

Federal Railroad Administration
FY 2009 Budget Submission
Overview

The Federal Railroad Administration (FRA) is pleased to submit its FY 2009 Budget Request. While safety continues to be our primary goal, our budget is presented in accordance with the President's Management Agenda initiative as it links budget and performance, directly supports five of the Department's six performance segments, and aligns with the Department's strategic plan.

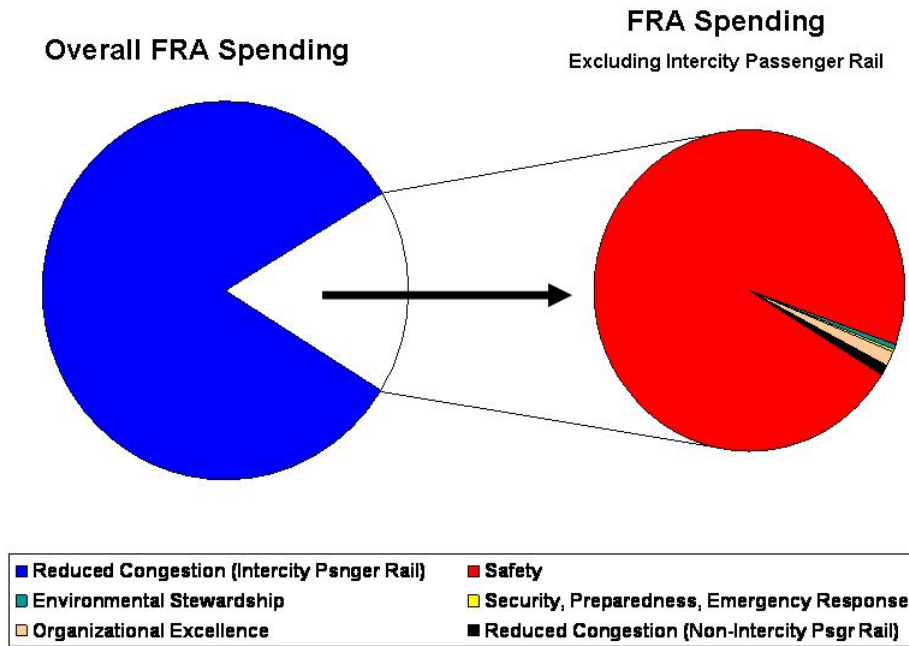
The FY 2009 budget request of \$1.1 billion supports FRA's commitment to continue and improve the Nation's strong railroad safety record. It also provides funding to ensure the continuation of passenger rail operations. The funding request is as follows:

- **Grants to the National Passenger Rail Corporation/Intercity Passenger Rail:** The request of \$900 million would enable Amtrak's new management team to keep the trains running and act on its mandate to reshape the company. This request includes \$525 million for capital costs and \$275 million for efficiency incentive grants. In addition, \$100 million would be dedicated to issuing capital matching grants to States for intercity passenger rail projects. When combined with collections from Amtrak partners, the matching grants will enable infrastructure repairs that the Administration has supported in its own reform program.
- **Safety & Operations:** In FY 2009, of the \$157 million requested for this mission essential activity, \$149 million is requested to support the Department's goal of reducing railroad accidents and incidents, while contributing to the avoidance of serious hazardous materials incidents in rail transportation. In addition, in FY 2009, \$1.2 million is requested to implement a Close Call Confidential Reporting Pilot Program, which will allow FRA to better leverage its resources by expanding its partnership with industry to achieve safety goals.
- **Research & Development:** In FY 2009, a total of \$34 million is requested to support research efforts in the areas of rail systems safety, track and structures, train occupant protection, human factors in train operations, rolling stock and components, track and train interaction, train control, grade crossings, hazardous materials, and transportation and research development facilities and test equipment.

The chart below shows a break out of our FY 2009 budget request, by strategic goal. The pie on the left shows that the majority of FRA's requested funding supports Reduced Congestion. That funding directly supports Intercity Passenger Rail, through our Grants to Amtrak, as well as through our new Intercity Passenger Rail Grant program, requested originally in FY 2008. When the Intercity Passenger Rail funding is taken out of the

request, it becomes clear that FRA's top priority is Safety, as displayed in the pie on the right.

FRA FY 2009 Request by Strategic Goal



FRA has served as the Federal government's lead railroad safety compliance and regulatory agency since its establishment in 1966. Over the past 40 years, the railroad industry has made significant safety improvements and most safety trends are moving in the right direction. However, train accidents continue to occur. Moreover, several major freight and passenger train accidents in 2004 and 2005 (such as those at Macdona, Texas; Graniteville, South Carolina; and Glendale, California) raised specific concerns about railroad safety issues deserving government and industry attention.

The FRA has championed several key national railroad safety initiatives and has brought to market an impressive portfolio of safety policies, standards, protocols and regulations. For example:

- In May 2005, DOT and FRA announced the *National Rail Safety Action Plan*. This Plan was a blueprint to comprehensively address critical safety issues facing the railroad industry with the following strategy: (1) target the most frequent, highest-risk causes of train accidents; (2) focus FRA's oversight and inspection resources on areas of greatest concern; and (3) accelerate research efforts that have the potential to mitigate the largest risks.

The Plan includes initiatives that address: (1) reducing train accidents caused by human factors; (2) fatigue; (3) improving track safety; (4) enhancing hazardous materials safety and emergency preparedness; (5) strengthening FRA's safety compliance program; and (6) improving highway-rail grade crossing safety.

- The *National Inspection Plan (NIP)* is a resource allocation program that uses predictive indicators to assist FRA in conducting inspection and enforcement activities within a specific geography or on a certain railroad. The NIP helps FRA optimize existing inspection and accident data in such a way to identify potential safety "hot spots" so they can be examined before a serious safety hazard emerges.
- FRA's robust *railroad industry regulatory program* addresses such topics as track, passenger equipment, locomotives, freight cars, power brakes, locomotive event recorders, signal and train control systems, maintenance of active warning devices at highway-rail grade crossings, accident reporting, alcohol and drug testing, protection of roadway workers, operating rules and practices, locomotive engineer certification, positive train control, the use of locomotive horns at grade crossings, and many other subject areas.

Also noteworthy are the FRA sponsored railroad safety Research and Development (R&D) activities. These R&D initiatives have greatly advanced the Agency's passenger and freight safety mission. The robust R&D agenda serves as a catalyst for the Administration's vision and policy, and continues to advance the science of railroad safety into the 21st century. The R&D projects are vital to the FRA's safety regulatory processes, to railroad suppliers, to railroads involved in the transportation of freight, intercity passengers, commuters, and to railroad employees and their labor organizations. FRA-owned facilities provide the infrastructure necessary to conduct experiments and test theories, concepts, and new technologies in support of the R&D program.

Of special note are three R&D technologies that are changing the science of rail safety and catapulting the industry into the 21st century:

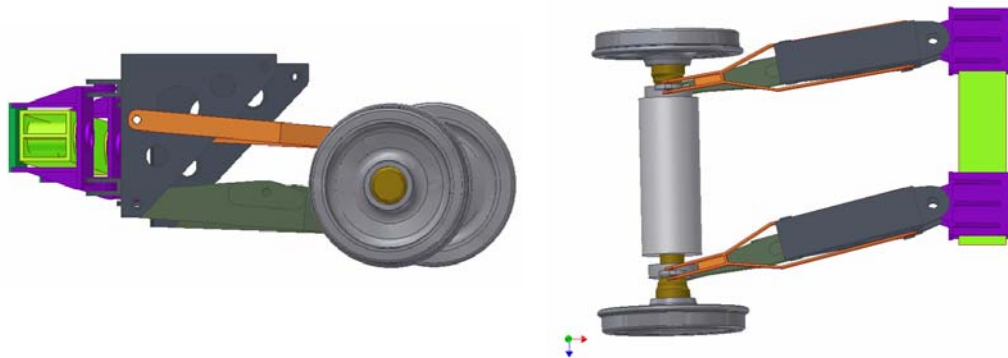
- **Automated Joint Bar Inspection System:** Broken joint bars are one of the leading causes of main line derailments in the United States. Traditionally, joint bars are inspected *visually* by railroad maintenance personnel. Searching for small hairline sized cracks in the joint bars is a difficult and time consuming task. The quality of this inspection, which is usually performed from a moving vehicle, is questionable. During FY2001, FRA started the development of an automated high-resolution video joint bar inspection system that could be deployed on a maintenance vehicle and would detect visual cracks in joint bars without having to stop the vehicle. Today, this technology detects a crack; the software displays the broken joint bar images with their GPS coordinate to operator and produces an exception report. This system has been successfully demonstrated to several railroads (UP, CP, NS, BNSF, NJ transit.).

As a result of these demonstrations, an enhanced high speed commercial version of this inspection system has been independently developed by the support contractor. Canadian Pacific and Canadian National railroads each purchased the system and Union Pacific and Burlington Northern railroads are currently evaluating the enhanced system. A joint bar inspection service will soon be available for the railroads in the U.S. Application of this technology has already found thousands of cracked joint bars each having the capacity to derail a train if allowed to grow.

- **Deployable Gage Restraint Measurement System:** Gage widening-related accidents, caused when the forces generated by the train are greater than the holding capacity of the ties and fasteners allowing the wheels to drop between the rails, have been one of the top five causes of track related accidents. To address these safety issues, the FRA Office of Research and Development along with the Volpe National Transportation System Center initiated and maintained its research effort in Gage Restraint Measurement System (GRMS) technology development to improve detection of railroad track gage defects that cause derailments. The FRA Office of R&D, as part of continued research effort on the advancement in GRMS technology, has developed the Deployable GRMS vehicle (T-18). This state-of-the-art self-propelled vehicle conducts performance-based testing of railroad track strength. It uses a unique design approach of deploying a fifth axle from the frame of a track geometry vehicle providing safer, more efficient, and higher speed operational capabilities. Since the T-18's delivery in 2004, it has been playing a significant role as a rolling laboratory for track strength/gage widening research activities. In addition, the T-18 is being utilized by the FRA Office of Safety in an enforcement mode on designated GRMS territories and provides supplemental inspection surveys for the ATIP program.

The FRA Office of Safety will use the T-18 for the DM&E and Alaska Railroad in FY2008 to assist the railroads in evaluating tie condition. The FRA Office of R&D will continue research efforts to increase GRMS operational speed, provide GRMS test support, and use GRMS data for more efficient and effective operations and maintenance planning.

- **Crash Energy Management:** A cab car led passenger train presents a particularly challenging situation in collisions with locomotive-led trains. The approach of including crush zones in cab and coach cars, referred to as Crash Energy Management (CEM), can significantly increase the survivability of passengers during a collision. Sacrificial crush zones can be placed in unoccupied locations in cars which are designed to collapse gracefully, preserving the integrity of the occupied areas.



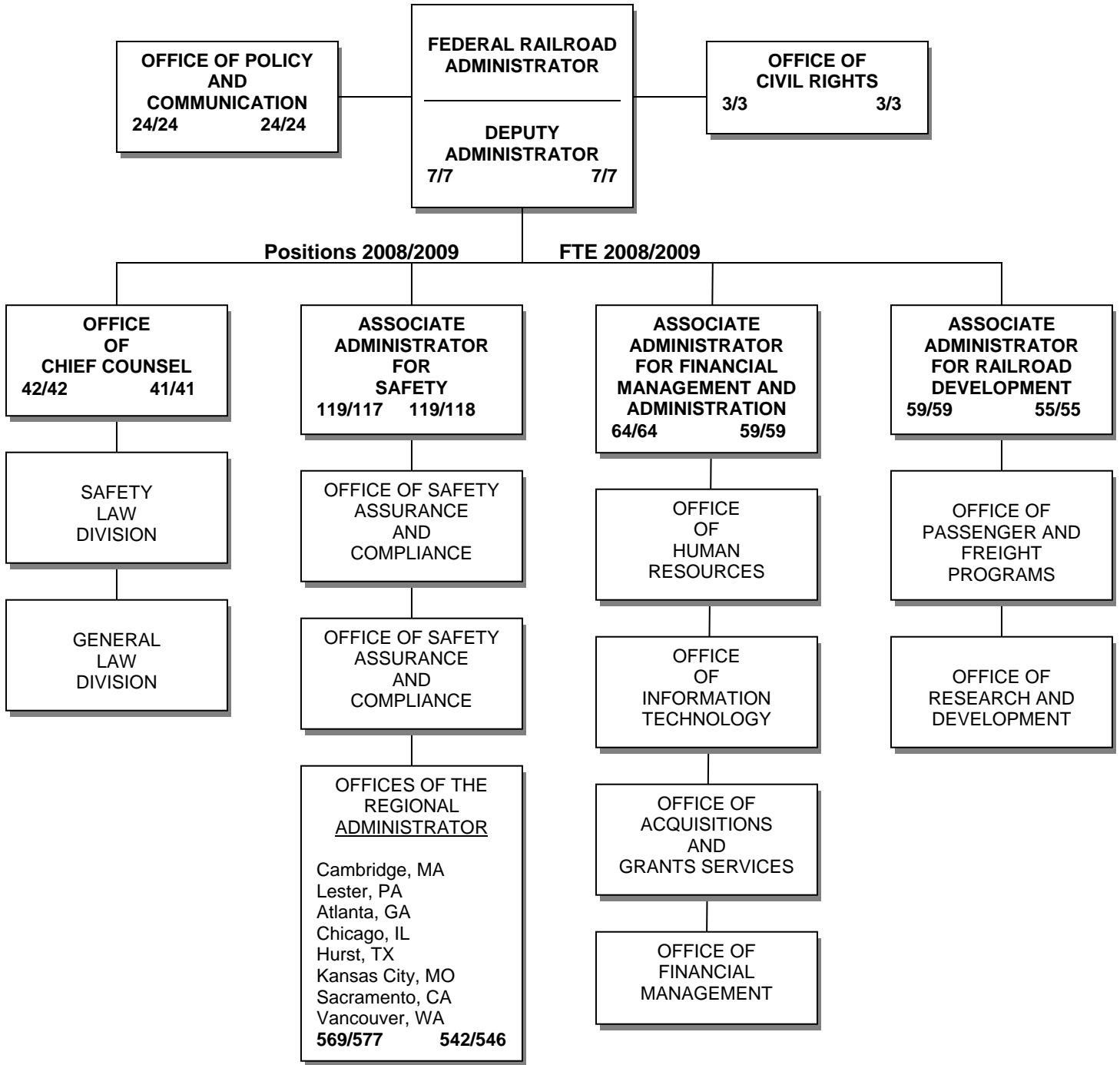
The FRA with support from the Volpe Center demonstrated the superior crashworthiness performance of CEM equipment over conventional equipment with full-scale impact tests. In conventional equipment test, the colliding cab car crushed by approximately 22 feet and overrode the locomotive, eliminating the space for the operator's seat and approximately 47 passenger seats. During the 30 mph CEM equipment test, the front of the cab car crushed by approximately 3 feet with no override, and the crush propagated back to all of the unoccupied ends of the trailing passenger cars. All of the space for the passengers and crew remained intact, without any intrusion.

In coordination with the American Public Transportation Association (APTA), Metrolink approached the FRA about transferring CEM technology to the industry. The FRA, with the Federal Transit Administration (FTA) and APTA, formed the ad hoc Crash Energy Management Working Group in May 2005. This working group included participants from the rail industry, including passenger railroads, suppliers, rail, and industry consultants. Railroads supplied insight regarding operations pros and cons of CEM features and designs on cars. Carbuilders reacted to proposed CEM requirements with specifics as to cost, feasibility, schedule, weight, and other issues related to design details. Suppliers provided input regarding the ability of their existing lines of equipment to meet proposed requirements, and the extent of development that would be required in cases where they felt that the level performance needed to meet the requirements was beyond the capacity of their existing lines. In some cases, the requirements were modified to minimize the need for such development. Consultants provided input based on experience with procurement of CEM rolling stock in the U.S. and internationally. The FRA is

continuing to work with Metrolink, to review the design being developed by Rotem, a rail equipment manufacturer. The FRA is also working with the APTA/PRESS Construction-Structural Subcommittee to start the process of developing CEM standards.

FEDERAL RAILROAD ADMINISTRATION

Positions/FTE Related to Safety, Reduced Congestion, Security, and Organizational Excellence



Totals:

Positions 887/893

FTE 850/853

EXHIBIT II-I

COMPARATIVE STATEMENT OF NEW BUDGET AUTHORITY
FEDERAL RAILROAD ADMINISTRATION
(\$000)

<u>ACCOUNT NAME</u>	<u>FY 2007 ACTUAL</u>	<u>FY 2008 ENACTED</u>	<u>FY 2009 REQUEST</u>
1. Safety and Operations	150,271	150,193	156,745
2. Railroad Research and Development	34,524	35,964	33,950
3. Rail Line Relocation & Improvement Program	--	20,040	--
4. Operating Grants to the National Railroad Passenger Corporation	490,050	475,000	--
5. Capital / Debt Service Grants to the National Railroad Passenger Corporation	772,200	850,000	525,000
6. Efficiency Incentive Grants to the National Railroad Passenger Corporation	31,300	--	275,000
7. Intercity Passenger Rail Grant Program	--	30,000	100,000
TOTAL	1,478,345	1,561,197	1,090,695

EXHIBIT II-2

**FY 2009 BUDGET REQUEST BY APPROPRIATION ACCOUNT
FEDERAL RAILROAD ADMINISTRATION
Budget Authority, Appropriations, Obligation Limitations, and Exempt Obligations
(\$000)**

<u>ACCOUNT NAME</u>	(A)	(B)	(C)	(D)	(E)
	<u>FY 2007 ACTUAL</u>	<u>FY 2008 ENACTED</u>	<u>FY 2009 BASELINE ESTIMATES</u>	<u>FY 2009 PROGRAM CHANGES</u>	<u>TOTAL REQUEST (C+D)</u>
Safety and Operations	150,271	150,193	154,340	2,405	156,745
Salaries and Expenses	148,767	148,870	153,046	2,405	155,451
Contract Support	588	588	559	--	559
Alaska Railroad Liabilities	916	735	735	--	735
Railroad Research and Development	34,524	35,964	31,500	2,450	33,950
Railroad System Issues	3,165	3,168	2,855	300	3,155
Human Factors	3,360	3,616	3,075	400	3,475
Rolling Stock and Components	2,850	2,871	3,000	500	3,500
Track and Structures	3,840	3,861	4,450	--	4,450
Track and Train Interaction	3,144	3,168	3,100	--	3,100
Train Control	7,900	5,600	6,720	--	6,720
Grade Crossings	2,150	2,178	1,850	--	1,850
Hazardous Materials Transportation	1,287	1,287	1,550	--	1,550
Train Occupant Protection	4,948	5,120	3,600	--	3,600
R&D Facilities and Test Equipment	1,880	1,881	1,300	1,250	2,550
Advanced Freight Locomotive Safety	--	980	--	--	--
Dem. & Deploy PTC (Alaska)	--	735	--	--	--
Center for Comm. Deployment of Trans. (CALTECH)	--	245	--	--	--
WVU Constructed Facility Center	--	191	--	--	--
Marshall Univ - Univ. of Nebraska	--	573	--	--	--
Peers, IL	--	490	--	--	--
Rail Line Relocation & Improvement Program	--	20,040	--	--	--
Rail Line Relocation	--	14,905	--	--	--
Mt. Vernon RR Cut, NY	--	245	--	--	--
Pecos St. Grade Crossing, Adams Cty, CO	--	196	--	--	--
Pierre Rail Improvements, Pierre, SD	--	196	--	--	--
Rail Safety Upgrades, Coos Cty, NH	--	392	--	--	--
Rail Line Relocation, Chester, SC	--	392	--	--	--
Railroad Grade Separation, Elkhart, IN	--	441	--	--	--
Railroad Relocation Planning, Terre Haute, IN	--	431	--	--	--
Sacramento Intermodal Terminal Facility Track Reloc., CA	--	392	--	--	--
Wisconsin West Rail Transit Authority, Barron, WI	--	2,450	--	--	--
Grants to the National Railroad	1,293,550	1,355,000	900,000	0	900,000
Passenger Corporation	490,050	475,000	--	--	--
Operating Subsidy Grants	490,050	475,000	--	--	--
Capital/Debt Service Grants	772,200	850,000	500,000	25,000	525,000
Efficiency Incentive Grants	31,300	--	300,000	-25,000	275,000
Intercity Passenger Rail Grant Program	--	<u>30,000</u>	<u>100,000</u>	--	<u>100,000</u>
TOTAL	1,478,345	1,561,197	1,085,840	4,855	1,090,695

EXHIBIT II-3

**FY 2009 BUDGET REQUEST BY APPROPRIATION ACCOUNT AND STRATEGIC OBJECTIVE
FEDERAL RAILROAD ADMINISTRATION
(\$000)**

<u>APPROPRIATION/PROGRAM ACTIVITY/ PERFORMANCE GOAL</u>	<u>SAFETY</u>	<u>REDUCED CONGESTION</u>	<u>GLOBAL CONN</u>	<u>ENVIRON STEWARD</u>	<u>SECURITY</u>	<u>ORG EXCELL</u>	<u>TOTAL</u>
Safety and Operations	153,575	175			538	2,457	156,745
A. Salaries and Expenses	152,281	175			538	2,457	155,451
Reduce Rail-Related Accidents and Incidents	121,825						121,825
Reduce Number of Serious Hazardous Materials Incidents	30,456						30,456
Percent Travel Time in Congested Conditions		175					175
Transportation Capability Assessment					538		538
Strategic Workforce Planning						1,079	1,079
Departmental Management						1,378	1,378
B. Contract Support	559						559
Reduce Rail-Related Accidents and Incidents	447						447
Reduce Number of Serious Hazardous Materials Incidents	112						112
C. Alaska Railroad Liabilities	735						735
Reduce Rail-Related Accidents and Incidents	588						588
Reduce Number of Serious Hazardous Materials Incidents	147						147
Railroad Research and Development	30,975	1,950		825	200		33,950
A. Railroad System Issues	2,755			200	200		3,155
Reduce Rail-Related Accidents and Incidents	2,204						2,204
Reduce Number of Serious Hazardous Materials Incidents	551						551
Reduce Transportation Pollution				200			200
Transportation Capability Assessment					200		200
B. Human Factors	3,475						3,475
Reduce Rail-Related Accidents and Incidents	2,780						2,780
Reduce Number of Serious Hazardous Materials Incidents	695						695
C. Rolling Stock & Components	3,000	500					3,500
Reduce Rail-Related Accidents and Incidents	2,400						2,400
Reduce Number of Serious Hazardous Materials Incidents	600	500					1,100
D. Track & Structures	4,450						4,450
Reduce Rail-Related Accidents and Incidents	3,560						3,560
Reduce Number of Serious Hazardous Materials Incidents	890						890
E. Track & Train Interaction	3,100						3,100
Reduce Rail-Related Accidents and Incidents	2,480						2,480
Reduce Number of Serious Hazardous Materials Incidents	620						620
F. Train Control	5,370	1,350					6,720
Reduce Rail-Related Accidents and Incidents	4,296						4,296
Reduce Number of Serious Hazardous Materials Incidents	1,074						1,074
Percent Travel Time in Congested Conditions		1,350					1,350
G. Grade Crossings	1,750	100					1,850
Reduce Rail-Related Accidents and Incidents	1,750						1,750
Percent Travel Time in Congested Conditions		100					100
H. Hazardous Materials Transportation	925			625			1,550
Reduce Number of Serious Hazardous Materials Incidents	925						925
Reduce Transportation Pollution				625			625
I. Train Occupant Protection	3,600						3,600
Reduce Rail-Related Accidents and Incidents	3,600						3,600
Reduce Transportation Pollution							0
J. R&D Facilities & Test Equipment	2,550						2,550
Reduce Rail-Related Accidents and Incidents	2,040						2,040
Reduce Number of Serious Hazardous Materials Incidents	510						510
Grants to the National Railroad Passenger Corporation	0	900,000					900,000
A. Federal Subsidy	0	900,000					900,000
Percent Travel Time in Congested Conditions		900,000					900,000
Total FY 2009 Request	184,550	902,125	0	825	738	2,457	1,090,695
FTE	[832]	[1]			[4]	[16]	[853]

EXHIBIT II-3A

FY 2009 INFORMATION TECHNOLOGY (IT) BUDGET REQUEST BY IT INVESTMENT AND STRATEGIC OBJECTIVE
 FEDERAL RAILROAD ADMINISTRATION
 (\$000)

<u>APPROPRIATION/PROGRAM ACTIVITY/ PERFORMANCE GOAL</u>	<u>SAFETY</u>	<u>REDUCED CONGESTION</u>	<u>GLOBAL CONN</u>	<u>ENVIRON STEWARD</u>	<u>SEC. PREP EMG RESP</u>	<u>ORG EXCELL</u>	<u>TOTAL</u>
Safety and Operations	16,264	0	0	0	0	0	16,264
A. DOT IT Support/WCF Services	6,500						6,500
Reduce Rail-Related Accidents and Incidents	5,200						5,200
Reduce Number of Serious Hazardous Materials Incidents	1,300						1,300
B. FRA Other HW/SW Support Services	750						750
Reduce Rail-Related Accidents and Incidents	600						600
Reduce Number of Serious Hazardous Materials Incidents	150						150
C. IT Security Program Services	700						700
Reduce Rail-Related Accidents and Incidents	560						560
Reduce Number of Serious Hazardous Materials Incidents	140						140
E. Enterprise Architecture	540						540
Reduce Rail-Related Accidents and Incidents	432						432
Reduce Number of Serious Hazardous Materials Incidents	108						108
F. Capital Planning & CIO Support	590						590
Reduce Rail-Related Accidents and Incidents	472						472
Reduce Number of Serious Hazardous Materials Incidents	118						118
G. Controlled Correspondence Manager (CCM)	180						180
Reduce Rail-Related Accidents and Incidents	144						144
Reduce Number of Serious Hazardous Materials Incidents	36						36
H. PRISM	173						173
Reduce Rail-Related Accidents and Incidents	138						138
Reduce Number of Serious Hazardous Materials Incidents	35						35
I. Railroad Information Collaboration Environment (WIS)	634						634
Reduce Rail-Related Accidents and Incidents	507						507
Reduce Number of Serious Hazardous Materials Incidents	127						127
J. Railroad Safety Information System	2,392						2,392
Reduce Rail-Related Accidents and Incidents	1,914						1,914
Reduce Number of Serious Hazardous Materials Incidents	478						478
K. Automated Track Inspection Program Information Systems	970						970
Reduce Rail-Related Accidents and Incidents	776						776
Reduce Number of Serious Hazardous Materials Incidents	194						194
L. Enforcement Case System	472						472
Reduce Rail-Related Accidents and Incidents	378						378
Reduce Number of Serious Hazardous Materials Incidents	94						94
M. Post Accident Toxicological Testing Data System	235						235
Reduce Rail-Related Accidents and Incidents	188						188
Reduce Number of Serious Hazardous Materials Incidents	47						47
N. Railroad Safety Advisory Committee	107						107
Reduce Rail-Related Accidents and Incidents	86						86
Reduce Number of Serious Hazardous Materials Incidents	21						21
O. Railroad Routing and Visualization System	19						19
Reduce Rail-Related Accidents and Incidents	15						15
Reduce Number of Serious Hazardous Materials Incidents	4						4
P. Quiet Zone Calculator	80						80
Reduce Rail-Related Accidents and Incidents	64						64
Reduce Number of Serious Hazardous Materials Incidents	16						16
Q. National Inspection Plan	100						100
Reduce Rail-Related Accidents and Incidents	80						80
Reduce Number of Serious Hazardous Materials Incidents	20						20
S. Mobile Workforce Initiative	858						1,301
Reduce Rail-Related Accidents and Incidents	686						1,041
Reduce Number of Serious Hazardous Materials Incidents	172						260
T. State Inspection Program IT Services	400						400
Reduce Rail-Related Accidents and Incidents	320						320
Reduce Number of Serious Hazardous Materials Incidents	80						80
U. Litigation Reference System	25						25
Reduce Rail-Related Accidents and Incidents	20						20
Reduce Number of Serious Hazardous Materials Incidents	5						5
V. Railroad Carload Waybill Sample Data System	176						176
Reduce Rail-Related Accidents and Incidents	141						141
Reduce Number of Serious Hazardous Materials Incidents	35						35
W. Railroad Network System	243						243
Reduce Rail-Related Accidents and Incidents	194						194
Reduce Number of Serious Hazardous Materials Incidents	49						49
X. GradeDEC.Net	120						120
Reduce Rail-Related Accidents and Incidents	96						96
Reduce Number of Serious Hazardous Materials Incidents	24						24
Railroad Research and Development	610						610
A. Credit Risk Assessment Model	198						198
Reduce Rail-Related Accidents and Incidents	158						158
Reduce Number of Serious Hazardous Materials Incidents	40						40
B. Track Research Instrumentation Platform Information Systems	392						392
Reduce Rail-Related Accidents and Incidents	314						314
Reduce Number of Serious Hazardous Materials Incidents	78						78
C. RDV Library	20						20
Reduce Rail-Related Accidents and Incidents	16						16
Reduce Number of Serious Hazardous Materials Incidents	4						4
Total FY 2009 Request	16,874	0	0	0	0	0	16,874
FTE	[3.6]						[3.6]

