallel runways; the program has additional funding from NextGen.

Environment and Energy. $15 million to conduct research and to develop, verify, and validate analytical tools to better understand the relationship between noise and emissions, and different types of emissions, to provide cost-benefit analyses; deliver Version 3.0 of models; develop new standards and methodologies to quantify noise, emissions, and alternative-fuels impacts; and assess impacts of new technologies and operations.

NextGen. A total of $97.9 million, including $16 million to complete a detailed feasibility study for "drop-in" gas turbine engine fuels; initiate efforts to explore the potential for renewable gas turbine fuels for commercial applications; develop a detailed plan to achieve NextGen environmental goals; and establish a consortium for Continuous Low Energy Emissions and Noise Technologies (CLEEN).[5]

[5] NextGen includes the following budget line items: Joint Planning and Development Office ($14.5 million); NextGen-related Wake Turbulence research ($7.4 million); NextGen -- Air Ground Integration ($2.6 million); NextGen -- Self Separation ($8 million); NextGen -- Weather in the Cockpit ($8 million); NextGen -- Environmental Research ($16 million); and NextGen -- System Development ($41.4 million).

Federal Highway Administration

The FHWA's mission is to improve mobility on our Nation's highways through national leadership, innovation, and program delivery. One of the agency's key roles is to be an innovator for a better future. Toward this end, FHWA provides leadership, expertise, and resources to continually improve the quality of the highway system and its intermodal connections. Cooperating with States and other partners, the agency coordinates Federal highway programs and conducts supporting research in highway safety, pavement and structures, congestion relief, planning, and the environment. Among the agency's major highway programs are the Federal-Aid Highway Program, which provides financial assistance to States to construct and improve the National Highway System, urban and rural roads, and bridges, and the Federal Lands Highway Program, which provides access to and within national forests, national parks, Indian reservations, and other public lands.

Funding Trends FY 2007–2009

Figure 6 shows FHWA RD&T funding for the 3-year period covered by this report. Funding details are in Appendix A.

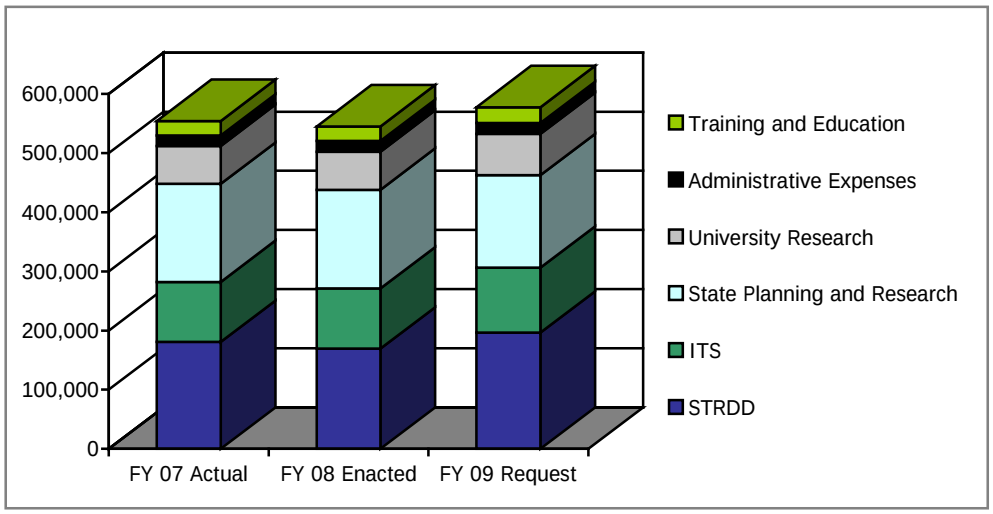

Figure 6. FHWA RD&T Funding ($000)

The FHWA's FY 2009 request is up 4 percent compared to actual FY 2007 funding, from $554 to $577 million, reflecting the funding levels authorized in SAFETEA-LU.
The FY 2009 request is up $32 million (6 percent) from enacted FY 2008 funding of $545 million. Of the total request for FY 2009, just $241.5 million (42 percent) is under FHWA stewardship: $196.4 million for Surface Transportation Research, Development, and Deployment (STRDD); $26.7 million for Training and Education; and $18.4 million for Administrative Expenses. RITA administers the ITS Program ($110 million) and the University Transportation Centers ($69.7 million), which together account for 31 percent of FHWA's FY 2009 RD&T request. Another $156.2 million, or 27 percent, reflects the share of State Planning and Research apportionments that States must allocate for RD&T.

Support for DOT Goals

Figure 7 shows how FHWA's FY 2009 RD&T request will support DOT goals. The request will support all goals, with an emphasis on reduced congestion (75 percent) and safety (13 percent). Other supported goals include environmental stewardship (6 percent); organizational excellence (5 percent); and global connectivity (1 percent). Less than 1 percent of the RD&T budget will address security, preparedness, and response. Additional details are in Appendix B.

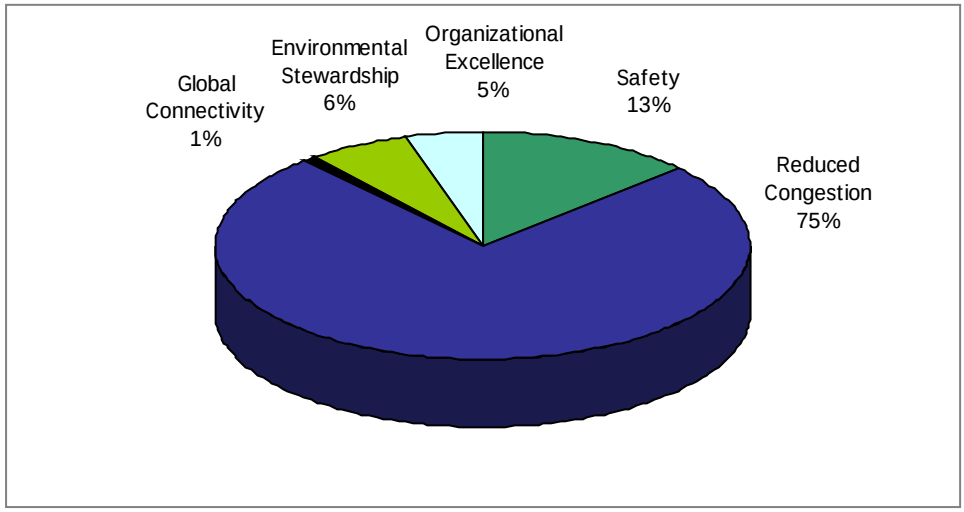

Figure 7. FHWA RD&T Request by DOT Goal

FHWA RD&T Accomplishments and Highlights

FY 2007 Accomplishments

Infrastructure. Incorporated requirements for the Long-Term Bridge Performance (LTBP) program into the LTBP strategic plan and tactical roadmap; led the establishment of an Executive Committee to guide a collaborative approach to concrete pavement research; and initiated research to achieve a performance-based concrete pavement mix design system.

Planning, Environment, and Realty. Developed initiative to conduct applied research to field test an ecosystem approach to developing infrastructure projects; completed research on congestion management process improvements and the Mobile Sources Air Toxics Near Roadway Dissemination protocol.

Operations. Completed four field tests for a reduced-scale version of the Adaptive Control System (ACS), ACS "Lite," and facilitated the commercial introduction of ACS Lite products for deployment; published a new edition of the Traffic Detector Handbook.

Highway Safety. Completed research supporting the final rule for Maintaining Traffic Sign Retroreflectivity; released two new intersection analysis software tools; and completed and released finite element models for three vehicles and two materials (wood and concrete).

Exploratory Advanced Research. Awarded eight projects through a competitive broad area announcement, which resulted in 384 proposals.

FY 2009 Highlights

Structures Research. $25.6 million to address the development and application of advanced materials and accelerated construction technologies and improve the resilience of the built highway infrastructure.

Pavement Research. $40.8 million for research to advance the national pavement technology agendas in the areas of concrete, hot mix asphalt, and pavement preservation and for the Long-Term Pavement Performance program.

Planning, Environment, and Realty. $19.5 million for the Surface Transportation Environment and Planning Cooperative Research Program, TRansportation ANalysis SIMulation System, Center for Environmental Excellence, and other research initiatives authorized in SAFETEA-LU.

Operations. $7.8 million to improve mobility through the development and testing of tools for integrated corridor operations and congestion-relief solutions.

Highway Safety. $13.6 million for safety research, development, and technology deployment, including ongoing field evaluations of non-traditional intersections/ interchanges; public release of SafetyAnalyst software to identify system-wide safety improvements; ongoing development of pedestrian detection system; and completion of Phase IV of low-cost safety improvements.

Strategic Highway Research Program (SHRP) 2. $44.7 million to fund continuing SHRP 2 research through the National Academy of Sciences.

Exploratory Advanced Research. $12.2 million for longer term, higher risk research with the potential for dramatic breakthroughs in surface transportation.

Federal Motor Carrier Safety Administration

The FMCSA's mission is to reduce the number and severity of commercial motor vehicle crashes. The agency's research and technology program supports this mission through the discovery, application, and dissemination of new knowledge, and the assessment, development, and promotion of new technologies. The program addresses the safety performance of drivers, carriers, and vehicles and also includes crosscutting projects relating to crash problem assessment and program support.

Funding Trends FY 2007–2009

Figure 8 shows FMCSA RD&T funding for the 3-year period covered by this report. Funding details are in Appendix A.

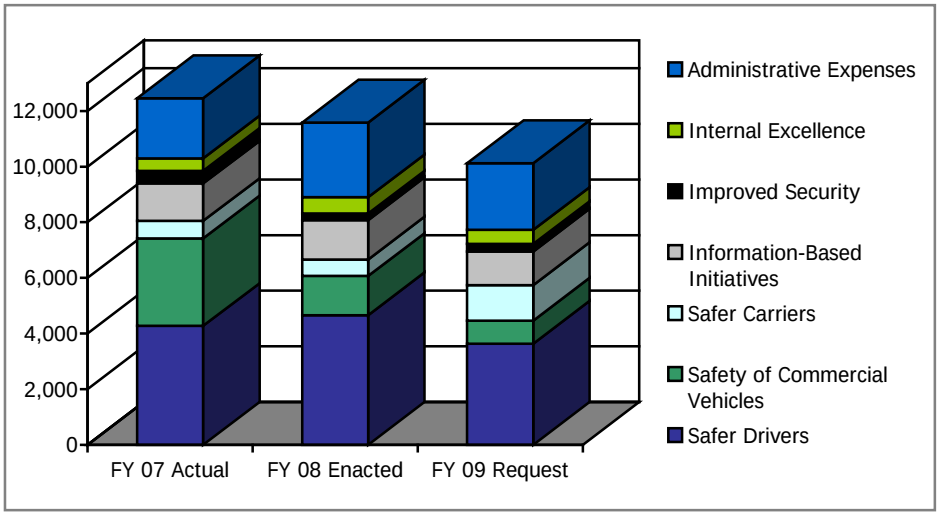

Figure 8. FMCSA RD&T Funding ($000)

The FMCSA's RD&T request is down $2.3 million (19 percent) compared to actual FY 2007 funding and $1.4 million (13 percent) compared to FY 2008. Compared to FY 2008, funding is down $0.6 million (41 percent) for improved safety of commercial vehicles, while funding for safer carriers is more than twice that of FY 2008, marking a shift of emphasis to RD&T activities aimed at the safety of motor carriers.

Support for DOT Goals

Figure 9 shows how FMCSA's FY 2009 RD&T request will support the Department's strategic goals. Eighty-three percent of the agency's RD&T funding will address improved safety. Other supported goals include organizational excellence (7 percent); reduced congestion (6 percent); and security, preparedness, and response (4 percent). Details for FMCSA RD&T programs are in Appendix B.

