## BUDGET ESTIMATES FISCAL YEAR 2022

FEDERAL RAILROAD ADMINISTRATION

SUBMITTED FOR THE USE OF THE COMMITTEES ON APPROPRIATIONS

#### DEPARTMENT OF TRANSPORTATION FEDERAL RAILROAD ADMINISTRATION

#### FY 2022 PRESIDENT'S BUDGET JUSTIFICATION

#### TABLE OF CONTENTS

### Page **Section 1: Overview Section 2: Budget Summary Tables** Section 3: Budget Request by Appropriation

Passenger Rail Im	provement, Modernizati	ion, and Expansion (	Grants1	11

FRA Administrative Provisions	121
Section 4: Research, Development, and Technology	123
Section 5: Information Technology Expenditure	129

#### DEPARTMENT OF TRANSPORTATION FEDERAL RAILROAD ADMINISTRATION

#### **ADMINISTRATOR'S OVERVIEW**

The Federal Railroad Administration's (FRA) mission is to enable the safe, reliable, and efficient movement of people and goods for a strong America, now and in the future. FRA oversees the safety of the U.S. rail industry by carrying out a robust regulatory enforcement and technical assistance program that combines rigorous data analysis, continuous stakeholder engagement, and the expertise of a highly-skilled and dedicated workforce. FRA also administers a broad portfolio of grants aimed at improving safety and the condition of the Nation's rail infrastructure, while enhancing the operating performance of both intercity passenger and freight rail service. These investments enable the introduction of new and upgraded intercity passenger rail corridors that help to connect communities, combat climate change, and grow America's economy and job opportunities. FRA's railroad safety and investment programs are supported by cutting edge research and development, through which FRA advances technology innovations and new practices to improve rail safety and efficiency.

**The FY 2022 President's Budget requests \$4.01 billion for FRA,** including \$2.70 billion for Amtrak grants, \$1.00 billion for competitive rail grants, \$247.70 million for the Safety and Operations account, and \$58.83 million for the Research and Development account. The FY 2022 President's Budget builds off of the expansive \$80 billion rail investment proposed in the American Jobs Plan. Where the American Jobs Plan is in part necessary due to decades of underinvestment in rail, the FY 2022 President's Budget will provide the steady-state of ongoing funding to adequately maintain and incrementally improve the rail network.

With the Fixing America's Surface Transportation Act (FAST Act) set to expire in September, the FY 2022 President's Budget offers a number of grant program enhancements for Congress to consider. The FAST Act represented a momentous milestone by bringing rail into a comprehensive authorization with the other modes of surface transportation. However, rail still lacks a dedicated funding source similar to those that have supported highway, transit, and airport investments for decades. As Congress considers reauthorization principles, a dedicated and reliable funding source for Amtrak and competitive rail grants is key to develop rail industry capacity and strengthen project delivery capabilities to enable project sponsors and their partners to make the large-scale infrastructure investments needed to build back better.

Together, the FY 2022 President's Budget, American Jobs Plan, and forthcoming FAST Act reauthorization will ensure rail plays a critical role in addressing the Biden-Harris Administration's transportation priorities, including:

• Safety: An unwavering commitment to railroad safety underpins all of FRA's operations and proposed actions. The FY 2022 President's Budget request encourages innovation and data analysis, leveraging workforce expertise and industry partnerships, and proposes increased funding to address the causes of approximately 95 percent of rail-related deaths – trespassing on railroad property and collisions at highway-rail grade crossing. The FY 2022 President's Budget proposes to enhance the Consolidated Rail Infrastructure and

Safety Improvements (CRISI) grant program to include trespass prevention capital projects, enforcement of state and local trespass and grade crossing laws, and suicide prevention efforts. Funding requested for FRA's Research and Development account will continue to build the science-based understanding of railroad systems and technologies, with particular focus on root cause analysis and development of countermeasures to prevent trespassing and grade crossing casualties, as well as accidents resulting from track, equipment, and other causes.

- Equity: Many century-old rail lines and facilities bisect communities of color and lowincome neighborhoods, impeding access to employment opportunities and critical community services. To correct decades of failed land-use policies and investments in these underserved and disadvantaged communities, the FY 2022 President's Budget proposes several improvements to its programs, including:
  - Dedicating at least \$50 million in CRISI funds to grade separations, rail line relocations, and other mitigations for the detrimental safety and quality of life effects rail transportation can have on communities;
  - Establishing Tribal governments as eligible recipients of competitive grant programs;
  - Reducing statutory cost-sharing requirements for underserved communities or disadvantaged communities;
  - Increasing funding for workforce development, outreach, and apprenticeship programs to foster greater diversity, equity, and inclusion in the rail industry; and
  - Consistent with the Justice40 Initiative, working towards a goal that at least 40 percent of competitive grant funding for projects benefits underserved or disadvantaged communities in order to build a more equitable transportation system.
- Climate and Resilience: Rail is among the most energy-efficient modes of transportation, moving one-third of all freight on a ton-mile basis, while consuming less than 2 percent of energy used in the transportation sector.<sup>1</sup> Diverting passengers and freight from less efficient transportation modes to rail could reduce fuel consumption and greenhouse gas emissions. The FY 2022 President's Budget is supporting grants and research and development to advance clean power investments in alternative fuels, battery technology, and electrification to reduce the negative environmental effects of transportation. FRA is also encouraging short line railroads to apply for proposed CRISI funding to help retire their aging locomotive fleet and replace them with greener technologies that will reduce harmful emissions.
- Economic Recovery and Core Assets: The \$3.7 billion in proposed grant funding under the FY 2022 President's Budget will help our economy recover from the COVID-19 pandemic, invest in our vital infrastructure, and provide opportunities for families to achieve economic security through rail industry employment. Amtrak and the proposed

<sup>&</sup>lt;sup>1</sup> U.S. Department of Transportation, Bureau of Transportation Statistics, <u>Energy Consumption by Mode of</u> <u>Transportation</u>, February 2021.

Passenger Rail Improvement, Modernization, and Expansion (PRIME) grant funding will continue to support Amtrak's existing Northeast Corridor, State-Supported, and Long Distance services, while investing in upgrades and new services across the country. Similarly, CRISI will continue to provide an essential source of capital for resource-constrained short line railroads, which often provide the first- and last-mile connections for farms, factories, and shippers to the rail network. These grant program investments will be supported through new workforce development initiatives in FRA's Research and Development account to ensure the industry workforce is prepared and maintains the skillsets needed for success, both today and in the future.

• **Transformation and Future Proofing:** Building new rail infrastructure is a multigenerational investment. As evidenced by the 100+ year age of many of the bridges and tunnels on the Northeast Corridor, rail assets can withstand heavy usage for decades with proper maintenance. While it is past due and costly to replace our nation's key rail assets, the investments proposed in the FY 2022 President's Budget and American Jobs Plan will help our country build back better and create a new, long-lasting legacy of high performing rail service.

The U.S. rail network is critical to national economic productivity and serves an indispensable role in fulfilling the freight and passenger mobility needs of a population that is expected to increase by nearly 70 million over the next 40 years. The FY 2022 President's Budget request will help FRA in enabling continuous safety, reliability, and efficiency improvements to meet our country's transportation challenges.

#### AMERICAN JOBS PLAN: <u>BUILD WORLD-CLASS TRANSPORTATION</u> INFRASTRUCTURE: FIX HIGHWAYS, REBUILD BRIDGES, AND UPGRADE PORTS, AIRPORTS, RAIL AND TRANSIT SYSTEMS

President Biden is calling on Congress to make a historic and overdue investment in our roads, bridges, rail, ports, airports, and transit systems. The President's plan will ensure that these investments produce good-quality jobs with strong labor standards, prevailing wages, and a free and fair choice to join a union and bargain collectively. These investments will advance racial equity by providing better jobs and better transportation options to underserved communities. These investments also will extend opportunities to small businesses to participate in the design, construction, and manufacturing of new infrastructure and component parts. President Biden's plan will deliver infrastructure Americans can trust, because it will be more resilient to floods, fires, storms, and other threats, and not fragile in the face of these increasing risks.

The President's plan invests an additional \$621 billion in transportation infrastructure and resilience:

- Within this amount, **\$540 Billion** would reside in the Department of Transportation for its programs allocated over a five-year period, and is in addition to the base amounts included in the FY 2022 Budget request.
- Separately, the American Jobs Plan also provides \$50 billion make our infrastructure more resilient of which **\$7.5 Billion** would be provided to the Department of Transportation.
- Aside from Department of Transportation funding, the American Jobs Plan calls for \$74 Billion in additional infrastructure investments, including \$8 Billion to the U.S. Army Corps of Engineers for Inland Waterways and Harbor Projects, \$3 Billion to the General Services Administration for land ports of entry, \$20 Billion to the Environmental Protection Agency for school bus electrification, and \$43B for non-transportation resilience programs.

#### Detailed information about the American Jobs Plan can be found within the FY 2022 Budget Highlights located at:

https://www.transportation.gov/mission/budget/fiscal-year-2022-budget-highlights

#### SURFACE TRANSPORTATION REAUTHORIZATION

The President's vision for addressing our Transportation Safety and Infrastructure needs relies on three building blocks:

#### The FY 2022 Budget

First, the FY 2022 President's Budget provides discretionary and mandatory funding in core programs to continue the current portfolio of transportation programs and includes targeted funding elements to address the Administration's current priorities particularly in the transit and rail areas.

#### **Surface Transportation Reauthorization**

The President's plan also recognizes that the current surface authorization act – Fixing America's Surface Transportation Act (FAST Act) – expires this fiscal year. Since Congress is now considering multi-year legislation that would begin in FY 2022, the budget displays flat levels equal to the last year of the FAST Act for simplicity. This is not a policy decision that the next reauthorization should equal FAST ACT levels, but rather a technical presentation to ensure consistency between the American Jobs Plan (AJP) and the traditional DOT accounts. Surface authorization acts have traditionally provided mandatory funding for highway, transit, and safety programs from excise tax revenue deposited into the Highway Trust Fund (HTF). Additionally, surface authorization acts establish certain programs that Congress funds through the annual appropriations process. For example, the FAST Act was the first time a rail title was included in a multi-year surface reauthorization package.

#### American Jobs Plan

Finally, the \$621 billion in investments proposed in the American Jobs Plan represent investments in addition to the base amounts included in the FY 2022 President's Budget request.

The FY 2022 Budget request reflects the American Jobs Plan funding as budget authority provided over five years. Funding is grouped in nine new program accounts that align with the major portions of the AJP, but funding is not assigned to specific DOT Budget Accounts.

The President's FY 2022 request does not include a formal legislative reauthorization proposal. Rather, the President's Budget documents present key Administration reauthorization principles, which align with the foundation of the AJP. These include:

- Safety
- Equitable Economic Strength and Improving Core Assets
- Ensuring Investments Meet Racial Equity and Economic Inclusion Goals
- Resilience and Addressing Climate Change

• Transformation of our Nation's Transportation Infrastructure

To reflect this, the FY 2022 President's Budget shows flat funding of contract authority in current Highway Trust Fund accounts throughout the full 10-year Budget window. These flatline levels do not represent funding or program design recommendations by the Administration.

When the Congress takes up the AJP and Surface Transportation reauthorization, the Administration looks forward to working collaboratively with Congress to infuse its key principles and policy proposals into legislation, and to add additional funding and policy proposals proposed in the American Jobs Plan. The Administration seeks to work with Congress to reflect the American Jobs Plan and key principles in legislative measures to advance ambitious investments in infrastructure, including surface transportation reauthorization.

#### How does this impact programs not impacted by AJP goals?

For other programs that receive discretionary appropriations and mandatory programs unaffected by surface authorization, the FY 2022 Budget presents detailed information consistent with DOT's prior budget requests.

#### **JUSTICE40**

Executive Order 14008, issued on January 27, 2021, created a government-wide "Justice40" Initiative with the goal of delivering 40 percent of the overall benefits of relevant federal investments to disadvantaged communities and tracking performance toward the goal through an Environmental Justice Scorecard.

The Justice40 Initiative has the potential to deliver benefits that could include increased access to renewable energy and energy efficiency improvements, public transit, water infrastructure, climate-resilient affordable housing, training and workforce development, reductions in legacy pollution, and equitable and just community development, among others. There are important considerations in the development, implementation, and evaluation of such a wide-reaching and complex initiative. To advance Justice40 goals the Department is considering options in areas such as, but not limited to, incorporating criteria in the Department's discretionary grant programs, developing implementable definitions for "investment benefit" and "disadvantaged communities" as it relates to programmatic activities, public engagement strategies with stakeholders to define and further understand "investment benefits" that can be targeted for disadvantaged and underserved communities, and developing a Department-wide Environmental Justice Scorecard.

In the coming months, the Department will be working to ensure that subsequent programs, targets, and metrics fulfill the ambition of the Justice40 Initiative to deliver meaningful and measurable benefits to disadvantaged and underserved communities.



# DEPARTMENT OF TRANSPORTATION FEDERAL RAILROAD ADMINISTRATION



#### EXHIBIT II-1 FY 2022 BUDGET AUTHORITY FEDERAL RAILROAD ADMINISTRATION (\$000)

			(A)		(B)		(C)		(D)		(E)		(F)
ACCOUNT NAME	M/D		FY 2020 ACTUAL	C	FY 2020 ARES Act	E	FY 2021 NACTED		FY 2021 CRRSA	A Re	FY 2021 American escue Plan	PRI I	FY 2022 ESIDENT'S BUDGET
SAFETY AND OPERATIONS	D	\$	224,198	\$	250	\$	234,905	\$	-	\$	-	\$	247,700
RAILROAD RESEARCH AND DEVELOPMENT	D	\$	40,600	\$	-	\$	41,000	\$	-	\$	-	\$	58,826
NORTHEAST CORRIDOR GRANTS TO THE NATIONAL RAILROAD PASSENGER CORPORATION	D, M	\$	700,000	\$	492,000	\$	700,000	\$	655,431	\$	970,388	\$	1,300,000
NATIONAL NETWORK GRANTS TO THE NATIONAL RAILROAD PASSENGER CORPORATION	D, M	\$	1,300,000	\$	526,000	\$	1,300,000	\$	344,569	\$	729,612	\$	1,400,000
CONSOLIDATED RAIL INFRASTRUCTURE AND SAFETY IMPROVEMENTS	D	\$	325,000	\$	-	\$	375,000	\$	-	\$	-	\$	375,000
PASSENGER RAIL IMPROVEMENT, MODERNIZATION, AND EXPANSION GRANTS	D	\$		\$		\$		\$		\$		\$	625,000
FEDERAL-STATE PARTNERSHIP FOR STATE OF GOOD REPAIR	D	\$	200,000	\$	-	\$	200,000	\$	-	\$	-	\$	-
RESTORATION AND ENHANCEMENT GRANTS	D	\$	2,000	\$		\$	4,720	\$		\$	-	\$	-
MAGNETIC LEVITATION TECHNOLOGY DEPLOYMENT PROGRAM	D	\$	2,000	\$		\$	2,000	\$		\$		\$	
RAIL LINE RELOCATION AND IMPROVEMENT PROGRAM Rescissions	D	\$ \$	-	<u>\$</u>	-	<u>\$</u> \$	(12,650) (12,650)	\$ \$	-	\$ \$	-	\$ \$	
CAPITAL AND DEBT SERVICE GRANTS TO THE NATIONAL RAILROAD PASSENGER CORPORATION Rescissions	D	<u>\$</u> \$		<u>\$</u> \$		<u>s</u>	(10,458) (10,458)	<u>\$</u> \$		\$ \$		\$ \$	
RAILROAD SAFETY TECHNOLOGY PROGRAM Rescissions	D	\$ \$	-	\$ \$		<u>\$</u> \$	(613)	\$ \$	-	\$ \$	-	\$ \$	-
INTERCITY PASSENGER RAIL GRANT PROGRAM Rescissions	D	\$ \$	-	\$ \$	-	\$ \$	(10,165) (10,165)	\$ \$	-	\$ \$	-	\$ \$	-
NEXT GENERATION HIGH SPEED RAIL Rescissions	D	\$ \$	-	\$ \$	-	<u>\$</u> \$	(3,035) (3,035)	\$ \$	-	\$ \$	-	\$ \$	
TOTALS Gross New Budget Authority Rescissions Transfers Offsets		\$ \$ \$ \$	2,793,798 - - -	\$ \$ \$	1,018,250 - - -	\$ \$ \$ \$	2,857,625 (36,921) -	\$ \$ \$ \$	1,000,000 - - -	\$ \$ \$ \$	1,700,000 - - -	S S S	4,006,526 - - -
NET NEW BUDGET AUTHORITY: [Mandatory BA] [Discretionary BA]		\$ \$	2,793,798	\$ \$ \$	<b>1,018,250</b>	\$ \$ \$	2,820,704	\$ \$	1,000,000	\$ \$ \$	<b>1,700,000</b> 1,700,000	\$ \$	4,006,526

## EXHIBIT II-2 FY 2022 TOTAL BUDGETARY RESOURCES BY APPROPRIATION ACCOUNT FEDERAL RAILROAD ADMINISTRATION Appropriations, Obligation Limitations, and Exempt Obligations (\$000)

			(A)		<b>(B)</b>		(C)		(D)		(E)		(F)
ACCOUNT NAME	<u>M / D</u>	I A	FY 2020 ACTUAL		FY 2020 ARES Act	Е	FY 2021 NACTED	]	FY 2021 CRRSA	R	FY 2021 American escue Plan	PRI I	FY 2022 ESIDENT'S BUDGET
SAFETY AND OPERATIONS	D	\$	224,198	\$	250	\$	234,905	\$	-	\$	-	\$	247,700
RAILROAD RESEARCH AND DEVELOPMENT	D	\$	40,600	\$	-	\$	41,000	\$	-	\$	-	\$	58,826
NORTHEAST CORRIDOR GRANTS TO THE NATIONAL RAILROAD PASSENGER CORPORATION	D, M	\$	700,000	\$	492,000	\$	700,000	\$	655,431	\$	970,388	\$	1,300,000
NATIONAL NETWORK GRANTS TO THE NATIONAL RAILROAD PASSENGER CORPORATION	D, M	\$	1,300,000	\$	526,000	\$	1,300,000	\$	344,569	\$	729,612	\$	1,400,000
CONSOLIDATED RAIL INFRASTRUCTURE AND SAFETY IMPROVEMENTS	D	\$	325,000	\$	-	\$	375,000	\$	-	\$		\$	375,000
PASSENGER RAIL IMPROVEMENT, MODERNIZATION, AND EXPANSION GRANTS	D	\$	-	\$	-	\$	-	\$	-	\$		\$	625,000
FEDERAL-STATE PARTNERSHIP FOR STATE OF GOOD REPAIR	D	\$	200,000	\$	-	\$	200,000	\$		\$		\$	-
RESTORATION AND ENHANCEMENT GRANTS	D	\$	2,000	\$	-	\$	4,720	\$	-	\$	-	\$	-
MAGNETIC LEVITATION TECHNOLOGY DEPLOYMENT PROGRAM	D	\$	2,000	\$	-	\$	2,000	\$	-	\$		\$	
RAIL LINE RELOCATION AND IMPROVEMENT PROGRAM Rescissions	D	<u>\$</u> \$	-	\$ \$	-	<u>\$</u> \$	(12,650) (12,650)	<u>\$</u> \$	-	\$ \$		<u>\$</u> \$	-
CAPITAL AND DEBT SERVICE GRANTS TO THE NATIONAL RAILROAD PASSENGER CORPORATION Rescissions	D	<u>\$</u> \$	-	\$ \$	-	<u>\$</u>	(10,458) (10,458)	<u>\$</u> \$	-	\$ \$	-	\$ \$	-
RAILROAD SAFETY TECHNOLOGY PROGRAM Rescissions	D	\$ \$	-	\$ \$	-	\$ \$	(613) (613)	\$ \$	-	\$ \$		\$ \$	-
INTERCITY PASSENGER RAIL GRANT PROGRAM Rescissions	D	<u>\$</u> \$	-	\$ \$	-	\$ \$	(10,165) (10,165)	\$ \$	-	\$ \$	-	\$ \$	-
NEXT GENERATION HIGH SPEED RAIL Rescissions	D	\$ \$	-	\$ \$	-	\$ \$	(3,035) (3,035)	\$ \$	-	\$ \$	-	\$ \$	-
TOTALS Gross New Budgetary Resources Rescissions Transfers Offsets		S S S	2,793,798 - - -	\$ \$ \$ \$	1,018,250 - - -	5 5 5 5	2,857,625 (36,921) -	\$ \$ \$ \$	1,000,000 - - -	\$ \$ \$	1,700,000 - - -	\$ \$ \$	4,006,526 - - -
TOTAL BUDGETARY RESOURCES: [Mandatory] [Discretionary] [Obligation Limitation]		<b>\$</b> \$ \$	2,793,798 - 2,793,798 -	\$ \$ \$ \$	<b>1,018,250</b> - 1,018,250	\$ \$ \$ \$	<b>2,820,704</b> - 2,820,704	\$ \$ \$ \$	<b>1,000,000</b> - 1,000,000 -	<b>\$</b> \$ \$	<b>1,700,000</b> 1,700,000 - -	<b>\$</b> \$ \$	<b>4,006,526</b> - 4,006,526 -

#### EXHIBIT II-4 FY 2022 OUTLAYS FEDERAL RAILROAD ADMINISTRATION (\$000)

			(A)		<b>(B)</b>		(C)		(D)		(E)		(F)
	M/D	A	FY 2020 ACTUAL	С	FY 2020 ARES Act	Е	FY 2021 NACTED	1	FY 2021 CRRSA	I A Re	FY 2021 merican scue Plan	PR I	FY 2022 ESIDENT'S BUDGET
SAFETY AND OPERATIONS	D	\$	220,780	\$	220	\$	252,000	\$	-	\$	-	\$	262,000
RAILROAD RESEARCH AND DEVELOPMENT	D	\$	38,000	\$	-	\$	45,000	\$	-	\$	-	\$	56,000
GRANTS TO THE NATIONAL RAILROAD PASSENGER CORPORATION	D	\$	-	\$	-	\$	4,000	\$	-	\$	-	\$	11,000
NORTHEAST CORRIDOR GRANTS TO THE NATIONAL RAILROAD PASSENGER CORPORATION	D, M	\$	699,000	\$	492,000	\$	702,069	\$	654,931	\$	969,888	\$	1,305,000
NATIONAL NETWORK GRANTS TO THE NATIONAL RAILROAD PASSENGER CORPORATION	D, M	\$	1,300,000	\$	526,000	\$	1,302,819	\$	344,069	\$	729,112	\$	1,403,000
CAPITAL AND DEBT SERVICE GRANTS TO THE NATIONAL RAILROAD PASSENGER CORPORATION	D	\$	1,000	\$	-	\$	1,000	\$	-	\$	-	\$	-
CONSOLIDATED RAIL INFRASTRUCTURE AND SAFETY IMPROVEMENTS	D	\$	41,000	\$	-	\$	149,000	\$	-	\$	-	\$	207,000
PASSENGER RAIL IMPROVEMENT, MODERNIZATION, AND EXPANSION GRANTS	D	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
FEDERAL-STATE PARTNERSHIP FOR STATE OF GOOD REPAIR	D	\$	-	\$	-	\$	25,000	\$	-	\$	-	\$	115,000
RESTORATION AND ENHANCEMENT GRANTS	D	\$	-	\$	-	\$	-	\$	-	\$	-	\$	1,000
RAILROAD SAFETY GRANTS	D	\$	10,000	\$	-	\$	16,000	\$	-	\$	-	\$	7,000
CAPITAL ASSISTANCE TO STATES - INTERCITY PASSENGER RAIL SERVICE	D	\$	1,000	\$	-	\$	5,000	\$	-	\$	-	\$	5,000
NORTHEAST CORRIDOR IMPROVEMENT PROGRAM	D	\$	2,000	\$	-	\$	8,000	\$	-	\$	-	\$	9,000
PENNSYLVANIA STATION REDEVELOPMENT PROJECT	D	\$	4,000	\$	-	\$	1,000	\$	-	\$	-	\$	-
CAPITAL ASSISTANCE FOR HIGH SPEED RAIL CORRIDORS AND INTERCITY PASSENGER RAIL SERVICE	D	\$	9,000	\$	-	\$	89,000	\$	-	\$	-	\$	57,000
NEXT GENERATION HIGH-SPEED RAIL	D	\$	-	\$	-	\$	-	\$	-	\$	-	\$	1,000
RAIL LINE RELOCATION AND IMPROVEMENT PROGRAM	D	\$	-	\$	-	\$	1,000	\$	-	\$	-	\$	1,000
RAILROAD SAFETY TECHNOLOGY PROGRAM	D	\$	-	\$	-	\$	-	\$	-	\$	-	\$	1,000
MAGNETIC LEVITATION TECHNOLOGY DEPLOYMENT PROGRAM	D	\$	-	\$	-	\$	-	\$	-	\$	-	\$	2,000
TOTAL:		\$	2,325,780	\$	1,018,220	\$	2,600,888	\$	999,000	\$	1,699,000	\$	3,443,000
Mandatory Discretionary		\$ \$	- 2,325,780	\$ \$	- 1,018,220	\$ \$	- 2,600,888	\$ \$	- 999,000	\$ \$	1,699,000 -	\$ \$	- 3,443,000

EXHIBIT II-5 SUMMARY OF REQUESTED FUNDING CHANGES FROM BAS	Federal Kaliroad Administration Appropriations, Obligation Limitations, and Exempt Obligations (5000)
---	---

**Baseline Changes** 

FRA Total

						0						
FKA Total	FY 2020 Actual	FY 2021 Enacted	Annualization of Prior Pay Raises	Annualization of new FY 2021 FTE	FY 2022 Pay Raises	Adjustment for Compensable Days (261 days)	GSA Rent	WCF Increase/ Decrease	Inflation and other adjustments to base	FY 2022 Baseline Estimate	Program Increases/ Decreases	FY 2022 President's Budget Request
PERSONNEL RESOURCES (FTE)												
Direct FTE	890	906	•		•		•	ı		906	38	944
FINANCIAL RESOURCES												
ADMINISTRATIVE EXPENSES												
Salaries and Benefits	139,070	147,828	370	,	3,001	,		,	3,078	154,276	6,524	160,800
Benefits for Former Employees (AK RR)	600	600	•	'	•		•		(88)	512	•	512
Travel	7,544	10,780	'	'			'		104	10,884	621	11,505
Transportation		60		'					1	61	(39)	22
GSA Rent	6,384	6,560	'	'			(1,347)			5,213	'	5,213
Communications, & Utilities	94	126	ı	,		ı	1	ı	1	127	(3)	124
Printing	519	528	,	'			'		5	533	(8)	525
Other Services:												
-WCF	15,792	15,986	ı	,		ı	066	5,182	,	22,158		22,158
-ESC	2,284	2,282	'	'	ı	,	ı	,	15	2,297	'	2,297
-Other contracts	34,153	31,856	'	'					161	32,017	11,118	43,135
Supplies	392	528	'	'			'		5	533	98	631
Equipment	405	1,953		•	'				17	1,970	(1,168)	802
Insurance Claims & Settlements	297	2,400		-		-		-	104	2,504	(2,104)	400
Admin Subtotal	207,534	221,486	370	ı	3,001		(357)	5,182	3,403	233,085	15,039	248,124
PROGRAMS												
Safety and Operations	34,252	32,940	'	'	,		,	'		32,940	3,860	36,800
Railroad Research and Development	38,282	37,276			•					37,276	17,826	55,102
Grants to Amtrak	1,990,000	1,990,000					'	,	ı	1,990,000	696,500	2,686,500
Consolidated Rail Infrastructure and Safety												
Improvements Passenger Rail Improvement. Modernization.	921,126	9/1/2		'						007,175	(nc/,c)	000,105
and Expansion Grants		,				,		,	,	,	612.500	612.500
Federal-State Partnership for State of Good												
Repair	198,000	198,000	'	'	ı	,	ı	·		198,000	(198,000)	,
Restoration and Enhancement Grants	1,980	4,673				'				4,673	(4,673)	
мадиенс деунацон геспноюду дерюуниен. Program	2.000	2.000				,		,	,	2.000	(2.000)	,
											(apple)	
Programs Subtotal	2,586,264	2,636,139								2,636,139	1,122,263	3,758,402
TOTAL	2,793,798	2,857,625	370	ī	3,001	,	(357)	5,182	3,403	2,869,223	1,137,303	4,006,526

						<b>Baseline Changes</b>						
FRA Total	FY 2020 Actual	FY 2021 Enacted	Annualization of Prior Pay Raises	Annualization of new FY 2021 FTE	FY 2022 Pay Raises	Adjustment for Compensable Days (261 days)	GSA Rent	WCF Increase/ Decrease	Inflation and other adjustments to base	FY 2022 Baseline Estimate	Program Increases/ Decreases	FY 2022 President's Budget Request
CANCELLATIONS												
Capital Assistance for High Speed Rail Corridors			'			ı	'		'		'	
and Intercity Passenger Rail Service		(02) 010							027 01			
Kall Line Kelocation and Improvement Program		(000,71)							12,050			
Capital And Debt Service Grants to the National	,	(10, 458)	·	,	'		'	,	10,458	·	'	'
Railroad Passenger Corporation												
Railroad Safety Technology Program		(613)	ı	ı	ı		1	I	613	ı	1	ı
Intercity Passenger Rail Grant Program	,	(10, 165)	'	'	ı	,	'	'	10,165	ı	'	,
Next Generation High Speed Rail	,	(3,035)	'	'	ı		'	'	3,035	'	'	,
<b>Cancellations Subtotal</b>		(36,921)			•		•		36,921		•	•
TOTAL with Cancellations	2,793,798	2,820,704	370		3,001		(357)	5,182	40,325	2,869,223	1,137,303	4,006,526

