United States Department of Transportation
Annual Modal Research Plans FY 2023
Program Outlook FY 2024

Cover Page

FEDERAL TRANSIT ADMINISTRATION
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Executive Summary

"Every day, transit connects millions of Americans to jobs, schools, groceries, hospitals, resources, and countless other opportunities – all while helping to reduce pollution, congestion, and traffic," said U.S. Transportation Secretary Pete Buttigieg.[1] Transit sits squarely at the center of the U.S. Department of Transportation (DOT) strategic goals for safety, equity, climate preservation and economic competitiveness. Continued innovation in public transportation is essential to transform the industry to meet the everyday needs of Americans in today's "new normal" and tomorrow's next challenge.

The Bipartisan Infrastructure Law (BIL) provides unprecedented Federal investment in public transportation and public transportation research to improve safety, modernize transit fleets, reduce climate impacts, and promote equity. The Federal Transit Administration (FTA) developed a new strategic plan to leverage this opportunity and develop tools, technologies, systems and service models that improve safety, build resiliency, increase sustainability, improve equity and, connect communities.

FTA's Public Transportation Innovation Research Program (49 U.S.C. § 5312) works to provide a better quality of life for all and build public transportation excellence in line with the agency's mission to improve America's communities through public transportation. The strategic research goals for FTA are to facilitate equitable and accessible mobility, improve and leverage transit to reduce climate impacts, and enable a safe and secure public transit system. The program conducts the foundational research, prototyping and proof-of-concept demonstrations for wide scale deployment necessary to meet Department and Administration goals (see Figure 1).

[1] From the 4-6-2022 Press release on President Biden, USDOT Announce More than $20 Billion for Communities of All Sizes to Support Transit This Year. President Biden, USDOT Announce More than $20 Billion for Communities of All Sizes to Support Transit This Year | FTA

Figure 1.
DOT's Strategic Goals

Transit is the safest mode of surface travel (injury/fatality per trip). At the same time, operator and rider assaults are on the rise, and pedestrian and bicycle fatalities – modes commonly used to access transit – remain stubbornly high. Public transportation uses a fraction of the amount of fuel and roadway space per person compared to private auto travel, but America needs to dramatically increase the transit mode share to really leverage these benefits. Transit is a low-cost mode of travel, but still presents a time and cost burden to many low-income and transportation-insecure residents.

FTA's research and development program works to improve public transportation to be the mode of choice for a significant share of trips in urban areas and for providing efficient and empowering critical connectivity in rural and tribal communities.

FTA's Annual Modal Research Plan (AMRP) outlines planned research for FY 2023 and the outlook for FY 2024. The FTA AMRP is a dynamic document noting strategic directions for research investments including the major program areas FTA expects to fund, and the level of that funding for FY 2023. Each program aligns under a DOT strategic goal and many advance multiple goals. FTA's level of investment for each of these programs by primary strategic goals is noted in Table 2.

Below is a list of FTA's FY 2023 major research programs categorized by the DOT strategic goal with which they principally align:

<u>Safety</u>

Safety – to research new technologies, solutions, and practices to reduce injuries and fatalities and to improve safety culture with the use of technological advancements and innovations, working toward a future where public transportation-related serious injuries and fatalities are eliminated.

Equity

Mobility neXt – 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.

Climate and Sustainability

Environmental Sustainability and Resiliency – to harness novel renewable energy methods and advance research and innovations in climate solutions to reduce carbon footprint, tackling the climate crisis by ensuring that public transportation plays a central role in the solution.

Economic Strength and Global Competitiveness

Small Business Innovation Research Program (SBIR) – a statutory program where FTA, like all DOT operating administrations, applies 3.2 percent of discretionary research funds for research in products and services needed by FTA that small businesses can develop and make commercially available.

Transformation

Strategic Transit Automation Research Program – to advance the research, development, and deployment of transit bus automation and the application of automated driving systems learnings.

Advanced Digital Construction Management Systems Program – to accelerate the adoption of advanced digital systems applied throughout the lifecycle of transportation infrastructure through the planning, design, engineering, construction, operations, and maintenance phases. To advanced digital construction management systems, practices, performance, and benefits to reduce public transportation-related disparities, adverse community impacts, and health effects.

Organizational Excellence

Technology Transfer, Performance, and Dissemination– to deploy proven research solutions to improve transit service delivery. In addition, the program will continue to facilitate the implementation of research and technology development and to advance the interests of public transportation, monitor, report on, and improve outreach efforts to drive research to practice.

Critical RD&T Programs and Anticipated Outcomes

FTA has the following critical RD&T programs: Safety, Mobility neXt, and Environmental Sustainability and Resiliency.

The Safety program will focus on addressing operator and traveler assaults, rail crossing safety, mitigating suicides, understanding the risks of cybersecurity, and implementing the provisions of the DOT new Safe Systems Approach. Expected outcomes under the Safety program are reduction of transit worker fatality and serious injury rates; increased transit ridership in the top transit cities; and increased percentage of person trips by transit and active transportation modes.

Mobility neXt leans into the next critical era to focus on equity transit operational efficiency, and smarter mobility choices through projects that address transportation insecurity, frictionless mobility payment, curated traveler information, accessible transportation research, and data standards/governance. In FY 2023 and FY 2024, the program will focus on developing a comprehensive Mobility neXt strategic program plan, conducting exploratory research on data analytics, technological solutions, and behavioral research that enable smart transit operations through integrated mobility, and smart travelers through curated and personalized information. Expected outcomes are treater transportation resiliency, interoperability within the mobility ecosystem, and human-centered universal design of transit systems and services.

FTA's Environmental Sustainability and Resiliency Program is oriented toward advancing transit technology and technical assistance to eliminate carbon emissions from the transit sector by 2050. In FY 2023 and FY 2024, the program will focus on developing zero-emission transition tools and researching promising practices in electrification, charging systems, route planning, bus selection, and fielding new research centers to study advanced and emerging technologies. Key program projects are LoNo component research, a new learning laboratory, and environmental sustainability projects. In addition to decarbonizing the nation's transit fleet, sustainability demands that dramatically more trips be taken by transit and non-auto modes. Expected outcomes are dramatic reductions in carbon emissions from the transit sector; research and development resulting in new products, systems and services in the areas of clean energy and energy efficiency, clean transportation, and the remediation and reduction of legacy pollution flow to disadvantaged communities.

Collaboration Efforts

Collaboration is at the heart of FTA's innovative research and is done through two primary ways – partnerships with recipients of funding and partnerships with non-funded entities. FTA collaborates with internal and external partners. Internal partners are other DOT modal partners, the Joint Program Office, the Office of the Secretary, the VOLPE Center, and the Bureau of Transportation Statistics. External partnerships include diverse and broad entities including nonprofit organizations, academic institutions, transportation industry associations, and private sector organizations; as well as local/state/Federal governmental entities.

