

FTA Report No. 0273



FTA Annual Research Report for Fiscal Year 2024

PREPARED BY
Federal Transit Administration



U.S. Department of Transportation
Federal Transit Administration

DECEMBER
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December 2024

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PREPARED BY

Federal Transit Administration
Office of Research, Demonstration, and Innovation
U.S. Department of Transportation
1200 New Jersey Avenue, SE
Washington, DC 20590

AVAILABLE ONLINE

<https://www.transit.dot.gov/about/research-innovation>

Metric Conversion Table

SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
LENGTH				
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
VOLUME				
fl oz	fluid ounces	29.57	millimeters	mL
gal	gallons	3.785	liters	L
ft ³	cubic feet	0.028	cubic meters	m ³
yd ³	cubic yards	0.765	cubic meters	m ³
NOTE: volumes greater than 1000 L shall be shown in m ³				
MASS				
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
TEMPERATURE (exact degrees)				
°F	Fahrenheit	5 (F-32)/9 or (f-32)/1.8	Celsius	°C

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14. ABSTRACT This report provides information on projects funded under the Federal Transit Administration's Public Transportation Innovation Program (49 U.S.C. § 5312). FTA's over \$203 million in active research activities in FY2024 support the US Department of Transportation (DOT) strategic goals, of Safety, Equity, Transformation, Economic Strength and3Global Competitiveness, Climate and Sustainability, and Organizational Excellence.					
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U.S. Department
of Transportation
**Federal Transit
Administration**

Deputy Administrator

1200 New Jersey Avenue, SE
Washington, DC 20590

Dear Colleagues:

I am pleased to provide the Federal Transit Administration (FTA) Annual Report on Research for Fiscal Year (FY) 2024. This report summarizes the accomplishments of \$203 million in FTA's research funded from the FTA Public Transportation Innovation Program (49 U.S.C § 5312).

FTA's mission is to improve America's communities through public transportation. FTA's research investments facilitate this goal by accelerating innovation that enhances everyone's safety, improves equitable mobility, refines transit operations, and fosters clean energy. As I traveled the country this year, I witnessed many challenges and opportunities in transit. Today, transit agencies are transforming their services through innovations in safety, automation, zero-emission buses, mobility on demand, and asset management. FTA's research tests new solutions in these areas so transit agencies can deploy emerging technologies based on lessons learned.

Enhancing safety continues to be our north star. FTA invested the largest amount of research funding to improve safety: \$48 million. Safety research supports rider, vulnerable road users, pedestrian, bicyclist, and worker safety – especially ways to mitigate bus operator assaults. Today, transformative technologies abound. Over \$40 million in FTA research funds is dedicated to exploring the use of technologies like artificial intelligence to identify changes in traveler preferences. Other projects are assessing the use of modeling to simulate new approaches to mobility. Major partners are reviewing advanced vehicle designs, bus battery safety, and effective lifecycle management of low or no emission vehicles. FTA funded \$7 million to further equity by leveraging a social science approach to understand how improved mobility impacts individuals and communities. The Transit Cooperative Research Program is managing a portfolio of over \$30 million in research studies that provides a foundation for FTA's larger deployment and demonstration programs.

The overarching goal for public transit innovation is to help transit agencies more effectively serve their communities so everyone can ride when, where, and how they need to with a safe, accessible, and complete trip. I hope you enjoy reading about our research. I am very proud of what we achieved over the last year.

Sincerely,

Veronica Vanterpool

Executive Summary

The Federal Transit Administration (FTA) Public Transportation Innovation Program (49 U.S.C. § 5312) advances innovative public transportation research by selecting, funding, and managing projects and programs of national significance to improve public transportation. In FY 2024, FTA led a portfolio of \$203 million in active projects to support FTA’s vision of a better quality of life for all built upon public transportation excellence and FTA’s mission to improve America’s communities through public transportation.

Research activities evolve through a statutory pipeline phased approach, as seen in Figure 1, moving from the early research of promising ideas through evaluation and implementation.

Figure 1 FTA Pipeline Phased Approach



- **Foundational Research** – developing and deploying new and innovative ideas, practices, and approaches.
- **Innovative Development** – improving public transportation systems nationwide to provide more efficient and effective delivery of public transportation services through technology and technological capacity improvements.
- **Demonstration and Deployment** – enabling early deployment and demonstration of innovations in public transportation with broad applicability, including low or no emission vehicle deployment.
- **Evaluation and Implementation** – analyzing project results and plans for broad-based implementation of research findings.

FTA's strategic research goals for FY 2024 aligned with the U.S. Department of Transportation (DOT) strategic goals by ensuring a safe and secure public transit system, enabling equitable and accessible mobility, transforming transit by connecting communities, improving sustainability and resilience to address climate change, improve economic strength and global competitiveness by supporting stronger transit related manufacturers, and enhancing organizational excellence through technology transfer initiatives.

Below are descriptions of how FTA's research activities are furthering the DOT strategic goals:

Safety

FTA sought ways to improve safety for transit workers, transit riders, and all who are in or near transit systems. Research under the Safety Research and Demonstration (SRD) Program and the Public Transportation COVID-19 Research Demonstration Grant Program leveraged innovative technologies, processes, and applications to monitor and explore the use of technologies to increase worker, rider, pedestrian, and bicyclist safety.

Equity

FTA embarked on equity initiatives in FY 2024 to ensure historically disadvantaged riders have access to the services they need for their lives. Additionally, FTA continued to advance mobility through the Mobility, Access, and Transportation Insecurity (MATI) Program to improve people's mobility and access to daily needs and evaluate outcomes and impacts on individuals and communities.

Transformation

FTA invested in purpose-driven research and innovation to meet the challenges of the present and modernize a future transportation system that serves everyone today and in the future. The Enhancing Mobility Innovation (EMI) and the Integrated Mobility Innovation (IMI) Demonstration Programs enhanced mobility options and the ability of all travelers, including those with disabilities, rural residents, and lower-income individuals to safely plan and take a complete trip.

Climate and Sustainability

FTA addressed the climate crisis by ensuring that public transportation is central to the solution. Through the Low or No Emission Components Assessment Program (LoNo CAP) and the Transit Vehicle Innovation Deployment Centers (TVIDC), FTA addressed the significant and growing risk of climate change to the safety, reliability, and sustainability of public transportation infrastructure and operations.

Economic Strength and Global Competitiveness

FTA invested in the nation's public transportation system to give American workers and businesses reliable and efficient access to resources, markets, and good-paying jobs. FTA created the Advanced Digital Construction Management Systems (ADCMS) to accelerate the adoption of advanced digital systems from project planning, design, engineering, construction, operations, and

maintenance. Additionally, FTA's Small Business Innovative Research (SBIR) Program continued to invest in small businesses to help them grow and thrive.

Organizational Excellence

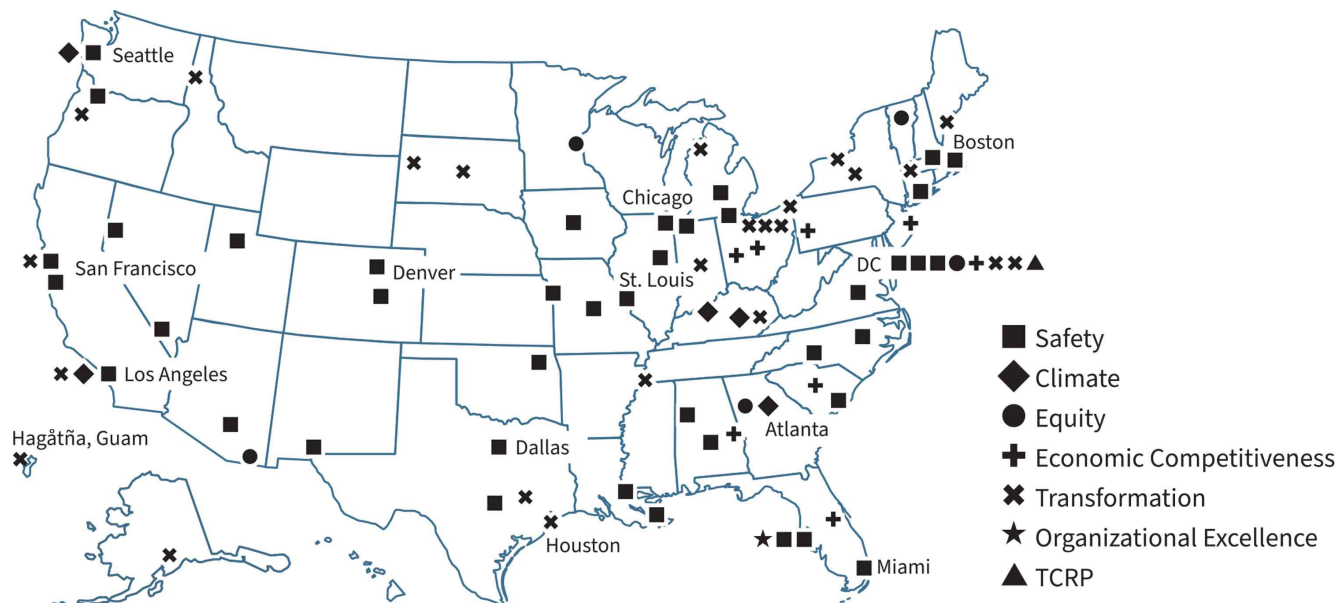
FTA advanced DOT's mission by establishing policies, processes, and an inclusive and innovative culture to effectively serve communities and responsibly steward the public's resources. One key aspect of achieving organizational excellence through research is effective outreach and technology transfer activities. FTA refers to Technology Transfer as Research to Practice, which is sharing research information and results. The primary method for sharing research information is through FTA's [Reports and Publications](#) website.

Table 1 Complete List of FY 2024 Active FTA Research Programs and Projects

DOT Strategic Area	Project Title	FTA Funding
Safety	Advanced Driver Assistance Systems (ADAS) for Transit Buses Demonstration & Automated Transit Bus Maintenance and Yard Operations Demonstration	\$7,096,061
Safety	Public Transportation COVID-19 Research Demonstration Grant Program	\$14,791,306
Safety	Innovations in Transit Public Safety Projects	\$3,050,695
Safety	Safety Risk Management (SRM) and Analysis	\$2,000,000
Safety	Redesign of Transit Bus Operator Compartment to Improve Safety, Operational Efficiency, and Passenger Accessibility (Bus Operator Compartment) Program	\$1,600,000
Safety	FY 2020 Safety Research and Demonstration (SRD) Program	\$7,513,656
Safety	FY 2020 Safety Research and Demonstration (SRD) Program Evaluation	\$700,000
Safety	FY 2016 Safety Research and Demonstration (SRD) Program	\$5,101,740
Safety	FY 2016 Safety Research and Demonstration (SRD) Program Evaluation	\$750,000
Safety	Real-Time Transit Infrastructure and Rolling Stock Condition Assessment Demonstration Program	\$1,368,816
Safety	Real-Time Transit Infrastructure and Rolling Stock Condition Assessment Research and Demonstration Program Evaluation	\$750,000
Safety	MARTA Track Inspection & Asset Management Research and Demonstration	\$4,225,000
Safety	Public Safety Awareness Technology Evaluation (PSATE) Project	\$100,000
Equity	Mobility, Access, and Transportation Insecurity (MATI)	\$6,000,000

DOT Strategic Area	Project Title	FTA Funding
Equity	Human Services Coordination Research (HSCR) Deployment Program	\$1,039,130
Transformation	Mobility NeXt Research Design and Implementation	\$2,000,000
Transformation	Enhancing Mobility Innovation (EMI) Program	\$3,550,251
Transformation	Integrated Mobility Innovation (IMI) Demonstration Program	\$15,243,674
Transformation	Accelerating Innovative Mobility (AIM) Program	\$13,774,500
Transformation	Mobility Innovation Demonstration Programs Evaluation	\$3,050,000
Transformation	Innovative Technology and Mobility Solutions Project Evaluation	\$300,000
Transformation	Transit Cost and Delivery Project	\$469,565
Transformation	Energy Efficient Mobility Systems Program	\$1,000,000
Transformation	Strategic Transit Automation Research (STAR) Plan Enabling Research and Implementation	\$350,000
Transformation	Transit Bus Automation Strategic Partnerships	\$600,000
Climate and Sustainability	Low or No (LoNo) Emission Vehicle Deployment Program*	\$12,660,824
Climate and Sustainability	Transit Vehicle Innovation Deployment Centers (TVIDC)	\$13,805,000
Climate and Sustainability	Low or No Emission Vehicle Component Assessment (LoNo-CAP)	\$34,000,000
Climate and Sustainability	Transit Vehicle Exhaust Emissions Resources Project	\$199,995
Economic Strength and Global Competitiveness	Accelerating Advanced Digital Construction Management (ADCMS)	\$5,100,000
Economic Strength and Global Competitiveness	Small Business Innovation Research (SBIR) Program	\$3,781,065
Economic Strength and Global Competitiveness	Transit Vehicle Manufacturing Study	\$250,000
Organizational Excellence	Technology Transfer (T2) Program	\$5,000,000
Organizational Excellence	National Bus Rapid Transit Institute (NBRTI)	\$1,706,250
TCRP	Transit Cooperative Research Program (TCRP)	\$30,186,007
Total		\$203,113,535

**In 2016, the LoNo Program matured from a research program to a capital discretionary program authorized by Federal public transportation law (49 U.S.C. § 5339(c)). However, the research demonstration program continued in FY 2024. FTA is still administering and overseeing some of these projects funded under the LoNo Research Program.*

Figure 2 Location of FTA Research Programs and Project Recipients

Requirements for This Report

Federal public transportation law (49 U.S.C. § 5312(f)) requires FTA to post an annual report on research available to the public on its website not later than the first Monday in February of each year. This report must include:

- A description of each project that received assistance under this section during the preceding fiscal year.
- An evaluation of demonstration and deployment programs and projects that received assistance in the preceding year.
- A strategic research roadmap proposal for allocations of amounts for assistance under this section for the current and subsequent fiscal year, including anticipated work areas, proposed demonstrations, and strategic partnership opportunities.