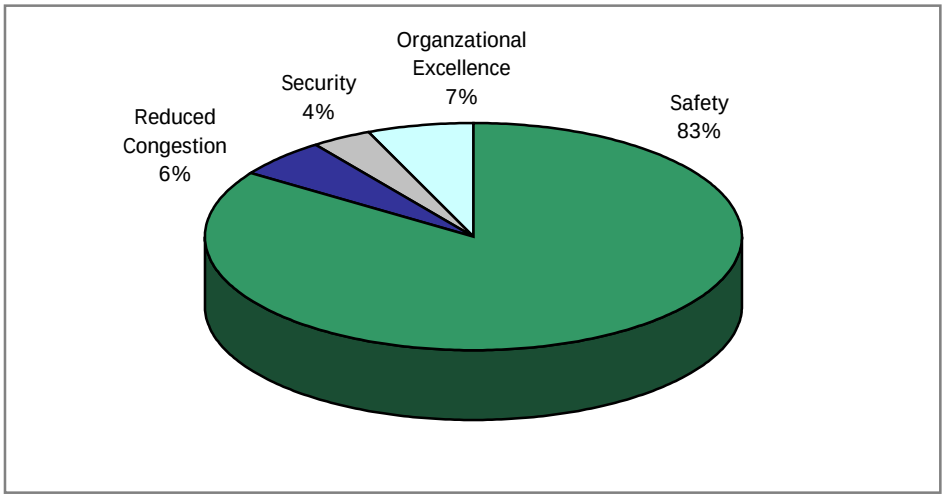

Figure 9. FMCSA RD&T Request by DOT Goal

FMCSA RD&T Accomplishments and Highlights

FY 2007 Accomplishments

Produce Safer Drivers. Completed the first phase of an Onboard Monitoring System for Commercial Motor Vehicles (CMVs); partnered with the National Institute of Occupational Safety and Health to survey driver working conditions, injuries, and diseases.

Improve the Safety of CMVs. Completed a study that provided alternative strategies for reducing rollovers crashes; completed a study to improve safety belt use; and completed a study that gathered and analyzed information on the causes, frequency, and severity of bus fires.

Advance Safety through IT Initiatives. Continued the Commercial Vehicle Information Systems and Networks (CVISN) Deployment Grant Program providing technical and program management support to States; awarded $25 million in grants to 26 States; certified 4 additional States as completing core CVISN deployment (total of 18 States); completed a pilot test of software intended for detecting and deterring fraud perpetrated by third-party and State motor vehicle examiners.

Enable and Motivate Internal Excellence. Completed a study that highlighted important trends affecting the motor carrier industry and DOT.

FY 2009 Highlights

Produce Safer Drivers. A request of $3.6 million to identify driver risk factors in crashes with a large-scale case control study; analyze Large Truck Crash Causation and naturalistic driving data to gain a better understanding of the precursors to different crash types and their prevention; complete a prototype system that can detect and warn drowsy drivers; compare the effectiveness of applying alternative instructional technologies in behavioral training programs to prevent hazmat cargo tank rollovers; develop a low-cost, easily-installed device to increase safety belt use; examine implementation of the Employer Notification Service; report the safety benefits of a wireless inspection network; and accelerate the identification and demonstration of new roadside safety technologies and operational concepts to provide real-time parking information.

Improve Safety of Commercial Motor Vehicles. $828K to increase deployment and use of systems and technologies that address safety and security needs; use technology solutions as a means to monitor and evaluate carrier performance; and test and evaluate an all-weather indirect viewing system with 360-degree vision capability.

Produce Safer Carriers. $1.3 million to provide continued research support for rulemaking activities; determine the root causes of bus fires; and generate specific recommendations for preventing incident recurrences.

Federal Railroad Administration

The FRA's mission is to promulgate and enforce railroad safety regulations; administer financial assistance programs to railroads, including Amtrak; conduct research in support of improved railroad safety, operational efficiency, asset utilization, and capacity; foster the development of high-speed-rail passenger service; and consolidate government support of rail transportation activities. The FRA's RD&T covers railroad system issues (safety, security, environment); human factors; rolling stock and components; track and structures; track/train interaction; train control; grade crossings; hazardous materials; train occupant protection; and R&D facilities and equipment.

Funding Trends FY 2007–2009

Figure 10 shows FRA RD&T funding for the 3-year period covered by this report. Funding details are in Appendix A.

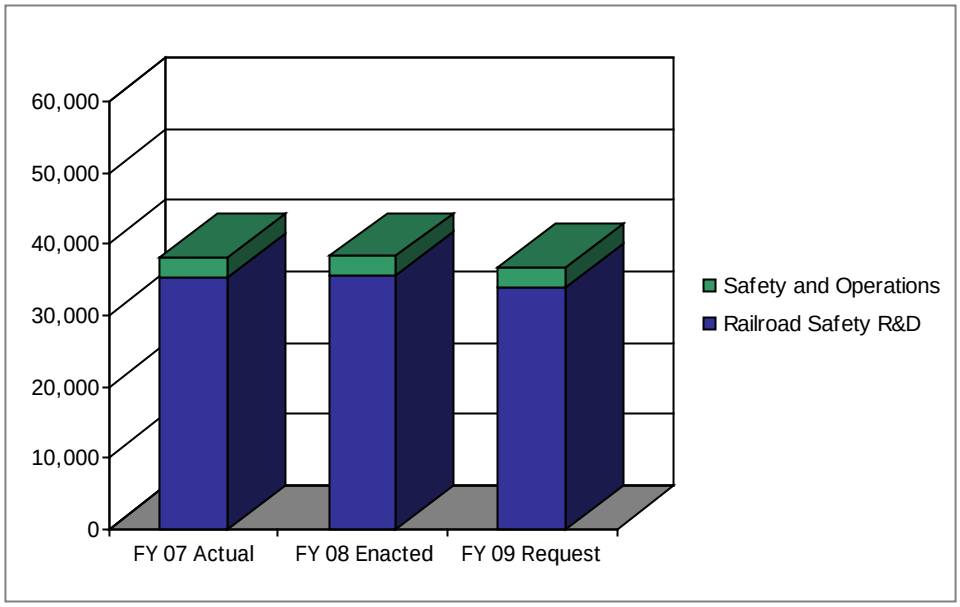

Figure 10. FRA RD&T Funding ($000)

For FY 2009, FRA's total RD&T request of $36.7 million is down $0.6 million (1.5 percent) compared to FY 2007 and $1.8 million (5 percent) from FY 2008. In large part, the reduction in RD&T funding is due to a decrease in research for train occupant protection and the completion of several congressionally designated projects. Funding is up for rolling stock and components, track and structures, and train control, with the largest increase for rolling stock and components research ($6.3 million, or 22 percent).

Support for DOT Goals

Figure 11 shows how FRA's FY 2009 RD&T request will support DOT strategic goals. As shown, FRA will direct 92 percent of RD&T funding to railroad safety but will also support reduced congestion (5 percent); environmental stewardship (2 percent); and security, preparedness, and response (1 percent). Details for FRA RD&T programs are in Appendix B.

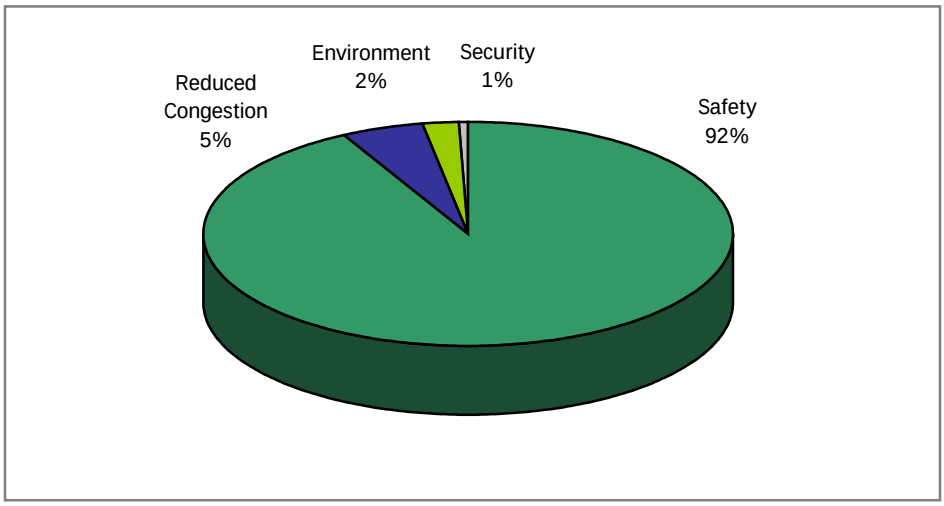

Figure 11. FRA RD&T Request by DOT Goal

FRA RD&T Accomplishments and Highlights

FY 2007 Accomplishments

Railroad System Issues. Unveiled a "Rollover Rig" that simulates passenger train derailments and began development of a passenger egress model.

Human Factors. Completed validation of the Fatigue Avoidance Scheduling Tool and initiated a pilot test site for the Confidential Close Call Reporting System.

Rolling Stock and Components. Installed Onboard Condition Monitoring System equipment and other advanced components for the Advanced Concept Train.

Track and Structures. In cooperation with the railroad industry, conducted several experiments to improve the safety of rails, ties, switches, fasteners, and bridges.

R&D Facilities & Equipment. Completed facility enhancements to permit testing and qualification of new passenger rail equipment.

Track and Train Interaction. Developed a model that simulates railroad vehicle–track dynamics to study various derailment scenarios and conditions.

Train Control. Began development of a software-defined High Accuracy Nationwide Differential Global Positioning System receiver for use in Positive Train Control (PTC).

Grade Crossings. Awarded several grants for the closure and upgrading of crossings.

Hazardous Materials Transportation. Supported development of new safety rules for the construction of tank cars carrying hazardous materials.

Train Occupant Protection/Locomotive Crashworthiness. Supported industry in the development of Crash Energy Management standards.

FY 2009 Highlights

Railroad System Issues. $3.2 million to address railroad system safety, tank car protection, emergency equipment, energy efficiency, and environmental impacts.

Human Factors. $3.5 million for R&D on human performance and system design.

Rolling Stock and Components. $3.5 million to continue support of the Advanced Concept Train, which showcases technology to enhance safety and efficiency in train operations.

Track and Structures. $4.5 million for further studies on rail and bridge structural integrity, rail defect detection, and track inspection and monitoring.

Track and Train Interaction. $3.1 million for R&D on derailment dynamics and modeling.

Train Control. $6.7 million for continued advancement of PTC, including the development of a low-cost collision avoidance system.

Grade Crossings. $1.9 million to make further grade crossing safety improvements.

Hazardous Materials Transportation. $1.6 million for critical research on tank car structural integrity and security.

Train Occupant Protection and Locomotive Crashworthiness. $3.6 million to continue work in locomotive crashworthiness and the crashworthiness of passenger equipment.

Federal Transit Administration

The FTA's mission is to ensure personal mobility and community vitality by supporting high-quality public transportation. The agency accomplishes its mission through leadership, financial resources, and technical assistance. Research is focused on analyzing potential solutions to transit challenges, evaluating and testing best practices and technologies, and working with the transit industry to implement research solutions that are found to have significant return on investment. Conducted in partnership with the broader transit community, FTA research focuses on increasing transit ridership, improving safety and emergency preparedness, improving capital and operating efficiency, and protecting the environment and promoting energy independence.

Funding Trends FY 2007–2009

Figure 12 shows FTA RD&T funding for the 3-year period covered by this report. Funding details are in Appendix A.

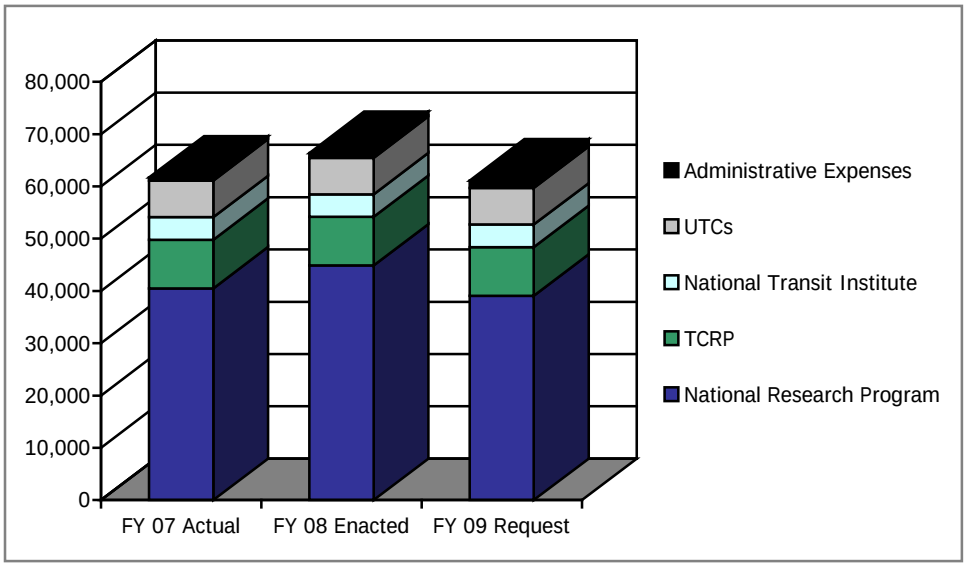

Figure 12. FTA RD&T Funding ($000)

As the figure shows, there is little change between request FTA's FY 2009 request and the FY 2007 actual level (a drop of 1 percent). Funding is down $5.3 million (8 percent) compared to the enacted level FY 2008. In particular, overall funding for the National Research Program is down 13 percent compared to FY 2008. Within this program, funding is down for efforts aimed at increasing transit ridership and improving capital and operating efficiency, and is up for programs to improve safety and emergency preparedness and to promote transit research leadership. Funding has been stable for FTA's other major RD&T programs—the Transit Cooperative Research Program (TCRP) and the National Transit Institute.