FTA has long established collaborations with academic institutions, industry-leading nonprofits, and diverse Federal partners. Auburn University; The Ohio State University; and the Altoona Bus Testing Center at Penn State University lead LoNo emission

component testing and bus testing. The Center for Urban Transportation Research (CUTR) at the University of South Florida, the Virginia Tech Transportation Institute, and the Texas A&M Transportation Institute provide vital expertise in safety and project evaluation. The Center for Transportation and the Environment (CTE), and CALSTART provide critical research in electrification and carbon emissions research, electrification, alternative fuel buses and carbon emission research. FTA also routinely collaborates with the U.S. Department of Energy's National Renewable Energy Laboratory (NREL) and Vehicle Technology Office.

Collaboration is a core element of FTA's over fifteen years of mobility research. National associations like the American Public Transportation Association (APTA); and the Community Transportation Association of America (CTAA) and nonprofit partners like the Shared Use Mobility Center and Intelligent Transportation Systems(ITS) America as well as evaluation partners such as ICF International have helped FTA research, demonstrate, and feature mobility innovations spanning new mobility as a service models; smart phone apps; transit automation; and cashless integrated payment systems. FTA also benefits from interagency partnerships that further accessibility, The Accessible Transportation Technology Research Initiative (ATTRI) partners closely with the National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR). Additionally, FTA partners with other modes in mobility research including the Federal Highway Administration (FHWA), the Office of the Assistant Secretary for Research and Technology (OST-R), the Intelligent Transportation Systems Joint Program Office (JPO). FTA is leveraging previous research in unmanned aerial systems from the Federal Aviation Administration (FAA) and the Federal Railroad Administration (FRA) to inform its work in this relatively new area for public transit agencies.

Collaboration is also a key facet of responding to the COVID-19 public health emergency, and Federal agencies such as the Environmental Protection Agency (EPA) and the Department of Homeland Security (DHS) are sharing their COVID-19 related research activities.

FTA is active with the Transportation Research Board (TRB) of the National Academy of Sciences, Engineering, and Medicine (NASEM). In addition to the Transit Cooperative Agreement Program (TCRP), FTA works closely with TRB on a number of other important activities. Yearly, FTA participates in the TRB Annual Meeting, and sometimes funds special projects with TRB. TRB hosts the Transport Research International Documentation (TRID), which contains over 1.3 million records of transportation research worldwide, combined from TRB's Transportation Research Information Services (TRIS) and OECD's Joint Transport Research Centre's International Transport Research Documentation (ITRD) Database. FTA research reports, in addition to being hosted on DOT's research hub, are also noted in TRID.

Coordinating with partners helps to extend research, leverages, and builds upon previous research findings, ensures a multi-modal focus, reduces duplication, and gathers information on research needs to help focus FTA's research project selection.

Technology Transfer/Deployment Activities

FTA refers to Technology Transfer as Research to Practice, which is sharing research information and results. FTA has an extensive deployment process for its research to practice activities to engage stakeholders and educate public transportation agencies on proven research solutions to improve transit service delivery. The activities include the improvement of dissemination efforts, the creation of new activities such as the research to practice project, and the continuation of effective existing practices.

FTA continues to improve its communications, outreach, and dissemination efforts, including a new quarterly FTA research newsletter to inform transit industry stakeholders about FTA-sponsored transit research and innovation activities. The newsletter highlights the latest FTA research news, TCRP recently released documents, and recent FTA publications.

To better conduct its technology transfer activities, FTA developed a research, marketing, and communications plan to identify and implement strategies and tactics to increase awareness of FTA-funded research in the transit industry. These new efforts are in addition to FTA's continued production of final research reports and publications that are 508 compliant and accessible to the public transportation industry and the public.

Evaluation and Performance Measurement Efforts

FTA recently completed a three-year effort assessing the best ways to measure success at multiple levels of research activities. It included project level evaluation, program evaluation, research goal measurements, and public transportation innovation impacts. In FY 2021, FTA finalized a set of performance measures for its research goals and a set of data analytic activities to provide a quarterly scorecard of trends to measure the reach, industry adoption, and utility of research investments. All FTA research demonstration programs are independently evaluated and the evaluation reports are posted on the FTA research site (https://www.transit.dot.gov/research-innovation/fta-reports-and-publications).

FTA also created an inventory of datasets that include transit service provided (i.e. from FTA's National Transit Database (NTD)), travel patterns (using data from the Census and the National Household Travel Survey), the location of transit service (using the National Transit Map), and data that relates transit usage, racial equity, climate change, jobs creation and health outcomes. FTA's business intelligence database acts as a repository of important information and resource for further FTA research analysis.

FTA identified and is tracking some overarching measures that help assess success. These are high-level measures based upon data that serves as a proxy for indicators of correlation to industry use of FTA's past research investments results.

- ***Public Transportation Innovation performance*** is technology innovation adoption. This measure is compiled by totaling the funding invested and number of transit

agencies adopting previous research technology solutions through the analysis of narrative text in grant applications.

- ***Climate and Sustainability Trends in Public Transportation*** success is the speed of transition of transit agencies to low and no emissions buses. It is measured utilizing the NTD and greenhouse gas (GHG) emissions calculator (https://www.transit.dot.gov/regulations-and-guidance/environmental-programs/ftas-transit-greenhouse-gas-emissions-estimator).
- ***Level of Equity Focus/poverty related research*** tracks how FTA's research recipients have expanded their focus on communities of color and historically disadvantaged communities. The analysis extracts place of performance location and census demographics.
- ***Increasing Safety in Transit Systems*** results look toward achieving a reduction in incidents including those at rail crossings, suicides, worker safety incidents, and bus collisions.

FTA also developed a technology inventory of 155 technologies that FTA's research has funded and the implementation status of each technology. FTA tracks the implementation status of technologies on a quarterly basis and monitors whether the technology is being adopted by the project sponsors.

FTA's research data scientist provides technical support and assistance to research recipients in the development of public data access plans; and research program managers work with each cooperative agreement partner at the statement of work stage to ensure performance measures are SMART – specific, measurable, achievable, relevant, and timely.