EXHIBIT II-4

**COMPARATIVE STATEMENT OF NEW BUDGET AUTHORITY
FEDERAL RAILROAD ADMINISTRATION
(\$000)**

<u>ACCOUNT NAME</u>	<u>FY 2007 ACTUAL</u>	<u>FY 2008 ENACTED</u>	<u>FY 2009 REQUEST</u>
1. Safety and Operations	150,271	150,193	156,745
2. Railroad Research and Development	34,524	35,964	33,950
3. Rail Line Relocation & Improvement Program	--	20,040	--
4. Operating Grants to the National Railroad Passenger Corporation	490,050	475,000	--
5. Capital / Debt Service Grants to the National Railroad Passenger Corporation	772,200	850,000	525,000
6. Efficiency Incentive Grants to the National Railroad Passenger Corporation	31,300	--	275,000
7. Intercity Passenger Rail Grant Program	--	30,000	100,000
8. RR Rehab & Improvement Financing Fund - Loan Program Account	3,294	20,751	--
9. RR Rehab & Improvement Financing Fund - Liquidating Account	<u>-4,422</u>	<u>-5,725</u>	<u>-4,701</u>
TOTAL	1,477,217	1,576,223	1,085,994
<i>Discretionary</i>	<i>1,478,345</i>	<i>1,561,197</i>	<i>1,090,695</i>
<i>Mandatory</i>	<i>-1,128</i>	<i>15,026</i>	<i>-4,701</i>

EXHIBIT II-5

FY 2009 BUDGET REQUEST BY APPROPRIATION ACCOUNT
 FEDERAL RAILROAD ADMINISTRATION
 OUTLAYS
 (\$000)

<u>ACCOUNT NAME</u>	<u>FY 2007 ACTUAL</u>	<u>FY 2008 ENACTED</u>	<u>FY 2009 REQUEST</u>	
Safety and Operations	145,265	198,506	156,090	
Railroad Research and Development	33,812	52,847	43,197	
Rail Line Relocation and Improvement Program	--	10,020	10,020	
Grants to the National Railroad Passenger Corp	16,623	20,878	--	
Operating Grants to the National Railroad Passenger Corp	485,100	484,900	--	
Capital / Debt Service Grants to the National Railroad Passenger Corp	772,200	850,000	525,000	
Efficiency Incentive Grants to the National Railroad Passenger Corp	--	62,683	275,000	
Intercity Passenger Rail Grant Program	--	1,500	9,500	
Pennsylvania Station Redevelopment Project	--	4,805	23,931	
Alaska Railroad Rehabilitation	5,370	1,431	--	
Next Generation High-Speed Rail	14,581 ^{1/}	4,528	8,207	
Northeast Corridor Improvement Program	--	6,228	--	
Subtotal, Discretionary	1,472,951	1,698,326	1,050,945	
Railroad Rehabilitation and Improvement Program Liquidating Account	-1,128	15,026	-4,701	
Subtotal, Mandatory	-1,128	15,026	-4,701	
Total	1,471,823	1,713,352	1,046,244	
	[Discretionary]	1,472,951	1,698,326	1,050,945
	[Mandatory]	-1,128	15,026	-4,701

EXHIBIT II-6

SUMMARY OF REQUESTED FUNDING CHANGES FROM BASE
 FEDERAL RAILROAD ADMINISTRATION
 Budget Authority
 (\$000)

SAFETY AND OPERATIONS

Baseline Changes

	FY 2008 Enacted	FY 2008 PC&B by Program	FY 2008 Contracts Expense	Annualztn of 2008 Pay Raise	FY 2009 Pay Raise	WCF Increase/ Decrease	Internal Base Changes	FY 2009 Adjusted Base	FY 2009 PC&B Program Increase	FY 2009 FTE Increase by Program	FY 2009 Other Program Increases	FY 2009 Request
PERSONNEL RESOURCES												
Direct FTE	850.0							850.0		3.0		853.0
FINANCIAL RESOURCES												
ADMINISTRATIVE EXPENSES												
Salaries and Benefits	101,133	101,133	--	679	2,295	--	--	104,107	--	--	755	104,862
Travel	9,718	--	--	--	--	--	--	9,718	--	--	--	9,718
Transportation	249	--	--	--	--	--	--	249	--	--	--	249
GSA Rent	4,805	--	--	--	--	--	111	4,916	--	--	--	4,916
Communications, Rent & Utilities	1,104	--	--	--	--	--	--	1,104	--	--	--	1,104
Printing	186	--	--	--	--	--	--	186	--	--	--	186
Other Services												
-WCF	6,549	--	--	--	--	273	--	6,822	--	--	--	6,822
-Other	21,629	--	12,324	--	--	--	789	22,418	--	--	1,650	24,068
Supplies and Materials	709	--	--	--	--	--	--	709	--	--	--	709
Equipment	3,096	--	--	--	--	--	--	3,096	--	--	--	3,096
Grants, Subsidies and Contributions	1,015	--	--	--	--	--	--	1,015	--	--	--	1,015
Administrative Subtotal	150,193	101,133	12,324	679	2,295	273	900	154,340	0	0.0	2,405	156,745
PROGRAMS												
Salaries and Expenses	148,899	100,398	11,765	679	2,295	273	900	153,046	0	3.0	2,405	155,451
Contract Support	559	--	559	--	--	--	0	559	--	--	--	559
Alaska Railroad Liabilities	735	735	--	--	--	--	--	735	--	--	--	735
Programs Subtotal	150,193	101,133	12,324	679	2,295	273	900	154,340	0	3.0	2,405	156,745
TOTAL	150,193	101,133	12,324	679	2,295	273	900	154,340	0	3.0	2,405	156,745

EXHIBIT II-6A

WORKING CAPITAL FUND
FEDERAL RAILROAD ADMINISTRATION
Appropriations, Obligation Limitations, Exempt Obligations and Reimbursable Obligations
(\$000)

	<u>FY 2008 ENACTED</u>	<u>FY 2009 REQUEST</u>	<u>CHANGE</u>
DIRECT:			
Safety and Operations	6,549	6,822	273
	<hr/>	<hr/>	<hr/>
SUBTOTAL	6,549	6,822	273
	<hr/>	<hr/>	<hr/>
TOTAL	6,549	6,822	273

EXHIBIT II-6

SUMMARY OF REQUESTED FUNDING CHANGES FROM BASE
 FEDERAL RAILROAD ADMINISTRATION
 Budget Authority
 (\$000)

RAILROAD RESEARCH AND DEVELOPMENT

	FY 2008 Enacted	Other Program Changes	FY 2009 Baseline Estimates	FY 2009 Program Increases/ Decreases	FY 2009 Request
<u>FINANCIAL RESOURCES</u>					
ADMINISTRATIVE EXPENSES					
Other Services	11,967	-1,600	10,367	700	11,067
Operation and Maintenance of Facilities	1,881	-581	1,300	500	1,800
Research and Development Contracts	20,612	-2,283	18,329	1,250	19,579
Grants, Subsidies and Contributions	<u>1,504</u>	<u>0</u>	<u>1,504</u>	--	<u>1,504</u>
Total by Object Class	35,964	-4,464	31,500	2,450	33,950
<u>PROGRAMS</u>					
Railroad System Issues	3,168	-313	2,855	300	3,155
Human Factors	3,616	-541	3,075	400	3,475
Rolling Stock and Components	2,871	129	3,000	500	3,500
Track and Structures	3,861	589	4,450	--	4,450
Track and Train Interaction	3,168	-68	3,100	--	3,100
Train Control	5,600	1,120	6,720	--	6,720
Grade Crossings	2,178	-328	1,850	--	1,850
Hazardous Materials Transportation	1,287	263	1,550	--	1,550
Train Occupant Protection	5,120	-1,520	3,600	--	3,600
R&D Facilities and Test Equipment	1,881	-581	1,300	1,250	2,550
Advanced Freight Locomotive Safety	980	-980	0	0	0
Dem and Deploy PTC in Alaska	735	-735	0	0	0
Center for Commercial Deployment of Transp Tech CA	245	-245	0	0	0
WVU Constructed Facility center	191	-191	0	0	0
Marshall Univ - Univ of Nebraska	573	-573	0	0	0
PEERS, IL	<u>490</u>	<u>-490</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total by Program	35,964	-4,464	31,500	2,450	33,950

EXHIBIT II-6

SUMMARY OF REQUESTED FUNDING CHANGES FROM BASE
 FEDERAL RAILROAD ADMINISTRATION
 Budget Authority
 (\$000)

RAIL LINE RELOCATION AND IMPROVEMENT PROGRAM

	FY 2008 Enacted*	Other Program Changes	FY 2009 Baseline Estimates	FY 2009 Program Increases/ Decreases	FY 2009 Request
PROGRAMS					
Rail Line Relocation	14,905	-14,905			
Rail Line Relocation (Earmarks)	5,135	-5,135	0	0	0
<i>Mt. Vernon RR Cut, NY</i>	(245)	(245)	0	0	0
<i>Pecos St. Grade Crossing Adams Cty, CO</i>	(196)	(196)	0	0	0
<i>Pierre Rail Improvements, Pierre SD</i>	(196)	(196)	0	0	0
<i>Rail Safety Upgrades, Coos Cty, NH</i>	(392)	(392)	0	0	0
<i>Rail Line Relocation, Chester, SC</i>	(392)	(392)	0	0	0
<i>Railroad Grade Separation, Elkhart, IN</i>	(441)	(441)	0	0	0
<i>Railroad Relocation Planning, Terre Haute, IN</i>	(431)	(431)	0	0	0
<i>Sacramento Intermodal Terminal Facility Track Relocation, CA</i>	(392)	(392)	0	0	0
<i>Wisconsin West Rail Transit Authority, Barron, WI</i>	(2,450)	(2,450)	0	0	0
			0	0	0
Total by Program	20,040	-20,040	0	0	0

* The FY08 Omnibus bill included a 2% recission under DOT GP 186 that receded funds provided for the nine earmarks.

EXHIBIT II-6

SUMMARY OF REQUESTED FUNDING CHANGES FROM BASE
 FEDERAL RAILROAD ADMINISTRATION
 Budget Authority
 (\$000)

INTERCITY PASSENGER RAIL GRANTS

	FY 2008 Enacted	Other Program Changes	FY 2009 Baseline Estimates	FY 2009 Program Increases/ Decreases	FY 2009 Request
PROGRAMS					
Capital / Debt Service Grants	850,000	-350,000	500,000	25,000	525,000
Efficiency Incentive Grants	--	300,000	300,000	-25,000	275,000
Intercity Passenger Rail Grant Program	30,000	70,000	100,000	--	100,000
Operating Subsidy Grants	475,000	-475,000	--	--	--
Total by Program	1,355,000	-455,000	900,000	--	900,000

EXHIBIT II-7

FEDERAL RAILROAD ADMINISTRATION
PERSONNEL RESOURCE - SUMMARY
TOTAL FULL-TIME EQUIVALENTS

<u>DIRECT FUNDED BY APPROPRIATION</u>	<u>FY 2007 ACTUAL</u>	<u>FY 2008 ENACTED</u>	<u>FY 2009 REQUEST</u>
Safety and Operations	811	850	853

EXHIBIT II-9

FEDERAL RAILROAD ADMINISTRATION
RESOURCE SUMMARY - STAFFING
FULL-TIME PERMANENT POSITIONS

<u>DIRECT FUNDED BY APPROPRIATION</u>	<u>FY 2007 ACTUAL</u>	<u>FY 2008 ENACTED</u>	<u>FY 2009 REQUEST</u>
Safety and Operations	887	887	893

FRA 2009 General Provisions

Sec. 150. The Secretary may purchase promotional items of nominal value for use in public outreach activities to accomplish the purposes of 49 U.S.C. 20134: Provided, That the Secretary shall prescribe guidelines for the administration of such purchases and use.

Sec. 151. The Secretary of Transportation may receive and expend cash, or receive and utilize spare parts and similar items, from non-United States Government sources to repair damages to or replace United States Government owned automated track inspection cars and equipment as a result of third party liability for such damages, and any amounts collected under this subsection shall be credited directly to the Safety and Operations account of the Federal Railroad Administration, and shall remain available until expended for the repair, operation and maintenance of automated track inspection cars and equipment in connection with the automated track inspection program.

These General Provisions are not new for FY 2009 as they were included in the FY 2008 Omnibus spending bill specifically for the Federal Railroad Administration.

EXHIBIT III-1

SAFETY & OPERATIONS Summary by Program Activity Appropriations, Obligation Limitations, and Exempt Obligations

	FY 2007 <u>Actual</u>	FY 2008 <u>Enacted</u>	FY 2009 <u>Request</u>	Change <u>FY 08-09</u>
Salaries and Expenses	148,767	148,870	155,451	5,581
Contract Support	588	588	559	--
Alaska Railroad Liabilities	<u>916</u>	<u>735</u>	<u>735</u>	<u>--</u>
TOTAL	150,271	150,193	156,745	5,581
FTEs	844	850	853.0	3.0

The Safety and Operations account funds the following activities:

Salaries and expenses - Provides support for Federal Railroad Administration (FRA) rail safety activities and all other administrative and operating activities related to FRA staff and programs.

Contract support - Provides support for policy-oriented economic, industry, and systems analysis.

Alaska Railroad Liabilities - Provides reimbursement to the Department of Labor for compensation payments to former Federal employees of the Alaska Railroad who were on the rolls during the period of Federal ownership and support for clean-up activities at hazardous waste sites located at properties once owned by the FRA. The 2009 request is for workers' compensation.

EXHIBIT III-2

**SAFETY AND OPERATIONS
SUMMARY ANALYSIS OF CHANGE FROM FY 2008 TO FY 2009
Budget Authority
(\$000)**

Item	Total (\$000s)	FTE
FY 2008 Enacted	150,193	850.0
Adjustments to Base:		
Annualization of 2007 Comparability Pay Increase	679	--
2008 Comparability Pay Increase	2,295	--
WCF	273	
Internal Base Changes	2,621	--
Inspector Travel	-830	--
1/ New Hires	-629	--
Consultant	-200	--
General Reduction	-62	--
Subtotal, Adjustments to Base	4,147	0.0
Total, FY 2009 Baseline Estimates	154,340	850.0
New/Expanded Programs		
Salaries and Expenses:		
ATIP	500	--
Bridge Safety Specialists	471	2.0
Close Call	1,150	--
Tank Car Specialists	284	1.0
Subtotal, New/Expanded Programs	2,405	3.0
Total FY 2009 Request	156,745	853.0

1/ This figure does not affect safety inspectors.

Detailed Justification for Salaries and Expenses

Safety and Operations	FY 2009 Request: \$ 156,745,000
<p>Overview:</p> <p>In FY 2009, FRA requests a total of \$156,745,000 under Safety and Operations. Of this amount, \$155,451,000 is for Salaries and Expenses, which is \$6,581,000 above the FY 2008 enacted amount. Of the remaining balance, \$559,000 is for Contract Support, which is unchanged from the FY 2008 request and \$735,000 is for Alaska Railroad Liabilities. Details on the Salaries and Expenses enhancements are below.</p> <p>FRA is the single Federal government agency charged with promoting and ensuring the safety of the Nation's railroad industry. FRA accomplishes its mission by promulgating and enforcing safety regulations and through consistent, onsite monitoring of railroad operations. The goal is to prevent fatalities and injuries related to both railroad operations. The Agency's primary goal is to prevent fatalities and injuries related to unsafe railroad operations and/or the release of hazardous materials from rail cars.</p> <p>In FY 2009, FRA requests \$155,451,000 for Salaries and Expenses, which is the program activity supporting FRA's rail safety program activities, as well as FRA's management and administrative operating activities related to staff and programs. Within this total, FRA proposes adjustments to the base totaling \$4,147,000 and program enhancements totaling \$2,405,000.</p>	
<p>FY 2008 Base:</p> <p>Includes funding for FRA personnel compensation and benefits; travel; rent; service contracts; training; information technology; supplies and equipment; and the annual grant for the Operation Lifesaver initiative.</p>	
<p>Anticipated FY 2008 Accomplishments:</p> <p>Reduce the rate of rail-related accidents and incidents per million train-miles to 18.45 by:</p> <ul style="list-style-type: none">Reducing the grade crossing incident rate to 3.75;Reducing the human factors caused train accident rate to 1.66;Reducing the track caused train accident rate to 1.15;Reducing the equipment caused train accident rate to .521;Reducing the other (signal & miscellaneous) train accident rate to .647; andReducing the rail hazmat incident rate to .915.	

FY 2009 Budget Request:

FRA's safety program is the backbone for all FRA program activities and initiatives. In addition to setting safety standards and ensuring industry compliance, the safety program focuses on serious rail safety problems; educates the rail industry on the Federal standards; informs the American public on rail safety issues; focuses on emerging security issues; investigates rail accidents and employee fatalities; conducts research and development on safety issues; and sets the tone for safety efforts in the industry. For FY 2009, the following 5 new initiatives are requested for this program activity:

New Initiative: ATIP Operational Funds (\$500,000)

In FY 2009, FRA requests \$500,000 for operational costs associated with the Office of Research and Development's T-16 and T-18 geometry cars. The T-16 and T-18 geometry cars are key FRA assets that enable the Agency to conduct more thorough and more extensive scientific-based rail track compliance surveys. The requested enhancement of operational resources will allow FRA to maximize the use of its ATIP fleet. The \$500,000 will finance the operational costs of the T-16 and T-18 geometry cars in conducting safety track inspections when not in use by the Office of Research and Development. Thus, additional FY 2009 funding will allow FRA to more effectively respond to the workload associated with unplanned survey requests without compromising or interfering with the Office of Safety's previously scheduled ATIP survey activities.

The surveys are determined by the compliance history of track segments, their traffic composition, and National importance. Deviation from a planned survey to route the cars to an unplanned location can result in significant time lapses between compliance surveys. This disruption causes a considerable loss in inspection units and inefficient operations.

Performance Goals Supported:

- Reduce the rate of rail-related accidents/incidents
- Reduce the number of serious hazardous materials incidents

Justification for Initiative/Relationship to Performance Goal:

The Nation's railroads operate trains over more than 160,000 miles of main track. ATIP's function is to minimize the risk of a passenger or catastrophic hazardous material accident/incident by continuously improving the geometry vehicle's operational efficiency, insuring measured and recorded values accurately represent track conditions, and timely distributing track geometry information to FRA headquarters, regional management, and respective railroad personnel.

The ATIP technology is a key safety-resource for FRA Inspectors. ATIP promotes and supports FRA's safety mission and program as these assets provide Inspectors with the capacity to proactively respond to potential accident-causing hazards. ATIP empowers

Inspectors with the real-time data and tangible evidence necessary to impose and safeguard rail transportation with compulsory operational and maintenance remediation.

FRA's track geometry survey vehicles helps America's railroads increase safety and assist the railroad industry keep pace with advancing technology. The data that is collected by the geometry cars through the precise measurement of existing track systems is used to monitor industry compliance with federal safety standards and facilitates the efficient, effective track system maintenance planning to support the engineering of today's energy efficient, high speed railroads.

FRA relies on ATIP data as a primary tool for headquarter and regional managers to (1) monitor and assess railroad compliance with the Federal Track Safety Standards (FTSS); (2) evaluate safety trends within the industry; and (3) create a centralized Track Data Management System (TDMS) database to support special safety studies, including accident/incident investigations, congressional, and public requests. Additionally, the TDMS database maybe used to set priorities for enforcement activities, compliance agreements, perform quality assurance checks for the geometry vehicle, and to evaluate the effect of proposed changes in the FTSS.

The on-board measurement and geographic reference systems also make ATIP a valuable tool for the inventory of track structures (e.g., turnouts, at grade railroad crossings, and highway-rail crossing's locations), defect analyses (including profile, alignment, gage, cross-level, warp, runoff and twist) (i.e. to determine root causes of defects), and provides convenient access to historical data for switches and track structures of railroads surveyed.

New Initiative: Bridge Safety Specialists (\$471,000 / 4 positions)

FRA requests funding for 4 additional Bridge Safety Specialists, which will double the number of FRA's Bridge Safety Specialists from 4 to 8. The 4 new Bridge Safety Specialists will be stationed in the field to enhance the overall effectiveness of FRA's Bridge Safety and Security Program. Since FRA deployed its first 4 field Bridge Safety Specialists in 2004, many structural conditions on railroad bridges have been discovered and corrected in advance of an accident or incident. The requested 4 additional Bridge Safety Specialists will enable FRA to effectively double its capacity to monitor the safety of the Nation's aging railroad bridges, tunnels, and other vital railroad structures.

Performance Goals Supported:

- Reduce the rate of rail-related accidents/incidents
- Reduce the number of serious hazardous materials incidents

Justification for Initiative/Relationship to Performance Goal:

The Nation's railroads own and operate trains over an estimated 100,900 bridges. About 70 percent of the bridges are on Class I railroads while the remaining 30 percent are on regional and short line railroads. It is important to note that many smaller railroads lack

the capital resources for major bridge upgrades. As a result, smaller railroads are vulnerable as their bridge structures are more likely to be compromised and unable to sustain increasing rail traffic of today's heavier rail cars, which average 286,000 pounds gross weight. For example, our Nation's bridges are accumulating fatigue at rates 50 to 100 times faster under current conditions compared to the past. A majority of steel (and all iron) railroad bridges were built before 1930, and a significant number are approaching 100 years of age. Age alone does not condemn them, but they will require higher levels of inspection and management attention as their loads continue to increase.

For the past 15 years FRA has been monitoring and evaluating the Nation's aging bridges. Until 2004, this work was generally performed by the Track Safety Inspectors in coordination with a Bridge Engineer and a Bridge Specialist from FRA Headquarters.

As mentioned above, beginning in 2004, FRA enhanced its Bridge Safety program by hiring an additional Structural Engineer located at FRA Headquarters and 4 Bridge Specialists deployed to the field. This team specializes in bridge inspections and evaluations. They also investigate accidents and complaints. Based on lessons learned, they have implemented a more intensive bridge safety assessment program. Their work has revealed that many opportunities exist for improvement in the bridge management and maintenance practices of several larger railroads as well as among the many smaller roads. FRA's Bridge Safety Specialists perform on-site inspections, investigations, and/or program evaluations relative to the safety and security of over 100,000 railroad bridges across the country. They work with rail carriers to ensure that the security of rail bridges is adequately addressed in railroad security risk assessments and security planning processes. In addition, they prepare, review, and analyze surveys and reports relative to the program areas to determine trends and problems.

In addition to inspecting bridges, this team reviews and investigates bridge and tunnel conditions discovered by Track Safety Inspectors during routine track inspections. They respond to train accidents involving tunnels as well as to all significant complaints regarding other railroad structures such as retaining walls and overhead structures. Each Bridge Specialist is assigned a territory that includes approximately one-quarter of the United States. As a result, they spend a considerable amount of time traveling by air to their assignments. The addition of 4 new Bridge Specialists will lessen the travel burden on the existing team and is expected to increase the program's overall effectiveness and efficiency by having more inspection resources available, distributed geographically, to manage the workload.

In 2005, an investigation of a mile-long timber trestle over water required the work of all 4 FRA Bridge Safety Staff. The field investigation was completed in two days and produced results that were very satisfactory to the railroad and the FRA. Since the beginning of 2007, the FRA Bridge Safety Staff have investigated 3 major train accidents involving bridges; two which were caused by the structural failure of the bridge. Additionally this team has investigated more than a dozen serious bridge failures that did not progress to a train accident. They have conducted detailed investigations of bridge conditions on a major regional railroad that has resulted in a compliance agreement that

required intensive, continual monitoring. As the number of bridges found with potential safety problems continues to increase, more intensive investigation and improvement of bridge management on all railroads is required. One major Class I railroad is under close surveillance for their structure management practices. In addition, congressional concerns have required FRA to investigate the condition of many structures in specific areas, including Western New York State, where the scope of the investigation was limited by personnel resources available to FRA.

Collectively, as the Nation's railroad infrastructure continues to age and as more specialized inspections on bridges take place, FRA anticipates needing additional resources to deploy. This FY 2009 enhancement is the first step in bolstering FRA's capacity to more effectively manage is expanding, critical infrastructure, and public safety workload.

New Initiative: Close Call Confidential Reporting System (\$1,150,000)

FRA is requesting additional funds to support the Close Call Confidential Reporting System Pilot Study.

Performance Goals Supported:

- Reduce the rate of rail-related accidents/incidents
- Reduce the number of serious hazardous materials incidents

Justification for Initiative/Relationship to Performance Goal:

FRA's risk reduction programs include efforts by railroads to prevent accidents through collecting and analyzing data on accident precursors such as close call incidents, employee errors, or organizational characteristics to better identify and correct individual and organizational characteristics that contribute to accidents.

In FY 2009, FRA requests \$1,150,000 for the Close Call Confidential Reporting System (C3RS) Pilot Study initiative. This project is part of the National Rail Safety Action Plan and is a proactive process to collect and analyze leading indicator data necessary for the advancement of the safety reporting culture for the railroad industry. Currently, FRA is sponsoring a C3RS pilot in North Platte, NE. Plans are underway to bring two additional C3RS pilots on-line during FY 2008. Preliminary information from the North Platte pilot appears to indicate a higher than anticipated volume of calls. FRA continues to monitor call frequency and expects to publish reports on changes in safety culture, call frequencies, close call patterns and corrective actions as soon as more than one pilot site is online.

Currently, the safety reporting systems used by the railroad industry are reactive systems for reporting accidents that often trigger punitive actions and the withholding of critical safety-related information. While reactive systems are valuable in identifying safety issues, the typically small number of accidents that are reported in such systems hinders effective trend spotting and other analyses. Systems like C3RS collect and report many

more rail-related events and thereby allow safety problems to be identified and corrected before accidents can occur. Moreover, C3RS systems can significantly reduce accidents and injuries by establishing an environment where critical safety-related information is openly shared for analysis, instead of being actively withheld to mitigate punishment or liability. The C3RS concept mirrors the close call systems implemented by the industry over a decade ago. The success of this initiative is dependent upon the collaboration and leveraging of resources between the FRA, railroad management, and railroad labor.