Program and Project Descriptions

This report includes detailed descriptions of programs and projects that received funding in FY 2024. Assistance definitions include planning and developing new programs and projects, awarding a new project or program, managing an existing project or program, or evaluating a project or program. Program and project descriptions are categorized by DOT strategic goals — Safety, Equity, Transformation, Climate and Sustainability, Economic Strength and Global Competitiveness, and Organizational Excellence. Individual program and project descriptions include title, recipient(s), performance indicators (results), evaluation, and FTA funding.

Safety

Description:

In FY 2024, FTA prioritized research that addressed the safety of transit workers, riders, and all who are in or near transit systems utilizing technologies such as automation, sensor systems, artificial intelligence, cameras, monitoring real-time video in transit stations/buses, and identifying best practices to address worker and rider assaults.

Objectives:

The FTA safety research program sought to:

- Support research to reduce fatalities and injuries.
- Improve safety culture with the use of technological advancements and innovations.

FTA had 13 active safety programs and projects in FY 2024 (see Table 2).

Table 2 Safety Research Programs and Projects Receiving Assistance from FTA, FY 2024

Safety Programs	
Project Title	FTA Funding
Advanced Driver Assistance Systems (ADAS) for Transit Buses Demonstration & Automated Transit Bus Maintenance and Yard Operations Demonstration	\$7,096,061
Public Transportation COVID-19 Research Demonstration Grant Program	\$14,791,306
Innovations in Transit Public Safety Projects	\$1,892,503
Safety Risk Management (SRM) and Analysis	\$2,000,000
Redesign of Transit Bus Operator Compartment to Improve Safety, Operational Efficiency, and Passenger Accessibility (Bus Operator Compartment) Program	\$1,600,000
FY 2020 Safety Research and Demonstration (SRD) Program	\$7,513,656
FY 2020 Safety Research and Demonstration (SRD) Program Evaluation	\$700,000
FY 2016 Safety Research and Demonstration (SRD) Program	\$5,101,740
FY 2016 Safety Research and Demonstration (SRD) Program Evaluation	\$750,000
Real-Time Transit Infrastructure and Rolling Stock Condition Assessment Demonstration Program	\$1,368,816
Real-Time Transit Infrastructure and Rolling Stock Condition Assessment Research and Demonstration Program Evaluation	\$750,000
MARTA Track Inspection & Asset Management Research and Demonstration	\$4,225,000
Public Safety Awareness Technology Evaluation (PSATE) Project	\$100,000
Total	\$47,889,082

Title: *Advanced Driver Assistance Systems (ADAS) for Transit Buses Demonstration & Automated Transit Bus Maintenance and Yard Operations Demonstration*

Recipients: Transit authorities partnering with local governments, educational institutions, and private entities (see Table 3).

Program Description: The demonstration aims to establish the feasibility of automated transit bus maintenance, yard operations, and use cases and improve understanding of transit automation. The goals of the demonstrations are to 1) increase safety and efficiency; 2) create a testbed for the study of technical issues, user acceptance, operational and maintenance costs, workforce training and transition, and institutional issues; and 3) spur technology development.

Results: All projects were obligated in FY 2024 and are underway. Examples of projects include strategies for avoiding collisions with pedestrians, improved emergency braking, and precision movement for bus fueling, charging, and maintenance. The demonstration projects will help determine potential benefits, costs, and other impacts of transit bus automation. They will also provide transit agencies with resources, guidance, and tools to make informed deployment decisions.

Program Evaluation: The program will have an independent evaluation as statutorily required.

FTA Funding: \$7,096,061

Table 3 Advanced Driver Assistance Systems (ADAS) for Transit Buses Demonstration & Automated Transit Bus Maintenance and Yard Operations Demonstration Projects Receiving Assistance from FTA, FY 2024

Project Title	Project Recipient	City and State	FTA Award
CapMetro Yard Automation Research & Deployment (YARD) Program	Capital Metropolitan Transportation Authority	Austin, TX	\$949,500
PSTA Autonomous Bus Yard Parking and Recall Demonstration	Pinellas Suncoast Transit Authority (PSTA)	St. Petersburg, FL	\$892,609
Validation and Real-World Pilot of ADAS Technologies in Large Transit Buses	University of Alabama	Tuscaloosa, AL	\$2,000,000
ADAS for Bustang Intercity and Regional Bus Transit	Colorado Department of Transportation (CDOT)	Denver, CA	\$1,253,952
CTfastrak ADAS Safety and Accessibility Deployment Project	Connecticut Department of Transportation (CTDOT)	Newington, CT	\$2,000,000
Total			\$7,096,061

Title: *Public Transportation COVID-19 Research Demonstration Grant Program*

Recipients: Transit authorities, state and local governments, and state DOTs in partnership with other transit providers (see Table 4).

Program Description: The COVID-19 Research Demonstration Grant Program develops, deploys, and demonstrates innovative solutions that improve the operational efficiency of transit agencies and enhance the mobility of transit users affected by the COVID-19 pandemic. This program is developing innovative solutions in four major areas: (1) vehicle, facility, equipment, and infrastructure cleaning and disinfection; (2) exposure mitigation measures; (3) innovative mobility such as contactless payments; and (4) actions that strengthen public confidence in taking transit trips.

Results: The active projects continued to develop, deploy, and demonstrate innovative solutions to improve the operational efficiency of transit agencies. Iowa's CityRide Program completed the COVID-19 demonstration project. The agency completed the installation of the Automatic Passenger Counter technology on its bus fleet and created a web-based application providing real-time crowd data for its entire bus fleet CyRide (mycityride.com). The South Bend Public Transportation Corporation (Transpo) and the Interurban Trolley added a mobile ticketing option with electronic validation. The project enhanced operator, passenger, and community safety by streamlining the boarding process, reducing the number of paper passes sold, and providing passengers with a contactless payment option. FTA received final reports from several recipients in FY 2024, which will be available on FTA's Reports and Publication page in FY 2025.

Program Evaluation: The program will have an independent evaluation as statutorily required.

FTA Funding: \$14,791,306

Table 4 COVID-19 Research Demonstration Grant Projects Receiving Assistance from FTA, FY 2024

Project Title	Project Recipient	City and State	FTA Award
COVID-19 Research Demonstration Project	Alabama Department of Transportation	Montgomery, AL	\$300,000
COVID-19 Research Demonstration Grant Program	City of Tucson	Tucson, AZ	\$600,000
5312 National Transit Adaptation Strategy	San Francisco Municipal Transportation Agency	San Francisco, CA	\$450,000

Project Title	Project Recipient	City and State	FTA Award
COVID-19 Research Demonstration - Transit Vehicle and Facility Enhancements to Mitigate COVID-19 Exposure	City of Colorado Springs	Colorado Springs, CO	\$600,000
Voice Activated Ticket Vending Machine Project	Connecticut Department of Transportation	Hartford, CT	\$450,000
COVID-19 Research and Demonstration Project	Washington Metropolitan Area Transit Authority	Washington, DC	\$600,000
R&D Bus Barrier- Testing and Studying of Protective Barriers	Delaware Transit Corporation	Wilmington, DE	\$450,000
Tri-Rail On-Demand Microtransit Demonstration Project	South Florida Regional Transportation Authority	Pompano Beach, FL	\$167,603
Statewide Contact-less Payment System	Georgia Department of Transportation	Atlanta, GA	\$450,000
Automatic Passenger Count (APC) Research Project	Ames Transit Agency	Ames, IA	\$450,000
Contactless Payments with Electronic Verification	South Bend Public Transportation Corporation	South Bend, IN	\$122,638
Contactless Fare Payment System	Capital Area Transit System	Baton Rouge, LA	\$300,000
Contactless Payment System for On-Demand Rides	Montachusett Regional Transit Authority	Fitchburg, MA	\$337,500
Baltimore County Public Transportation COVID-19 Research Demonstration Discretionary	Baltimore County	Baltimore, MD	\$12,096
Ride On Crowd Sourcing System (ROCSS)	Montgomery County Maryland	Rockville, MD	\$450,000
Michigan DOT's COVID-19 Research Demonstration Application for Automated Wheelchair Securement Systems and a Smart Phone App	Michigan Department of Transportation	Lansing, MI	\$600,000
Western Minnesota Contactless Payment Project	Minnesota Department of Transportation	St. Paul, MN	\$450,000
Statewide Safe and Reliable Return-to-Work Vanpool Program	Missouri Department of Transportation	Jefferson City, MO	\$450,000
KCATA Contactless Fare Validation and Integration Project	Kansas City Area Transportation Authority	Kansas City, MO	\$450,000
Commonwealth of the Northern Mariana Islands COVID-19 Research Demonstration	Commonwealth Office of Transit Authority	Saipan, CNMI	\$300,000
Contactless and Cashless On-Board Fare Payment System	City of Fayetteville	Fayetteville, NC	\$355,000

Project Title	Project Recipient	City and State	FTA Award
Improving Safety and Security via Video Analytics in the Age of COVID-19 and Beyond	New Jersey Transit Corporation	Newark, NJ	\$600,000
5312 Public Transportation COVID-19 Demonstration	Regional Transportation Commission of Southern Nevada	Las Vegas, NV	\$500,000
- New EMV (Europay, Mastercard and Visa) Certified Electronic Validators for Contactless Payment on Fixed Route	New York Metropolitan Transportation Authority	New York, NY	\$600,000
Transit's Path Forward in a Pandemic	Central Ohio Transit Authority	Columbus, OH	\$600,000
Multimodal Planning in the COVID-19 Environment to Improve Public Confidence	City of Portland	Portland, OR	\$439,950
Healthy and Reliable Transit	Southeastern Pennsylvania Transportation Authority	Philadelphia, PA	\$584,618
Mass Transit Vehicle Air Ventilation and Purification Technologies Evaluation	Berkeley-Charleston-Dorchester Council of Governments	Charleston, SC	\$575,000
Regional Contactless Mobile Ticketing and Trip Planning App	Nashville Metropolitan Transit Authority	Nashville, TN	\$585,000
5312 Public Transportation COVID-19 Research Demonstration	City of El Paso, Mass Transit Department dba Sun Metro	El Paso, TX	\$225,000
El Paso Sun Metro Innovative Payment Mobility System	Utah Transit Authority	Salt Lake City, UT	\$508,200
UTA Electronic Voucher (eVoucher) Phase Two Expansion	Virginia Department of Rail and Public Transportation	Richmond, VA	\$247,500
COVID-19 Transit Recovery Toolkit: Strategies Handbook and Statewide Marketing Campaign	Vermont Agency of Transportation	Montpelier, VT	\$581,201
Vermont UVC Research Grant	King County Metro	Seattle, WA	\$400,000
Total			\$14,791,306

Title: *Innovations in Transit Public Safety Projects*

Recipients: State and local governmental entities, transit authorities, non-profit organizations, or a consortium of entities, including providers of public transportation (see Table 5)

Program Description: This effort is part of FTA's Human Trafficking Awareness and Public Safety Initiative. This program supports the development of innovative products and services to prevent human trafficking and reduce crime on public transit vehicles and in facilities. The goals of the projects are to: 1) develop innovative projects to assist transit agencies with identifying and adopting specific measures to address public safety in transit systems, including crime prevention, human trafficking, and operator assault; and 2) maximize the transit industry's collective impact to address human trafficking and other public safety concerns.