EXHIBIT II-5	SUMMARY OF REQUESTED FUNDING CHANGES FROM BASE	Federal Railroad Administration	Appropriations, Obligation Limitations, and Exempt Obligations	(8000)
--------------	--	---------------------------------	--	--------

						<b>Baseline Change</b>						
Safety & Operations	FY 2020 Actual	FY 2021 Enacted	Annualization of Prior Pay Raises	Annualization of new FY 2021 FTE	FY 2022 Pay Raises	Adjustment for Compensable Days (261 days)	GSA Rent	WCF Increase/ Decrease	Inflation and other adjustments to base	FY 2022 Baseline Estimate	Program Increases/ Decreases	FY 2022 President's Budget Request
PERSONNEL RESOURCES (FTE) Direct FTE	880	887								887	28	915
FINANCIAL RESOURCES												
ADMINISTRATIVE EXPENSES Solories and Benefits	310 261	072 771	696		900 C				0,55,5	202.031	F02.4	CL1 331
Benefits for Former Employees (AK RR)	009 600	1 <del>41</del> ,/ <del>1</del> 0 600	700	•	006,7				00/,2	00//NCI 513	4,00/	100,470
	000	000	•			•	•	•	(88)	710	ļ	710
Transportation	1,219	10,410							104	10,014	1/2	C80/11
GSA Rent	- 384	00 92 9					- 1347)			5213	(~~)	5 2 1 3
Communications, Utilities, & Misc	94	126				. ,	()TC(1)		. –	12,0	(3)	124
Printing	501	510		ı	1	1		,		515	6	507
Other Services:									1			
-WCF	15,792	15,986				,	066	5,182		22,158		22,158
-ESC	2,284	2,282		ı	•	,		. '	15	2,297	•	2,297
-Other contracts	19,234	16,103		ı		ı		,	161	16,264	(4,288)	11,976
Supplies	392	528				'			5	533	98	631
Equipment	105	1,653	,			'			17	1,670	(1,168)	502
Insurance Claims & Settlements	297	2,400	•		•	-			104	2,504	(2,104)	400
Admin Subtotal	189,946	201,965	362	I	2,938		(357)	5,182	3,063	213,153	(2,253)	210,900
PROGRAMS												
Automated Track Inspection Program	16,279	16,500								16,500		16,500
Rail Safety Partnership	3,000	3,000		ı		,		'	ı	3,000	800	3,800
RSIS/Data Management	4,061	4,400	'	ı	ı	'	ı	'	ı	4,400	100	4,500
Rail Grade Crossing Safety	1,000	1,325	•	•	•	ı	•	,	ı	1,325	(150)	1,175
Bridge Inventory/Support Program	100	•			ı		•	'			1	
Washington Union Station	800	800				'	•	•		800	200	1,000
PTC Support	5,452	500	'							500	500	1,000
Drug and Alcohol Program	941	1,169								1,169	(269)	006
Security, Other Security Grants	478	580	'				'	•		580	(25)	555
Rail Safety Advisory Committee (RSAC)	ı	20	,	ı	I	,	I	,	ı	20	ı	20
Technical Training Standards Division	999	551	'	ı	ı	'	ı	'	ı	551	149	700
Transportation Technology Center (TTC)	,	500		,	1	,	•	,	·	500	1,600	2,100
Cybersecurity Threat Assessment		•		ı	I		•	,	ı	ı	1	,
Rail Enforcement System	ı	•		ı	ı	ı		'	ı	ı	ı	·
Audit Management	,	225		,	1	'	•	,	·	225	275	500
Trespass Prevention	650	2,300			ı		•	'		2,300	(1,900)	400
Safe Transportation of Energy Products		•	'				'	•				
Other Safety Grants	472	570	•	ı	•	1		•	ı	570	80	650
Grant & Project Development Technical Assistance and Oversight	353	500					,	,	,	500	2,500	3,000
Programs Subtotal	34,252	32,940	•		ı	•		•		32,940	3,860	36,800
TOTAL	774 108	23.4 905	362	1	7 0 28	1	(357)	5 187	1 063	246.003	1 607	007 700

EXHIBIT II-5 SUMMARY OF REQUESTED FUNDING CHANGES FROM BASE Federal Railroad Administration Appropriations, Obligation Limitations, and Exempt Obligations (\$000)

**Baseline Changes** 

Railroad Research and Development

	FY 2020 Actual	FY 2021 Enacted	Annualization of Prior Pay Raises	Annualization of new FY 2021 FTE	FY 2022 Pay Raises	Adjustment for Compensable Days (261 days)	GSA Rent	WCF Increase/ Decrease	other other adjustments to base	FY 2022 Baseline Estimate	Program Increases/ Decreases	FY 2022 President's Budget Request
PERSONNEL RESOURCES (FTE)												
Direct FTE					ı						·	
FINANCIAL RESOURCES												
ADMINISTRATIVE EXPENSES												
Salaries and Benefits												
Benefits for Former Employees (AK RR)	'	,					,				,	
Travel	100	120		,		,		,	'	120		120
Transportation	,		'	,	'					'	'	'
GSA Rent			'		'							
Communications, & Utilities	,	•								'		
Printing	18	18	'	,	'					18	'	18
Other Services:												
-WCF			'		'						'	
-ESC			'		'						'	
-Other contracts	1,900	3,286	'		'					3,286	'	3,286
Supplies	ı			,		,		,	,	'		
Equipment	300	300								300		300
Admin Subtotal	2,318	3,724	,		ı	,	ı	1	ı	3,724	ı	3,724
PROGRAMS												
Track Research Program	11,279	10,179	'		'					10,179	'	10,179
Rolling Stock Program	10,322	10,322	'		'					10,322	'	10,322
Train Control & Communications	8,086	8,086		,		,		,	,	8,086		8,086
Human Factors Program	6,042	6,042	,		'		'	,	,	6,042	'	6,042
Railroad System Issues	2,553	2,647	ı	,	ı	ı		,	,	2,647	17,826	20,473
Programs Subtotal	38,282	37,276								37,276	17,826	55,102
TOTAL	40,600	41,000			'					41,000	17,826	58,826

Amtrak

EXHIBIT II-5	SUMMARY OF REQUESTED FUNDING CHANGES FROM BASE	Federal Railroad Administration	Appropriations, Obligation Limitations, and Exempt Obligations	(2000)
--------------	--	---------------------------------	--	--------

		see
		eline Chang
(		Bas
5		

FY 2020 Actual	FY 2021 Enacted	Annualization of Prior Pay Raises	Annualization of new FY 2021 FTE	FY 2022 Pay Raises	Adjustment for Compensable Days (261 days)	GSA Rent	WCF Increase/ Decrease	other adjustments to base	FY 2022 Baseline Estimate	Program Increases/ Decreases	FY 2022 President's Budget Request
-	0								01	-	οc
10	41								61	10	67
2,026	3,080	8		63	ı	'	ı	340	3,490	1,837	5,327
ı		ı			ı	'	ı	ı			ı
150	100		'						100	50	150
						'					
										'	
7,824	6,820		,		,			,	6,820	1,203	8,023
,	'	,	,	,	,	,	,	,	,	'	,
ı						ı		ı			
10,000	10,000	8	1	63		1	1	340	10,410	3,090	13,500
696,500	696,500		,	'	,	,	'		696,500	597,000	1,293,500
1,293,500	1,293,500	,		,	,	ı		ı	1,293,500	99,500	1,393,000
1,990,000	1,990,000	•				•	•		1,990,000	696,500	2,686,500
2,000,000	2,000,000	8		63				340	2,000,410	699,590	2,700,000
	Actual 10 10 2.026 150 2.026 150 150 150 150 150 150 150 150 150 150	Actual Enacted 10 19 2,026 3,080 	FY 2020 FY 2021 Of Proc Pays   Actual Enacted Raises   2,026 3,080 8   - - -   150 100 -   - - -   - - -   - - -   - - -   - - -   - - -   - - -   - - -   - - -   - - -   - - -   - - -   - - -   - - -   10,000 10,000 -   1,990,000 1,990,000 -   1,293,500 1,990,000 -   1,293,500 1,990,000 -   2,000,000 1,990,000 -	NCtual FY 2020 FY 2021 OT FUTO FAy OT INVENTION   10 19 - - -   2,026 3,080 8 - -   - - - - - -   150 100 8 - - -   - - - - - - -   -	NCUAD FY 2021 OI FUNCTION Network 2021 FY 2022 FAY 2022   10 19 - - -   2,026 3,080 8 - 63   - - - - - -   150 100 8 - 63   - - - - - -   150 100 8 - 63 -   - <td< td=""><td>FY 2020 FY 2021 OTTOOLTAY OTTOOLTAY Days (Gd1 days)   10 19 - - - -   2,026 3,080 8 - 63 - -   - - - - - - - -   150 100 8 - 63 - - -   - - - - - - - - -   150 100 -<td>FY 2020 FY 2021 FY 2021 FY 2021 FY 2021 FY 2021 GAR Rest   10 19 -&lt;</td><td>FY JALD FY JALL OTTOP NOT THE PARSE Days Gol days GSA Reat WCL Increased   10 19 -<!--</td--><td>VV AUD VV AUD VV AUL NV AUL&lt;</td><td>W ALO W ALU Oriversity of new YALUL FALLETY COMPRISANDE WCL Increase alparaments to base in fatime fati</td><td>M. M. M. M. M. M. Marker, M. M.</td></td></td></td<>	FY 2020 FY 2021 OTTOOLTAY OTTOOLTAY Days (Gd1 days)   10 19 - - - -   2,026 3,080 8 - 63 - -   - - - - - - - -   150 100 8 - 63 - - -   - - - - - - - - -   150 100 - <td>FY 2020 FY 2021 FY 2021 FY 2021 FY 2021 FY 2021 GAR Rest   10 19 -&lt;</td> <td>FY JALD FY JALL OTTOP NOT THE PARSE Days Gol days GSA Reat WCL Increased   10 19 -<!--</td--><td>VV AUD VV AUD VV AUL NV AUL&lt;</td><td>W ALO W ALU Oriversity of new YALUL FALLETY COMPRISANDE WCL Increase alparaments to base in fatime fati</td><td>M. M. M. M. M. M. Marker, M. M.</td></td>	FY 2020 FY 2021 FY 2021 FY 2021 FY 2021 FY 2021 GAR Rest   10 19 -<	FY JALD FY JALL OTTOP NOT THE PARSE Days Gol days GSA Reat WCL Increased   10 19 - </td <td>VV AUD VV AUD VV AUL NV AUL&lt;</td> <td>W ALO W ALU Oriversity of new YALUL FALLETY COMPRISANDE WCL Increase alparaments to base in fatime fati</td> <td>M. M. M. M. M. M. Marker, M. M.</td>	VV AUD VV AUD VV AUL NV AUL<	W ALO W ALU Oriversity of new YALUL FALLETY COMPRISANDE WCL Increase alparaments to base in fatime fati	M. M. M. M. M. M. Marker, M.

EXHIBIT II-5 SUMMARY OF REQUESTED FUNDING CHANGES FROM BASE Federal Railroad Administration Appropriations, Obligation Limitations, and Exempt Obligations (\$000)

						<b>Baseline Change</b>						
Consolidated Rail Infrastructure and Safety Improvements	FY 2020 Actual	FY 2021 Enacted	Annualization of Prior Pay Raises	Annualization of new FY 2021 FTE	FY 2022 Pay Raises	Adjustment for Com pensable Days (261 days)	GSA Rent	WCF Increase Decrease	Inflation and other adjustments to base	FY 2022 Baseline Estimate	Program Increases/ Decreases	FY 2022 President's Budget Request
PERSONNEL RESOURCES (FTE) Direct FTE												
<u>FINANCIAL RESOURCES</u> ADMINISTRATIVE EXPENSES												
Salaries and Benefits												
Benefits for Former Employees (AK RR)			'			'		'				
Travel	75	150	'			,				150		150
Transportation	ı			ı	ı	·		'	ı	,		
GSA Rent	,	,	'			,		'				
Communications, & Utilities		•	'					'				
Printing	,	,	'			,		'				
Other Services:												
-WCF	,			,	,	,	ı	,	,	,	,	,
-ESC	,	•		,	,	,	,	,	,	,	,	,
-Other contracts	3,175	3,600		ı	ı	ı	,	,	,	3,600	3,750	7,350
Supplies		•	'					'				
Equipment												
Admin Subtotal	3,250	3,750	ı	ı	ı	ı	ı	ı	,	3,750	3,750	7,500
PROGRAMS Consolidated Rail Infrastructure and Safety												
Improvements	321,750	371,250	'	ı	ı	ı	ı	ı	,	371,250	(3,750)	367,500
Programs Subtotal	321,750	371,250	ı		ı	,	'			371,250	(3,750)	367,500
TOTAL	325,000	375,000								375,000		375,000

EXHIBIT II-5 SUMMARY OF REQUESTED FUNDING CHANGES FROM BASE Federal Railroad Administration Appropriations, Obligation Limitations, and Exempt Obligations (\$000)

						<b>Baseline Changes</b>						
Passenger Rail Improvement, Modernization, and Expansion Grants	FY 2020 Actual	FY 2021 Enacted	Annualization of Prior Pay Raises	Annualization of new FY 2021 FTE	FY 2022 Pay Raises	Adjustment for Compensable Days (261 days)	GSA Rent	WCF Increase/ Decrease	Inflation and other adjustments to base	FY 2022 Baseline Estimate	Program Increases/ Decreases	FY 2022 President's Budget Request
PERSONNEL RESOURCES (FTE) Direct FTE												
<u>FINANCIAL RESOURCES</u> a dministed a tive e y de nses												
Salaries and Benefits		,	'								,	
Benefits for Former Employees (AK RR)	'			'								
Travel	ı			,	'			,	,	,	,	ı
Transportation	'			'	'		,					
GSA Rent			'		'							
Communications, & Utilities			'		'							
Printing				'	'	•						
Other Services:												
-WCF	,	,	,	,	,	,	,	,	ı	,	,	,
-ESC	,	,	,	,	,	,	,	,	ı	,	,	,
-Other contracts	,			,	'	,		,	,	'	12,500	12,500
Supplies	'		,	,	'		•					
Equipment				-						-	-	
Admin Subtotal	ı	,	,	,	ı	ı	ı	1	ı	,	12,500	12,500
<u>PROGRAMS</u> Passenger Rail Improvement, Modernization,												
and Expansion Grants		•	'		'			•			612,500	612,500
Programs Subtotal											612,500	612,500
TOTAL											625,000	625,000

#### EXHIBIT II-6 WORKING CAPITAL FUND FEDERAL RAILROAD ADMINISTRATION (\$000)

	F	TY 2020 CTUAL	F EN	Y 2021 ACTED	F PRE B	Y 2022 SIDENT'S UDGET
DIRECT:						
Safety and Operations	\$	15,792	\$	15,986	\$	22,158
SUBTOTAL	\$	15,792	\$	15,986	\$	22,158
TOTAL	\$	15,792	\$	15,986	\$	22,158

#### EXHIBIT II-7 FEDERAL RAILROAD ADMINISTRATION PERSONNEL RESOURCE -- SUMMARY TOTAL FULL-TIME EQUIVALENTS

	FY 2020 ACTUAL	FY 2021 ENACTED	FY 2022 PRESIDENT'S BUDGET
DIRECT FUNDED BY APPROPRIATION			
Safety and Operations	880	887	915
National Network Grants to Amtrak	10	19	29
SUBTOTAL, DIRECT FUNDED	890	906	944
TOTAL FTEs	890	906	944

Note - FY 2020 Enacted column represents current hiring projection based on the SF-113G and available funding.

#### EXHIBIT II-8 FEDERAL RAILROAD ADMINISTRATION RESOURCE SUMMARY – STAFFING FULL-TIME PERMANENT POSITIONS

	FY 2020 ACTUAL	FY 2021 ENACTED	FY 2022 PRESIDENT'S BUDGET
DIRECT FUNDED BY APPROPRIATION			
Safety and Operations	872	890	930
National Network Grants to Amtrak	16	19	29
SUBTOTAL, DIRECT FUNDED	888	909	959
TOTAL POSITIONS	888	909	959

Note - FY 2020 Enacted column represents approved, funded, positions as enacted in the FY 2020 budget.

		FEDE	RAL RAILRO (	AD ADMINIST (\$000)	RATION					
Account	FY 2012	FY 2013 <sup>1/</sup>	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021 <sup>9/</sup>
Safety and Operations	178,596	169,254	184,500	186,870	199,000	218,298	221,698	221,698	224,448	234,905
Safety and Operations	I	1	ł	1	$(6,710)^{4/}$	I	I	I	:	ł
Railroad Research and Development	35,000	33,169	35,250	39,100	39,100	40,100	40,600	40,600	40,600	41,000
Railroad Research and Development	I	:	I	:	$(1,960)^{4/}$	I	I	ł	:	1
Rail Line Relocation and Improvement Program	I	:	ł	:	(2,241) <sup>4/</sup>	I	I	ł	:	(12,650) <sup>10/</sup>
Railroad Safety Grants	I	:	1	10,000	50,000	:	I	1	:	1
Railroad Safety Technology Program	I	1	ł	1	1	I	I	ł	:	(613) <sup>10/</sup>
Consolidated Rail Infrastructure and Safety Improvements	I	1	I	1	1	68,000	592,547	255,000	325,000	375,000
Federal-State Partnership for State of Good Repair	I	:	1	:	:	25,000	250,000	400,000	200,000	200,000
Restoration and Enhancement Grants	I	1	1	:	1	5,000	20,000	5,000	2,000	4,720
Northeast Corridor Grants to the National Railroad Passenger Corporation	I	I	I	ł	ł	328,000	650,000	650,000	1,192,000	2,325,819
National Network Grants to the National Railroad Passenger Corporation	I	I	I	1	1	1,167,000	1,291,600	1,291,600	1,826,000	2,374,181
Operating Grants to the National Railroad Passenger Corporation	466,000	441,625	340,000	250,000	288,500	I	I	I	1	1
Capital and Debt Service Grants to the National Railroad Passenger Corporation	952,000	902,205	1,050,000	1,140,000	1,101,500	ł	I	1	I	1
Capital and Debt Service Grants to the National Railroad Passenger Corporation	I	I	I	1	(5,000) 4/	I	I	1	1	(10,458) <sup>10/</sup>
Grants to the National Railroad Passenger Corporation	I	297,100 2/	ł	I	(267) 4/	13,480 6/	I	ł	ł	I
Pennsylvania Station Redevelopment Project	I	I	ł	ł	40,200 5/	I	I	1	I	I
Next Generation High-Speed Rail	I	ł	(1,973) <sup>3/</sup>	ł	(4,945) <sup>4/</sup>	I	I	ł	:	(3,035) <sup>10/</sup>
Northeast Corridor Improvement Program	I	ł	(4,419) <sup>3/</sup>	ł	19,163 4/	I	I	1	1	ł
Intercity Passenger Rail Grant Program	ł	ł	I	ł	:	I	ł	1	1	(10,165) <sup>10/</sup>
Magnetic Levitation Technology Deployment Program	I	I	ł	ł	I	I	I	10,000	2,000	2,000
Railroad Rehabilitation and Improvement Financing Program (discretionary)	I	I	I	I	1,960 4/	I	25,000	17,000	8/	1
Railroad Rehabilitation and Improvement Financing Program (mandatory)	16,905	33,445	43,845	31,455	563	1,809	100,371	60,811	8/	1
Total FRA Budget Authority	1,648,501	1,876,798	1,647,203	1,657,425	1,718,863	1,866,687	3,191,816	2,951,709	3,812,048	5,520,704
Notes:										
1/FY 2013 figures reflect 02% rescussion and sequesterea amounts excaused 2/The Disaster Relief Appropriations Act of FY 2013 (P.L. 113-2) provided.	funds to Amtrak fo	r Hurricane Sandy, in	cluding \$32 million	ı for repair work and	\$86 million for disast	er mitigation projec	ts, less sequestration	1. Also in FY 2013, 3	\$185 million was trar	sferred from

HISTORY OF APPROPRIATIONS, FY 2012 - 2021 EXHIBIT II-9

FTA to FRA for the Hudson Yards Project. 3/FY 2014 Ommbus (PL. 115-76) reflects rescissions on prior year unobligated balances of \$4.419M from the Northeast Corridor Improvement Program and \$1.973M from the Next Generation High-Speed Rail.

4/FY 2016 Ommbus (PL. 114-113) reflects the following rescissions from prior year unobligated balances: 56,710,477 from Safety & Operations, 51,960,000 from Railroad Research and Development, \$2,241,385 from Rail Line Relocation and Improvement, \$5,000,000 from Capital and Debt Service Grants to the National Railroad Passenger Corporation (NEC 2015), \$267,019 from Grants to the National Railroad Passenger Corporation (NEC 2015), \$257,019 from Grants to the National Railroad Passenger Corporation, and \$4,944,504 from Next Generation High-Speed Rail. These amounts were then reallocated to: \$19,163,385 for Northeast Corridor Improvement Program and \$1,960,000 to Railroad Rehabilitation and Improvement Financing Program.

5/In FY 2016, \$40.2M from the Disaster Relief Appropriations Act of FY 2013 (PL. 113-2) was transferred from FTA to FRA for risk reduction projects at Pennsylvania Station, which was an area impacted by Hurrisene Sandy.

6/In FY 2017, \$13.48M from the Disaster Relief Appropriations Act of FY 2013 (P.L. 113-2) was transferred from FTA to FRA for the MTA/LIRR River to River Rail Resilience project, which was an area impacted by Hurrisene Sandy.

7/FY 2020 amounts are the Enacted Budget plus supplemental funds. The CARES Act (COVID-19) provided \$0.25M to Safety & Operations, \$492M to Northeast Corridor Grants to Amtrak, and \$526M to National Network Grants to Amtrak.

8/ In FY 2020, the Railroad Rehabilitation and Improvement Financing Program accounts moved to the Office of the Secretary.

9/FY 2021 amounts are the Enacted Budget plus COVID-19 supplemental funds. Supplemental funds from the Coronavirus Response and Relief Supplemental Appropriations (CRRSA) Act include \$655,431,000 for Northeast Corridor Grants to Amtrak and \$344,569,000 to National Network Grants to Amtrak. Supplemental funds from the American Reseue Plan (ARP) Act include \$970,388,160 for Northeast Corridor Grants to Amtrak and \$729,611,840 to National Network Grants to Amtrak. Supplemental funds from the American Reseue Plan (ARP) Act include \$970,388,160 for Northeast Corridor Grants to Amtrak and \$729,611,840 to National Network Grants to Amtrak.

10/ The Consolidated Appropriations Act, 2021 (P.L. 116-260) includes the following rescissions of prior year unobligated balances: \$10,458,135.54 from Capital and Debt Service Grants to the National Rairoad Passenger Corporation, \$613,252.29 from Rail Safety Technology Program, \$10,164,8855.13 from Intercity Passenger Rail Grant Program, \$16,650,365.14 from Rail Line Relocation and Improvement, and \$5,094,848.52 from Next Generation High-Speed Rail.

#### DEPARTMENT OF TRANSPORTATION FEDERAL RAILROAD ADMINISTRATION

#### SAFETY AND OPERATIONS APPROPRIATIONS LANGUAGE

#### SAFETY AND OPERATIONS

For necessary expenses of the Federal Railroad Administration, not otherwise provided for, \$[234,905,000]247,700,000, of which \$25,000,000 shall remain available until expended; provided, that of the amounts provided under this heading, up to \$2,100,000 shall be available for the alteration and repair of buildings and improvements for fire and life safety, emergency power system, waste and potable water management, and asbestos abatement projects, to carry out necessary railroad safety, training, and research activities at the Transportation Technology Center.

Explanation of Changes: Existing buildings and improvements at FRA's Transportation Technology Center are aging and many require alteration and repair to support railroad safety, training activities, and research. FRA is requesting \$2,100,000 for fire and life safety systems, an emergency power system, the waste and potable water management system, and asbestos abatement, to begin addressing the rehabilitation backlog.

#### EXHIBIT III-1 SAFETY AND OPERATIONS Summary by Program Activity

#### Appropriations, Obligation Limitations, and Exempt Obligations

(\$000)

	<b>(A)</b>	<b>(B)</b>	(C)	<b>(D)</b>
	FY 2020 ACTUAL	FY 2020 CARES Act	FY 2021 ENACTED	FY 2022 PRESIDENT'S BUDGET
Safety and Operations	\$224,198	\$250	\$234,905	\$247,700
TOTAL	\$224,198	\$250	\$234,905	\$247,700
FTEs Direct Funded	880	0	887	915

#### **Program and Performance Statement**

Funds requested in the Safety and Operations account support the Federal Railroad Administration's (FRA) personnel and administrative expenses, the cost of rail safety inspectors, and other program activities, including contracts. Resources are also provided to fund critical rail safety programs, information management, technology, and safety education and outreach.

#### **EXHIBIT III-1a**

#### SAFETY AND OPERATIONS SUMMARY ANALYSIS OF CHANGE FROM FY 2021 TO FY 2022 Appropriations, Obligations, Limitations, and Exempt Obligations (\$000)

	<u>\$000</u>	FTE
FY 2021 ENACTED	<u>\$234,905</u>	<u>887</u>
ADJUSTMENTS TO BASE:		
Annualization of Prior Pay Raises	362	
FY 2022 Pay Raise	2,938	
GSA Rent	-357	
Working Capital Fund	5,182	
Other adjustments to base	3,063	
SUBTOTAL, ADJUSTMENTS TO BASE	\$11,189	0
PROGRAM REDUCTIONS		
Transportation	-39	
Communications & Utilities	-3	
Printing	-8	
Other contracts	-4,288	
Equipment	-1,168	
Insurance Claims & Settlements	-2,104	
Rail Grade Crossing Safety	-150	
Drug and Alcohol Program	-269	
Security, Other Security Grants	-25	
Trespass Prevention	-1,900	
SUBTOTAL, PROGRAM REDUCTIONS	-\$9,953	0

	<u>\$000</u>		<u>FTE</u>
PROGRAM INCREASES			
Salaries and Benefits	4,687		28
Travel	571		
Supplies	98		
Rail Safety Partnership	800		
RSIS/Data Management	100		
Washington Union Station	200		
Positive Train Control	500		
Technical Training Standards Division	149		
Transportation Technology Center (TTC)	1,600		
Audit Management	275		
Other Safety Grants	80		
Public-Private Partnership Grant & Project Development Oversight	2,500		
SUBTOTAL, PROGRAM INCREASES	\$11,560		28
FY 2022 REQUEST	\$247,700	+	915

#### **Detailed Justification for Railroad Safety and Operations**

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Safety and Operations	\$224,198	\$234,905	\$247,700
Total	\$224,198	\$234,905	\$247,700
FTE	880	887	915

#### FY 2022 – Railroad Safety and Operations – Budget Request (\$000)

#### What is this program and what does this funding level support?

The appropriation for the Safety and Operations (S&O) account funds many of FRA's programs to improve railroad safety. It also funds FRA's organizational infrastructure—payroll, rent, telecommunications, information technology, and contract support—that enables the agency to achieve its safety and infrastructure development goals.

FRA oversees, regulates, and enforces the safety of railroad operations nationwide. In addition, FRA supports the development of intercity passenger rail and freight rail services and new technologies and practices to improve railroad safety and efficiency. S&O funding is the foundation for FRA to carry out its mission of enabling the safe, reliable, and efficient movement of people and goods for a strong America, now and in the future.

Over the last 40 years, the rail industry has made significant strides to improve safety, with the rate of rail-related accidents and incidents having fallen by 86 percent over that time.<sup>1</sup> This improvement is due in large part to the railroad industry's dedicated and highly-skilled workforce who live and breathe safety each day on the job, as well as the development and adoption of new technologies and practices and FRA's safety enforcement and technical assistance regime. While the industry continues to drive safety improvements – for example, railroad industry employee fatalities have declined by 43 percent over the last 10 years – the rate of improvement has generally slowed over the last decade and not all areas of rail safety are trending in a positive direction. In particular, the number of grade crossing and trespassing incidents have increased over the last decade, by 13 percent and 39 percent, respectively. In response to the increases in grade crossing and trespassing incidents, FRA's budget request

<sup>&</sup>lt;sup>1</sup> Unless otherwise stated, cited safety statistics use FY 2019 as the horizon year. FY 2020 saw abnormal decreases in several safety indicators, including human factor-caused accidents; track-caused accidents; motive power and equipment-caused accidents; derailment rate per million train miles; and employee-on-duty incidents per 200,000 hours. These decreases are likely attributable to decreases in freight and passenger traffic due to COVID-19.

directs more resources towards curbing these troubling trends across the S&O, R&D, and CRISI accounts.