New Initiative: Tank Car Specialists (\$284,000 / 2 positions)

FRA requests \$248,000 for two new Tank Car Engineers who are needed to ensure designs purporting to meet the tank car safety enhancement rulemaking (now in progress) do in fact meet those new standards. Because this rulemaking will dramatically increase the ability of tank cars transporting Toxic Inhalation Hazard materials to survive strikes on both the head, and for the first time, the sides of the shell, it is vital that persons qualified to evaluate tank car designs augment the tank car safety program now under way. The addition of two engineers to the Hazardous Materials Staff will enable FRA to effectively deal with the development of new tank car designs and the integration of advanced technology in tank car safety.

Performance Goals Supported:

- Reduce the rate of rail-related accidents/incidents
- Reduce the number of serious hazardous materials incidents

Justification for Initiative/Relationship to Performance Goal:

Three high profile train accidents in recent years (Minot, North Dakota; Macdona, Texas; and Graniteville, South Carolina) and the resulting fatalities from the release of toxic chemicals being transported in the trains have highlighted the need for structural enhancements to the present day tank cars used to transport these materials.

In response to this need, FRA has embarked on a program to develop performance standards for the tank cars used to transport toxic inhalation hazard materials. The intended goal is to develop performance-based requirements that foster new technologies and advanced materials to improve survivability in railroad accidents. A complete change-out of the current fleet is anticipated.

The new performance requirements will extend well beyond currently accepted design and construction standards and will require oversight by the FRA to ensure compliance. The Hazardous Materials Division does not currently have the requisite skills necessary to make these determinations. Personnel with engineering knowledge particular to tank car construction are necessary to ensure that the fleet replacement meets the intended goal of reducing accident release-related fatalities.

The new designs will use advanced materials and require careful evaluation and application analysis to ensure adequate life cycle utilization.

In addition, the recently hired Tank Car Quality Assurance Specialists have discovered in their early audits of tank car builders, fleet owners, repair facilities, and valve shops, that there is a significant gap between professing to follow a quality assurance program, as a matter of regulatory compliance, and actually weaving quality assurance into the way the industry conducts its business. The cars to be constructed under the requirements of the new regulation will be much more complicated than their predecessors and will require extra efforts in the quality arena to ensure that these cars actually provide the protection they are supposed to provide. Persons possessing engineering skills along with the ability to analyze both the product and the process by which it is constructed are essential to achieve the success predicted in agency policy statements.

Explanation of Funding Changes for Salaries and Expenses

Salaries and Expenses	FY 2008 to FY 2009 base change: \$4,147,000
Overview:	
FRA's FY 2009 budget request includes a number of base adjustments necessary to sustain its workforce and current operations. Explanations of these changes are listed below.	
Annualization of FY 2008 Comparability Pay Increase (\$679,000)	
FRA's FY 2008 base included funding for a pay raise effective in January 2008. Due to an effective date not until the 2 nd quarter, the FY 2009 base must be increased to reflect a full year of employees at the higher rate of pay.	
FY 2009 Comparability Pay Increase (\$2,295,000)	
Funds the proposed pay raise effective January 2009.	
Working Capital Fund Increase (\$273,000)	
Funds FRA's contribution for the proposed increase in costs for DOT-wide services provided through the working capital fund.	
Internal Base Changes (\$2,621,000)	
FRA's FY 2009 budget request includes various changes relative to contract and other administrative costs. This figure represents the net of those changes. Increases of note include funding required to perform C&A reviews on FRA IT systems, inflationary increases for equipment and other services, and other cost increases.	

EXHIBIT III-1

**RAILROAD RESEARCH & DEVELOPMENT
Summary by Program Activity
Appropriations, Obligation Limitations, and Exempt Obligations**

	FY 2007 <u>Actual</u>	FY 2008 <u>Enacted</u>	FY 2009 <u>Request</u>	Change FY 2008 to FY 2009 <u>FY 2009</u>
Railroad System				
Issues	3,165	3,168	3,155	-13
Human Factors	3,360	3,616	3,475	-141
Rolling Stock and Components	2,850	2,871	3,500	629
Track and Structures	3,840	3,861	4,450	589
Track and Train Interaction	3,144	3,168	3,600	-68
Train Control	7,900	5,600	6,720	1,120
Grade Crossings	2,150	2,178	1,850	-328
Hazmat Transportation	1,287	1,287	1,550	263
Train Occupant Protection	4,948	5,120	3,600	-1,520
R&D Facilities & Test Equipment	1,880	1,881	2,550	669
Adv. Freight Locomotive Safety	0	980	0	-980
Dem. & Deploy PTC (Alaska)	0	735	0	-735
Center for Comm. Deployment of Trans. (CALTECH)	0	245	0	-245
WVU Constructed Facility Center	0	191	0	-191
Marshall University Peers, IL	0	573	0	-573
	<u>0</u>	<u>490</u>	<u>0</u>	<u>-490</u>
TOTAL	34,524	35,964	33,950	2,014

In FY 2009, the Railroad Research and Development request totals \$33,950,000, which is \$2,014,000 below the FY 2008 enacted.

The Railroad Research and Development Program provides science and technology support for FRA's rail safety rulemaking and enforcement efforts. It also stimulates technological advances in conventional and high-speed railroads and serves as the catalyst for the Administration's

vision and policy, and continues to advance the science of railroad safety into the 21st century. The program focuses on the following areas of research:

Railroad system issues - Provides for research in railroad system safety, performance-based regulations, railroad systems and infrastructure security, railroad environmental issues, and locomotive R&D.

Human factors - Provides for research in train operations, and yard and terminal accidents and incidents.

Rolling stock and components - Provides for research in onboard monitoring systems, wayside monitoring systems, and material and design improvements.

Track and structures - Provides for research in inspection techniques, material and component reliability, track and structure design and performance, and track stability data processing and feedback.

Track and train interaction - Provides for research in derailment mechanisms, and vehicle/track performance.

Train control - Provides for research in train control test and evaluation.

Grade crossings - Provides for research in grade crossing human factors and infrastructure.

Hazardous materials transportation - Provides for research in hazmat transportation safety, damage assessment and inspection, and tank car safety.

Train occupant protection - Provides for research in locomotive safety, and passenger car safety/performance.

R&D facilities and test equipment - Provides support to the Transportation Technology Center (TTC) and the track research instrumentation platform. The TTC is a Government owned facility near Pueblo, Colorado, operated by the Association of American Railroads under a contract for care, custody and control.

EXHIBIT III-2

**RAILROAD RESEARCH AND DEVELOPMENT
SUMMARY ANALYSIS OF CHANGE FROM FY 2008 TO FY 2009
Budget Authority
(\$000)**

Item	Total (\$000s)	FTE
FY 2008 Omnibus	35,964	--
Program Changes:		
General Reduction	-4,464	--
Subtotal, Program Changes	-4,464	--
Total, FY 2009 Baseline Estimates	31,500	--
New/Expanded Programs		
ADA Pasenger Boarding	300	--
Cab Technology Lab	400	--
Next Generation HS Passenger Trucks	500	--
TRIP Joint Bar Inspection	250	--
TRIP Rail Flaw Detection	1,000	--
Subtotal, New/Expanded Programs	2,450	--
Total FY 2009 Request	33,950	--

Detailed Justification for Railroad Systems Issues

Railroad Systems Issues	FY 2009 Request: \$3,155,000
Overview: Provides for research in railroad system safety, performance-based regulations, railroad systems and infrastructure security, railroad environmental issues, and locomotive R&D.	
FY 2008 Base: Funding will provide for on-going research activity in system performance and track security.	
FY 2009 Budget Request: New Initiative: ADA Passenger Boarding (\$300,000)	
Performance Goals Supported:	
<ul style="list-style-type: none"> • Reduce Congestion 	
Justification for Initiative/Relationship to Performance Goal:	
<p>For FY 2009, FRA requests \$300,000 to initiate the design and testing of a bridge plate to support access and “level boarding” requirements of the Americans with Disabilities Act (ADA). As envisioned, bridge plates will be designed and manufactured so they can be quickly and safely deployed from most intercity and commuter rail passenger coaches. Bridge plates would provide passengers and the rail industry with a reasonable solution for overcoming the access challenges that result from the non-uniformity in the heights of passenger coach floors and station platforms</p> <p>On February 27, 2006, the Department of Transportation published a notice of proposed rulemaking (NPRM) to change the Department's rules concerning rail station platforms for both intercity and commuter rail operations and the requirement that station platforms be designed in such a way as to provide "level boarding" by passengers with disabilities. A challenge confronting passenger rail operators is accomplishing level boarding between platforms that might vary in height from station to station and the wide range in floor heights currently found in the passenger car fleet. While the NPRM would move the industry toward standardized floor heights, it is likely to be decades before the goal of true level boarding can be accomplished given the long-lived nature of passenger cars (i.e., 50 year-old cars recently began service on the Virginia Railway Express).</p> <p>Under this initiative, FRA will undertake the research, development and demonstration activities related to a plate to bridge the gap between a fixed car floor height and multiple platform heights ranging between 4 inches above top of rail to 25 inches above top of rail, consistent with the ADA regulations. As envisioned, all cars would use bridge plates that would be easily accessible and quickly deployable and returned to storage so as to limit</p>	

impact on train operations. The design and construction must be robust to withstand the demands of the operational environment; require minimum level of effort to deploy; and have a flexible design to accommodate necessary retrofitting onto existing equipment designs at a minimum cost and limited disruption of services.

This project enables industry to respond to ADA's goal of eliminating barriers to access for all Americans much sooner than it may take for passenger rail carriers to standardize car floor and platform heights. This R&D effort also facilitates mobility by providing passenger rail carriers the opportunity to use existing equipment. This initiative may potentially reduce the cost of ADA compliance for Amtrak and the Nation's commuter railroads and communities. Although specific industry cost-benefit estimates are not available at this time, Amtrak has stated it will need to invest a minimum of \$200 million over the next 5 years to make its platforms ADA compliant. A savings of just 5% of these costs would generate a significant positive return on this research investment.

Detailed Justification for Human Factors

Human Factors	FY 2009 Request: \$3,475,000
<p>Overview: Provides for research in train operations, and also in yard and terminal accidents and incidents.</p>	
<p>FY 2008 Base: Funding will provide for Locomotive Simulator experiments to estimate human reliability and error probabilities in a cost effective manner without risk of injury or property damage. In addition, human performance models will be developed to model dispatcher tasks as an alternative method of examining performance changes resulting from the introduction of new technology.</p>	
<p>FY 2009 Budget Request:</p> <p>New Initiative: Cab Technology Integration Lab (\$400,000)</p> <p>Performance Goals Supported:</p> <ul style="list-style-type: none"> • Reduce Rail Related Accidents and Incidents • Reduce Number of Serious Hazardous Materials Incidents <p>Justification for Initiative/Relationship to Performance Goal:</p> <p>For FY 2009, FRA requests \$400,000 to continue construction and installation of the Cab Technology Integration Lab (CTIL). The FRA Office of Research and Development (ORD) initiated the Cab Technology Integration Laboratory (CTIL) project in 2007 to develop a laboratory for the purpose of developing, testing, and evaluating advanced technologies to enhance and support human operator decision making in the locomotive cab.</p> <p>New sensors and control/display technologies (i.e., ETMS, LEADER, PTC, situational awareness displays) are quickly emerging in the rail industry, each offering the potential to improve safety and/or efficiency of railroad operations. Because there is limited space in the cab, and because there are limitations in human cognitive (memory and attention) resources, an urgent need exists to develop an approach to integration of information useful for operational decision making. This issue is closely akin to problems encountered in the early adoption of computerized displays and controls in aircraft cockpits, as well as in maritime, military, and space applications.</p> <p>Failure to integrate sensors, control/display and information-processing technologies properly, without due consideration of human factors, has been identified repeatedly as a causal factor in major accidents (i.e., Three-Mile Island), as well as in numerous unsafe, insecure, and inefficient operational incidents in the aviation, maritime, military, and space</p>	

arenas. Without due consideration to the problem of integrating information flow, controls and displays, and human elements in the locomotive cab can be reasonably expected to result in unsafe conditions in future railroad systems. The CTIL will be an essential, objective tool to research these issues in the locomotive setting.

Detailed Justification for Rolling Stock & Components

Rolling Stock & Components	FY 2009 Request: \$3,500,000
<p>Overview: Provides research in on-board monitoring systems, wayside monitoring systems, and material and design improvements.</p>	
<p>FY 2008 Base: Includes funding for on-board monitoring systems, wayside monitoring systems, and material and design improvements.</p>	
<p>FY 2009 Budget Request:</p> <p>New Initiative: Next Generation High-Speed Passenger Trucks (\$500,000)</p> <p>Performance Goals Supported:</p> <ul style="list-style-type: none"> • Reduce Rail Related Accidents and Incidents • Reduce Number of Serious Hazardous Materials Incidents <p>Justification for Initiative/Relationship to Performance Goal:</p> <p>In FY 2009, FRA requests \$500,000 for the design of high-speed passenger trucks that are more suitable for North American rail conditions. High-speed passenger rail operations are successful in Europe and Asia and have established markets for premium rail equipment. . This equipment has been developed for these operations characterized by specially constructed dedicated tracks with premium components and little curvature. The Nation’s current rail infrastructure precludes the development of special dedicated rights-of-way and favors a more incremental implementation in which high-speed rail equipment is able to operate on existing, often curved tracks.</p> <p>This approach is only achievable with innovations in truck design. These innovations have the potential of producing trucks which remain stable at peak speeds, but with a higher degree of load equalization to accommodate less premium tracks and with the ability to safely negotiate curved tracks at faster speeds.</p> <p>Increasing passenger rail speeds to improve trip time often involves increasing the speed with which trains travel through curves. This can be accomplished without reconfiguring the geometry of existing curved track, by using tilt-body trains. Tilt-body trains can sustain acceptable ride quality through curves, but compromise acceptable safety margins and place more stress on the tracks, which increases required track maintenance to maintain safety. These and other performance issues can be addressed through rigorous requirements gathering for future high-speed bogie design. Ultimately, passenger rail vehicles must be designed to safely negotiate all tangent and curved tracks.</p>	

The objective of this project is to develop detailed requirements for a high-speed truck design, development and testing. Design requirements will be based on performance criteria appropriate for operating on existing North American railway tracks that are maintained to meet the needs of passenger and freight service trains. Initially, the high-speed bogies are expected to benefit the Acela train sets – improving overall performance and reliability. Variants of the new design would be appropriate for future passenger equipment acquired by the States and Amtrak for use in improved (90 mph-125mph +) service throughout the country.

Detailed Justification for R&D Facilities & Test Equipment

R&D Facilities & Test Equipment	FY 2009 Request: \$2,550,000
Overview: Provides support to the Transportation Technology Center (TTC) and the track research instrumentation platform (TRIP). The TTC is owned by the FRA and is located near Pueblo, Colorado and is operated, on behalf of the FRA via contract, by the Association of American Railroads. TRIP vehicles are utilized for the development and demonstration of R&D research products for the advancement of track inspection technologies and improvement of railroad safety.	
FY 2008 Base: Includes continued funding for the TTC and track research.	
FY 2009 Budget Request: New Initiative: TRIP Joint Bar Inspection (\$250,000)	
Performance Goals Supported: <ul style="list-style-type: none">• Reduce Rail Related Accidents and Incidents	
Justification for Initiative/Relationship to Performance Goal: For FY 2009, FRA requests \$250,000 in support of its TRIP Joint Bar Inspection technology effort. Broken joint bars have been identified as one of the major causes of main line derailment in the U.S. Joint bars are currently inspected during regular track inspections by railroad personnel. Visual inspection can provide good results, but is slow, tedious, and often misses the small hairline cracks. FRA has developed a hi-railer, (a light highway truck that is modified to run on a rail), based joint bar defect detection system. This system enables more effective and faster inspection of joint bars while detecting hairline cracked bars or missing bolts, which reduces derailments due to broken joint bars. This activity directly supports the Department's safety goal of reducing rail-related accidents and incidents. A completed system, installed on the hi-railer, is capable of detecting joint bars on both sides of each rail and has been successfully tested at several railroads. In 2006, this system was enhanced and can now detect the joints at speeds up to 50 mph. Requested funding will provide additional research to further improve the system and install it on FRA T18 (GRMS) car. T18 is the state of the art test car that can measure track geometry, and can also be used as a performance-based measurement system to apply known loads vertically and laterally to the track and assess the tie/fastener systems.	

This system enhancement will add visual joint bar inspection capabilities to T18 test car, which will enable the FRA to more effectively inspect a larger volume of track for visual hairline cracks and defects in the joint bars more effectively at speeds up to 50 mph.

FY 2009 Budget Request:

New Initiative: TRIP Rail Flaw Detection (\$1,000,000)

Performance Goals Supported:

- Reduce Rail Related Accidents and Incidents

Justification for Initiative/Relationship to Performance Goal:

For 2009, FRA requests \$1,000,000 in support of its TRIP Rail Flaw Detection technology effort. Broken rails have been identified as one of the major causes of main line track derailments. In the US, nearly 21% of all the track caused derailments have been attributed to broken rails of which 50% of these are caused by internal defects. To locate these defects, various railroads contract with independent testing outfits for rail flaw inspection. As a result of a series of recent derailments due to broken rails caused by internal flaws, the FRA is increasingly concerned that segments of the “continuously inspected rails” are being missed due to the inspection technologies and operator procedures. At this time, other than monitoring inspection records, the FRA has no capacity to evaluate the effectiveness of the rail flaw inspection technology or procedures.

The requested funding will be used to procure a high speed ultrasonic rail flaw inspection system and install it on the FRA Track Research & Instrumentation Platform (TRIP) for the evaluation at the TTC facility or other selected railroads. This will provide the FRA with the capability to find internal rail flaws that cause derailments on the nation’s railroads. In addition, the FRA will utilize the technology to evaluate the effectiveness of the emerging laser based non-contact systems currently under development.

EXHIBIT III-1

**RAIL LINE RELOCATION AND IMPROVEMENT PROGRAM
Summary by Program Activity
Appropriations, Obligation Limitations, and Exempt Obligations**

	FY 2007	FY 2008	FY 2009	Change FY 2008 to FY 2009
	<u>Actual</u>	<u>Enacted</u>	<u>Request</u>	<u>FY 2009</u>
Rail Line Relocation	0	14,905	0	-14,905
Rail Line Relocation Earmarks	<u>0</u>	<u>5,135</u>	<u>0</u>	<u>-5,135</u>
TOTAL	0	20,040	0	-20,040

In FY 2009, no funds are requested for the Rail Line Relocation and Improvement Program.

EXHIBIT III-2

RAIL LINE RELOCATION AND IMPROVEMENT PROGRAM
SUMMARY ANALYSIS OF CHANGE FROM FY 2008 TO FY 2009
Budget Authority
(\$000)

<u>Item</u>	<u>Total (\$000s)</u>	<u>FTE</u>
FY 2008 Enacted	20,040	--
Program Changes:		
General Reduction	-20,040	--
Subtotal, Program Changes	-20,040	--
Total, FY 2009 Baseline Estimates	0	--
New/Expanded Programs	0	--
Subtotal, New/Expanded Programs	0	--
Total FY 2009 Request	0	--

EXHIBIT III-1

INTERCITY PASSENGER RAIL GRANTS Summary by Program Activity Appropriations, Obligation Limitations, and Exempt Obligations

	FY 2007 <u>Actual</u>	FY 2008 <u>Enacted</u>	FY 2009 <u>Request</u>	Change <u>FY 08-09</u>
Operating Grants	490,050	475,000	--	-475,000
Capital / Debt Svc Grants	772,200	850,000	525,000	-325,000
Efficiency Incentive Grants	31,300	--	275,000	275,000
Intercity Passenger Rail Grant Program	<u>--</u>	<u>30,000</u>	<u>100,000</u>	<u>70,000</u>
TOTAL	1,293,550	1,355,000	900,000	-455,000

The Intercity Passenger Rail Grants Program is a collection of activities that provide support for the infrastructure and efficiency of the Nation's passenger rail services. In FY 2009, FRA is requesting a total of \$900 million for this program, which is a decrease of \$455,000 from the FY 2008 enacted amount.

The requested \$900 million would require Amtrak to make hard but necessary choices. The Administration expects Amtrak to be run more like a business, with the goal of addressing the nation's mobility problems in a cost-effective way. The Budget proposes to reduce unjustified operating subsidies. The Administration's position is that the Federal government should focus on strategically investing in capital rather than allocating scarce resources to operating inefficient trains that fail to solve pressing transportation challenges facing the Nation.

The Budget proposal is consistent with the view of independent parties, who have repeatedly cited the need to reform Amtrak. For example, the GAO recently concluded that Amtrak's long-distance trains "show limited public benefits for dollars expended" and that "these routes account for 15 percent of riders but 80 percent of financial losses." Moreover, it recommended "reexamining the entire structure of intercity passenger rail service with the focus on optimizing its performance on benefits for the federal and non-federal expenditures."

Operating Grants - The National Railroad Passenger Corporation (Amtrak) was established in 1970 through the Rail Passenger Service Act. Amtrak is a private corporation and not an agency or instrument of the U.S. Government. Its Board members are appointed by the Executive Branch with the advice and consent of the U. S. Senate Starting in 2006, funds for Amtrak are provided through separate appropriation accounts for capital, operating, and efficiency incentive grants. Beginning in FY 2008, no funds are requested for Amtrak operating grants.

Capital Grants - Resources in this account are provided to the Secretary of Transportation to make grants to the National Passenger Railroad Corporation for capital requirements.

Efficiency Incentive Grants - Resources in this account are provided to the Secretary of Transportation to make grants to the National Passenger Railroad Corporation for operating expenses contingent upon efficiency gains. The Budget also proposes a set of provisions that would increase the government's oversight of Amtrak's finances. Additionally, it proposes establishing a new competition pilot program that would allow the Secretary to test the viability of using alternative Amtrak operators on selected routes.

Intercity Passenger Rail Grant Program - For FY 2009, the Administration is proposing to continue the Capital Grant Program that was proposed in FY 2008, encouraging state participation in its passenger rail service. Under this program, a State or States would apply to FRA for grants for up to 50 percent of the cost of capital investments necessary to support improved intercity passenger rail service that either requires no operating subsidy or for which the State or States agree to provide any needed operating subsidy. To qualify for funding, States would have to include intercity passenger rail service as an integral part of Statewide transportation planning as required under 23 U.S.C. 135. Additionally, the specific project would have to be on the Statewide Transportation Improvement Plan.

EXHIBIT III-2

INTERCITY PASSENGER RAIL GRANTS
SUMMARY ANALYSIS OF CHANGE FROM FY 2008 TO FY 2009
Budget Authority
(\$000)

<u>Item</u>	<u>Total (\$000s)</u>	<u>FTE</u>
FY 2008 Enacted	1,355,000	--
Program Changes:		
General Reduction	-455,000	--
Subtotal, Program Changes	-455,000	--
Total, FY 2009 Baseline Estimates	900,000	--
New/Expanded Programs		
	<u>0</u>	<u>--</u>
Subtotal, New/Expanded Programs	0	--
Total FY 2009 Request	900,000	--

Detailed Justification for Intercity Passenger Rail Grants

Intercity Passenger Rail Grants	FY 2009 Request: \$900,000,000						
Overview:							
Provides funding for Intercity Passenger Rail.							
FY 2008 Base:							
Includes \$900 million for the continuation of intercity passenger rail service.							
FY 2009 Budget Request:							
Intercity Passenger Rail Service							
<p>In FY 2009, FRA requests \$ 900 million is requested for intercity passenger rail, which remains unchanged from the FY 2008 request. Resources are requested to be distributed as follows:</p>							
<table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Capital / Debt Service Grants</td> <td style="text-align: right; padding: 2px;">\$525M</td> </tr> <tr> <td style="padding: 2px;">Efficiency Incentive Grants</td> <td style="text-align: right; padding: 2px;">\$275M</td> </tr> <tr> <td style="padding: 2px;">Intercity Passenger Rail Grant Program</td> <td style="text-align: right; padding: 2px;">\$100M</td> </tr> </table>		Capital / Debt Service Grants	\$525M	Efficiency Incentive Grants	\$275M	Intercity Passenger Rail Grant Program	\$100M
Capital / Debt Service Grants	\$525M						
Efficiency Incentive Grants	\$275M						
Intercity Passenger Rail Grant Program	\$100M						
<p>The Administration remains committed to improving the manner by which intercity passenger rail services are provided. This program activity includes improvements to how Amtrak provides services and lays the groundwork for States to have a more prominent role in determining (1) key characteristics of services States will support financially and (2) opportunities for other providers of intercity passenger rail service to contract with States and/or Amtrak.</p>							
<p>Since 2002, the Administration has drawn a distinction between intercity passenger rail service, a form of transportation, and Amtrak, the only company that provides the service. Even though Administration strongly supports intercity rail as a form of transportation and as an important component of the national transportation system. It recognizes there are shortcomings with the service provider.</p>							
<p>The Administration's advocacy for change is beginning to see results. For example:</p> <ul style="list-style-type: none"> • Amtrak's Board of Directors has acknowledged the urgent need for reform and issued a Strategic Reform Initiative Plan that mirrors major elements of the Administration's policy, such as introducing competition; empowering States to participate in infrastructure decisions; reducing operating subsidies; and pinpointing more transparently the operating results of such identifiable lines of business as train operations and infrastructure management. • A new management team in place with a mandate to overhaul the company. 							

Additionally, Congress continues to encourage Amtrak to take more accountability for reducing operational costs and efficiencies.

For FY 2009, the FRA requests \$800 million in direct Amtrak subsidies and \$100 million to fund a continuing program of matching grants to the States to undertake state identified capital investment priorities for passenger rail services. In total, this amount supports continued improvement of intercity passenger rail service and enables Amtrak's new management team to act on its mandate to reshape the company through undertaking meaningful reforms and controlling spending. The FY 2009 request supports a multi-year effort to reduce, and eventually eliminate, operating subsidies for Amtrak. Overall, this level of support is appropriate as it provides Amtrak continuing incentives to more effectively manage costs, rationalize services, and pursue innovations. It expands State support for intercity passenger rail, empowering States and locals to help shape decisions on identifying those intercity rail passenger services and operations that should be funded with public funds.

Consistent with FY 2006 appropriations account restructuring, in FY 2009, FRA seeks resources for Amtrak under the Capital Grants and Efficiency Incentive Grant accounts. The FY 2009 budget request also contains many of the stipulations included in the FY 2006 appropriations language.

Capital Grants

In FY 2009, FRA requests \$525 million to provide direct Federal subsidies to Amtrak for capital improvement activities. In addition, the FY 2009 request includes \$100 million under the Intercity Passenger Rail Grant Program for grants to States. This State grant program requires States to guarantee a 50 percent match and directs that all grant funds are limited to managing capital costs associated with the priority intercity passenger rail services identified by States. FRA expects the combined \$625 million will be sufficient to appropriately support Amtrak and its State partners to execute a capital improvement programs that, when combined with other Amtrak partner initiatives will address the priority investment needs on the Northeast Corridor infrastructure, as well as essential equipment investments. Given there is only so much that can be completed during a single fiscal year, the \$625 million requested is the maximum capital budget that Amtrak could be expected to manage in FY 2009.

Efficiency Grants

In FY 2009, FRA requests \$275 million for efficiency costs. The request for operating subsidies is sufficient to avoid a bankruptcy, provided Amtrak acts to cut its costs by focusing on core services. To ensure this occurs, the FRA proposes to target funding based on Amtrak's progress implementing cost-cutting measures. For example, the Secretary of Transportation would review and approve grant requests for individual train routes and restrict the use of funds for specific operating expenses without the Secretary's approval, such as prohibit the funding of deficits stemming from food and beverage services which accounted for a substantial portion of the total Federal subsidy

of Amtrak. As it did in FY 2007, Amtrak must continue to improve its operating performance through net revenue gains, debt service reductions, and other means. Ultimately, FRA anticipates this initiative would lead to a more efficiently operated railroad, which will encourage Amtrak's management to explore opportunities for targeted cost savings and for net revenue gains.