Support for DOT Goals

Figure 13 shows how FTA's FY 2009 RD&T request will support DOT strategic goals. RD&T will support all goals, with an emphasis on reducing surface transportation congestion (75 percent). Thirteen percent will address safety; 9 percent, environmental stewardship; and 1 percent each, global connectivity, organizational excellence, and security, preparedness, and response. Additional details are in Appendix B.

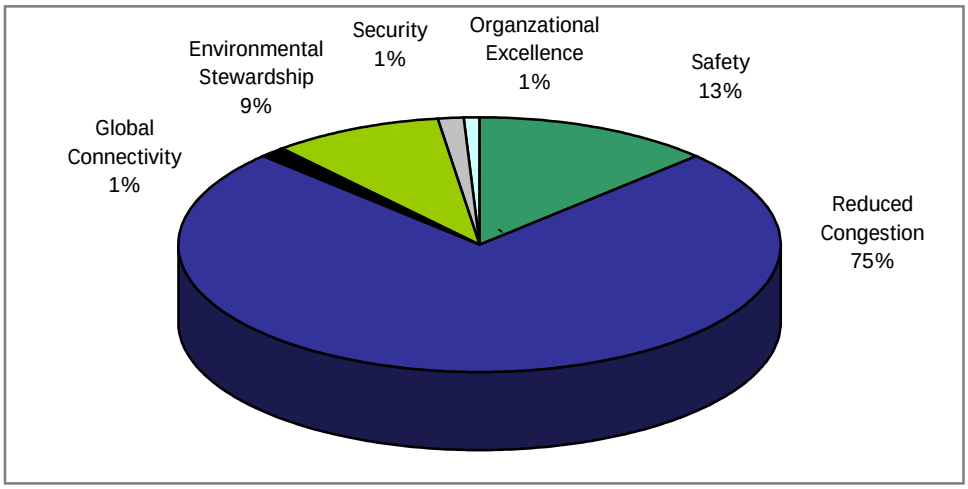

Figure 13. FTA RD&T Request by DOT Goal

FTA RD&T Accomplishments and Highlights

FY 2007 Accomplishments

New Program Implementation. Initiated projects awarded to the Center for Transportation and the Environment (Atlanta, Georgia), the Northeast Advanced Vehicle Consortium (Boston, Massachusetts), and Westart/CALSTART (Pasadena, California) under the National Fuel Cell Bus Program; awarded a total of more than $2.7 million to eight sites for the design and development of coordinated human services transportation systems that use ITS capabilities as part of the Mobility Services for All Americans initiative.

Delivering Products, Innovations, and Techniques. Among other activities, completed an analysis of the business case for integrated collision avoidance systems on transit buses, a construction project management handbook, and an examination of the useful life of transit buses and vans.

Protecting the Environment and Promoting Energy Independence. Completed three major studies of alternative fuels and transit, including Alternative Fuels Study: A Report to Congress on Policy Options for Increasing the Use of Alternative Fuels in Transit Vehicles; Environmental Benefits of Alternative Fuels and Advanced Technology in Transit; and Transit Bus Life Cycle Cost and Year 2007 Emissions Estimation.

FY 2009 Highlights

Increasing Transit Ridership. A request of $8.3 million to develop transportation solutions for aging and specialized populations and to improve mobility and reduce surface transportation congestion through improved transit services.

Improving Capital and Operating Efficiency. $14.1 million for RD&T to improve transit operational efficiency; control capital and operating costs; improve planning and management of capital investments; enhance workforce capacity; improve bus and rail operations, including Bus Rapid Transit; and develop voluntary design, safety, and performance standards.

Improving Safety and Emergency Preparedness. $8.4 million for research to improve fire safety on transit vehicles; prepare transit systems, emergency service agencies, and local, county, and regional governments for emergency situations; provide greater oversight in responding to emergency requests; and identify solutions to reduce the number of transit-related deaths and injuries.

Protecting the Environment and Promoting Energy Independence. $5.3 million for data collection and outreach to reduce barriers to deploying electric, hybrid, hydrogen, and fuel cell buses; research on technologies to reduce the energy consumption of rail systems; development of environmental streamlining guidance and best practices; and DOT's Center for Climate Change.

National Highway Traffic Safety Administration

The NHTSA's mission is to save lives, prevent injuries, and reduce economic costs due to road traffic crashes through education, research, safety standards, and enforcement activities. In the behavioral area, NHTSA focuses on the delivery of data-driven programs and countermeasures aimed at increasing use of occupant protection, reducing alcohol-related fatalities, reducing motorcycle fatalities, promoting effective speed management, prolonging older driver mobility as long as medically practicable, and maintaining the integrity of driver licensing processes. With respect to vehicle safety, NHTSA's research supports rulemaking, enforcement, and safety defect investigations and assesses the lifesaving benefits of emerging technologies as they enter the vehicle fleet.

Funding Trends FY 2007–2009

Figure 14 shows NHTSA RD&T funding for the 3-year period covered by this report. Funding details are in Appendix A.

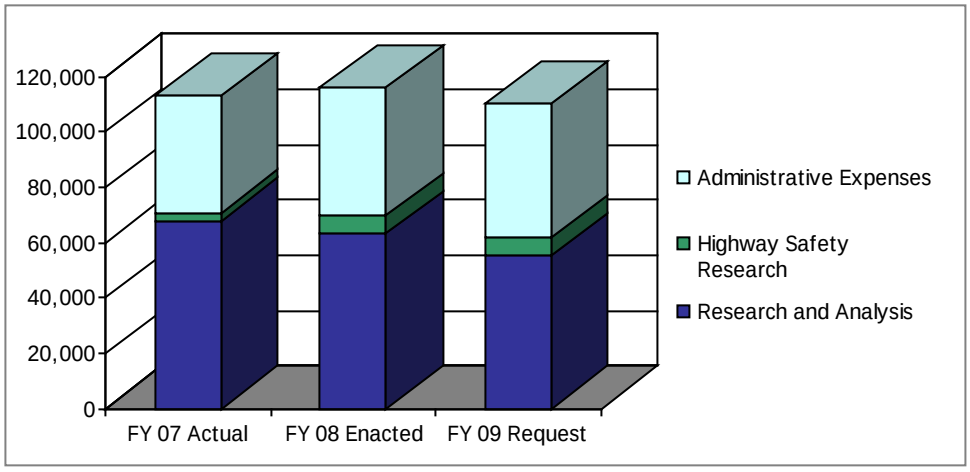

Figure 14. NHTSA RD&T Funding ($000)

For FY 2009 NHTSA's RD&T request is up $3.2 million (3 percent) compared to FY 2007 and down $6.1 million (5 percent) from FY 2008. The Research and Analysis program, which conducts vehicle-safety-related research, is down $6 million (5 percent) in FY 2009 compared to the FY 2008 enacted level. This decrease is in large part due to the elimination of funding for the National Motor Vehicle Crash Causation Survey and a reduction in funding for hydrogen research.

Support for DOT Goals

In keeping with NHTSA's mission, all FY 2009 RD&T funding will support the Department's safety strategic goal. (See Appendix B.)

NHTSA RD&T Accomplishments and Highlights

FY 2007 Accomplishments

Vehicle Safety Systems. Initiated safety studies for crash imminent braking and advanced frontal restraint systems; evaluated test procedures for rollover safety and rollover restraint performance.

Biomechanics. Developed new chest injury evaluation methods based on crash dummy measurements; enhanced knowledge of brain-injury mechanisms using new research and analysis tools; and fully implemented biomechanical-based methodology to assign injury mechanisms in crash injury field investigations.

Heavy Vehicles. Completed initial performance testing of heavy vehicle stability control systems, performance specifications for electronic vision enhancement technology, and field operational testing of a collision warning/advanced braking system.

FY 2009 Highlights

Vehicle Safety Systems. $6.8 million to complete ejection mitigation fleet benefits testing and initiate test development for evaluating advanced frontal restraint systems and crash-imminent braking.

Biomechanics. $11 million for multidisciplinary research programs on human impact and injury responses of major body regions; to finalize design and injury criteria for child side impact dummy; to implement enhancements to advanced adult frontal impact dummy; and to evaluate human modeling programs for assessment of injury.

Heavy Vehicles. $2.1 million to complete truck tractor stability control research, continue single unit truck and motorcoach research, and continue a field test of an advanced vision enhancement system to reduce truck blind spots and resulting collisions.

Office of the Secretary

The OST's mission is to formulate national transportation policies that affect various modes and help ensure achievement of DOT goals. Research in OST supports the development, evaluation, and improvement of these policies and comprises work in economic and strategic analysis; safety, energy, and environment; freight and logistics; navigation and spectrum policy; aviation and international policy; and security. Key priorities include improving the economic efficiency of the transportation system; encouraging diffusion of best practices in transportation safety; improving the sustainability of transportation through market-based solutions and new technologies; developing financial strategies to accelerate economic investment in freight capacity; and encouraging the development of civilian positioning, navigation, and timing applications.

Funding Trends FY 2007–2009

Figure 15 shows OST RD&T funding for the 3-year period covered by this report. Funding details are in Appendix A.

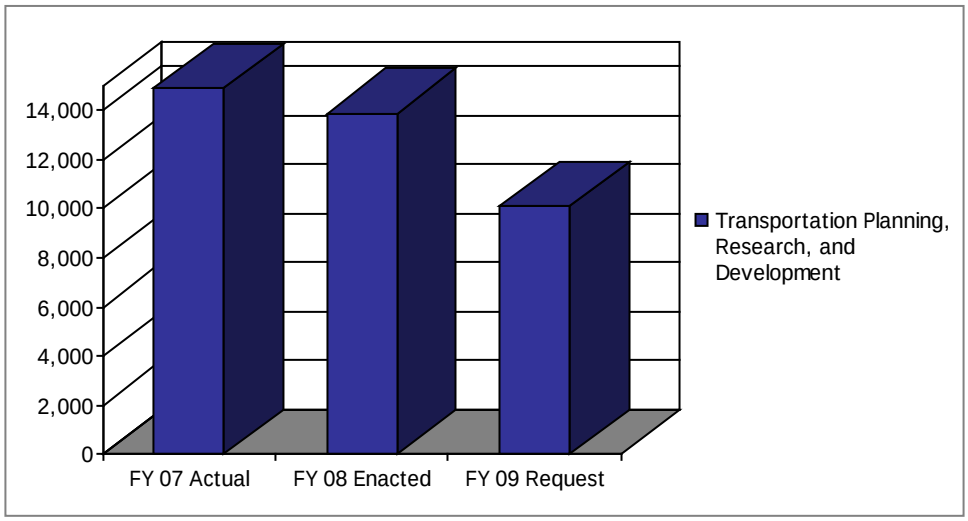

Figure 15. OST RD&T Funding ($000)

As the figure shows, requested FY 2009 funding for OST's Transportation Planning, Research, and Development (TPR&D) program is lower than both the actual level in FY 2007, with a difference of $4.8 million (32 percent), and the enacted level in FY 2008, with a reduction of $3.8 million (27 percent).

Support for DOT Goals

Figure 16 shows how OST's FY 2009 RD&T request will support DOT strategic goals. In keeping with the office's broad responsibilities, RD&T will address the following: global connectivity (31 percent); reduced congestion (26 percent); safety (21 percent); environmental stewardship (19 percent); and security, preparedness, and response (3 percent). Additional details are in Appendix B.