Results: The active projects under this program continued to empower transit agencies and other organizations to develop local solutions to address human trafficking on public transportation. Relevant results for FY 2024 included the Regional Transportation Commission (RTC) of Southern Nevada conducting training for its transit service contractors and sharing a [testimonial video](#) showcasing how human trafficking training helped a bus operator save a victim. The SunLine Transit Agency, in partnership with the Coachella Valley Coalition Against Human Trafficking, implemented a [Human Trafficking Awareness Campaign](#). The campaign informed riders and the public about the prevalence of human trafficking and how to help if someone recognizes a potential human trafficking incident.

FTA Funding: \$1,892,503

Table 5 Innovations in Transit Public Safety Projects Receiving Assistance from FTA, FY 2024

Project Title	Project Recipient	City and State	FTA Award
Sun Tran Public Safety Initiative	City of Tucson	Tucson, AZ	\$221,100
Santa Clara Valley Transportation Authority (VTA) - Human Trafficking Prevention Program	Santa Clara Valley Transportation Authority	Santa Clara, CA	\$350,000
Washington Metropolitan Area Transit Authority (WMATA) (Federal Fiscal Year (FFY) 19 Section 5312 Public Safety Pilot Study	Washington Metropolitan Area Transit Authority	Washington, DC	\$176,000
Section 5312 Innovations in Transit Public Safety	Capital Area Transportation Authority	Lansing, MI	\$75,000
Train Front Line Personnel on Human Trafficking	Bi-State Development Agency	St. Louis, MO	\$187,500

Project Title	Project Recipient	City and State	FTA Award
Statewide Educational and Training Program	North Carolina Department of Transportation	Raleigh, NC	\$120,000
Crime Prevention and Public Safety Rolling Classroom for Statewide Training	Grand Gateway EDA Pelivan Transit	Big Cabin, OK	\$350,475
TriMet Operator Safety & Rider Awareness	Tri- County Metropolitan Transportation District of Oregon	Portland, OR	\$151,052
Public Safety Awareness Marketing and Public Outreach Campaign of Public Safety Officers on Transit Vehicles	Central Midlands Regional Transit Authority	Columbia, SC	\$151,776
Human Trafficking Awareness & Public Safety	South Dakota Department of Transportation	Spearfish, SD	\$60,000
Training and Awareness Campaign Against Human Trafficking	Dallas Area Rapid Transit	Dallas, TX	\$49,600
Total			\$1,892,503

Title: *Safety Risk Management (SRM) and Analysis*

Recipients: The Volpe Center

Program Description: This program supports FTA by analyzing data to assist in the identification, assessment, and prioritization of transit safety risks and by monitoring and evaluating data related to mitigation strategies. Risk management depends on transit industry data and requires FTA to establish safety data identification and collection. The goals are to 1) assess data needs and quality and identify data gaps for assessing transit risks and 2) provide recommendations for addressing data gaps and improving data quality.

Results: In FY 2024, the Volpe Center completed research activities on several key topics, including transit worker hours of service and customer assault prevention. The Volpe Center also initiated the collection and analysis of safety and security data from the National Transit Database (NTD) and submitted an internal report to FTA summarizing stakeholder feedback. The report highlighted opportunities to enhance safety and security data reporting, investigation, data entry, validation, analysis, and outputs.

FTA Funding: \$2,000,000

Title: *Redesign of Transit Bus Operator Compartment to Improve Safety, Operational Efficiency, and Passenger Accessibility (Bus Operator Compartment) Program*

Recipients: Transit authorities, local governments, non-profit organizations, and state DOTs (see Table 6)

Program Description: This program aims to create innovative transit bus operator compartment designs in collaboration with bus manufacturers, technology providers, engineering firms, and transit agencies. The goals are to 1) enhance safety for both bus operators and the public, and 2) improve operator access to vehicle controls and instruments while maintaining passenger accessibility.

Results: The innovative projects continue to explore ways to protect transit employees and passengers and improve the overall safety and reliability of the service. In FY 2024, the International Transportation Learning Center (ITLC) conducted research focused on several interrelated areas: operator safety from assaults, visibility of pedestrians and other roadway users, passenger ease of access and promotion of positive interactions with operators, operator ergonomics, reduction of operator distraction, and accommodation of passengers with disabilities. The New Orleans Regional Transit Authority (NORTA) installed Bus Operator Compartments on its entire fixed-route bus fleet to improve bus operator safety and security by mitigating the risk of patrons assaulting operators and causing severe injury. The barriers were also used to minimize the spread of COVID-19.

FTA Funding: \$1,600,000

Table 6 Redesign of Transit Bus Operator Compartment to Improve Safety, Operational Efficiency, and Passenger Accessibility (Bus Operator Compartment) Active Projects in FY 2024

Project Title	Project Recipient	City and State	FTA Award
Implementation of Adding Shields and Barriers on Bus Fleet to Protect Bus Operators	New Orleans Regional Transit Authority (NORTA)	New Orleans, LA	\$600,000
Redesign of Transit Bus Operator Compartment to Improve Operator and Passenger Safety Project	International Transportation Learning Center	Silver Spring, MD	\$1,000,000
Total			\$1,600,000

Title: *FY 2020 Safety Research and Demonstration (SRD) Program*

Recipients: Transit authorities partnering with local governments, educational institutions, and private entities (see Table 7)

Program Description: The FY 2020 SRD Program evaluates advanced technologies and innovative safety solutions to prevent suicide and trespassing hazards on rail systems. The program also improves safety at highway-rail grade crossings and shared corridor operations. The program goals are to 1) explore advanced technologies, designs, and/or practices to mitigate and prevent safety hazards on rail transit systems and 2) evaluate the cost-effectiveness and practicality of potential solutions.

Results: The FY 2020 SRD Program enabled transit agencies to implement advanced safety technologies, delivering notable outcomes in FY 2024. For example, Rutgers and New Jersey Transit achieved significant progress with the Artificial Intelligence Vision system, enhancing rider safety. Through this research, five terabytes of video data detected over 100,000 violation events at four urban grade crossings in New Jersey. TriMet also finalized a beta version of the tool. They collected violation data using Artificial Intelligence and video cameras by rotating between two different crossings identified as high risk as part of their grade crossing risk/hazard matrix. Charlotte Area Transit System (CATS) and Charlotte Department of Transportation (CDOT) completed the installation of signage and pavement markings to address parking-related issues blocking streetcar tracks. CATS also completed the installation of traffic calming devices in high-traffic areas to ensure the safety of bicyclists. Lastly, CATS conducted two rounds of marketing and educational campaigns to encourage safe behaviors along the Gold Line streetcar alignment. The Gold Line's on-time performance increased from 68.8% to 95.2% after the implementation of the project.

FTA Funding: \$7,513,656

Table 7 FY 2020 Safety Research and Demonstration (SRD) Active Projects in FY 2024

Project Title	Project Recipient	City and State	FTA Award
CTA's Third Rail Safety Enhancement Pilot Project	Chicago Transit Authority (CTA)	Chicago, IL	\$1,183,091
MDOT MTA Track Intrusion Detection and Alert System	Maryland Department of Transportation (MDOT)	Hanover, MD	\$675,000
An Artificial Intelligence-Aided System for Automated Detection of Trespassing at Grade Crossings	Rutgers, The State University of New Jersey	New Brunswick, NJ	\$357,072

Project Title	Project Recipient	City and State	FTA Award
Designed for Impact- Innovative Approach to Train Front-end Safety and Collision Fatality Reduction	New York Metropolitan Transportation Authority	New York, NY	\$3,450,907
Watch Out for CityLYNX! Be Streetcar Smart	City of Charlotte	Charlotte, NC	\$56,080
TriMet Risk Ranking Tool and Data Validation for Grade Crossing Safety Enhancement	Tri-County Metropolitan Transportation District of Oregon (Tri-Met)		\$825,506
Transit Track Worker & First Responder Safety Protection Demonstration Project	Southeastern Pennsylvania Transportation Authority (SEPTA)	Portland, OR	\$742,000
Utah Transit Authority Suicide Prevention Research and Demonstration Project	Utah Transit Authority (UTA)	Philadelphia, PA	\$224,000
Total			\$7,513,656

Title: *FY 2020 Safety Research and Demonstration (SRD) Program Evaluation*

Recipient: University of South Florida (USF) Center for Urban Transportation Research (CUTR)

Project Description: This project supports FTA's FY 2020 SRD Program and meets the statutory requirement of independent research demonstration evaluation under Federal public transportation law (49 U.S.C. § 5312 (e)(4)). The goals of this project are to 1) evaluate the FY 2020 SRD projects; 2) assess the contribution of each project towards advancing FTA's SRD program goals of exploring advanced technologies, designs, or practices to mitigate and prevent safety hazards on rail transit systems and evaluating the cost-effectiveness and practicability of potential solutions; and 3) estimate the national impact of FY 2020 SRD projects. Each project-level evaluation has a set of performance measures established by FY 2020 SRD award recipients in coordination with the SRD evaluation team.

Results: In FY 2024, CUTR submitted the interim evaluation report to FTA for approval. CUTR worked with FTA to review and provide comments on the six data management plans (DMP) submitted by each project team. CUTR also worked with FTA project managers to track each project's progress.

FTA Funding: \$700,000

Title: *FY 2016 Safety Research and Demonstration (SRD) Program*

Recipients: Transit authorities partnering with local governments, educational institutions, and private entities (see Table 8)

Program Description: The FY 2016 SRD Program funds innovative safety technologies and strategies, focusing on collision avoidance, mitigation, and transit worker protection. The program goals are to: 1) explore advanced technologies to prevent transit vehicle collisions, 2) enhance the safety of transit services by incorporating safer design elements, and 3) evaluate the cost-effectiveness and practicality of potential solutions.

Results: In FY 2024, the four remaining active projects under this program completed research and submitted final reports to FTA for review. All reports will be published on FTA's [Reports and Publications](#) page in FY 2025. The FY 2016 SRD Program pursued new approaches to avoid safety hazards, including exploring technologies that prevent collisions, as well as those that protect transit bus operators from assault.

FTA Funding: \$5,101,740

Table 8 FY 2016 SRD Projects Receiving Assistance from FTA in FY 2024

Project Title	Project Recipient	City and State	FTA Award
CTA Operations Control Center Safety Enhancements Project	Chicago Transit Authority	Chicago, IL	\$1,078,300
Fixed-Location Train Detection and Worker Warning System Demonstration	Maryland Department of Transportation	Baltimore, MD	\$688,448
Collision Avoidance and Mitigation Technologies on LA Metro Bus Pilot	Los Angeles County Metropolitan Transportation Authority	Los Angeles, CA	\$1,450,000
Track Inspector Location Awareness with Enhanced Transit Worker Protection Pilot	Washington Metropolitan Area Transit Authority	Washington, DC	\$1,884,992
Total			\$5,101,740

Title: *FY 2016 Safety Research and Demonstration (SRD) Program Evaluation*

Recipient: University of South Florida (USF) Center for Urban Transportation Research (CUTR)

Project Description: This project supports FTA's FY 2016 SRD Program and meets the statutory requirement of independent research demonstration evaluation under Federal public transportation law (49 U.S.C. § 5312 (e)(4)). The goals of this project are to 1) evaluate the FY 2016 SRD projects; 2) assess the contribution of each project towards advancing FTA's FY 2016 SRD Program goals of improved collision avoidance and increased worker safety; and 3) estimate the national-level impact of FY 2016 SRD projects. Each project-level evaluation has a set of performance measures established by FY 2016 SRD award recipients in coordination with the SRD evaluation team.

Results: In FY 2024, CUTR worked with recipients and project managers to collect lessons learned, analyze data generated by the projects, assist with knowledge transfer activities, and conduct project close-out interviews. The independent evaluators submitted the final evaluation report for review, which will be published on FTA's Reports and Publications page in FY 2025.