**Trespasser & Highway-Rail Grade Crossing Incidents** 

FRA's S&O account also supports many of the agency's actions to advance the Biden-Harris Administration's comprehensive response to COVID-19. FRA has maintained its level of safety enforcement activities throughout the pandemic, relative to previous years, and continues to explore all options to protect rail passengers and workers, provide economic and administrative relief to agency stakeholders, and maintain the highest levels of safety for our nation's essential passenger and freight rail services. FRA actions include:

- Issuing an Emergency Order to implement Executive Order 13998 to require the use of face masks in railroad operations.<sup>2</sup>
- Granting emergency waivers from certain FRA regulatory requirements, primarily to maintain social distancing protocols.
- Providing relief and flexibility for certain grant application and administration requirements, such as extending grant application



<sup>2</sup> Federal Railroad Administration, <u>Emergency Order Requiring Face Mask Use in Railroad Operations</u>, 86 Fed. Reg. 11888, March 1, 2021.

<sup>■</sup> Trespasser Incidents, not at GX ■ Highway-Rail GX Incidents

deadlines, providing no-cost extensions to grant periods of performance, and allowing additional time for grantees to submit single audits to the Federal Audit Clearinghouse.

- Purchasing additional safety and personal protective equipment to safeguard the health of FRA personnel.
- Tracking industry trends including COVID cases in the industry, waiver usage metrics, and railroad performance.
- Expeditiously awarding and administering over \$3.7 billion in COVID relief funds for Amtrak.

The following sections describe FRA's FY 2022 major cost categories for S&O.

#### Mission Support and Fixed Costs

*FY 2020 Enacted: \$189.95 million FY 2021 Enacted: \$201.97 million FY 2022 Request: \$210.90 million* 

More than 85 percent of S&O funding covers salaries and benefits, travel and motor vehicle fleet, and other operating infrastructure costs, such as rent. FRA executes its railroad safety responsibilities through a diverse and highly skilled staff. FRA's field presence is composed of more than 500 employees who directly interact with railroads and other stakeholders. These individuals include approximately 350 rail safety inspectors covering six safety disciplines: operating practices, motive power and equipment, signal and train control, track, hazardous materials, and grade crossing safety. In addition to the inspector workforce, FRA employs more than 100 field-based specialists, engineers, analysts, and managers with expertise in areas such as PTC, passenger rail, human performance, alcohol and drug programs, tank car quality assurance, rail and infrastructure integrity, bridge safety, occupational health, radioactive materials, and railroad management. FRA headquarters staff includes technical experts who manage the mission critical programs and provide technical oversight and management of field personnel, support development of safety standards and regulations, and evaluate waiver petitions.

In June 2020, the FRA's Office of Railroad Safety reorganized to align all field specialists and inspectors in each discipline under the respective headquarters staff director to promote consistency in enforcing compliance regulations nationwide. In addition, this reorganization re-designated FRA's eight field headquarters offices as Safety Management Teams (SMT). An additional office was created bringing the total number of SMTs to nine. The SMTs are responsible for engaging with a single railroad or a group of railroads to become familiar with the breadth and depth of the assigned railroad(s) systems and operations, with the goal to collaboratively identify potential issues as early as possible. The reorganization also established new offices for addressing the use of innovative new technology in the rail industry and providing a single office to liaison with industry associations.

FRA's remaining S&O-funded personnel are in the Offices of Railroad Policy and Development, Chief Counsel, Chief Financial Officer, Administration, and the Administrator. These personnel include planners, project development and delivery

specialists, engineers, economists, attorneys, budget and financial analysts, human resources specialists, public and government affairs specialists, and other professionals.

Team	Location	Assigned Railroad(s)
SMT-1	Cambridge, MA	Amtrak and Commuters, East
SMT-2	Wilmington, DE	Short Lines, East
SMT-3	Atlanta, GA	Norfolk Southern
SMT-4	Chicago, IL	Canadian Pacific Railway, Canadian National Railway, Chicago Commuter District
SMT-5	Fort Worth, TX	BNSF Railway
SMT-6	Kansas City, MO	Union Pacific Railroad and Kansas City Southern
SMT-7	Sacramento, CA	Commuters, West
SMT-8	Vancouver, WA	Short Lines, West
SMT-9	Jacksonville, FL	CSX

**FRA Safety Management Teams** 

#### Automated Track Inspection Program

*FY 2020 Enacted:* \$16.50 million<sup>3</sup> *FY 2021 Enacted:* \$16.50 million *FY 2022 Request:* \$16.50 million

Defective track is one of the most frequent causes of derailments. Identifying track defects and other precursor conditions is the primary focus of FRA's Automated Track Inspection Program (ATIP). FRA deploys its ten ATIP vehicles to collect data on the highest risk routes, including passenger and hazardous materials routes. FRA then uses the data to inform oversight and enforcement activities, the development of regulations, audit railroad compliance with Federal Track Safety Standards, and assess the state-of-repair of U.S. railroads. FRA shares the infrastructure diagnostics with the track owners and notifies railroads of major safety risks. Additionally, ATIP supports FRA's railroad safety research program. During ATIP operations, FRA evaluates new technologies to improve track evaluation and other safety benefits. In FY 2020, FRA's ATIP fleet operated over 125,000 miles of track.

<sup>&</sup>lt;sup>3</sup> The FY 2020 amount includes salaries related to ATIP (\$0.30 million) that are included above in Mission Support and Fixed Costs.
FRA will use FY 2022 funding to continue to validate the railroads' autonomous track inspection programs, and when needed, will use ATIP funding to advance research priorities, conduct routine compliance checks of railroad inspections, and to accelerate deferred maintenance activities.

#### **Positive Train Control**

FY 2020 Enacted: up to \$13.00 million<sup>4</sup> FY 2021 Enacted: \$0.50 million FY 2022 Request: \$1.00 million

On December 29, 2020, FRA announced that PTC technology was in operation on all 57,536 required freight and passenger railroad route miles, prior to the December 31, 2020 statutory deadline set by Congress. Furthermore, as of that date, railroads had reported that interoperability had been achieved between each applicable host and tenant railroad that currently operates on PTC-governed main lines. In addition, as required, FRA certified that each host railroad's PTC system complies with the technical requirements for PTC systems. This accomplishment was the culmination of over a decade of sustained and direct engagement and collaboration among FRA and the 41 railroads currently subject to the statutory mandate, including seven Class I railroads, Amtrak, 28 commuter railroads, 5 other freight railroad that host regularly scheduled intercity or commuter rail passenger service, as well as key railroad industry associations, material suppliers, and service providers.

While the railroad industry successfully met the December 31, 2020 PTC implementation deadline, significant work still remains. FRA will continue to monitor and inspect railroad's safe operation and proper maintenance of PTC systems, and enforce compliance with each railroad's PTC safety plan as well as applicable statutes and regulations (including assessing penalties), and report on the status of PTC performance. FRA will also provide technical oversight and approve all material changes to PTC systems and related hardware and software, as well as provide oversight and technical assistance to any new start passenger railroads, any railroad that is required to be PTC equipped due to changes in traffic or poisonous- or toxic-by-inhalation hazardous (PIH/TIH) levels, and any Class II/Class III railroads subject to the December 31, 2023 deadline to PTC-equip certain locomotives.

PTC funding will be used for contractors that provide FRA with direct project and data management support, along with subject matter experts to review the material modifications of PTC systems. Railroads have indicated that software updates and changes are anticipated twice a year post the 2020 deadline, which will necessitate FRA review.

<sup>&</sup>lt;sup>4</sup> The FY 2020 amount includes salaries related to PTC (\$2.22 million) that are included above in Mission Support and Fixed Costs.

#### Steps Toward Full PTC System Implementation of Mandated PTC Systems



Based on Railroads' Self-Reported Progress as of December 29, 2020

## Rail Safety Partnerships

FY 2020 Enacted: up to \$3.00 million FY 2021 Enacted: \$3.00 million FY 2022 Request: \$3.80 million

Confidential Close Call Reporting System (C<sup>3</sup>RS)

The C<sup>3</sup>RS program enables railroad employees to report close calls and unsafe events and conditions in a safe environment. Employees who report a close-call event receive protection from railroad discipline and FRA enforcement. Railroads also receive protection from FRA enforcement for events reported within C<sup>3</sup>RS. However, a close call does not involve willful, reckless, or criminal acts, nor does it involve any FRA-reportable accident resulting in harm to a person or property. Events that involve alcohol or drug impairment, or are witnessed in real-time by FRA personnel or a railroad manager or supervisor, are not close calls. Any incident resulting in a release of hazardous material is not a close-call event. Analyzing close calls is a proactive way to manage safety. When individual events are analyzed collectively through root cause analysis, railroads can identify safety hazards and develop solutions to mitigate or eliminate threats.

As with previous years' funding, FRA will use the FY 2022 funds to pay for third-party processing of close-call reports from safety-related railroad employees. The National Aeronautics and Space Administration (NASA) provides this service for FRA (and the Federal Aviation Administration). NASA supports FRA in achieving the highest level of close-call report processing.

FRA has worked diligently with industry to grow the C<sup>3</sup>RS program. At the end of 2018, eight railroads were participating in C<sup>3</sup>RS. At the end of April 2021, 20 passenger, commuter, and freight railroads—representing nearly 25,000 safety-related railroad employees—were participating. As the C<sup>3</sup>RS program continues to grow, FRA strives to maintain the highest level of processing to ensure the Peer Review Teams have the high-quality, reliable data necessary to develop mitigation proposals.

For FY 2022, FRA also plans to provide funding to the Short Line Safety Institute to develop, maintain, and perform as a Peer Review Team for the C<sup>3</sup>RS program's participating Class II and Class III carriers. The Short Line Safety Institute's Peer Review Team will work with participating railroads to identify and analyze emerging patterns or trends in close calls, relate those close calls to corrective actions taken by railroads, and advise and assist with the implementation of corrective actions.

#### **Trespass Prevention**

FY 2020 Enacted: \$0.65 million FY 2021 Enacted: \$2.30 million FY 2022 Request: \$0.40 million

Trespassing on railroad rights-of-way is the leading cause of rail-related fatalities, accounting for 63 percent of U.S. rail-related deaths in FY 2019. An average of nearly 460 trespassers died each year between FY 2010 and FY 2019. Since 1997, more people have been killed each year while trespassing than in motor vehicle collisions with trains at highway-rail grade crossings. Unlike the rates and numbers of several other safety data indicators that decreased over the past year – likely due to decreases in freight and passenger traffic due to COVID-19 – the number of trespass incidents and fatalities slightly increased in FY 2020. The number of trespasser incidents rose from 1,054 in FY 2019 to 1,073 in FY 2020, while trespasser fatalities rose from 554 in FY 2019 to 557 in FY 2020. Preventing trespassing will not only save lives but will also improve the efficiency of the rail transportation network.

In 2018, FRA published the *National Strategy to Prevent Trespassing on Railroad Property*, which focused on four strategic areas to combat trespassing on railroad property: (1) data gathering and analysis; (2) community site trespass prevention assessments; (3) funding; and (4) partnerships with affected stakeholders. FRA worked diligently to implement and complete tasks identified in the 2018 strategy. S&O funding is requested in FY 2022 to advance new efforts to collect data to improve trespass prevention and conduct targeted outreach to communities affected by trespass suicide:

1. Collaborate with suicide prevention organizations on outreach to targeted communities. This funding will be used to analyze high risk audiences to determine what information they know and what additional information they need to know about the dangers of trespassing on railroad property. FRA will work to design effective and timely messages to reach the target audiences, as well as determining the most effective communications channels to employ. Funding will also help to develop surveys to

receive feedback from target audiences to determine the effectiveness of the communications strategy.

2. **Procure and analyze new data sources.** FRA continues to seek additional data sources to inform our efforts to curb trespassing on railroad property. FRA intends to incorporate into its geographic information system analyses additional statistical and demographic information from the Census Bureau to track additional data points that may lead to better targeting of FRA's anti-trespass efforts; data from local building offices on permits for construction of both highway-rail grade crossings and nearby building/structures to determine effects on trespass activity; and data from local police reports with greater detail about specific trespassing incidents to determine if additional information is available about what caused the accidents, and what additional collaboration with local law enforcement might provide appreciable reductions in the number of trespassing incidents.

FRA is also advancing trespass safety in other areas of the FY 2022 President's Budget and with previously appropriated resources:

#### Funding

In addition to the funding requested in S&O, the FY 2022 President's Budget will help address the funding strategic area identified in the 2018 *National Strategy* by enhancing the Consolidated Rail Infrastructure and Safety Improvements (CRISI) program to better address trespassing. Proposed improvements include clarifying the eligibility of trespass prevention capital and technology deployment projects, and making enforcement of railroad trespass laws and suicide prevention activities eligible for funding. Since FY 2019, FRA has allocated approximately \$3 million in S&O funds for pilot grants in the areas of railroad trespass law enforcement and suicide prevention. Early results from the initial grants have shown promising results, with over 500 trespass arrests or warnings issued to date and an officer funded through a grant saving the life of an unconscious individual laying between the gage of the rail. The FY 2022 President's Budget proposes to set aside at least \$10 million in CRISI funding for such activities.

Through FRA's R&D program, FRA is currently developing a survey form and database to be used by law enforcement grantees and FRA inspectors to collect information in communities where trespasser incidents have been a persistent problem. Data collected from this effort will help to identify trespass causes and risk areas, inform community awareness, and develop mitigation measures to prevent further trespassing.

#### Trespasser Prevention Summits

From April to June of 2020, FRA was scheduled to convene trespasser prevention summits with representatives from each of the top 10 counties for trespasser casualties to (1) collaborate with community leaders, law enforcement, railroads, and the public to consider learned best practices and develop local mitigation strategies; (2) provide information on availability of Federal grants; and (3) assist with outreach campaigns. Due to the impacts of the coronavirus, these initial summits were postponed. FRA intends hold the summits using the prior-year S&O funding allocated for this purpose when it is safe to do so.

#### Highway-Rail Grade Crossing Safety

FY 2020 Enacted: \$1.00 million FY 2021 Enacted: \$1.33 million FY 2022 Request: \$1.18 million

Collisions at highway-rail grade crossings are the second leading cause of rail-related fatalities, accounting for approximately one-third of all such fatalities. At each of the approximately 209,000 U.S. highway-rail grade crossings there is a potential for a collision between a train and highway vehicle. FRA expects the risk of highway-rail grade crossing incidents to remain a significant rail and public safety issue during the next decade.

FRA has adopted a comprehensive approach to grade crossing safety. Following FRA's 2018 *Grade Crossing Fatality Prevention Summit* to gather stakeholder perspectives, FRA conducted listening sessions in 2019 on grade crossing safety technology. FRA convened a symposium in FY 2020 to review findings from the listening sessions and developed a three-to five-year business plan to identify, evaluate, and implement the most effective low and high-tech solutions. The business plan also addresses facilitation of obtaining Federal, State, and local approvals and funding, monitoring effectiveness, and communicating project results.

FRA will use the FY 2022 S&O funding for the following efforts:

- Continue to evaluate and update the FRA Web Accident Prediction System (WBAPS). WBAPS is an analytical computer model that provides information that can assist in determining where scarce highway-rail grade crossing resources can best be directed. WBAPS generates reports listing public highway-rail intersections for a State, County, City or railroad ranked by predicted collisions per year. These publicly-available reports include brief lists of the current Inventory record and the collisions over the last 10 years along with a list of contacts for further information. FY 2022 funding will assist in conducting a statistical evaluation of the effect of changing operating conditions and variables on the validity of the risk calculations, which will improve the accuracy of the prediction system.
- 2. Continue to update the Grade Crossing Dashboard. GXDash! provides regulators and educators with data related to grade crossing safety to assist in outreach initiatives and enforcement.
- 3. Continue to work with localities to identify the most effective education, engineering, and enforcement strategies implemented across the national rail network and develop a communication strategy.
- 4. **Continue Study on Real-Time Crossing Equipment Operating Status.** PTC-equipped locomotives communicate in real time with railroad dispatchers. As these locomotives pass a grade crossing, their on-board cameras capture and record whether the grade crossing protection is functioning. This concept study would consider whether the

locomotives could transmit crossing equipment status in real time in lieu of the periodic physical inspections Federal regulations currently require. If viable, this concept would enable railroads to deploy personnel to fix malfunctions rather than conduct scheduled inspections of all equipment.

5. Improve and update underlying grade crossing data and analytical capabilities. FRA maintains the U.S. DOT National Highway-Rail Crossing Inventory, which contains a record for most grade crossings in the country. Each record includes information such as the location of the crossing, the types of warning devices employed, and characteristics of the train and motor vehicle traffic they travel through the crossing. With FY 2022 funds, FRA proposes to purchase and collect longitudinal demographic information and building codes and deidentified police report data to better understand the root causes of accidents and incidents at grade crossing hotspots. FRA will also work to validate the crossing inventory information that is reported by railroads and states.

Operation Lifesaver, a non-profit rail safety organization that previously received funding under the S&O account, will now receive its annual grant funding through the CRISI program under changes proposed in the FY 2022 President's Budget. FRA proposes to set aside \$1 million for Operation Lifesaver under CRISI and to waive the non-Federal match requirement, which did not historically apply under their previous S&O funding.

#### Washington Union Station

FY 2020 Enacted: \$0.80 million FY 2021 Enacted: \$0.80 million FY 2022 Request: \$1.00 million

As the statutory owner of Washington Union Station, FRA must ensure compliance with applicable building, fire, and life safety codes and requirements. FRA contracts to obtain the specialized knowledge to perform these duties, including inspections of the station, review of drawings and plans for new construction initiatives, and inspection of all repair work to ensure compliance with applicable building, fire, and life safety codes.

#### Data Management and Railroad Safety Information System

FY 2020 Enacted: up to \$4.80 million FY 2021 Enacted: \$4.40 million FY 2022 Request: \$4.50 million

The Railroad Safety Information System (RSIS) is FRA's set of data management systems that collect, organize, process, visualize, and publish information on railroad accidents and incidents, safety inspections and violations, highway-rail crossing attributes, and other rail safety related information. FRA uses data from RSIS in trend analysis, safety performance measurement, and resource allocation. The information is publicly available on FRA's website.

FRA's website provides a dynamic, streamlined tool to quickly access a wealth of railroad safety data. FRA also initiated the development of its new Asset Inventory of Railroads and Shippers (AIRS) and a redesign of the inspection data site. Funding will support continued development and maintenance of FRA's data websites and systems, including new cloud-based solutions to facilitate sophisticated data science and analysis capabilities.

#### Control of Drug and Alcohol Use

FY 2020 Enacted: \$0.86 million FY 2021 Enacted: \$1.17 million FY 2022 Request: \$0.90 million

In June 2017, an FRA final rule to broaden the scope of its drug and alcohol testing regulation to cover maintenance-of-way (MOW) employees went into effect. This resulted in 45,000 MOW employees that perform track construction and maintenance duties being added to the FRA Drug & Alcohol (D&A) testing program (49 CFR Part 219). This rulemaking has increased FRA's testing case load, oversight, and technical assistance responsibilities. FRA is also in the process of addressing a requirement in the *Substance Use-Disorder Prevention that Promotes Opioid Recovery and Treatment for Patients and Communities Act (SUPPORT Act)* to amend Part 219 regulations to include railroad mechanical craft employees, which will add another 25,000 industry employees to FRA's testing program.

FRA has added over 3,000 track construction and maintenance employers to its testing program, many of whom are small businesses and provide disadvantaged business enterprise services for public commuter rail agencies. FRA's challenge is to provide effective oversight of these entities as well as 700 railroads. These employers require FRA-approved policies and Part 219 triennial compliance audit reports, which are currently produced as flat Microsoft Word files. In response to recommendations from a recent DOT Office of Inspector General (OIG) report<sup>5</sup>, FRA is developing a systems approach and an IT system for compliance audits that would allow for rapid generation of reports, tracking of corrective actions, and analyzing findings in order to target audits with an empirical risk-based approach. Funding requested in FY 2022 will allow for the addition of mechanical contractors to the testing program.

<sup>&</sup>lt;sup>5</sup> Department of Transportation Office of Inspector General, <u>Oversight Weaknesses Limit FRA's Review, Approval,</u> and Enforcement of Railroads' Drug and Alcohol Testing Programs, April 29, 2020.

#### Transportation Technology Center Repair and Rehabilitation

FY 2020 Enacted: \$0.50 million FY 2021 Enacted: \$0.50 million FY 2022 Request: \$2.10 million

Since its 1970s establishment on more than 33,000 acres near Pueblo, CO, FRA's Transportation Technology Center (TTC) has been a vital resource in FRA's and the railroad community's pursuit of safer, more reliable, and more efficient rail services. As TTC has continued to deliver valuable research and training, demands on the physical infrastructure have grown. Thousands of people now participate each year in TTC research, testing, safety training and first responder training.

FRA manages the site through an on-site contractor, who conducts research using the facility and maintains the facility to support that research. Approximately \$2.10 million is requested for needed investment associated with FRA's responsibility as the property owner and are outside of the nature of investments made by the on-site contractor and/or through the research program. Proposed construction projects include:

- Fire and Life Safety This funding would be used to design and install fire sprinkler systems and audible/visible warning devices for fire safety. This would bring buildings up to fire code as they are currently not equipped with these systems. The planned buildings include the Operations Building, Transit Maintenance Building, FAST Service Facility, Security & Emergency Response Training Center, Urban Rail Building, and TTX Building, as well as water distribution utilities. Funding is also requested to support the refurbishment of TTC's fire station, which provides critical emergency response services to the remote facility.
- Emergency Power System This funding would install an emergency generator and power network capabilities. Currently, the emergency power system is reliant on one backup generator for the entire center. The planned buildings include the Security & Emergency Response Training Center, Warehouse Laboratory Facility, Urban Rail Building, and Rectifier Substation #1/#2.
- 3. <u>Waste and Potable Water Management</u> This funding would replace end-of-life septic tanks and provide needed updates to an on-site well providing potable water. Given the remote nature of the site, there are no municipal services to meet these needs. The planned buildings include the Rail Dynamics Laboratory, Operations Building, and Security & Emergency Response Training Center.
- <u>Asbestos Abatement</u> This funding would support asbestos abatement and address building code requirements. The planned buildings include the Rail Dynamic Laboratory, Center Services Building, and Operations Building.

#### **Audit Management Program**

FY 2020 Enacted: \$0.50 million FY 2021 Enacted: \$0.23 million FY 2022 Request: \$0.50 million

FRA established its audit management program in 2016 to ensure FRA follows Generally Accepted Government Auditing Standards (GAGAS) when conducting audits of railroads' plans and programs and to coordinate oversight of railroad compliance with regulations that require railroads to create and implement performance-based plans. The audit management program is administered by current FTEs. A funding increase will enable FRA to augment its staff with contractor resources to (1) conduct audit training for inspectors, (2) develop tools and systems to coordinate, support, and evaluate the audit management program, and (3) to ensure ongoing quality assurance of all audits conducted by the FRA.

#### Grant & Project Development Technical Assistance and Oversight

FY 2020 Enacted: \$0.35 million FY 2021 Enacted: \$0.50 million FY 2022 Request: \$3.00 million

FRA's authorized grant programs provide for an administrative takedown to dedicate resources to grant administration, technical assistance, and oversight. However, FRA also currently administers grants and provides technical assistance to both public- and private-sector sponsors where the agency is prohibited from using its program-specific takedowns. These include INFRA grants, support provided to the Build America Bureau on RRIF and TIFIA rail projects, California High-Speed Rail, and other publicly- and privately-sponsored projects. These projects that fall outside FRA's currently authorized grant programs are often complex and require additional environmental, engineering, and legal resources to ensure they are properly planned, developed, and implemented.

# What benefits will be provided to the American public through this request and why is this program necessary?

FRA's safety programs provide tangible safety and operational benefits to the American public and railroad industry by supporting the nation's economic productivity and ensuring the safety of its passenger and freight mobility needs. The FY 2022 request continues to target FRA's resources at the most pressing rail safety issues.

## Preventing trespassing on railroad property and increasing safety at grade crossings.

Preventing trespassing and increasing grade crossing safety will not only reduce the number of fatalities, but will also improve the efficiency of the transportation network. These two leading causes of rail-related fatalities accounted for nearly 850 deaths in FY 2019. The 209,000 at-grade highway-rail grade crossings in the United States each present the potential for a collision between a train and highway vehicle. Incidents of trespassing, trespassing suicide, and grade crossing collisions are not only railroad and public safety issues, but also potential markers of inequity in our transportation system and land-use planning policies. The FY 2022 President's Budget supports a comprehensive approach to addressing these leading causes of rail casualties through safety regulation and enforcement, data analysis, infrastructure improvements, and investments in community outreach and social services.

**Protecting passengers and railroad crews** on the more than 500 million annual rail passenger trips. The rate of rail-related accidents and incidents has fallen by 86 percent over the last 40 years. Moreover, the number of employee on-duty fatalities in FY 2019 was 43% less than FY 2010. Although these safety improvements are noteworthy, FRA continues to work to find ways to further enhance railroad safety.

**Beating and recovering from the COVID-19 pandemic.** FRA's safety enforcement actions are helping to maintain critical freight and passenger rail operations in a safe manner, support commerce and economic recovery, and prevent the spread of the virus.

Ensuring railroads operate safely to support economic productivity and meet passenger and freight mobility needs. FRA will remain diligent and examine new approaches to advance continuous safety improvement and make rail transportation as safe as possible.

Monitoring operations and providing technical assistance in support of the most important rail safety technology in more than 100 years to improve system performance. PTC systems are life-saving technology that stop certain railroad-related accidents and near accidents.

## DEPARTMENT OF TRANSPORTATION FEDERAL RAILROAD ADMINISTRATION

#### RAILROAD RESEARCH AND DEVELOPMENT APPROPRIATIONS LANGUAGE

# RAILROAD RESEARCH AND DEVELOPMENT

For necessary expenses for railroad research and development, [\$41,000,000]*\$58,826,000*, to remain available until expended.

# EXHIBIT III-1 RAILROAD RESEARCH AND DEVELOPMENT Summary by Program Activity Appropriations, Obligation Limitations, and Exempt Obligations (\$000)

	FY 2020 ACTUAL	FY 2021 ENACTED	FY 2022 PRESIDENT'S BUDGET
Track	\$11,279	\$10,179	\$10,179
Rolling Stock	\$10,322	\$10,322	\$10,322
Train Control and Communication	\$8,086	\$8,086	\$8,086
Human Factors	\$6,042	\$6,042	\$6,042
Railroad Systems Issues	\$4,871	\$6,371	\$24,197
TOTAL	\$40,600	\$41,000	\$58,826
FTEs			
Direct Funded	0	0	0

#### **Program and Performance Statement**

FRA's Research and Development (R&D) Program is focused on improving railroad safety. It provides scientific and engineering support for the agency's safety enforcement and regulatory rulemaking efforts. The program also identifies and develops emerging technologies for the rail industry to adopt voluntarily. The outcomes of the research and development are reduced railroad accidents and incidents. The program also supports intercity passenger rail development by providing technical assistance, equipment specifications, proposal evaluations, and Buy America compliance research. The focus of FRA's program is to fill the gaps in research not taken on by industry itself, and to partner with industry to leverage private R&D investment in a manner that ensures broader public safety benefits are achieved.

In addition to improving safety, the program contributes significantly towards activities to achieve and maintain a state of good repair, develop the rail industry's workforce, combat climate change, and grow the economy.

The program has the following areas of research:

• Track Program – Reducing derailments due to track related causes.

- **Rolling Stock Program** Reducing derailments due to equipment failures, minimizing the consequences of derailments, and minimizing hazardous material releases.
- **Train Control and Communication Program** Reducing train-to-train collisions and train collisions with objects on the line and at grade crossings.
- Human Factors Program Reducing accidents caused by human error.
- **Railroad System Issues Program** Prioritizing R&D projects on the basis of relevance to safety risk reduction and other DOT goals.

# EXHIBIT III-1a

# RAILROAD RESEARCH AND DEVELOPMENT SUMMARY ANALYSIS OF CHANGE FROM FY 2021 TO FY 2022 Appropriations, Obligations, Limitations, and Exempt Obligations (\$000)

	<u>\$000</u>	<u>FTE</u>
FY 2021 ENACTED	<u>\$41,000</u>	<u>0</u>
PROGRAM INCREASES		
Track	0	
Rolling Stock	0	
Train Control and Communication	0	
Human Factors	0	
Railroad Systems Issues	17,826	
SUBTOTAL, PROGRAM INCREASES	\$17,826	0
FY 2022 REQUEST	\$58,826	0

#### Detailed Justification for the Railroad Research and Development

Program Activity	FY 2020 Enacted	FY 2021 Enacted	FY 2022 Request
Track	11,279	10,179	10,179
Rolling Stock	10,322	10,322	10,322
Train Control and Communication	8,086	8,086	8,086
Human Factors	6,042	6,042	6,042
Railroad Systems Issues	4,871	6,371	24,197
Total	\$40,600	\$41,000	\$58,826

# FY 2022 – Railroad Research and Development – Budget Request (\$000)

## What is this program and what does this funding level support?

The mission of FRA's Research and Development (R&D) program is to ensure the safe, reliable, and efficient movement of people and goods by rail through applied research. FRA's R&D program aligns closely with the Department's key transportation priorities for FY 2022:

- **Safety:** FRA's R&D efforts provide the scientific and engineering basis for safety enforcement, oversight, and regulation.
- Economic Recovery / Core Assets: FRA R&D will advance the transformation of the rail infrastructure into a 21<sup>st</sup> century system that creates more communities of opportunity, accelerates equitable economic growth, and increases global competitiveness.
- Equity: FRA's R&D program will continue to invest in rail technologies that increase engagement opportunities for underserved communities. R&D will expand initiatives and programs to address diversity, equity, and inclusion within the railroad industry and by working with minority serving institutions.
- **Climate and Resilience:** FRA's R&D will undertake research that will investigate the efficacy of alternative fuels and advanced motive power technologies to improve energy efficiency and reduce emissions of rail transportation.
- **Transformation and Future Proofing:** Historically, FRA's R&D program has invented new technologies that transformed railroad safety inspection, passenger rail crashworthiness, and operating practices, among other innovations. The FY 2022 President's Budget continues investment in the next generation of innovative

technologies that will future-proof rail infrastructure as safe, equitable, and long-lasting transportation.