Table 1 - FY 2023 RD&T Program Funding Details

RD&T Program Name	FY 2023 President's Budget Request ($000)	Applied ($000)	Technology Transfer ($000)	Facilities ($000)	Experimental Development ($000)	Major Equipment, R&D Equipment ($000)
Public Transportation Innovation Fund						
Strategic Transit Automation Program	$7,000				$7,000	
Transit Cybersecurity (Safety)	$2,000	$2,000				
Advanced Digital Construction Management	$3,000	$3,000				
Low No Component Testing	$5,105				$5,105	
Small Business Innovation Research (SBIR)	$825				$825	
Bus Testing Learning Lab (Environmental Sustainability and Resiliency)	$2,000				$2,000	
Transit Cooperative Research Program (TCRP)	$6,716	$6,716				
Safety	$8,964	$8,964				
Technology Transfer and Performance	$2,000		$2,000			
Sub-total	$37,610	$20,680	$2,000	0	$14,930	0
Transit Research Fund						
Safety NeXt (Safety)	$5,008	$5,008				
Mobility neXt	$14,000	$14,000				
Environmental Sustainability and Resiliency	$10,000	$10,000				
SBIR	$992				$992	
Sub-total	$30,000	$29,008	0	0	$992	
Totals	**$67,610**	**$49,688**	**$2,000**	**0**	**$15,922**	

The AMRP reflects funding as found in the FY 2023 President's budget request per 49 U.S.C. Chapter 65 Sec. 6501 Research Planning. The FY 2023 enacted numbers will be posted as part of the FY2024 President's budget request.

Table 2 - FY 2023 RD&T Program Budget Request by DOT Strategic Goal

RD&T Program Name	FY 2023 President's Budget Request* ($000)	Safety ($000)	Economic Strength and Economic Competitiveness ($000)	Equity ($000)	Climate and Sustainability ($000)	Transformation ($000)	Organizational Excellence ($000)
Public Transportation Innovation Fund							
Strategic Transit Automation Program	$7,000					$7,000	
Transit Cybersecurity (Safety)	$2,000	$2,000					
Advanced Digital Construction Management	$3,000					$3,000	
Low No Component Testing	$5,105				$5,105		
SBIR	$825		$825				
Bus Testing Learning Lab (Environmental Sustainability and Resiliency)	$2,000		$2,000				
TCRP	$6,716		$1,000	$3,716	$1,000	$1,000	
Safety	$8,964	$8,964					
Technology Transfer and Performance	$2,000					$2,000	
Sub-total	$37,610	$10,964	$3,825	$3,716	$6,105	$13,000	$0
Transit Research							
Safety NeXt (Safety)	$5,008	$5,008					
Mobility neXt	$14,000			$5,000		$9,000	
Environmental Sustainability and Resiliency	$10,000				$10,000		
SBIR	$992		$992				
Sub-total	$30,000	$5,008	$992	$5,000	$10,000	$9,000	$0
Totals	**$67,610**	**$15,972**	**$4,817**	**$8,716**	**$16,105**	**$22,000**	**$0**

The AMRP reflects funding as found in the FY 2023 President's budget request per 49 U.S.C. Chapter 65 Sec. 6501 Research Planning. The FY 2023 enacted numbers will be posted as part of the FY2024 President's budget request.

Chapter 1 – FY 2023 RD&T Programs

Strategic Transit Automation Research Program
$7,000
($000)

Program Description:

Automation capabilities have evolved rapidly in recent years and have changed the dialogue around all aspects of the surface transportation system. Transit bus automation could deliver many potential benefits, including but limited to, improved safety, enhanced mobility, and improved quality of life for those with little or no other transportation options, greater transit operational efficiency and productivity, and increased overall customer satisfaction. In order to make informed and prudent deployment decisions, transit agencies need additional research and policy guidance to fully understand the benefits, use cases and implications of transit automation. FTA's Strategic Transit Automation Research (STAR) program aims to address these issues.

The STAR Program will continue to advance the research, development, and deployment of transit bus automation and the application of automated driving systems learnings. Through the demonstration of automated transit buses, the STAR program will provide examples on how to design and integrate automated transit buses into revenue service in a safe manner, and will engage with stakeholders and industry to conduct a market analysis and understand the availability of transit bus automation technologies.

Collectively, the research results from the STAR Program support the Department's strategic goals of Transformation and Safety.

Major Program Objectives:

1. To improve transit safety for operators, riders, and the traveling public.
2. To increase efficiency and productivity of transit operations.
3. To enhance customer experience and satisfaction, particularly for essential transit users including people with disabilities, women, older adults, and historically disadvantaged communities.
4. To advance deployment of automated buses and integration of automated technologies and grow American industry.
5. To spur economic development by introducing automation for transit-focused applications, such as bus rapid transit in transit dense corridors and within transit right-of-ways.

Anticipated Program Activities:

STAR Demonstrations and Evaluations: FTA has invested in automation research to demonstrate selected advanced driver assistance systems (ADAS) (SAE L1-2) and

Automated Driving Systems (ADS) (SAE L3-5) technologies for transit specific use cases to achieve greater safety and mobility performance, including demonstrations to support ADAS for transit safety and automated transit bus maintenance and yard operations. In FY 2023, these demonstrations will be ongoing, and FTA will evaluate the results and promote any promising findings.

STAR Enabling Research: Conduct research, such as transit automation market analysis, to further share information on commercially available automation technologies, analyze the accessibility implications of automated transit buses in a variety of use cases, and coordinate with key public and private entities, such as APTA and SAE International. Also, continue to analyze established laws, regulations, and policies that impact the deployment of automated transit buses and recommend potential changes to them for FTA and DOT consideration.

STAR Workforce Development and Transition Planning: Release a request for information to support an update to FTA's transit bus automation research program with a focus on automation's implications on workforce development and transition. Also, hold listening sessions at key industry conferences and events to support dialogues on workforce development and transition.

STAR Strategic Partnerships: Leverage research projects and investments led by other agencies. FTA funding and technical assistance will supplement partners' deployment and evaluation activities, so research topics of interest to FTA may be cost-effectively added and research findings can be disseminated.

Potential Program Outputs, Outcomes, and Impacts:

FTA will select various demonstrations to support ADAS for transit and automated transit bus maintenance and yard operations. FTA will conduct research and publish information to highlight the availability, capabilities, and limitations of transit bus automation and analyze the accessibility implications of automated transit buses in a variety of use cases, reflecting current practice and those suggested by research in progress. FTA will also continue to leverage research projects and investments led by other agencies. FTA funding and technical assistance will supplement partners' deployment and evaluation activities, so research topics of interest to FTA may be cost-effectively added and research findings can be disseminated.

Outputs: Update to FTA Report 116 – Strategic Transit Automation Research Plan, accessible at https://rosap.ntl.bts.gov/view/dot/35646; several other research reports, webinars, and presentations related to STAR projects within five years.

Outcomes:
By 2026, support 20 percent increase from 2022 level in automated transit buses revenue miles.

By 2026, support 20 percent increase from 2022 level in number of bus procurements with automation capabilities, both for ADAS and ADS.

Impacts: Broadened support and adoption for transit bus automation operations and technologies; reduced number and severity of bus crashes; increased temporal and geographical area of service; and increased operating efficiencies.