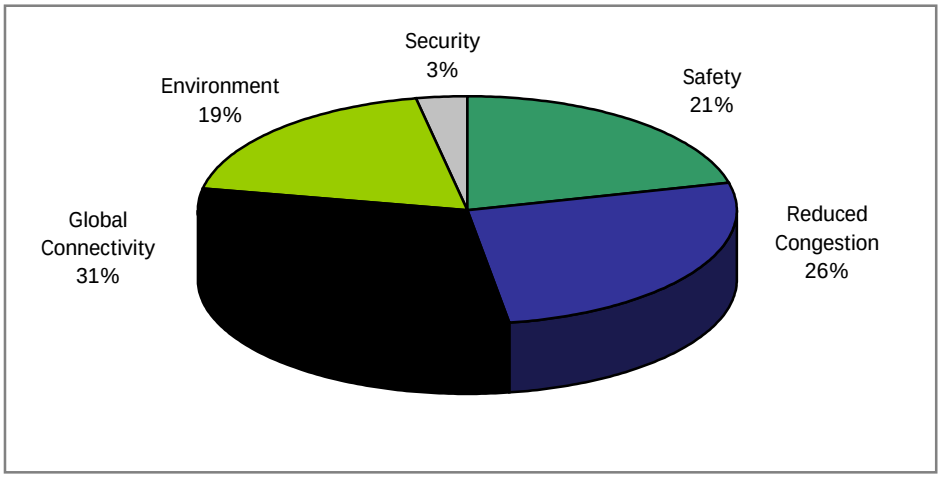

Figure 16. OST RD&T Request by DOT Goal

OST RD&T Accomplishments and Highlights

FY 2007 Accomplishments

Fuel Economy and Congestion Pricing. Conducted research aimed at understanding the fuel consumption and the impact of emissions from congestion in order to define the energy and environmental effects of congestion and congestion mitigation programs.

Economic Benefits of Tolled or Priced Roads to the Trucking Industry. Studied the issues of congestion relief and the perceived costs and benefits that may arise through the use of dedicated or mixed-use toll road facilities through the lens of the trucking industry.

Economic trade-offs of Exclusive Truck Lanes (ETL), High-Occupancy Toll (HOT), and General Purpose (GP) Highway Lanes. Conducted research to determine the comparative economic benefits of the addition of HOT/ETL facilities and the addition or expansion of GP lanes.

FY 2009 Highlights

Transportation Economics Center. $500K to support research, sponsor conferences, and conduct training in the application of economic principles and theories to solving transportation problems and resource allocation.

Environmental Analysis. $350K for the analysis of transportation environmental issues, including the effects of transportation on climate change and air quality, policy tools to help manage the environmental impacts of transportation, the effects of new ozone air quality standards on transportation, and the implications of new energy and emissions reduction technologies.

Fuels Analysis: $400K for study of alternative fuel infrastructure to support the President's Twenty in Ten renewable fuels proposals, the fuel and emissions costs of congestion, benefits of congestion mitigation, and monitoring of ethanol freight flows.

Research on Remote Right-of-Way Intrusion Detection for Pipelines. $400K for research conducted by the Texas Transportation Institute to develop remote sensors that can detect excavations and/or leaks in pipeline rights-of-way.

Aviation Data Modernization. $1M to update and enhance the Nation's airline traffic and financial data collection system to improve aviation infrastructure planning and aviation policy analysis.

Pipeline and Hazardous Materials Safety Administration

The PHMSA's mission is to promote the safe and secure transportation of hazardous materials by all modes. The agency has two major safety offices: the Office of Pipeline Safety, which promotes the safe, reliable, and environmentally sound operation of pipeline transportation; and the Office of Hazardous Materials Safety, which identifies, evaluates, and mitigates risks to the safe and secure transportation of hazardous materials. The RD&T program includes work in mission-critical areas, such as pipeline operations, control, and monitoring; pipeline damage prevention; improved pipeline materials; hazardous materials packaging and shipping; hazardous materials emergency response, hazard identification, risk assessment, and risk management; and hazardous materials transportation security.

Funding Trends FY 2007–2009

Figure 17 shows PHMSA RD&T funding for the 3-year period covered by this report. Funding details are in Appendix A.

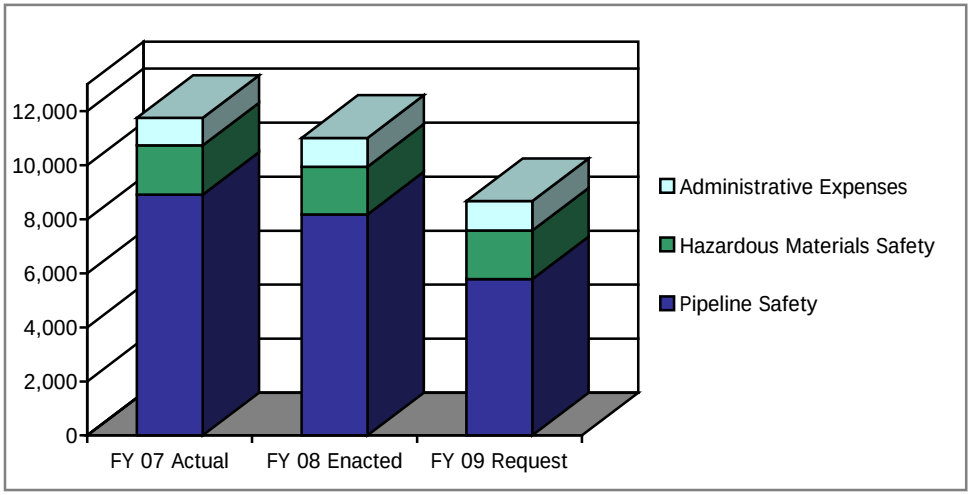

Figure 17. PHMSA RD&T Funding ($000)

For FY 2009, PHMSA's total RD&T request is $3.1 million less (26 percent) than the actual level for FY 2007 and $2.3 million less (21 percent) than FY 2008. This reduction in RD&T funding is due primarily to a $2.4 million decrease in the agency's pipeline safety research program, representing a 29 percent drop for FY 2009 compared to FY 2008.

Support for DOT Goals

Figure 18 shows how PHMSA's FY 2009 RD&T request will support DOT strategic goals. Primary emphasis will be on RD&T in support of improved safety (79 percent), with additional efforts supporting Departmental goals for environmental stewardship (19 percent) and reduced congestion (2 percent). Details for PHMSA RD&T programs are in Appendix B.

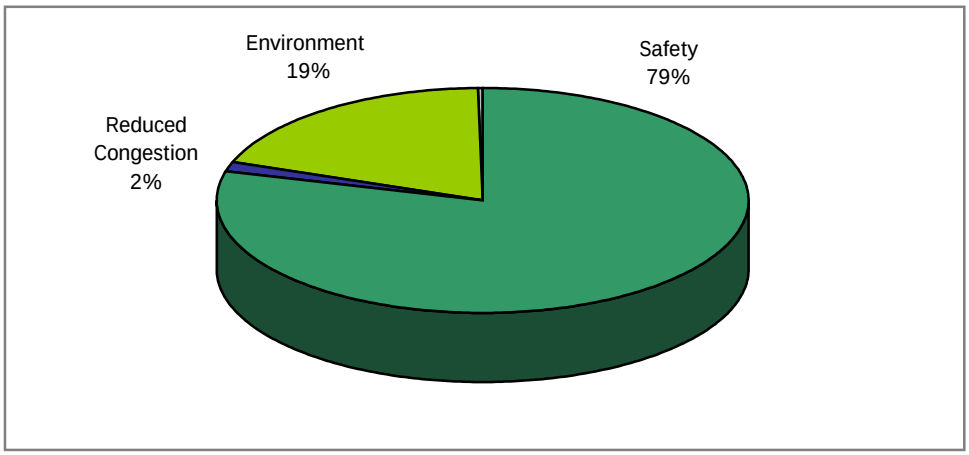

Figure 18. PHMSA RD&T Request by DOT Goal

PHMSA RD&T Accomplishments and Highlights

FY 2007 Accomplishments

Government/Industry Pipeline RD&T Forum. Held a forum on February 7-8 to develop an agenda to address technical gaps and challenges and to identify short- and long-term research objectives for liquid/gas transmission and gas distribution pipelines.

Pipeline Safety RD&T Projects. $4.6 million for eleven RD&T projects addressing improvements in weld design and construction practices for high-strength steel pipe; weld inspection, assessment, repair, and maintenance; and joint integrity and assessment for nonmetallic materials.

Pipeline Safety RD&T Project Peer Reviews. Held the second structured peer review for compliance with OMB's "Final Information Quality Bulletin for Peer Review" of influential scientific information.

Pipeline Safety Small Business Innovation Research Projects. Awarded three Phase I projects ($.3 million) for innovative safety, reliability, and inspection technologies for pipeline system integrity management.

Hazardous Materials Transportation Safety. Supported development of the 2008 Emergency Response Guidebook; Acute Exposure Guideline Levels; and nondestructive testing techniques and failure analysis for hazardous materials packaging.

Hazardous Materials Cooperative Research Program. Continued with second year of this four-year pilot program being administered by the Transportation Research Board.

FY 2009 Highlights

Pipeline Safety. A total request of $5.8 million, including demonstrations to commercialize ongoing successful technology developments; research to further address excavation damage prevention; direct assessment; defect detection and characterization; defect remediation, repair, and mitigation; and a comprehensive roadmap to remove technical barriers for biofuels and other alternative fuels.

Hazardous Materials Transportation Safety. A total request of $1.8 million for new or follow-on research to enhance hazardous materials transportation safety and continue the pilot or the Hazardous Materials Cooperative Research Program.

Research and Innovative Technology Administration

The RITA's mission is to coordinate and review the Department's RD&T programs and to advance technologies that will reduce congestion and improve safety and system performance across the Nation's transportation network. The agency accomplishes the RD&T components of this mission by leading crossmodal research in areas such as hydrogen safety, ITS, remote sensing technologies, and positioning, navigation, and timing systems; planning, reviewing, and coordinating RD&T Department-wide; leading the Department's RD&T Planning Council and RD&T Planning Team; managing the UTC program and the ITS Joint Program Office; overseeing the Volpe National Transportation Systems Center and the Transportation Safety Institute; and managing the Bureau of Transportation Statistics, which plays a key role in gathering and improving the quality of the aviation, freight, and passenger flow data so critical for Departmental decision-making and priority-setting.

Funding Trends FY 2007–2009

Figure 19 shows RITA RD&T funding for the 3-year period covered by this report. Funding details are in Appendix A.[5]

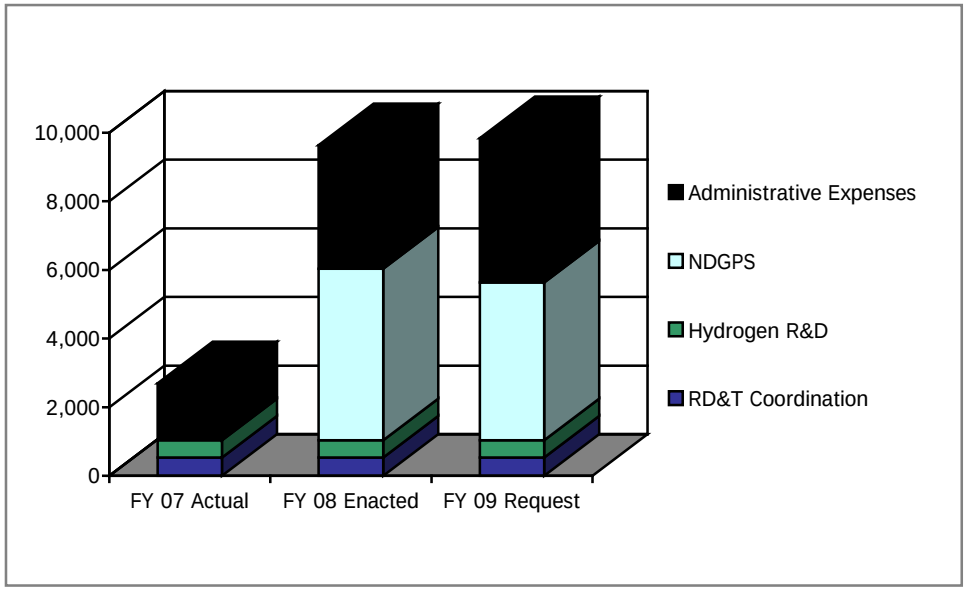

Figure 19. RITA RD&T Funding ($000)

The FY 2009 RD&T request for RITA is up $7.4 million from FY 2007 and up slightly from the enacted level in FY 2008. Funding for RD&T projects has remained stable between FY 2008 and FY 2009, with a slight increase in the request for RD&T-related administrative expenses.[6]

[5] For FY 2009, NDGPS includes two separate line items: NDGPS and Positioning, Navigation, and Timing.

[6] In addition to the RD&T programs in RITA's RD&T budget, RITA administers the ITS Program (funded through FHWA) and UTC Program (funded through FHWA and FTA).