Intercity Passenger Rail Grant Program

Most publicly supported transportation in the U.S. is undertaken through a partnership between the Federal government and the States. This model, which has worked well for generations for highways and transit and airports, places the States, and in certain cases their subdivisions, at the forefront of planning and decision-making. States are uniquely qualified to understand their mobility needs and connectivity requirements through statewide and metropolitan area inter-modal and multimodal transportation planning funded, in part, by the U.S. Department of Transportation.

While intercity passenger rail has historically been an exception to the application of this model, in recent years some States have taken an active role in their rail transportation services. Several States have chosen to invest in intercity passenger rail service provided by Amtrak as part of strategies to meet their passenger mobility needs. Over the ten years between 1996 and 2006, Amtrak ridership on State -supported routes grew by a total of 88 percent, while all other routes' ridership grew by 17 percent.

State participation in planning and decision-making for intercity passenger rail service identifies where mobility requirements justify public investment. An excellent example can be found in Washington State, which has invested in intercity passenger rail from Portland, OR, through Seattle, to Vancouver, B.C. in order to relieve highway travel on the congested I-5 corridor. Similarly, the state of Illinois has made financial commitments that have effectively doubled the number of State-supported trains operated by Amtrak on three routes.

Past experience shows active State engagement in planning and decision-making helps assure that infrastructure components, such as stations, provide connectivity to other forms of transportation, which support inter-modalism within the State. For example, in North Carolina, the State has undertaken the redevelopment of its intercity passenger rail stations and transformed them into multi-modal transportation centers serving the needs of the surrounding communities.

State participation in financing intercity passenger rail service provides added incentives for Amtrak to seek ways to enhance quality of service, partnership, and goodwill. In Vermont, where the State offered higher State operating subsidies for current service, Amtrak was willing to restructure services to drive down operating costs, while increasing train frequencies for Vermont citizens.

Amtrak's strategic reform initiative seeks to build on its recent experience with the States as it is proactively seeking to create a stronger role for the States in designing and

supporting State priorities. The Administration supports this aspect of Amtrak's internal reform. In discussions with interested States, the U.S. Department of Transportation has found that the greatest single impediment to implementing this initiative is the lack of a Federal/State partnership for investing in the capital needs of intercity passenger rail. Such a partnership is one of the five principles of intercity passenger rail reform laid out by former Secretary Mineta in 2002 and was a central element of the Administration's passenger rail investment reform legislative proposal.

Therefore, the Administration proposes to continue the Intercity Capital Grant Program and will seek State participation in passenger rail service. Under this program, States would apply to FRA for grants for up to 50 percent of the cost of capital investments necessary to support improved intercity passenger rail service that either require no operating subsidy or for which the State agrees to provide any needed operating subsidy. Priority would be given to infrastructure improvement projects that (1) improve the safety, reliability, and schedule of intercity passenger trains; (2) reduce congestion on the host freight railroads where the freight railroads commit to an enforceable on-time performance of passenger trains of 80 percent or greater; (3) States that commit other financial resources to improve the safety of highway/rail grade crossings over which the passenger service operates; and (4) protect and enhance the environment, promote energy conservation, and improve quality of life.

To qualify for funding, States have to include intercity passenger rail service as an integral part of Statewide transportation planning as required under 23 U.S.C. 135. Additionally, the specific project would have to be on the Statewide Transportation Improvement Plan.

PERFORMANCE OVERVIEW

Annual Performance Results and Targets

The Federal Railroad Administration integrates performance results into its budget request to demonstrate alignment with the Department of Transportation's Strategic Plan. FRA tracks the following DOT level performance measures to demonstrate program results (2006 figures are preliminary):

Strategic Objective: Safety

Reduce Rail-Related Accidents and Incidents	2005	2006	2007	2008	2009
Target	17.14	16.08	16.70	18.45	17.00
Actual	17.49	16.97	15.67	--	--

Strategic Objective: Safety

Reduce Number of Serious HAZMAT Incidents	2005	2006	2007	2008	2009
Target	503	460	466	462	N/A
Actual	523	484	--	--	--

Strategic Objective: Environmental Stewardship

% of DOT facilities categorized as No Further Remedial Action Planned	2005	2006	2007	2008	2009
Target	93	93	93	93	N/A
Actual	92	92	--	--	--

Program Assessment Rating Tool (PART) Assessment

PART was developed to provide a standardized way to assess the effectiveness of the Federal Government's portfolio of programs. The structured framework of the PART provides a means through which program activities can be assessed from a different perspective than through traditional reviews. The following FRA programs have been assessed via the PART:

Program	Cycle	Score	Assessment Rating
Railroad Safety	FY 2005	80	Moderately Effective
Research and Development	FY 2006	78	Moderately Effective
Amtrak	FY 2007	25	Ineffective

The following updates the status of recommendations made during the FRA PART reviews:

PART Review	Recommendation	Status
Railroad Safety	Schedule an evaluation of program effectiveness	Complete - evaluations have been scheduled and are underway
	Develop an efficiency measure for the rail safety program.	Efficiency goal was included in FRA's FY 2006 – FY 2009 budgets
Railroad Research and Development	Develop a strategic framework for managing the program and its component research projects.	Resources approved in FY 2006 budget – employee hired in FY 2007, framework is being developed.
	Request funding in the FY 2006 budget for staff and resources to coordinate strategic planning effort.	Complete - funding requested and approved
	Include in FRA's annual performance reports a numeric chart showing progress made towards achieving performance goals at the R&D project level	Efficiency performance indicators included in FY 2007 through FY 2009 budgets, though indicators will likely undergo significant change during budget process
	Develop process for tracking "on-budget" and "on-schedule" efficiency measures	To be developed during FY 2009 budget process
Amtrak	Work with the board of directors to increase Amtrak's accountability for its financial and operational performance	Complete / Ongoing - In FY 2006 and in future grant agreements with Amtrak, various financial and operational accountability conditions and contingencies are included.
	Evaluate capital projects and proposed route changes to assess the return on investment (ROI) as well as any operating impacts.	Work begun – FRA will ensure that capital grant agreements with Amtrak require ROI analysis on the majority of their capital projects.
	Work with Congress to develop legislation that better articulates the Federal policy on intercity passenger rail, including Amtrak's mission and goals	Ongoing

EXHIBIT IV-1

FY 2009 BUDGET REQUEST BY STRATEGIC OBJECTIVE AND PERFORMANCE GOAL
Federal Railroad Administration
Appropriations, Obligation Limitations, & Exempt Obligations
(\$000)

	(A)	(B)	(D)	(E)	(F)
STRATEGIC & PERFORMANCE GOALS BY PERFORMANCE MEASURE	FY 2007 ACTUAL	FY 2008 ENACTED	FY 2009 BASELINE ESTIMATES	FY 2009 PROGRAM CHANGES	TOTAL FY 2009 REQUEST (D+E)
1. SAFETY STRATEGIC GOAL					
A. <u>Rail Safety Performance Goal</u>					
a. Rail-related accidents and incidents per million train-miles	144,923	161,180	145,456	2,514	147,970
b. Other	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	0
Subtotal Performance Goal	144,923	161,180	145,456	2,514	147,970
B. <u>Hazardous Materials Safety Performance Goal</u>					
a. Number of serious hazardous materials transportation incidents	36,230	40,294	36,364	216	36,580
b. Other	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	0
Subtotal Performance Goal	36,230	40,294	36,364	216	36,580
Total - Safety Strategic Goal	181,153	201,474	181,820	2,730	184,550
2. REDUCED CONGESTION STRATEGIC GOAL					
A. <u>Urban Congestion</u>					
a. Other	<u>1,293,694</u>	<u>1,356,618</u>	<u>900,000</u>	<u>2,125</u>	<u>902,125</u>
Subtotal Performance Goal	1,293,694	1,356,618	900,000	2,125	902,125
Total - Reduced Congestion Strategic Goal	1,293,694	1,356,618	900,000	2,125	902,125
3. GLOBAL CONNECTIVITY STRATEGIC GOAL					
A. <u>Expand Opportunities</u>					
a. Percent of total dollar value of DOT direct contracts awarded to women owned businesses.	0	0	0	0	0
b. Percent of total dollar value of DOT direct contracts awarded to small disadvantaged businesses.	0	0	0	0	0
c. Other	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Subtotal Performance Goal	0	0	0	0	0
Total - Global Connectivity Strategic Goal	0	0	0	0	0
4. ENVIRONMENTAL STEWARDSHIP STRATEGIC GOAL					
A. <u>Reduction in Pollution Performance Goal</u>					
Percent of DOT facilities characterized as 'No Further Remedial Action' under the Superfund Amendments Reauthorization Act.	675	975	825	0	825
b. Other	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Subtotal Performance Goal	675	975	825	0	825
Total - Environmental Stewardship Strategic Goal	675	975	825	0	825
5. SECURITY, PREPAREDNESS AND RESPONSE STRATEGIC GOAL					
A. <u>Hazmat Emergency Response Performance Goal</u>					
a. Other	<u>752</u>	<u>752</u>	<u>738</u>	<u>0</u>	<u>738</u>
Subtotal Performance Goal	752	752	738	0	738
Total - Security, Preparedness and Response Strategic Goal	752	752	738	0	738
6. ORGANIZATIONAL EXCELLENCE STRATEGIC GOAL					
A. <u>Fulfill the President's Management Agenda Performance Goal</u>					
a. Other	<u>2,071</u>	<u>1,378</u>	<u>2,457</u>	<u>0</u>	<u>2,457</u>
Subtotal Performance Goal	2,071	1,378	2,457	0	2,457
Total - Organizational Excellence Strategic Goal	2,071	1,378	2,457	0	2,457
GRAND TOTAL	1,478,345	1,561,197	1,085,840	4,855	1,090,695

**Detailed Justification by Performance Goal: SAFETY
Reduce Rail-Related Accidents and Incidents**

This funding request contributes to the DOT Safety strategic objective and to the Reduce Rail-Related Accidents and Incidents performance outcome goal.

Rail-related accidents and incidents per million train-miles.						
	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>
Target:	17.49	17.14	16.08	16.70	18.45	17.00
Actual:	18.92	17.49	16.97	15.67	--	--

FRA's FY 2009 request supports DOT's success in achieving railroad safety goals. Specifically, the funding level enhances FRA's existing safety program by adding bridge safety inspectors, additional track geometry inspections, and research and development activities. Collectively, these activities are targeted toward increasing the safety of the Nation's railroad system. In the FY 2008 request, this goal replaced the previous goal of "Reducing train accidents and highway-rail incidents," which only captured a subset of FRA's safety achievements.

The resources requested to achieve this goal are:

PERFORMANCE MEASURES/GOALS by PROGRAM ACTIVITIES	FY 2007 ACTUAL	FY 2008 ENACTED	FY 2009 TOTAL REQUEST
I. Safety			
A. Rail Safety Performance Goal			
Rail-related accidents and incidents	144,923	161,180	147,970
Other	0	0	0
Subtotal Performance Goal	144,923	161,180	147,970
FTE	[653]	[659]	[664]

Marginal Cost of Performance

Requested Program Changes from FY 2009 Baseline Associated with this Goal:

Appropriations Account(s)	FY 2009 Baseline Estimates		FY 2009 Program Changes		FY 2009 Total Request	
	(\$000)	FTEs	(\$000)	FTEs	(\$000)	FTEs
Safety and Operations	120,592	662	3,884	2	124,476	664
Railroad R & D	23,959	--	971	--	24,930	--

Agency Output or Outcome Measure Associated with this Program increase(s): Reduce the rate of rail-related accidents and incidents.

Initiative	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
Baseline Performance Level	16.778	18.695	17.255	17.275	17.276	17.277	17.277
National Inspection Plan	-0.018	-0.035	-0.035	-0.035	-0.035	-0.035	-0.035
Additional OP Inspectors	-0.017	-0.034	-0.034	-0.034	-0.034	-0.034	-0.034
Track Geometry Cars	-0.093	-0.186	-0.186	-0.186	-0.186	-0.186	-0.186
Bridge Safety Specialists			0.000	-0.001	-0.002	-0.003	-0.003
ATIP Operational Funds			0.000	-0.019	-0.019	-0.019	-0.019
Close Call			0.000	0.000	0.000	-0.005	-0.018
Total Performance Target with Program Changes	16.650	18.440	17.000	17.000	17.000	17.000	17.000

Note – Measures for FY 2010 and beyond are preliminary

Effects of Past (Approved) Initiatives

National Inspection Plan (NIP): The NIP allocates inspection resources to minimize accidents and incidents. Start-up for the NIP was funded from existing resources. The NIP models were developed in FY 2005 and the plan was partially implemented in FY 2006. Benefits begin in FY 2007 after inspectors have worked a full year under the plan.

Additional Operating Practices Inspectors: This initiative included hiring eight Operating Practices inspectors to analyze accident/incident and train-and-engine data, and to conduct safety inspections to prevent human-factors-caused accidents and injuries. Following an 18-month hiring and training period, the effects of this initiative begin half way through FY 2007. FY 2008 and 2009 show a full year of benefit.

Track Geometry Cars: This initiative funded purchases additional geometry vehicles. After the 30-month car procurement, construction, testing, and implementation period, the car will be placed into full-time service inspecting track nationwide. The effects of this initiative begin halfway through FY 2007. FY 2008 and 2009 show a full year of benefit.

Operations Research Analyst: The analyst was needed to allow full implementation of the NIP (described above). The increase in NIP benefits from FY 2007 to FY 2008 shows the effect of full implementation.

NIP Contractor Support: The funding was needed to complete development of the NIP web site. The increase in NIP benefits from FY 2007 to FY 2008 shows the effect of full implementation.

ATIP Track Safety Specialist: The funding was needed to fully realize the benefits of the Track Geometry Car (described above). Without the initiative, the increase in benefits from FY 2007 to FY 2008 cannot be achieved.

Effects of Proposed FY 2009 Initiatives

Bridge Safety Specialists (\$471,000 / 4 positions): These four positions will augment the existing four bridge safety specialists stationed in the field to enhance FRA's Bridge Safety and Security Program. Their addition will enable FRA to effectively deal with increased rail traffic on the Nation's aging bridges, tunnels, and other vital railroad structures. Although the number of rail accidents attributable to bridge and tunnel failures is small, the consequences of these accidents are great. As noted in the table above, this initiative will have no effect in FY 2009 due to the lead time necessary to hire specialists, have them begin inspections, and follow-up with the railroads. The effects will begin in 2010 and increase through 2013.

Close Call Confidential Reporting System (\$1.15 M): This initiative includes a pilot study as part of the Risk Reduction Program under the overall National Rail Safety Action Plan. "Close Call" is a process for aggressively collecting and analyzing leading indicator data, and for improving the safety reporting culture for the rail industry. As noted in the table above, this initiative has a long lead time before effects will be realized (2012), due to the need for time to collect a sufficient number of cases to evaluate, time to introduce change in industry practices, and time for the industry to actually implement the changes.

ATIP Operational Funds (\$500,000): These funds will finance the operational costs of the T-16 and T-18 geometry cars in conducting safety track inspections when not in use by the Office of Research and Development. This funding will allow FRA to more effectively respond to the workload associated with unplanned survey requests without compromising or interfering with the Office of Safety's previously scheduled ATIP survey activities.

**Detailed Justification by Performance Goal: SAFETY
Number of Serious Hazardous Materials Incidents in Transportation**

This funding request contributes to the DOT Safety strategic objective and to the Number of Serious Hazardous Materials Incidents in Transportation performance outcome goal.

Number of serious hazardous materials incidents.						
	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>
Target:	509	503	460	466	462	--
Actual:	492	523	484	462		

FRA's FY 2009 request supports DOT's success in achieving hazmat goals. Specifically, the funding level requested supports FRA's continued focus on hazmat transportation and release prevention activities and FRA's compliance monitoring of hazardous material shipments over rail. The funding levels identified below do not reflect the funds spent directly on our hazmat work, but instead reflect a portion of many aspects of FRA's safety program. This is due to the fact that many of the safety functions FRA performs, even those that are not specifically hazmat related, contribute to the overall safety of hazmat shipments.

As the Department is creating a risk-based performance goal to measure the effectiveness of its hazardous materials program. This new goal will examine the effectiveness of DOT's regulations, inspections, and outreach in changing practices and lowering risk in the hazmat industry.

The resources requested to achieve this goal are:

PERFORMANCE MEASURES/GOALS by PROGRAM ACTIVITIES	FY 2007 ACTUAL	FY 2008 ENACTED	FY 2009 TOTAL REQUEST
1. Safety			
B. Haz. Mat. Performance Goal			
# of haz. mat. transportation incidents	36,230	40,294	36,580
Other	<u>0</u>	<u>0</u>	<u>0</u>
Subtotal Performance Goal	36,230	40,294	36,580
Total – Safety Strategic Goal	181,153	201,474	184,550
FTE	[653]	[659]	[664]

The goal of Reducing Serious Hazardous Materials Incidents is a Department-wide goal. Therefore, due to the multi-modal variables affecting out-year estimates, FRA can not yet project targets for FY 2009 and beyond. While the new initiatives listed in the previous section primarily affect our safety goals, they also have a secondary impact on reducing hazardous materials releases.

Efficiency Goals

FRA's Safety Program

By FY 2009, reduce the ratio of indirect spending on safety activities to 26 percent from 27 percent in FY 2008.

Ratio of Indirect Spending on Safety Activities							
	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>
Target %:	N/A	30	29	29	28	27	26
Actual %:	N/A	30	29	29	28	--	--

FRA's Research and Development Program

Percentage of R&D Projects Completed Within Budget							
	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>
Target %:	N/A	N/A	71	75	77	77	77
Actual %:	N/A	N/A	74	75	77	--	--

The FY 2006 enacted appropriations bill funded a new R&D program manager with the sole responsibility of strategically planning and tracking R&D projects. That employee was hired during FY 2007. As a result, this goal will be better defined in subsequent years.

Safety Performance Segment
FRA Internal Performance Goals

As discussed in FRA’s FY 2007 and FY 2008 budget justifications, the Rail Safety Action Plan has drastically changed the way we accomplish our safety mission. To that end, we have modified our internal goals to better reflect FRA’s major lines of business and continue to support the Department’s performance measure of reducing rail-related accidents and incidents through six new goals, which encompass the following rail-related disciplines:

- Grade Crossing;
- Operating Practices
- Track
- Motive Power and Equipment
- Signal and Train Control; and
- Hazardous Materials.

The table below depicts historical performance on these measures, as well as performance goals through FY 2009.

	<u>Actual 2003</u>	<u>Actual 2004</u>	<u>Actual 2005</u>	<u>Actual 2006</u>	<u>Actual 2007</u>	<u>Goal 2008</u>	<u>Goal 2009</u>
Departmental Safety Goals:							
1. Rail-related accidents and incidents per million train-miles	19.39	18.92	17.49	16.97	15.67	18.45	17.00
2. Number of serious hazardous materials incidents	472	492	523	484	466	462	TBD
FRA Safety Goals:							
1. Grade crossing incidents per million train-miles	--	--	3.77	3.78	3.48	3.75	3.47
2. Human-factors-caused train accidents per million train-miles	--	--	1.63	1.34	1.20	1.66	1.35
3. Track-caused accidents per million train-miles	--	--	1.39	1.29	1.22	1.15	1.15
4. Equipment-caused accidents per million train-miles	--	--	0.498	0.422	0.402	0.521	0.450
5. Other train accidents per million train-miles	--	--	0.699	0.625	0.485	0.647	0.647
6. Non-accident hazardous materials releases per million train-miles	--	--	0.910	0.790	0.838	0.915	0.800

Safety Performance Segment
FY 2009 New Initiatives Request

The following new funding requests are included in our budget to address the performance segment of safety:

Safety Related Initiatives	Funding Request (\$000)	Positions
ATIP	500	
Close Call	1,150	
Bridge Safety Specialists	471	4
Tank Car Specialists	284	2

Detailed justifications for these initiatives may be found in Section 3: Budget Request by Appropriation Account.

FRA Safety Accomplishments

FRA has served as the Federal government's lead railroad safety compliance and regulatory agency since its establishment in 1966. Over the past 40 years, the railroad industry's has made significant safety improvements and most safety trends are moving in the right direction. However, train accidents continue to occur. Moreover, several major freight and passenger train accidents in 2004 and 2005 (such as those at Macdona, Texas; Graniteville, South Carolina; and Glendale, California) raised specific concerns about railroad safety issues deserving government and industry attention.

The FRA has championed several key national railroad safety initiatives and has brought to market an impressive portfolio of safety policies, standards, protocols and regulations. For example:

- In May 2005, DOT and FRA announced the *National Rail Safety Action Plan*. This plan was a blueprint to comprehensively address critical safety issues facing the railroad industry with the following strategy: (1) target the most frequent, highest-risk causes of train accidents; (2) focus FRA's oversight and inspection resources on areas of greatest concern; and (3) accelerate research efforts that have the potential to mitigate the largest risks.

The Plan includes initiatives that address: (1) reducing train accidents caused by human factors; (2) fatigue; (3) improving track safety; (4) enhancing hazardous materials safety and emergency preparedness; (5) strengthening FRA's safety compliance program; and (6) improving highway-rail grade crossing safety.

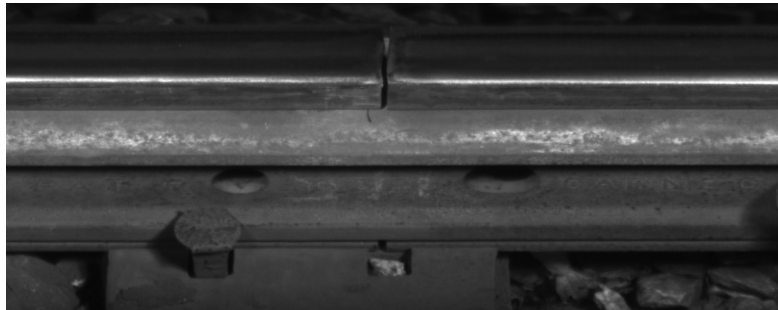
- The *National Inspection Plan (NIP)* is a resource allocation program that uses predictive indicators to assist FRA in conducting inspection and enforcement activities within a specific geography or on a certain railroad. The NIP helps FRA optimize existing inspection and accident data in such a way to identify potential safety "hot spots" so they can be examined before a serious safety hazard emerges.
- FRA's robust *railroad industry regulatory program* addresses such topics as track, passenger equipment, locomotives, freight cars, power brakes, locomotive event recorders, signal and train control systems, maintenance of active warning devices at highway-rail grade crossings, accident reporting, alcohol and drug testing, protection of roadway workers, operating rules and practices, locomotive engineer certification, positive train control, the use of locomotive horns at grade crossings, and many other subject areas.

Also noteworthy are the FRA sponsored railroad safety research and development activities. These R&D initiatives have greatly advanced the Agency's passenger and freight safety mission. The robust R&D agenda serves as a catalyst for the Administration's vision and policy, and continues to advance the science of railroad safety into the 21st century. The R&D projects are vital to the FRA's safety regulatory processes, to railroad suppliers, to railroads involved in the transportation of freight,

intercity passengers, commuters, and to railroad employees and their labor organizations. FRA-owned facilities provide the infrastructure necessary to conduct experiments and test theories, concepts, and new technologies in support of the R&D program.

Of special note, are three R&D technologies that are changing the science of rail safety and catapulting the industry into the 21st century:

- **Automated joint bar inspection system:** Broken joint bars are one of the leading causes of main line derailments in the United States. Traditionally, joint bars are inspected *visually* by railroad maintenance personnel. Searching for small hairline sized cracks in the joint bars is a difficult and time consuming task. The quality of this inspection, which is usually performed from a moving vehicle, is questionable. During FY2001, FRA started the development of an automated high-resolution video joint bar inspection system that could be deployed on a maintenance vehicle and would detect visual cracks in joint bars without having to stop the vehicle. Today, this technology detects a crack, the software displays the broken joint bar images with their GPS coordinate to operator and produces an exception report. This system has been successfully demonstrated to several railroads (UP, CP, NS, BNSF, NJ transit,).



As a result of these demonstrations, an enhanced high speed commercial version of this inspection system has been independently developed by the support contractor. Canadian Pacific and Canadian National railroads each purchased the system and Union Pacific and Burlington Northern railroads are currently evaluating the enhanced system. A joint bar inspection service will soon be available for the railroads in US. Application of this technology has already found thousands of cracked joint bars each having the capacity to derail a train if allowed to grow.

- **Deployable Gage Restraint Measurement System:** Gage widening-related accidents, caused when the forces generated by the train are greater than the holding capacity of the ties and fasteners allowing the wheels to drop between the rails, have been one of the top five causes of track related accidents. To address these safety issues, the FRA Office of Research and Development along with the Volpe National Transportation System Center initiated and maintained its research effort in Gage Restraint Measurement System (GRMS) technology development to improve detection of railroad track gage defects that cause derailments. The FRA Office of R&D, as part of continued research effort on the advancement in GRMS technology, has developed the Deployable GRMS vehicle (T-18). This state-of-the-art self-propelled vehicle conducts performance-based testing of railroad track strength. It

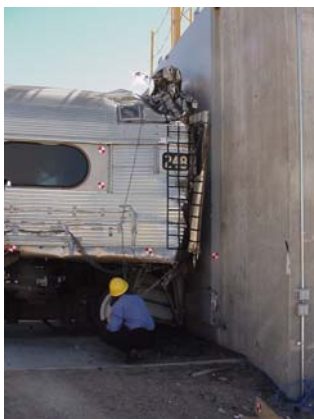
uses a unique design approach of deploying a fifth axle from the frame of a track geometry vehicle providing safer, more efficient, and higher speed operational capabilities. Since the T-18's delivery in 2004, it has been playing a significant role as a rolling laboratory for track strength/gage widening research activities. In addition, the T-18 is being utilized by the FRA Office of Safety in an enforcement mode on designated GRMS territories and provides supplemental inspection surveys for the ATIP program.

The FRA Office of Safety will use the T-18 for the DM&E and Alaska Railroad in FY2008 to assist the railroads in evaluating tie condition. The FRA Office of R&D will continue research efforts to increase GRMS operational speed, provide GRMS test support, and use GRMS data for more efficient and effective operations and maintenance planning.

- **Crash Energy Management:** A cab car led passenger train presents a particularly challenging situation in collisions with locomotive-led trains. The approach of including crush zones in cab and coach cars, referred to as Crash Energy Management (CEM), can significantly increase the survivability of passengers during a collision. Sacrificial crush zones can be placed in unoccupied locations in cars which are designed to collapse gracefully, preserving the integrity of the occupied areas.



The FRA with support from the Volpe Center demonstrated the superior crashworthiness performance of CEM equipment over conventional equipment with full-scale impact tests. In conventional equipment test, the colliding cab car crushed by approximately 22 feet and overrode the locomotive, eliminating the space for the operator's seat and approximately 47 passenger seats. During the 30 mph CEM equipment test, the front of the cab car crushed by approximately 3 feet with no override, and the crush propagated back to all of the unoccupied ends of the trailing passenger cars. All of the space for the passengers and crew remained intact, without any intrusion.



In coordination with the American Public Transportation Association (APTA), Metrolink approached the FRA about transferring CEM technology to the industry. The FRA, with the Federal Transit Administration (FTA) and APTA, formed the ad hoc Crash Energy Management Working Group in May 2005. This working group included participants from the rail industry, including passenger railroads, suppliers, rail labor, and industry consultants. Railroads supplied insight regarding operations pros and cons of CEM features and designs on cars. Carbuilders reacted to proposed CEM requirements with specifics as to

cost, feasibility, schedule, weight, and other issues related to design details. Suppliers provided input regarding the ability of their existing lines of equipment to meet proposed requirements, and the extent of development that would be required in cases where they felt that the level performance needed to meet the requirements was beyond the capacity of their existing lines. In some cases, the requirements were modified to minimize the need for such development. Consultants provided input based on experience with procurement of CEM rolling stock in the U.S. and internationally. The FRA is continuing to work with Metrolink, to review the design being developed by Rotem, a rail equipment manufacturer. The FRA is also working with the APTA/PRESS Construction-Structural Subcommittee to start the process of developing CEM standards. Agenda items for the next meeting include a standard for retrofit of pushback couplers onto existing equipment and incorporation of CEM features on locomotives.