Potential Economic or Societal Impacts:

Automation of bus service, if applied appropriately, has the potential to expand service coverage and hours of operation to disadvantaged communities, including, but not limited to, underserved rural areas and low-income areas. Improved service will have secondary benefits of increased economic inclusion, including providing new areas of employment. In addition, improved service will provide underserved populations access to education, employment, and other needed societal activities and services. Automation of bus service also has the potential to enhance safety by reducing the severity and frequency of collisions.

Potential Progress Made Toward Achieving Strategic Goals:

The STAR program continues to focus on funding exploratory research and experimentation, uncovering opportunities and challenges, and bringing new voices and translating knowledge and technologies through collaboration into public transportation. Research completed or underway to-date includes a preliminary Federal policy analysis and provision on frequently asked questions, market assessment, business case analysis, evaluation guidance, and practical demonstrations in revenue service for a number of use cases. These research activities provide a foundation for better understanding the benefits, costs, and other impacts of transit bus automation, including, but not limited to, safety, service delivery, and user acceptance. The current and planned STAR Program activities will continue to look at performance of automation technologies to improve safety of automated transit buses and accelerate transformation of the public transportation industry to serve people and communities across America.

Collaboration Partners:

- *Internal partners*: NHTSA, FHWA, FMCSA, OST, Volpe Center and the ITS JPO. Additional modes are commencing research programs or are in the process of increasing their research efforts, such as FRA and the U.S. Maritime Administration (MARAD).
- *Other Federal partners*: DOL, DOE, National Park Service (NPS), United States Access Board.
- *External partners*: Research universities, bus manufacturers, technology providers, and trade associations (e.g., APTA), and public transit agencies implementing their own automation projects.

Safety
$15,972
($000)

Program Description:

Transit is the safest mode of surface travel, but the vision of zero fatalities or serious injuries has not yet been met. Operator and passenger assaults, suicides and trespassing incidents, vehicle crashes, safe access to transit, and cyber security breaches all require improvement. Of the total, FTA proposes to use $10.964 million in Contract Authority provided under the Bipartisan Infrastructure Law for Transit Cybersecurity ($2 million) and $8.964 million for Safety initiatives. The President's Budget included an additional $5.008 million General Funds request to support Safety NeXT.

The safety for all transit riders and operators, and transit systems remains paramount including bicyclists and pedestrians of all ages and abilities. Under the DOT's National Roadway Safety Strategy, roadway safety is highlighted as a foundational prerequisite to our success in addressing two other major priorities: equity and climate. To improve transit ridership, safety on our roadways must be improved for pedestrians and bicyclists around bus and rail stops, and the pathways to leading up to them because pedestrians and bicyclists suffer disproportionately from serious injuries and fatalities when a crash occurs compared to people in motor vehicles.

Transit cybersecurity is an increasingly important area given the proliferation of computer systems in transit applications. Each system creates a pathway to vulnerability and risks into transit systems.

The expanded Safety research initiative will continue to advance transit safety at all levels by incorporating the DOT's Safe System approach, specifically adopting the elements of:

- Safer People: Encourage safe, responsible behavior by people who use our roads and create conditions that prioritize their ability to reach their destination unharmed.
- Safer Roads: Design roadway environments to mitigate human mistakes and account for injury tolerances, to encourage safer behaviors, and to facilitate safe travel by the most vulnerable users.
- Safer Vehicles: Expand the availability of vehicle systems and features that help to prevent crashes and minimize the impact of crashes on both occupants and non-occupants.

This initiative will also leverage innovative technologies, processes, and applications to monitor, predict and plan operations and maintenance using unmanned aircraft systems (UAS) and robotics; and explore the use of advanced technologies that increase rider, pedestrian, and bicyclist safety.

Research conducted will develop and demonstrate applications that reduce worker injuries and mitigate cybersecurity risks, as well as increase rider, bicyclist, and pedestrian safety, and improve monitoring and maintenance of transit assets.

This program supports the Department's strategic goal of Safety by making the public transportation system safer for all people, and work toward a future where transportation-related serious injuries and fatalities, and system vulnerabilities are eliminated.

Major Program Objectives:

1. To reduce fatalities and injuries and improve safety culture with the use of transformational innovative technologies, practices, and systems.
2. To improve transit operational safety by leveraging state of art technologies and practices to monitor and maintain critical transit assets.
3. To advance innovation, best practices, and guidance to make transit, road, and street systems safe for riders and operators.

Anticipated Program Activities:

Safe System Research & Demonstration: Using the Safe System Approach, assess transit challenges and gaps, and identify transit use cases for Safer People, Safer Roads and Safer Vehicles including street safety for pedestrians and bicyclists accessing transit, and recommend up to three scenarios for future research and demonstration.

Automated Track Detection and Flight Automation Research & Demonstration: Develop automated track detection and flight automation capability using unmanned aerial systems, robotics, automation, artificial intelligence (AI)/machine learning, etc. monitor, maintain and improve operational safety, system resiliency and condition based maintenance including identification of three promising applications for further research and demonstration.

Bus Operator Human Factors Study: Conduct a human factors study to understand how bus operator tasks impact safety issues and how new collision avoidance technologies can be used to address bus-pedestrian crashes and safety concerns.

Transit Cybersecurity: Implement the FY 2021 transit cybersecurity strategy and rollout a plan to adopt well-established, robust cybersecurity strategies from other industries and evaluate changes in transportation cybersecurity vulnerabilities, threats, and risks.

Potential Program Outputs, Outcomes and Impacts:

FTA will conduct research and select various deployment and demonstrations to reduce fatalities and injuries, advance innovation, best practices, and guidance to reduce transit systems, and cybersecurity risks, threats, and vulnerabilities to make public transportation safer for all people.

Outputs: Research reports, guidance documents, software and applications.

Outcomes: Percent of increase in the adoption of a safe system approaches across the industry; identification of track detection and flight automation applications; and adoption of cybersecurity strategy.

Impacts: Reduce fatalities and injuries, and cybersecurity risks; and improve operational safety, system resiliency, and transit ridership.

Potential Economic or Societal Impacts:

By providing better safety and security for riders, operators and transit systems, the program will increase rider and operator confidence in using transit systems, make transit a desirable mode of transportation and increase use of transit.

Potential Progress Made Toward Achieving Strategic Goals:

The program supports DOT's strategic goal of safety and will create a number of lessons learned, guidance documents, and tools that ensure the safety of all including the riders, operators, transit users and others.

Collaboration Partners:

- *Internal partners*: FRA, FAA.
- *Other Federal partners*: DHS, TSA.
- *External partners*: Transit agencies, standard development organizations, universities, technology providers.

Advanced Digital Construction Management
$3,000
($000)

Program Description:

Construction is the costliest and potentially most disruptive phase of any transit project. Effective management of all elements and phases of construction is key to successful completion on time and on budget. Teams must know how and why specific changes or improvements are being made and be privy to variations in methods of construction, delays and stakeholder inputs. Without effective construction management strategies, it is likely that transit projects will result in delays, cost overruns, rework, injuries, and poor quality.