FTA Funding: \$750,000

Title: *Real-Time Transit Infrastructure and Rolling Stock Condition Assessment Demonstration Program*

Recipient: Transit authorities, local governments, non-profit organizations, and state DOTs (see Table 9)

Program Description: This demonstration program utilizes state-of-the-art technologies, including smart sensors, unmanned aerial vehicles, and big data analytics to support innovative approaches in eliminating or mitigating known public transportation infrastructure deficiencies. These technologies enable real-time, detailed monitoring and reporting of infrastructure conditions. The goals of the program are to: 1) explore advanced cutting-edge technologies that can provide real-time condition assessment of transit capital assets and facilities; 2) allow a more effective way for transit agencies to assess, detect, monitor, and track deficiencies and defects related to infrastructure and rolling stock; and 3) evaluate the cost-effectiveness and the practicality of proposed state-of-the-art solutions.

Results: The projects within this program offered transit agencies a unique opportunity to develop innovative technologies and designs, thereby enhancing

the safety of their transit systems. In FY 2024, the Maryland Department of Transportation (MDOT) completed a Light Detection and Ranging (LiDAR) survey of about 57 miles of light rail track. The LiDAR survey data was successfully integrated with the Maryland Transit Administration (MTA) Optram analytics software, which allowed proactive and targeted real-time condition assessment of transit infrastructure and rolling stock. The Regional Transportation Commission (RTC) of Washoe County and the University of Nevada completed the demonstration of the prototype LiDAR-based system. This system, installed on transit buses, automatically identified broken infrastructure, such as damaged signage and broken glass at bus stops. The prototype system achieves an accuracy rate of 94%.

FTA Funding: \$1,368,816

Table 9 Real-Time Transit Infrastructure and Rolling Stock Condition Assessment Demonstration Program
Receiving Assistance from FTA in FY 2024

Project Title	Project Recipient	City and State	FTA Award
Real Time Track and Vehicle Health Monitoring through Rail-mounted Load Quantification Smart Sensors	Board of Trustees of the University of Illinois	Champaign, IL	\$395,000
Mobile LiDAR: Modernizing Condition Assessments- An innovative approach to data acquisition	Maryland Department of Transportation	Baltimore, MD	\$150,000
The Digital Twin Paradigm for Real-Time Transit Infrastructure Maintenance	Regional Transportation Commission of Washoe County	Reno, NV	\$131,661
SEPTA Regional Rail Automated Wire Scan	Southeastern Pennsylvania Transportation Authority (SEPTA)	Philadelphia, PA	\$170,000
DART Real-time Infrastructure and Asset Digital Condition Assessment Project	Dallas Area Rapid Transit (DART)	Dallas, TX	\$184,000
Polarized Infrared and Optical Imaging System for Transit Infrastructure Condition Assessment	Utah Transit Authority (UTA)	Salt Lake City, UT	\$338,155
Total			\$1,368,816

Title: *Real-Time Transit Infrastructure and Rolling Stock Condition Assessment Research and Demonstration Program Evaluation*

Recipient: The Volpe Center

Project Description: This project supports and independently evaluates FTA's Real-Time Transit Infrastructure and Rolling Stock Condition Assessment Research and Demonstration Program and meets the statutory requirement of independent research demonstration evaluation under Federal public transportation law (49 U.S.C. § 5312 (e)(4)). Each project-level evaluation has a set of performance measures established by award recipients in coordination with the program evaluation team. The evaluator assesses the contribution of each project towards advancing the program goals of exploring advanced technologies, designs, or practices.

Results: In FY 2024, Volpe completed the review of the Data Management Plan (DMP) submitted by each recipient to ensure the proposed data sets were collected, relevant, and accessible to FTA and the evaluation team. The Volpe Center reviewed performance measurement metrics submitted by each recipient and completed evaluation interviews with project managers to collect information and feedback on each project implementation progress.

FTA Funding: \$750,000

Title: *MARTA Track Inspection & Asset Management Research and Demonstration*

Recipient: Metropolitan Atlanta Rapid Transit Authority (MARTA)

Project Description: This project demonstrates an autonomous track inspection system (ATIS) to help FTA disseminate innovative track asset management practices to the transit industry. Its goals are to 1) demonstrate the transferability of an ATIS system to transit; 2) demonstrate its effectiveness compared to existing track management practices (track inspection, data analysis, data management, and maintenance); and 3) evaluate the return on investment of the system at MARTA.

Results: In FY 2024, the project completed retesting and commissioning activities. This completed phase included hardware resolution to mitigate water intrusion, repair of inter-car cable conduits, and retesting of Track Component Imaging System (TCIS) technologies as part of the ATIS. The project addressed the ATIS computer hardware issues, which prevented periodic data collection on a work train. The team continued the ATIS data capture across various

line segments, including a line segment of track rehabilitation to show before and after comparisons of asset data collected by the ATIS. MARTA's Track & Structures group began field validation activities to validate the defects that ATIS identified.

Project Evaluation: The program conducts an independent and continuous evaluation during the project performance period. The evaluator will include detailed information about design, issues, and resolutions in its final evaluation report.

FTA Funding: \$4,225,000

Title: *Public Safety Awareness Technology Evaluation (PSATE) Project*

Recipients: Pipeline and Hazardous Materials Safety Administration (PHMSA)

Project Description: This project will identify, test, evaluate, and document technologies to reduce pedestrian fatalities within and around rail systems. These technologies have the potential to be applied on a larger scale. The project includes demonstrations of safety technologies and an evaluation framework to test new and emerging technologies.

Results: In FY 2024, the project completed Phase 1 of the Public Safety Awareness Technology Evaluation project, resulting in three internal interim reports:

- Interim Report: Stakeholder Engagement and Technology Selection Process
- Interim Report: Technology Scoring Protocol
- Interim Report: Testbed Selection Guide

The project identified potential technologies for testing on railway tracks frequently exposed to trespassers, vulnerable road users such as pedestrians and bicyclists, and other critical safety areas.

FTA Funding: \$100,000

Equity

Description:

FTA’s equity projects and programs are designed to enhance public transportation services for communities that have historically had limited access to transit. These initiatives specifically target lower-density, lower-income metropolitan areas and their adjacent rural regions. To identify equity issues and opportunities, FTA is leveraging social-science concepts and assessing how access to transit improves peoples’ lives.

Objectives:

- To uncover the next iteration of the most promising technologies, practices, programs, and strategies to accelerate and lead public transportation transformation toward a more equitable and sustainable future.

FTA had two active Equity programs and projects in FY 2024 (see Table 10).

Table 10 Equity Programs and Projects Receiving Assistance from FTA, FY 2024

Project Title	FTA Funding
Mobility, Access, and Transportation Insecurity (MATI)	\$6,000,000
Human Services Coordination Research (HSCR) Deployment Program	\$1,039,130
Total	\$7,039,130

Title: *Mobility, Accessibility, and Transportation Insecurity (MATI)*

Recipient: University of Minnesota Center for Transportation Studies

Project Description: MATI explores strategies to improve people’s mobility and access to daily needs and evaluates outcomes and impacts on individuals and communities. It also aims to support an equitable, integrated transportation system that meets the transportation needs of low-income individuals and communities in need.

Results: In FY 2024, the University of Minnesota convened a research committee of academicians, mobility providers, and researchers. They [selected eight communities](#) (Anderson, South Carolina; Arlington, Texas; Boston, Massachusetts; Chicago, Illinois; Mansfield, Ohio; Oahu, Hawaii; Portland, Maine;

and San Joaquin, California) for the first phase of the MATI Demonstration program, which will run from August 2024 to July 2025, offering support in study design, transportation planning, and community engagement.

Project Evaluation: MATI will conduct an independent evaluation as statutorily required.

FTA Funding: \$6,000,000

Title: *Human Service Coordination Research (HSCR) Deployment Program*

Recipients: Transit authorities, local governments, non-profit organizations, and state DOTs (see Table 11)

Program Description: The HSCR Deployment Program supports the implementation of innovative strategies to improve human services transportation coordination for older adults, people with disabilities, and low-income individuals. Its goals are to: 1) integrate new mobility tools such as smartphone apps and demand-responsive bus services; 2) improve multi-modal connectivity for older adults, people with disabilities, and low-income individuals; 3) address accessibility issues through innovative technologies and practices; 4) improve the quality of the traveler experience and the transit product; and 5) identify new mobility-enhancing practices and technologies. This program addresses gaps in transportation services. Project selections were announced on May 22, 2019.

Results: In FY 2024, the Southeastern Arizona Governments Organization (SEAGO) created a mobile service hub where medical, food, and transportation services were offered simultaneously at strategic locations. The transition to telemedicine significantly increased the demand for prescription deliveries. Prescription deliveries became their partners' primary need, and SEAGO adjusted their project to meet this need.

FTA Funding: \$1,039,130

Table11 Human Service Coordination Research (HSCR) Projects Receiving Assistance from FTA, FY 2024

Project Title	Project Recipient	City and State	FTA Award
Bridging Medical and Healthy Food Access with Transportation in Cochise County, Arizona	Southeastern Arizona Governments Organization	Bisbee, AZ	\$235,352
Alternative Senior Transportation Service using TNCs	County of Fulton	Atlanta, GA	\$243,778
Enhancing Technology Resources for Increased Mobility Options	Maryland Transit Administration	Baltimore, MD	\$240,000
Rides Toward Work	Rhode Island Public Transit Authority	Providence, RI	\$150,000
Recovery Rides – Access to Substance Abuse Treatment and Employment	Vermont Agency of Transportation	Montpelier, VT	\$170,000
Total			\$1,039,130

Transformation

Description:

FTA's Transformation research bolsters the ability of transit agencies and communities to connect their communities during a time of changing traveler expectations. By leveraging emerging technologies and fostering public-private partnerships, FTA advances a user-centric approach that enhances mobility options and the ability of all travelers, including those with disabilities, rural residents, and lower-income individuals to safely plan and take a complete trip.

FTA had ten active Mobility Innovation programs and projects in FY 2024 (see Table 12)

Table 12 Transformations Programs and Projects Receiving Assistance from FTA, FY 2024

Project Title	FTA Funding
Mobility NeXt Research Design and Implementation	\$2,000,000
Enhancing Mobility Innovation (EMI) Program	\$3,550,251
Integrated Mobility Innovation (IMI) Demonstration Program	\$15,243,674
Accelerating Innovative Mobility (AIM) Program	\$13,774,500
Mobility Innovation Demonstration Programs Evaluation	\$3,050,000
Innovative Technology and Mobility Solutions Project Evaluation	\$300,000
Transit Cost and Delivery Project	\$469,565
Energy Efficient Mobility Systems Program	\$1,000,000
Strategic Transit Automation Research (STAR) Plan Enabling Research and Implementation	\$350,000
Transit Bus Automation Strategic Partnerships	\$600,000
Total	\$40,337,990

Title: *Mobility NeXt Research Design and Implementation*

Recipients: The Volpe Center

Project Description: This project develops an implementation plan for the Mobility NeXt research program, which facilitates research, modeling, and testing of emerging mobility technologies, strategies, and tools over the next four years. The goal of the research project is to explore opportunities for innovative technologies, strategies, and practices to accelerate the transformation of public transportation and promote carefree mobility.

Results: In FY 2024, the project engaged with research program managers at DOT and the U.S. Department of Energy (DOE). The two agencies were informed about the development of program activities, including transit modeling, exploratory research programs, and emerging technology demonstrations. The project also developed a scan of modeling tools, drawing from interviews and literature reviews. These interviews and reviews summarized the state of practice on modeling tools and presented an initial framework of modeling use cases and advanced these tools for public transportation and multi-modal mobility systems.

FTA Funding: \$2,000,000

Title: *Enhancing Mobility Innovation (EMI) Program*

Recipient: Transit authorities, state and local governments, and state DOTs in partnership with other transit providers (see Table 13)

Program Description: The EMI Program supports a vision for a safe, reliable, equitable, and accessible mobility ecosystem for all travelers. Projects advance emerging technologies, strategies, and innovations in passenger-centric mobility in two distinct areas: 1) concept development and demonstration projects that improve mobility and enhance the rider experience; and 2) projects that support the development of software solutions to facilitate demand-response public transportation.

Results: The program implements two provisions of the FY 2021 and FY 2022 Consolidated Appropriations Act (Pub. L. 116-260) that directed FTA to fund projects in these areas. On July 1, 2024, FTA announced the release of a [Notice of Funding Opportunity \(NOFO\) for EMI](#) for \$1.94 million. This competitive grant will support research to advance emerging technologies, strategies, and innovations that make transit more manageable and accessible for transit riders.