Detailed Justification by Performance Goal: REDUCED CONGESTION

This funding request contributes to the DOT Reduced Congestion Strategic Goal. The majority of the funding requested in this performance segment is directly associated with Intercity Passenger Rail. Additional funds under this account fund research, technology enhancements, and demonstration projects under the Railroad Research and Development account.

The resources requested to achieve this goal are:

PERFORMANCE MEASURES/GOALS by <u>PROGRAM ACTIVITIES</u>	FY 2007 <u>ACTUAL</u>	FY 2008 <u>ENACTED</u>	FY 2009 TOTAL <u>REQUEST</u>
2. Reduced Congestion			
A. Urban Congestion			
Other	<u>1,293,694</u>	<u>1,356,618</u>	<u>902,125</u>
Subtotal Performance Goal	1,293,694	1,356,618	902,125
Total – Reduced Congestion Strategic Goal	1,293,694	1,356,618	902,125

**Detailed Justification by Performance Goal: ENVIRONMENTAL STEWARDSHIP
12-Month Moving Average Number of Area Transportation Emissions Conformity Lapses
and Percentage of DOT facilities categorized as No Further Remedial Action Planned
(NFRAP) under the Superfund Amendments and Reauthorization Act (SARA)**

This funding request contributes to the DOT Environmental Stewardship strategic goal and to the outcome goal of the percentage of DOT facilities categorized as No Further Remedial Action Planned (NFRAP) under the Superfund Amendments and Reauthorization Act (SARA)

Percentage of DOT facilities categorized as No Further Remedial Action Planned (NFRAP) under the Superfund Amendments and Reauthorization Act (SARA)						
	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>
Target:	92	93	93	93	93	93
Actual:	93	92	92	--	--	--

The funding requested in this performance segment continues FRA’s work in support of the Department’s environmental stewardship goal. The spending under this performance segment funds the locomotive research and development project, which is exploring alternative fuels and engine technology to benefit railroad efficiency and global environment. This project began in FY 2003.

The resources requested to achieve this goal are:

PERFORMANCE MEASURES/GOALS by PROGRAM ACTIVITIES	<u>FY 2007 ACTUAL</u>	<u>FY 2008 ENACTED</u>	<u>FY 2009 TOTAL REQUEST</u>
4. Environmental Stewardship			
A. Reduction in Pollution			
% of DOT facilities char. as “No Further Remedial Action” under Superfund Amendments	675	975	825
Other	<u>0</u>	<u>0</u>	<u>0</u>
Subtotal Performance Goal	675	975	825
Total – Environmental Stewardship Strategic Goal	675	975	825

**Detailed Justification by Performance Goal: SECURITY
Transportation Security**

This funding request contributes to the overall DOT goal of Security. The funding requested in this performance segment continues FRA's work supporting the Department's security goals. Although FRA's spending under this goal is nominal, the majority of our safety initiatives have a definite impact on security as well.

The resources requested to achieve this goal are:

PERFORMANCE MEASURES/GOALS by <u>PROGRAM ACTIVITIES</u>	FY 2007 <u>ACTUAL</u>	FY 2008 <u>ENACTED</u>	FY 2009 TOTAL <u>REQUEST</u>
5. Security, Preparedness and Response			
A. Hazmat Emergency Response			
Other	<u>752</u>	<u>752</u>	<u>738</u>
Subtotal Performance Goal	752	752	738
Total – Security Strategic Goal	752	752	738

**Detailed Justification by Performance Goal: ORGANIZATIONAL EXCELLENCE
Strategic Workforce Planning/Departmental Management**

This funding request contributes to the DOT Organizational Excellence goal and to the outcome goal of “Fulfilling the President’s Management Agenda.”

The funding requested in this performance segment continues FRA’s work in Workforce Planning, and supports the FRA’s Safety program by continuing to fund the inspector trainee program.

The resources requested to achieve this goal are:

PERFORMANCE MEASURES/GOALS by PROGRAM ACTIVITIES	FY 2007 ACTUAL	FY 2008 ENACTED	FY 2009 TOTAL REQUEST
6. Organizational Excellence			
A. Fulfill the Pres. Mngmt. Agenda			
Other	<u>2,071</u>	<u>1,378</u>	<u>2,457</u>
Subtotal Performance Goal	2,071	1,378	2,457
Total – Organizational Excellence Strategic Goal	2,071	1,378	2,457

EXHIBIT V-1
FEDERAL RAILROAD ADMINISTRATION
RESEARCH, DEVELOPMENT, AND TECHNOLOGY ACTIVITIES
BUDGET AUTHORITY
(Dollars in Thousands)

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

EXHIBIT V-2

**FEDERAL RAILROAD ADMINISTRATION
FY 2009 RD&T Budget Request
(\$000)**

RD&T Program	FY2009 Request	<i>Safety</i>	<i>Reduced Congestion</i>	<i>Global Con.</i>	<i>Environ.</i>	<i>Sec, Prep, and Emerg Response</i>	<i>Org. Excell.</i>
Railroad System Issues	3,155						
RR Accident & R&D Investment		200					
Risk Assessment and System Safety		255					
Emergency Equipment and Evacuation		550					
Aerodynamic/Glazing Safety		100					
Support for RSAC and APTA		350					
High-Speed Rail Equipment Safety Assessment		100					
Tank Car Protection						200	
LEADER/ECP demo		200					
Emissions Measurement /Alternative Fuel Performance					200		
ADA Compliant Passenger Boarding			300				
System Safety Related Research		300					
Exploratory Technology Development / TRB IDEA		400					
Human Factors	3,475						
Automation, Info Management, Control		200					
Human System Interface		300					
Railroad Signage Ergonomics		150					
Moving Map Display		250					
Program Evaluation Support		500					
Work Schedule Risk Management & Accreditation		300					
Railroad Job Task Analysis		200					
Volpe Support		300					
Fatigue Studies		275					
Cab Technology Integration Lab		500					
Risk Reduction Program		500					
Rolling Stock & Components	3,500						
Advanced Concept Train		1,400					
ACT Integrity Preservation		200					
Wayside Detection Related Resrch		400					
Material and Design Research		700					
Volpe Support		300					
Next-Gen Passenger Rail Trucks		100	400				
Track and Structures	4,450						
Technical Support for Safety Enforcement		250					
Rail Integrity Studies		550					

RD&T Program	FY2009 Request	<i>Safety</i>	<i>Reduced Congestion</i>	<i>Global Con.</i>	<i>Environ.</i>	<i>Sec, Prep, and Emerg Response</i>	<i>Org. Excell.</i>
On-Line Rail Defect Detection System		200					
Plastic Ties Safety Performance Evaluations		150					
Bridge Structural Integrity Monitoring		300					
Track Buckling Prevention		300					
Track Strength and Gage Widening Studies		200					
HAL/FAST Cooperative Program		500					
Machine Vision Based Track Inspection System		300					
Track Modulus Measurement System		300					
Track Subsurface Condition Evaluation Using Ground Penetrating Radar		250					
Autonomous Track Geometry Measurement System		300					
Detection of Potential Bridge Defects Using Track Geometry Data		50					
Railroad Bridge Condition Monitoring		250					
Rail Buckling Detection System		250					
Automated Switch Inspection System		300					
Track/Train Interaction	3,100						
Technical Support for Safety Enforcement		250					
Simulation of Multibody Railroad Vehicle/Track Dynamics		550					
Instrumented Wheelsets		125					
Vehicle/Track Interaction Testing, Modeling and Analysis		1,000					
Neural Network for Predicting Wheel/Rail Forces		300					
FAST Testing – Track/Train Interaction		475					
Wheel/Rail Interface Research		400					
Train Control	6,720						
Higher Performance Wireless Communication		150	150				
Train Control Interoperability and Universal On-board Platform		100	600				
Continue the Development of Portable Employee-in-Charge Terminal		300					
Advanced Activation		600	200				
Develop a Truly Vital and Safety-Critical PTC		2,000					

RD&T Program	FY2009 Request	Safety	Reduced Congestion	Global Con.	Environ.	Sec, Prep, and Emerg Response	Org. Excell.
Interagency Agreement with Institute for Telecommunication Sciences		100					
Merge PTC System with "Smart Train" Technology and Train Pacing			400				
Low – Cost Collision Avoidance System		1,400					
PTC Communications Safety		720					
Grade Crossings	1,850						
LIDAR – Laser to Measure Crossings Profile		200					
PTC/ITS Interface and Technology Merging		50	100				
Grade Crossing Safety Research Support		300					
Acoustic Warning Device Evaluation		200					
Causal Analysis of Accidents		200					
Evaluation of Driver Behavior		200					
Countermeasures to Reduce Suicides on Railway Right-of-Way		200					
Grade Crossing Data Collection		200					
Motorist Decision Making Model		200					
Hazardous Materials	1,550						
Tank Car Structural Integrity		100			100		
Tank Car Puncture Resistance Evaluation and Test		300			400		
Tank Car Fitting Evaluation		125			125		
Tank Car Operating Environment		150					
Evaluation of NGRTC		250					
Train Occupant Protection	3,600						
Crashworthiness of Passenger Rail Equipment-Bi-Level Cars		2,150					
Support of RSAC and APTA Safety Standards Development		350					
Locomotive Crash Mitigation Measures		250					
Advanced Locomotive Cab		450					
Fire Safety		400					
R&D Facilities and Equipment	2,550						
TTC Support (Facility Improvement) (F)		1,000					
Track Research & Instrumentation Platform (F)		1,550					
Subtotal, R&D	31,400	28,525	1,850	0	825	200	0
Subtotal, Tech Investment (T)	0	0	0	0	0	0	0
Subtotal, Facilities (F)	2,550	2,550	0	0	0	0	0
Subtotal FRA	33,950	31,075	1,850	0	825	200	0
R&D Salaries and Expenses	2,772	2,772	0	0	0	0	0
Total, FRA	36,722	33,847	1,850	0	825	200	0

**RD&T PROGRAM: RAILROAD SYSTEMS ISSUES
AMOUNT REQUESTED FOR FY 2009: \$3,155,000**

Projects:

Railroad Accident and Investment Criteria

Objective: Develop framework for processing the large amounts of safety related data that is collected by FRA to establish better links between the R&D activities with severe incidents.

DOT Goal/RD&T Strategy: Safety - Understand and address causal factors and risks.

Description: This project provides support to the Office of R&D to respond to recommendations from the Transportation Research Board Committee for Review of the FRA R&D Program. Support includes assembling and analyzing safety data from FRA and other sources to provide linkage between the data and the projects. Framework includes the following: a detailed review of rail industry historical and potential accidents, use this information to conduct a failure analysis, conduct surveys of government and industry countermeasures to incidents and R&D requirements, develop and then rate and rank individual projects, and then select the most cost beneficial projects and assign to various program areas.

Outputs: The deliverables from this project include detailed composite reports that review the historical and potential accident consequences and frequency to establish risk inputs. If data available is sufficiently refined conduct a quantitative risk analysis using risk inputs and present information to key government and industry stakeholders for comment and discussion. Based upon feedback from key stakeholders a ranking and rating system will be provided through which programs can be assessed through cost/beneficial analysis. Once the hierarchy has been established then the assignment of resources to various program areas can be quantitatively established.

RD&T Partners: Transportation Research Board and Various Industry Stakeholders (Operating Authorities, American Public Transportation Association, Labor Unions, Class I Railroads, and Car Manufacturers)

FY 2009 Funding: \$200,000

Risk Assessment and System Safety

Objective: Develop guidelines for conducting a system safety hazard analysis for commuter operations as well as develop methodology to conduct qualitative risk analysis for different levels for system operations.

DOT Goal/RD&T Strategy: Safety - Understand and address causal factors and risks.

Description: This project is to develop and maintain an in-house system assessment capability for rail system safety auditing of commuter railroads as more safety standards are moving toward performance based regulations. As more electronic equipment as well as train control system being introduced in railroad operations, it is critical for FRA to maintain the tools and staff to do the safety evaluation of new and innovative equipment. Both the risk and the mitigation schemes for various equipment and procedures need to be continued evaluated. As new equipment is being introduced, new system safety program need to be developed for each case and examined by FRA.

Outputs: The deliverables from this research program include: a detailed report describing the development of the information and processes to conduct a collision hazard analysis and mitigation steps that can be taken to alleviate issues that may be common to different operating environments; update the Volpe Rail Network database to include information about signaling, traffic flow, capacity, speed, and other characteristics; provide information to the RSAC General Passenger Safety Task Force Group.

RD&T Partners: Volpe Transportation Research Board and Various Industry Stakeholders (Operating Authorities, American Public Transportation Association, Labor Unions, and Car Manufacturers)

FY 2009 Funding: \$255,000

Emergency Equipment and Evacuation and Fire Safety

Objective: Investigate alternative strategies to improve emergency egress by passengers and response time of emergency responders as well as develop information about heat release rates using small scale assembly tests for typical components and materials used in passenger rail service.

DOT Goal/RD&T Strategy: Safety – Mitigate accidents and incidents.

Description: This is part of the continued effort to develop a performance based emergency evacuation safety standards and fire safety performance standards. Alternative strategies and technologies relating to passenger rail system emergency preparedness are being investigated. This will provide a sound technical basis for revising the content of the FRA passenger train emergency preparedness requirements. This project interfaces with industry to develop and revise APTA passenger rail equipment standards. In FY 08 the fire tests will be completed and alternative criteria will be developed in FY 09. In FY 09 the rail car egress computer model software and performance based egress time requirements will be completed.

Outputs: Deliverables for this research program include: emergency egress evacuation times from various types of passenger rail equipment such as single and multi-level commuter and intercity cars; an emergency egress computer model based upon the information obtained from the egress experiments, assisted evacuation times from

emergency response teams using information gained from the roll over rig at WMATA; heat release rate data from fire tests for small scale and sub-assembly tests; and fire burn through times for experiments where the ignition source occurs under the flooring of the passenger rail car; and a fire growth computer model that can be used with egress commuter model to evaluate passenger car design. In addition all this information will be disseminated at various industry forums to allow for immediate feedback from interested stakeholders and provide technical basis for rule-making and standards development.

RD&T Partners: Volpe National Transportation Systems Center, American Public Transportation Association, Federal Transit Administration

FY 2009 Funding: \$550,000

Aerodynamic and Glazing Safety

Objective: Develop baseline information about the aerodynamic hazards of high-speed train passage at passenger stations, near wayside objects, and on other passing equipment as well as develop alternative strategies for ensuring compartmentalization of passengers in the event of a roll over incident.

DOT Goal/RD&T Strategy: Safety – Mitigate accidents and incidents.

Description: This project provides research to ensure a safe environment for people and equipment located in or near train operations. Aerodynamic forces of high-speed trains have been evaluated and will continue as new equipment is introduced. Glazing test standards are being evaluated and new criteria proposed. This includes testing and standard development with the industry.

Outputs: Deliverables from this research program include: technical information which can be used to develop standards for station designs; potential restrictions in train operations for different types of passing equipment; alternative designs of window glazing systems to better protect passengers from ejection during a roll over event. In addition all this information will be disseminated at various industry forums to allow for immediate feedback from interested stakeholders and provide technical basis for rule-making and standards development.

RD&T Partners: Volpe National Transportation Systems Center, American Public Transportation Association

FY 2009 Funding: \$100,000

Support of RSAC and APTA Safety Standards Development

Objective: Provide sound technical basis for industry standard development and potential rule-making activities on system safety and emergency egress and response.

DOT Goal/RD&T Strategy: Safety - Understand and address causal factors and risks/
Mitigate accidents and incidents.

Description: This is a continued effort with the FRA's Office of Safety, APTA and suppliers to update or develop safety standards and design guidelines for passenger rail equipment for better emergency evacuation and system safety. Other technical support will be provided to the FRA team in Passenger Safety RSAC group by the Volpe Center staff. It is anticipated that this project will be continued.

Outputs: Currently three industry standards are close to being accepted: emergency lighting, emergency signage for egress/access of passenger rail equipment, and low-location exit path marking. Implementation of the standards into the industry will be observed and information about usage will assist in developing enhanced rule-making activities on these topics.

RD&T Partners: Volpe National Transportation Systems Center, American Public Transportation Association, Federal Transit Administration

FY 2009 Funding: \$350,000

High-Speed Rail Equipment Safety Assessment

Objective: Develop information for use in new equipment design specifications and industry standards for high speed equipment as well as conduct testing of high speed equipment that addresses issues related to dynamic behavior of rail vehicles for: derailment safety, ride quality, component failure or fatigue.

DOT Goal/RD&T Strategy: Safety - Understand and address causal factors and risks/
Assess new technologies, vehicles, concepts, designs, and procedures.
Reduced Congestion - Reduce passenger and freight congestion in air and surface modes.

Description: This is a continued effort with the FRA's Office of Safety, APTA and suppliers to monitor the safe operation of existing and any new high-speed equipment, including system safety design and emergency evacuation guidelines for passenger rail equipment during its construction. Other technical support will be provided to the FRA team in Passenger Safety RSAC group by the Volpe Center staff. Support is also provided for evaluating issues with the Acela high-speed train system.

Outputs: Information about the performance of existing high-speed equipment under North American service loading environment that may be used for potential development of additional high-speed lines in other parts of the country. Testing results will be

provided on ride quality, vehicle track interaction effects on the potential for derailment, and component failure and fatigue information. System safety information will also be obtained which will help in the development of enhanced emergency evacuation and response guidelines for this type of equipment.

RD&T Partners: Volpe National Transportation Systems Center, American Public Transportation Association, Federal Transit Administration

FY 2009 Funding: \$100,000

Tank Car Protection

Objective: To develop a system to protect tank cars carrying TIH materials that is light weight and cost effective.

DOT Goal/RD&T Strategy: Safety – Mitigate accidents and incidents.
Security, Preparedness and Response - Secure hazardous materials shipments and assess risks.

Environmental Stewardship - Understand and mitigate transportation impacts.

Description: Tank Car security project is a joint effort between Department of Homeland Security (DHS), FRA, Office of R&D, and Association of American Railroads (AAR). In November 2001 a small arm firing conducted at TTCI, Pueblo Colorado. The test revealed the vulnerability of the tank cars to small calibers firing. Recently there are many products enter the market which showed promising results on protecting the tank cars from small caliber penetration stop leak ability. The DHS decided it is important to expand the tank car project and study the effectiveness of these polymer materials in railroad tank cars application. Testing of sample panels has begun and continued testing for chemical compatibility is expected to continue in FY 09.

Outputs: Recommendations of materials that are resistant to ballistic penetration and are self sealing.

RD&T Partners: AAR; Navy, Tank Car Industry

FY 2009 Funding: \$200,000

Leader/ECP Demo

Objective: Reduce fuel use, improve operations safety and reduce emissions.

DOT Goal/RD&T Strategy: Safety – Assess new technologies, vehicles, concepts, designs, and procedures.

Environmental Stewardship - Understand and mitigate transportation impacts.

Description: Leveraging the tools associated with the LEADER project, new fuel efficiency initiatives will be undertaken to reduce fuel consumption and reduce total emissions. Fuel additives, add-on diesel engine components will be examined with analyses, bench tests and actual engine field deployment. LEADER associated tools will provide the link to safe train handling, fuel use measurement and preliminary effect on track. The LEADER project's success points the way to further benefits in an area of major railroad costs. Field deployment will be a co-operative venture with industry participation.

Outputs: Crew assist LEADER system for improved train handling while reducing emissions and fuel consumption

RD&T Partners: Norfolk Southern, New York Air Brake

FY 2009 Funding: \$200,000

Emissions/Performance testing (reduce environmental effects)

Objective: To develop real time in-situ emissions measurement of locomotives.

DOT Goal/RD&T Strategy: Environmental Stewardship - Understand and mitigate transportation impacts.

Description: In situ emissions testing procedures are currently being developed for large diesel engines. This work allows for the measurement of exhaust gases directly at the engine smoke stack under actual operating conditions. This will allow optimum maintenance to be used instead of costly over maintenance. This "portable" measurement procedure can also be used to determine exhaust gas chemistry for alternate fuels, additives and other new parts.

Outputs: A prototype emissions measurement system prototype will be demonstrated.

RD&T Partners: Sharma & Associates, railroads

FY 2009 Funding: \$200,000

ADA Compliant Passenger Boarding

Objective: To permit "level boarding" that meets the requirements of the Americans with Disabilities Act.

DOT Goal/RD&T Strategy: Safety – Mitigate accidents and incidents/
Assess new technologies, vehicles, concepts, designs, and procedures.

Description: This is a new project to evaluate existing boarding systems for passenger rail cars, intercity and commuter, to comply with the Americans with Disabilities Act requirements for level boarding.

Outputs: Demonstration of a prototype bridge plant that can be deployed quickly and safely from various designs of intercity and commuter rail passenger coaches.

RD&T Partners: Amtrak, APTA, FTA

FY 2009 Funding: \$300,000

System Safety Related Research

Objective: To identify and categorize risks associated with railroad operations and undertake research and development activities aimed at minimizing those risks and also to support the rulemaking activities of the Office of Safety by providing timely and comprehensive analyses and test data.

DOT Goal/RD&T Strategy: Safety - Understand and address causal factors and risks/ Mitigate accidents and incidents.

Description: This program includes all track-related research projects addressing system safety issues for freight, commuter, intercity passenger, and high-speed passenger railroads for the enhancement of railroad safety by looking into risk management and system performance metrics development.

Outputs: Development and enhancement of general assessment methodologies for system and component level risk assessments and improved detection methods/technologies for railroad system safety.

RD&T Partners: AAR and Railroad Industry

FY 2009 Funding: \$300,000

Exploratory Technology Development through the TRB IDEA program / BAA

Objective: To fund promising innovations to improve rail safety and operations.

DOT Goal/RD&T Strategy: Safety – Assess new technologies, vehicles, concepts, designs, and procedures.

Description: This program promotes use of the Broad Agency Announcement program to search for and stimulate development of new equipment, new infrastructure and new processes to enhance the safety, capacity and efficiency of both passenger and freight services. FRA ensures that the results of projects supported under BAA programs are used for public benefit. National Academy of Sciences, Transportation Research Board

(NAS/TRB): IDEA Programs explore promising but unproven concepts with potential to advance surface transportation systems technologies and safety. The program is administered by TRB. Projects are awarded competitively and are generally of relatively high risk, but offer high potential reward. The program is open to all applicants, and solicits proposals from individual researchers as well as larger organizations both within and outside the usual transportation research community.

Outputs: Potential new equipment and processes to improve railroad safety.

RD&T Partners: Universities, Rail Suppliers

FY 2009 Funding: \$400,000

RD&T PROGRAM: HUMAN FACTORS
AMOUNT REQUESTED FOR FY 2009: \$3,475,000

FRA continues to support a robust Human Factors Research program. FRA serves as an active member on the Department's Human Factors Coordinating Committee, and continually strives to leverage resources on applicable projects. In many cases, the human factors studies we conduct are rail specific, but even in those cases our findings and results may serve to assist research in other modes.

Projects:

Automation, Information Management and Control

Objective: Improve the design of new technology in the Railroad industry so as to facilitate the use of productivity-enhancing technology in the industry.

DOT Goal/RD&T Strategy: Safety – Assess new technologies, vehicles, concepts, designs, and procedures.

Description: The introduction of new communications and computer technology in the railroad industry will change how workers in railroad operations perform their jobs. Automation and the management and control of information are becoming essential components of railroad operations. This project examines the effects of automation on operator performance and how operators manage information. Current work has focused on the locomotive engineer and maintenance of way workers. Future work will focus on dispatchers and RCL operators. It is expected that this project will be completed in FY11.

Outputs: The design of equipment which includes new technology will be improved by information about human-machine interaction within the railroad context. This will enable designers to avoid costly and unsafe designs and will speed the introduction of productivity-enhancing technology into the railroad industry.

RD&T Partners: Contractor (TBD), labor organizations, carriers, equipment manufacturers

FY 2009 Funding: \$200,000

Human Systems Integration

Objective: The objective is the introduction of HSI processes and techniques into the railroad industry's efforts to acquire and implement new technologies for more safe and efficient operations.

DOT Goal/RD&T Strategy: Safety - Understand and address causal factors and risks/ Assess new technologies, vehicles, concepts, designs, and procedures.

Description: Human Systems Integration (HSI) is a systematic, organization-wide approach to implementing new technologies and modernizing existing systems in a way that can optimize safety and total ownership costs. Consistent with the Rail Safety Action Plan to address human factors and human error issues related to safety, HSI is a management process to be introduced to the rail industry to specifically address the integration of new technologies and people engaged in rail operations in a manner that addresses human as well as system performance. It is expected that this project will be completed in FY12.

Outputs: Through the application of HSI methodology, develop policy, process, and practice to allow the railroads to realize optimized manning and reduced ownership, or life-cycle, costs of new technologies, ensuring the human is considered as a major component of the system. HSI will enable safer, more efficient implementation of new technology.

RD&T Partners: TBD

FY 2009 Funding: \$300,000

Railroad Signage Ergonomics

Objective: Improve the safety of rail operations by setting standards for signage.

DOT Goal/RD&T Strategy: Safety – Mitigate accidents and incidents.

Description: The design of equipment and environments to fit human capabilities and needs is an important element of improving safety in any industry. This project is currently examining the design of wayside signage to determine the minimum requirements needed to ensure that signs can be read at normal operating speeds and environment conditions, and to provide a higher degree of consistency in railroad signage such as is accomplished in highway signs by the MUTCD. It is expected that this project will be completed in FY09.

Outputs: Standards for railroad signage that provide a higher degree of consistency such as is accomplished in highway signs by the Manual of Uniform Traffic Control Devices. This will include standards for readability at normal operating speed, consistency of sign size, shape, color, placement, and replacement characteristics.

RD&T Partners: Volpe Center, AREMA

FY 2009 Funding: \$150,000

Engineer's Moving Map Display

Objective: Develop a digital moving map display for the locomotive engineer's station to be used as a primary device for track navigation. Demonstrate the usefulness of this technology adapted for rail industry use.

DOT Goal/RD&T Strategy: Safety – Assess new technologies, vehicles, concepts, designs, and procedures.

Description: A prototype digital information display for the locomotive engineer will be developed that exploits data link and GPS technologies. The intent of the project is to build the display such that train position can be constantly displayed over a graphic moving geographic map that indicates grade crossings, sidings, signal locations, and selected dispatch data with other information for example. The display will be tested and evaluated using the Cab Technology Integration Laboratory. It is expected that this project will be completed in FY12.

Outputs: A cab display that demonstrates how train-driving information can be provided to potentially yield better situation awareness, reduce workload, and minimize the potential for train collisions through the use of GPS and digital map technologies to convey accurate train locations relative to track profiles displayed to the locomotive engineer.

RD&T Partners: TBD

FY 2009 Funding: \$250,000

Program Evaluation/Implementation and Impact Assessment Tools

Objective: To develop implementation and impact assessment tools to support the evaluation of on-going Human Factors R&D Program demo projects, and to create and sustain overall organizational processes that make quality program evaluation methods ordinary and routine practices within FRA and between FRA and the railroad industry.

DOT Goal/RD&T Strategy: Safety - Understand and address causal factors and risks/ Assess new technologies, vehicles, concepts, designs, and procedures.