Digital technology is effectively used in other industries to maximize interoperability with other systems and tools, and to streamline processes by creating digital twins.

FTA will establish and implement a new statutory program as authorized under 49 U.S.C. § 5312(b)(4), to promote, implement, deploy, and demonstrate Advanced Digital Construction Management Systems (ADCMS). The program will create a central location for managing the planning, design and implementation of construction projects including processing submission and approvals of change requests of design, budget and schedules with construction entities and stakeholders.

The ADCMS program will enable innovative technologies to perform digital project management from procurement to construction, while boosting productivity, interoperability, integration, security, transparency, and a single source of real-time information that can be accessed by all stakeholders in a project.

This program will support DOT's strategic goals of transformation, economic strength and global competitiveness.

Major Program Objectives:

1. To establish, implement and deploy advanced digital construction management systems throughout the construction lifecycle.
2. To maximize interoperability, boost productivity, reduce project delays and cost overruns, and enhance safety and quality.
3. To facilitate advanced digital transformation, technology adoption and implementation success by fostering partnerships with internal and external partners.

Anticipated Program Activities:

Foundational Research: Conduct industry scan on current transit construction management systems, business tools/models, and best practices, assess gaps, and coordinate with key public and private entities to identify future actions.

Strategic Partnerships: Explore and build partnerships within DOT and with other federal agencies to leverage current research projects and investments. Form strategic partnerships to accelerate the goals of the program.

Program Roadmap: Develop a roadmap to address transit industry construction management system issues, concerns, and needs including next steps on research, development, demonstration, and deployment.

Potential Program Outputs, Outcomes and Impacts:

FTA will establish advanced digital construction management systems program, conduct research, and select various deployment and demonstrations to maximize interoperability, boost productivity and enhance safety and quality by working with States, local governmental authorities, and public transportation agencies.

Outputs: A research roadmap with different tasks and projects that will facilitate and accelerate the adoption of advanced digital systems, and a pilot plan for development and deployment of digital management systems and applications at multiple transit systems. Develop guidance to update regulations where needed.

Outcomes: Create digital technology systems for transportation planning and infrastructure operation that serve as interoperable platforms to engage with various tools, technologies, and stakeholders. Increase in technology adoption and deployment by States, local governmental authorities, and public transportation agencies.

Impacts: More timely and productive information-sharing among stakeholders and development of highly skilled workforce through technology training and workforce development that help grow an inclusive and sustainable economy and invest in our transportation system to provide American workers and businesses reliable and efficient access to resources, markets, and good-paying jobs.

Potential Economic or Societal Impacts:

This program will provide economic impact through advancement of the efficiencies and benefits of advanced digital construction management systems and related technologies including development of highly skilled workforce through technology training and workforce development that help grow an inclusive and sustainable economy and invest in our transportation system.

Potential Progress Made Toward Achieving Strategic Goals:

The program supports DOT's strategic goals of transformation, economic strength and global competitiveness with emerging technology solutions, environmental footprint reduction of construction projects, and technology training and workforce development.

Collaboration Partners:

- *Internal partners*: FHWA
- *Other Federal partners*: General Services Administration (GSA), the National Aeronautics and Space Administration (NASA).
- *External partners*: Construction Management Association of America (CMAA), American Association of State Highway and Transportation Officials (AASHTO), Building Information Management (BIM) Council.

Low- No- Component Testing (LoNo-CAP)
$5,105
($000)

Program Description:

The Federal Transit Administration was instrumental in the development and ultimate deployment of zero emission transit vehicles. But for that investment, the full fleet transition underway today would not be possible. FTA continues that innovation tradition with the LoNo Emission Vehicle Component Assessment Program, funded through the Bipartisan Infrastructure Law (LoNo-CAP, 49 U.S.C. § 5312(h)). This new authorization increased statutory funding for the LoNo- CAP Centers, and added an important provision to allow the LoNo-CAP Centers to do directed research on new and emerging technology components, intended for use in low or no emission vehicles.

LoNo-CAP conducts testing, evaluation, and analysis of LoNo emission (LoNo) vehicle components intended for use in LoNo vehicles. In 2017, FTA competitively selected two institutions – The Ohio State University (Ohio State) and Auburn University (Auburn) – to implement and manage LoNo-CAP Testing Centers. Since that time, manufacturers of LoNo components for transit buses can voluntarily submit components for testing to one of the Testing Centers.

The FY 2021 Omnibus Appropriations Act authorized FTA to allow Ohio State and Auburn to use the $15 million in obligated and unexpended funding from the LoNo-CAP program for the purchase of testing equipment or other capital expenses needed for LoNo-CAP testing and/or LoNo bus testing. The Bipartisan Infrastructure Law, while increasing the funding for these centers, now allows the LoNo-CAP facilities to conduct directed technology research and use funds for equipment and capital projects related to testing LoNo emission vehicle components, or research related to advanced vehicle technologies.

While leveraging the LoNo-CAP centers, this program will create pathways to increase development and adoption of LoNo vehicle components, and stimulate economic growth and transformation in LoNo components.

The program supports DOT's strategic goals of climate sustainability as well as economic competitiveness and transformation.

Major Program Objectives:

1. To operate and maintain LoNo-CAP testing centers to conduct testing, evaluation, and analysis of LoNo emission vehicle components.
2. To conduct directed technology research innovating new low no emission components and strengthening domestic supply chain.
3. To support the transition of the nation's transit industry toward zero carbon emissions.
4. To spur economic development across the transit vehicle industry.

Anticipated Program Activities:

Transit Battery and Drive System Research: Develop next generation batteries with improved lifespan, safety, and affordability for transit vehicles, improving the performance and durability of electrolytes that carry ions within batteries, and increasing the power density of electric drive systems.

LoNo Transit Technology Research: Conduct global innovation scan to leverage LoNo vehicle components such as chassis, HVAC and other advanced and emerging technologies in auxiliary power systems, that are either in research, or early limited deployment and build transit use cases. Recommend up to three scenarios for future research and demonstration.

Transit Chassis Equity: Work with transit industry to design, prototype and demonstrate transit chassis that meet transit needs including low floor platform that facilitates modular design and configuration for different battery and vehicles types and uses, travelers and communities.

Enable US Manufacturing: Enable rapid prototyping and rapid testing of select Low No components using digital tools such as digital twins and simulation and modeling to create proof-of-concept and validate early innovations. Work with stakeholders and partners to demonstrate new innovations and build domestic capacity.