Program Evaluation: The EMI Program will have an independent evaluation for each active project as statutorily required.

FTA Funding: \$3,550,251

Table 13 Enhancing Mobility Innovation (EMI) Projects Receiving Assistance from FTA, FY 2024

Project Title	Project Recipient	City and State	FTA Award
San Francisco Bay Area Regional Demand Responsive Transit Brokerage Service: Software for End-to-End Demand Responsive Transit Trip Planning and Reservations	Metropolitan Transportation Commission	San Francisco, CA	\$500,000
Unify Richmond Moves: Pilot Program to Coordinate Microtransit and Paratransit Riders	City of Richmond	Richmond, CA	\$250,000
Transit App to Develop a New Digital Survey	City of Santa Monica's Big Blue Bus	Santa Monica, CA	\$330,432
Vanpool Microtransit Pilot Program	Metropolitan Washington Council of Governments	Washington, DC	\$250,000
Software Application for Transit Agencies to Generate Tradable Credits from Emission Reductions and Social Equity Improvements	University of Maryland-College Park	College Park, MD	\$800,000
Verifying Low-Income Fare Eligibility via Connections to other State Databases	Rochester Genesee Regional Transportation Authority	Rochester, NY	\$283,219
Software Solutions to Facilitates Integrated Demand- Response Public Transportation with Real-Time Open Data Exchange	NEOride	Wadsworth, OH	\$338,600
Pilot Program to Finetune Data by Scaling the Identification of Data Quality Issues and Sharing Improved Datasets	Mobility Data, Inc.	Portland, OR	\$798,000
Total			\$3,550,251

Title: *Integrated Mobility Innovation (IMI) Demonstration Program*

Recipient: Transit authorities partnering with local governments, educational institutions, and private entities (see Table 14)

Program Description: The IMI Program demonstrates practices, partnerships, and technologies to enhance public transportation effectiveness, increase efficiency, expand quality, promote safety, and improve the traveler experience. IMI helps communities make it easier for people to use transit, especially older adults and people with disabilities. The goals of the program are to: 1) explore new business approaches and emerging technology solutions that support transformational mobility services; 2) enable communities to adopt innovative

mobility solutions that enhance transportation efficiency and effectiveness; and 3) facilitate the widespread deployment of proven mobility solutions that foster expanded personal mobility.

Results: In FY 2024, the Greater Hartford Transit District in Connecticut developed a responsive, 24-hour transportation option for older adults and people with disabilities to fill gaps in mobility services throughout Connecticut. Kootenai County explored an open architecture fare payment system to help close gaps in transportation services in Idaho's second-most populous region while determining cost-effective and efficient transportation options and solutions for riders.

Program Evaluation: The IMI program will have an independent evaluation for each selected project as statutorily required.

FTA Funding: \$15,243,674

Table 14 Integrated Mobility Innovation (IMI) Projects Receiving Assistance from FTA, FY 2024

Project Title	Project Recipient	City and State	FTA Award
Matanuska-Susitna Borough Centralized Mobility Management Software Project	Matanuska-Susitna Borough	Knik- Fairview, AK	\$231,191
Testing and Deployment of Automated Buses on Connecticut Fastrak	Connecticut Department of Transportation	Hartford, CT	\$2,000,000
Atlanta-Region Rider Information and Data Evaluation System (ATL RIDES)	Georgia Regional Transportation Authority for Atlanta-Region Transit Link Authority (ATL)	Atlanta, GA	\$430,400
Kootenai County 2019 Integrated Mobility Innovation (IMI)	Kootenai County	Coeur d'Alene, ID	\$150,000
Road to Recovery: Driving Transformational Change and Removing Barriers for the Recovery Community	Cecil County, Maryland	Elkton, MD	\$562,845
Transportation for Rural and Small Communities	Independent Transportation Network (ITN)	Portland, ME	\$1,658,025
Comprehensive Healthcare Access with Rural Transit Solutions (CHARTS)	Michigan Department of Transportation	Lansing, MI	\$276,499
Northeastern Wake County Rural Microtransit Service	Wake County Human Services	Raleigh, NC	\$393,527

Project Title	Project Recipient	City and State	FTA Award
Tompkins Mobility-as-a-Service (MaaS) Phase I	Tompkins County	Ithaca, NY	\$820,000
Regional Cloud-Based Traffic Management Artificial Intelligence System	Central Ohio Transit Authority	Columbus, OH	\$1,725,000
EZfare: The Gateway	Stark Area Regional Transit Authority (SARTA)	Canton, OH	\$1,997,503
Grand Gateway Economic Development Association - PICK Mobility on Demand	Grand Gateway Economic Development Association	Big Cabin, OK	\$1,514,479
STEPS to Mobility on Demand and Mobility Payment Integration	Tri-County Metropolitan Transportation District of Oregon	Portland, OR	\$1,812,282
Rural Integrated Mobility – Connecting paratransit and fixed-route services through modern ticketing technologies	Crawford Area Transportation Authority (CATA)	Meadville, PA	\$715,233
Expanding Rural Access to Non-Emergency Medical Transportation	Coordinated Community Transportation Systems	Pierre, SD	\$401,760
Boxtown/Westwood On-Demand Transit Pilot Project	Memphis Area Transit Authority	Memphis, TN	\$394,000
Virginia Rural Microtransit Deployment Initiative	Virginia Department of Rail and Public Transportation	Wise, VA	\$160,930
Total			\$15,243,674

Title: *Accelerating Innovative Mobility (AIM) Program*

Recipient: Transit authorities, state and local governments, and state DOTs in partnership with other transit providers (see Table 15)

Program Description: The AIM Program fosters innovation in the transit industry by encouraging progressive strategies to enhance system design, service, and financing. Its goals are to: 1) explore and validate innovative approaches that improve these key areas, 2) provide funding to transit agencies in all types of communities—urban, suburban, and rural— to identify, test, and prove new approaches, technologies, and service models; 3) establish a national network of public transportation stakeholders that are incorporating innovative approaches and business models to improve mobility, and that will share their project results; and 4) identify and promote the most promising and effective innovations that can be implemented more broadly through FTA's capital programs. AIM will foster innovative transit technologies, practices, and

solutions that incentivize travelers to choose public transportation, promote community economic development, and enhance public-private partnerships to improve personal mobility.

Results: In FY 2024, the Minnesota Department of Transportation (MnDOT) developed and implemented the [Regional Mobility-as-a-Service \(MaaS\) Platform](#) with 13 Southern and Western Minnesota transit agencies. This multimodal trip planning, booking, and payment system aimed to improve rural transit access, with participating agencies seeing four percent higher ridership than non-participating agencies. The Los Angeles County Metropolitan Transportation Authority (LA Metro) launched the "One Car Challenge" as part of the [Travel Rewards Research Pilot](#). The Challenge encouraged households with multiple vehicles to use only one, aiming to reduce weekly vehicle miles traveled and promote greater use of transit, walking, and biking.

Program Evaluation: The AIM Program will evaluate each selected project independently, as statutorily required.

FTA Funding: \$13,774,500

Table 15 Accelerating Innovative Mobility (AIM) Projects Receiving Assistance from FTA, FY 2024

Project Title	Project Recipient	City and State	FTA Award
Travel Rewards Research Pilot	Los Angeles County Metropolitan Transportation Authority	Los Angeles, CA	\$700,000
Implementing App-Based, Inter-Agency Fare Purchase and Trip Planning in the Rocky Mountain West	Regional Transportation District	Denver, CO	\$687,000
Creating the World's First Integrated Mobility Solution	Delaware Transit Corporation	Dover, DE	\$317,692
Transit Integration: PSTA Direct Connect Service	Pinellas Suncoast Transit Authority	St. Petersburg, FL	\$120,000
GRTA KOKO Birds AIM for the Future Freedom of Mobility on the Patriotic Route	Guam Regional Transit Authority	Guam	\$1,950,106
RTA Regional Coordination - A Technological Solution to Coordinate Regional Transportation, Creating Efficiency in Service	Iowa Department of Transportation	Ames, IA	\$120,000
IMPACT South Cook Improving Metra, Pace and CTA Together, South Cook	Cook County Department of Transportation and Highways	Chicago, IL	\$330,000

Project Title	Project Recipient	City and State	FTA Award
IndyGo Mobility Concierge	Indianapolis Public Transportation Corporation	Indianapolis, IN	\$400,000
An Innovative Solution to Dynamically Manage Resource Capacity in Real-time in the Post-COVID Normal and Beyond	Transit Authority of the Lexington Fayette Urban County Government (Lextran)	Lexington, KY	\$422,625
AI Communication Platform for Revenue Expansion	Capital Area Transit System	Baton Rouge, LA	\$250,000
Installation of On-Bus Mobile Ticket Validators and Development of an Origin-Destination-Transfer (ODX) Model	Pioneer Valley Transit Authority	Springfield, MA	\$617,000
Montgomery County Mobile Ticketing Project	Montgomery County Maryland	Rockville, MD	\$468,820
Southern Minnesota Mobility as a Service (MaaS) Platform	Minnesota Department of Transportation	St. Paul, MN	\$628,000
Cost-Effective Advanced Driver Assistance System (ADAS) to Ensure ADA-Compliant Level Boarding for Bus Rapid Transit	Kansas City Area Transportation Authority	Kansas City, MO	\$600,000
Transforming Public Transit in Wilson with Rural On-Demand Microtransit	City of Wilson	Wilson, NC	\$250,000
Beyond Verification & Validation (V&V) for CBTC/ UWB Systems	New York Metropolitan Transit Authority	New York City, NY	\$180,000
Enhancing Life with Automated Transportation for Everyone (ELATE)	Western Reserve Transit Authority	Youngstown, OH	\$2,331,000
Near Real-Time Large Transit Network Reporting System	Oregon Department of Transportation	Portland, OR	\$480,000
Advancing Geofencing Functionality	Rhode Island Public Transit Authority	Providence, RI	\$244,000
AI based smart dispatch for dynamic data driven Micro-Transit Service	West River Transit Authority	Spearfish, SD	\$308,912
Memphis Integrated Mobility Framework	Memphis Area Transit Authority	Memphis, TN	\$483,000
Transits First/Last Mile Solution: the EZ Zeus, a zero-emission, Level 4, FMVSS, ADA, and Buy America-compliant Automated Shuttle Bus	Metropolitan Transit Authority of Harris County	Houston, TX	\$1,473,435
Electric Fast Foil Ferry: Re-imagining the Mosquito Fleet for Accelerating Passenger Ferry Innovation	Kitsap County Public Transportation Benefit Area	Bremerton, WA	\$372,910

Project Title	Project Recipient	City and State	FTA Award
Seamless Transportation Services for the Greater Morgantown Area	Monongalia Urban Mass Transit Authority dba Mountain Line Transit	Morgantown, WV	\$40,000
Total			\$13,774,500

Title: *Mobility Innovation Demonstration Programs Evaluation*

Recipient: ICF International

Project Description: This project supports FTA's IMI and AIM Programs and meets the statutory requirement of independent research demonstration evaluation under Federal public transportation law (49 U.S.C. § 5312 (e)(4)). The assessment will focus on projects that seek to lead the development and deployment of innovative practices and technologies that incentivize travelers to choose public transportation, improve personal mobility, and enhance the traveler's experience. The project goals are to: 1) evaluate the IMI and AIM projects; 2) document the success and impact of individual projects and the potential implications nationally; and 3) develop a synthesis report of the IMI and AIM programs, including findings, lessons learned, and recommendations for research and policy actions.

Results: In FY 2024, the independent evaluator made eight in-person site visits, conducting expert interviews, focus groups, and ethnographic interviews to support the independent evaluation requirements. Site visits occurred for the following project recipients: Iowa Department of Transportation, ITN America (KY, FL, CA), Kansas City Area Transportation Authority, Lextran (KY), Matanuska-Sustina Borough (AK), Minnesota Department of Transportation, Pinellas Suncoast Transit Authority (FL), and Pioneer Valley Transit Authority (MA).

FTA Funding: \$3,050,000

Title: *Innovative Technology and Mobility Solutions Project Evaluation*

Recipient: Michigan Department of Transportation (MDOT)

Project Description: The project is responsible for evaluating 13 initiatives funded by the Michigan Mobility Challenge (MMC). The MMC funds projects that bring together public transportation providers and technology providers to propose solutions for mobility gaps for seniors, persons with disabilities,

and/or veterans within a defined geographic area in Michigan. The goals of the project are to: 1) evaluate MMC projects; 2) document the success and impact of individual projects and the potential impact nationally; and 3) develop a synthesis report of the MMC that includes findings, lessons learned, and recommendations to support future state and national innovation technology and mobility funding programs.