Work undertaken in R&D contributes to today's safety performance. R&D projects typically follow one of the following paths to implementation:

- 1. **Voluntary Industry Adoption:** R&D by FRA is necessary for conducting higher-risk and longer-term projects, which private industry would not otherwise undertake, to develop advanced technologies and practices. In many cases, industry voluntarily adopts these safety practices and technology.
- 2. **Enforcement:** R&D by FRA creates new technology for efficient and effective oversight of railroad compliance with safety regulations.
- 3. **Regulation:** R&D by FRA is necessary to develop the scientific and engineering foundation for regulatory actions to ensure safety.
- 4. **Incorporation into Industry Standards and Recommended Practices:** The results of research performed by FRA are often used to develop, modify, or update relevant industry standards. These include standards created by the American Public Transportation Association (APTA) and the Association of American Railroads (AAR). Industry standards can leverage the output of FRA R&D to achieve safety benefits.

FRA's R&D program is organized around the following five rail safety disciplines:

- Track Program
  - Track and structures performance, inspection technology and processes, and substructure assessment
  - Rail Integrity assessment and defect detection technologies
  - System Performance and Analysis, including predictive analytics
  - Track and train interaction including, wheel-rail interface, vehicle track modeling, simulation and validation

## Rolling Stock Program

- Rolling stock and components, onboard and wayside monitoring systems, and material and design improvements
- Hazardous materials transportation risk reduction, tank car damage assessment, inspection, and integrity
- Safety research on energy efficiency technologies
- Liquefied Natural Gas (LNG) Natural Gas Safety Research
- Train occupant protection, locomotive and passenger car safety and performance

## • Train Control and Communication

- Development and testing of Positive Train Control (PTC) technologies and communication systems
- Interoperability standards
- Communication cybersecurity
- Automation and automated vehicle research
- Drone-based technology research

- Train control and grade crossing risk simulation and modeling
- Grade crossing safety technologies and pilot studies, including intelligent rail systems, blocked crossings, and trespass prevention
- Development and testing of train control and communication systems

#### • Human Factors Program

- Railroad trespass and suicide prevention, including data quality improvement, outreach, and countermeasure development and evaluation
- Motorist behavior at highway-rail grade crossings
- Project Evaluation
- Human fatigue
- Vigilance, attention and distraction
- Automation, operating personnel information management and control
- Office of Railroad Safety Support
- Short Line Safety Institute program support and evaluation

#### Railroad System Issues Program

- Railroad environmental issues and energy efficiency research
- Railroad industry workforce development research
- Research, Development & Technology (RD&T) research strategy
- Safety risk analysis and performance-based regulations
- Research prioritization
- Strategic collaborations and partnerships
- Locomotive safety
- Rail Safety IDEA (Innovations Deserving Exploratory Analysis) program grants with the Transportation Research Board
- Program or Project evaluation, including the Transportation Research Board's independent review of FRA's R&D programs
- Technology Transfer
- Project Evaluation
- R&D facilities at the Transportation Technology Center (TTC) managed through a public-private partnership, partnership RD&T related support services

The FY 2022 President's Budget includes \$58.83 million for FRA's R&D program, an increase of \$17.83 million from the FY 2021 Enacted Budget. In addition to continuing to advance transformative, next-generation safety technology initiatives, new funding is proposed in FY 2022 to support two of the Biden-Harris Administration's top transportation priorities:

- 1. Climate and Resilience \$5 million in new resources is requested to advance research, development, and testing of alternative fuels for use in rail and other clean energy solutions that will build on rail's already superior energy efficiency and contribute to reductions in the transportation sector's greenhouse gas emissions.
- 2. Racial Equity \$5 million in new resources is requested to improve equity, diversity, and access in the rail industry through greater engagement with minority serving institutions to foster interest in transportation related employment.

The additional \$7.8 million requested above FY 2021 levels will be used to purchase heavy equipment and other instrumentation to support FRA's research at the Transportation Technology Center, located in Pueblo, Colorado.

# TRACK RESEARCH PROGRAM

The FY 2022 Request includes \$10.18 million for FRA's Track Research Program.

The number of accidents due to track-related causes decreased by 22 percent from 2010 to 2019. This reduction is due, in part, to the industry's adoption of technologies developed by FRA, such as:

- Autonomous inspection technologies, including highly successful Autonomous Track Geometry Measurement System (ATGMS), used by many railroads throughout North America to complement visual inspections.
- Gage restraint measurement system, a technology to assess the integrity of ties and fasteners.
- Vehicle-track interaction monitoring system developed for Amtrak and Class I freight railroads.
- Joint bar inspection system, an image-based technology that detects defects.

The Track Research Program prepares for the future of rail transportation through applied research, development, and demonstration in the areas of rail performance, predictive analytics, track stability, track inspection, and vehicle track performance. FRA conducts applied research to test concepts and further the understanding of safety problems causing accidents and incidents. Research that provides a deeper understanding of the efficacy of technology, systems, practices or standards may lead to the development and testing of a prototype and demonstration with industry. A project like the Autonomous Internal Rail Flaw Inspection Device began as applied research and was developed utilizing existing and new technologies.

As new technologies continue to emerge and train axle loads and speeds increase, the timely development of technical information, data, and expertise is crucial to provide a basis on which to make decisions about issues affecting the safe operation of rail vehicles on U.S. track. The Track Research Program supports the goals and objectives of the DOT/FRA by conducting safety related research for new and in-service railroad system investments; developing and demonstrating new track condition assessment technologies; and coordinating research teams between railroads, universities, industry suppliers, and the government.

The Track Research Program endeavors to prevent high-consequence derailments that result in the loss of human life and cause significant damage to property and communities by:

- Identifying, understanding, and mitigating track-related failure modes that pose significant risk to safe freight and passenger rail operations.
- Ensuring the safe and effective implementation of new and innovative technologies and maintenance strategies intended to mitigate adverse effects on track infrastructure.

- Developing procedures for vehicle and track simulation building and validation.
- Providing guidelines for FRA's Office of Railroad Safety and the railroad industry on how to build, model, and simulate different vehicle or track components to better understand the fundamentals of vehicle/track interaction and reduce derailment risk.
- Predicting, detecting, and preventing rail defects that lead to train derailments.
- Investigating advanced materials and systems that ensure a state of good repair.
- Preventing track buckles.
- Leveraging predictive analytics to identify conditions and safety-related issues in the track infrastructure before they become problematic.
- Exploring the application of advanced technologies such as unmanned aircraft vehicles, artificial intelligence, and autonomous inspection tools to improve rail safety in addition to visual inspections.
- Increasing safety by reducing track support caused derailments.
- Supporting research partners in derailment investigations.
- Supporting research partners and the railroad manufacturing community in vehicle qualification and evaluation testing.
- Understanding the root cause of rolling contact fatigue in wheels and rails and developing methodologies, techniques, and inspection tools to identify problematic conditions before they become a safety threat.

Strategic collaboration partners for the Track Research Program include FRA's Office of Railroad Safety, American Short Line Regional Railroad Association (ASLRRA), Association of American Railroads (AAR), multiple railroads and universities.

Anticipated FY 2021 accomplishments for the Track Research Program include:

- Completion of phase 1 reports on different technologies to measure rail neutral temperature and their field test results addressing track buckles.
- Completion of field tests of two different types of non-contact rail integrity inspection.
- Commission hi-rail truck and continue development and demonstration of Automatic Track Change Detection (ATCD) technologies in partnership with FRA's Office of Railroad Safety and participating railroads.
- Initiate cooperative program with select railroads to incorporate ATCD into ongoing Section 211.51 tests to automate track inspection activities (213 subpart F).
- Complete phase 2 development of drone-based ATCD technology (Small Business Innovation Research (SBIR) program). Support widespread field testing and commercialization.
- Initiate comprehensive research program to identify and develop needed technologies to enable FAA-approved Beyond Visual Line of Sight (BVLOS) operations over a significant portion of U.S. railroad tracks.
- Complete final phase of development and demonstrate of highly automated bridge inspection system with railroad partners, including ASLRRA. Publish results and encourage industry adoption of this new tool.
- Delivery and testing of near "real time" processing of Ground Penetrating Radar (GPR) Fouling Depth Layer metrics combined reporting geospatial referenced track geometry

defects/FRA accessible Web based system management and defect reporting portal RASC Manager.

• Continue to quantify and evaluate Rail Flaw Inspection Practices and Modern Rail Steel Defect Growth Analysis.

# Track and Structures

Track and Structures - Rail Performance

This research builds upon the FY 2019 first generation prototype with the second-generation prototype of flash thermography technology for detection of base defects.

Activities:

- Broken Rail Detection System on End of Train.
  - Develop a cost-effective end of train device that can detect rail breaks utilizing a unique line laser approach.
- Non-contact rail integrity inspection prototype.
  - Either laser or acoustic based or both.
- Continue to gather rail defect donations from at least three Class I railroads, characterize these defects, and add them to the FRA rail defect library at TTC for the entire research community to utilize in developing better detection systems.
- Refine towards commercialization a unique automation of detection protocol for ultrasonic rail inspection.
- Refine towards commercialization a unique 3D rail flaw imaging technology.
- Build a prototype to utilize flash IRT (Infrared Thermography) to detect anomalies in the rail base area.
- Automated, Solid-State Rail Joining Technology.
  - Research and development of friction welding technologies to join rail sections. Cooperative research at TTC with industry to reduce or eliminate performance issues associated with flash butt and thermite welding techniques.
- Innovative treatments for Rail Steel.
  - Research on heat treatment, coatings, and other technologies to improve the service life of running rails and special track work.
  - Continue research and development of automated methods to repair worn frogs, wings and other track appliances.

Expected Outcomes:

- Complete third-generation of broken rail detection system for the end of trains.
- Develop third-generation non-contact rail integrity inspection system prototype and complete a probability of detection study.
- Expanded FRA rail defect library at TTC for the entire research community.
- Complete field tests and assessment of automation of detection protocol for ultrasonic rail inspection. Generate list of needed improvements and research.
- Complete compact 3D rail flaw imaging prototype and rail life estimator software. Both are ripe for the commercial sector to develop the rest of the way and get out into industry where they can make a difference.

- Complete first field tests of flash IRT (Infrared Thermography) to detect anomalies in the rail base area.
- Restart research to develop a solid-state process to join full section rails in cooperative partnership with industry and other research organizations.
- Procure support for rail treatment and coatings research. Complete early development testing in the laboratory.
- Successfully close out research into automated, solid-state frog repair technology with completion of field testing and technology transfer to industry for commercialization.
- Re-start research and development of friction welding technologies to join rail sections. Cooperative research with industry, Transportation Technology Center, Inc. (TTCI), and FRA to reduce or eliminate performance issues associated with flash butt and thermite welding techniques.
- Research on heat treatment, coatings and other technologies to improve the service life of running rails and special track work.
- Complete research and development of automated methods to repair worn frogs, wings and other track appliances. Transition technology to industry for commercialization.

# Track and Structures – Track Inspection Technology and Processes

This research improves the track inspection process to automate the detection of conditions that causes track failure and report the conditions and location to the railroad for remediation.

Activities:

- Continue research and development of change detection technology suitable for deployment on autonomous inspection platforms. In addition, develop automated data analysis of track inspections to determine safety related changes to the track structure and report this information to stakeholders.
- Continue developing innovative approaches to imbed sensors and detection and communications technologies within the track structure to allow for a type of self-enunciation when conditions warrant remedial maintenance or pose a threat to safe rail operations.

Expected Outcomes:

• The long-range objective is to develop technology that permits railroad track to communicate its "state-of -repair" directly to the railroads, in a manner that is somewhat analogous to the way modern devices communicate via the internet of things (IoT).

<u>R&D Facilities and Equipment – On-Track Research and Testing (FRA Research Assets)</u> This research seeks to conduct track research and testing to prevent derailments caused by track and structures.

Activities:

- Continue revenue service testing focused on the effects of cold weather on the integrity of the track system.
- Continue to investigate root causes of potential issues that may arise during FY 2021 affecting safe Heavy Axle Load (HAL) operations.

Expected Outcomes:

- Report results of expanded testing using the "rainy section" at TTC to investigate weld strains and failures associated with progressively deteriorated track support.
- Test results on the effects of cold weather on the integrity of the track system (e.g., effects of frozen ballast on Rail Neutral Temperature (RNT) loss and remediation).

# Track and Structures - Track Support & Substructure

This research seeks to prevent derailments caused by track support and subgrade issues.

Activities:

- Develop reliable and automated method to assess track fouling and the development of safety criteria through understanding of subgrade failures.
- Develop characterization and further understanding of ballast mechanistic behavior and properties.
- Further develop vertical track deflection measurements to provide a structural indication of the track support structure with large deflection indicating weakness in the track support layers.
- Further refine Gage Restraint Measurement Systems (GRMS) technology to identify potential track strength weakness at the rail tie interface.

Expected Outcomes:

- Automated method to assess track fouling and the development of safety criteria through understanding of subgrade failures.
- Improved understanding of ballast mechanistic behavior and properties.
- Vertical track deflection measurements to provide a structural indication of the track support structure with large deflection indicating weakness in the track support layers.
- Refinement of GRMS technology to identify potential track strength weakness at the rail tie interface.

# Track and Structures – Track Stability

This research builds upon the FY 2020 first and second-generation prototypes for measuring rail stress without a zero reference.

Activities:

- Develop third generation prototypes to measure rail stress without a zero reference.
- Upgrade of Continuous Welded Rail (CWR)-Safe Software.
- Upgrade Rail Temperature and Buckling Prediction website.
- Initiate build of a rail stress and rail neutral temperature test bed at TTC.
- Finish the design and start building a test bed that can be used to validate the accuracy of track geometry measurement systems Research lateral stability and track buckling practices.

Expected Outcomes:

- Prototypes to measure rail stress without a zero reference that are robust and repeatable.
- Completion of CWR-Safe software upgrade. An asset to industry and track researchers trying to understand and prevent track buckles.

- Completion of upgrade of Rail Temperature and Buckling Prediction Website. An asset that will be valuable to field and management personnel, both in government and in industry, for preventing track buckle derailments.
- In-progress build of a rail stress and rail neutral temperature test bed at TTC.
- Quantified ways to build, monitor and maintain track to prevent track buckles.

## Track-Train Interaction – Wheel-Rail Interface

The goal of this project is to continue research to understand the root cause of Rolling Contact Fatigue (RCF) and develop methodology, techniques and inspection tools, to identify problematic conditions before they become a safety threat.

Activities:

• Development of recommendations on third body layer influence and parameters, and operating conditions that can cause RCF.

# **Expected Outcomes:**

• Recommendations on third body layer influence and parameters, and operating conditions that can cause RCF.

## Track-Train Interaction – Vehicle-Track Modeling, Simulation and Validation

Under the vehicle-track modeling research area of this program, the Track Research program will continue the work on all the areas related to vehicle-track modeling.

Activities:

- Continue to support the development of procedures for both model building and model validation.
- Continue to support the development of procedures to include advanced friction models that examine the effects of falling friction, speed, and third body layer on wheel-rail contact forces, and 3D contact geometry.
- Support testing and modeling of vehicle suspension components.
- Support building of vehicle and track models for various equipment and operating practices to be used for derailment investigations or developing safety.
- Completion of the model perform simulation to see the response of the vehicle to multiple track input.

Expected Outcomes:

- Developed procedures for both model building and model validation.
- Developed procedures to include advanced friction models that examine the effects of falling friction, speed, and third body layer on wheel-rail contact forces, and 3D contact geometry.
- Test results and modeling of vehicle suspension components.
- Progress toward building of vehicle and track models for various equipment and operating practices to be used for derailment investigations or developing safety.
- Completion of the model perform simulation to see the response of the vehicle to multiple track input.

## System Performance and Analysis

## System Performance & Analysis - Predictive Analytics

This research focuses on the utilization of "Big Data" sources as well as the automation of track-related data processing and analyses to improve track safety and decrease derailments.

Activities:

- Complete methodologies for the evaluation of track inspection technology effectiveness and initiate process to incorporate as recommended practice.
- Continue research efforts focused on the application of artificial intelligence (AI) into track-related safety inspection techniques.
- Complete automated procedures for the alignment, processing, and reporting of Automated Track Geometry Measurement Systems (ATGMS) data for predicting areas approaching maintenance and safety limits.
- Conduct field investigation into the root causes of track geometry degradation associated with observed/predicted accelerated deterioration trends.

Expected Outcomes:

- Continue to improve automated processing capabilities in order to move from near realtime to real-time analysis of track-related data.
- Establish a standardized procedure for evaluating the effectiveness of existing and emerging track inspection technologies prior to use in industry.
- Recommend remedial methods associated with observed/predicted deterioration trends that most improve track geometry stability and safety.

Deployment of Expected Outputs/Products:

Partnerships and stakeholder engagement form the foundation of RD&T's technology transfer (RDT2) methodology leading to the adoption of research products. Autonomous Track Geometry Monitoring System (ATGMS) is an example of Track's collaboration with industry and universities that is leading to the deployment of ATGMS systems throughout the industry.

# **ROLLING STOCK PROGRAM**

The FY 2022 Request includes \$10.32 million for FRA's Rolling Stock Research Program.

The Rolling Stock Research Program performs research activities relating to critical transportation topics that promote rail safety, improve rail infrastructure and the mobility of goods and passengers, as well as topics that focus on preserving the environment. The Rolling Stock Research program conducts research to reduce railroad accidents and incidents due to rail equipment related causes as well as research to reduce fatalities and injury severity to passengers and crew members involved in passenger train accidents and incidents. The Rolling Stock Research program produces solutions contributing to all DOT strategic goals: safety, economic recovery / core assets, equity, climate and resilience, and transformation and "future proofing".

This Program's research helps determine criticality and methods for proactively identifying, analyzing, and evaluating potential failure modes. Under the Rolling Stock Research Program, applied research is conducted to test concepts and further the understanding of safety problems causing accidents and incidents. Research topics that provide deeper understanding of technology, systems, practices or standards may lead to the development and testing of a prototype solution and demonstration with industry.

The Rolling Stock Research Program helps mitigate potential risks of unexpected failures occurring in rolling stock that can cause delays and disruptions to transport services or even result in derailment or collision accidents by:

- Conducting research and testing pertaining to bulk packaging traveling by rail, such as tank cars, rail cars, and intermodal tanks.
- Testing and understanding the different hazards of materials to be considered for transportation over the rail network.
- Providing engineering support in the research, design, fabrication, and test planning of ISO intermodal containers, tank car fire testing and the structural performance of this equipment when used as fuel tenders and energy products as commodity transport.
- Improving defect detection, monitoring, inspection and control of rolling stock equipment and components to help reduce risks through the prevention of above-track equipment and component failures to improve safety and reduce risks.
- Developing and demonstrating the effectiveness of designs, strategies, and technology solutions that address structural integrity of locomotives and passenger cars, to decrease the risk of fatalities and injuries in the event of accidents.

Strategic collaboration of partners for the Rolling Stock Research Program include FRA's Office of Railroad Safety, the Pipeline and Hazardous Materials Safety Administration (PHMSA), the Maritime Administration (MARAD), the ASLRRA, the AAR, multiple railroads, associations, manufacturers, and universities.

Anticipated FY 2021 accomplishments for the Rolling Stock Research Program include:

- Identify and understand potential failure modes of rolling stock under normal transportation and during accident conditions, and provide FRA with information on the survivability of tank cars and passenger rail equipment in the event of a train derailment accident.
- Understand the tank car operating environment and possible failure modes under normal and accident transportation conditions.
- Provide a foundation for developing equipment performance models, or standards by leading research and capturing the results.
- Disseminate information and research results to the rail equipment, component, and tank car industry so it can be used for future tank car designs, as well as equipment and component design, manufacturing, inspection, and monitoring.
- Identify relevant studies to address defects that affect the structural integrity and safety of equipment, components, systems, train operations, and hazmat transportation.
- Evaluate and document damage to railroad tank cars, study and capture the results of the liquid/vapor release flow on pressure relief.

- Develop an online hazardous material (HazMat) release probabilistic risk assessment platform for real-time, local track risk analysis.
- Evaluate, test and develop advanced equipment and components to improve operations and increase integrity to withstand damage and failure that could increase risks and lead to accidents and incidents.
- Research methods to inspect, monitor, and measure the predictability of equipment health and component wear life.
  - Collaborate with the industry to evaluate and better understand failure modes, detection, prevention, and characteristics to minimize risks.
  - Evaluate and demonstrate advanced equipment and inspection, maintenance procedures and develop technologies to identify, monitor, detect and track defects on rolling stock equipment and component systems, as well as predict failures.
  - Collaborate and support the development, demonstration and implementation of advanced wayside and onboard monitoring and inspection of equipment and components to help reduce risks and ensure safe train operations.
  - Improve the process for demonstrating and implementing new technology. Establish a standard process for wayside technology pilot demonstrations and implementation.
- Evaluate and encourage safe practices for train makeup and handling to reduce accidents and derailments. Develop train handling and operational strategies to help reduce adverse effects on train operations.
- Investigate current passenger truck designs and areas of improvement.
- Conduct train-to-train test to affirm the behavior of the prototype deformable anticlimber and pushback coupler system as an effective means for inhibiting vehicle-tovehicle override in collisions and assess the secondary impact environment to which passenger in wheeled mobility devices are exposed.
- Conduct room corner fire tests to validate test sample scaling laws developed through simulation models.
- Evaluate various methods for measuring toxicity of burning materials for development of industry standards.
- Conduct experiments for the evaluation of containment methods for passenger seated in wheeled mobility devices.
- Evaluate railExodus and other modern available emergency evacuation simulation tools for effectively predicting evacuation of passengers under various scenarios.
- Educate the public and emergency responders on how to locate and use the Emergency Notification System (ENS) sign information.
- Review railroads alternative fuel usage programs and develop standards for natural gas fuel tender.

# Hazardous Material (HazMat) Transportation

This research program focuses on improving the safety of rail transport of hazardous materials and is conducted in cooperation with the railroad and tank car industry, PHMSA and Transport Canada. This program seeks to develop new standards and methodologies to evaluate the safety and performance of current and new tank car designs used to transport hazardous material.

#### HazMat – Tank Car Research

This research develops and improves the packages that carry hazardous materials, helping to reduce the release of material during rail accidents and incidents.

Activities:

- Fire test on a DOT 112 tank car.
- Side impact test on a DOT 113 tank car.

#### Expected Outcomes:

- Improve the computer model and update current regulation on thermal protection.
- Update computer model to include cryogenic tank cars.

#### <u>HazMat – Structural Integrity</u>

The goal of this project is to understand the performance and durability of safety equipment, and protective systems for tank cars and portable tanks. This research area focuses on the current fleet, identifying problems with current equipment and packages.

Activities:

- Testing of different pressure relief valves used on tank cars.
- Perform a rollover protection test on a current DOT 117.

#### Expected Outcomes:

- Improve the performance of pressure relief devices.
- Improve the rollover protection for new tank cars.

#### HazMat - Accident Consequence Reduction

This research will study the loading and unloading practices of hazardous material to improve the operating practices and securement of packages for safe transportation and reducing nonaccident releases.

Activities:

- Investigate accidents involving hazardous materials packages.
- Conduct forensic analysis on equipment.
- Conduct a study on material characterization of steels.
- Procure and store equipment for further investigation.

Expected Outcomes:

- Better understanding of how failures occur and how to best prevent or manage the consequences of such failures through improved equipment design and protection.
- Help FRA evaluate and document damage to railroad tank cars, study and capture the results of the liquid/vapor release flow on pressure relief.
- Understand the tensile properties of different steel used on the fabrication of tank cars.

# **Rolling Stock Equipment and Components (RSEC)**

Research efforts in the Rolling Stock Equipment and Components (RSEC) program area focus on development and improvement of equipment defect detection and control. Both wayside and on-board detection and control systems offer diverse platforms for such research and demonstration.

## RSEC - Rolling Stock Component Safety

Proactively prevents above-track equipment and component failures (e.g., situational hazard prevention), and provides the analytical and technical basis to develop equipment safety standards while also improving safety, reliability, and inspectability of rail equipment, technologies, and material.

Activities:

- Continue to evaluate and test equipment and components for increased integrity to withstand damage and failure that could increase risks and lead to accidents and incidents.
- Continue to research methods to measure the predictability of equipment health and component wear life.
  - Conduct evaluations and demonstrations of advanced devices.
  - Research damage resistance models of freight components. (Tonnage carried per wheel has progressively increased thus increasing stress to railway equipment leading to increased risks).
  - Collaborate with the industry to evaluate failure modes and characteristics.

Expected Outcomes:

- Research, development, and technology transfer of components and systems that reduce the risk of rail incidents and accidents and increase the safety of the nation's rail transportation network.
- Reduce the likelihood of derailments from equipment failures and mitigate the consequences should derailments occur through these or other causes. Strategic priorities include investigation of the effectiveness of wayside and onboard monitoring systems to detect equipment defects and analysis of component failure modes to identify necessary improvements in materials and construction methods.
- Design, develop, and demonstrate prototypes of effective wayside and onboard technologies that can provide component health monitoring.
- Increased understanding of equipment failure mechanisms and facilitate mitigation to reduce public safety risks.

# RSEC - Rolling Stock Maintenance & Inspection

The focus of this research is to evaluate and demonstrate the effectiveness and efficiency of automated inspection and maintenance procedures and equipment. Demonstrate the ability to develop, monitor, control, and evaluate integrated advanced components to detect defects in real-time, predict and prevent future failures, improve rolling stock capabilities and performance, and improve overall rail operational safety. Develop a system for powering many advanced detection devices on freight trains will increase safety and security, and improve the

efficiency of freight railroad operations. Technologies developed to detect defects on rolling stock equipment, and predict future failures that may be prevented, will substantially improve railroad safety. These investments keep the U.S. rail sector growing and improving to keep up with the latest efficiency and safety standards.

Benefits of this research include improved safety requirements, lower operating costs for railroads, reduced railroad accidents and fatalities, improved equipment service life for equipment, and increased safety, security and efficiency of freight railroad operations.

Activities:

• Analysis of broken axles trends and causes.

**Expected Outcomes:** 

• Detailed analysis of broken axles trends and causes, and recommendation to eliminate or mitigate their hazards.

# RSEC - Train Handling & Operating Practices

This research will develop simulation scenarios to evaluate different network and capacity related parameters and compare these to the conventional signaling and braking applications. Simulation scenarios include network topology, traffic type, and various scenarios.

This research will also focus on developing effective methodologies/models for evaluating the economic benefits of improving railroad network velocity and capacity. These tools will be critical in demonstrating the benefits of advanced technologies, higher speed operations, and shared corridors.

This research includes a Very Long Trains (VLT) Study in collaboration with industry stakeholders – Evaluation and Risk Reduction Through Improved Train Makeup and Train Handling of Very Long Trains

- Support and provide responses to the Government Accountability Office's (GAO) questions on FRA's VLT related research efforts.
- Conduct air brake simulations to develop test scenarios for rack test plans of VLT configurations at a vendor's rack.
- Develop Air Brake Tests plan for testing at a major air brake system vendor facility with 250-Car rack.
- Establish a collaborative VLT study effort and air brake test program with industry stakeholders, including AAR, air brake system vendors, and the Brake System Committee.

Impact on quality, timeliness, effectiveness, efficiency and/or cost savings

- Assessment of emerging long trains operational safety
- Investigation of long train operations and train handling on crew efficiency and fatigue
- Potential train handling options for extra-long and heavy trains

Activities:

- Continue to define the network topology of the freight transportation system. Also, defining the nodal and linkage bottlenecks, and the investment strategies to be examined.
- Continue to investigate current passenger truck designs and diagnose the main issues that need improvement.

Expected Outcomes:

- Continue to improve the network topology to have the topological structure to offer robustness, resiliency, efficiency and effectiveness. Enhancing the network to meet the current increasing challenges.
- Continue to improve passenger truck designs that can provide superior equalization and curving performance to better handle rough track geometry.
- Evaluate advanced bearing technology and testing that prevents water related failures due to various environmental exposure.

# **Train Occupant Protection**

Research in this area will develop improved strategies and designs for rail rolling stock to reduce injuries and fatalities resulting from rail accidents (i.e., collisions and derailments).

# TOP - Locomotive Crashworthiness and Occupant Protection

FRA continues to invest in this research to support its missions of improved safety, performance, and mitigation of the consequences of collisions and derailments that cause injury and loss of life. Crashworthiness and occupant protection continue to be major safety issues as evidenced by several high-profile collisions and derailments that occurred over the last decade.