Potential Program Outputs, Outcomes and Impacts:

FTA will maintain the LoNo-CAP centers to conduct testing, evaluation, and analysis of LoNo vehicle components. The program will conduct state of the art research and select various demonstrations to spur innovation, design and development. The program will support expanded adoption and deployment of LoNo emission vehicle components by bus manufacturers, transit agencies, States, and local governmental authorities.

Outputs: Increase in number of LoNo vehicle components, technologies and solutions developed, tested, identified and adopted.

Outcomes*:* Reduced carbon emissions in the transit sector; more competitive American transit manufacturing market; expanded and more stable domestic supply for LoNo components; increased transit use resulting from cleaner, quieter and more efficient and attractive transit services.

Impacts: Spur innovation in and deployment of LoNo emission vehicle components with directed technology research and demonstrations that create more timely products and low emission solutions, which, in turn, positively impact the climate by reducing greenhouse gas emissions and reliance on fossil fuels.

Potential Economic or Societal Impacts:

Innovation in LoNo emission vehicle components with directed technology research and demonstrations will enable wider adoption of Low No vehicles, mitigate environmental impacts, vitalize the domestic supply chain, and increase global competitiveness.

Potential Progress Made Toward Achieving Strategic Goals:

The program supports DOT's strategic goals of climate and sustainability and transformation by innovating new Low No emission components, as well as economic strength and global competitiveness by supporting development of products in America to contribute to the domestic supply chain.

Collaboration Partners:

- *Internal partners*: NHTSA, FMCSA, FHWA
- *Other Federal partners*: DOE, NASA.
- *External partners*: Mid-Size Bus Manufacturers Association, Transit Vehicle Manufacturers (TVMs).

Small Business Innovation Research Program (SBIR)
$1,817
($000)

Program Description:

The SBIR Program will build on the momentum of FY 2022. The goal of FTA's SBIR program is to help small businesses grow by funding product development research in strategic areas such as safety, infrastructure, mobility, and other topics important to transit. The program supports innovative solutions that help solve complex challenges and invests in promising early-stage innovations that may otherwise be too high of a risk for private investors. Of the total $1.8 million, $825,000 is provided by Contract Authority authorized under the Bipartisan Infrastructure Law (P.L. 117-58) and $992 in General Funds requested in the FY2023 President's Budget.

The SBIR program is administered by each DOT modal administration with guidelines established by Federal law. FTA designates research and development (R&D) topics for annual solicitations and accepts proposals from small businesses through a competitive review process. FTA's SBIR program is structured into two phases: In Phase I, FTA works with the small business as they develop a proof-of-concept and commercial potential for one of FTA's strategic areas or other topics important to transit. Phase I grants do not exceed $150,000 and cover six months. In Phase II, Phase I R&D efforts are further refined by the small business. For Phase II investments, FTA expects the small business will derive future revenues, and a lucrative commercially available product or solution. Phase II grants are typically around $650,000 and usually have a duration of two years.

In FY 2023, the program will continue to advance the goals of the Biden-Harris Administration by funding product development research in strategic areas such as safety, equity, climate and sustainability, and transformation. With regard to safety, FTA will fund research on reducing transit bus collisions with non-transit vehicles. This research will help develop safety for workers and travelers and help create safe systems. The SBIR program will address the Department's goal of equity by connecting individuals in food desserts to healthy foods. This research will help reduce inequities by expanding access to healthy foods while empowering and educating communities on healthy foods and habits. The program will address climate and sustainability through research on tools and applications that will transition transit fleets towards zero-emissions and help achieve net-zero emissions from transit by 2050. To advance transformation, FTA will research blockchain-enabled transit incentivization. This research will experiment with new ideas and innovations that will help modernize transit for the future. FTA's SBIR program will seek technological innovations that incorporate green technologies and help combat the negative impacts of climate change. In addition, FTA's SBIR program will continue to promote racial and social equity by fostering and encouraging participation in innovation and entrepreneurship by women and socially and economically disadvantaged persons.

The SBIR Program provides support across DOT's strategic goals and in particular lifts up Economic Strength and Global Competitiveness for America's small business enterprises.

Major Program Objectives:

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.
4. Increase private-sector commercialization of innovations derived from Federal research and development funding.

Anticipated Program Activities:

Phase I & II anticipated activities include:

Reduction of Transit Bus Collisions with Other Vehicles: Research on the different causes of transit bus collisions with non-transit vehicles and documented information on methods or strategies for addressing the contributing factors identified through the research.

Connecting Individuals in "Food Deserts" to Healthy Foods: Research on the major barriers to accessing healthy foods, and potential solutions that utilize public transit resources to mitigate food deserts and identify two or three communities where a prototype design or model could be implemented as a pilot in Phase II.

Tools and Applications Towards Moving to Zero-Emissions: Explorative research on the creation of a tool or application that can help transit agencies select the right battery electric bus for their unique systems, taking into consideration terrain, climate, length of route, etc., and greenhouse gas (GHG) emission impacts.

Blockchain-Enabled Transit Incentivization: Research on the feasibility and effectiveness of novel incentivization strategies using blockchain technology, such as a tokenized gamification through a smart phone application, to manage modality use by commuters.

Potential Program Outputs, Outcomes and Impacts:

In FY 2023, R&D will continue and transition from Phase I to Phase II. FTA anticipates Phase I projects to develop feasibility studies/proof-of-concepts ready for Phase II. The objective of Phase II is to continue the R/R&D effort from the completed Phase I. Phase II effort is based on the results of Phase I, the scientific and technical merit of the Phase II proposal, and the commercial potential of the proposed Phase II project.

Outputs: Interim reports I and II on progress of R&D efforts in Phase I; and feasibility studies/proof-of-concept for Phase I.

Outcomes: Number of Phase I projects selected for Phase II to grow and expand small and disadvantaged businesses and improve profit and productivity through expanded experience and exposure.

Impacts: Reduction in transit bus collisions and fatalities; reduction in greenhouse gas emissions; increase in access to healthy foods; increase in use of blockchain technology in transit.

Potential Economic or Societal Impacts:

The various activities happening in FY 2023 have the potential to impact the economy and society in numerous ways. The Reduction of Transit Bus Collisions with Other Vehicles project has the potential to not only reduce bus collisions with non-transit vehicles, but the opportunity to reduce fatalities and injuries. This research has the potential to make it safe for transit workers and the public, and overall, promote a safety culture. Addressing inequities involving access and mobility is important to the administration and is addressed by FTA's research on food deserts. Connecting individuals in food deserts to healthy foods not only supports and engages people to live healthier lives, but this research also focuses on what affordable and accessible options can be delivered to reduce transportation-related disparities and other structural obstacles.

FTA's research on Tools and Applications Towards Moving to Zero-Emissions will help reduce air pollution and greenhouse gas emissions, supporting DOT's goal of climate and sustainability, and will address climate and environmental justice by addressing the disproportionate negative environmental impacts of transportation on disadvantaged communities, supporting DOT's goal of equity. This research will also help transit agencies make more informed choices about battery electric bus purchases, which creates a culture of making climate-informed decision making.