Results: In June 2024, the project conducted evaluations and expert interviews and completed five internal evaluation reports. The remaining eight evaluations will conclude in FY 2025. Once all the evaluations are completed, MDOT will finalize an MMC evaluation synthesis report, which will be posted on FTA's [Reports and Publications](#) page.

FTA Funding: \$300,000

Title: *Transit Cost and Delivery Project*

Recipients: Eno Center for Transportation

Project Description: This project aims to analyze current and historical trends in public transit project delivery domestically and internationally to better understand the drivers behind the high transit capital project construction costs and delayed delivery timelines in the US. The goals are to: 1) produce a full foundational report with recommendations for federal, state, and local agencies and project sponsors; 2) develop project case studies; 3) create a database of US and select international transit construction projects that list key metrics; 4) produce a report on international decision-making processes for ten select countries; 5) disseminate foundational report findings and execute outreach plan; and 6) plan and host a symposium on transit project delivery.

Results: In their work on this project, the Eno team has collected construction cost data for over 180 domestic and international rail transit projects completed over the past 20 years. Eno's policy team formed best practices and recommendations from this data to help professionals in the field. Eno is also conducting research and interviews on how the public sector can better recruit, train, and retain top-quality workers to manage highly complex projects, leading to a report with actionable recommendations.

FTA Funding: \$469,565

Title: *Energy Efficient Mobility Systems Program*

Recipients: U.S. Department of Energy (DOE)

Project Description: This project aims to research, develop, apply, and validate technology and data solutions to improve the efficiency and effectiveness of public transportation so that it better meets the public's transportation demands. The goals are to: 1) co-fund three projects to improve energy efficiency for the delivery of public transportation services; 2) enhance the traveler experience and improve public transportation operations; and 3) promote mobility for all travelers as well as quantify the energy and mobility gains that result from using advanced technologies and service delivery strategies.

Results: The FTA portion of this project concluded in FY 2024. Under this project, FTA and DOE optimized simulation-based artificial intelligence models to improve the charging scheduling for a fast-charging electric vehicle system. DOE has also developed various tools to optimize the delivery of public transportation services and energy efficiency. The project developed a data schema and baseline algorithms to collect real-time origin-destination data, enabling the integration of transit and energy simulations. This setup helps study electric vehicle fleet integration and gather performance data for AI model training and demonstration.

FTA Funding: \$1,000,000

Title: *Strategic Transit Automation Research (STAR) Plan Enabling Research and Implementation*

Recipients: The Volpe Center

Project Description: The purpose of this project is to continue the implementation of FTA's STAR Plan. Its goals are to: 1) gain an understanding of the concerns about the viability of transit automation as an investment; 2) assess the market for transit bus automation; 3) develop a business case for deploying automated transit buses; and 4) assist transit agencies in developing a robust, rigorous evaluation component for pilot and demonstration projects. The STAR Plan includes additional research, development, and automation demonstration in transit bus vehicles.

Results: This project concluded in FY 2024. FTA and Volpe completed the following:

- [Strategic Transit Automation Research Plan 2.0 \(2023-2028\)](#): Provides strategic research and demonstration framework for 2023 – 2028 to

advance driving automation systems that meet public transportation needs. This plan continues with the original 2018 STAR Plan that provided a strategic research and demonstration framework for 2017–2022.

- **Transit Bus Automation Market Assessment:** Researchers assessed prototype and commercially available transit bus automation technologies and systems to inform FTA and the transit community about the development status and availability of automated transit buses.
- **Considerations for Evaluating Automated Transit Bus Programs:** Researchers prepared a guidance document to assist transit agencies with planning and conducting self-evaluations for their automated transit bus programs.
- **Assessing Transit Providers' Internal Business Case for Transit Bus Automation:** Researchers conducted an analysis on the business case for implementing automated transit buses to help transit agencies and industry stakeholders understand how agencies are approaching automation decisions.
- **Survey Research for Automated Shuttle Pilots:** The review examines survey development approaches used in recent projects and discusses how to develop future surveys in three key areas: survey population, survey approach, and questionnaire design.

Key project results included enabling research on safe, equitable, and effective transit automation deployments; demonstrating nearly market-ready prototype technologies in real-world settings; and learning from and sharing knowledge with the transit stakeholder community.

FTA Funding: \$350,000

Title: *Transit Bus Automation Strategic Partnerships Project*

Recipient: University of South Florida (USF) Center for Urban Transportation Research (CUTR)

Project Description: This project aims to supplement the work organizations are conducting on transit bus automation research and help disseminate their research findings to the broader transit community. The goals are to 1) leverage investment by others, in both the private and public sectors and 2) gain access to datasets and results that would otherwise be unavailable. Creating strategic partnerships with organizations conducting automated vehicle research accelerates learning about automation implementations and shares that information with the public transportation industry.

Results: This project concluded in FY 2024. Under this project, FTA published the [Lincoln Tunnel Exclusive Bus Lane Connected Automated Bus Proof-of-Concept Demonstration Project Final Report](#). This project successfully tested and demonstrated Automated Driving System (ADS) technologies to improve the safety, reliability, and capacity of the exclusive bus lanes (XBL).

FTA Funding: \$600,000

Climate and Sustainability

Description:

FTA's research in climate and sustainability addressed the significant and growing risk to the safety, reliability, and sustainability of transportation infrastructure and operations of climate change; and the opportunities to reduce the impact of emissions through advances in low or no emissions vehicles. The emergence of battery electric technologies and fuel cell and electrical propulsion systems, along with innovations in alternative renewable energy sources and cleaner electrical grids, offer increased opportunities to make public transportation carbon neutral.

Objectives:

- Foster sustainable and resilient systems for transit vehicles and infrastructure.
- Explore ways to charge and optimize charging costs and operations for large, small, and rural transit agencies.

FTA had four climate and sustainability projects and programs active in FY 2024 (see Table 16).

Table 16 Climate and Sustainability Programs and Projects Receiving Assistance from FTA, FY 2024

Project Title	FTA Funding
Low or No Emission (LoNo) Vehicle Deployment Program*	\$12,660,824
Transit Vehicle Innovation Deployment Centers (TVIDC)	\$13,805,000
Low or No Emissions Component Assessment Program (LoNo CAP)	\$34,000,000
Transit Vehicle Exhaust Emissions Resources Project	\$199,995
Total	\$60,665,819

* In 2016, the LoNo Program matured from a research program to a capital discretionary program authorized by Federal public transportation law (49 U.S.C. § 5339(c)). However, the research demonstration program continued. In FY 2024 FTA is still administering and overseeing some of these projects funded under the LoNo Research Program.

Title: *Low or No (LoNo) Emission Vehicle Deployment Program*

Recipients: Transit authorities and project teams comprising transit agencies, systems experts, and bus manufacturers (see Table 17)

Program Description: The FTA LoNo program began in FY 2013 as a program funded under Federal public transportation law (49 U.S.C. § 5312) and is now bridging FTA's research and capital programs. The goals of the program are

to: 1) lower cost and increase the availability of more energy-efficient buses; 2) increase private investment in transit bus development and create new jobs in US transit bus manufacturing; and 3) expand knowledge regarding the strengths and weaknesses of new bus technologies, and how best to deploy these buses. The program identified the risks of early deployments of new bus technology and helped inform the industry of the capabilities and challenges of new technologies. The LoNo Program was funded for three years as a research program under Federal public transportation law (49 U.S.C. § 5312), where it gained popularity and success. In FY 2016, the FAST Act authorized the successor Low or No Emissions Grant (Low-No) Program as a discretionary capital program under Federal public transportation law (49 U.S.C. § 5339), and funding increased to \$55 million annually. The BIL grew the program further by increasing funding to \$1.1 billion per year.

Results: In FY 2024, three demonstration projects remained active. The projects were intended for public transportation use and significantly reduced harmful emissions or energy consumption compared to similar standard or low-emission vehicles. The LoNo Emission Vehicle Deployment Program helped deploy environmentally sound, technologically advanced vehicles across the country, providing a better riding experience for passengers and improving public health.

Program Evaluation: Through an interagency agreement with the National Renewable Energy Laboratory (NREL), part of the U.S. Department of Energy, FTA funded the technology evaluations of all LoNo project sites. The evaluations measured bus technology performance on regularly scheduled bus routes over a year, addressing fuel economy, fuel costs, bus availability, maintenance costs, and breakdown frequency.

FTA Funding: \$12,660,824004

Table 17 Low or No (LoNo) Emission Vehicle Deployment Projects Receiving Assistance from FTA, FY 2024

Project Title	Project Recipient	City and State	FTA Award
5 battery electric buses	Transit Authority of River City	Louisville, KY	\$3,321,250
5 battery electric buses	Transit Authority of Lexington Fayette Urban County Government (Lextran)	Lexington, KY	\$6,003,534
Deploy 8 additional battery electric buses to King County's electric fleet	King County Metro	Seattle, WA	\$3,336,040
Total			\$12,660,824

Title: *Transit Vehicle Innovation Deployment Centers (TVIDC)*

Recipients: CALSTART and the Center for Transportation and the Environment (CTE) (see Table 18)

Program Description: The purpose of this program is to research the next generation of public transit vehicle technology and facilitate an integrated public transportation innovation deployment network. A key goal is to convene transit agencies and U.S. transit vehicle manufacturers, and research ongoing efforts to test, deploy, and commercialize low and no emissions vehicles and related components. The Centers assess ways to ensure the successful transition to zero-emission by transit agencies. TVIDC researches the field and coordinates and disseminates information to the public transportation industry.

Results: In FY 2024, TVIDC rescoped to expand research activities in support of new provisions of BIL. FTA worked with the Centers to initiate scans; assess gaps, needs, and barriers; and produce toolkits to support fleet transition. TVIDC also presented 28 research proposals to FTA to accelerate the production of zero-emission transit vehicles and technologies. Of these proposals, seven TVIDC projects were selected.

FTA Funding: \$13,805,000

Table 18 Transit Vehicle Innovation Deployment Centers (TVIDC) Projects Receiving Assistance from FTA, FY 2024

Project Title	Project Recipient	City and State	FTA Award
CTE Transit Vehicle Innovation Deployment Centers Project	Center for Transportation and the Environment	Atlanta, GA	\$4,840,000
CTE Transit Vehicle Innovation Deployment Centers Project	Center for Transportation and the Environment	Atlanta, GA	\$2,750,000
Zero Emission Vehicle Barrier and Needs Assessments	CALSTART	Pasadena, CA	\$4,840,000
Transit Vehicle Innovation Deployment Centers Project	CALSTART	Pasadena, CA	\$1,375,000
Total			\$13,805,000

Title: *Low or No (LoNo) Emission Vehicle Component Assessment Program (LoNo CAP)*

Recipients: The Ohio State University and Auburn University (AU) (see Table 19)

Program Description: The two LoNo CAP Centers, managed by The Ohio State University and Auburn University, conduct testing, evaluation, and analysis of low or no (LoNo) emission vehicle components intended for use in low or no emission vehicles, as required by Federal public transportation law (49 U.S.C. § 5312(h)). The program's goals are to: 1) perform low or no emission component tests; 2) establish performance benchmarks for low or no emission components for vehicle manufacturers; and 3) support emerging low and no emission bus technologies and innovations. These two centers support FTA's statutory low or no emission transit bus capital programs and economic strength and modernization goals by providing a voluntary mechanism for manufacturers to test innovations in low or no emission components. The passage of the Bipartisan Infrastructure Law (BIL) expanded the roles of both Centers to permit directed research for low or no emission components and capital expenditures, which aided both research and testing efforts.

Results: In FY 2024, FTA staff visited The Ohio State University (OSU) and Auburn University (AU) to provide direction and technical assistance on their directed research proposals, evaluations, and capital improvement plans. During these site visits, FTA worked closely with the two centers to revamp their statements of work and budgets, including reviewing and finalizing plans to increase the capabilities of the centers through infrastructure investments. FTA toured the research laboratories and met with engineers and investigators who provided innovative research proposals.

OSU completed the design and construction plan for a laboratory to conduct directed technology research, testing, evaluation, and analysis of low or no emission transit bus components. OSU designed the facility to address the needs of the transit industry and support FTA's designated concentration areas for LoNo CAP testing. Working with stakeholders, Ohio State identified energy storage systems, hydrogen fuel cells, and a heavy-duty vehicle chassis dynamometer as the research and testing capability focus of the new facility.