Support for DOT Goals

Figure 20 shows how RITA's FY 2009 RD&T request will support DOT strategic goals. The majority of RITA's RD&T activities will support DOT goals for reduced congestion (49 percent) and organizational excellence (46 percent), with additional efforts supporting environmental stewardship (5 percent). Details for RITA RD&T programs are in Appendix B.

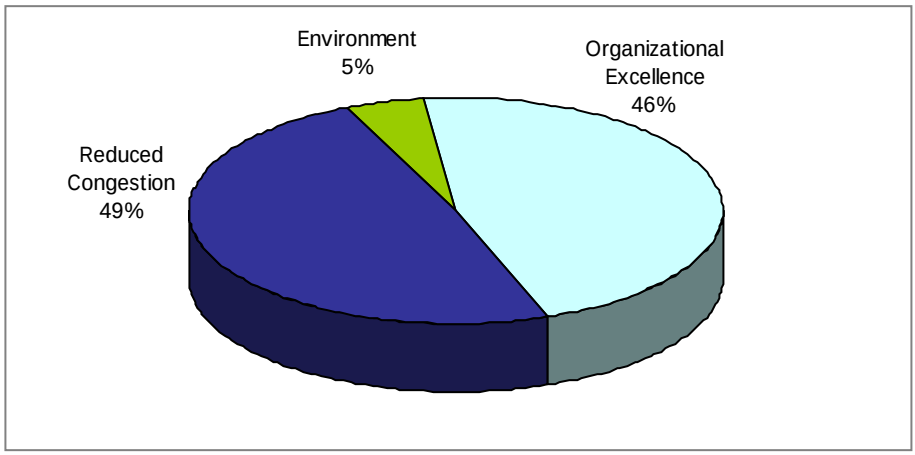

Figure 20. RITA RD&T Request by DOT Goal

RITA RD&T Accomplishments and Highlights

FY 2007 Accomplishments

RD&T Coordination. Furthered the implementation of DOT Order 1120.39A on the Research, Development, and Technology Planning Council, Team, and Process, including completing the FY 2008 *RD&T Annual Funding Report to Congress*; identifying crossmodal RD&T priorities; reviewing operating administration RD&T budgets to assess support for Secretarial priorities; and leading annual program reviews to assess how modal priorities align with DOT goals.

Hydrogen Fuels Safety R&D. Developed a joint R&D plan for hydrogen transportation infrastructure with DoD; coordinated and completed the interagency assessment on Regulations for a Hydrogen Economy and published the corresponding Federal Register Notice; and engaged Missouri S&T as a University Transportation Center to develop a thermo-mechanical composite cylinder model to assess localized flame impingement on compressed gas cylinders.

FY 2009 Highlights

RD&T Coordination. $0.5 million to continue enhancing Department-wide coordination by focusing DOT's efforts to increase evaluation and measurement activity; continue implementation of RITA's research investment planning process to ensure that the right mix of investments meets DOT's goals, to foster collaborative RD&T portfolio management, and to advise the Secretary on budgetary implications of RD&T investment decisions; conduct multiple stakeholder workshops supporting crossmodal research priorities and emerging technologies; establish communications guidelines to strengthen collaboration/coordination across DOT and share information with University Transportation Centers, Centers of Excellence, and other entities; continue providing staff support to the RD&T Planning Council and RD&T Planning Team; engage internal and external stakeholders; and continue with ongoing planning and coordination activities, such as Annual Report to Congress, updates to the strategic plan and budget guidance, budget reviews, and program reviews.

Hydrogen Fuels Safety R&D. $0.5 million to continue progress made in FY 2008 in conducting multi-modal research in materials compatibility, design, and operations guidelines for hydrogen delivery, and research aimed at addressing near-term gaps; continue involvement in domestic and international partnerships; continue a program to educate and train State and local public safety officials and first responders; and conduct research to develop, evaluate, and validate, under real-world conditions, non-destructive testing and other safety and inspection technologies that will facilitate the reliable and safe operation of components of the hydrogen transportation system.

NDGPS. $4.6M for continued operation and maintenance of the partially-deployed inland NDGPS segment. In March 2008, the National Space-Based Positioning, Navigation and Timing Executive Committee endorsed the DOT decision to continue inland NDGPS operations, with DOT continuing as Executive Agent for the system; funding received from other Federal agencies with system requirements or other sources will be used to recapitalize NDGPS equipment, and possibly to pursue completion of inland NDGPS Initial Operating Capability (IOC) as defined by the *2005 Federal Radionavigation Plan*.

4. RD&T Evaluation

The Department continually assesses its RD&T programs to ensure their effectiveness and performance. This section of the *RD&T Annual Funding Report* discusses DOT's RD&T evaluation strategy, which is depicted in Table 2.

Table 2. RD&T Evaluation Strategy

R&D Investment Criteria and Program Assessment Rating Tool	Internal RD&T Program Review	External Coordination and Review
• Assesses RD&T Relevance, Quality, and Performance • Evaluates Processes for RD&T Program Planning, Budgeting, and Management	• Annually Assesses Implementation of Investment Criteria and Program Assessment Rating Tool • Ensures That RD&T Is Evaluated According to Best Practices • Identifies Opportunities for Crossmodal Initiatives • Prevents Duplication	• Ensures That RD&T Addresses Critical Needs • Identifies RD&T Priorities and Programmatic Direction • Upholds Technical Quality of RD&T • Provides Basis for Developing Effective Performance Metrics

As shown, this broad strategy comprises three principal mechanisms: (1) systematic application of the Administration's R&D Investment Criteria and Program Assessment Rating Tool (PART); (2) annual internal review of operating administration RD&T programs; and (3) external RD&T coordination and review.

R&D Investment Criteria and PART

To guide the planning and management of research across the government, the Administration has established three investment criteria for RD&T: relevance, quality, and performance. The criteria incorporate established best practices for research evaluation as identified by the National Academy of Sciences, Government Accountability Office, and others. Each criterion has both prospective and retrospective elements:

- **Relevance.** Programs must have complete plans, with clear goals and priorities; must articulate their potential public benefits; and must be relevant to national and customer needs.
- **Quality.** Programs must use clearly stated, defensible methods for awarding funding; those allocating funds through means other than a competitive, merit-based process must document how quality is maintained.
- **Performance.** Programs must maintain long-term objectives, with annual measures and targets, and define appropriate outputs, outcomes, schedules, and decision points.

The PART contains questions to assess how well agencies are implementing the investment criteria. On the basis of the PART, programs are rated as Effective, Moderately Effective, Adequate, Ineffective, or Results Not Demonstrated. To date, DOT RD&T programs have been assessed through the PART in FAA, FHWA, FRA, FTA, NHTSA, PHMSA, and RITA.

Internal RD&T Program Review

Within the Department there are two primary mechanisms for ensuring implementation of the R&D Investment Criteria and PART: (1) evaluation of RD&T best practices, and (2) research investment planning.

Evaluation of RD&T Best Practices

In an August 2006 report on RD&T coordination in the Department, the U.S. Government and Accountability Office (GAO) recommended that DOT develop "a strategy to ensure that the results of all of DOT's RD&T activities are evaluated according to established best practices."[7] In response to this recommendation, the Department's RD&T Program Review Working Group, representing each of the research-performing DOT administrations and OST, identified a set of evaluation best practices to be the focus of periodic RD&T program reviews. Shown in Table 3, the evaluation best practices reflect guidelines for research evaluation recommended by the GAO;[8] the National Academies Committee on Science, Engineering, and Public Policy;[9] and OMB.[10]

Table 3. RD&T Evaluation Best Practices

External Stakeholder Involvement	Transparent and consistent process for involving external stakeholders in the development of RD&T program agendas and priorities and for responding to stakeholder recommendations.
Merit Review of Competitive Proposals	Documented process for awarding competitive research grants and contracts based upon merit review.
Independent Expert Review	Adherence to OMB guidelines for peer review of "Highly Influential" and "Influential" scientific information. Systematic process for evaluating significant RD&T programs that incorporates some form of independent expert review and for using review results to guide future program decisions.
RD&T Performance Measures	Single- or multi-year objectives for significant RD&T programs (outcome measures) and measurable annual milestones that show how objectives will be reached (output measures).
RD&T Coordination	Consistency with the RD&T strategies identified in the DOT Strategic Plan and RD&T Strategic Plan. Coordination with relevant operating administrations, Federal agencies, and other partners.

[7] *Opportunities for Improving the Oversight of DOT's Research Programs and User Satisfaction with Transportation Statistics*. GAO-06-917. p. 13.
[8] *Highway Research: Systematic Selection and Evaluation Processes Needed for Research Program*. May 2002. GAO-02-573.
[9] *Evaluating Federal Research Programs: Research and the Government Performance and Results Act*. 1999. Washington, D.C. National Academy Press.
[10] Guidance for Completing the Program Assessment Rating Tool (PART). March 2005.

In FY 2007, the RD&T Program Review Working Group assessed operating administrations' adherence to these practices using a set of formal evaluation guidelines and agreed-upon implementation criteria. The results of this review process are presented in Table 4.

Table 4. Summary of RD&T Program Review Results

Best Practices and Implementation Criteria	Administrations Implementing (N=8)	Percent Implementing
External Stakeholder Involvement		
Transparent and Consistent Process for Involving Stakeholders in Developing Program Agendas and Priorities	7	88%
Process for Responding to Stakeholder Recommendations	5	63%
Merit Review of Competitive Proposals		
Transparent and Documented Process for Awarding Competitive Grants and Contracts Based on Merit Review	8	100%
Independent Expert Review		
Adherence to OMB Guidelines for Peer Review of "Highly Influential" and "Influential" Scientific Information	8	100%
Systematic Process for Evaluating Significant RD&T Programs Using Independent Expert Review	6	75%
Process for Using the Results of Expert Reviews to Guide Future Program Decisions	5	63%
RD&T Performance Measures		
Long-term Objectives for Significant RD&T Programs	7	88%
Measurable Annual Milestones that Show How Objectives Will Be Reached	8	100%
RD&T Coordination		
Consistency with RD&T Strategies Identified in the DOT Strategic Plan	8	100%
Coordination with Relevant Operating Administrations, Agencies, and Partners	8	100%

As shown in the table, the reviews demonstrated the following with regard to implementation of the RD&T evaluation best practices:

External Stakeholder Involvement. Most DOT operating administrations have a transparent and consistent process for involving stakeholders in their RD&T programs. However, some do not have a clear and documented process for responding to stakeholder recommendations. Stakeholder involvement is an area for improvement for follow-up in future RD&T program reviews.

*Merit Review of Competitive Proposals***.** Across the Department, competitive RD&T grants and contracts are awarded based upon merit review. These procedures are transparent and clearly documented.

Independent Expert Review. Operating administrations are in compliance with OMB guidelines for peer review of "Highly Influential" and "Influential" research. However, some administrations do not use independent expert review to evaluate significant RD&T programs or use the results to guide program decisions. Independent expert review is an area for improvement for follow-up in future RD&T program reviews.

RD&T Performance Measures. Most operating administrations have documented long-term objectives for significant RD&T programs and all have annual RD&T milestones. In addition to these measures, common performance measures can be developed for RD&T for inclusion in the next *Transportation RD&T Strategic Plan*.

RD&T Coordination. Operating administrations have demonstrated support for the RD&T strategies and for cooperative research both within and outside DOT.

Research Investment Planning

In concert with the RD&T Planning Council and RD&T Planning Team, RITA is designing a new research investment planning process to fulfill its statutory responsibility for coordinating, facilitating, and reviewing the Department's research and development programs and activities. The research investment planning process will help DOT to institute a collaborative approach to RD&T investments. Moreover, it will allow the Department to:

- Document the alignment of research investments with our National transportation goals.
- Track performance and net benefits of U.S. DOT RD&T dollars invested.
- Create visibility and transparency for all directed and discretionary research funding.
- Identify potential redundancies and eliminate unnecessary duplication.
- Leverage available research resources.

In conjunction with the implementation of a new research investment planning process, RITA is creating an online searchable database to inventory and track all RD&T activities, from budget planning through execution. The goal is to achieve greater budget transparency and bring into one database all of the RD&T data that are currently scattered among the different operating administrations. When completed, the database will allow policy makers, researchers, and other users to search for RD&T information by research topic, funding level, grant description, contractor, State, Congressional district and more. As such, the database will be a critical tool for coordinating DOT's research investments.

External Coordination and Review

A critical element of the RD&T evaluation best practices and research investment planning process is systematic consultation and engagement with external stakeholders and experts. Such activities avoid duplication, uphold the technical quality of research, and ensure that RD&T programs are wise public investments that address critical needs.