Potential Progress Made Toward Achieving Strategic Goals:

Research underway on non-emergency medical transportation cost allocation method/technology has the potential to impact DOT's goal of Economic Strength and Equity. The development of this cost allocation solution will improve system reliability and connectivity for urban and rural transit agencies and expand access by removing barriers for disabled, Medicaid recipients, aging, Veterans, and low-income populations.

In addition, the current COVID-19 pandemic has presented many challenges to the safety of transit riders and operators and has prompted the industry to rethink ways of doing day-to-day normal operations. Research is underway on using Robots for Unmanned Disinfection and Decontamination of Transit Assets and Using Artificial Intelligence (AI) to Inspect, Repair and Sanitize Transit Vehicles. The progress made on this research has the potential to make public transportation safer for all people and promote a safety culture that demonstrates a commitment to safety and strengthens the use of informed data-driven decision-making.

Collaboration Partners:

- *Internal partners*: OST-R, FRA, NHTSA, FHWA, JPO, and the Volpe Center.
- *Other Federal partners*: Small Business Administration.
- *External partners*: Transit agencies and other industry stakeholders.

Environmental Sustainability and Resiliency
$12,000
($000)

Program Description:

Climate change is a significant and growing risk to the safety, reliability, and sustainability of transportation infrastructure and operations, not to mention impacts to human health and vitality. The greenhouse gases (GHGs) produced by the transportation sector in the US has surpassed the power sector as the largest emitter at 29 percent of total emissions, and 24 percent globally. The US transit fleet is still over-reliant on fossil fuel vehicles; only one third of the fleet is low emission and less than 1 percent is zero emission. With billions of dollars of new investments to help transit agencies purchase and transition to LoNo (Low No) emission vehicles, FTA is working to make the transit sector carbon-neutral by 2050. Of the total $12 million, $2 million is provided by Contract Authority authorized under the Bipartisan Infrastructure Law (P.L. 117-58) to support the Bus Testing Learning Lab and $10 million in General Funds requested in the FY2023 President's Budget to support Environmental Sustainability and Resiliency.

The emergence of battery electric technologies and fuel cell and electrical propulsion systems that are zero-emissions, along with innovation in alternative renewable energy sources and cleaner electrical grids, offer increased opportunities to make public transportation carbon neutral.

The purpose of this program is to make public transportation systems more sustainable and resilient by harnessing novel renewable energy methods and advancing research and innovations in climate solutions to reduce carbon footprint. The program will build from lessons learned in FY 2022 and before.

This program supports the Department's strategic goals of climate and sustainability, economic strength and global competitiveness, and transformation.

Major Program Objectives:

1. Foster sustainable and resilient systems for transit vehicles and infrastructure that are carbon neutral by 2050.
2. Establish a learning lab that facilitates electrification and climate smart innovations and research.

Anticipated Program Activities:

Enabling Research: Develop and refine user scenarios into a concept of operations for solutions that substantially reduce greenhouse gas emissions and transportation-related pollution including prototype development and demonstration.

Transit Electrification: Continue assessment of transit electrification needs and development of user scenarios for fleet transitions including development of tools and applications. Explore ways to charge and optimize charging costs and operations for large, small and rural transit agencies.

Learning Laboratory: Continue to establish a learning laboratory that ideates and creates clean energy sustainable and resilient systems for transit vehicles and infrastructure, including exploring use of window wind turbine for fresh air circulation, and wind and solar farms that reduce carbon footprint and enhance national vitality.

Potential Program Outputs, Outcomes and Impacts:

FTA will conduct research and select various deployment and demonstrations to create sustainable and resilient systems for transit vehicle and infrastructure including tools and applications for transit electrification that reduce carbon footprint and achieve zero emission goals by 2050.

Outputs: Research products and tools; initial setup of state-of-the-art learning laboratory. Develop guidance to update regulations where needed.

Outcomes*:* Increased number of new renewable energy and climate friendly solutions that reduce carbon emissions, and bring new and competitive American technologies to domestic market and strengthen the supply chain.

Impacts: The program will conduct research and demonstration of solutions that substantially reduce greenhouse gas emissions and transportation-related pollution, and help build more resilient and sustainable transportation systems to benefit and protect communities by supporting electrification and other clean energy efforts and remove barriers to electrification for all transit agencies.

Potential Economic or Societal Impacts:

Renewable energy and climate friendly solutions will help reduce the carbon footprint and will enable new advancement towards sustainable and resilient transit systems.

Potential Progress Made Toward Achieving Strategic Goals:

The program supports DOT's strategic goals of climate and sustainability, economic growth and global competitiveness, and transformation by creating sustainable and resilient systems that remove barriers for all transit agencies and spur domestic industry and supply chain with new and innovative solutions that reduce greenhouse gas emissions and transportation-related pollution..

Collaboration Partners:

- *Internal partners*: OST, FHWA.
- *Other Federal partners*: DOE, NREL.
- *External partners*: TVMs.

Mobility neXt
$14,000
($000)

Program Description:

As the mobility ecosystem continues to evolve rapidly, combined with accelerated changes following the pandemic, the future of mobility holds great potential and yet at the same time remains uncertain. The FY 2023 President's Budget requests funding that will support FTA's Mobility neXt program focus on uncovering the potential of emerging technologies, practices, and strategies to accelerate public transportation transformation – preparing for and leading a more equitable and sustainable future.

The program will continue to seek public-private partnership opportunities in mobility research to advance new mobility concepts, technologies and solutions (such as mobility payment integration enabled by blockchain technology) and support public transportation to deliver quality mobility in America's communities for everyone. A major focus of the Mobility neXt program in FY 2023 is to rapidly understand and adapt to the new patterns of mobility demand and supply following the COVID-19 pandemic. In the longer term, the program strives to mobilize Federal and private sector investments in mobility research to advance new models of how public transportation is delivered and consumed, leveraging technologies and solutions to achieve equitable and climate-smart mobility outcomes.

The Mobility neXt program will support the Department's strategic goals of Equity and sustainability, as well as Transformation. This program will help reduce inequities across our transportation systems and the communities they affect. It will also support and engage people and communities to promote safe, affordable, accessible, and multimodal access to opportunities and services while reducing transportation-related disparities, adverse community impacts, and health effects. Mobility neXt aims to make transit use easy, seamless and frictionless. If successful it will increase transit and shared mobility use and decrease single occupant vehicle travel.