AU also made significant progress on planning a facility to conduct low or no emissions transit bus component directed technology research, testing, evaluation, and analysis. Based on input from stakeholder and industry advisory groups, AU identified the most significant barrier to low or no emission bus adoption, specifically related to climate. Major concerns included impacts of weather conditions on battery performance and aging and regional disparities in heating and air conditioning demand. AU also completed component testing conducted cybersecurity vulnerability assessments

related to low or no emission technology and penetration tests to make risk mitigation recommendations to transit vehicle manufacturers. The tests identified vulnerabilities at access points such as plug-in and overhead charge controllers, heating, ventilation, and air-conditioning systems, motor inverters, battery thermal management systems, and the energy storage system battery networks.

FTA Funding: \$34,000,000

Table 19 Low or No (LoNo) Emission Vehicle Component Assessment (LoNo CAP) Projects Receiving Assistance from FTA, FY 2024

Project Title	Project Recipient	City and State	FTA Award
Low or No (LoNo) Emission Component Assessment Program (LoNo CAP) - Auburn University	Auburn University	Auburn, AL	\$7,500,000
Low or No (LoNo) Emission Component Assessment Program (LoNo CAP) - The Ohio State University	The Ohio State University	Columbus, OH	\$7,500,000
Low or No (LoNo) Emission Bus Testing Centers - Auburn University	Auburn University	Auburn, AL	\$5,500,000
Low or No (LoNo) Emission Bus Testing Centers - The Ohio State University	The Ohio State University	Columbus, OH	\$5,500,000
FY 2021 Appropriations – Auburn University	Auburn University	Auburn, AL	\$1,500,000
FY 2021 Appropriations – The Ohio State University	The Ohio State University	Columbus, OH	\$1,500,000
FY 2022 Appropriations – Auburn University	Auburn University	Auburn, AL	\$2,500,000
FY 2022 Appropriations – The Ohio State University	The Ohio State University	Columbus, OH	\$2,500,000
Total			\$34,000,000

Title: Transit Vehicle Exhaust Emissions Resources Project

Recipients: West Virginia University

Project Description: This project supports updates and enhances the online Integrated Bus Information System (IBIS) Transit Vehicle Emissions Resources to include the latest fuel and propulsion technologies. The goal of IBIS is to provide tools to help transit agencies evaluate the impact of various fuel and propulsion options—including diesel, compressed, and liquefied natural gas (CNG), and hybrid-electric systems—on the emissions footprint of their transit fleets.

Results: In FY 2024, WVU collected and analyzed additional data to update electricity cost calculations for battery electric buses in the lifecycle cost modeling tool. WVU also completed a comprehensive testing and evaluation of the model calculation for accuracy. In April of 2024, FTA received the Life Cycle Cost Model for review and testing, and in May 2024, FTA received the updated final report for review and comment.

FTA Funding: \$199,995

Economic Strength and Global Competitiveness

Description:

FTA’s research investments also seek to enhance the transit manufacturers’ global competitiveness, improve transit agencies’ effectiveness with construction projects, and further small business development. The new BIL program, Advanced Digital Construction Management Systems (ADCMS), will accelerate the adoption of advanced digital systems from project planning, design, engineering, construction, operations, and maintenance. Integrated enterprise technology solutions that link all processes and functions across major transit infrastructure programs can reduce construction cost overruns, improve the lifecycle management of the program, help keep the program on schedule, enhance the sharing of information across all contractors, and improve program management. FTA’s research on the transit vehicle marketplace will aid the understanding of issues and opportunities to ensure the health and viability of strong transit manufacturers. Additionally, FTA’s Small Business Innovative Research (SBIR) Program continues to invest in small businesses to help them grow and thrive.

Objectives:

- Establish, implement, deploy, and evaluate advanced digital construction management systems throughout the construction lifecycle.
- Maximize capital project interoperability, boost productivity, reduce capital project delays and cost overruns, and enhance safety and quality.
- Increase private-sector commercialization of innovations derived from Federal research and development funding.

FTA had three active Economic Strength programs in FY 2024 (see Table 20).

Table 20 Economic Strength and Global Competitiveness Programs Receiving Assistance from FTA, FY 2024

Project Title	FTA Funding
Accelerating Advanced Digital Construction Management (ADCMS)	\$5,100,000
Small Business Innovation Research (SBIR)	\$3,781,065
Transit Vehicle Manufacturing Study	\$250,000
Total	\$9,131,065

Title: *Accelerating Advanced Digital Construction Management Systems (ADCMS) Program*

Recipients: To be Selected

Project Description: The purpose of the ADCMS Program is to accelerate the adoption of advanced digital systems from project planning, design, engineering, construction, operations, and maintenance. The goals of the program are to: 1) promote field-tested comprehensive digital platforms; 2) reduce costs and improve the delivery of public transit capital construction projects; and 3) document best practices for incorporating digital tools in public transit capital construction projects.

Results: In FY 2024, FTA announced the [ADCMS Notice of Funding Opportunity \(NOFO\)](#) to apply for funding for a program lead to administer ADCMS demonstration projects and deliver other program requirements. FTA received applications and completed the reviews needed to make a final selection. FTA will announce the selected recipient (s) in FY 2025.

FTA Funding: \$5,100,000

Title: *Small Business Innovation Research (SBIR) Program*

Recipients: The Volpe Center

Program Description: The purpose of the SBIR program is to encourage domestic small businesses to engage in Federal Research/Research and Development (R/R&D) with the potential for commercialization. FTA is one of eight operating administrations within DOT that funds SBIR research. Federal law (15 U.S.C. § 638) mandates that each operating administration set aside a portion of its annual research budget to fund SBIR contracts. FTA contributes 3.2% of its yearly research discretionary funding to SBIR contracts; FTA's FY 2024 discretionary funding amount for SBIR was \$1,192,369. FTA's participation in the program focuses on areas such as safety, operations, maintenance, and other topics essential to transit. The goals of SBIR are to: 1) stimulate technological innovation; 2) meet Federal research and development needs; 3) foster and encourage participation in innovation and entrepreneurship by women and socially or economically disadvantaged persons; and 4) increase private-sector commercialization of innovations derived from Federal research and development funding (see Table 21).

Results: In FY 2024, Tranalytics, LLC developed a web portal to visualize bus stop data where most bus-pedestrian and bus-fixed object collisions occur, providing trajectory data over time that can be useful for identifying root causes

for bus-related crashes at bus stops. SPLUSM LLC finished the development of its mobile app user interface, making visual accessibility and user preference compatibility enhancements. Right Click Solutions continued work on carbon credit incentive prototype development and finalized program design, data structure requirements, and a timeline for pilot communications and user recruitment. Interphase Materials installed CO/CO2 monitors that collected ventilation data. This data was synthesized with disease and air quality data, and five months of ventilation data to determine air exchange rates.

FTA Funding: \$3,781,065

Table 21 Small Business Innovation Research (SBIR) Projects Receiving Funding from FTA, FY 2024

Project Title	Project Recipient	City and State	FTA Award
FTA Interagency Agreement with the Volpe Center for Phase I & II Projects	The Volpe Center	Cambridge, MA	\$704,000
Cost Allocation Technology for Non-Emergency Medical Transportation – Phase II	RLS & Associates, Inc.	Dayton, OH	\$719,702
Virtual and Augmented Reality to Aid Transit Use by All Travelers – Phase II	Design Interactive, Inc.	Orlando, FL	\$749,852
AI for Maintenance on Buses (AIM on Bus) – Phase I	Preteckt, Inc.	Memphis, TN	\$119,619
AI Based Predictive Capabilities for Condition-based Sanitization of Public Transit Vehicles – Phase I	Interphase Materials	Pittsburgh, PA	\$148,312
Fully Autonomous Omnidirectional Adaptive Robots for the Disinfection and Decontamination of Transit Assets – Phase I	Advent Innovations, Ltd. Co.	Columbia, SC	\$147,211
FY 2024 Set Aside	The Volpe Center	Cambridge, MA	\$1,192,369
Total			\$3,781,065

Title: *Transit Vehicle Manufacturing Study*

Recipients: The Volpe Center

Project Description: The purpose of this project is to better understand the state of the transit vehicle manufacturing industry. The goals of the project are to: 1) provide a scan of previous research and current snapshot of the U.S. transit vehicle manufacturing market; 2) identify and summarize causal factors that impact the health of transit vehicle manufacturing industry for each sector;

and 3) develop a list of options to improve resilience and increase competition in the industry.

Results: In FY 2024, the Volpe Center conducted preliminary studies, reviewed previous research, and conducted interviews with transit agencies, manufacturers, and FTA. The focus of their work was on rail car, bus, and cutaway manufacturing. Once the study is completed, the Volpe Center will finalize a report for FTA's review.

FTA Funding: \$250,000

Organizational Excellence

Description:

FTA has programs and projects that address organizational excellence and cross-cutting issues associated with its three research priorities—Safety, Infrastructure, and Mobility Innovation—and support research-to-practice implementation. In addition to those programs, FTA manages the statutorily required Transit Cooperative Research Program (TCRP) through the National Academies of Sciences, Engineering, and Medicine. One key aspect of research organizational excellence is effective outreach and technology transfer. FTA refers to Technology Transfer as Research to Practice, which is sharing research information and results. The primary method for sharing research information is through our website and reports. Surveys of FTA’s recipients show that the web is their preferred method to receive FTA information. In addition, FTA is also assessing other research to practice methodologies with a new technology transfer program to build a strong research-to-deployment initiative.

Objectives:

Programs under this section support FTA with dissemination, evaluation, and additional industry-driven and selected research. Outputs include:

- Deploy proven research solutions to improve transit service delivery.
- Facilitate the implementation of research and technology development.
- Advance the interests of public transportation.
- Monitor, report on, and improve outreach efforts to drive research to practice.

FTA had two active Organizational Excellence programs in FY 2024 (see Table 22).

Table 22 Supporting Programs and Initiatives Receiving Assistance from FTA, FY 2024

Project Title	FTA Funding
Technology Transfer (T2) Program	\$5,000,000
National Bus Rapid Transit Institute (NBRTI)	\$1,706,250
Total	\$6,706,250

Title: *Technology Transfer (T2) Program*

Recipient: To be Determined

Project Description: The purpose of this program is to facilitate the deployment of research and technology development resulting from federally funded efforts and the implementation of research and technology development to advance the interests of public transportation. The goals of the T2 Program are to: 1) develop processes, systems, and resources to support the deployment and adoption of FTA's innovative research results in the public transportation industry; 2) support the commercialization and production of technologies developed in the U.S., in part through FTA-funded research and development; and 3) overcome barriers and challenges affecting the adoption of research products in transit agencies.

Results: In FY 2024, FTA designed the T2 Program. FTA will announce a NOFO for the program and will have a recipient to conduct its activities in FY 2025.

FTA Funding: \$5,000,000

Title: *National Bus Rapid Transit Institute*

Recipient: University of South Florida (USF) Center for Urban Transportation Research (CUTR)

Project Description: The purpose of this project is to conduct continuing research and provide technical assistance to the transit industry for bus rapid transit (BRT).

The goals are to: 1) conduct research in BRT safety, technology, and state of good repair; 2) develop best practice manuals and tools; and 3) provide technical assistance.

Results: The project ended in FY2024. FTA published the National Bus Rapid Transit Institute (NBRTI) Program Report, summarizing the activities of the [National Bus Rapid Transit Institute \(NBRTI\)](#) from its inception in January 2001 to June 2024. The Institute was charged with creating a national program for training, technical assistance, research, innovation, and evaluation of existing and proposed bus rapid transit (BRT) projects. This program report includes two appendices documenting additional research efforts.

FTA Funding: \$1,706,250

Transit Cooperative Research Program (TCRP)

Recipient: National Academies of Sciences, Engineering, and Medicine (NAS)

Program Description: TCRP is authorized by Federal public transportation law (49 U.S.C. § 5312(i)). This program provides applied research with near-term, practical results addressing key challenges facing the public transportation industry. TCRP supported DOT's strategic goals of Safety, Equity, Transformation, Economic Strength and Global Competitiveness, Climate and Sustainability, and Organizational Excellence. The TCRP Oversight and Project Selection (TOPS) Commission, consisting of senior industry leaders, represents the primary beneficiaries of TCRP research and functions as the TCRP governing board, setting research priorities. TCRP also includes FTA's strategic research goals as criteria for screening and selecting projects, helping to further extend FTA's reach (see Table 23).