Activities:

- Continue the literature review and analyzation/investigation of the current and previous state-of-the-art methods in crash energy management (CEM) technology and implementations (world-wide).
- Continue conducting accurate and reliable feasibility analysis to improve the CEM capabilities of existing (in-service) passenger and critical hazmat equipment.
- Continue to evaluate geometric compatibility between coach cars and locomotives in collisions. Translate these into additional potential load cases with appropriate evaluation criteria to ensure stable performance under moderate collision conditions.
- Re-evaluation of traditional anti-climbing requirements if push-back couplers and CEM are present (may not need same load requirements to be sustained while achieving the same or better performance when compared to conventionally designed equipment).
- Re-evaluation of end frame elastic requirements for passenger vehicles with CEM. Some designs may prematurely activate crush zones but still have significant residual strength to function as intended.
- Continue to evaluate the impact of the crashworthiness standards through a combination of statistical analysis, finite element (FE) modeling and simulation, as well as validation tests.

- Assess results of full scale train-to-train test to affirm the behavior of the prototype deformable anti-climber and pushback coupler system as an effective means for inhibiting vehicle-to-vehicle override in collisions and assess the secondary impact environment to which passenger in wheeled mobility devices are exposed.
- Complete the engineering analyses related to passenger car side structure requirements which are being performed to address the outstanding National Transportation Safety Board (NTSB) recommendation to FRA.
- Completion of testing to assess the efficacy of retrofit collision posts on older "legacy" locomotives which are not compliant with modern industry crashworthiness standards.

Expected Outcomes:

- Improving the crash energy management (CEM) capabilities of existing (in-service) passenger and critical hazmat equipment, through cost-effective adaptations and retrofit technology.
- The re-evaluation activities described above will take advantage of more sophisticated modelling capabilities which exist and apply them to the structural analyses of alternative passenger equipment designs. Outcomes will be technical data which can be leveraged to inform potential improvements to existing safety standards.
- Improving rail safety as well as the railroad operational efficiency.
- Results from train-to-train test will be used to inform possible development of revised regulations or industry standards related to locomotive crashworthiness and standards for containment strategies for occupants in wheeled mobility devices to reduce the severity of the secondary impact velocity to which they are exposed in collision accidents.
- Provide results of testing of "legacy" locomotive collision post retrofit to industry to foster adoption of the approach to improved locomotive crashworthiness.
- Provide results from passenger car side structure engineering analyses to FRA Office of Railroad Safety as its response to the NTSB recommendation on this matter.

## TOP – Glazing Standards

In the last 44 years, at least 25 fatalities have been attributed to ejection through rail car window openings during passenger train accidents. The research in this area will comprehensively describe all the engineering requirements placed on glazing systems, survey existing glazing systems design strategies used throughout the world, and assess the effectiveness of these designs in meeting all of the engineering requirements. In addition to functioning as a window, glazing systems are also expected to be impact resistant, provide emergency egress, provide emergency access, be fire resistant, and provide occupant containment.

FRA needs to invest in this research as it has the responsibility for conceptualizing and demonstrating the effectiveness of technology solutions that improve safety and where safety regulations may or may not already exist.

Activities:

- Evaluate the results of the glazing retention test program to derive appropriate metrics for consideration in possible rulemaking and/or development of industry standards for enhanced glazing retention capacity.
- Leverage results from test program to make recommendations to the industry on most effective mechanisms from improving glazing retention capacity.

# Expected Outcomes:

• Final draft of proposed APTA safety standard for improved glazing retention capacity.

# TOP - Fire Safety Research

The Fire Safety Research program will focus on improving current Federal regulations and industry standards for crashworthiness of passenger locomotive fuel tanks, fire performance of materials and components used in passenger rail equipment through research activities. Modern, innovative, alternative methods for evaluating fire performance of materials and components will improve safety, yield cost-savings opportunities, and advancement of modern tools for the passenger rail sector. The FRA requirements for materials fire safety performance and fuel tank crashworthiness were developed over 20 years ago. Passenger locomotive fuel tank structural requirements are based on static loading. Research into the performance of passenger locomotive fuel tanks under dynamic loads such as those seen in derailments and collisions is needed. Smaller profile diesel multiple unit (DMU) fuel tanks, which are not like those in a traditional passenger locomotive, are being assessed for their ability to perform under these loads as well. The research allows the FRA to not only evaluate conventional and DMU fuel tanks under dynamic loads, it also validates test methods that can be for evaluation of these types of equipment. This research allows FRA to review the current requirements for equivalency with newer standards, possibly allowing for the application of newer industry standards, promoting innovation and safety.

Activities:

- Evaluate various methods for measuring toxicity of burning materials in support of development of publicly available industry standard.
- Simulation of other scenarios of fuel tank puncture using validated models.
- Finalize recommendations for scaling of test specimen for structural floor fire test.

## **Expected Outcomes:**

- Validated scaling laws for modeling and simulation of rail car fire growth predictions.
- List of toxicity measurement methods.
- Review international and domestic standards for fire safety, with the goal identifying synergy among the standards for improved compliance.
- Support development of complementary industry standards for passenger locomotive fuel tank crashworthiness.

# <u>TOP – Emergency Preparedness Research</u>

Emergency Preparedness standards set forth the basic minimum requirement for communication and safe evacuation of passengers and crew in emergency situations. Understanding the dynamics of passenger interaction as evacuation ensues on a passenger train

will provide FRA with quantitation data to make decisions for improving the current standards. This project will investigate and develop innovative safety technologies that improve emergency preparedness and egress features of passenger rail equipment. The Emergency Preparedness Research program supports initiatives that ensure passenger rail equipment and onboard crewmembers' training is modern, progressive, and effective. It also supports providing vital safety information in a central location for all interested parties; this includes producing training videos and distributing it among related stakeholders and on the FRA website.

#### Activities:

- Continue to evaluate railExodus and other modern available emergency evacuation simulation tools for effectively predicting evacuation of passengers under various scenarios.
- Investigate integration of emergency evacuation tools such as railExodus with fire dynamics models for safety and emergency preparedness research.
- Continue educating the public and emergency responders on how to locate and use the Emergency Notification System (ENS) sign information.

#### Expected Outcomes:

- Evaluate evacuation scenarios in coupled fire dynamics-egress models
- A training video to be distributed to the public and emergency responders on how to locate and use ENS sign information. The format of the video should follow the same method as used for the rail safety videos. The video shall contain an overall safety message and details of the ENS signs.

#### TOP - Cab Displays, Controls, & Environment

This project will improve cab/locomotive visibility at night, provide extra alerting for track workers and attempting trespassers, provide extra visibility/alerting when approaching grade crossings, unify an optimized cab display across all railroad providers, increase freight and passenger rail safety, and reduce operating and maintenance costs for locomotives.

#### Activities:

• Continue to test and validate the candidate LED headlights for railroad application.

Expected Outcomes:

• Validate the new LED headlights and assist in adopting new standards and regulations for LED lights on locomotives.

#### Liquefied Natural Gas (LNG) - Natural Gas Safety Research

This research will investigate innovative safety technologies that will improve the transportation and use of natural gas, both liquefied and compressed (CNG), in the rail sector. The research provides the FRA Office of Railroad Safety with the scientific basis for decision-making and development of standards and requirements.

## Activities:

• Development of standards for natural gas fuel tender.

• Review of railroads' natural gas fuel usage programs.

Expected Outcomes:

- Guidance documents to the Office of Railroad Safety on natural gas fuel usage by railroads.
- Grade-crossing impact test of LNG fuel tender.

Partnerships and stakeholder engagement form the foundation of RD&T's technology transfer (RDT2) methodology leading to the adoption of research products. The Rolling Stock Research Program is subject to continuous input and review from industry stakeholders. PMs are active contributors to industry committees and meetings overseen by the AAR, APTA, American Society of Mechanical Engineers (ASME), and others. Input from industry stakeholders at these meetings is solicited and appropriately addressed in on-going research efforts.

# TRAIN CONTROL AND COMMUNICATION PROGRAM

The FY 2022 Request includes \$8.09 million for FRA's Train Control and Communication (TC&C) Research Program.

The number of signal-related train accidents has decreased by 23 percent from 2010 to 2019. Further reduction is expected from the installation of Positive Train Control (PTC) on certain routes, as PTC is one of the most transformative technological changes in the history of railroad signal technologies.

The TC&C Research Program focuses on improving railroad operation safety through the development and testing of train control and communication systems and grade crossing safety technologies. TC&C funds research to establish interoperable PTC performance standards and specifications for railroads to adopt and maintain and for suppliers to follow when designing PTC safety systems. The program conducts applied research to test safety systems and demonstrate concepts of operations to improve railroad operational safety. The program conducts pilot studies, creates prototypes, and demonstrates safety and security systems, including intelligent rail systems, and trespass prevention.

FRA's TC&C Research Program is aimed at reducing train-to-train collisions and train collisions with objects on the line and at grade crossings by:

- Assisting railroads in meeting PTC goals while maintaining safe and efficient rail operations. As a critical safety system, PTC must be highly reliable, interoperable, and secure.
- Working with railroads to define interoperable standards and system performance requirements. Developing and testing next generation PTC technologies to improve operational safety, maintain a high level of availability, and improve capacity. Integrating existing and new technologies to enable various levels Automated Train Operations (ATO).
- Developing safety application for Connected Vehicles (CV) to prevent vehicle-train collisions at railroad crossings.

- Developing, testing, and validating methods and means to reduce the number of casualties due to trespass activities.
- Developing technologies and tools to decrease accidents involving injuries and deaths at grade crossings.
- Simulating and modeling non-invasive and non-destructive methods to predict traffic trends and accident reduction in a controlled environment.
- Creating education and awareness tools to increase public understanding and awareness of the risks involved when near railroad property to help decrease incidents and accidents.

Strategic collaboration partners for the TC&C include FRA's Office of Railroad Safety, the Intelligent Transportation Systems Joint Program Office (ITS-JPO), the Federal Highway Administration (FHWA), the AAR, multiple railroads, local DOTs and police departments.

The Train Control and Communication research activity has innovated PTC-related technologies for several years. Notable successes include:

- Freight and Passenger Braking Algorithm development and refinement to improve braking enforcement performance for passenger railroads.
- Cybersecurity protection and PTC communications messaging verification and validation.
- Rail Crossing Violation Warning Application Development, a cooperative vehicle and infrastructure system that assists drivers in avoiding crash-imminent situations at railroad crossings.
- Automated and autonomous vehicle research to develop interoperability standards and improve grade crossing safety.
- Strategic rail industry spectrum needs assessments and spectrum acquisition planning.
- Built PTC and wireless communications test beds at Transportation Technology Center to be used by both large and small railroads.
- Developed a PTC Track Data Auditing System and associated interoperable standards and protocols to improve PTC reliability.

Anticipated FY 2021 accomplishments include:

- Evaluation of next generation Track Circuit technologies to support increased rail automation and communications-based train control systems.
- Development of technologies to safely increase the capacity of freight and passenger railroad trains through densely populated areas.
- Increased PTC operating efficiencies through development of improved PTC Adaptive Braking Algorithms.
- Positive Train Control Interoperability Testing Support.
- Full implementation and technology transfer of the Monitoring and Analysis of Integrated Network (MAIN).
- Development of Interoperable Lifecycle Management (ILM) network.
- Publication of interoperable Automated Train Operation performance requirements and interface standards.
- Controlled conditions field test of advanced positive train location system.

- Research of innovative Rail Communication Security approaches.
- Research cooperative automation technologies to improve grade crossing safety.
- Evaluate effectiveness of connected vehicle technologies in a field environment.
- Evaluate closed loop architectures for communicating grade crossing status to connected or automated vehicles.

For the Grade Crossing and Trespass Research Program, the anticipated FY 2021 accomplishments include:

- Publication of the first results of research on how artificial intelligence (AI) algorithms and related technologies can be used in reducing trespass occurrences along the railroad's ROW.
- Development of innovative grade crossing scanning techniques for digitalization and integration with the National Grade Crossing Inventory database by using LiDAR based scanning systems mounted on rail vehicles and UAVs.
- Continue evaluating the feasibility of and explore the design and implementation of novel or improved warning devices.
- Investigate and test the integration of grade crossing locations into mapping providers.
- Investigate the use of enforcement tools to mitigate the risk of accidents by pedestrians at grade crossings.
- Development of a new grade crossing accident prediction and severity model for use by the states and local communities.
- Collaboration with organizations such as Operation Lifesaver.
- Assist the FRA Office of Railroad Safety in conducting outreach with stakeholders and communities affected by grade crossing safety and trespassing on railroad property.
- Publish the results of the Pilot Law Enforcement grant.

## **Train Control and Communication**

## PTC Technology

This research addresses problems associated with finalizing PTC development, deployment, and continued long-term evolution and maintenance. It supports the design and development of innovative systems to ensure PTC interoperability and reliability continue to evolve with the pace of technology development.

Activities:

- Testing of enhanced track circuit technologies to increase safety and throughput.
- Continue development of technologies to safely increase the capacity of freight and passenger trains through densely populated areas.
- Testing of improved PTC adaptive braking algorithms.

## Expected Outcomes:

- Validate increased efficiency of PTC without reducing safety.
- Increased rail capacity and throughput.
- Increased braking accuracy for freight and passenger trains.
## PTC Interoperability

Interoperability is the requirement that all railroads have the ability to work anywhere on the North American railroad network. If railroads are not interoperable, all rail traffic must stop and transition between carriers at each individual railroad boundary. This would be extremely inefficient, costly and create extreme burden on the FRA, railroads, passengers and freight railroad customers.

Interoperability is a requirement of the Rail Safety Improvement Act of 2008 (RSIA), as all railroads must have the ability to use the national network and transport goods and people on all lines. Multiple efforts are reviewed for viability, including radiofrequency spectrum allocation, infrastructure enhancements and modifications, and monitoring and analysis of the network. Interoperability will alleviate the regulatory burden requiring the FRA to check the interoperability between different railroads and will lead to development of an automated system that will ensure interoperability.

## Activities:

- PTC interoperability testing support.
- Next phase development of Monitoring and Analysis of Integrated Network (MAIN).
- Development of Interoperable Lifecycle Management (ILM) network.

# Expected Outcomes:

- Efficient and reliable interoperability controls between railroads.
- Automated interoperability verification between railroads.
- Automated file transfers between railroads to determine problem areas and corrections.
- Centralized test facilities that serve small freight and commuter railroads to streamline testing and validation of their PTC systems.

## PTC Next Generation

This research will identify and develop the methods, facilities, equipment and capabilities required for providing future industry PTC development. Research will focus on providing additional functionality, improving reliability, and supporting integration with other technologies, all of which will support the objectives of improving safety and throughput. Multiple areas of consideration are under review for potential development, including signaling, communications, and infrastructure enhancements to reduce PTC burden and improve safety.

## Activities:

- Applied automated train operation research and development.
- Testing of advanced train location and positioning system.
- Standardization of new rail communication security techniques.

## Expected Outcomes:

- Improved rail network capacity and decreased delays caused by PTC.
- Rail network safety and efficiency improvements through interoperable automation.
- Increased cyber security of PTC systems.

# Intelligent Transportation Systems (ITS)

Facilitate collaboration between railroads and automotive industry stakeholders to develop coordinated solutions for automated transportation systems. Accelerated development of connected and autonomous road vehicles must be mirrored by railroad investment in rail automation and connected highway-rail grade crossing technologies.

RD&T's research of ITS improves 49 CFR Part 234 Grade Crossing Safety and Part 924 Highway Safety Improvement Program. Most of the highway-grade crossing regulations, especially those pertaining to the interactions of highway users, fall under FHWA or the Federal Motor Carriers Safety Administration (FMCSA). The regulations that FRA puts forth on highway-grade crossing, in general, pertain to the requirements that the railroads must maintain regarding the safety devices and general upkeep of the highway-rail grade crossing. However, as the auto industry is pursuing autonomous vehicles, those vehicles will need to interact with highway-rail grade crossing safety system will need to be conducted. Odds are that the current highway-rail grade crossing safety system will need to be altered to better communicate with autonomous vehicles so that the vehicles are "informed" of the position of the gates as well as informed about oncoming trains. A potential benefit that could come from the inclusion of autonomous vehicles at highway-rail grade crossings is the reduction of accidents caused by highway drivers moving around safety devices or by highway drivers misjudging the distance of an oncoming train and continuing to move through the crossing.

## Activities:

- Develop automation technologies to improve grade crossing safety.
- Evaluate effectiveness of connected vehicle technologies in a field environment.
- Develop rail industry-driven standards for communicating grade crossing status to connected or automated vehicles.

**Expected Outcomes:** 

- Advancement of connected and automated vehicle technologies with a focus on grade crossing safety.
- Communication standards tightly coordinated between rail and automotive industry groups.

# **Grade Crossing Safety and Trespass Prevention**

Grade Crossing Safety Research plays a vital role in reducing accidents and incidents around grade crossings, which has for decades been the rail industry's largest public safety concern. This research continues the collaboration with State DOTs, local authorities, and communities to study and implement innovative solutions to improve safety around grade crossings. This research takes advantage of advancement in drones and UAV technologies to detect and prevent trespassers. In an effort to enhance and verify the accuracy of FRA grade crossing inventory database, this research uses LiDAR technology to map grade crossing profiles including elevation to identify hump crossings and prevent accidents resulting from low ground clearance vehicles being stuck at crossings.

## Trespass Countermeasures

Continue to work with stakeholders in developing new tools and technologies to address trespassing on railroad Right-of-ways (ROW).

Activities:

- Continue and/or develop new work on AI applied to railroad trespassing.
- Continue working on the effectiveness of mobile systems used for detection of trespassing activities within any given railroad.
- Develop new research ideas based on the input of the several stakeholders involved in trespassing issues, through engagement in roadshows or workshops
- Explore geofencing techniques and how can these be applied to the railroad environment.

# Expected Outcomes:

• The outcome of the research described at a high level above is then expected to be transferred to other stakeholders, such as railroads or local communities for further development and implementation, thus increasing public safety.

## Grade Crossing Technology

Continue to work with universities, the industry, railroads and public sector in exploring new technologies geared toward innovative devices to increase safety at grade crossings.

Activities:

- Explore new areas where PTC can play a role in increasing safety at grade crossings.
- Investigate and demonstrate the effectiveness of the integration of FRA's National Grade Grossing Inventory database into mapping providers.

Expected Outcomes:

- With the wide introduction and implementation of PTC, its inclusion of a grade crossing warning system will increase overall public safety and at the same time reduce accountability and liability.
- Increased safety at grade crossings thanks to the increased awareness from those mapping providers that include grade crossings in their systems.
- New technologies and solutions are expected to be developed or tested for feasibility under this set of activities in this research area. Increased safety and reliability, along with a significant reduction in accountability and liability are expected.

# Grade Crossing Pedestrian Safety

Continue to explore measures to address accidents at grade crossings and along railroad ROWs that involve pedestrians.

Activities:

- Explore new methods and techniques to improve pedestrian safety at rail grade crossings.
- Continue to explore enforcement and educational tools to reduce accidents at grade crossings involving pedestrians.

Expected Outcomes:

• TC&C expects to increase safety for pedestrians at crossings thanks to this research described at a high level above.

# Grade Crossing Modeling and Simulation

Continue working on the new accident prediction and severity model for grade crossings, as well as developing models for studying behavior in general at grade crossings.

Activities:

- Explore new modelling and simulation to reproduce real scenarios of human behavior at crossings. This can create new testing solutions without intervening on the actual railroad property or grade crossing itself.
- Research and validate through simulations the concepts of various warning times for crossing activations.
- Research the behavior of pedestrians in the presence of blocked crossings.

Expected Outcomes:

- New accident prediction and severity model will greatly assist state and local communities in better planning investments for either grade crossing improvements, closure or grade separation.
- Use of the simulation tools will allow to propose improvements in a non-destructive manner allowing for an increase in safety in an innovative way.

# Grade Crossing and Trespass Outreach and Education

Continue developing and disseminating educational tools to the public, including local and state governments, law enforcement agencies, and schools, among others.

- Develop new research ideas based on the outcome of the trespasser listening sessions that were originally planned for FY 2020, but were postponed due to COVID-19; FRA intends to hold these sessions when it is safe to do so.
- Continue collaboration with organizations such as Operation Lifesaver and others.
- Formation of an international working group on railroad trespass prevention.
- Develop a grade crossing and trespass toolbox that are similar to other tools available internationally.
- Explore the feasibility of revising and updating the care model.

Expected Outcomes:

• Increased safety overall in the railroad environment when interacting with grade crossing and trespass prevention.

Partnerships and stakeholder engagement form the foundation of RD&T's technology transfer (RDT2) methodology leading to the adoption of research products. Stakeholder input is a critical driver of TC&C's research planning. All the research and development activities conducted by the TC&C Research Program are done in partnership with government and non-government groups to target the research to solve rail transportation safety issues and needs.

These partnerships benefit from technical and financial collaboration for a more efficient and effective research program. Multiple railroads are contributing in-kind support of the development of requirements, testing and providing technical guidance and intellectual resources.

# HUMAN FACTORS PROGRAM

The FY 2022 Request includes \$6.04 million for FRA's Human Factors (HF) Research Program.

Human error continues to be one of the primary causes of railroad accidents and incidents. FRA's Human Factors R&D program's priorities are railroad organizational culture and safety performance; railroad worker and operator performance; railroad technology, automation and system design; and highway-railroad grade crossings, trespass and suicide prevention.

Across the rail industry there is a distinct lack of attention to human requirements in the design and development of systems for safety and efficiency. Failure to include human factors requirements in the systems development of new technology, for example, will result in more error-prone systems acquired and used by railroads. The HF research program attempts to fill the gap in attention to human factors by providing the rail industry with knowledge about human behavior in operational settings, and research yielding human requirements for better design of technology and processes. Human factors concepts, behavioral models, and researchderived tools are applied in research settings to define and understand human behavior related to safety issues that cause or contribute to accidents and incidents.

The FRA's Cab Technology Integration Laboratory (CTIL), developed and maintained under the Human Factors research program, provides the FRA and the rail industry the capability to examine the effect of human-machine collaborative automation, train controls, new and more meaningful displays and different operating procedures, on human and system performance. The CTIL also provides a system development test and prototyping capability in a virtual environment more suitable for new system concepts, where there is less risk, before moving on to an operational testing environment.

The Human Factors Research Program is focused on improving railroad safety and reducing rail accidents caused by human error by:

- Developing interventions and solutions to mitigate fatigue and the effect of irregular work hours, as well as the unpredictability of on-duty times associated with the U.S. rail industry.
- Understanding ways to improve the situational awareness of operating personnel that could improve vigilance and sustained attention.
- Applying simulation and modeling tools to address crew attentiveness and situational awareness issues, as well as the design of system safety technology, like PTC.
- Providing program oversight to the Short Line Safety Institute, which helps improve safety and safety culture in Class II and Class III railroads.

- Conducting project evaluations to ensure program success and holding contractors conducting government-funded research accountable for efficient and effective use of resources to serve the public good.
- Conducting applied research to reduce the number of casualties due to trespass activities.
- Developing technologies and tools to understand human behavior at grade crossings.
- Creating education and awareness tools to increase public understanding and awareness of the risks involved when near railroad property to help decrease incidents and accidents.
- Identifying and studying the causal factors that lead to trespassing and suicides incidents on railroad property.

Strategic collaboration partners for the Human Factors Program include FRA's Office of Railroad Safety, ASLRRA, AAR, Operation Lifesaver, and other rail safety organizations.

Anticipated FY 2021 accomplishments for the FRA's Human Factors R&D program include:

- Initial feasibility assessment of the Railroad Information Sharing Environment (RISE) partnership to determine full scalability of data trust in the railroad environment will be delivered to FRA during Q3 of FY 2021.
- Publication of a fatigue research strategic plan and identification of research to assist RRS following publication of the Fatigue Risk Management System rule.
- Assessment of C3RS expansion to additional short line and regional railroads, using SLSI as the Peer Review Team.
- Publication of a summative evaluation of SLSI's FY 2020 program activities. Evaluation will provide an assessment of the extent to which SLSI's programmatic activities led to improvements in Class II and Class III railroads' safety and safety culture.
- Assessment of SLSI's follow up safety culture assessment process and determination of safety culture change over time.
- Assist the Office or Railroad Safety's grade crossing outreach activities.
- Support the Office or Railroad Safety's railroad safety committees (e.g., Switching Operations Fatality Analysis (SOFA) and Fatality Analysis of Maintenance-of-way Employees and Signalmen (FAMES)) by offering data analysis support and development of protocols for consistent case analyses.
- Report on the efficacy of new suicide countermeasures for preventing intentional fatalities on rail ROWs.
- Collaborate with FRA Public Affairs on results from the Information and Communication Technology (ICT) needs assessment to inform FRA's stakeholder communications strategies.
- Publish guidance materials about topics where human error is a causal factor in railroad operations (e.g., misaligned switches).
- Publication of PTC-related human errors, as reported through C3RS.
- MIT Augmented Reality Heads Up Display prototype and initial human performance evaluations in CTIL.

- GE Enhanced Manual Mode display prototype and human performance evaluations in CTIL.
- HUD general symbology initial data set and evaluation in CTIL.
- Michigan Tech University In-Vehicle Auditory Alerts alert prototypes and human performance simulator evaluation.
- University of New Mexico evaluations of prototype grade crossing treatments using virtual reality approach.
- Collaborate with the Automated Train Operations (ATO) working group to ensure human factors issues are integrated into the development of locomotive automation standards.
- Publish results of an assessment of scenario-based training for improving railroad safety. Provide guidance to railroads who are interested in adopting similar methods for training their employees.
- Publish an assessment of the portability of SLSI's safety culture assessment process to commuter and passenger railroads.

# Human Factors (HF)

# Rail Trespass and Suicide Prevention

Railroad trespass and suicide are the leading categories of rail causalities in the U.S. HF will continue to examine the human behaviors associated with rail trespass and suicide.

Activities:

- Partner with non-profit organizations to help improve education and outreach related to rail suicide and trespassing.
- HF will continue its suicide prevention research program, with activities in the following areas:
  - Data quality improvements.
  - Countermeasure development, implementation and evaluation.
  - Outreach.

# Expected Outcomes:

The outcome goals of the trespasser and suicide prevention research topic area are to:

• Produce Technical Reports, Research Results reports, and presentations related to the program activities.

## Automation, Operating Personnel Information Management and Control

HF addresses safety issues associated with (a) rail technology assessment and human performance, (b) new technology concept demonstration and the human-machine interface, (c) human-systems integration as an acquisition and implementation process for new technology.

# Activities:

- Research head-up display for passenger locomotives and operations.
- Research to develop a new approach (human-automation teaming to accommodate the best characteristics of both) for operating displays.

**Expected Outcomes:** 

- Enhanced locomotive crew vehicle and operating environment situational awareness precursor for accident prevention.
- Developed human-machine interface (HMI) producing reduced workload, ease of use, and improved operational performance as impacts safety.

## Railroad Worker and Operator Performance

Individuals and groups (teams) of workers perform safety critical jobs in the railroad industry under a variety of personal (age, sleep deprivation, motivation, memory, etc.), environmental (noise, temperature, vibration, etc.), and social (status, role, etc.) conditions that may affect job performance and safety. This Research Area examines these factors to identify those that have significant impacts on job performance and safety and to suggest strategies to enhance safety and job performance.

Activities:

- Gather and summarize research on physiological basis of human fatigue.
- Studies related to the measurement and assessment of human fatigue in railroad operations.

Expected Outcomes:

- Informed industry on physiological basis of fatigue and how human fatigue is measured or assessed.
- Understanding of human fatigue and how to better manage it in railroad operations.

## Railroad Organizational Culture and Safety Performance

This Research Area focuses on projects that enhance railroad safety by encouraging the development of a positive safety culture within the railroad industry. Organizations with a positive safety culture are characterized by communications founded on mutual trust, by shared perceptions of the importance of safety, and by confidence in the efficacy of preventive measures.

## Activities:

# • Short Line Safety Institute

The Human Factors Division continues to provide program monitoring and support of the SLSI. The SLSI provides safety culture assessments and training to small railroads, which are largely located in rural areas. Funding for the SLSI has been provided through congressionally-directed spending within the annual appropriations bills. For FY 2022, the President's Budget proposes to fund SLSI through the CRISI program.

# • FRA Office of Railroad Safety Support

Support FRA's Office of Railroad Safety (RRS) by providing subject matter expertise, consultation, research, data, and tools to improve railroad safety. RRS works closely with RD&T to provide insight into research needs throughout the fiscal year. RD&T must be able to respond to and support requests for research and expertise for time-sensitive safety issues.

Expected Outcomes:

• Technical Reports, Research Results reports, and presentations to FRA stakeholders.

# Highway-Rail Grade Crossing

Human Factors research addresses human behavior at grade crossings, and the extent to which individuals understand new technologies to notify them of an approaching train. HF will continue to pursue solutions to highway-rail grade crossing because investment in research on new technologies at grade crossings does not completely address grade crossing safety; one must understand how drivers will react to new technologies at crossings.

Activities:

• Continue to address human behavior issues related to the integration of new technologies aimed at improving grade crossing safety.

Expected Outcomes:

• Technical Reports, Research Results reports, and presentations to stakeholders.