Within the operating administrations, external coordination and review are essential for establishing RD&T priorities, programmatic activities, and performance metrics. Table 5 summarizes operating administrations' external RD&T evaluation processes, the results of their most recent evaluations, and a schedule for planned reviews in FY 2008.

Table 5. RD&T Evaluation Processes

Operating Administration	Evaluation Process	Recent Evaluations and Recommendations	FY 2008 Reviews
FAA	(1) Annual review by Research, Engineering, and Development Advisory Committee (REDAC) (2) Commercial Space Transportation Advisory Committee (COMSTAC) reviews safety-related commercial space transportation R&D	*REDAC:* November 2007 letter report recommends that FAA: • Provide resources to address environmental concerns associated with new aircraft and systems • Enhance collaboration with NASA to coordinate R&D activities • Assert leadership in applied aeronautical Human Factors R&D in support of research requirements • Align its activities in research areas necessary for NextGen implementation and certification of advanced technologies • Further develop program linkage between its environmental and safety-related fuels initiatives • *COMSTAC:* Provided recommendations in January 2008 on research proposals of interest to the industry	*REDAC:* October 3, 2007 March 5, 2008 *COMSTAC:* October 10-11, 2007 May 15-16, 2008
FHWA	(1) Periodic review by Transportation Research Board (TRB) Research and Technology Coordinating Committee (RTCC) (2) Laboratory Assessment Program	*RTCC*: Met twice in FY 2007 and provided advice on issues including: • Implementation of the Corporate Master Plan for Research and Technology • Prioritization of research needs by the highway community • Technology transfer and deployment strategies • Implementation of the Exploratory Advanced Research Program *Lab Assessment*: Independent panels assessed research at FHWA's Highway Safety Information Systems, Geometric Design, Bridge Management Information Systems, and Nondestructive Evaluation Validation Center laboratories	*RTCC:* November 5-6, 2007 March 10-11, 2008 *Lab Assessments:* Fall 2007 Spring 2008 Summer 2008

Operating Administration	Evaluation Process	Recent Evaluations and Recommendations	FY 2008 Reviews
FMCSA	Regular inputs on planning and programs from key stakeholders	*Stakeholder Forum:* January 2006 forum addressed research needs and accomplishments in key areas, including: • State data quality • Lane departure warning systems • Large Truck Crash Causation Study • Medical programs • Wireless inspection technologies • Fatigue management • Hazardous materials safety	*Ongoing reviews by the Motor Carrier Advisory Committee:* December 6-7, 2007
FRA	(1) Annual review by TRB Committee for the Review of the FRA Research, Development, and Demonstration Programs (2) Other external review mechanisms	*Committee Report:* May 2007 letter report concludes that FRA: • Should provide research assistance and guidance for the development of standards for interoperable PTC and related systems • Should provide tools for use by industry and government agencies to develop means to (1) determine capacity, (2) formulate metrics for measuring capacity, and (3) develop a methodology for quantifying the benefits of investments in rail network capacity • Should consolidate findings and research related to energy and environmental issues from projects undertaken in all areas	*TRB Review Committee:* Fall 2007
FTA	Transit Research Analysis Committee (TRAC)	*TRAC Report:* May 2007 letter report commends FTA for its efforts to develop a multi-year research program plan responsive to the goals in its strategic research plan, and makes several recommendations, including: • Ensure a research portfolio that is comprehensive, balanced, and consistent with the research plan • Reformulate ridership goal in light of the effect of current research activities • Undertake research aimed at demonstrating the potential impact of transit on national goals such as reduced road congestion and environmental stewardship • Explore opportunities to involve the University Transportation Centers in FTA research	*TRAC:* June 2008 December 2008

Operating Administration	Evaluation Process	Recent Evaluations and Recommendations	FY 2008 Reviews
NHTSA	Broad-based research meetings with automotive manufacturers and suppliers	*Research Meetings:* Meetings with auto manufacturers and suppliers to discuss developments in automotive technologies and deployment strategies that include specific recommendations for: • New Car Assessment Program • Lane departure warning systems • Advanced occupant restraint systems • Vehicle compatibility	*Research Meetings:* TBD
PHMSA	Periodic outreach events, stake-holder meetings, peer reviews	*Peer Review of Pipeline Safety R&D:* Peer reviews of 27 active research projects in March 2007 resulted in ratings of Effective to Very Effective by the expert panelists *R&D Forum:* A Government and Industry workshop on pipeline safety R&D held on February 7-8, 2007 identified key challenges, including: • Environmental protection and the transportation of new fuels • Improving an effective technology program through stakeholder communication • Maintaining the safety, security, and reliability of an aging pipeline infrastructure	*Pipeline Safety R&D Forum:* TBD to FY 2009 *Peer Reviews*: May 1, 6, and 14
RITA	National Research Council (NRC) Committee on the Review of the DOT Strategic Plan for RD&T	*NRC Review Committee:* June 2006 NRC panel review assessed the draft RD&T Strategic Plan and DOT's research coordination process and submitted a letter report in August 2006	*NRC Committee:* TBD

Appendix A. RD&T Funding Details

Table A-1. FAA RD&T Funding ($000)

RD&T Program	FY 2007 Actual	FY 2008 Enacted	FY 2009 Request
Research, Engineering and Development	**130,234**	**146,828**	**171,028**
Improve Aviation Safety	*88,232*	*96,526*	*90,763*
Fire Research and Safety	6,638	7,350	6,650
Propulsion and Fuel Systems	4,048	4,086	3,669
Advanced Materials/Structural Safety	2,843	7,083	2,920
Atmospheric Hazards/Digital System Safety	3,848	3,574	4,838
Aging Aircraft	18,621	15,946	14,589
Aircraft Catastrophic Failure Prevention Research	1,512	2,202	436
Flightdeck/Maintenance/System Integration Human Factors	7,999	9,200	7,465
Aviation Safety Risk Analysis	5,292	9,517	12,488
Air Traffic Control/Airway Facilities Human Factors	9,654	10,000	10,469
Aeromedical Research	7,032	7,760	8,395
Weather Program Safety	19,545	16,888	16,968
Unmanned Aircraft Systems	1,200	2,920	1,876
Improve Efficiency	*21,166*	*30,234*	*43,254*
Joint Planning and Development Office	18,100	14,321	14,494
Wake Turbulence	3,066	12,813	10,132
GPS Civil Requirements	0	3,100	0
NextGen: Air-Ground Integration – Flightdeck/ Maintenance System Integration	0	0	2,554
NextGen: Self-Separation	0	0	8,025
NextGen: Weather Technology in the Cockpit	0	0	8,049
Reduce Environmental Impact	*16,018*	*15,469*	*31,658*
Environment and Energy	16,018	15,469	15,608
NextGen: Environmental Research CLEEN	0	0	16,050
NextGen: Environmental Research Metrics & Impacts	0	0	0
Mission Support	*4,818*	*4,599*	*5,353*
System Planning and Resource Management	1,388	1,184	1,817
William J. Hughes Technical Center Laboratory Facility	3,430	3,415	3,536

RD&T Program	FY 2007 Actual	FY 2008 Enacted	FY 2009 Request
Facilities and Equipment	**94,928**	**114,300**	**0**
Advanced Technology Development and Prototyping	*42,700*	*72,460*	*0*
Plant (F)	*17,398*	*17,200*	*0*
Center for Advanced Aviation System Development	*34,830*	*24,640*	*0*
NextGen: Demonstrations and Infrastructure Development	*0*	*0*	*0*
NextGen: System Development	*0*	*0*	*0*
Air Traffic Organization	**0**	**0**	**161,486**
Engineering Development Testing & Evaluation	*0*	*0*	*33,000*
Plant (F)	*0*	*0*	*18,400*
Center for Advanced Aviation System Development	*0*	*0*	*28,728*
NextGen: Demonstrations and Infrastructure Development	*0*	*0*	*28,000*
NextGen: System Development	*0*	*0*	*41,400*
Operations	*0*	*0*	*11,958*
Airport Improvement Program	**27,870**	**28,712**	**34,348**
Airport Technology Research (T)	*17,870*	*18,712*	*19,348*
Airport Cooperative Research (T)	*10,000*	*10,000*	*15,000*
Operations	**8,353**	**9,481**	**0**
Commercial Space Transportation	**125**	**140**	**125**
Subtotal, R&D	**216,242**	**253,549**	**316,576**
Subtotal, Technology Investment (T)	**27,870**	**28,712**	**34,348**
Subtotal, Facilities (F)	**17,398**	**17,200**	**18,400**
Total FAA	***261,510***	***299,461***	***369,324***

Table A-2. FHWA RD&T Funding ($000)

RD&T Program	FY 2007 Actual	FY 2008 Enacted	FY 2009 Request
Surface Transportation Research	**180,829**	**169,369**	**196,400**
Safety	7,839	6,880	7,978
Safety (T)	6,413	4,861	5,637
Pavements	18,891	20,148	23,363
Pavements (T)	10,174	7,486	8,681
Structures	13,181	14,151	16,409
Structures (T)	10,785	7,885	9,144
Environmental, Planning, and Right-of-Way	7074	14,938	17,322
Environmental, Planning, and Right-of-Way (T)	10,610	1,875	2,174
Highway Operations	4,268	5,755	6,674
Highway Operations (T)	2,845	1,,008	1,169
Long-Term Pavement Performance	7,998	7,604	8,818
International Outreach	237	147	170
International Outreach (T)	0	79	91
Exploratory Advanced Research	11,064	10,520	12,199
Future Strategic Highway Research Program	40,504	38,511	44,657
OST, RITA, FMCSA, NHTSA & PHMSA	15,329	25,273	29,307
OST, RITA, FMCSA, NHTSA & PHMSA (T)	13,617	2,248	2,607
Technology Deployment Program	**0**	**0**	**0**
Training and Education	**24,583**	**24,671**	**26,700**
National Highway Institute (T)	8,535	8,566	9,270
Local Technical Assistance Program (T)	9,869	9,904	10,719
Eisenhower Transportation Fellowship Program (T)	1,956	1,963	2,124
Garrett Morgan Program (T)	1,111	1,115	1,207
Transportation Education Development Pilot Program (T)	1,667	1,673	1,811
Freight Planning Capacity Building (T)	778	781	845
Surface Transportation Congestion Relief Assistance (T)	667	669	724

(T): Technology Investment

RD&T Program	FY 2007 Actual	FY 2008 Enacted	FY 2009 Request
Intelligent Transportation Systems	**101,279**	**101,640**	**110,000**
Vehicle Infrastructure Integration	34,770	15,880	23,910
Integrated Vehicle-Based Safety Systems	638	1,800	1,350
Cooperative Intersection Collision Avoidance	8,764	4,925	4,400
Next Generation 911	2,530	0	0
Integrated Corridor Management	2,702	3,650	8,800
Emergency Management and Operations	1,280	1,000	0
Mobility Services for All Americans	738	2,775	1,200
Clarus	3,065	1,850	2,200
Road Weather Research and Development	1,239	2,775	3,300
I-95 (T)	6,335	6,420	7,800
Architecture and Standards (T)	6,567	4,290	4,700
Professional Capacity Building (T)	3,535	2,445	2,700
Program Assessment (T)	3,201	4,310	3,100
Outreach (T)	685	370	440
ITS Program Support	3,420	4,530	6,100
Congestion Relief Research and Development (T)	20,000	40,000	40,000
Rural Communications Corridor Study	1,810	4,620	0
University Transportation Research (T)	**64,174**	**64,403**	**69,700**
Other	**165,774**	**166,921**	**156,221**
State Planning and Research	165,774	166,921	156,221
Administrative Expenses	**17,556**	**17,960**	**18,373**
Subtotal, R&D	**370,671**	**372,613**	**392,751**
Subtotal, Technology Investment (T)	**183,524**	**172,351**	**184,643**
Subtotal, Facilities (F)	**0**	**0**	**0**
Total FHWA	***554,195***	***544,964***	***577,394***

Table A-3. FMCSA RD&T Funding ($000)