Description: This effort will help develop a suite of evaluation tools and methodologies for conducting implementation evaluations, outcome and impact assessments. It will provide on-going evaluation and continuous improvement support for various demonstration programs, such as existing risk reduction approaches being implemented by the industry (i.e. Close Calls and Behavior-Based Safety), and will evaluate whether those safety programs improve safety outcomes and the underlying safety culture. For example, the Clear Signal for Action (CSA) evaluation of a behavior-based safety implementation at Amtrak Chicago Station Services documented an 80% drop in injuries at the station with a predictive model showing potential annual savings of more than \$300,000. The CSA evaluation of the behavior-based accident prevention project in San

Antonio documented at-risk behaviors were cut by 2/3 over 17 months. Broader long-term goals are to help institutionalize quality program evaluation methods within FRA that increase the use and adoption of R&D, leading to significant reductions in accidents and injuries and improvements in organizational safety culture.

Outputs: Program logic models; stakeholder buy-in and commitment strategies; implementation and evaluation plans; outcome measures and leading safety indicators capable of monitoring and measuring program success; technology transfer tools; implementation, outcome and impact assessments.

RD&T Partners: Volpe, Consultants, RR labor/management

FY 2009 Funding: \$500,000

Work Schedule Manager (WSM) Accreditation

Objective: Develop a cross-governmental partnership that will support the development and implementation of a work schedule manager certification program designed to professionalize the job of managing work schedules and reduce fatigue related accidents in around-the-clock industries.

DOT Goal/RD&T Strategy: Safety - Understand and address causal factors and risks/ Assess new technologies, vehicles, concepts, designs, and procedures.

Description: The purpose of this effort is to develop and validate a curriculum and an accreditation program for work schedule managers in the rail industry. Fatigue has been identified as a major contributing factor in numerous railroad catastrophes in the past 10 years. With the majority of the railroad industry workforce, and other industries too, on irregular and nighttime work schedules, fatigue-related accidents and other associated health and social costs remains a serious concern among many. Yet, the majority of those who manage work schedule (WS) operations have little or no formal training in staffing analysis, schedule design, fatigue, or the human factors of shiftwork, often leading to significant operational or safety problems. The nature of the problem, and the KSAO's needed to effectively manage WS operations, appears similar across occupational classifications. Phase I will systematically assess the gap between optimal WS management and current practices, synthesize research needed to address gaps, create an org. development plan, and secure cross government funding for long-term program development. Phase II will develop model curricula/tools, implement WSM training and certification at pilot test sites, and evaluate impacts. Phase III will fully develop model certification program for technology transfer to industry. A fully developed accreditation program for fatigue and work schedule managers is expected to be ready for transfer to the private sector by FY12.

Outputs: A cross-governmental partnership/steering committee with committed funding for long-term program development; a case study analysis documenting operational and safety impact of ergonomic work schedules Phase I: a) A case study analysis

documenting operational and safety impact of ergonomic work schedules, b) a list of KSAO's for certification of WSM, c) a white paper describing broad needs and next steps, d) a cross governmental partnership/working group committed to long-term funding and program development. Phase II: a) model curricula/tools, b) impact assessment of pilot test. Phase III: a) fully developed certification program, b) utilization and impact studies of broader implementation.

RD&T Partners: Volpe, Consultants, other government agencies, consultants, industry

FY 2009 Funding: \$300,000

Railroad Job Task Analysis

Objective: Improved railroad recruitment, selection and training strategies, safety awareness and mentoring programs resulting in safer, more efficient and cost-effective transportation of goods.

DOT Goal/RD&T Strategy: Safety - Understand and address causal factors and risks/ Assess new technologies, vehicles, concepts, designs, and procedures.

Description: The Railroad Retirement Board projects that more than 80,000 new workers (labor and management) will enter the industry in the next six years and up to 140,000 new employees over the next 10 years. The purpose of this effort is to conduct job task analyses of safety critical jobs in the railroad industry, including FRA Office of Safety inspectors and industry management. Job task analyses will build the data and information needed to attract, train and retain highly qualified personnel to meet the demands of new technology and changing business practices, such as digital communications and proactive risk management systems. Expected outcomes from this effort include improvements in recruitment strategies, safety awareness, training and mentoring programs, resulting in safer more cost-effective and efficient transportation of goods. Preliminary efforts for this program will begin in FY07. It is expected that this project will be completed in FY11.

Outputs: Up-to-date job task analyses for dispatchers, locomotive engineers, conductors, remote control operators, signalmen, Office of Safety inspectors, industry management.

RD&T Partners: Contractor (TBD), labor organizations, carriers

FY 2009 Funding: \$200,000

Volpe Support

Objective: Provide support for programmatic research in a variety of areas where railroad human factors expertise is difficult to obtain.

DOT Goal/RD&T Strategy: Safety - Understand and address causal factors and risks/Mitigate accidents and incidents/Assess new technologies, vehicles, concepts, designs, and procedures.

Description: Provide funding for various projects including the Locomotive Simulator, the Human Factors Data Analysis and Reporting Tool, and the Railroad Fatigue Education Website.

Outputs: Expertise in railroad human factors research will be maintained to support programmatic efforts of the FRA in the conduct of its Research and Development program.

RD&T Partners: Volpe Center

FY 2009 Funding: \$300,000

Fatigue Studies

Objective: Develop data sets on work and rest patterns for railroad workers and analyze those data sets with a validated fatigue model to improve the understanding of the role of fatigue in the industry.

DOT Goal/RD&T Strategy: Safety - Understand and address causal factors and risks.

Description: Train Crew Fatigue: The objective of this task is to continue examination of human error and fatigue in the safety-critical area of locomotive operating crews. Previous FRA research has examined work/rest schedules in signalmen, dispatchers and MOW workers. This task will extend that project to examine work/rest schedules in a random sample of conductors and locomotive engineers. If FRA receives authority to regulate hours of service from Congress, this task will be extremely important to inform the new regulations.

Fatigue Data Analysis: Work/rest diary data from representative random samples of MOW workers, signalmen, and dispatchers have been collected and described under prior tasks. This task will make this data accessible to the scientific community and provide an in-depth analysis of the data with a fatigue model (FAST) and other analytic tools. The accident data that was used for the validation of the FAST model will also be made accessible to the scientific community and an economic analysis of that data will be performed. Again, this task will be extremely important to inform any new regulations that FRA may formulate in the future

Outputs: Accident rates reduced by better understanding of work scheduling practices and the role of fatigue in accidents. Databases published from all studies for the use of

the scientific community interested in work and fatigue issues. A comprehensive picture of fatigue in rail industry is provided for FRA regulations.

RD&T Partners: Foster-Miller, Inc., labor organizations

FY 2009 Funding: \$275,000

Cab Technology Integration Lab

Objective: Provide the FRA with a capability and methodology to assess and evaluate the impact of new displays, controls, and cab configurations on human performance of the locomotive crew. The lab will further provide a capability to make safety assessments of new displays and controls from the human factors perspective and enable better data-driven responses to Product Safety Plans submitted by industry involving new technology.

DOT Goal/RD&T Strategy: Safety – Assess new technologies, vehicles, concepts, designs, and procedures.

Description: The Federal Railroad Administration requires the capability to assess the integration of new controls and displays in the locomotive cab environment and to demonstrate to industry new technology and workstation configurations that may enhance human performance and human reliability by increasing the locomotive engineer's capabilities to communicate, plan, and control locomotives within the railroad system and thereby enhance safety. The Cab Technology Integration Laboratory is a proposed lab designed to specifically examine cost saving design approaches, technology implementation safety issues, and efficient operations related to the locomotive cab design. It is expected that this project will be completed in FY12.

Outputs: Safety and human performance assessments, demonstration to industry of new cab configurations and control arrangements, demonstrate to industry the importance of sound human factors methodology in industry acquisition of technology processes

RD&T Partners: Volpe Transportation Research Center, others TBD

FY 2009 Funding: \$500,000

Risk Reduction Program

Objective: To develop new and innovative uses of predictive data, not just reactive data, that encourages a safety learning culture and allows open disclosure about safety without fear.

Description: FRA's Risk Reduction Program (RRP) is an industry-wide initiative to reduce accidents and injuries, and build strong safety cultures, by developing innovative methods, processes, and technologies to identify and correct individual and systemic

contributing safety risk factors using “upstream” predictive data. Two R&D pilot risk reduction projects have already been initiated: Confidential Close Call Reporting (C3RS) and Clear Signal for Action (CSA) behavior-based safety. In collaboration with the Office of Safety, this effort will converge these two projects into a broader safety program by designing, implementing, and evaluating innovative precursor data management approaches for industry-wide adoption. The initial demonstration phase will establish successful implementations at selected pilot sites, documenting measurable outcomes from the program’s intended impact.

Outputs: Formation of FRA Executive Steering Committee and Working Group; Formation of Industry RRP Steering Committee; Pilot Implementation, Leadership Development, and Evaluation Plans for selected pilots; RRP pilot implementation MOU’s; pilot outcome and impact assessments; transfer to Office of Safety.

RD&T Partners: FRA Office of R&D, FRA Office of Safety, RR labor/management

FY 2009 Funding: \$500,000

RD&T PROGRAM: ROLLING STOCK AND COMPONENTS
AMOUNT REQUESTED FOR FY 2009: \$3,500,000

Projects:

Advanced Concept Train

Objective: Improve safety, mobility, and efficiency of the nation's railroad operations.

DOT Goal/RD&T Strategy: Safety – Mitigate accidents and incidents/Assess new technologies, vehicles, concepts, designs, and procedures.

Description: This project will develop an On-board Monitoring and Control System (OBMCS). From the locomotive, the engineer will have the ability to remotely control mechanical systems such as the handbrakes, angle cocks, cushion unit lockout, cut levers, freight car doors, and ECP Brakes. Continuous monitoring will detect defects such as hot/defective bearings, derailments, truck hunting, and flat wheels. The OBMCS broad capabilities for monitoring, tracking and remote control will provide value to railroads, fleet owners and shippers. This system will help eliminate derailments and delays from mechanical breakdowns. Early detection of defects will facilitate proactive repairs and maintenance before breakdowns and accidents can occur. The use of one or more Advanced Components in freight operations will promote crew safety and improve productivity. Advanced information technology from OBMCS will improve rail safety and efficiency. Modular architecture of OBMCS based on open standards for hardware, software and communications will facilitate technology transition to the railroad industry. The OBCMS/ACT technology is rugged and affordable

FY09 funding will support the procurement of equipment and components required to advance the demonstration and implementation of ACT related activities. The existing advanced systems and components will be further refined and optimized for use in multiple commodities. Administrative support will also be needed to collect, analyze, and disseminate data for preventive maintenance derailment detection and prevention.

Outputs: 24/7 tracking of all cars for equipment defects and dynamic stability. Demonstrate OBMCS in partnership with a railroad to highlight safety and efficiency benefits.

RD&T Partners: Norfolk Southern Railroad

FY 2009 Funding: \$1,400,000

Advanced Concept Train Integrity Preservation

Objective: To fully demonstrate the locomotive security system, the tank car security/monitoring system and a container security system in conjunction with the Advanced Concept Train demonstration.

DOT Goal/RD&T Strategy: Security, Preparedness and Response - Reduce vulnerability and improve preparedness and recovery.

Description: Continue evaluation of security systems for locomotives, tank cars, and other freight cars.

Outputs: Security and Tracking Systems for railroad use

RD&T Partners: Union Tank Car, Fulcrum, TTX, Wi-Tronix

FY 2009 Funding: \$200,000

Wayside Detection Related Research

Objective: To explore improved train inspection ability using Wayside Detection Technologies with the potential for regulatory change. This will support the Office of Safety needs in this area.

DOT Goal/RD&T Strategy: Safety – Assess new technologies, vehicles, concepts, designs, and procedures.

Description: In co-operation with Norfolk Southern Railroad, Wayside Condition Monitoring systems will be used to evaluate car inspection ability for car mechanical defects and potential dynamic instability. These wayside systems have the ability to predict derailment risk factors as well as identify defective and poor performing railroad vehicles and trucks, which affect the safety of railroads. Defective equipment may increase fuel consumption, accelerate track degradation, and vehicle component wear. FY 09 project funding will be used to focus on the use of wayside detection technology, which will automate the inspection process and enhance inspection opportunities such as dynamic vs. static measurements, and system vs. component inspections. The wayside inspection stations will help to proactively identify failing equipment. The data collected by such wayside systems may be analyzed and serve as case studies with respect to potential rulemaking and validation. The wayside systems will also help prevent road failure delays and detect defects through trending analysis.

Outputs: Recommendations for wayside inspection station requirements and standards based on analysis of actual data.

RD&T Partners: Norfolk Southern, Union Pacific, and Burlington Northern Santa Fe

FY 2009 Funding: \$400,000

Material and Design Research

Objective: To improve freight car/train performance, particularly in the area of truck suspensions, wheels and braking.

DOT Goal/RD&T Strategy: Safety – Assess new technologies, vehicles, concepts, designs, and procedures.

Description: FY 09 funding will help finalize and advance the development of a high-speed freight truck. In particular off-tread braking will be developed for the high speed truck. The high speed truck requires off-tread braking, due to wheel thermal considerations. The proper evaluation of the truck will require two high-speed freight trucks, which will be manufactured for use in full-scale testing. Full scale testing will include Chapter 11 type testing for hunting and rock and roll as well as curving type tests. In order to increase railroad line capacity, the trucks must be able to withstand and support higher speeds. As such, much more stable, true high-speed trucks are required. These improvement and development projects will continue through 2009.

To evaluate higher train operating speeds to improve line capacity. We propose to use TEDS, a model being developed to simulate train operations. In-train forces will be calculated for any train consists running over any track configuration. Train operation can be manual or automatic. This model, when validated, will be able to assist in accident investigations also. It will also be useful to evaluate proposed speed limits on rail line capacity and train handling parametric studies. A Beta test will be conducted in FY 08 and the final model will be available by the end of FY 09.

Outputs: High Speed Freight Trucks with off-tread brakes for increasing line capacity. Output also will include a TEDS model for train operations planning (safety and efficiency) and for accident investigations.

R&D Partners: Sharma & Associates, railroads

FY 2009 Funding: \$700,000

Volpe Support

Objective: New / updated specification for freight car and locomotive wheels.

DOT Goal/RD&T Strategy: Safety – Assess new technologies, vehicles, concepts, designs, and procedures.

Description: Provide funding for Volpe to support Office of Safety requests related to operating practices, train make up, wheels, bearings, and other rail vehicle components as required.

Outputs: New specification draft for freight car and locomotive wheels and recommendations in support of regulatory needs.

RD&T Partners: Volpe; APTA, FTA

FY 2009 Funding: \$300,000

Next Generation High-Speed Passenger Trucks

Objective: To improve the quality of high-speed rail service in the US on existing curved, mixed use tracks.

DOT Goal/RD&T Strategy: Safety – Assess new technologies, vehicles, concepts, designs, and procedures/Reduce passenger and freight congestion in air and surface modes.

Description: This is a new project to study and test ways to improve the long-term future of the Acela train set running in the Northeast corridor, in particular, the adaptability of various passenger rail car truck design features.

Outputs: Design, build, and test an improved passenger rail car truck

RD&T Partners: TBD

FY 2009 Funding: \$500,000

RD&T PROGRAM: TRACK & STRUCTURES
AMOUNT REQUESTED FOR FY 2009: \$4,450,000

Projects:

Technical Support for Office of Safety - Track and Structures

Objective: To provide Office of Research and Development expertise, technical advice, test and analytical support to the Office of Safety to ensure safe operations of the U.S. railroads.

DOT Goal/RD&T Strategy: Safety - Understand and address causal factors and risks/ Mitigate accidents and incidents/Assess new technologies, vehicles, concepts, designs, and procedures.

Description: As new technologies continue to emerge and train speeds increase, the timely development of technical information, data and expertise is crucial to providing a basis on which to make decisions on issues affecting the safe operation of rail vehicles on U.S. track. Rulemaking and revisions to the Track and Equipment Safety Standards through the Rail Safety Advisory Committee (RSAC) process reflect the experience and understanding that has been gained, and define the qualification requirements and determination of maximum safe speeds and curving speeds for new and existing rail equipment. In recent years, safety issues that have arisen and been addressed included cracks detected in the spokes of the Acela high-speed trainset brake discs, which suspended operations for over three months, fatigue cracks developed in the suspension support structure of the Talgo trainset cars operating on the Pacific Northwest Corridor, and the evaluation of tests and analyses to assess the safety of operating the Acela high-speed trainsets at up to nine inches of cant deficiency in curves on Amtrak's Northeast Corridor. A similar level of support in addressing safety issues is expected in the year 2009 in the area of Track and Structures.

Outputs: Formal NTIS reports and/or letter reports including data analysis and recommendations as required.

RD&T Partners: Ensco, Volpe and Railroads

FY 2009 Funding: \$250,000

Rail Integrity Studies

Objective: Development of production or maintenance practices that increase rail service life to improve safety via reduction in rail failures.

DOT Goal/RD&T Strategy: Safety – Mitigate accidents and incidents/ Assess new technologies, vehicles, concepts, designs, and procedures.

Description: Rail integrity research is aimed at extending the life of rail until it must be removed due to either fatigue failure or wear beyond allowable limits. This research includes the study of rail steel properties; defect formation and growth rates; the effects of residual, thermal, and train-applied stresses; surface wearing characteristics; and maintenance grinding and lubrication practices. The research efforts under this program will continue to focus on increased safety of train operations through improved rail defect detection and flaw characterization, appropriate metallurgy for switches and turnouts, and welding techniques to improve service life and economy. The FY 2009 request is to continue the on-going cooperative research with the Association of American Railroads (AAR) and university R&D grants focused on defect detection, flaw characterization, and fatigue crack growth.

Outputs:

- Reduce main line derailments due to broken rails
- Address objectives of DOT's National Rail Safety Rail Action Plan

RD&T Partners: Volpe

FY 2009 Funding: \$550,000

On-Line Rail Defect Detection System

Objective: Develop a system based on non-contact ultrasonic testing for rail-flaw detection.

DOT Goal/RD&T Strategy: Safety – Mitigate accidents and incidents/Assess new technologies, vehicles, concepts, designs, and procedures.

Description: FRA safety statistics indicate that rail defects are responsible for about 25% of track related accidents. Based on this significant statistic, FRA have been supporting since mid-1990s research to improve the reliability of Rail Nondestructive Evaluation (NDE) Technology. Also, this research is in direct response to the National Transportation Safety Board (NTSB-PB94-917003) recommendation based on the finding of rail failure as the cause of the derailment at Superior, Wisconsin on June 30, 1992. In the referenced report, the NTSB recommended that the FRA develop inspection methods that will identify internal defects in rail containing significant shelling and other surface defects. Development of reliable inspection technology for rail defect detection continues to be a priority area for FRA R&D. Conventional ultrasonic rail inspection, which is the common technique used by railroad maintenance personnel for defect detection, is operated in a water-filled wheel probing the rail with ultrasonic beams that are launched from the top of the rail head. The major drawback of this method is the fact that horizontal shallow cracks (shelling) can mask the internal transverse defects. A new technique is currently being developed under a grant to the University of California at San Diego. This technique is based on ultrasonic waves that propagate along, rather than across, the rail running direction. An increased detectability of the defects is afforded by

signal processing algorithms embedded in the inspection system. An initial version of the prototype was tested in the field (Gettysburg, PA) in March 2006 using the FRA's Hy-Railer research platform with encouraging results. The system will be redesigned based on the lessons learned from this initial field testing and retested in FY2007. The FY 2009 request is for system demonstration and deployment on an FRA research vehicle.

Outputs:

- Increasing safety by improving reliability of rail defect detection

RD&T Partners: University of California, San Diego

FY 2009 Funding: \$200,000

Plastic Ties Safety Performance Evaluations

Objective: To continue information sharing efforts regarding the new section on plastic ties in the AREMA Engineering Manual.

DOT Goal/RD&T Strategy: Safety – Assess new technologies, vehicles, concepts, designs, and procedures.

Description: The use of new material for railroad infrastructure is expected to increase as new competitive products come into market. As a case in point, the use of plastic composite ties by U.S. railroads is expected to continue growing for the foreseeable future. The Union Pacific railroad is in the midst of a multi-year program to install five million plastic ties. A significant share of the ten million wood tie annual replacement market is feasible, assuming that plastic composite ties continue to demonstrate safe and reliable service in track. With support from the FRA, two National Work Shops have been held for information sharing, safety performance testing conducted at the TTC, and a new section on plastic ties added to the AREMA Engineering Manual. The FY 2009 request is to expand this effort, and proactively evaluate the safety performance of these material before their wide spread use and develop engineering guides through cooperative efforts.

Outputs: Technical guidance to assure safe use of new class of tie products, NTIS technical reports based on testing at TTCI, update AREMA engineering manual based on test data, and National Workshops on plastic ties for information sharing.

RD&T Partners: USACE, UP, BNSF, CSX, CTA, Rutgers University, CTL, TTCI & Manufacturers

FY 2009 Funding: \$150,000

Bridge Structural Integrity Monitoring

Objective: Health monitoring of a railway bridge in Miller, IN using displacement and acceleration sensors that transfer data through the adjacent load station to a remote database for processing; evaluation of alarms and exceptions in data and notifying appropriate personnel; make the data available to appropriate personnel through the Internet.

DOT Goal/RD&T Strategy: Safety – Assess new technologies, vehicles, concepts, designs, and procedures.

Description: The railway bridge infrastructure of U.S. is aging while both the traffic density and axle loads have been increasing. Hence, there is a need for better understanding of the implications of heavier axle loads on railway bridges. Pursuant to its safety mission, FRA is interested in developing smart technologies for the monitoring of the structural integrity of railway bridges. A modest effort is currently in progress is a cooperative project jointly funded by the FRA and the Northern Indiana Commuter Transportation District (NICTD) to monitor the axle load on bridges. It is also intend to serve as a testbed for the validation of axle load and structural integrity monitoring techniques. With the availability of funds in the future, the existing system will be enhanced by incorporating extra sensors or an additional field data acquisition system. These extra sensors could include accelerometers, tilt-meters, displacement sensors etc. Newer ‘smart’ sensors, wireless data transmission systems, etc. could be demonstrated and tested on this test bed in future. The FY 2009 request is to fund research and development in these smart technologies for bridge structural integrity monitoring.

Outputs:

1. Self-contained module of a functioning ‘Pilot’ project demonstrating the developed ‘smart’ sensors and bridge monitoring technology
2. A comprehensive final report documenting project work, to be published as an NTIS report pursuant to FRA policy for technical information sharing.

RD&T Partners: Sharma & Associates, FHWA and a TBD Railroad

FY 2009 Funding: \$300,000

Track Buckling Prevention

Objective: Development and Demonstration of Track Buckling Risk Assessment and Control.

DOT Goal/RD&T Strategy: Safety - Understand and address causal factors and risks/ Assess new technologies, vehicles, concepts, designs, and procedures.

Description: The ability to determine track buckling risk and the ability to control track buckling risk factors needs to be improved. The projects envisioned in this program are: 1) Development of computer program for the determination of the likelihood and associated risk of track buckling; 2) Development of techniques to measure rail stress and lateral track resistance; and 3) Development of maintenance procedures for minimizing track-buckling risk. FRA R&D is currently pursuing development and verification of longitudinal rail stress measurement devices that can be utilized for the prevention of buckling and pull-apart. FRA R&D is also pursuing research on the development of a model predicting rail temperatures based on the forecast meteorological data provided by a high resolution weather model. The predicted rail temperatures will provide more objective references in issuance of slow orders instead of current approach of arbitrary ambient temperature limit.

Outputs: Track Buckling Risk Model, Maintenance Procedures for Minimizing Track-Buckling Risk

RD&T Partners: Ensco, Inc.

FY 2009 Funding: \$300,000

Track Strength and Gage Widening Studies

Objective: To provide Gage Restraint Measurement System (GRMS) data analysis support for the advancement of GRMS technologies used in the evaluation of track strength and degradation.

DOT Goal/RD&T Strategy: Safety - Understand and address causal factors and risks/ Assess new technologies, vehicles, concepts, designs, and procedures.

Description: The new gage restraint measurement vehicle, the T-18, with its state of the art deployable split axle is a major advancement in track strength evaluation technology. The T-18 has undergone several tests to evaluate and refine this new technology while also providing data to support other research programs and railroads. The T-18 has made a series of tests at a location with composite ties installed to evaluate their degradation rate compared to wood ties. With its ability to vary loading configurations, the T-18 has also been able to provide data that has improved the understanding of track response under load. This data is being used to evaluate the requirements for gage restraint measurement systems (GRMS) and track defect criteria outlined in the Federal Track Safety Standards (FTSS). Research activities will focus on developing a gage widening degradation model, increasing the GRMS operational speed, and performance comparison studies of the T-18 with other railroad owned GRMS vehicles.

Outputs: Reduced number of derailment due to wide gage through improved inspections

RD&T Partners: Ensco, Railroads

FY 2009 Funding: \$200,000

HAL/FAST Cooperative Program

Objective: Improve the reliability and safety of the railroad infrastructure through the test and development of new ties, fasteners, rails, bridges, joint bars, switches and welding techniques.

DOT Goal/RD&T Strategy: Safety – Assess new technologies, vehicles, concepts, designs, and procedures.

Description: The Heavy Axle Load/Facility for Accelerated Service Testing (Hal/Fast) is a testbed for a cooperative program conducted at the TTC and co-funded by the FRA and the AAR. It is identified as priority research area in both FRA's Strategic R&D plan and AAR's Strategic Research Initiative. The FAST is a unique test facility which provides a controlled environment not otherwise available for the acquisition of a realistic data for the evaluation of system and/or component performance under service conditions. It affords the Government and the railroad industry an opportunity for the detection of potential problems and resolution to eliminate or minimize risks in revenue service. The continuous operation of a freight train over the dedicated oval test track at the TTC permits many experiments and tests to be conducted concurrently in as near a real-world environment as is possible so that short and long-term cause and effect can be identified in a compressed time period. The FY 2009 request is to fund this on-going cooperative program.

Outputs: This program will improve railroad infrastructure and document the performance of advanced design components and techniques.

RD&T Partners: AAR, individual railroads and suppliers of the railroad industry.

FY 2009 Funding: \$500,000

Machine Vision Based Track Inspection System

Objective: To continue research geared towards further development of the machine vision based track inspection system.

DOT Goal/RD&T Strategy: Safety – Assess new technologies, vehicles, concepts, designs, and procedures.

Description: Machine vision technology utilizes high speed cameras and powerful computers to collect and analyze high resolution digital images of railroad track from a fast moving inspection car. Computers can potentially detect multiple defects in railroad track that currently can only be recognized by track inspectors walking the track. Examples of the defects that can be detected by this technology include visible cracks on

rail surface, broken or cracked ties, missing fasteners, worn or misaligned switch points, washouts and so on. Machine vision systems can make inspections more objective and improve safety of track inspectors by decreasing their time on the track. A prototype of the first machine vision based system to detect cracks in joint bars has been developed under FRA R&D. The system is currently being tested in the field and demonstrates significant potential of this technology. The future research will concentrate on the development and improvement of the existing system and development of a prototype inspection system for more comprehensive track inspection of rail surface and fasteners, looking in particular for cracks in rail surface and missing fasteners.

Outputs: TBD

RD&T Partners:

FY 2009 Funding: \$300,000

Track Modulus Measurement System

Objective: Design a system that will provide autonomous real-time measurements of track modulus from a moving rail car operating in revenue service.

DOT Goal/RD&T Strategy: Safety - Understand and address causal factors and risks/ Mitigate accidents and incidents.