# RAILROAD SYSTEMS ISSUES PROGRAM

The FY 2022 Request includes \$24.20 million for FRA's Railroad System Issues (RSI) Program. A small portion of this funding is for staff to oversee contractors' and grantees' performance and to witness testing, including travel.

FRA's Railroad System Issues Program improves railroad safety by evaluating risks and prioritizing RD&T projects to reduce safety risk and achieve DOT, Office of the Assistant Secretary for Research and Technology (OST-R), and FRA goals. Railroad System Issues objective is to determine strategic research needs and priorities through collaboration with internal and external partners and stakeholders, considering real time safety issues requiring subject matter expertise or long-term research solutions.

Strategic collaboration partners for the RSI Program include FRA's Office of Railroad Safety, ASLRRA, AAR, multiple railroads and universities.

Anticipated FY 2021 accomplishments for the Railroad Systems Issues program include:

- Analyzing data to modify the safety risk model algorithm for guiding future R&D.
- Supporting DecisionLens software funding to help in cost-effective project prioritization.
- Evaluating projects conducted by the four RD&T divisions.
- Supporting the Workforce Development Program covering: Council on Women and Girls, Transportation Career Pathway Model Development, Minority Serving Institutions Task Force, and the YES Mentoring Program.
- Begin a new railroad industry workforce assessment to gather data on trends, skill demands, training opportunities, industry best practices, cross-modal efforts, etc.

- Providing Broad Agency Announcement (BAA) opportunities for Science, Technology, Engineering, and Math (STEM) education.
- Funding BAA proposals with universities, addressing Intelligent Rail Systems (IRS) issues.
- Testing of rear and forward-facing wheeled mobility devices (WhMDs) and its occupant in low-speed train-to-train collision.

Funding requested in FY 2022 will advance a number of initiatives under the Railroad Systems Issues Research Program, including new workforce development and energy emission research topics to address racial inequity in transportation and the climate crisis, respectively.

# **Railroad Systems Issues (RSI)**

## Workforce Development (WFD)

This research provides support and domain expertise in the areas of railroad WFD to adequately identify suitable approaches for both the management and capture of rail workforce-related trends. This research increases the awareness of railroad industry WFD issues by establishing and/or participating in forums and research efforts to foster and support industry collaboration. With additional funding, FRA will address equity, diversity, and access, by increasing its engagement with minority serving institutions to encourage interest in transportation related jobs.

Activities:

- Participate in the DOT Education and Workforce Development Community of Practice on behalf of FRA.
- Conduct and publish a railroad industry workforce assessment (known as the Modal Profile).
- Capture and analyze data on trends, skill gaps, skill demands, training opportunities, industry best practices, and cross-modal efforts.
- Develop STEM outreach programs for K-12 and underrepresented colleges and universities.

Expected Outcomes:

- Updated Modal Profile published.
- Research results of workforce development published.
- Continued stakeholder engagement.

# Energy and Emissions Safety Research

In support of DOT priorities of safety and climate and resilience, FRA undertakes research that will investigate efficacy of alternative fuels and advanced motive power technologies to improve energy efficiency and reduce emissions of rail transportation. This research area focuses on supporting activities related to real-world demonstration of alternative fuels, technologies and improvements in standards for noise emissions to ensure their implementation on rail systems across the nation.

Research provides data in support of the safe operation and use of alternative fuels, engine improvement, and motive power technologies. Newer innovative solutions for freight and passenger operations such as hydrogen, fuel cell, and battery technologies hold great potential for the U.S. rail market. Research on the structural requirements for liquid and gaseous hydrogen containers and their structural design is needed. Research on the safety of refueling/recharging infrastructure is needed. The efficacy of current CFR standards to address and ensure the safe use of such fuels will be analyzed and decisions made to adjust accordingly. The research provides FRA's Office of Railroad Safety with the scientific basis for decision-making and development of standards, regulations, and other requirements. FRA will collaborate with other federal agencies to ensure safe use of the energy products.

#### Activities:

- Continued impact and applicability study of hydrogen for rail applications.
- Identification of standards and best practices for hydrogen fuel usage for rail applications.
- Additional safety assessment of hydrogen and fuel cell technology for rail applications.
- Identify safety issues surrounding refueling/recharging of new advanced clean fuel and motive power systems
- Engagement with the rail and energy sector on gaps in technologies that act as barrier to implementation of safe clean alternative fuels for railroad applications.

#### Expected Outcomes:

• Identification of safety research needed to progress hydrogen and fuel cell technologies in U.S.

#### Rail Safety Innovations Deserving Exploratory Analysis (IDEA)

The Transportation Research Board (TRB) initiated this effort in conjunction with FRA to address safety needs within the railroad industry. The focus of this project is to solicit innovation, ideas and advanced technology in railroad safety. Each research effort selected has a unique timeframe, generally lasting one to two years.

#### Activities:

With multiple activities each year, the outcomes vary based on the selected projects and duration of research.

- Announcement An IDEA Program Announcement will be issued annually to solicit proposals for Rail Safety IDEA program exploratory research projects. The announcement describes the program and criteria and provides guidelines for eligibility and preparing and submitting proposals.
- Evaluation of Proposals Proposals will be evaluated on a competitive basis. The Rail Safety IDEA program committee will evaluate those proposals meeting the technical eligibility criteria.
- Widespread announcement of contract opportunities for rail inventors.
- Management of projects to completion.
- Tracking of successful implementation of completed projects.

Expected Outcomes:

- Detailed Project Work Plan, Budget, and Schedule.
- Project Agreement between TRB and Sub-awardees (Consultants/Contractors).
- Quarterly Progress Reports (using the FRA QPR template).
- Final Performance Report that should describe the cumulative activities of the Project, including a complete description of the Grantee's achievements with respect to the Project objectives and milestones.
- Final Report for each selected project will be posted on TRB's website/publication.

# Project Selection

RD&T utilizes a software package (DecisionLens Software) and the Safety Risk Model as part of the prioritization process. This project includes the activities and costs associated to maintaining the license for the prioritization software, optimizing the Safety Risk Model and executing the prioritization process. RD&T conducts prioritization activities to effectively manage its budget and ensure that stakeholder and industry needs are inputs to the investment planning process.

# Activities:

- Renew Decision Lens software license for an additional option year.
- Apply improved rating process to candidate research project for FY 2023.
- Use results to support the FY 2023 Annual Modal Research Plan.

# Expected Outcomes:

- Robust FY 2023 research portfolio.
- Quantifiable project prioritization plan.

# Project Evaluation

The focus of this project is to educate and train program managers (PMs) about project evaluation techniques, develop performance measures, improve project progress, and reduce cost. PMs and external parties will evaluate projects conducted by the five RD&T divisions to measure success, improve project performance and railroad safety. Project evaluation processes will help RD&T better manage funding.

Activities:

- Continue project evaluation training.
- Create project evaluation tools.
- Continue implementation of RD&T's project evaluation methodology.
- Conduct project evaluations.
- Optimize RD&T's performance management metrics.

## Expected Outcomes:

- Increase maturity of project evaluation practices.
- Standardize performance measurement.
- Standardize project evaluation.
- Establish performance measurement baseline.

# Accessibility

Investigate universal and inclusive designs for accessibility on-board passenger trains. FRA is in a unique position to collaborate with stakeholders (other Federal agencies, disability advocacy groups, passenger rail operators, and equipment manufacturer and industry groups) to ensure that new standards for accessibility are feasible and safe; balancing the requirements of the law with the capability of the equipment. Accessibility to our nation's rail stations and equipment is a civil right, and FRA research and industry partnership in this area help to advance transportation equity.

Activities:

- Continued testing of rear and forward-facing wheeled mobility devices (WMDs) and its occupant in low-speed train-to-train collision.
- Assessment of current state of art securement systems for WMDs on board trains.

# Expected Outcomes

• Data on relative motion of wheeled mobility device and its occupant in non-contained spaces.

# Locomotive Safety

The goal of this research is to investigate innovative locomotive engine technologies to ensure the safe and efficient transportation of goods and people. Areas of focus for this research program include: reduction in fuel consumption, improvement in engine component life, and improvement in the efficiency of older, less efficient locomotives. Research is conducted in collaboration with Class I railroads to demonstrate and develop prototype systems. This research area addresses the DOT priorities of Safety and Climate and Resilience.

Activities:

- Complete assessment of technological innovation using high-pressure heat exchangers in a real-world environment.
- Complete development and prototype demonstration of hybrid systems.

Expected Outcomes:

- Knowledge of the performance of locomotive engine systems to improve efficiency while maintaining safety.
- Ensure that emerging, innovative locomotive engine efficiency improvement technologies are safe.

Partnerships and stakeholder engagement form the foundation of RD&T's technology transfer (RDT2) methodology leading to the adoption of research products. As part of technology transfer efforts, RD&T staff engages with both internal and external stakeholders throughout the research and development life cycle. An integral part of engagement includes collaborating with stakeholders to understand research needs and safety issues. RD&T conducts prioritization activities to effectively manage its budget and ensure that stakeholder and industry needs are included in the RD&T investment planning process. DOT priorities and safety priorities, especially those provided by the FRA Office of Railroad Safety, are a major input into the process.

Research with Universities on Intelligent Railroad Systems

This project will support university research on intelligent railroad systems. FRA will use a broad agency announcement (BAA) to solicit basic and applied technology research projects that will support DOT and FRA goals to advance connected vehicle technology adoption in the rail industry. The BAA was produced in collaboration with the Intelligent Transportation Systems – Joint Program Office (ITS-JPO). Program objectives within this project include:

- Enabling safer vehicles and roadways
- Enhancing mobility
- Limiting environmental impacts
- Promoting innovation
- Supporting transportation connectivity

# Activities:

- Publish the request for proposals.
- Review university proposals.
- Select prospective research projects.
- Fund and begin selected projects.

**Expected Outcomes:** 

- Focus on advanced technology, automation, and connected vehicle technologies.
- Projects that advance these technologies for rural application.
- Intelligent transportation systems.
- Workforce development.

# Office of Railroad Safety Support

All RD&T divisions support the Office of Railroad Safety (RRS) by providing subject matter expertise consultation, research, data, and tools to improve railroad safety and reduce accidents and incidents. RRS works closely with RD&T to provide insight into research needs throughout the fiscal year. RD&T needs the ability to support requests for research and expertise for time sensitive safety issues. RD&T plans to support the following RRS requested initiatives:

- Rail Information Sharing Environment (RISE) Developmental Evaluation Support.
- Periodic requests from RRS.

# Activities:

- Partner with RRS and industry on the RISE project.
- Conduct research of urgent safety issues.
- Provide SME support to RRS.

# Expected Outcomes:

- Analysis of safety risks and identifying mitigations to those risks.
- Growth and maturity of RISE including industry involvement.

Note: This funding will come from multiple divisions to support their research.

## Research with Universities

Research with Universities provides research opportunities to American academic institutions and this project attracts and funds proposals that have the potential of improving safety and performance in railroad systems in the following areas: track, rolling stock, train control & communication, and human factors. In addition, this project incorporates participation from railroad industry.

FRA will incorporate input that it receives from the railroad industry to determine research themes. These research themes will drive research topics. Research topics will be announced and reviewed and the most promising proposals will be selected for funding.

All selected proposals have the ultimate goals of improving railroad safety and performance, enhancing the infrastructure conditions and services by stimulating economic growth, and productivity and workforce development.

Activities:

- Publish the request for proposals.
- Review university proposals.
- Select prospective research projects.
- Fund and begin selected projects.

Expected Outcomes: The expected outcomes align with DOT priorities and include projects that focus on:

- Advanced technology.
- Safe automation
- Connected vehicle technologies.
- Clean energy research and safety.
- Workforce development.

## **Transportation Technology Center**

The primary objective of this funding is to develop unique R&D infrastructure to accommodate the testing and evaluation of intelligent railroad systems technologies and to provide the FRA with the type and quality of facilities and equipment needed to meet its R&D mission. Focused on enhancing railroad safety, TTC drives national R&D and application of new technology for railways, suppliers, governments, and others involved in rail transportation. This funding supports RD&T Facilities and Equipment Programs, which enhance rail transportation technology development, testing, and standards development. Additional funds will be used to purchase heavy equipment necessary to maintain the physical track infrastructure and rolling stock, such as track tampers and backhoes. These funds would also be used to purchase instrumentation that supports FRA research, such as ultrasonic test equipment, hi-speed cameras, and data acquisition systems.

Activities:

• FRA will fund selected site improvements and equipment at TTC that directly support R&D projects, including a track regulator to conduct maintenance on the track.

- Consolidate the Rail Flaw Library and the Nondestructive Evaluation (NED) of Railroad Tank Cars program at TTC.
- Refurbishment of the Linear Induction Motor Research Vehicle (LIMRV) to support the metallurgy research.
- Begin the first phase of building a test bed that can be used to validate the accuracy of track geometry measurement systems with a curved test track.

Expected Outcome:

- These activities support conducting rail transportation technology development, testing, and standards development.
- Rail stress and rail neutral temperature test bed at TTC.
- Test bed to validate the accuracy of track geometry measurement systems.
- Constructed curved test track.

# What benefits will be provided to the American public through this request and why is this program necessary?

R&D must play a foundational role in addressing the transportation challenges facing the United States. In addition to helping continuously improve railroad safety and operating performance, modest investments in R&D can pay significant dividends as the Biden-Harris Administration and industry partners take an "all-hands on deck" approach to tackling the climate crisis. Investments made today through FRA's R&D program may one day be the key to building more resilient infrastructure, developing more energy efficient rail platforms, or identifying and nurturing the next generation of rail industry leaders.

As described previously, FRA's research, development, and technology projects provide tangible safety and operational benefits to the railroad industry. FRA's applied research efforts help to develop innovative solutions to challenges facing the rail industry and ensures that the best available science and technology are the basis for FRA's safety regulatory actions, enforcement, and programs. FRA also develops technology that the rail industry can adopt voluntarily to improve safety. FRA conducts research, development, and technology initiatives independently and collaboratively to:

- Ensure safety is the paramount consideration in exploring new technologies and practices;
- Leverage public resources, disperse costs, and reduce or eliminate redundant efforts;
- Assess new concepts and technologies that the railroad industry is using; and
- Promote industry adoption of promising research results.

RD&T also focuses on technology transfer through the lifecycle of its research with the goal to engage stakeholders, internal and external, and to increase industry adoption of RD&T's concepts, research, and methodologies that enhance safety and performance of the railroads. RD&T's research, technology transfer activities include:

- Adoption of Technology
- Industry Conferences, Working Groups, Meetings, Presentations/Demonstrations
- Joint Research Activities with Federal partners
- Stakeholder Meetings
- Research Publications and Reports

Research into tank cars will benefit the American public by reducing the spillage of hazardous material. FRA's R&D program will help protect people who live in neighborhoods through which trains operate and reduce the likelihood of environmental damage due to hazardous material releases. Two areas of research that help achieve this are (1) reducing failures such as broken wheels and rails that cause derailments and (2) improving the strength of tank cars to better survive derailments that do occur.

Safe rail transportation directly benefits the public traveling by train. FRA's R&D program will reduce train collisions by facilitating the implementation of new technologies such as PTC. It will reduce collision risks when passenger trains share the same corridors as freight trains. The program will lay the foundation for future safety actions and approaches that will reduce the likelihood of derailments. FRA's R&D program will also improve occupant protection in collisions and derailments.

By addressing the root causes of grade crossing accidents, FRA's R&D program improves the safety of the American public that needs to cross railroad rights-of-way. Human factors research into driver behavior at highway-rail grade crossings and the effectiveness of alternative warning systems helps identify optimum solutions. Developing new technologies for crossing protection and train to vehicle communications leads to reduced incidents of grade crossings being blocked, which can delay emergency responders.

FRA's R&D program helps to reduce fatalities and injuries to trespassers on railroad property. Members of the public are known to take shortcuts across railroad property. Innovative solutions for warning people of the danger they face need to be researched and implemented.

By funding universities to conduct R&D, FRA supports a pipeline of future rail expertise by providing opportunity for students to prepare for rewarding jobs in the railroad industry. The age profile for railroad industry employees shows a growing demand for new entrants.

#### DEPARTMENT OF TRANSPORTATION FEDERAL RAILROAD ADMINISTRATION

#### NATIONAL RAILROAD PASSENGER CORPORATION APPROPRIATIONS LANGUAGE

#### NORTHEAST CORRIDOR GRANTS TO THE NATIONAL RAILROAD PASSENGER CORPORATION

To enable the Secretary of Transportation to make grants to the National Railroad Passenger Corporation for activities associated with the Northeast Corridor as authorized by section 11101(a) of the Fixing America's Surface Transportation Act (division A of Public Law 114-94), [\$700,000,000]\$1,300,000, to remain available until expended: Provided, That the Secretary may retain up to one-half of 1 percent of the funds provided under both this heading and the "National Network Grants to the National Railroad Passenger Corporation" heading to fund the costs of project management and oversight of activities authorized by section 11101(c) of division A of Public Law 114-94: Provided further, That in addition to the project management oversight funds authorized under section 11101(c) of division A of Public Law 114-94, the Secretary may retain up to an additional \$5,000,000 of the funds provided under this heading to fund expenses associated with the Northeast Corridor Commission established under section 24905 of title 49, United States Code: Provided further, That of the amounts made available under this heading and the "National Network Grants to the National Railroad Passenger Corporation" heading, not less than \$75,000,000 shall be made available to bring Amtrak-served facilities and stations into compliance with the Americans with Disabilities Act: Provided further, That of the amounts made available under this heading and the "National Network Grants to the National Railroad Passenger Corporation" heading, not less than [\$100,000,000]\$150,000,000 shall be made available to fund the replacement of the single-level passenger cars used on the Northeast Corridor, State-supported routes, and long-distance routes, as such terms are defined in section 24102 of title 49, United States Code.

#### NATIONAL NETWORK GRANTS TO THE NATIONAL RAILROAD PASSENGER CORPORATION

To enable the Secretary of Transportation to make grants to the National Railroad Passenger Corporation for activities associated with the National Network as authorized by section 11101(b) of the Fixing America's Surface Transportation Act (division A of Public Law 114-94), [\$1,300,000,000]*\$1,400,000,000*, to remain available until expended: Provided, That the Secretary may retain up to an additional \$2,000,000 of the funds provided under this heading to fund expenses associated with the State-Supported Route Committee established under section 24712 of title 49, United States Code[: Provided further, That at least \$50,000,000 of the amount provided under this heading shall be available for the development, installation and operation of railroad safety technology, including the implementation of a positive train control system, on State-supported routes as defined under section 24102(13) of title 49, United States Code, on which positive train control systems are not required by law or regulation: Provided further, That none of the funds provided under this heading shall be used by Amtrak to give notice under subsection (a) or (b) of section 24706 of title 49, United States Code, with respect to long-distance routes (as defined in section 24102 of title 49, United States Code) on which Amtrak is the sole operator on a host railroad's line and a positive train control system is not required by law or regulation, or, except in an emergency or during maintenance or construction outages impacting such routes, to otherwise discontinue, reduce the frequency of, suspend, or substantially alter the route of rail service on any portion of such route operated in fiscal year 2018, including implementation of service permitted by section 24305(a)(3)(A) of title 49, United States Code, in lieu of rail service].

Explanation: The FY 2022 President's Budget proposes to fund Amtrak grants under the account structure authorized by the FAST Act.

#### EXHIBIT III-1

#### GRANTS TO THE NATIONAL RAILROAD PASSENGER CORPORATION

#### Summary by Program Activity

#### Appropriations, Obligation Limitations, and Exempt Obligations

(\$000)

	(A)	<b>(B)</b>	(C)	(D)	<b>(E)</b>	(F)
	FY 2020 ACTUAL	FY 2020 CARES Act	FY 2021 ENACTED	FY 2021 CRRSA	FY 2021 American Rescue Plan	FY 2022 PRESIDENT'S BUDGET
Northeast Corridor Grants to the National Railroad Passenger Corporation	\$700,000	\$492,000	\$700,000	\$655,431	\$970,388	\$1,300,000
National Network Grants to the National Railroad Passenger Corporation	\$1,300,000	\$526,000	\$1,300,000	\$344,569	\$729,612	\$1,400,000
TOTAL	\$2,000,000	\$1,018,000	\$2,000,000	\$1,000,000	\$1,700,000	\$2,700,000
FTEs Direct Funded	12	0	19	0	0	29

#### **Program and Performance Statement**

FRA's Grants to Amtrak provide capital, operating, and debt service funding to Amtrak, as well as support FRA's management and oversight of Amtrak. These funds support Amtrak's three primary service lines – Northeast Corridor, State-Supported, and Long Distance – and costs associated with managing other passenger and freight rail operator access to Amtrak's infrastructure and Amtrak corporate operations.

#### **EXHIBIT III-1a**

# GRANTS TO THE NATIONAL RAILROAD PASSENGER CORPORATION SUMMARY ANALYSIS OF CHANGE FROM FY 2021 TO FY 2022 Appropriations, Obligations, Limitations, and Exempt Obligations (\$000)

	<u>\$000</u>	<u>FTE</u>
FY 2021 ENACTED	<u>\$2,000,000</u>	<u>19</u>
ADJUSTMENTS TO BASE:		
Annualization of Prior Pay Raises	8	
FY 2022 Pay Raises	63	
Inflation and other adjustments to base	340	
SUBTOTAL, ADJUSTMENTS TO BASE	\$410	0
PROGRAM INCREASES		
Salaries and Benefits	1,837	10
Travel	50	
Other contracts	1,203	
Northeast Corridor Grants to the National Railroad Passenger Corporation National Network Grants to the National Railroad	597,000	
Passenger Corporation	99,500	
SUBTOTAL, PROGRAM INCREASES	\$699,590	10
FY 2022 REQUEST	\$2,700,000	29

# Detailed Justification for the Grants to the National Railroad Passenger Corporation

## FY 2022 – Grants to the National Railroad Passenger Corporation – Budget Request (\$000)

Program Activity	FY 2020 Enacted	FY 2021 Enacted	FY 2022 Request
Northeast Corridor Grants to the National Railroad Passenger Corporation	\$700,000	\$700,000	\$1,300,000
National Network Grants to the National Railroad Passenger Corporation	\$1,300,000	\$1,300,000	\$1,400,000
Total	\$2,000,000	\$2,000,000	\$2,700,000
FTE	12	19	29

# What is this program and what does this funding level support?

As the nation's primary operator of intercity passenger rail service and majority owner of one of the most important transportation assets in the world – the Northeast Corridor – Amtrak delivers integral services to connect our country and drive economic prosperity. Since Amtrak began operations in 1971, the Federal Government has provided needed funding each year to support Amtrak's operations and certain basic capital obligations, with periodic special appropriations dedicated to specific purposes, such as the Northeast Corridor Improvement Project in the 1980s, the Northeast High-Speed Rail Improvement Project in the 1990s, the American Recovery and Reinvestment Act in 2009, and most recently, COVID relief funding in 2020 and 2021.

President Biden's American Jobs Plan represents the largest ever investment in Amtrak and intercity passenger rail. The American Jobs Plan would reverse decades of underinvestment in Amtrak and erase much of the backlog of state of good repair needs that have accumulated across the network. This deteriorating infrastructure and equipment are the source of costly delays and performance issues, and require expensive and inefficient maintenance to keep these assets in service.

The FY 2022 President's Budget underpins the American Jobs Plan by continuing to support Amtrak's basic operating needs and annual capital program, while providing the additional capital funding necessary to (1) prevent further assets from slipping into a state of disrepair and (2) implement incremental improvements to lay the groundwork for the mega-projects envisioned under the American Jobs Plan. The funding proposed for Amtrak in the FY 2022 President's Budget does not include further COVID relief funds; these needs will be continually assessed and determined based on Amtrak's FY 2021 ridership and revenue performance and updated forecasts for FY 2022.

# FRA FY 2022 Grant Program Structure

The FY 2022 President's Budget distinguishes clear objectives for FRA's three grant programs:

- Amtrak Provides support for Amtrak's basic capital, operating, and legacy debt service requirements.
- **CRISI** Invests in the world-class U.S. freight rail network with a particular emphasis on the capital needs of resource-constrained short line railroads along with safety and congestion relief projects for both freight and intercity passenger rail.
- **Passenger Rail Improvement, Modernization, and Expansion (PRIME)** Serves as the primary investment vehicle to modernize and expand existing intercity passenger rail corridors and develop new corridor services.

As Congress considers reauthorization principles, a dedicated and reliable funding source for Amtrak and competitive rail grants is key to develop rail industry capacity and strengthen project delivery capabilities to enable project sponsors and their partners to make the large-scale infrastructure investments needed to build back better.

The National Railroad Passenger Corporation (Amtrak) operates three primary types of intercity passenger rail services:

- 1. Higher speed, high frequency, Northeast Corridor (NEC) services;
- 2. **State-Supported**, short distance, corridor service on 28 routes that are located in densely populated regions and connections to smaller communities; and
- 3. Long Distance services on 15 routes greater than 750 miles that connect rural areas and population centers.

Amtrak has transformed its operations over the last 15 years, making significant strides to improve revenues, cost recovery, and ridership. This improvement is borne out by the corporation's FY 2019 performance metrics, which showed Amtrak posting record revenue and ridership of \$3.3 billion and 32.5 million passengers, respectively, while also driving down net operating losses to an all-time low of \$29.7 million.<sup>1</sup> Prior to COVID-19's dramatic effects on the transportation sector's travel demand and revenues, Amtrak was on pace to break-even operationally for the first time in its 50-year history in FY 2020.

<sup>&</sup>lt;sup>1</sup> Amtrak, <u>Monthly Performance Report</u>, FY 2019, April 10, 2020.



Amtrak Financial Performance (\$m)

Amtrak's inclusion in the broader surface transportation reauthorization in 2015 – the FAST Act – has led to the highest level of consistent Federal appropriations for Amtrak in the company's history. This funding, combined with record revenues, has helped put Amtrak and its state partners in position to begin undertaking multi-generational investments to replace the 100+ years old bridges and tunnels on the NEC, replace an aging fleet of passenger rail cars and locomotives that have outlasted their planned service horizons, and continue to deliver a competitive intercity transportation option to the traveling public.

The FY 2022 President's Budget requests \$2.7 billion for Amtrak. This funding represents a 35 percent increase over recent Amtrak funding levels and will provide much needed investment in Amtrak's core infrastructure requirements on both the NEC and National Network. The \$700 million increase proposed for Amtrak will:

- Accelerate track renewal and improvement projects to increase reliability;
- Renovate additional stations to enhance the customer experience;
- Increase overhauls and refreshes of the existing passenger rail fleet to sustain performance and continue driving ridership growth; and
- Ensure Amtrak's critical maintenance facilities and rail yards are equipped to handle the increase in rail funding and services.

# FY 2021 Accomplishments

Anticipated FY 2021 accomplishments for FRA's funding of Amtrak include:

- Continued monitoring and oversight of Amtrak's use of COVID-19 relief funds provided under the Coronavirus Aid, Relief, and Economic Security (CARES) Act, the Coronavirus Response and Relief Supplemental Appropriations (CRRSA) Act, and the American Rescue Plan (ARP) Act.
- Continued support of Amtrak's annual capital program to reduce their maintenance backlog and improve infrastructure, equipment, stations, facilities, information technology, and other support services required to provide intercity passenger rail operations.
- Continued manufacturing and testing of next-generation high-speed trainsets for the Acela service on the NEC and ongoing major station improvements at Washington Union Station, Baltimore Penn Station, and New Carrollton Station in Maryland. These projects were financed by the Department's Build America Bureau in 2016 through the Railroad Rehabilitation and Improvement Financing (RRIF) Program. The Moynihan Train Hall expansion to Penn Station in New York City was also financed through this RRIF loan and opened on January 1, 2021.
- Continued oversight of Amtrak's implementation of 5-year service line and asset line plans. Amtrak's asset lines include Transportation, Infrastructure, Equipment, Stations, and National Assets and Corporate Services. These plans complement the 5-year service line plans for NEC Intercity Operations, State-Supported, Long Distance, Infrastructure Access, and Ancillary Services. Asset lines provide resources and deliver transportation and related services to the service lines. The service line and asset line plans help to inform Amtrak's decision-making process and more clearly communicate with the Department, Congress, states, passengers and other partners on Amtrak's business priorities and financial performance.

The FY 2022 President's Budget request of \$2.7 billion for Amtrak includes:

**Northeast Corridor (\$1.3 billion):** The Northeast Corridor is the lifeblood to the region's economy, carrying more than 800,000 people each day on Amtrak and commuter services prior to the COVID-19 public health emergency. Amtrak's NEC train operations account for 38 percent of its ridership (12.5 million) and more than 40 percent of its operating revenue (\$1.3 billion).<sup>2</sup>

The FY 2022 President's Budget requests \$1.3 billion for the Northeast Corridor account – a \$600 million increase over FY 2021 and FY 2020 levels – to fund the following needs:

<sup>&</sup>lt;sup>2</sup> Amtrak, <u>Monthly Performance Report</u>, FY 2019, April 10, 2020.