Objectives: Identify the highest-priority transit problems that need research and development (R&D) investigation. Provide an opportunity for transit operators, local government officials, and other constituents—such as construction organizations, financiers, real estate developers, and community representatives—to identify problems and participate in developing appropriate solutions.

Outputs:

- Engage public transportation stakeholders and industries to identify challenges for the public.
- Production of publications.
- Disseminate research results through events, bulletins, webinars, and email blasts.

Results: From June 2023 – June 2024, there were 33,571 downloads of TCRP reports and 79,331 OpenBook sessions for visually impaired readers. In October 2023, the TOPS Commission met and selected fourteen research projects to fund for FY 2024. The topics include: cyber vulnerability of vehicle systems, gaps in measuring disability within data systems, surveying hard-to-reach populations, updating the marketing segmentation handbook, track design handbook for light rail transit, rail structure interaction analysis, psychological health and safety at the workplace, recruiting and retaining individuals with disabilities, CDL requirements for drivers, equitable rural transit economic benefit analyses, drug testing science, transit service delivery, transit governance, and transit operations and artificial intelligence. In June 2024, the TOPS Commission met to receive updates on TCRP projects and programs.

Project sponsors presented the results of four projects on Homelessness and Public Transportation, Train Robotic Systems, Mental Health for Transit System Workers, and Bus Operator Barrier Design. TRB staff provided updates on the Dissemination and Implementation of TCRP Research, The Transit IDEA Program, Legal Issues, and Quick Response Research.

FTA Funding: \$30,186,007

Table 23 Transit Cooperative Research Program (TCRP) Projects Receiving Assistance from FTA, FY 2024

Project Title	Project Recipient	City and State	FTA Award
TCRP 29th Year - FY 2020	National Academy of Sciences	Washington, DC	\$5,000,000
TCRP 30th Year - FY 2021	National Academy of Sciences	Washington, DC	\$5,000,000
TCRP 31st Year - FY 2022	National Academy of Sciences	Washington, DC	\$6,578,592
TCRP 32nd Year - FY 2023	National Academy of Sciences	Washington, DC	\$6,716,026
TCRP 33rd Year - FY 2024	National Academy of Sciences	Washington, DC	\$6,891,389
Total			\$30,186,007

Strategic Research Roadmap

Federal public transportation law (49 U.S.C. § 5312(f)(c)) requires FTA to provide a strategic research roadmap proposal for allocations for the current and subsequent Fiscal Year (FY), including anticipated work areas, proposed demonstrations, and strategic partnership opportunities (see Table 24).

Two-years before the Annual Research Report is compiled, FTA develops an Annual Modal Research Plan (AMRP) noting expected and budgeted upcoming research activities. The AMRP covers two upcoming fiscal years, with a detailed program budget for the first year. FTA submitted the [FTA's AMRP for FY 2024 and FY 2025](#) in September 2023 and it was published on the [DOT AMRP website](#) in August of 2024. FTA's planned research allocations for FY 2024 and proposed allocations for FY 2025 are noted below (see Table 26), as referenced in the FY 2023 Enacted Appropriation and in the FY 2024 President's Budget:

Table 24 Research Allocations for FY 2024 and Proposed Allocations for FY 2025 (in Millions)

Program	FY2024 Enacted (\$000)	FY 2025 President's Budget (\$000)
PUBLIC TRANSPORTATION INNOVATION		
Mobility NeXt	\$7,116	\$7,000
Strategic Transit Automation	\$5,000	
Advanced Digital Construction Management	\$1,500	\$2,145
Low No Component Testing 5312(h)	\$5,238	\$5,346
Small Business Innovation Research Program	\$847	\$864
Transit Cooperative Research Program (TCRP) 5312(i)	\$6,891	\$7,034
Safety	\$10,000	
Research to Practice and Dissemination Program (Tech Transfer)	\$2,000	
Transit Enhanced Living Program		\$5,000
Safe Infrastructure and People		\$5,000
Transit Defined Systems		\$7,000
Sub-total Transit Formula Grants	\$38,592	\$39,389
TRANSIT INFRASTRUCTURE GRANTS		
Small Business Innovative Research	\$114	
Research - Accelerate Adoption of Zero Emission Buses	\$3,455	
Sub-total Transit Infrastructure Grants	\$3,569	
Total	\$42,161	\$39,389

Anticipated Work Areas/Programs

In FY 2024, FTA overhauled and updated its research programs. FTA streamlined and improved the research programs by focusing on a discrete set of larger programs, and sun-settled completed programs. In FY 2025, FTA will elaborate from the momentum from FY 2024 with its research projects and programs.

After taking a year to do outreach and plan for the ADCMS program, in FY 2024, FTA announced a Notice of Funding Opportunity (NOFO) for demonstration projects to implement the statutory goals of the ADCMS. FTA spends over \$4 billion a year on large infrastructure projects. By effectively fielding this new program, FTA aims to improve how transit agencies deliver infrastructure construction projects by applying enterprise business solutions to the entire lifecycle of a construction project. There are nine statutory goals for ADCMS. The top five goals are: Accelerating the adoption of advanced digital systems; promoting more timely and productive information sharing among all stakeholders; deploying digital management systems that enable and leverage the use of advanced digital technologies; and increasing the technology adoption and deployment by states, local governmental authorities, and designated recipients of ADCMS solutions. Applying ADCMS solutions in large infrastructure projects will streamline tasks, document agreements, and facilitate communication for workers – contractors, agency personnel, and others – throughout the lifecycle of infrastructure projects from design to asset management. It will enable contractors, agency staff, and all workers to perform tasks faster and support the transfer of information as assets are handed off into operation.

In FY 2025, FTA will announce the availability of \$5 million in competitive grant funding for the Technology Transfer (T2) Program. The program will promote the early deployment and demonstration of innovative technologies developed through FTA funding. The program will also help commercialize innovations with broad applicability to public transportation. encouraging technology transfer and commercialization and allowing small businesses and nonprofit organizations to retain ownership of and commercialize their federally funded products or inventions. The T2 Program will be active in FY 2025.

Collaboration Efforts

Broad stakeholder collaboration is a foundational component of FTA's innovative research. Key stakeholder groups fall into six major categories: transit agencies; academic/consulting partners; other DOT offices/modes; national nonprofits, including national transit associations; private sector partners; and other federal agencies. Partners are either recipients of research funding or organizations that closely partner with FTA to share information and provide feedback on industry trends, issues, and needs.

Transit agencies play a major role in planning, implementing, and assessing potential innovations. FTA's transit agency research recipients span FTA's ten regions enabling promising transit solutions development in myriad environments. FTA is indebted to those transit agencies willing to invest their time to try new approaches to mobility, safety, resiliency, sustainability, and other solutions. An analysis of FTA's portfolio shows that FTA has awarded almost twice as much funding to transit agencies than to the next largest funded stakeholder organization – academic institutions.

Academic institutions are the second largest recipient of FTA funding. FTA has long-established collaborations with academic institutions. Auburn University and The Ohio State University lead low or no emission component testing as FTA's Low or No Emissions Component Testing Centers. Additionally, a new BIL provision allows the Centers to do directed research related to advanced vehicle technology and low or no emission. The [Center for Urban Transportation Research](#) (CUTR) at the University of South Florida has vital safety, and project evaluation expertise and is currently leading an important transit operator and rider safety study. FTA also has a new partnership with the University of Minnesota as the lead for MATI. The University of Minnesota brings a new level of scientific integrity and validity to FTA's research.

Consulting partners like the Center for Transportation and the Environment (CTE), CALSTART, and National Associations like Intelligent Transportation Society (ITS) America, the American Public Transportation Association (APTA), the Community Transportation Association of America (CTAA) provide key roles both as advisors and as recipients of specific research studies. CTE and CALSTART manage FTA's two Transit Vehicle Innovative Deployment Centers, playing a critical role in further climate and sustainability and the shift to zero-emission transit vehicles. ITS America keeps FTA informed on key trends in transit, especially related to intelligent transportation systems. Through its conferences and close collaboration with FTA through its committees, APTA is a key outreach and engagement partner, enabling FTA and FTA recipients to share data and experiences in innovation. APTA is also the recipient of FTA's expanded Standards Development Program under the Technical Assistance and Workforce Development Program (49 U.S. Code § 5314), which will provide important information to FTA's research noting areas where standards are needed. CTAA, through its National Center for Advanced Transportation Technology (N-CATT), is also funded under 49 U.S. Code § 5314 and is a key partner with FTA's data initiative from the training and technical assistance side, which will give important feedback to FTA's data research.

FTA continues collaboration with internal DOT modal administration partners. The internal partners include the [Intelligent Transportation Systems](#) (ITS) [Joint Program Office](#) (JPO), [Office of the Assistant Secretary for Research and Technology](#) (OST-R), [Office of the Assistant Secretary for Aviation](#)

and International Affairs (OST-X), the VOLPE Center, the Federal Highway Administration (FHWA), the Pipelines and Hazardous Materials Administration (PHMSA), the National Highway Traffic Safety Administration (NHTSA), the Federal Railroad Administration (FRA), and the Bureau of Transportation Statistics. The National Highway Traffic Safety Administration (NHTSA) is a key partner in transit automation. The Federal Highway Administration helped FTA plan the ADCMS program. In FY 2024, FTA is restarting a relationship with FRA's Transportation Technology Testing Center in Pueblo, Colorado, expanding FTA's goal to build a national network of laboratories. FTA is learning from the Federal Aviation Administration in the area of unmanned aerial systems. PHMSA is an important partner in transit vehicle battery safety research. The VOLPE Center is the lead for the administration of the Small Business Innovative Research and a key research resource for many transit studies on specific topical areas such as data integration and automation. FTA maintains a close working relationship with OST-R, actively participating in cross-modal exchanges hosted by OST-R, and benefiting from the many briefings on innovative trends in transportation facilitated by OST-R.

Other Federal agencies help lead the way in important subject matter research, such as zero-emission technology. FTA routinely collaborates with the U.S. Department of Energy's National Renewable Energy Laboratory (NREL), the Vehicle Technology Office (VTO), and the Joint Office of Energy and Transportation.

Nonprofit partners like the Shared Use Mobility Center (SUMC) and Intelligent Transportation Society of America (ITS America), as well as evaluation partners such as ICF International, help demonstrate and feature FTA research. In comparison, National nonprofits such as the National Academies' Transportation Research Board (TRB) manage one of FTA's statutory programs – the Transit Cooperative Research Program (TCRP). TCRP manages industry-selected grassroots research that often are precursors to larger FTA innovative research demonstration grants. FTA also works closely with TRB with the TRB Annual Meeting, the TRB Executive Committee, and special projects. TRB hosts the Transport Research International Documentation (TRID) repository, which contains over 1.3 million records of transportation research worldwide. TRID combines the TRB's Transportation Research Information Services (TRIS) and Economic Co-operation and Development (OECD) Joint Transport Research Centre's International Transport Research Documentation (ITRD) Databases. FTA research reports, in addition to being hosted on DOT's Repository & Open Science Access Portal (ROSA P), are also noted in TRID.

FTA continues to expand international collaboration by participating in APTA International Exchanges and working closely with the International Association of Public Transport (UITP), including attending their national conference in Barcelona in FY 2023.



Acronyms and Abbreviations

ADAS	Advanced Driver Assistance Systems
ADCMS	Advanced Digital Construction Management Systems
AIM	Accelerating Innovative Mobility Program
CTE	Center for Transportation and the Environment
CUTR	Center for Urban Transportation Research at the University of South Florida
DOE	Department of Energy
DOT	Department of Transportation
EMI	Enhancing Mobility Innovation
FTA	Federal Transit Administration
FY	Fiscal Year
HSCR	Human Service Coordination Research
IMI	Integrated Mobility Innovation
LoNo-CAP	Low or No Emission Vehicle Component Assessment Program
LoNo	Low or No Emission
MATI	Mobility, Access, and Transportation Insecurity
NAS	National Academy of Sciences
NBRTI	National Bus Rapid Transit Institute
PSATE	Public Safety Awareness Technology Evaluation
SBIR	Small Business Innovation Research
SRD	Safety Research and Demonstration
SRM	Safety Risk Management and Analysis
STAR	Strategic Transit Automation Research
T2	Technology Transfer
TCRP	Transit Cooperative Research Program
TVIDC	Transit Vehicle Innovation Deployment Centers



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