RD&T Program	FY 2007 Actual	FY 2008 Enacted	FY 2009 Request
Motor Carrier Safety	**12,458**	**11,584**	**10,122**
Produce Safer Drivers	*4,271*	*4,656*	*3,636*
Produce Safer Drivers	3,916	3,124	2,031
Produce Safer Drivers (T)	355	1,532	1,605
Improve Safety of Commercial Motor Vehicles	*3,147*	*1,415*	*828*
Improve Safety of Commercial Motor Vehicles	1,169	236	0
Improve Safety of Commercial Motor Vehicles (T)	1,978	1,179	828
Produce Safer Carriers	*630*	*589*	*1,279*
Produce Safer Carriers	630	589	1,279
Produce Safer Carriers (T)	0	0	0
Advance Safety Through Information-Based Initiatives	*1,348*	*1,414*	*1,203*
Advance Safety Through Information-Based Initiatives	674	589	501
Advance Safety Through Information-Based Initiatives (T)	674	825	702
Improve Security Through Safety Initiatives	*450*	*236*	*276*
Improve Security Through Safety Initiatives	450	236	0
Improve Security Through Safety Initiatives (T)	0	0	276
Enable and Motivate Internal Excellence	*450*	*590*	*502*
Enable and Motivate Internal Excellence	450	295	251
Enable and Motivate Internal Excellence (T)	0	295	251
Administrative Expenses	**2,162**	**2,684**	**2,398**
Subtotal, R&D	**9,451**	**7,753**	**6,460**
Subtotal, Technology Investment (T)	**3,007**	**3,831**	**3,662**
Subtotal, Facilities (F)	**0**	**0**	**0**
Total FMCSA	***12,458***	***11,584***	***10,122***

Table A-4. FRA RD&T Funding ($000)

RD&T Program	FY 2007 Actual	FY 2008 Enacted	FY 2009 Request
Railroad Research and Development	**34,524**	**35,964**	**33,950**
Railroad System Issues	3,165	3,168	3,155
Human Factors	3,360	3,616	3,475
Rolling Stock and Components	2,850	2,871	3,500
Track and Structures	3,840	3,861	4,450
Track and Train Interaction	3,144	3,168	3,100
Train Control	7,900	5,600	6,720
Grade Crossings	2,150	2,178	1,850
Hazardous Materials Transportation	1,287	1,287	1,550
Train Occupant Protection	4,948	5,120	3,600
Corridor Planning	0	0	0
R&D Facilities and Test Equipment (F)	1,880	1,881	2,550
Advanced Freight Locomotive Safety	0	980	0
Demonstrate and Deploy PTC in Alaska	0	735	0
Center for Commercial Deployment of Transportation Tech CA	0	245	0
WVU Constructed Facility Center	0	191	0
Marshall University- University of Nebraska	0	573	0
PEERS, II	0	490	0
Safety and Operations	**2,780**	**2,610**	**2,772**
Salaries and Expenses	*2,780*	*2,610*	*2,772*
Subtotal, R&D	**35,424**	**36,693**	**34,172**
Subtotal, Technology Investment (T)	**0**	**0**	**0**
Subtotal, Facilities (F)	**1,880**	**1,881**	**2,550**
Total FRA	***37,304***	***38,574***	***36,722***

Table A-5. FTA RD&T Funding ($000)

RD&T Program	FY 2007 Actual	FY 2008 Enacted	FY 2009 Request
National Program	**40,500**	**44,863**	**39,100**
Increase Transit Ridership	*12,210*	*12,181*	*8,340*
Increase Transit Ridership	800	1,600	1,000
Increase Transit Ridership (T)	11,410	10,581	7,340
Improve Capital and Operating Efficiency	*15,295*	*17,530*	*14,085*
Improve Capital and Operating Efficiency	4,333	5,290	9,183
Improve Capital and Operating Efficiency (T)	10,962	12,240	4,902
Improve Safety and Emergency Preparedness	*7,175*	*7,250*	*8,385*
Improve Safety and Emergency Preparedness	1,050	915	2,075
Improve Safety and Emergency Preparedness (T)	6,125	6,335	6,310
Protect the Environment & Promote Energy Independence	*2,912*	*5,132*	*5,250*
Protect the Environment & Promote Energy Independence	1,412	4,096	4,550
Protect the Environment & Promote Energy Independence (T)	1,500	1,036	700
Provide Transit Research Leadership	*2,908*	*2,770*	*3,040*
Provide Transit Research Leadership (T)	2,908	2,770	3,040
Transit Cooperative Research Program (T)	**9,300**	**9,300**	**9,300**
National Transit Institute (T)	**4,300**	**4,300**	**4,300**
University Transportation Centers (T)	**7,000**	**7,000**	**7,000**
Subtotal, Research and University Programs	**61,100**	**65,463**	**59,700**
Administrative Expenses	**600**	**909**	**1,397**
Subtotal, R&D	**8,195**	**12,810**	**18,205**
Subtotal, Technology Investment (T)	**53,505**	**53,562**	**42,892**
Subtotal, Facilities (F)	**0**	**0**	**0**
Total FTA	***61,700***	***66,372***	***61,097***

Table A-6. NHTSA RD&T Funding ($000)

RD&T Program	FY 2007 Actual	FY 2008 Enacted	FY 2009 Request
Research and Analysis	**67,982**	**63,260**	**55,128**
Crashworthiness	*22,994*	*19,226*	*18,226*
Safety Systems	9,134	8,226	7,726
Biomechanics	13,860	11,000	10,500
Partnership for a New Generation of Vehicles	0	0	0
Crash Avoidance	*9,884*	*10,219*	*9,819*
Driver/Vehicle Performance	7,790	8,104	*7,904*
Driver Behavior Simulation Research	0	0	0
National Advanced Driver Simulator	0	0	0
Heavy Vehicles	2,094	2,115	1,915
Pneumatic Tire Research	0	0	0
Data Programs (T)	*34,188*	*32,890*	*26,658*
Fatal Accident Reporting System (T)	6,992	7,172	7,172
National Accident Sampling System (T)	12,108	12,230	12,230
Data Analysis Program (T)	1,980	1,666	1,666
State Data Program (T)	2,515	2,890	2,890
Occupant Protection Survey (T)	0	0	0
Special Crash Investigations (T)	1,683	1,700	1,700
National Motor Vehicle Crash Causation Survey (T)	7,920	6,232	0
Early Fatality Notification System (T)	990	1,000	1,000
Crash Avoidance	*0*	*0*	*0*
Vehicle Research and Test Center	*0*	*0*	*0*
Hydrogen New Initiative	*916*	*925*	*425*
NAS Tire Study	*0*	*0*	*0*
Plastic and Composite Vehicles	*0*	*0*	*0*
Highway Safety Research	**2,818**	**6,379**	**6,841**
Administrative Expenses	**42,529**	**46,505**	**48,120**
Subtotal, R&D	**79,141**	**83,254**	**83,431**
Subtotal, Technology Investment (T)	**34,188**	**32,890**	**26,658**
Subtotal, Facilities (F)	**0**	**0**	**0**
Total NHTSA	***113,329***	***116,144***	***110,089***

Table A-7. OST RD&T Funding ($000)

RD&T Program	FY 2007 Actual	FY 2008 Enacted	FY 2009 Request
Transportation Planning, Research, and Development	14,893	13,884	10,105
Total OST	***14,893***	***13,884***	***10,105***

Table A-8. PHMSA RD&T Funding ($000)

RD&T Program	FY 2007 Actual	FY 2008 Enacted	FY 2009 Request
Hazardous Materials Safety	**2,293**	**2,241**	**2,282**
Hazardous Materials	1,829	1,761	1,802
Administrative Expenses	464	480	480
Pipeline Safety	**9,458**	**8,773**	**6,392**
Pipeline Safety	8,907	8,184	5,784
Administrative Expenses	551	589	608
Total PHMSA	***11,751***	***11,014***	***8,674***

Table A-9. RITA RD&T Funding ($000)

RD&T Program	FY 2007 Actual	FY 2008 Enacted	FY 2009 Request
Hydrogen R&D	500	500	500
R&D Planning and Management	536	536	536
Administrative Expenses	1,659	3,597	4,201
NDGPS	0	5,000	4,600
Positioning, Navigation, and Timing	0	0	400
Total RITA	***2,695***	***9,633***	***10,237***

Appendix B. FY 2009 RD&T Support for DOT Goals

Table B-1. FAA RD&T Funding for DOT Goals ($000)

RD&T Program	DOT Goal					
	Safety	Reduced Congestion	Global	Environ.	Security	Org. Excellence
Research, Engineering and Development	**90,763**	**43,254**	**0**	**31,658**	**0**	**5,353**
Improve Aviation Safety	*90,763*	*0*	*0*	*0*	*0*	*0*
Fire Research and Safety	*6,650*	0	0	0	0	0
Propulsion and Fuel Systems	3,669	0	0	0	0	0
Advanced Materials/Structural Safety	2,920	0	0	0	0	0
Atmospheric Hazards/Digital System Safety	4,838	0	0	0	0	0
Aging Aircraft	14,589	0	0	0	0	0
Aircraft Catastrophic Failure Prevention Research	436	0	0	0	0	0
Flightdeck/Maintenance/System Integration Human Factors	7,465	0	0	0	0	0
Aviation Safety Risk Analysis	12,488	0	0	0	0	0
Air Traffic Control/Airway Facilities Human Factors	10,469	0	0	0	0	0
Aeromedical Research	8,395	0	0	0	0	0
Weather Program Safety	16,968	0	0	0	0	0
Unmanned Aircraft Systems	1,876	0	0	0	0	0
Improve Efficiency	*0*	*43,254*	*0*	*0*	*0*	*0*
Joint Planning and Development Office	0	14,494	0	0	0	0
Wake Turbulence	0	10,132	0	0	0	0
GPS Civil Requirements	0	0	0	0	0	0
NextGen: Air Ground Integration	0	2,554	0	0	0	0
NextGen: Self-Separation	0	8,025	0	0	0	0
NextGen: Weather Technology in the Cockpit	0	8,049	0	0	0	0
Reduce Environmental Impact	*0*	*0*	*0*	*31,658*	*0*	*0*
Environment and Energy	0	0	0	15,608	0	0
NextGen: Environmental Research Aircraft Technologies, Fuels and Metrics	0	0	0	16,050	0	0
Mission Support	*0*	*0*	*0*	*0*	*0*	*5,353*

RD&T Program	DOT Goal					
	Safety	Reduced Congestion	Global	Environ.	Security	Org. Excellence
System Planning and Resource Management	0	0	0	0	0	1,817
Technical Laboratory Facilities	0	0	0	0	0	3,536
Air Traffic Organization	**44,958**	**98,128**	**0**	**0**	**0**	**18,400**
Engineering Development Testing & Evaluation	33,000	0	0	0	0	0
Plant	0	0	0	0	0	18,400
Center for Advanced Aviation System Development	0	28,728	0	0	0	0
NextGen: Demonstrations and Infrastructure Development	0	28,000	0	0	0	0
NextGen: System Development	0	41,400	0	0	0	0
Air Traffic Organization—Operations	11,958	0	0	0	0	0
Airport Improvement Program	**15,239**	**14,109**	**0**	**5,000**	**0**	**0**
Airport Technology Research	10,239	9,109	0	0	0	0
Airport Cooperative Research	5,000	5,000		5,000	0	0
Safety and Operations	**2,337**	**0**	**0**	**0**	**0**	**0**
Commercial Space Transportation	**125**	**0**	**0**	**0**	**0**	**0**
Total FAA	***153,422***	***155,491***	***0***	***36,658***	***0***	***23,753***

DOT Goals: Safety; Reduced Congestion; Global Connectivity; Environmental Stewardship; Security, Preparedness, and Response; Organizational Excellence.