- Normalized replacement of NEC infrastructure in order to maintain safe and reliable operations;
- Selected improvement projects beyond annual normalized replacement programs that improve corridor assets and operations;
- Pre-construction and advance planning for major NEC projects to advance these largescale efforts toward construction;
- Annual equipment maintenance overhauls, repairs, and refurbishments;
- Principal and interest payments on Amtrak's legacy debt that is attributable to the NEC;
- Information technology and other "backbone" services to support NEC infrastructure and operations;
- Upgrades and repairs to Amtrak-served stations on the NEC, including projects to bring stations into compliance with Americans with Disabilities Act (ADA) requirements; and
- Planning and stakeholder coordination activities carried out by the Northeast Corridor Commission, which includes representatives from each of the eight NEC states, the District of Columbia, Amtrak, and the U.S. Department of Transportation.

**National Network (\$1.4 billion):** Statute defines the National Network to include capital, operating, and debt service for Amtrak's State-Supported routes, Long Distance routes, and other activities not allocated to the Northeast Corridor. The FY 2022 President's Budget requests \$1.4 billion for the National Network account – a \$100 million increase over FY 2021 and FY 2020 levels – to fund the following needs:

- <u>Long Distance Routes (\$900 million)</u>: The 15 Long Distance routes currently operated by Amtrak serve more than 300 stations in 39 states. This funding will be used to provide the operating, capital, and debt service funding necessary to operate Long Distance trains.
- <u>State-Supported Routes (\$377 million</u>): The 28 State-Supported routes provide corridor service in 17 states. Section 209 of the Passenger Rail Investment and Improvement Act (PRIIA) required states to be financially responsible for supporting their corridor services, beginning in FY 2014. In FY 2019, states paid Amtrak nearly \$300 million for capital and operating costs associated with State-Supported routes. FRA funding will provide capital assistance for the infrastructure, equipment, stations, and other assets utilized for State-Supported services, as well as the operating costs not covered by PRIIA 209 state payments (\$58 million in FY 2019). Of this funding, \$2 million will support the operations of the State-Amtrak Intercity Passenger Rail Committee (SAIPRC), as authorized by the FAST Act.
- <u>Infrastructure Access (\$116 million)</u>: While the majority of track over which Amtrak trains operate are owned by other railroads, Amtrak owns some infrastructure outside of the NEC mainline on the National Network. Amtrak-owned or controlled infrastructure on the National Network includes, but is not limited to:
  - o 96 miles of the Michigan Line between Kalamazoo, MI Porter, IN;
  - o 103 miles of the Keystone Corridor between Philadelphia Harrisburg, PA;
  - o 61 miles of the Springfield Line between New Haven, CT Springfield, MA;

- 94 miles of the Hudson Line owned by CSX and leased to Amtrak between Poughkeepsie, NY - Hoffmans, NY (near Schenectady); and
- o the terminal areas in Chicago, New Orleans, and other locations.

For these Amtrak-owned or controlled infrastructure and facilities, Amtrak is responsible for planning, developing, managing, and providing access to other rail operators (freight and passenger) and public or private entities that use those assets.

Unlike on the NEC prior to COVID-19, National Network revenues are not sufficient to fully cover operating costs and Federal assistance is required.

• <u>FRA Oversight</u>: FRA has the responsibility to oversee the delivery of Amtrak's capital program, along with its operating initiatives. Improved project delivery of capital projects to maintain and improve infrastructure, equipment, stations, and systems are essential for Amtrak to continue meeting the needs of its customers. FRA has a particular interest in ensuring Amtrak enhances its delivery of the Americans with Disabilities Act (ADA) stations program. Congress directed FRA to oversee Amtrak performance and delivery by authorizing 0.5% of NEC and National Network appropriations to be dedicated to management oversight of Amtrak.

# What benefits will be provided to the American public through this request and why is this program necessary?

Amtrak has weathered many challenges over its 50-year existence, including multiple economic downturns, major regulatory changes affecting Amtrak's common carrier competition and partners, natural disasters, and a lack of sufficient capital funding to provide the optimal rail services our country deserves. Through it all, Amtrak has persevered and is relied on by millions of Americans for their business and personal travel needs. As the nation looks to overcome existing and new challenges – ranging from meeting the mobility needs of our increasing population to responding to COVID-19 to the Biden-Harris Administration's commitment to addressing racial equity and the climate crisis – Amtrak will continue to play an instrumental and expanding role in our transportation system.

Among major travel modes, Amtrak's intercity passenger rail network uniquely links small, midsize, and large communities to each other within a single journey, connecting Americans across the country and serving a wide diversity of trips. At the proposed funding level, Amtrak's intercity passenger rail system will be affirmed on a solid financial footing that enables recapitalization of the existing network and allows Amtrak to consider and undertake intercity passenger rail network growth and expansion for the first time in a generation.

**Vital Infrastructure** – The NEC service disruptions caused by infrastructure failures, mechanical issues, rail traffic congestion, and other factors already cost the economy \$500 million per year in lost productivity. A loss of all NEC services for just one day would cost the

economy an estimated \$100 million.<sup>3</sup> Total delay incidents and delay time on the NEC have declined more than 10 percent from FY 2017-FY 2019, indicating some progress in improving reliability and service performance for Amtrak and its fellow NEC rail operators. But delays on the NEC remain stubbornly high, with the network experiencing an average 50 hours of train delay daily during FY 2019. The NEC proved its vitality to the region during the COVID-19 pandemic, as well: even with ridership corridor-wide down more than 95 percent during April 2020, at the initial height of the outbreak, NEC operators carried more than 52,000 daily trips, providing reliable and necessary service to essential workers throughout the region. <sup>4</sup>

Helps Meet Travel Demand – More than two times as many people travel through Amtrak's Penn Station in New York every day than through JFK, LaGuardia and Newark airports combined.<sup>5</sup> In total, Amtrak provides a transportation choice to more than 500 communities across 46 of the 48 contiguous states. Over the last 15 years, Amtrak and its state partners have helped to increase ridership across the network by 35 percent, with the 28 State-Supported routes representing the fastest growing segment at 45 percent growth over this timeframe. The existing network can accommodate further growth within its current infrastructure and service capacity, and is poised to grow further with transformational investments through the new PRIME program.

**Economic Development** – In 2014, Amtrak and its passengers generated an economic benefit of approximately \$10.8 billion, which supported 117,200 jobs and generated \$1.7 billion in taxes for Federal, state, and local governments.6 In addition, station development yields sizable economic benefits including attracting housing and retail development, restored parks and civic and private buildings, an increase in housing and property rental values, and tourism growth. Recent station redevelopment examples include Raleigh, North Carolina and Niagara Falls, New York.

<sup>&</sup>lt;sup>3</sup> Northeast Corridor Commission, <u>NEC Annual Report FY17</u>, April 2018.

<sup>&</sup>lt;sup>4</sup> Northeast Corridor Commission, <u>NEC Annual Report FY20</u>, March 2021.

<sup>&</sup>lt;sup>5</sup> Amtrak, <u>New Passenger Information Displays Improve Customer Experience at Penn Station New York</u>, October 11, 2016.

<sup>&</sup>lt;sup>6</sup> Amtrak, <u>FY 2016 Budget and Business Plan</u>.

#### DEPARTMENT OF TRANSPORTATION FEDERAL RAILROAD ADMINISTRATION

#### CONSOLIDATED RAIL INFRASTRUCTURE AND SAFETY IMPROVEMENTS APPROPRIATIONS LANGUAGE

#### CONSOLIDATED RAIL INFRASTRUCTURE AND SAFETY IMPROVEMENTS

For necessary expenses related to Consolidated Rail Infrastructure and Safety Improvements Grants, as authorized by section 22907 of title 49, United States Code, \$375,000,000, to remain available until expended: [Provided, That of the amounts made available under this heading--(1) not less than 75,000,000 shall be for projects eligible under section 22907(c)(2) of title 49, United States Code, that support the development of new intercity passenger rail service routes including alignments for existing routes: Provided, That the Secretary shall give preference for pre-construction elements including preliminary engineering and final design of such projects; and (2) not less than \$25,000,000 shall be for capital projects and engineering solutions targeting trespassing: Provided, That the Secretary shall give preference for such projects that are located in counties with the most pedestrian trespasser casualties as identified in the Federal Railroad Administration's National Strategy to Prevent Trespassing on Railroad Property: Provided further, That section 22905(f) of title 49, United States Code, shall not apply to projects for the implementation of positive train control systems otherwise eligible under section 22907(c)(1) of title 49, United States Code: Provided further, That amounts made available under this heading for projects selected for commuter rail passenger transportation may be transferred by the Secretary, after selection, to the appropriate agencies to be administered in accordance with chapter 53 of title 49, United States Code: Provided further, That the Secretary shall not limit eligible projects from consideration for funding for planning, engineering, environmental, construction, and design elements of the same project in the same application: Provided further, That for amounts available under this heading eligible recipients under section 22907(b) of title 49, United States Code, shall include any holding company of a Class II railroad or Class III railroad (as those terms are defined in section 20102 of title 49, United States Code): Provided further, That unobligated balances remaining after 6 years from the date of enactment of this Act may be used for any eligible project under section 22907(c) of title 49, United States Code:] Provided, That for amounts available under this heading, eligible recipients under section 22907(b) of title 49, United States Code, shall include tribal governments and the District of Columbia, and for projects under section 22907(c)(10) of title 49, United States Code, non-profit organizations: Provided further, That for amounts available under this heading, eligible projects under section 22907(c)(8) of title 49, United States Code, shall also include railroad systems planning, including the preparation of regional intercity passenger rail plans and State Rail Plans, and railroad project development activities, including railroad project planning, preliminary engineering, and the development and analysis of project alternatives: Provided further, That for amounts available under this heading, eligible projects under section 22907(c) of title 49, United States Code, shall include projects to reduce trespassing on railroad property and along railroad rights-of-way, including capital projects, suicide prevention activities, deployment of trespasser prevention technology, and

enforcement activities: Provided further, That for amounts available under this heading, eligible recipients under section 22907(b) of title 49, United States Code, shall include any State, county, municipal, local, and regional law enforcement agency only for projects described in the preceding proviso: Provided further, That section 22905(c)(1) of title 49, United States Code, shall be applied at the Secretary's discretion: Provided further, That for projects benefitting underserved communities, as determined by the Secretary, the Federal share of total project costs shall not exceed 90 percent and sections 22907(e)(1)(A) and 22907(h)(2) of title 49, United States Code shall not apply: Provided further, That the Secretary may withhold up to [1]2 percent of the amount provided under this heading for the costs of award and project management oversight of grants carried out under section 22907 of title 49, United States Code.

Explanation of Changes: The President's Budget is requesting funding for this grant program that is authorized by the FAST Act. Proposed changes include adding the District of Columbia and tribal governments as eligible funding recipients, modifying eligibility and match requirements to advance racial equity objectives, closing a loophole in the CRISI statute that prevented non-profit entities that administer rail safety programs from serving as eligible recipients for otherwise eligible projects, clarifying eligibility of railroad trespass prevention capital projects and allowing law enforcement and suicide prevention activities, providing greater specificity regarding rail planning eligibilities, and other technical corrections to better accommodate the wide range of applicants and project types eligible for funding. FRA requires additional takedown to administer the CRISI program. CRISI has greatly expanded the pool of applicants eligible for FRA grants, including local governments and railroads. In particular, the 600 short line railroads eligible for CRISI lack experience applying for and managing federal grants. To mitigate this risk, FRA has dedicated increased staff and takedown resources for technical assistance, training, and outreach to potential grantees.

# EXHIBIT III-1 CONSOLIDATED RAIL INFRASTRUCTURE AND SAFETY IMPROVEMENTS Summary by Program Activity

# Appropriations, Obligation Limitations, and Exempt Obligations

#### (\$000)

	FY 2020 ACTUAL	FY 2021 ENACTED	FY 2022 PRESIDENT'S BUDGET
Consolidated Rail Infrastructure and Safety Improvements	\$325,000	\$375,000	\$375,000
TOTAL	\$325,000	\$375,000	\$375,000
FTEs Direct Funded	0	0	0

#### **Program and Performance Statement**

The Consolidated Rail Infrastructure and Safety Improvements (CRISI) program was authorized by Congress to improve the safety, efficiency, and reliability of passenger and freight rail systems. Eligible activities include a wide range of freight and passenger rail capital, safety technology deployment, planning, environmental analyses, research, workforce development, and training projects. Eligible recipients include states, local governments, Class II and Class III railroads, Amtrak and other intercity passenger rail operators, rail carriers and equipment manufacturers that partner with an eligible public-sector applicant, the Transportation Research Board, University Transportation Centers, and non-profit rail labor organizations. As authorized by statute, the CRISI program requires a minimum non-Federal share of 20 percent, that preference be given to projects with at least a 50 percent non-Federal match, and that at least 25 percent of funds be provided to projects in rural areas.

#### **EXHIBIT III-1a**

# CONSOLIDATED RAIL INFRASTRUCTURE AND SAFETY IMPROVEMENTS SUMMARY ANALYSIS OF CHANGE FROM FY 2021 TO FY 2022 Appropriations, Obligations, Limitations, and Exempt Obligations (\$000)

	<u>\$000</u>	<u>FTE</u>
FY 2021 ENACTED	<u>\$375,000</u>	<u>0</u>
PROGRAM REDUCTIONS		
Consolidated Rail Infrastructure and Safety Improvements	-3,750	
SUBTOTAL, PROGRAM REDUCTIONS	-\$3,750	0
PROGRAM INCREASES		
Other contracts	3,750	
SUBTOTAL, PROGRAM INCREASES	\$3,750	0
FY 2022 REQUEST	\$375,000	0

Detailed Justification for the Consolidated Rail Infrastructure and Safety	Improvements
--	--------------

Program Activity	FY 2020 Enacted	FY 2021 Enacted	FY 2022 Request
Consolidated Rail Infrastructure and Safety Improvements	\$325,000	\$375,000	\$375,000
Total	\$325,000	\$375,000	\$375,000
FTE	0	0	0

# FY 2022 Consolidated Rail Infrastructure and Safety Improvements Budget Request (\$000)

# What is this program and what does this funding level support?

The Consolidated Rail Infrastructure and Safety Improvements (CRISI) program is FRA's most oversubscribed and flexible grant program, supporting a wide range of freight and intercity passenger rail projects to improve safety, efficiency, and reliability. Since the program was first funded in FY 2017, FRA has received over \$3.1 billion in funding requests for the nearly \$1.2 billion that has been made available and awarded through FY 2020.

The FY 2022 President's Budget clarifies the roles and purposes of Federal rail investment programs and proposes several important reforms that will enable the CRISI program to advance the Biden-Harris Administration's transportation agenda, particularly in addressing racial and socioeconomic equity and the climate crisis.

# <u>CRISI Awards (FY 2017 – FY 2020)</u>



# FRA FY 2022 Grant Program Structure

The FY 2022 President's Budget distinguishes clear objectives for FRA's three grant programs:

- Amtrak Provides support for Amtrak's basic capital, operating, and legacy debt service requirements.
- **CRISI** Invests in the world-class U.S. freight rail network with a particular emphasis on the capital needs of resource-constrained short line railroads along with safety and congestion relief projects for both freight and intercity passenger rail.
- **Passenger Rail Improvement, Modernization, and Expansion (PRIME)** Serves as the primary investment vehicle to modernize and expand existing intercity passenger rail corridors and develop new corridor services.

The CRISI program's authorization under the FAST Act is broad, covering a wide range of safety and operational improvements for both freight and intercity passenger rail. Many of the intercity passenger rail eligibilities of CRISI overlap with the FAST Act's Federal-State Partnership for State of Good Repair program, which caused confusion and duplicative work by the applicant community. The FY 2022 President's Budget proposes to steer applications for major investments to grow and improve intercity passenger rail service to the new PRIME program, and focus CRISI funding towards projects that strengthen the freight rail network and improve both freight and intercity passenger rail safety and fluidity.

As Congress considers reauthorization principles, a dedicated and reliable funding source for Amtrak and competitive rail grants is key to develop rail industry capacity and strengthen project delivery capabilities to enable project sponsors and their partners to make the large-scale infrastructure investments needed to build back better.

## 1. Advancing Racial Equity and Tackling the Climate Crisis

The CRISI program is particularly well-suited to support two of the Biden-Harris Administration's primary transportation priorities – addressing racial equity and the climate crisis.

#### Racial Equity

• The FY 2022 President's Budget proposes to dedicate at least **\$50 million in CRISI funds to grade separations, rail line relocation projects, and other countermeasures** to mitigate the safety risks and detrimental quality of life effects that rail lines can have on communities, particularly low-income areas and communities of color. Grade separating highway-rail crossings can alleviate hazards to both pedestrians and motor vehicles at crossings that experience high volumes of traffic, are poorly configured and present safety issues due to their design, or block community access due to the frequency or length of


trains that pass through. While many towns and cities were built around rail investments dating back a century or more, these rail lines often bisect communities and neighborhoods, and present barriers to important services and opportunities.

- Consistent with the Justice 40 Initiative, FRA intends to work to ensure at least 40 percent of CRISI funding benefits underserved or disadvantaged communities.<sup>1</sup> CRISI projects that create long-term jobs, alleviate congestion and safety risks, and increase access to community services and employment will be prioritized.
- The FY 2022 President's Budget also proposes to eliminate the statutory preference for a 50 percent non-Federal match for the CRISI program for projects in or benefiting underserved communities. Similarly, FRA proposes to reduce the required match for such projects from 20 percent to 10 percent.
- The FY 2022 President's Budget also proposes to add tribal governments as eligible funding recipients under the CRISI program.

## Climate Crisis

- By many measures, rail is among the most energy-efficient modes of transportation, particularly when dealing with the movement of freight. Rail carries approximately onethird of all freight on a ton-miles basis<sup>2</sup>, yet consumes less than 2 percent of transportation sector energy.<sup>3</sup>
- Diverting even a small portion of freight that moves by truck to rail could result in considerable reductions in fuel consumption and greenhouse gas emissions. In March 2021, the Association of American Railroads issued a climate change report that estimated greenhouse gas emissions could fall by more than 17 million tons annually if 10 percent of freight shipped by the largest trucks were shifted to rail – equivalent to removing 3.35 million cars from highways or planting 260 million trees.<sup>4</sup>
- While the seven Class I railroads that own approximately 70 percent of the U.S. rail network generate nearly \$70 billion in annual operating revenues, there are over 600 additional regional and short line railroads that comprise the network. These short line railroads play a vital role in the U.S. transportation system, often providing the first- and last-mile connections to the Class I network for freight shippers and customers. However, unlike the Class I railroads, many short line railroads lack the capital funding necessary to invest in improvements to their infrastructure and equipment. In 2014, FRA surveyed the industry and estimated that a nearly \$7 billion funding gap existed to address the current and near-term capital needs of Class II and Class III short line railroads.<sup>5</sup> The CRISI program has provided a vital infusion of funding in this sector, supporting nearly 90 short line projects totaling \$500 million over the last four years. The FY 2022 President's Budget would continue to provide resources to short line railroads to maintain fluidity on the network and accommodate future growth.

<sup>&</sup>lt;sup>1</sup> Executive Order 13985, Advancing Racial Equity and Support for Underserved Communities Through the Federal Government defines "equity" and "underserved communities."

<sup>&</sup>lt;sup>2</sup> U.S. Department of Transportation, Bureau of Transportation Statistics, U.S. Ton-Miles of Freight, July 2020.

<sup>&</sup>lt;sup>3</sup> U.S. Department of Transportation, Bureau of Transportation Statistics, Energy Consumption by Mode of <u>Transportation</u>, February 2021. <sup>4</sup> Association of American Railroads, <u>Freight Railroads & Climate Change</u>, March 2021.

<sup>&</sup>lt;sup>5</sup> FRA, Summary of Class II and Class III Railroad Capital Needs and Funding Sources, October 2014.

• CRISI can also play a substantial role in helping short line railroads retire their aging locomotive fleet and replace them with greener technologies that will reduce harmful emissions, including more efficient diesel locomotives and emerging technologies such as battery and hydrogen fuel cell propulsion systems. FRA will encourage short line railroads to apply for such projects during the FY 2022 funding process.

## 2. Strengthening the CRISI Program

In addition to new priorities related to racial equity and climate change described above, the FY 2022 President's Budget proposes a number of other measures to enhance the CRISI program's ability to prevent trespassing along railroad rights-of-way and address other safety and project delivery challenges. These improvements include:

- Making capital projects focused on trespass prevention and the deployment of trespass prevention technology explicitly eligible for funding.
- Adding suicide prevention activities and enforcement of state and local laws relating to railroad trespass violations as eligible grant projects, as well as the relevant law enforcement agencies charged with carrying out such projects as eligible recipients.
- Closing a loophole in the CRISI statute that prevented non-profit entities that administer
  rail safety programs from serving as eligible recipients for otherwise eligible projects
  under the program. For example, non-profits such as Operation Lifesaver and the Short
  Line Safety Institute which have historically received funding through FRA's S&O and
  R&D accounts, respectively will now receive funding to support their important
  railroad safety missions through CRISI. FRA proposes setting aside \$1 million for
  Operation Lifesaver and \$2.5 million for the Short Line Safety Institute, consistent with
  FY 2021 funding levels. FRA also proposes to waive the non-Federal match requirements
  for these two projects, which have not historically been required to provide a match under
  their previous FRA grant funding.
- Clarifying the eligibility of rail planning activities to ensure projects can be efficiently developed and to better align rail planning steps with the identification of project alternatives and environmental reviews required under the National Environmental Policy Act.

The FY 2022 President's Budget seeks to utilize the new and clarified authorities above to emphasize investment in **Railroad Trespassing Enforcement and Suicide Prevention.** Trespassing on a railroad's private property and along railroad rights-of-way is the leading cause of railrelated fatalities in America. Since 1997, more people have been fatally injured each year by trespassing than in motor vehicle collisions with trains at highway-rail grade crossings. Nationally, approximately 500 trespassing deaths occur each year. An average of an additional 289 people commit suicide each year on the U.S. rail system.



FRA's 2018 *National Strategy to Prevent Trespassing on Railroad Property* report to Congress established a strategic priority for FRA to identify grant funding opportunities to combat railroad trespassing. Since FY 2019, FRA has allocated approximately \$3 million through the Safety and Operations account for pilot initiatives in the areas of trespass law enforcement and suicide prevention. Early results from the initial grants have shown promising results, with over 500 trespass arrests or warnings issued to date and an officer funded through a grant saving the life of an unconscious individual laying between the gage of the rail.

The FY 2022 President's Budget proposes to significantly amplify the resources available to combat railroad trespassing by expanding eligibility for these critical safety initiatives under CRISI. In addition to trespass prevention capital and technology deployment projects eligible under CRISI, the FY 2022 President's Budget requests to dedicate at least \$10 million to law enforcement agencies to investigate compliance with and enforcement of rail trespass-related laws and for railroad carriers to initiate or expand efforts to prevent trespass suicide.

Additional information on other potential safety and infrastructure projects that could be funded from the CRISI program include:

**Grade Crossing Enhancements** – Improving safety at the more than 130,000 public highwayrail at-grade crossings in the United States is a top FRA priority. Each crossing represents a potential collision location between a train and motor vehicle, and the risk of highway-rail grade crossing incidents is likely to grow as future train and highway traffic increases. To date, the CRISI program has helped to fund improvements at more than 1,000 grade crossings.

**Rail Network Congestion Relief and Fluidity Improvements** – There are a number of key chokepoints on the U.S. rail network where heavy volumes or a confluence of freight and passenger trains introduce critical mobility delays, which can have far-reaching effects on both shippers and passengers across the rail network including in Chicago, St. Louis and Northern Virginia, as illustrative examples.

**Positive Train Control (PTC)** – While the rail industry successfully met the December 31, 2020 PTC implementation deadline, additional grant funds are available through the CRISI program to support new railroads that may be required to implement PTC or to help the industry build on and enhance PTC's capabilities for ensuring safety and improving operational efficiencies. To date, the CRISI program has funded 40 PTC projects totaling \$253 million.



## Summary of Key CRISI Project Funding Statistics (FY 2017 – FY2020)

## FY 2021 Accomplishments

Anticipated FY 2021 accomplishments for CRISI include:

- Announce selections for FY 2021 CRISI funding.
- Continue obligating grants selected under prior CRISI funding solicitations.
- Conduct stakeholder outreach and technical assistance to provide feedback to applicants to strengthen future applications.

# What benefits will be provided to the American public through this request and why is this program necessary?

Our nation's rail network is a critical component of the U.S. transportation system and economy. Prior to the COVID-19 public health emergency, rail carried over 32.5 million passengers on Amtrak services<sup>6</sup> and approximately 1.6 billion tons of freight valued at over \$600 billion each year.<sup>7</sup> The Consolidated Rail Infrastructure and Safety Improvements program will enhance rail safety, help to undo inequities caused by transportation and land use policies and create new opportunities for underserved communities, provide energy efficient transportation options to confront the effects of climate change, invest in projects that spur economic growth, and ensure our would-class freight network can meet the mobility demands of a growing population.



U.S. Rail System

**Increased Safety** – According to a report by the OneRail Coalition, fatal accidents involving freight rail take place at less than one-third the rate of truck accidents. Accidents involving injuries are one-fifth as frequent, and property damage accidents are 62 times less frequent.<sup>8</sup> However, opportunities exist to further improve the safety of the rail network.

<sup>&</sup>lt;sup>6</sup> Amtrak, <u>Monthly Performance Report</u>, FY 2019, April 10, 2020.

<sup>&</sup>lt;sup>7</sup> U.S. Department of Transportation, Bureau of Transportation Statistics, <u>Freight Facts and Figures</u>.

<sup>&</sup>lt;sup>8</sup> OneRail, <u>Rail Safety in the United States</u>, 2016.

**Freight and Passenger Growth** – Each American requires the movement of approximately 40 tons of freight per year across the freight network and approximately 85,000 passengers per day ride intercity trains. In addition to its intercity riders, the Northeast Corridor supports more than 700,000 commuter rail passengers per day. By 2045, the U.S. freight system is projected to experience a nearly 40 percent increase in the total amount of tonnage it moves, with the rail share expected to increase by 24 percent.<sup>9</sup> Over this same timeframe, U.S. population is anticipated to grow by nearly 20 percent. Passenger and freight rail transportation must play a critical role in accommodating this projected growth and provide an alternative to the nation's increasingly congested airports and highways.

**Energy Efficient** – The United States uses more than 11 million barrels of petroleum products every day for transportation, representing two-thirds of the nation's petroleum usage.<sup>10</sup> On average, rail transportation is four times more fuel efficient than trucks. On average, U.S. railroads move a ton of freight an average of 470 miles per gallon of fuel.<sup>11</sup>

**Private Sector Partnership** – The majority of both freight and intercity passenger rail services operate over privately-owned infrastructure, which enables private investment that generates significant public benefits. The Association of American Railroads estimates that U.S. freight railroads have invested approximately \$740 billion over the last 40 years to maintain and improve their assets.<sup>12</sup> Given the variety of private and public sector stakeholders and benefits associated with rail projects, the CRISI program is well-positioned to attract funding from multiple project partners from both the public and private sectors.

<sup>9</sup> U.S. DOT, <u>Beyond Traffic 2045</u>, January 2017.

<sup>&</sup>lt;sup>10</sup> U.S. Energy Information Administration, Monthly Energy Review, March 2021.

<sup>&</sup>lt;sup>11</sup> Association of American Railroads, <u>Sustainability Fact Sheet</u>, March 2021.

<sup>&</sup>lt;sup>12</sup> Association of American Railroads, <u>Railroad 101</u>, March 2021.

## DEPARTMENT OF TRANSPORTATION FEDERAL RAILROAD ADMINISTRATION

## PASSENGER RAIL IMPROVEMENT, MODERNIZATION, AND EXPANSION GRANTS APPROPRIATIONS LANGUAGE

## PASSENGER RAIL IMPROVEMENT, MODERNIZATION, AND EXPANSION GRANTS

For necessary expenses related to grants for projects that improve the state of good repair, operational performance, or growth of intercity rail passenger transportation, \$625,000,000, to remain available until expended: Provided, That the Secretary may withhold up to 2 percent of the amount provided under this heading for the costs of award and project management oversight of grants carried out under this heading.

Explanation: The President's Budget is requesting funding for this new dedicated program for intercity passenger rail development.

## EXHIBIT III-1 PASSENGER RAIL IMPROVEMENT, MODERNIZATION, AND EXPANSION GRANTS

## Summary by Program Activity Appropriations, Obligation Limitations, and Exempt Obligations (\$000)

	FY 2020 ACTUAL	FY 2021 ENACTED	FY 2022 PRESIDENT'S BUDGET
Passenger Rail Improvement, Modernization, and Expansion Grants	\$0	\$0	\$625,000
TOTAL	\$0	\$0	\$625,000
FTEs Direct Funded	0	0	0

#### **Program and Performance Statement**

The Passenger Rail Improvement, Modernization, and Expansion Grants (PRIME) program will serve as FRA's primary grant program to expand existing intercity passenger rail corridors and develop new corridor services. Eligible projects include pre-construction activities – such as planning, environmental analysis, and engineering work – and capital construction. Funding will also be available to provide transition operating assistance for new corridors or major enhancements to existing corridors, such as the introduction of new frequencies. Eligible recipients include states, tribal governments, local governments, Amtrak and other intercity passenger rail operators. This new program will require a minimum non-Federal match of 10 percent and applications must be supported by a benefit-cost analysis.