Description: Vertical Track Modulus is an important indicator of track quality and its ability to support service loads, but methods to measure this parameter from a moving rail car has been challenging because there is no stable reference for the measurements. The FRA has awarded a grant to the University of Nebraska at Lincoln (UNL) to develop a real-time measurement of track vertical stiffness (modulus) from a moving car. Significant progress has been made as documented in a formal technical paper presented at the American Railway Engineering and Maintenance Association (AREMA) Annual Conference in Chicago, IL in September 2005. This UNL system is based on measurements of the relative displacement between the track and the wheel/rail contact point. A laser-based vision system is used to measure this relative displacement, together with a mathematical model to estimate track modulus. The project has also received substantial support from the railroads, in terms of both donation of equipment and field testing support. The data being produced by the current prototype is being well received by the cooperating railroads. In FY 2007, the current prototype system is being refined and tested in revenues service. FY 2008 funding was for the installation of the final product on the FRA Track Research Platform (T-18) for demonstration and deployment. FY 2009 funding will continue the demonstration and deployment.

Outputs:

- Provide continuous knowledge of modulus for large sections of track
- Allow monitoring of track modulus leading to the development of preventive maintenance strategies for specific track problems.

RD&T Partners: Railroad Industry, including BNSF, UPRR, University of Nebraska,

FY 2009 Funding: \$300,000

Track Subsurface Condition Evaluation Using Ground Penetrating Radar

Objective:

1. To verify previously demonstrated GPR field test protocols and automated analysis algorithms to ensure accurate interpretation of ballast conditions, and applicability of the end of test report to railroad engineering and maintenance needs; and
2. To enhance the ability to automatically detect and evaluate sub-ballast and sub-grade conditions using GPR data.

DOT Goal/RD&T Strategy: Safety – Mitigate accidents and incidents/Assess new technologies, vehicles, concepts, designs, and procedures.

Description: Ground Penetrating Radar (GPR) is a method of transmitting pulses of radio energy into the subsurface, and receiving the returning pulses that have reflected off interfaces between materials with different electromagnetic properties. It is a pulse-echo technique using radio energy. Antennas are moved across an area with a continuous series of radar pulses, giving a profile of the subsurface. GPR can provide a rapid, nondestructive measurement technique for evaluating railway track substructure condition. The effectiveness of the GPR method has been proven under FRA R&D with encouraging results of initial application of GPR data in actual track rehabilitation projects (PATCO and BNSF). Currently, an algorithm is being developed for the automated evaluation of the GPR data. Reliability of data is currently limited to the identification of subsurface layers, trapped moisture, and ballast fouling. The FY 2009 request is to conduct additional testing and validation to extend the algorithm for more detailed information of subsurface condition, to include soil types and classifications.

Outputs: GPR Prototype to assess ballast fouling, subsurface layers and shoulder ballast condition; increased railroad safety; and cost savings for railroad industry.

RD&T Partners: Geophysical Survey Systems, Inc, and the University of Illinois, Urbana-Champaign, and Railroads.

FY 2009 Funding: \$250,000

Autonomous Track Geometry Measurement System

Objective: Develop an ATGMS to measure and transmit data in revenue service operations without interruption to rail service.

DOT Goal/RD&T Strategy: Safety – Mitigate accidents and incidents/Assess new technologies, vehicles, concepts, designs, and procedures.

Description: The proposed funding will be used to continue the development of an unmanned autonomous track geometry system for the collection of track geometry characteristics remotely up to 90 days without user intervention. A prototype system is under development for use with a hy-railer. The research envisioned is mounting the complete system on a locomotive or freight vehicle for the shipment in normal freight service. Track anomaly data will be detected and sent to a secure website to assist maintenance personnel in locating, verifying and correcting track defects.

Outputs:

- Develop ability to monitor track conditions every time rail is traversed, increasing collection rate.
- Eliminate the interruption of normal rail service for testing
- Reduction of complexity, size, and cost of traditional geometry systems without compromising performance

RD&T Partners: ENSCO, Inc.

FY 2009 Funding: \$300,000

Detection of Potential Bridge Defects Using Track Geometry Data

Objective: Development of an algorithm to detect patterns in track geometry indicative of possible bridge failure.

DOT Goal/RD&T Strategy: Safety – Mitigate accidents and incidents/Assess new technologies, vehicles, concepts, designs, and procedures.

Description: Track geometry deviations can be important indicators of developing bridge failures. The purpose of this project is to develop an algorithm to detect patterns in track geometry indicative of possible bridge failure and to report these events as advisory exceptions on inspection cars. Current track geometry systems used by the FRA do not provide this function.

Outputs: Detection/analysis/reporting algorithm

RD&T Partners: Ensco, Inc.

FY 2009 Funding: \$50,000

Railroad Bridge Condition Monitoring

Objective: Development of a Real-Time Railroad Bridge Monitoring system using arrays of sensors for early warning of a potential collapse.

DOT Goal/RD&T Strategy: Safety – Mitigate accidents and incidents/ Assess new technologies, vehicles, concepts, designs, and procedures.

Description: Currently most railroad bridges are inspected visually by skilled operators. A combination of increased tonnage and aging of the bridges necessitates the need for accurate assessments of bridge condition for accident prevention. This project will develop a monitoring system for railroad bridges using arrays of sensors to detect incipient local failures (cracks at joints) and incipient global failures (system instability).

Outputs: A bridge monitoring system using arrays of sensors.

RD&T Partners: Lanza di Scalea and Uang (UCSC)

FY 2009 Funding: \$250,000

Rail Buckling Detection System

Objective: Develop a technology to monitor stress levels and detect incipient buckling in rails.

DOT Goal/RD&T Strategy: Safety – Mitigate accidents and incidents/ Assess new technologies, vehicles, concepts, designs, and procedures.

Description: Buckling (sun kink) of continuously-welded rails remains a large cause of train accidents with tens of millions a year in associated damage costs. No established method exists today to detect incipient buckling of rails while in-motion. This project will develop techniques able to monitor stress levels and detect incipient buckling in rails and develop a prototype able to detect the incipient buckling in-motion during transit.

Outputs: A prototype for the detection of incipient buckling in-motion during train transit.

RD&T Partners: Lanza di Scalea and Uang (UCSD)

FY 2009 Funding: \$250,000

Automated Switch Inspection System

Objective: Develop an ATGMS to measure and transmit data in revenue service operations without interruption to rail service.

DOT Goal/RD&T Strategy: Safety – Mitigate accidents and incidents/Assess new technologies, vehicles, concepts, designs, and procedures.

Description: Defects in switches are one of the leading causes of derailments. Currently there is no automated inspection method for switches and frogs. This project will develop a vision-based system to inspect switches and frogs to provide quantitative measurements of switch parameters and will serve as a platform for development of automated defect algorithms.

Outputs:

- Develop ability to monitor track conditions every time rail is traversed, increasing collection rate.
- Eliminate the interruption of normal rail service for testing
- Reduction of complexity, size, and cost of traditional geometry systems without compromising performance

RD&T Partners: ENSCO, Inc.

FY 2009 Funding: \$300,000

**RD&T PROGRAM: TRACK TRAIN INTERACTION
AMOUNT REQUESTED FOR FY 2009: \$3,100,000**

Projects:

Technical Support for Safety Enforcement

Objective: To provide testing and analytical support to fulfill FRA's railroad safety mission, and the related development of performance based track safety standards.

DOT Goal/RD&T Strategy: Safety - Understand and address causal factors and risks.

Description: As new technologies continue to emerge and train speeds increase, the timely development of technical information, data and expertise is crucial to providing a basis on which to make decisions on issues affecting the safe operation of rail vehicles on U.S. track. Rule-making and revisions to the Track and Equipment Safety Standards through the Rail Safety Advisory Committee (RSAC) process reflect the experience and understanding that has been gained, and define the qualification requirements and determination of maximum safe speeds and curving speeds for new and existing rail equipment. In recent years, safety issues that have arisen and been addressed included cracks detected in the spokes of the Acela high speed trainset brake discs, which suspended operations for over three months, fatigue cracks developed in the suspension support structure of the Talgo trainset cars operating on the Pacific Northwest Corridor, and the evaluation of tests and analyses to assess the safety of operating the Acela High Speed Trainsets at up to nine inches of cant deficiency in curves on Amtrak's Northeast Corridor. A similar level of support in addressing safety issues is expected in the year 2009.

Outputs:

1. Equipment qualification for including testing, data analysis, and recommendation, and
2. Revised/updated of FRA's Track Safety Standards on a sound engineering basis.

RD&T Partners: Volpe, RSAC and Technical Support Consultants.

FY 2009 Funding: \$250,000

Simulation of Multibody Railroad Vehicle/Track Dynamics

Objective: To determine the influence of track geometry characteristics and vehicle speeds on extreme lateral and vertical dynamic forces and accelerations that can potentially lead to derailment or compromise passenger safety.

DOT Goal/RD&T Strategy: Safety - Understand and address causal factors and risks.

Description: A comprehensive computer program for modeling and simulating railway vehicle/track systems will be developed, with an emphasis on the dynamic performance of both vehicle and track and their interactions through the wheel/rail interface. This simulation program will be used to demonstrate the behavior of the complex nonlinear flexible multibody rail vehicle systems including multiple types of connections and multiple-coupled railway cars negotiating variable track geometries. The software program developed under this research will enhance the study of derailments, three-dimensional wheel/rail contact, and vehicle track interaction vehicle dynamics under high-speed operations. FRA's contractor has developed a beta version of the software that includes a three-dimensional wheel/rail model and implemented a three-dimensional multibody simulation computer code.

Outputs: Dynamic Modeling/Simulation program for practical applications

RD&T Partners: University of Illinois

FY 2009 Funding: \$550,000

Instrumented Wheelsets

Objective: To develop performance based track safety standards.

DOT Goal/RD&T Strategy: Safety - Understand and address causal factors and risks/ Assess new technologies, vehicles, concepts, designs, and procedures.

Description: The Federal Railroad Administration (FRA) has developed vehicle/track interaction standards to assure the safety of high-speed rail (HSR) operations in the US. To assist in the assessment of performance-based standards for HSR safety, the FRA has commissioned three Instrumented Wheelset Systems (IWS). The IWS provides for the measurement of forces at each wheel/rail interface on one truck and accelerations on the truck frame and carbody. The simultaneous collection of geometry, wheel/rail interactive forces, and accelerations on a given track provides valuable information for correlation and use in predictive models of vehicle response to track irregularities and safe performance, particularly at higher speed regimes. Knowledge of their interactions allows determination of appropriate vehicle and track design, construction, maintenance, and operation standards. FRA also has a set of IWS for freight operation that can be used for testing of different freight cars. This activity will keep all of the IWS ready and operational for testing and providing data collection support for passenger and freight services. The data will be used for training the neural Network research activities and other research activities in support of studying vehicle/track interactions.

Outputs: Prototype predictive model of vehicle performance based on track geometry data and appropriate neural network algorithms.

RD&T Partners: Ensco, Amtrak, and railroads (TBD)

FY 2009 Funding: \$125,000

Vehicle/Track Interaction Testing, Modeling and Analysis

Objective: To prevent or minimize derailments due to vehicle interaction with track geometry.

DOT Goal/RD&T Strategy: Safety – Assess new technologies, vehicles, concepts, designs, and procedures.

Description: The objective of this research is to prevent and reduce derailments due to the interaction between track geometry and vehicle. The goals of these research activities are: (1) to analyze the responses of different rail vehicles, in the US and abroad, to real and theoretical track geometry, (2) to validate and improve the vehicle-track interaction (VTI) dynamics model using measured data from Instrumented Wheelset System (IWS), Track Geometry Measurement System (TGMS) and other surveys, (3) to provide data and technical support for development and validation of the new rail vehicle simulation tools, (4) to provide data and technical support throughout studies focusing on the implementation and operation of high-speed rail vehicles, in the US and abroad, (5) (6) to provide data and support throughout efforts to consider the wheel/rail interface and the arrival at optimal profile contours. Analysis of geometry and vehicle data collected on different rail corridors to determine the influence of track geometry characteristics and vehicle speeds on extreme lateral and vertical dynamic forces and accelerations that can potentially lead to a derailment or compromise passenger and rail safety. This research program will provide test support for collection of vehicle/track interaction data for passenger and high speed services.

Outputs: Predictive model of vehicle performance for specified track geometry condition, and the development of pro-active track maintenance guides.

RD&T Partners: University of Illinois-Chicago and Ensco

FY 2009 Funding: \$1,000,000

Neural Network for Predicting Wheel/Rail Forces

Objective: To develop a model for Virtual Car for real-time simulation capable of predicting unsafe railroad conditions that track geometry alone might miss.

DOT Goal/RD&T Strategy: Safety – Assess new technologies, vehicles, concepts, designs, and procedures.

Description: The Virtual Car is a real-time simulation program that predicts unsafe railroad conditions that track geometry alone might miss. The purpose of the Virtual Car is to estimate the vertical and lateral forces on the wheel/rail interface as a function of the track geometry and the operating characteristics of the vehicle (i.e., speed and

acceleration). The wheel/rail forces are usually measured with instrumented wheelsets, but they are expensive and impractical to test several continuously. The Virtual Car can be installed on any track geometry inspection vehicle using only additional computers to predict several vehicles in real-time simultaneously. This system is currently being used on FRA's T-16 track inspection vehicle to identify track locations where the estimated wheel/rail forces exceed the limits recommended for safe operations. Currently, more vehicles are being trained to provide a wide assortment of vehicle types, starting with the most problematic or high risk vehicles. This activity will produce a set of virtual cars that can be used to test response of the cars to track geometry. Virtual car models will be installed on a geometry car to predict the response of the cars to track geometry inputs.

Outputs: Virtual Car Simulation model for safety evaluation for specified track geometry condition.

RD&T Partners: Ensco, Inc.

FY 2009 Funding: \$300,000

FAST Testing – Track/Train Interaction

Objective: Improve the reliability and safety of the railroad infrastructure through the test and development of new ties, fasteners, rails, bridges, joint bars, switches and welding techniques.

DOT Goal/RD&T Strategy: Safety - Understand and address causal factors and risks/ Assess new technologies, vehicles, concepts, designs, and procedures.

Description: This is a testing program at TTC, Pueblo, CO in conjunction with HAL/FAST program for track structures. The FAST is a unique test facility which provides a controlled environment not otherwise available for the acquisition of a realistic data for the evaluation of system and/or component performance under service conditions. It affords the Government and the railroad industry an opportunity for the detection of potential problems and resolution to eliminate or minimize risks in revenue service. The continuous operation of a freight train over the dedicated oval test track at the TTC permits many experiments and tests to be conducted concurrently in as near a real-world environment as is possible so that short and long-term cause and effect can be identified in a compressed time period. The FY 2009 request is to fund this on-going cooperative program.

Outputs: This program will improve railroad infrastructure and document the performance of advanced design components and techniques.

RD&T Partners: AAR, individual railroads and suppliers of the railroad industry.

FY 2009 Funding: \$475,000

Wheel/Rail Interface Research

Objective: To evaluate the interdependent parameters of rail profile, wheel profile, wheel/rail contact forces, rail grinding and lubrication to reduce derailment risks.

DOT Goal/RD&T Strategy: Safety - Understand and address causal factors and risks/ Assess new technologies, vehicles, concepts, designs, and procedures.

Description: The FRA is undertaking detailed analyses of wheel/rail interface and profiles to determine the impact of various factors like wheel profile, rail profile, lubrication and rail grinding and wheel/rail contact forces to reduce the risk of derailment and improve safety. In this project the complete wheel/rail interface system will be studied together as a system. Under this research project FRA had already developed a new wheel and rail profile for Amtrak Acela operation in NEC. This research will continue to monitor and modify the wheel/rail profile, lubrication and grinding practice at NEC to optimize the wheel/rail contact for passenger and commuter service. Other activities to examine the problems of rolling contact fatigue in rails to find an accurate and reliable high-speed surface condition-monitoring system to identify rail with surface-initiated rolling-contact-fatigue defects that may compromise safety.

Outputs: Guidelines for wheel profile/wheel truing for improved railroad safety and operational effectiveness.

RD&T Partners: Volpe, Ensco, TTCI, and Amtrak.

FY 2009 Funding: \$400,000

RD&T PROGRAM: TRAIN CONTROL
AMOUNT REQUESTED FOR FY 2009: \$6,720,000

Projects:

Higher Performance Wireless Communication

Objective: To support research and standard development in high-performance wireless communication.

DOT Goal/RD&T Strategy: Safety – Assess new technologies, vehicles, concepts, designs, and procedures. Reduce passenger and freight congestion in air and surface modes.

Description: This is a co-operative effort with AAR Wireless Communication Task Force (WCTF) to develop a wireless communication system that can adequately support communication based train control (CBTC) and other wireless data applications in the railroad industry. The requirements to meet the demands of these applications and a Request for Proposal (RFP) are being developed for solicitation from the radio suppliers to design such a system. The FY08 funding is to procure software and hardware for testing within a deployable communication based train control system for performance measurement. It is expected that this project will be completed by the end of FY09 with further testing performed in future production CBTC systems.

Outputs: A prototype system for high-performance data radio and wireless communication devices for advanced train control

RD&T Partners: Association of American Railroads – Wireless Communication Committee (WCC) and Railroad Research Foundation (RRF), Amtrak

FY 2009 Funding: \$300,000

Train Control Interoperability and Universal On-board Platform

Objective: To examine the interoperability of PTC and design an universal onboard platform.

DOT Goal/RD&T Strategy: Safety – Assess new technologies, vehicles, concepts, designs, and procedures.

Description: This is a co-operative effort with the AAR Railroad Electronics Task Force and Norfolk Southern to develop an universal on-board platform that will interoperate with current cab signal systems, the Locomotive Speed Limiter (a NS automatic train control system), ASES (New Jersey Transit train control system), and ACSES (Amtrak train control system). This platform will be further developed for a truly universal

protocol and message sets for interoperability among all existing and future Positive Train Control (PTC) systems. A RFP has been sent to potential suppliers for the universal platform. FY08 funding will be used for further development of this platform beyond the NS requirements. The project is planned for completion by the end of FY09.

Outputs: Universal onboard platform that will interoperate with current cab signal systems, the Locomotive Speed Limiter, ASES, and ACSES.

RD&T Partners: Association of American Railroads, Norfolk Southern Railway, New Jersey Transit Authority, Amtrak

FY 2009 Funding: \$700,000

Continue the Development of Portable Employee-in-Charge Terminal

Objective: To finalize the development of portable employee-in-charge terminal.

DOT Goal/RD&T Strategy: Safety – Mitigate accidents and incidents/Assess new technologies, vehicles, concepts, designs, and procedures.

Description: This is a co-operative effort with TTCI and BNSF to develop a hand-held terminal that the employee-in-charge of a track gang can communicate and control the authorities of approaching trains equipped with an electronic train control system, in order to protect the roadway workers in a work zone. With this terminal, other management functions will also be incorporated so that the track gangs can access information in real-time from a central office system for enhancing productivity and efficiency, besides safety. The requirements for such a system are being developed by TTCI with cooperation from BNSF. The FY08 funding is used to complete the testing of this device in the BNSF ETMS territory. It is anticipated that this project will be completed by the end of FY09.

Outputs: A prototype hand-held computer device that meets track gang/roadway workers' needs in communication and management of work orders and track authorities.

RD&T Partners: Transportation Technology Center, Inc., Burlington Northern Santa Fe Railway (BNSF)

FY 2009 Funding: \$300,000

Interagency Agreement with Institute for Telecommunication Sciences

Objective: To support testing and analysis of wireless communication.

DOT Goal/RD&T Strategy: Safety – Assess new technologies, vehicles, concepts, designs, and procedures.
Reduced Congestion – Reduce passenger and freight congestion in air and surface modes.

Description: An interagency agreement was executed in 1997 between FRA and the Institute for Telecommunication Sciences (ITS), Boulder, CO to provide testing and analyses related to wireless communication in train control systems and railroad operations. ITS, through its in-house telecommunication expertise, continues to provide valuable advices to FRA in setting directions of wireless communication research based on public interest. Examples of the past work are radio performance study for Oregon DOT, Michigan DOT ITCS data radio evaluation, assistance in the current AAR narrow banding license-consolidation petition to the FCC, and the interference mitigation study of voice-over-data radios.

Outputs: Reports that identify the issues, solutions, and policy recommendations.

RD&T Partners: Institute for Telecommunication Sciences (ITS), Oregon Department of Transportation, Michigan Department of Transportation, Association of American Railroads

FY 2009 Funding: \$100,000

Advanced Activation

Objective: To enhance grade crossing protection systems with PTC and onboard communication systems.

DOT Goal/RD&T Strategy: Safety - Understand and address causal factors and risks/ Mitigate accidents and incidents/Assess new technologies, vehicles, concepts, designs, and procedures.

Description: Leveraging on the development of NAJPTC in train tracking, wireless communication, microprocessor-based on-board platform and vital software, grade crossing gate activation can be performed through wireless communication instead of track circuits. On a wide-scale basis, this method is very cost-effective. For currently unprotected grade crossings especially in dark territories, advanced activation using radios will provide grade crossing protection without the substantial investment of wiring track circuits. This project will be initiated in FY07, to be incrementally funded in FY08 and FY09. The funding will be used to develop, analyze and test such a system at TTCI for the development of a set of specifications.

Outputs: Improve rail-highway grade crossing safety

RD&T Partners: AAR, TTCI, Amtrak

FY 2009 Funding: \$800,000

Develop a True Vital and Safety-Critical PTC

Objective: To develop and test a true vital and safety-critical PTC system.

DOT Goal/RD&T Strategy: Safety – Assess new technologies, vehicles, concepts, designs, and procedures.
Reduced Congestion – Reduce passenger and freight congestion in air and surface modes.

Description: Currently, there is not a production PTC for freight railroads with a true vital design that provides the close-loop error and failure detection and fail-safe schemes under all circumstances. Some of the production systems such as BNSF ETMS and CSXT CBTM are labeled as non-vital overlay. While indeed these systems provide an additional layer of protection, accidents will not be eliminated as they are still subject to potential undetected equipment failures and human errors. In the on-going FRA effort in continuous improvement in safety, a cost-effective vital PTC system needs to be developed. A vital system is even more critical when the railroads start to use PTC to replace aging signaling systems. IDOT PTC is an attempt on a totally vital system, but however, it will be an expensive system when it is in the market due to the complex design for moving blocks and its requirement to track and assign authorities to unequipped trains.

Outputs: A series of tests and reports on the safety and reliability of PTC systems.

RD&T Partners: Association of American Railroads (AAR), the Volpe Center

FY 2009 Funding: \$2,000,000

Merge PTC System with “Smart Train” Technology and Train Pacing

Objective: To incorporate “smart train,” train pacing and other onboard train control technologies with PTC systems, and fully integrate the onboard computer systems with back-office dispatching systems and wayside equipment monitoring systems.

DOT Goal/RD&T Strategy: Safety – Mitigate accidents and incidents.
Reduced Congestion – Reduce passenger and freight congestion in air surface modes.

Description: FRA research initiatives in PTC have stimulated several railroads to develop and install PTC systems for safety considerations. However, the PTC platform can be expanded to obtain business benefits by interfacing with other train operation systems, such as New York Airbrake Leader System, on-board train defect detectors and train pacing algorithm. The benefits will be fuel savings, reduction of train forces, improvement in train management and asset utilization, better train handling techniques. The FY08 funding will be used to award a contract to a supplier familiar with all these systems to interconnect and integrate these systems with a demonstration on a railroad. Norfolk Southern has expressed interests in this area. It is anticipated that the program will complete in FY09.

Outputs: A prototype system that integrates the Advanced Concept Train (ACT) components with PTC systems.

RD&T Partners: Norfolk Southern, New York Airbrake (NYAB)

FY 2009 Funding: \$400,000

Low Cost Collision Avoidance System

Objective: The objective of this program is to develop a low cost Automated Collision Avoidance System (ACAS) that could be used either as a standalone system or in conjunction with a Positive Train Control system to prevent train collisions.

DOT Goal/RD&T Strategy: Safety – Mitigate accidents and incidents/Assess new technologies, vehicles, concepts, designs, and procedures.

Description: Automated collision avoidance systems have been developed for use in the aviation and maritime transportation industries. Similar technology could be used to prevent train collisions. The system would combine a Nationwide Differential GPS (NDGPS) receiver, a train-to-train transceiver and an onboard processor on each locomotive to create the ACAS. The low cost system could be used as an alternative to complex and more costly positive train control systems for short line passenger and freight railroads. It could also be used to provide an extra layer of safety in a PTC system. The system also has the potential to provide security against the unauthorized operation of a train.

Outputs: The output will be a non-proprietary industry standard for an ACAS system; development of prototype systems and testing of these systems.

RD&T Partners: AAR, individual railroads and railroad suppliers.

FY 2009 Funding: \$1,400,000

PTC Communications Safety

Objective: To examine potential safety issues in PTC communication systems.

DOT Goal/RD&T Strategy: Safety – Assess new technologies, vehicles, concepts, designs, and procedures.

Description: PTC communication and interoperability are two key issues raised by TRB Committee for Review of FRA's RD&D Programs. High-capacity digital communications systems are critical to the implementation of PTC systems. Although the new wireless communications technologies hold promise for providing adequate capacity, the reliability and safety of communication must be studied before the standards

for interoperability are set (see TRB 2006 Workshop on Railroad Research Needs). The research involves the tests and analyses of wireless communication bandwidth, electromagnetic interference (EMI), radio signal interference, and Internet security.

Outputs: A series of tests and reports on PTC communication safety issues

RD&T Partners: Volpe Center, Association of American Railroads (AAR) - Transportation Technology Center, Inc. (TTCI)

FY 2009 Funding: \$720,000

RD&T PROGRAM: GRADE CROSSINGS
AMOUNT REQUESTED FOR FY 2009: \$1,850,000

Projects:

LIDAR – Laser to Measure Crossings Profile

Objective: Design, test, and demonstrate a grade crossing profile measurement system prototype, including collecting a large sample of profiles with the prototype system installed on an FRA geometry car.

DOT Goal/RD&T Strategy: Safety – Mitigate accidents and incidents/Assess new technologies, vehicles, concepts, designs, and procedures.

Description: The present approach for accurately measuring the profile of grade crossings is very expensive and time consuming, requiring the use of a professional survey crew. Simpler survey techniques can only determine whether a crossing meets the Association of American State Highway and Transportation Officials (AASHTO) criteria of “hump” of 3 inches in 30 feet. The LIDAR system is a portable laser measuring system that can be mounted to the front of a Hi-Railer which can produce an accurate measurement of the crossing profile as the Hi-Railer travels the system at speeds up to 50 mph. The result of this effort will be a refined measurement software to accurately measure grade crossing “hump” at speed and the beginnings of a crossing profiles database, identifying not only humped crossings but the degree of hump on major rail routes. Research is being coordinated with Federal Motor Carrier Safety Administration (FMCSA) and Federal Highway Administration (FHWA).

Outputs: A database of 3D maps of humped grade crossings across the country that can be used to prevent hang-ups by allowing drivers using at-risk, low-clearance vehicles to plan a safe route in advance.

RD&T Partners: ENSCO

FY 2009 Funding: \$200,000

PTC/ITS Interface and Technology Merging

Objective: Linking of PTC communication systems to the ITS to improve safety at crossings.

DOT Goal/RD&T Strategy: Safety – Mitigate accidents and incidents/Assess new technologies, vehicles, concepts, designs, and procedures.

Description: Positive Train Control (PTC) communication systems offer a significant opportunity to improve safety at crossings by linking to the Intelligent Transportation Systems (ITS) being developed. Train location information provided to ITS can provide

advanced warning to drivers that a crossing will be blocked in adequate time for them to take an alternate route to avoid the blocked crossing. This would be particularly advantageous for emergency vehicles. Additional concepts are in-vehicle warnings conveyed by the Intelligent Vehicle Initiative (IVI) systems, or emergency radios being demonstrated in some cities, that a crossing will be blocked. The proposed FY08 funding will be used for a feasibility study and specification preparation. The result of this effort will be to identify those concepts that are feasible and outline specifications for developing prototypes for field-testing.