Table B-2. FHWA RD&T Funding for DOT Goals ($000)

RD&T Program	DOT Goal					
	Safety	Reduced Congestion	Global	Environ.	Security	Org. Excellence
Surface Transportation Research	**36,975**	**121,253**	**2,574**	**32,273**	**600**	**2,725**
Safety	13,614	0	0	0	0	0
Pavements	0	29,545	0	2,500	0	0
Structures	0	25,553	0	0	0	0
Environmental, Planning, and Right-of-Way	100	7,912	1,313	8,046	0	2,126
Highway Operations	0	7,542	0	0	0	0
Long-Term Pavement Performance	0	8,818	0	0	0	0
International Outreach	0	0	261	0	0	0
Exploratory Advanced Research	3,000	6,000	1,000	1,000	600	599
OST, RITA, FMCSA, NHTSA & PHMSA	2,398	16,446	0	13,070	0	0
Future Strategic Highway Research Program	17,863	19,137	0	7,657	0	0
Training and Education	**8,000**	**8,494**	**845**	**2,000**	**500**	**6,861**
National Highway Institute	1,000	6,770	0	1,000	500	0
Local Technical Assistance Program	7,000	1,000	0	1,000	0	1,719
Eisenhower Transportation Fellowship Program	0	0	0	0	0	2,124
Garrett Morgan Program	0	0	0	0	0	1,207
Transportation Education Development Pilot Program	0	0	0	0	0	1,811
Freight Planning Capacity Building	0	0	845	0	0	0
Surface Transportation Congestion Relief Assistance	0	724	0	0	0	0
Intelligent Transportation Systems	**29,570**	**77,730**	**2,700**	**0**	**0**	**0**
Vehicle Infrastructure Integration	12,200	11,710	0	0	0	0
Integrated Vehicle-Based Safety Systems	1,350	0	0	0	0	0
Cooperative Intersection Collision Avoidance Systems	4,400	0	0	0	0	0
Integrated Corridor Management	0	8,800	0	0	0	0
Mobility Services for All Americans	0	1,200	0	0	0	0
Clarus	1,100	1,100	0	0	0	0
Road Weather Research and Development	1,100	2,200	0	0	0	0
I-95	1,200	4,400	2,200	0	0	0
Architecture and Standards	2,000	2,700	0	0	0	0
Professional Capacity Building	1,000	1,700	0	0	0	0

RD&T Program	DOT Goal					
	Safety	Reduced Congestion	Global	Environ.	Security	Org. Excellence
Program Assessment	1,500	1,600	0	0	0	0
Outreach	220	220	0	0	0	0
ITS Program Support	3,500	2,100	500	0	0	0
Congestion Relief Research and Development	0	40,000	0	0	0	0
University Transportation Research	0	**69,700**	0	0	0	0
Other	0	**156,221**	0	0	0	0
State Planning and Research	0	156,221	0	0	0	0
Administrative Expenses	0	0	0	0	0	18,373
Total FHWA	***74,545***	***433,398***	***6,119***	***34,273***	***1,100***	***27,959***

DOT Goals: Safety; Reduced Congestion; Global Connectivity; Environmental Stewardship; Security, Preparedness, and Response; Organizational Excellence.

Table B-3. FMCSA RD&T Funding for DOT Goals ($000)

RD&T Program	DOT Goal					
	Safety	Reduced Congestion	Global	Environ.	Security	Org. Excellence
Motor Carrier Safety	**6,797**	**0**	**0**	**0**	**0**	**0**
Produce Safer Drivers	3,636	0	0	0	0	0
Improve Safety of Commercial Motor Vehicles	828	0	0	0	0	0
Produce Safer Carriers	1,279	0	0	0	0	0
Advance Safety Through Information-Based Initiatives	778	425	0	0	0	0
Improve Security Through Safety Initiatives	0	0	0	0	276	0
Enable and Motivate Internal Excellence	0	0	0	0	0	502
Administrative Expenses	**2,024**	**0**	**0**	**0**	**0**	**0**
Total FMCSA	***8,545***	***557***	***0***	***0***	***362***	***658***

Table B-4. FRA RD&T Funding for DOT Goals ($000)

RD&T Program	DOT Goal					
	Safety	Reduced Congestion	Global	Environ.	Security	Org. Excellence
Railroad Research and Development	**31,775**	**1,850**	**0**	**825**	**200**	**0**
Railroad System Issues	2,755	0	0	200	200	0
Human Factors	3,475	0	0	0	0	0
Rolling Stock and Components	3,100	400	0	0	0	0
Track and Structures	4,450	0	0	0	0	0
Track and Train Interaction	3,100	0	0	0	0	0
Train Control	5,370	1,350	0	0	0	0
Grade Crossings	1,750	100	0	0	0	0
Hazardous Materials Transportation	925	0	0	625	0	0
Train Occupant Protection	3,600	0	0	0	0	0
R&D Facilities and Test Equipment	2,550	0	0	0	0	0
Safety and Operations	**2,772**	**0**	**0**	**0**	**0**	**0**
Salaries and Expenses	2,772	0	0	0	0	0
Total FRA	***33,847***	***1,850***	***0***	***825***	***200***	***0***

DOT Goals: Safety; Reduced Congestion; Global Connectivity; Environmental Stewardship; Security, Preparedness, and Response; Organizational Excellence.

Table B-5. FTA RD&T Funding for DOT Goals ($000)

RD&T Program	DOT Goal					
	Safety	Reduced Congestion	Global	Environ.	Security	Org. Excellence
National Program	**7,585**	**24,074**	**800**	**5,250**	**800**	**591**
Increase Transit Ridership	0	8,340	0	0	0	0
Improve Capital and Operating Efficiency	0	13,001	700	0	0	384
Improve Safety and Emergency Preparedness	7,585	0	0	0	800	0
Protect the Environment & Promote Energy Independence	0	0	0	5,250	0	0
Provide Transit Research Leadership	0	2,733	100	0	0	207
Transit Cooperative Research Program	**0**	**9,300**	**0**	**0**	**0**	**0**
National Transit Institute	**0**	**4,300**	**0**	**0**	**0**	**0**
University Transportation Centers	**0**	**7,000**	**0**	**0**	**0**	**0**
Administrative Expenses	**173**	**846**	**0**	**378**	**0**	**0**
Total FTA	*7,758*	*45,520*	*800*	*5,628*	*800*	*591*

DOT Goals: Safety; Reduced Congestion; Global Connectivity; Environmental Stewardship; Security, Preparedness, and Response; Organizational Excellence.

Table B-6. NHTSA RD&T Funding for DOT Goals ($000)

RD&T Program	DOT Goal					
	Safety	Reduced Congestion	Global	Environ.	Security	Org. Excellence
Research and Analysis	**55,128**	**0**	**0**	**0**	**0**	**0**
Crashworthiness	*18,226*	*0*	*0*	*0*	*0*	*0*
Safety Systems	7,726	0	0	0	0	0
Biomechanics	10,500	0	0	0	0	0
Crash Avoidance	*9,819*	*0*	*0*	*0*	*0*	*0*
Driver/Vehicle Performance	7,904	0	0	0	0	0
Heavy Vehicles	*1,915*	0	0	0	0	0
Pneumatic Tire Research	0	0	0	0	0	0
Data Programs	*26,658*	*0*	*0*	*0*	*0*	*0*
Fatal Accident Reporting System	7,172	0	0	0	0	0
National Accident Sampling System	12,230	0	0	0	0	0
Data Analysis Program	1,660	0	0	0	0	0
State Data Program	*2,890*	0	0	0	0	0
Special Crash Investigations	1,700	0	0	0	0	0
National Motor Vehicle Crash Causation Survey	0	0	0	0	0	0
Early Fatality Notification System	1,000	0	0	0	0	0
Vehicle Research and Test Center	*0*	*0*	*0*	*0*	*0*	*0*
Hydrogen New Initiative	*425*	*0*	*0*	*0*	*0*	*0*
Highway Safety Research	**6,841**	**0**	**0**	**0**	**0**	**0**
Administrative Expenses	**48,120**	**0**	**0**	**0**	**0**	**0**
Total NHTSA	***110,089***	***0***	***0***	***0***	***0***	***0***

Table B-7. OST RD&T Funding for DOT Goals ($000)

RD&T Program	DOT Goal					
	Safety	Reduced Congestion	Global	Environ.	Security	Org. Excellence
Transportation Planning, Research, and Development	2,134	2,663	3,077	1,931	300	0
Total OST	2,134	2,663	3,077	1,931	300	***0***

DOT Goals: Safety; Reduced Congestion; Global Connectivity; Environmental Stewardship; Security, Preparedness, and Response; Organizational Excellence.

Table B-8. PHMSA RD&T Funding for DOT Goals ($000)

RD&T Program	DOT Goal					
	Safety	Reduced Congestion	Global	Environ.	Security	Org. Excellence
Hazardous Materials Safety	**2,248**	**0**	**0**	**0**	**34**	**0**
Hazardous Materials	1,802	0	0	0	0	0
Administrative Expenses	446	0	0	0	34	0
Pipeline Safety	**4,612**	**132**	**0**	**1,648**	**0**	**0**
Pipeline Safety	4,256	84	0	1,444	0	0
Administrative Expenses	356	48	0	204	0	0
Total PHMSA	***6,860***	***132***	***0***	***1,648***	***34***	***0***

Table B-9. RITA RD&T Funding for DOT Goals ($000)

RD&T Program	DOT Goal					
	Safety	Reduced Congestion	Global	Environ.	Security	Org. Excellence
Salaries and Administrative Expenses	0	0		0	0	4,201
Hydrogen Fuels Safety R&D	0	0		500	0	0
RD&T Coordination	0	0		0	0	536
National Differential Global Positioning System	0	4,600		0	0	0
Positioning, Navigation, and Timing	0	400		0	0	0
Total RITA	***0***	***5,000***	***0***	***500***	***0***	***4,737***

DOT Goals: Safety; Reduced Congestion; Global Connectivity; Environmental Stewardship; Security, Preparedness, and Response; Organizational Excellence.

Appendix C. DOT Goals and RD&T Strategies

DOT Goal	RD&T Strategies
Safety Enhance public health and safety by working toward the elimination of transportation-related deaths and injuries	• Conduct and support research to understand and address the causal factors and risks in accidents and to anticipate future safety risks in all transportation modes • Conduct and support research to determine the most effective ways of mitigating the consequences of transportation accidents and incidents in all modes • Support safety rulemaking by assessing the potential safety impacts of new transportation technologies, vehicles, concepts, designs, and procedures
Reduced Congestion Reduce congestion and other impediments to using the Nation's transportation system	• Conduct and support research to reduce urban and suburban traffic congestion, freight gateway congestion, and aviation system congestion • Conduct and support research to extend the life of the existing transportation system and improve the durability of infrastructure • Conduct and support research to advance the use of next generation technologies and to make effective use of combinations of modes in moving people and goods • Conduct and support research to improve the planning, operation, and management of surface transportation and aviation services and assets • Conduct and support research to improve transportation services for underserved areas and populations • Advance the Nation's transportation research capability through capacity building, fellowships, grants, and cooperative research with universities, the private sector, and State and local governments
Global Connectivity Facilitate an international transportation system that promotes economic growth and development	• Conduct and support research leading to harmonized international standards, improved cross-border collaboration, and global leadership for U.S. transportation providers
Environmental Stewardship Promote transportation solutions that enhance communities and protect the natural and built environment	• Conduct and support research to understand the various impacts of transportation activities on the natural and built environment and communities and to advance technologies and concepts to mitigate those impacts • Conduct and support research on ways to improve the environmental review process to achieve the timely delivery of transportation projects

DOT Goal	RD&T Strategies
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	• Conduct and support research to reduce the vulnerability of transportation systems and to improve their ability to prepare for and recover from attacks, natural disasters, and emergencies • Conduct and support research to develop technologies and procedures to secure hazardous materials shipments and to assess the risks of hazmat events
Organizational Excellence Advance the Department's ability to manage for results and achieve the goals of the President's Management Agenda	• Consistently apply the President's R&D Investment Criteria—relevance, quality, and performance—to all DOT-sponsored and in-house research

Appendix D. Acronyms

ACS	Adaptive Control System
CLEEN	Continuous Low Energy Emissions and Noise
CMV	Commercial Motor Vehicle
COMSTAC	Commercial Space Transportation Advisory Committee
CVISN	Commercial Vehicle Information Systems and Networks
DoD	Department of Defense
DOT	Department of Transportation
ETL	Exclusive Truck Lane
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
FY	Fiscal Year
GAO	Government Accountability Office
GP	General Purpose
HOT	High-Occupancy Toll
ITS	Intelligent Transportation Systems
LED	Light Emitting Diode
LTBP	Long-Term Bridge Performance
NAS	National Academy of Sciences
NASA	National Aeronautics and Space Administration
NDGPS	Nationwide Differential Global Positioning System
NextGen	Next Generation Air Transportation System
NHTSA	National Highway Traffic Safety Administration

NRC	National Research Council
OMB	Office of Management and Budget
OST	Office of the Secretary of Transportation
PART	Program Assessment Rating Tool
PHMSA	Pipeline and Hazardous Materials Safety Administration
R&D	Research and Development
RD&T	Research, Development and Technology
RE&D	Research, Engineering and Development
REDAC	Research, Engineering and Development Advisory Committee
RITA	Research and Innovative Technology Administration
RTCC	Research and Technology Coordinating Committee
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SHRP	Future Strategic Highway Research Program
STRDD	Surface Transportation Research, Development, and Deployment
TCRP	Transit Cooperative Research Program
TPR&D	Transportation Planning, Research, and Development
TRAC	Transit Research Analysis Committee
TRB	Transportation Research Board
UTC	University Transportation Center