## **EXHIBIT III-1a**

# PASSENGER RAIL IMPROVEMENT, MODERNIZATION, AND EXPANSION GRANTS SUMMARY ANALYSIS OF CHANGE FROM FY 2021 TO FY 2022 Appropriations, Obligations, Limitations, and Exempt Obligations (\$000)

	<u>\$000</u>	FTE
FY 2021 ENACTED	<u>\$0</u>	<u>0</u>
PROGRAM INCREASES		
Other contracts	12,500	
Passenger Rail Improvement, Modernization,		
and Expansion Grants	612,500	
SUBTOTAL, PROGRAM INCREASES	\$625,000	0
FY 2022 REOUEST	\$625,000	0

## Detailed Justification for the Passenger Rail Improvement, Modernization, and Expansion Grants

## FY 2022 Passenger Rail Improvement, Modernization, and Expansion Grants Budget Request (\$000)

Program Activity	FY 2020 Enacted	FY 2021 Enacted	FY 2022 Request
Passenger Rail Improvement, Modernization, and Expansion Grants	\$0	\$0	\$625,000
Total	<b>\$0</b>	<b>\$0</b>	\$625,000
FTE	0	0	0

## What is this program and what does this funding level support?

The nation's rail networks have the potential to offer safe, reliable, efficient, and climate-friendly alternatives for moving people and freight. America's freight rail system is the envy of the world and generates significant return on private capital to maintain much of the network. While Amtrak and its state partners – as well as new services like Connecticut's CT*rail* and the privately-sponsored Brightline operation in Florida – have helped to grow intercity passenger rail over the last decade, these services provide for a fraction of the demand that exists. If intercity passenger rail is to fulfill its potential in helping to meet the mounting transportation challenges facing the country, then a **dedicated investment program supported by dedicated funding** is required. The FY 2022 President's Budget proposes \$625 million for a new program to serve this purpose – the Passenger Rail Improvement, Modernization, and Expansion (PRIME) program.

The greatest impediment to maintaining the country's intercity passenger rail infrastructure and making well-planned investments to expand passenger service has been the lack of a dedicated funding source for rail. For decades, Congress has funded highway, transit, and airport programs through multi-year authorizations that provide dedicated funding. By establishing a dedicated intercity passenger rail development program in PRIME, the FY 2022 President's Budget will transform rail infrastructure investment and build needed capacity among rail stakeholders. The Biden-Harris Administration's commitment to ensuring our infrastructure is made in America by America's workers in combination with the PRIME program will also strengthen domestic manufacturing and supply industries and create well-paying jobs.

# FRA FY 2022 Grant Program Structure

The FY 2022 President's Budget distinguishes clear objectives for FRA's three grant programs:

- Amtrak Provides support for Amtrak's basic capital, operating, and legacy debt service requirements.
- **CRISI** Invests in the world-class U.S. freight rail network with a particular emphasis on the capital needs of resource-constrained short line railroads along with safety and congestion relief projects for both freight and intercity passenger rail.
- **PRIME** Serves as the primary investment vehicle to modernize and expand existing intercity passenger rail corridors and develop new corridor services.

The PRIME program consolidates and expands the two competitive passenger-rail focused grant programs authorized under the FAST Act – the Federal-State Partnership for State of Good Repair (Partnership) program and the Restoration & Enhancement Grants (R&E) program. The Partnership program is limited to projects located on publicly-owned or Amtrak-owned infrastructure, which diminishes the program's ability to fund the most meritorious projects in the pipeline. The R&E program provides operating assistance grants for initiating, restoring, or enhancing intercity passenger rail transportation. FRA proposes to incorporate and modify the R&E eligibilities within the PRIME program to provide a comprehensive intercity passenger rail development program.

As Congress considers reauthorization principles, a dedicated and reliable funding source for Amtrak and competitive rail grants is key to develop rail industry capacity and strengthen project delivery capabilities to enable project sponsors and their partners to make the large-scale infrastructure investments needed to build back better.

Key elements of the PRIME program's design and structure include:

• Eligible Projects – The PRIME program is intended to support the full lifecycle of rail project development and delivery – planning, environmental analysis, engineering, and construction. The program is also intended to be technology neutral, allowing for both conventional and high-speed intercity passenger rail projects, as well as emerging technologies.

In addition to supporting traditional capital construction and pre-construction costs, PRIME proposes to also fund operating expenses for certain rail improvements and new services. Modeled after the FAST Act's R&E program, PRIME would provide transition operating assistance as new services or new frequencies on existing services are introduced. This operating support would be phased-out over time as the new or improved services build their ridership and revenue base.

Top help unlock the potential of the Railroad Rehabilitation and Improvement Financing (RRIF) program to advance intercity passenger rail projects, PRIME funding may also be

used to cover a portion of the credit risk premium that the RRIF program requires borrowers to pay.

The Biden-Harris Administration's historic \$80 billion proposal for rail in the American Jobs Plan will address Amtrak's repair backlog; modernize the high traffic Northeast Corridor; improve existing corridors and connect new city pairs; and enhance grant and loan programs that support passenger and freight rail safety, efficiency, and electrification. Under the FY 2022 President's Budget, the PRIME program will complement the mega-projects and corridor-wide investments covered under the American Jobs Plan by funding projects to improve reliability, speed, and trip times across the network, as well as continue planning and project development work for larger projects.

- Funding Recipients The PRIME program envisions supporting the wide range of funding recipients that may be responsible for sponsoring or advancing intercity passenger rail projects, including:
  - o States
  - Interstate compacts
  - Public agencies and publicly charted authorities established by states
  - Amtrak and other rail carriers that provide intercity passenger rail transportation
  - Local governments
  - Tribal governments, who have previously not been directly eligible for intercity passenger rail grant funding
- Award Process In order to ensure an equitable geographic distribution of rail funding that supports the rail network's current needs and accommodates future growth, the PRIME program will ensure that both the Northeast Corridor (NEC) and projects located off the

corridor receive no less than 40 percent of funds each year. These off-corridor projects could include improvements or additions to Amtrak's National Network or projects where intercity passenger rail service is provided by operators other than Amtrak.



Under the PRIME program, potential **projects located off the NEC would compete for funding** through traditional grant evaluation processes used by FRA under CRISI and previous programs. **Funding for projects on the NEC would be awarded and sequenced according to a DOT-approved plan submitted by the NEC Commission**. The NEC Commission is currently developing a systematic plan to identify and sequence the infrastructure investments along the corridor, known as the Connect 2035 plan<sup>1</sup>, which would likely serve as the basis for such a DOT-approved plan.



<sup>1</sup> NEC Commission, <u>Connect NEC 2035</u>, accessed April 2021.

# What benefits will be provided to the American public through this request and why is this program necessary?

The United States faces a number of interrelated transportation challenges that pose a significant threat to our nation today and in the future. As outlined in President Biden's Executive Order on Tackling the Climate Crisis at Home and Abroad<sup>2</sup>, the country and the world must act now to avoid the looming catastrophic impacts of climate change. Our transportation policies and investment decisions have also done a disservice to many Americans, from segregating and displacing communities to not ensuring that all individuals can access our rail stations and trains over 30 years after the passage of the Americans with Disabilities Act. While the American Jobs Plan will help to right some of these inequities, a one-time funding infusion is not sufficient to solve climate change or provide underserved communities with the first-rate transportation choices all Americans deserve. Sustained investment in intercity passenger rail infrastructure and services is necessary to continue advancing these priorities and to provide for the mobility and economic security needs of a population that is projected to grow by nearly 70 million over the next 40 years.

**Demand for Rail** – Prior to the COVID-19 pandemic, Amtrak set an all-time ridership record, carrying over 32.5 million passengers in FY 2019. This performance is even more impressive when taking into consideration that many major markets across the country – and particularly in the Southeast, Southwest, and Texas – are either grossly underserved or not served by rail at all. Of the top ten fastest growing metropolitan areas over the last decade, only three major markets are served by at least three intercity passenger rail trains per day. Over the last 15 years, states, public rail authorities, FRA, and some private sector entities have led extensive planning studies and project development work to establish a pipeline of corridors and projects ready for investment.

Rank	Metropolitan Area	July 2019 Population	Population Growth 2010-2019	Major Metro Station	Number of Daily Round Trip Trains
1	Dallas-Fort Worth-Arlington, TX	7.573.136	1.206.599	Dallas	1
		.,	1,200,000	Fort Worth	2
2	Houston-The Woodlands-Sugar Land, TX	7,066,141	1,145,654	Houston	<1
3	Phoenix-Mesa-Chandler, AZ	4,948,203	755,074	N/A <sup>1</sup>	0
4	Atlanta-Sandy Springs-Alpharetta, GA	6,020,364	733,646	Atlanta	1
5	Washington, Arlington, Alexandria, DC-VA-MD-WV	6,280,487	630,799	Washington	45
(			(00.214	Miami (Amtrak)	2
0	Miami-Fort Lauderdale-Pompano Beach, FL	L 6,166,488 600,214 Miami (I		Miami (Brightline)	17
7	Seattle-Tacoma-Bellevue, WA	3,979,845	540,037	Seattle	7
8	Austin-Round Rock, Georgetown, TX	2,227,083	510,760	Austin	1
9	Orlando-Kissimmee-Sanford, FL	2,608,147	473,748	Orlando	2
10	Riverside-San Bernardino-Ontario, CA	4,650,631	425,683	Riverside	1

Тл	n 10	Metro	nolitan	Areas l	hv N	umeric	Growth	(2010 -	2019)
10	h 10	with	pontan	AI Cas	UYIN	unicite	Growin	(2010 -	<b>4</b> 017)

1/ Maricopa, located 35 miles south of Phoenix, is the closest station serving Phoenix with trains arriving/departing only three days per week.

<sup>2</sup> Executive Order 14008, <u>Tackling the Climate Crisis at Home and Abroad</u>, January 27, 2021.

**Mounting Congestion** – As the U.S. population grows, so too does the use of its transportation systems. The Texas A&M Transportation Institute found that the cost of traffic congestion has increased from \$15 billion per year in 1982 to \$179 billion in 2017, when factoring in lost time, productivity, and fuel consumption.<sup>3</sup> The U.S. Department of Transportation's Freight Analysis Framework projects significant increases in highway congestion over the next 25 years, as shown in the maps below<sup>4</sup>. Investing in intercity passenger rail will offer a release valve for highway and aviation congestion, especially in markets where further highway and airport expansion may be geographically infeasible due to land use, environmental, and community impacts – particularly the disadvantaged communities that were already failed by previous investments that displaced and disrupted residents.



<sup>3</sup> Texas A&M Transportation Institute, <u>2019 Urban Mobility Report</u>, August 2019.

<sup>4</sup> U.S. Department of Transportation, Bureau of Transportation Statistics, <u>Freight Facts and Figures</u>.

Miles

**Greenhouse Gas Emissions** – Each year, the U.S. Environmental Protection Agency compiles the *Inventory of U.S. Greenhouse Gas Emissions and Sinks*<sup>5</sup>, which provides a comprehensive accounting of total greenhouse gas emissions for all man-made sources in the United States. While greenhouse gas emissions in the U.S. have fallen from their peak in the mid-2000s, they are still 1.8 percent higher than they were in thirty years ago. In 2019, transportation accounted for nearly 29 percent of all U.S. greenhouse gas emissions. The transportation sector must do its part in reducing these harmful emissions and meeting our climate goals. This includes not only adopting more energy efficient vehicles and fuel alternatives, but expanding investment and use of passenger rail options for intercity travel. Trips on Amtrak are more energy efficient than similar trips by car or plane, with data from 2018 showing Amtrak used 45 percent less energy than car travel and 33 percent less than air travel per passenger mile.<sup>6</sup> Amtrak has reduced its greenhouse gas emissions by 20 percent since 2010 and continues to seek efficiencies and emissions reductions across its business.<sup>7</sup>

<sup>&</sup>lt;sup>5</sup> U.S. Environmental Protection Agency, <u>U.S. Greenhouse Gas Emissions and Sinks: 1990-2019</u>, April 2021.

<sup>&</sup>lt;sup>6</sup> U.S. Department of Energy, Oak Ridge National Laboratory, <u>Transportation Energy Data Book</u>, Edition 39, Table 2.13, February 2021.

<sup>&</sup>lt;sup>7</sup> Amtrak, <u>Travel Green</u>, accessed April 2021.

### ADMINISTRATIVE PROVISIONS APPROPRIATIONS LANGUAGE

### ADMINISTRATIVE PROVISIONS – FEDERAL RAILROAD ADMINISTRATION [(INCLUDING RESCISSIONS)]

Sec. 150 None of the funds made available to the National Railroad Passenger Corporation may be used to fund any overtime costs in excess of \$35,000 for any individual employee: Provided, That the President of Amtrak may waive the cap set in the preceding proviso for specific employees when the President of Amtrak determines such a cap poses a risk to the safety and operational efficiency of the system: Provided further, That the President of Amtrak shall report to the House and Senate Committees on Appropriations no later than 60 days after the date of enactment of this Act, a summary of all overtime payments incurred by Amtrak for [2020]2021 and the 3 prior calendar years: Provided further, That such summary shall include the total number of employees that received waivers and the total overtime payments Amtrak paid to employees receiving waivers for each month for [2020]2021 and for the 3 prior calendar years.

[Sec. 151 None of the funds made available to the National Railroad Passenger Corporation under the headings "Northeast Corridor Grants to the National Railroad Passenger Corporation" and "National Network Grants to the National Railroad Passenger Corporation" may be used to reduce the total number of Amtrak Police Department uniformed officers patrolling on board passenger trains or at stations, facilities or rights-of-way below the staffing level on May 1, 2019.

Sec. 152 None of the funds made available by this Act may be used by the National Railroad Passenger Corporation in contravention of the Worker Adjustment and Retraining Notification Act (29 U.S.C. 2101 et seq.).

Sec. 153 The matter under the heading "Department of Transportation--Federal Railroad Administration--Consolidated Rail Infrastructure and Safety Improvements"—

- (1) in division G of the Consolidated Appropriations Act, 2019 (Public Law 116-6) is amended by striking "4 years" and inserting "6 years" in the fourth proviso; and
- (2) in division H of the Further Consolidated Appropriations Act, 2020 (Public Law 116-94) is amended by striking "4 years" and inserting "6 years" in the fourth proviso.

Sec. 154 Of the unobligated balances of funds remaining from-

- "Capital and Debt Service Grants to the National Railroad Passenger Corporation" accounts totaling \$10,458,135.54 appropriated by the following public laws are hereby permanently rescinded:
  - (A) Public Law 112-10 a total of \$289,234.48;
  - (B) Public Law 112-55 a total of \$4,760,000.00;
  - (C) Public Law 113-76 a total of \$792,502.52;
  - (D) Public Law 113-235 a total of \$1,698,806.61; and
  - (E) Public Law 114-113 a total of \$2,917,591.93;

- (2) "Railroad Safety Technology Program" account totaling \$613,252.29 appropriated by Public Law 111-117 is hereby permanently rescinded;
- (3) "Capital Assistance to States--Intercity Passenger Rail Service" account totaling \$10,164,885.13 appropriated by Public Law 111-8 is hereby permanently rescinded;
- (4) "Rail Line Relocation and Improvement Program" accounts totaling \$12,650,365.14 appropriated by the following public laws are hereby permanently rescinded:
  - (A) Public Law 110-161 a total of \$923,214.63;
  - (B) Public Law 111-8 a total of \$5,558,233.95;
  - (C) Public Law 111-117 a total of \$3,763,767.95; and
  - (D) Public Law 112-10 a total of \$2,405,148.61; and
- (5) "Next Generation High-Speed Rail" accounts totaling \$3,034,848.52 appropriated by the following public laws are hereby permanently rescinded:
  - (A) Public Law 104-50 a total of \$610,807.00;
  - (B) Public Law 104-205 a total of \$5,963.71;
  - (C) Public Law 105-66 a total of \$1,218,742.47;
  - (D) Public Law 105-277 a total of \$17,097.00;
  - (E) Public Law 106-69 a total of \$1,005,969.00;
  - (F) Public Law 108-7 a total of \$43,951.57;
  - (G) Public Law 108-199 a total of \$24,263.48; and
  - (H) Public Law 108-447 a total of \$108,054.29.

Sec. 155 It is the sense of Congress that-

- (1) long-distance passenger rail routes provide much-needed transportation access for 4,700,000 riders in 325 communities in 40 States and are particularly important in rural areas; and
- (2) long-distance passenger rail routes and services should be sustained to ensure connectivity throughout the National Network (as defined in section 24102 of title 49, United States Code).]

Department of Transportation FY 2022 Budget Federal Railroad Administration Research, Development, & Technology Budget Narrative (Budget Authority in Thousands)

Budget Account	FY 2020 Actual	FY 2021 Enacted	FY 2022 President's Budget	Applied	Tech Transfer	Facilities	Experimental Development	Major Equipment, R&D Equipment
Railroad Research and Development	\$40,600	S41,000	\$58,826	\$41,848	\$280	\$1,762	\$7,110	\$7,826
Track	11,279	10,179	10,179	6,379		1,762	2,038	
Rolling Stock	10,322	10,322	10,322	8,050	•	•	2,272	
Train Control and Communication	8,086	8,086	8,086	8,086	•	•	•	
Human Factors	6,042	6,042	6,042	4,822	•	•	1,220	•
Railroad Systems Issues	4,871	6,371	24,197	14,511	280		1,580	7,826
Safety and Operations	\$4,243	\$4,243	\$4,117	<b>\$3,184</b>	80	<b>S</b> 0	\$933	80
Administrative	4,243	4,243	4,117	3,184	1	ı	933	•
Total	\$44.843	\$45.243	\$62.943	\$45.032	\$280	\$1.762	S8.043	\$7.826

## What problems and challenges were addressed with previous fiscal year funding?

The problems and challenges addressed were:

- Reducing incidents and accidents involving America's railroads, saving lives, and reducing environmental hazards;
- Promoting innovation and facilitating leadership across the industry; and
- Continuously improving FRA's understanding of the impact of technology on safety and the industry workforce.

## How were the problems and challenges addressed?

FRA research programs improved railroad safety and efficiency by evaluating risks and prioritizing RD&T projects to reduce safety risk and achieve DOT and FRA goals. FRA helped determine strategic research needs and priorities through collaboration with internal and external partners and stakeholders, considering real-time safety issues requiring subject matter expertise or long-term research solutions. Overall, FRA sponsored and promoted research that improved safety, economic recovery / core assets, equity, climate and resilience, and transformation and future proofing.

The principal focus and goal of the **Railroad Systems Issues** (RSI) program is safety; however, the program's activities in the past year contributed to all DOT goals. The RSI research program developed, facilitated, managed, and supported the following areas: RD&T's research strategy; safety risk analysis; research prioritization; strategic collaborations and partnerships; regulations and non-regulatory recommendations; railroad environmental issues; locomotive safety; project evaluation; Transportation Research Board's (TRB) independent evaluation recommendations; workforce development; RD&T-related technology transfer and travel; operations, maintenance, and equipment at the Transportation Technology Center (TTC) facilities in Pueblo, Colorado; and contractor support.

The **Track Research Division** prepared for the future of rail transportation through applied research, development, and demonstration. As new technologies emerge, and train axle loads and speeds increase, the timely development of technical information, data, and expertise provided a basis on which to make decisions about issues affecting the safe operation of rail vehicles on U.S. track. The Division supported the goals and objectives of DOT/FRA; conducted safety-related research for new and in-service railroad system investments; developed and demonstrated new track condition assessment technologies; and coordinated research teams between railroads, universities, technology leaders, and the government. There are three primary research areas included in the program:

- Track structures and components
- Vehicle and track performance
- Operation of research assets, including the DOT TTC facility

The study of automated track inspection systems was particularly notable. RD&T, in conjunction with industry partners, successfully tested a rail inspection system based on the principle of laser triangulation that combines pulsed high-power, invisible, laser line projectors and synchronized cameras to capture a high-resolution-intensity image and 3-dimensional range profile of the railway trackbed. This new system will provide more accurate data and improve FRA's ability to detect track defects.

The **Rolling Stock Division** continued to research activities on critical transportation topics that promoted rail safety and improved rail infrastructure and mobility of goods and passengers. The program helped reduce railroad accidents and incidents due to rolling stock-related causes and reduced fatalities and injury severity to passengers and crew members. This Division conducted tank car and hazardous materials research to improve the tank cars and packages that transport hazardous materials and also investigated accidents/incidents that released hazardous materials to find ways to reduce or mitigate the consequences of such releases.

RD&T has sponsored groundbreaking tank car research at TTC. The development of a new tank car specification, DOT-117, specifically for the transportation of high hazard flammable liquids such as crude oil and ethanol, has made shipping these commodities far safer. RD&T continues to study how to safely transport cryogenic liquids such as liquefied natural gas in the DOT-113 tank car – a "tank-within-a-tank" design that differs substantially from the previously tested specification tank cars. The first test of a DOT-113 was performed in November 2019; the second, using a surrogate outer tank made of a thicker steel alloy, was performed in June 2020.

The **Train Control and Communication (TC&C) Division** focused on improving railroad operational safety through the development and testing of train control and communication systems and grade crossing safety technologies. The program also conducted pilot studies, created prototypes, and demonstrated safety and security systems, including intelligent rail systems, blocked crossings, and trespass prevention. Among its most important tasks has been the development of and software updates to Positive Train Control (PTC) systems.

TC&C led research on a new DOT Accident Prediction and Severity model. The new model will support grade crossing management by enabling more accurate risk ranking of grade crossings, more rational allocation of resources for public safety improvements at grade crossings, and the ability to assess the statistical significance of variances in the measured risk at grade crossings.

In addition, the Division created a new grade crossing research landing page, designed to offer policymakers, industry leaders, and the general public with an easy-to-navigate webpage that organizes recent Technical Reports by category: Technology, Pedestrian Safety, Modeling and Simulation, Trespass Outreach/Education, and Trespass Countermeasures.

FRA's **Human Factors (HF) Division** conducted human factors research, engineering, development, and evaluation capabilities within a human systems integration framework related to safe rail operations and the safe integration of people with technology. Complicated operating systems require an understanding of how humans and machines interact; the HF Division has been at the forefront of studying the workings of the locomotive cab and crew.

HF Technical Reports covered several pressing HF topics, including train engineer fatigue, locomotive crew communications, and, in conjunction with the Short Line Safety Institute, a study on safety culture. Work on suicide prevention continued apace as well, with reports on demographics and intent.

## What benefits were realized by the American people?

RD&T efforts have directly resulted in fewer railroad accidents and incidents. The number of accidents due to track-related causes decreased by 22 percent from 2010 to 2019. This reduction was due, in part, to the industry's adoption of technologies developed by FRA, such as:

- Autonomous inspection technologies, including the highly successful Autonomous Track Geometry Measurement System (ATGMS), used by many railroads throughout North America to complement visual inspections.
- Gage restraint measurement system, a technology to assess the integrity of ties and fasteners.
- Vehicle-track interaction monitoring system developed for Amtrak and Class I freight railroads.
- Joint bar inspection system, an image-based technology that detects defects.

The number of signal-related train accidents decreased by 23 percent from 2010 to 2019. Further reduction is expected from the installation of PTC, which was completed on all 57,536 freight and passenger railroad route miles prior to the December 31, 2020 statutory deadline. PTC is one of the most transformative technological changes in the history of railroad signal technologies.

RD&T focused on technology transfer through the lifecycle of its research with the goal to engage stakeholders, internal and external, and to increase industry adoption of its concepts, research, and methodologies that enhance safety and performance of the railroads. RD&T research and technology transfer activities included:

- Adoption of technology
- Industry conferences, working groups, meetings, presentations/demonstrations
- Joint research activities with Federal partners
- Stakeholder meetings
- Publication of Technical Reports and Research Results

Technical Reports and Research Results were published not only on the FRA eLibrary but also the National Transportation Library (NTL), Transportation Research Board's (TRB's) Researchin-Progress (RiP) database, the U.S. DOT Repository and Open Science Access Portal (ROSA-P), and the Transportation Research International Documentation (TRID) database. This provided accessibility to industry stakeholders and the American public. Information regarding RD&T's work can also be found on the OST-R Research Hub.

	FY 2017	FY 2018	FY 2019	FY 2020
Technical Reports	25	41	44	52
<b>Research Results</b>	4	17	22	19
Other Reports	10	14	3	2

The following table summarizes RD&T publishing efforts from FY 2017 to FY 2020:

# Briefly summarize research programs which further align with the Annual Modal Research Plans.

FRA's RD&T efforts included five research programs that contributed critical research, development, and technology to the industry and aligned with the Annual Modal Research Plan:

- Railroad Systems Issues Railroad Systems Issues and Research with Universities on Intelligent Railroad Systems
- Track Track and Structures; Systems Performance and Analytics; and Research and Development Facilities
- Rolling Stock Hazardous Materials; Safe Transportation of Energy Products (STEP); Rolling Stock Equipment and Components; and Train Occupant Protection
- Train Control and Communication PTC and Grade Crossing/Trespassing
- Human Factors Human Factors and the Short Line Safety Institute

# What are the problems and challenges that will be addressed with future fiscal year funding?

The problems and challenges that will be addressed include:

- Increasing support in the area of railroad workforce development to address equity, diversity, and access, as well as ensure the workforce of today and the future possess the skills to succeed. Efforts include increased engagement with minority serving institutions to encourage interest in transportation related jobs.
- Increasing efforts in energy emissions research that investigates the efficacy of alternative fuels to improve energy efficiency and reduce emissions of rail transportation.
- Reducing incidents and accidents involving America's railroads, saving lives, and reducing environmental hazards.
- Promoting innovation and facilitate leadership across the industry.
- Continuously improving FRA's understanding of the impact of technology on safety and the industry workforce.

FRA's RSI research program improves railroad safety by evaluating risks and prioritizing RD&T projects to reduce safety risk and achieve DOT and FRA goals. The Track Research Division works to prevent high-consequence derailments that result in the loss of human life and cause significant property damage. The Rolling Stock Division helps mitigate the risk of unexpected

failures in rolling stock that cause delays and disruptions to transport services or even result in derailment or collision accidents. FRA's TC&C Division is aimed at reducing train-to-train collisions and train collisions with objects on the line and at grade crossings. The Human Factors Division is focused on improving railroad safety and reducing rail accidents caused by human error.

### What are the anticipated benefits that will be realized by the American people?

Now and in the future, FRA conducts research, development, and technology initiatives independently and collaboratively to:

- Ensure safety is the paramount consideration in exploring new technologies and practices.
- Leverage public resources, disperse costs, and reduce or eliminate redundant efforts.
- Assess the safety of new concepts and technologies that the railroad industry uses.
- Promote industry adoption of promising research results.

# INFORMATION TECHNOLOGY DEPARTMENT OF TRANSPORTATION FEDERAL RAILROAD ADMINISTRATION BUDGET AUTHORITY

#### (\$000)

Budget Account	FY 2020 Actual	FY 2021 Enacted	FY 2022 President's Budget
Safety and Operations			
Commodity IT SS WCF	\$10,865	\$16,239	\$16,081
Modal IT	\$14,879	\$17,194	\$16,857
Total	\$25,744	\$33,433	\$32,938

The Federal Railroad Administration (FRA) is requesting **\$32.938 million** in FY 2022 for information technologies (IT) that support the full spectrum of FRA programs as well as the Department's initiative to transform and consolidate the management of certain IT solutions centrally by the Office of the Chief Information Officer (OCIO).

### Commodity IT Shared Services (SS) through the Working Capital Fund

OCIO will continue to provide all modes Commodity IT Shared Services in FY 2022 to achieve economies of scale and increase consistency of cybersecurity protections across the Department. Commodity IT Shared Services include IT functions and activities dedicated to basic support services, including network operations, end-user computing, telecommunications services, and server operations.

• FRA requests **\$32.938 million** from the Safety and Operations account, of which **\$16.081 million** is for Commodity IT Shared Services. FRA's share was based on actual commodity IT consumption in prior years as well as planned future consumption. OCIO, in collaboration with FRA, assumed a one-to-one cost estimate to transition all commodity IT to OCIO. FRA will only be charged for services rendered.

## Modal IT

The following major mission-critical IT systems will be maintained by FRA in FY 2022. This list is only a subset of all IT systems that support FRA and are reported in OMB's the CIMS.

- Railroad Safety Information System (RSIS) FRA requests \$5.70 million from Safety and Operations for development, modernization, and enhancement (DME) and operation and maintenance (O&M) of FRA's RSIS. RSIS is a data management program comprised of the people, processes, and tools required to support the collection, processing, delivery, reporting, and analyzing of railroad safety and safety-related data. RSIS supports the fundamental FRA safety mission through data and data-driven decision-making processes; enables analysis of safety data for identification of safety issues and trends, prioritization of programs, regulatory reform, and resource planning; enables risk analysis and quiet zone establishment; supports the Rail Compliance System program; and provides the authoritative safety data source that preserves historical data.
- Automated Track Inspection Program (ATIP) FRA requests \$2.51 million from Safety and Operations for DME and O&M of FRA's ATIP to ensure track safety, support FRA's vision of "ensuring the safe, reliable, and efficient movement of people and goods for a strong America, now and in the future" by developing and advancing inspection technologies and also using these technologies in compliance programs for identification of deteriorating and substandard track conditions.
- FRA requests **\$8.65 million** from Safety and Operations for DME and O&M for the remaining IT support and systems staying within the mode, such as Railroad Safety Inspection Tools, GrantSolutions, Railroad Network Systems, Web Information Services, Business Intelligence, and Rail Compliance System.