Outputs: Feasibility study and specifications

RD&T Partners: Volpe, USDOT/ITS Joint Program Office

FY 2009 Funding: \$150,000

Grade Crossing Safety Research Support

Objective: Provide timely support for grade crossing safety research support activities that require immediate attention and maintain support of FRA research activities.

DOT Goal/RD&T Strategy: Safety - Understand and address causal factors and risks.

Description: This work area reflects the efforts in general administration of the FRA's grade crossing safety research program at Volpe Center plus such generalized support as "monthly reporting," "research dissemination," "conference support," and "quick response and special studies." Volpe provides support for requests from the FRA Office of Research and Development requiring immediate attention or any studies not covered in an existing task. This task provides a convenient means of accomplishing work quickly with minimal administrative effort. Quick response includes research dissemination and conference support. It is expected that this project will be completed in FY12.

Outputs: The ability to quickly respond to a request for information (research) is very important for maintaining a credible presence in an area that is responsible for the second highest number of fatalities in the railroad industry. Congressional and public scrutiny and interest in grade crossing accidents is traditionally very high, and the flexibility to respond quickly is essential

RD&T Partners: Volpe Center

FY 2009 Funding: \$300,000

Acoustic Warning Device Evaluation

Objective: Acoustic warning devices truly pose a three-horned dilemma: a device must be capable of alerting motorists to the train's approach, not annoy residents, and not damage train crew hearing. This project examines new technology, such as hyper sound,

that might be able to resolve this dilemma and the combination of acoustic characteristics that might be manipulated to achieve an effective warning that does not annoy or damage crew hearing. This project is examining the spectral characteristics of devices, timing and duration of sound and no-sound intervals, etc., to improve device effectiveness.

DOT Goal/RD&T Strategy: Safety – Mitigate accidents and incidents/ Assess new technologies, vehicles, concepts, designs, and procedures.

Description: Auditory warnings represent an important alternative to visual warnings in alerting the motorist to an approaching train. Research by the FRA’s Office of Safety suggests the train horn plays a significant role in preventing accidents. Improving economic conditions have resulted in more train traffic and an increase in noise levels near the grade crossings from train horns. The FRA is working on a variety of approaches to reduce community noise levels while maintaining safety. The Volpe Center is evaluating technologies designed to meet the objectives of maximizing safety and minimizing community noise impact and the sound exposure of locomotive crews. It is anticipated that a series of laboratory and field tests will be conducted resulting in several reports describing these efforts. It is expected that this project will be completed in FY09.

Outputs: This project will reduce grade crossing accidents by improving the ability of motorists to hear and recognize an approaching hazard through new technology while reducing community annoyance and train crew hearing loss.

RD&T Partners: Volpe Center

FY 2009 Funding: \$200,000

Causal Analysis of Accidents

Objective: Understand “why” grade crossing accidents, such as motorists driving into the sides of trains, occur so that these accidents can be reduced.

DOT Goal/RD&T Strategy: Safety - Understand and address causal factors and risks.

Description: This project is a multi-year effort to understand the underlying factors that contribute to accidents at highway-railroad grade crossings. Currently, our accident reporting systems tell us “what” happened, but we do not know “why” the accident occurred. Emphasis will be placed on identifying human factors (e.g., crossing characteristics that promote poor motorist decision-making) and system issues (e.g., ambiguities in jurisdiction that impede the correction of problems) that contribute to accidents. This project’s primary goal is to identify areas for future research. It will use Moray’s Sociotechnical model and Reason’s analytic framework to guide the work. Activities will consist of a literature review and analysis of accident statistics. This effort will proceed in close coordination with activities in the evaluation of the driver behavior project. It is expected that this project will be completed in FY12.

Outputs: Grade crossing accidents account for the second highest number of fatalities in the rail road industry. This project will identify new approaches that may lead to further reductions in accidents and help to identify systemic issues that have been previously overlooked.

RD&T Partners: Volpe Center

FY 2009 Funding: \$200,000

Evaluation of Driver Behavior

Objective: Reduce grade crossing accidents by better understanding the contribution of motorist behavior to such accidents.

DOT Goal/RD&T Strategy: Safety - Understand and address causal factors and risks/ Assess new technologies, vehicles, concepts, designs, and procedures.

Description: Driver behavior is an important factor in understanding and preventing accidents at highway-railroad grade crossings. The focus of this research is to determine how safety systems can be made more effective by addressing driver behavior, and how locomotive alerting determines how grade crossing safety systems can be made more effective by addressing driver behavior. For example, how can locomotive alerting lights, freight car reflectors, and wayside horns be designed and operated to maximize their ability to attract a motorist's attention and foster safe motorist behavior? These activities will be performed in coordination with the accident causation study. It will include laboratory experiments using a driving simulator and field studies examining driver behavior under naturalistic conditions. It is expected that this project will be completed in FY12.

Outputs: This project will determine how locomotive alerting lights, freight car reflectors, wayside horns should be designed and operated to maximize their ability to attract motorist attention and foster safe motorist behavior. The project will also determine why compliance with active crossing devices depends on the amount of time prior to train arrival at the crossing; how the timing of train horn warnings interacts with the timing of device activation; etc.

RD&T Partners: Volpe Center

FY 2009 Funding: \$200,000

Countermeasures to Reduce Suicides on Railway Rights-of-Way

Objective: To determine the prevalence and underlying causal factors of rail-related suicides, and to develop effective measures to reduce the incidence of suicide along railway rights of way (including crossings).

DOT Goal/RD&T Strategy: Safety - Understand and address causal factors and risks/
Mitigate accidents and incidents.

Description: Trespassing on railroad property is one of the most serious safety problems facing the railroad industry. Railroad carriers that have tracked probable suicides on the rail system report that suicides are responsible for 39% of pedestrian fatalities. A 3-5 year phased study led by an Industry Steering Committee and coordinated with a similar effort by Transport Canada on behalf of the Canadian rail industry will: 1) determine the prevalence and underlying causal factors of rail-related suicides in the U.S., 2) develop effective measures to reduce the incidence of suicide along railway rights of way (including crossings), 3) establish a pilot program of prevention countermeasures, and 4) provide baseline for monitoring trends. This project was begun in FY06 and is expected to be complete in FY11.

Outputs: Program and Research Plans; Industry Steering Committee organized; Retrospective Prevalence Assessment; Prospective Prevalence Assessment and Causal Analysis; Suicide Countermeasures; Evaluation of Countermeasures.

RD&T Partners: Railroad Research Foundation, AAR Risk Management Committee, American Association of Suicidology

FY 2009 Funding: \$200,000

Grade Crossing Data Collection

Objective: Develop a system to automate the collection of data for vehicle and train activity at grade crossings.

DOT Goal/RD&T Strategy: Safety - Understand and address causal factors and risks/
Mitigate accidents and incidents.

Description: Current methods for determining motorist behavior at grade crossings require either direct observation at the grade crossing or review of video records of grade crossings. In both instances, the methods are labor intensive and very expensive. FRA has contracted for the development and construction of a portable, computerized system for the detection of highway and rail vehicles at grade crossings. The device resembles a variable message sign that might be deployed along side a highway to inform motorists of special conditions ahead. The system will collect information on highway conditions, vehicle characteristics (weight, speed, etc.) and rail consist characteristics. It is expected that this project will be completed in FY09.

Outputs: Provide a system for automated vehicle driver behavior data collection. This will aid in reducing accident rates by improving the understanding of vehicle driver behavior at grade crossings.

RD&T Partners: Westat, Volpe Center

FY 2009 Funding: \$200,000

Motorist Decision Making Model

Objective: Update and revise the current model of motorist decision making.

DOT Goal/RD&T Strategy: Safety - Understand and address causal factors and risks.

Description: Accidents at grade crossings often involve faulty decision-making by motorists. The current model of motorist decision-making at grade crossings, which is based on signal detection theory, used data from 1986. This model has been useful in various regulatory analyses (e.g., reflectorization, horn ban) and for generating experimental hypotheses in the Driver Behavior project. However, the model clearly needs to be updated with more current data, including an assessment of its predictive value based on outcomes from regulatory actions and other changes in the U.S. grade crossing system. This project will update the model and examine its predictive value with the aim of producing a revised model. It is expected that this project will be completed in FY10.

Outputs: Understanding why motorists drive into the side of trains or directly in front of trains is a very important element in reducing grade crossing accidents. Decision-making models will help predict what types of changes in grade crossings or trains are likely to provide the best return on investment and can suggest new strategies for interventions.

RD&T Partners: Volpe Center

FY 2009 Funding: \$200,000

**RD&T PROGRAM: HAZARDOUS MATERIALS TRANSPORTATION
AMOUNT REQUESTED FOR FY 2009: \$1,550,000**

Projects:

*Tank Car Structural Integrity and Puncture Resistance
Evaluation and Test*

Objective: Continue to develop baseline and improved car performance information under newly prescribed performance standards through component testing and analysis.

DOT Goal/RD&T Strategy: Safety – Mitigate accidents and incidents/Assess new technologies, vehicles, concepts, designs, and procedures. Reduce passenger and freight congestion in air and surface modes.

Reduced Congestion - Extend system life and improve durability. Advance use of Next Generation technologies and combinations of modes. Improve planning, operations, and management. Improve services for underserved areas and populations. Advance the Nation's Transportation Research capability.

Security, Preparedness and Response - Secure hazardous materials shipments and assess risks.

Description: In FY 09, FRA will continue the tank car puncture resistance testing to validate the material failure and rupture of new materials used for innovative designs, as well as conduct components tests of multi-layered materials for both head and shell protection. Work in 08 will continue developing a model for tank car puncture resistance for tank cars in 286K gross rail limit (GRL) service and investigating new tank car materials with the tank car industry for their puncture resistance. Material testing of tank car jackets as a function of puncture resistance will be evaluated to determine the effects of different materials and layers between the tank jacket and tank shell of pressure tank cars.

Outputs: Information from this research program will be provided to industry car manufacturers to help offset design development costs for the development of new clean sheet designs as well as potential retrofit onto existing cars. Modeling and testing procedures will be developed, documented, and disseminated to the key industry stakeholders at various industry wide forums and symposia.

RD&T Partners: Volpe National Transportation Systems Center, AAR Tank Car Committee, Tank Car Manufacturers, NGRTC group

FY 2009 Funding: \$900,000

Tank Car Fittings Evaluation

Objective: To improve the overall safety of tank car operations by mitigating hazardous material release in tank car rollover derailments.

DOT Goal/RD&T Strategy: Safety – Mitigate accidents and incidents/Assess new technologies, vehicles, concepts, designs, and procedures.

Description: In FY 08 FRA will study the different manway designs and shapes of gaskets, especially the ones involved in NARs, and how they interact with the manway to form a good seal. FRA is studying the ergonomics, leak prevention, maintenance, and qualification of different valves, to determine if a new design can reduce the failure of these devices. FRA will investigate the possibility of using a fusible closure for tank cars transporting hazardous materials with low vapor pressure. This will provide total containment preventing the loss of lading. The fusible plug will melt if the tank car is involved in a fire. Another concern is top fittings and their performance during tank car roll-over accidents. FRA will continue the testing of prototypes for top fitting protections for existing non-pressure and pressure tank cars in FY 09. FRA needs to update the 1970's study of the liquid flow characteristics of tank car pressure relief valves, and liquid flow testing of small and large capacity valves in hazardous materials service. This will include studying the two-phase liquid/vapor flow for relief valves in FY 08 and FY 09.

Outputs: Improve overall safety of tank car operations by mitigating hazardous material release in tank car rollover derailments. Develop recommendations for industry use for future design and test of fittings and valves.

RD&T Partners: Sharma and Associates, Dow Chemical, Midland Manufacturing Company

FY 2009 Funding: \$250,000

Tank Car Operating Environment

Objective: To identify areas to be inspected on the tank car and to define inspection intervals.

DOT Goal/RD&T Strategy: Safety - Understand and address causal factors and risks/ Mitigate accidents and incidents/Assess new technologies, vehicles, concepts, designs, and procedures.

Description: For several years FRA has been working with the tank car industry, through the Tank Car Committee, to identify the dynamic forces that a tank car encounters in revenue service. Some recent tank car failures have been attributed to fatigue cracks that propagated. As part of this project, FRA will initiate a study in FY 07 to monitor coupling speed. The findings from the rail coupling speed study will provide a better understanding of the forces induced into rail tank cars in yard operations (classification and handling) and support FRA research on the Tank Car Operating Environment project.

Outputs: Dynamic force data provides for more reliable estimation of fatigue life for existing tank car designs. Fatigue life estimations are used to develop more reliable inspection procedures. Identify areas to be inspected and define inspection intervals. Create better understanding of the operational environment and forces exerted on tank cars in the creation of fractures. Confirm the industry's current understanding of fracture initiation and propagation. Potentially reveal additional factors that are critical to the understanding of the phenomena

RD&T Partners: TTCI, EnSCO, Rail Supply Industry

FY 2009 Funding: \$150,000

Evaluation of NGRTC

Objective: Provide strong technical support to the NGRTC group in the development of new design and fabrication techniques for an improved tank car as well as provide analysis and testing support.

DOT Goal/RD&T Strategy: Safety – Mitigate accidents and incidents/Assess new technologies, vehicles, concepts, designs, and procedures.

Description: A Memorandum of Understanding was initiated in FY 2007 with Dow Chemical Company, UP, and UTLX to develop a Next Generation Rail Tank Car. FRA is providing technical support for the evaluation and testing of the design being developed by the consortium. Funding is needed in FY 2009 to continue this evaluation.

Outputs: The information gained from this program will provide the technical basis for understanding the behavior of the NGRTC generation 1 and generation 2 tank car designs subjected to both the performance standards stipulated by the newly promulgated rule for enhanced tank car crashworthiness as well as the metrics defined by the NGRTC group. Presentations will be made at various industry wide forums to help disseminate the knowledge gained and get immediate feedback from other key industry stakeholders. The NGRTC group will develop novel top fittings protection strategies that FRA would like to include in potential second phase rulemaking activities.

RD&T Partners: Volpe National Transportation Systems Center, Dow Chemical Company, UTLX, and Union Pacific

FY 2009 Funding: \$250,000

**RD&T PROGRAM: TRAIN OCCUPANT PROTECTION
AMOUNT REQUESTED FOR FY 2009: \$3,600,000**

Projects:

Crashworthiness of Passenger Rail Equipment

Objective: Develop alternative design strategies to enhance structural passenger equipment crashworthiness through incremental incorporation of Crash Energy Management (CEM) on conventional equipment using pushback couplers in conjunction with deformable energy absorbing anti-climbers as well as developing modifications to passenger locomotives used in push-pull service to reduce the aggressivity with impacts to cab cars and MU locomotives.

DOT Goal/RD&T Strategy: Safety - Understand and address causal factors and risks/Mitigate accidents and incidents/Assess new technologies, vehicles, concepts, designs, and procedures.

Description: This is part of the continued full-scale impact tests series that was initiated in 1998, resulting in the design of Crash Energy Management (CEM) for single level passenger coach and cab cars. In a joint effort with the American Public Transportation Association (APTA), FY 08 and 09 funding will provide the technology and testing support to a CEM system for multi-level passenger rail vehicles. Component and system validation tests are needed to verify the design. Continued support to a full-scale rollover test is required. It is expected that this project will be completed by the end of FY09 with further testing performed in the prototype of this multi-level vehicle.

Objective: Develop alternative design strategies to enhance occupant protection for passenger equipment through development of improved seat and workstation table designs as well as a passive protection system for locomotive engineers.

Description: This is a part of the joint research project with the United Kingdom to develop a friendly interior of passenger vehicle with better seat, table and seatbelt where needed. The risk and mitigation schemes for standing passengers and those on a bench seat along the wall will be conducted by the Volpe Center and its contractors. A series of tests have been done in FY 06-07 to confirm the concept of new commuter rail seats of single level coach cars. New designs of seat and tables will be incorporated into the new bi-level passenger coaches being procured by the Metrolink of California. Prototype tests may be conducted if necessary. Safer seat designs for the operator in rail cab cars will also be evaluated and tested with completion by the end of FY 09.

Outputs: The information obtained from these research programs can be used to help estimate the costs and benefits to incorporating the new design strategies in operating authority procurement specifications as well as provide support for the development of new industry wide design standards and rulemaking initiatives. Component testing will be conducted on retrofit pushback couplers on both single level and multilevel

equipment. Additionally alternative deformable anti-climbing systems will be analyzed and tested. New combinations of this type of technology will be developed and incorporated for retrofit onto an existing passenger locomotive to test for aggressivity with impacts with equipment with and without CEM features. Additionally a grade crossing test will be conducted of a fully retrofitted CEM cab car to assess improvement in performance over conventional equipment. The occupant protection work will provide standardized testing protocols for seat and workstation table quasi-static and dynamic testing. Presentations will be made at various industry wide forums to help disseminate the knowledge gained and get immediate feedback from other key industry stakeholders.

RD&T Partners: Volpe National Transportation Systems Center, American Public Transportation Association, Railway Safety Standards Board from the United Kingdom, FTA

FY 2009 Funding: \$2,150,000

Support of RSAC and APTA Safety Standards Development

Objective: Currently FRA is working in conjunction with an RSAC Task Force and the APTA PRESS C&S sub-group to develop enhanced crashworthiness standards for incremental introduction of Crash Energy Management (CEM) features into current operating authority procurement specifications.

DOT Goal/RD&T Strategy: Safety - Understand and address causal factors and risks/ Mitigate accidents and incidents.

Description: This is a continued effort with the FRA's Office of Safety, APTA and suppliers to update or develop safety standards and design guidelines for passenger rail equipment for better crashworthiness. Other technical support will be provided to the FRA team in Passenger Safety RSAC group by the Volpe Center staff. It is anticipated that this project will be continued to the end of FY 09.

Outputs: Presentations will be made at various industry wide forums to help disseminate the knowledge gained and get immediate feedback from other key industry stakeholders. This information will serve as the technical basis for standard development and rulemaking activities.

RD&T Partners: Volpe National Transportation Systems Center, American Public Transportation Association, FTA

FY 2009 Funding: \$350,000

Locomotive Crash Mitigation Measures

Objective: To provide improved crew protection in the event of collisions.

DOT Goal/RD&T Strategy: Safety - Understand and address causal factors and risks/
Mitigate accidents and incidents/Assess new technologies, vehicles, concepts, designs,
and procedures.

Description: This project has rail industry oversight. In addition to the FRA, regular presentations are made to labor, railroads, locomotive builder and the AAR locomotive committee. With this support new design approaches to improve crashworthiness will be explored, concepts developed and tested in a lab.

Outputs: New crashworthiness components to improve safety of crew in collisions, reduce repair costs resulting from collisions, reduce accident costs

RD&T Partners: Foster Miller Inc

FY 2009 Funding: \$250,000

Advanced Locomotive Cab

Objective: Reduced crew fatigue, reduced crew injuries and improved operations safety.

DOT Goal/RD&T Strategy: Safety – Mitigate accidents and incidents/ Assess new technologies, vehicles, concepts, designs, and procedures.

Description: This will continue as a co-operative effort with the AAR Locomotive Committee, the Locomotive Builders, and labor. Work began in FY 2006 with a goal to develop a cab with reduced vibration and noise. Isolation of the cab from the underframe without sacrificing crashworthiness is sought. Active noise control will be deployed. Other ergonomic measures also will be deployed. The cab development will meet the crew size/configuration needs consistent with new technology needs (communications, braking, vehicle tracking). The demonstration will be conducted by the end of FY09.

Outputs: Advanced ergonomic cab layout with reduced vibration and noise and improved comfort.

RD&T Partners: Railroads, labor and locomotive builders

FY 2009 Funding: \$450,000

Fire Safety

Objective: Recognize high fire risk conditions and prevent locomotive fires in accident situations.

DOT Goal/RD&T Strategy: Safety – Mitigate accidents and incidents/Assess new technologies, vehicles, concepts, designs, and procedures.

Description: This is an effort initiated in 2005/2006 to understand how fuel fires initiate and propagate. The goal is to fully understand the damage resulting from fires and to develop protection measures to prevent fires in accidents/derailments and to develop mitigation measures, Fueling systems will be examined for risk. The requirements for a reduced risk system will be developed. The FY08 funding is used to initiate the testing of this system and to develop fire prevention strategies and training tools. This project will be completed by the end of FY09.

Outputs: Develop fire suppression systems for use in the event of fuel leak on ballast

RD&T Partners: Locomotive builders, railroads

FY 2009 Funding: \$400,000

**RD&T PROGRAM: R&D FACILITIES AND TEST EQUIPMENT
AMOUNT REQUESTED FOR FY 2009: \$2,550,000**

Projects:

TTC Support (Facility Improvement)

Objective: The purpose of this program is to construct facilities and procure equipment needed at FRA owned research and development Transportation Technology Center (TTC).

DOT Goal/RD&T Strategy: Safety - Understand and address causal factors and risks/ Assess new technologies, vehicles, concepts, designs, and procedures.

Description: For years, FRA has performed testing in the Transportation Technology Center (TTC), Pueblo, CO, which has proved to be a unique and valuable facility for railroad testing. Some examples are crashworthiness of various types of equipment, track research testing, new and untried equipment dynamics evaluation etc. FRA will continue to utilize this facility to perform testing on equipment and trainsets. However, our past experience especially on crashworthiness testing showed that we need an under-cover environment to maintain and instrument the equipment in a trainset to prevent weather from damaging the instrumentation or affecting the calibration, and to provide a fast turnaround at times of configuration changes. The FY08 funding is for the continued construction of a building dedicated to FRA test equipment and to support various facility improvements. FY 09 funding provides continued maintenance.

Outputs: Construction of facilities and procurement of equipment.

RD&T Partners: AAR, individual railroads, and railroad suppliers

FY 2009 Funding: \$1,000,000

Track Research & Instrumentation Platform

Objective: To provide the FRA with the type and quality of equipment needed for the development and demonstration of R&D research products/ideas to advance and improve track inspection technologies; and to maintain FRA capabilities to independently evaluate railroad infrastructure integrity.

DOT Goal/RD&T Strategy: Safety – Assess new technologies, vehicles, concepts, designs, and procedures.

Description: The FRA Office of Research and Development owns and operates two research vehicles, DOTX-216 (T-16) and DOTX-218 (T-18) to support the track research programs.

The T-16 is a converted Amtrak Metroliner coach equipped with state of the art instrumentation for conducting railway research. The on-board systems are capable of measuring track geometry, rail profiles, ride quality, wheel / rail interface forces, and other track based measurements at speeds up to 165 mph.

The T-18, the new FRA Gage Restraint Measurement Systems (GRMS) vehicle, utilizes a deployable 5th split railroad axle to laterally load the head of both rails. This vehicle helps to prevent wide gage derailments by measuring rail motion under a combined vertical and lateral load for the detection of weak ties and fasteners.

The T-16 high-speed research car has surveyed over 15,000 miles during five different test programs each with different objectives providing the support to NCDOT, IDOT, Amtrak, Metrolink, Caltrain and Office of Safety. The T-18 GRMS car has surveyed over 6000 miles providing the support to Transportation Technology Center, Inc (TTCI) in evaluation of a heavy axle load composite tie performance as well as sharing of the track data with the private railroad industry.

Track Research & Instrumentation Platform Information System has been identified as a major Capital Planning project. Continuous funding for the operation and maintenance to have the FRA R&D research cars in constant readiness to maintain the capability to independently evaluate track and structure integrity through quick-response instrumentation, test support, and materials testing.

Outputs: Data on Track Geometry, Gage Restraint Measurement System (GRMS), Rail Profile System, Track Quality Indices, Differential Global Positioning System(DGPS), Ride Quality Measurement System, Wheel Force Measurement/Prediction, and Wayside Image Mapping with GPS Coordinates.

RD&T Partners: Ensco, Inc

FY 2009 Funding: \$1,550,000

EXHIBIT V-3

**FEDERAL RAILROAD ADMINISTRATION
Support for Secretarial and Administration RD&T Priorities**

Policy Initiative	Supporting RD&T Program (s)	FY 2009 Request (\$000)
Safety – (Rail Safety and Hazmat Safety) <i>Secretarial Priority</i>	Railroad System Issues	\$3,155
	Human Factors	3,475
	Rolling Stock & Components	3,100
	Track and Structures	4,450
	Track / Train Interaction	3,100
	Train Control	3,360
	Grade Crossings	925
	Hazardous Material	1,550
	Train Occupant Protection	3,600
	R&D Facilities and Equipment	2,550
System Performance and Reliability <i>Secretarial Priority</i>	Rolling Stock & Components	\$ 400
	Train Control	1,680
	Grade Crossings	463
21 st Century Solutions for 21 st Century Transportation Problems <i>Secretarial Priority</i>	Train Control	\$ 1,680
	Grade Crossings	462

Detailed information on these programs, including their linkage to Secretarial priorities and our partnerships with other Federal entities, can be found in the narrative accompanying Exhibit V-2.

**EXHIBIT V-4
USE OF R&D INVESTMENT CRITERIA**

Our R&D program continues to maintain the following investment criteria:

R&D Investment Criterion	Program Evidence	Actions Reflected in FY 2009 Request
<i>Relevance</i>	<ul style="list-style-type: none"> • All R&D elements contribute to Departmental and FRA goals. • Developed with other DOT agencies and key stakeholders, a five-year strategic R&D plan outlines a vision for the future and the technologies needed to realize it. • The TRB Committee for Review of the FRA Research, Development, and Demonstration Programs provides annual prospective and retrospective review. • Other inputs to the R&D planning process include coordination with the FRA's Office of Safety, the American Public Transportation Association Research Needs Conference, the Highway–Railroad Grade Crossing Research Needs Conference, and the Association of American Railroads Railway Technology Working Committee and Tank Car Committee. 	<ul style="list-style-type: none"> • R&D activities support FRA and DOT goals as well as the Secretary's priorities. • Composition and management of the R&D programs reflect inputs from TRB, APTA, HRGC, AREMA and AAR conferences and committees; FRA's Office's of Safety and Policy; and Research and Innovative Technology Administration. • R&D results will be shared with the railroad industry via FRA Website and/or presentations at various conferences and committee meetings and publications in peer reviewed technical magazines. • Budget request is based on multi-year program plans tied to the 5 year R&D plan which is currently being updated, with stakeholder input.

R&D Investment Criterion	Program Evidence	Actions Reflected in FY 2009 Request
<i>Quality</i>	<ul style="list-style-type: none"> • The FRA awards research contracts and grants on a competitive basis to the greatest extent possible. • The TRB conducts periodic peer reviews of the FRA's R&D programs that address (1) the management structure and approach; (2) the direction and allocation of funds; and (3) the appropriate balance of Federal, State, and private sector inputs and costs. 	<ul style="list-style-type: none"> • Ensuring quality through periodic peer reviews of the FRA's R&D programs by TRB, AAR, AREMA, other professional organizations, industry and academia are considered and incorporated as deemed appropriate. • Cooperative effort and partnerships with the railroad industry and state DOTs provide checks and balances necessary for the successful R&D programs. • Laboratory testing and field-testing are conducted for validation and verification.
<i>Performance</i>	<ul style="list-style-type: none"> • Inputs are tracked via an annual procurement plan; monthly obligations reports; and monthly progress reports that track actual vs. planned technical accomplishments, costs, and schedules. • All FRA R&D contributes to the goals in the FRA's and Department's annual performance plans; the FRA is developing annual and long-term measures and targets to accurately assess the progress of its R&D in meeting these goals. • The DOT <i>Performance and Accountability Report</i> provides a public accounting of FRA performance against the goals in the previous year's performance plan. 	<ul style="list-style-type: none"> • Multi-year program plans employ phased approaches where results are evaluated at key milestones to adjust program direction for the next phase to incorporate lessons learned and customer feedback. • Many projects are conducted as cooperative efforts, with railroads or other partners.