Major Program Objectives:

1. To enable transit agency smart operations by researching and demonstrating future public transportation service models that accelerate transformation of public transportation providers to become integrated mobility managers across America's communities. This will connect all modes and services for enhanced mobility of all travelers, and allow for dynamic, flexible systems that can respond quickly to changes in travel patterns and meet changing traveler expectations.
2. To empower smart travelers by understanding traveler needs and behaviors and exploring enabling technologies and policy tools to support personal mobility through environmentally sensitive, personally optimized mobility options. To incentivize smart traveler decisions based on curated choices provided to travelers tailored to their individual preferences and circumstances.

3. To research, through demonstrations, programs, policies and incentives that effectively address mobility gaps for transportation insecure persons.

Anticipated Program Activities:

Mobility neXt enabling research: Conduct exploratory research on transformational mobility data analytics, technological solutions, and traveler behavioral research and their potential to significantly enhance travelers' mobility and inform mobility choices. Examples include, but are not limited to: artificial intelligence (AI), modeling and simulation, and blockchain, that promote user-centric mobility innovation, such as using AI to fuse archived and real-time data to support the more tailored system operations, modeling and simulation tools to estimate mobility outcomes based on various pricing scenarios, and blockchain to support secured transactions and more efficient allocation of mobility resources, such as vehicle capacity and curb space.

Mobility neXt demonstration projects: Fund demonstration projects that explore and test smart operational concepts, smart traveler tools, novel policy experiments, tactical urbanism facility pilots, and/or advanced mobility strategies. Example projects to fund include: blockchain-enabled apps for traveler personalization and mode incentivization, innovative strategies for payment integration across agencies and modes, data modeling and analytical strategies to improve operations and improve transit service, and innovative partnerships and governance strategies for integrated mobility or advanced Mobility as a Service (MAs) to address transportation equity.

Mobility neXt smart partnerships: Establish and maintain a community of practice for mobility innovation to enhance public transportation equity, efficiency, and effectiveness, and accelerate transformation by fostering collaboration and knowledge-sharing among public and private stakeholders.

*Integrated Smart Mobility Pilot Grants: S*upport active transportation, shared use mobility, and public transportation improvements. To address door to door safety; support the transformation of transportation to an integrated services model; support innovative approaches to mobility that will improve accessibility and equity in access to community services; and economic opportunities including first and last mile operations.

Potential Program Outputs, Outcomes and Impacts:

FTA will conduct exploratory research on transformational mobility data analytics, technological solutions, and traveler behavioral research that enable smart transit operations through integrated mobility, and smart travelers through personalized mobility. FTA will fund demonstrations of public transportation transformation, while achieving equitable and climate smart mobility. FTA will also facilitate knowledge transfer and the widespread deployment of the most promising mobility innovation technologies, tools, and approaches.

Outputs: Produce a comprehensive 5-year Mobility neXt strategic program plan; establish a mobility innovation community of practice; produce research reports and briefings on transformational mobility data analytics and technological solutions; fund demonstration projects that explore and test smart operational concepts, smart traveler tools, and/or advanced mobility strategies; introduce new technologies for transit applications.

Outcomes: By 2026, partner with 25 transit agencies that adopt artificial intelligence capability to enhance transit service efficiency and equity in communities across the US. with different built environment. By 2026, support 5 novel business models and technology approaches related to mobility payment integration in communities across the US. By 2026, design and experiment 5 novel smart traveler tools using artificial intelligence, data analytics, and gamifications to support personalized traveler advisory based on personal preference and real-time situational awareness.

Impacts: Widespread transit agency exploration of mobility operational strategies; smarter traveler behaviors enabled by better information, and personalized choices and decision support tools; reduced national transportation cost burden by 5%, and mobility cost as a percent of income; and FTA policy modernization to incentivize transit agency innovation.

Potential Economic or Societal Impacts:

Mobility neXt's research, demonstration, and knowledge-transfer efforts on smart operations and smart travelers will transform public transportation viability and user experience, reduce barriers to transportation and improve quality of life through improved access to employment, healthcare, education, shopping, and leisure activities. A major focus of the Mobility neXt program is to support community-driven efforts to promote economic and social mobility and other opportunities in American communities, particularly disadvantaged or rural communities. For example, innovative payment integration technologies and concepts can further advance transportation equity. Mobility integration can expand access and ease of use of all modes and services by all travelers, including rural areas, travelers with disabilities, and lower income individuals. Mobility neXt also contributes to cleaner air and reduced environmental impact of transportation through climate-smart technologies, operational strategies, and traveler incentives.

Potential Progress Made Toward Achieving Strategic Goals:

For the primary strategic goal of Equity, Mobility neXt will embrace the concept of the complete trip and remove barriers to opportunity through equitable mobility innovations that expand access to and enhance convenience of high-quality public transportation. The program also ensures that future mobility system interventions will be equitable by establishing channels for diverse voices and community inclusion to identify underserved needs. Mobility neXt focuses on improving quality of life through an improved mobility system that connects people seamlessly to where they need and want to go.

For the secondary strategic goal of Transformation, Mobility neXt will facilitate experimentation on new mobility strategies and technologies that drive the industry forward; benefit operators, travelers, and society; and create a more resilient mobility system. The program will encourage high-risk, high-reward research with the goal of advancing mobility solutions that are equitable and climate-smart. The program will also promote flexibility through the development of innovations that will help our public transportation systems adapt and predict changing needs and trends in mobility and society.

Collaboration Partners:

- *Internal partners*: OST offices, FHWA, NHTSA, FMCSA, FRA, FAA, the Volpe Center, and the JPO.
- *Other Federal partners*: DOL, NIDILRR and the DOE's Vehicle Technology Office.
- *External partners*: Private sector mobility providers and technology developers, Shared Use Mobility Center, TRB, APTA, CTAA, Mobility on Demand Alliance (MODA) by Intelligent Transportation Society of America (ITSA), CUTR, Texas Transportation Institute (TTI), Other Academic and Research Institutions, and private sector consulting firms.

Transit Cooperative Research Program (TCRP)
$6,716
($000)

Program Description:

The TCRP purpose and funding level is authorized in Federal public transportation law (49 U.S.C. § 5312(i)) and operated through the Transportation Research Board (TRB). This program provides applied research with near-term, practical results addressing key challenges facing the public transportation industry. TCRP publishes research reports on critical issues such as bus service reliability, equity analysis, data sharing, tax increment financing for transit projects, and women in the public transportation workforce. The TCRP Oversight and Project Selection (TOPS) Commission selects the highest priority projects annually and is supported through a panel of expert practitioners from the industry and managed by TRB staff.

In FY 2023, TCRP will support the Department's strategic goals of Safety, Economic Strength and Global Competitiveness, Equity, Climate Sustainability, and Transformation through TCRP project solicitations and evaluations. TCRP research aligns with the Departmental priorities and complements existing efforts.

Major Program Objectives:

1. Identify the highest priority transit problems in need of research and development (R&D) investigation.
2. Provide an opportunity for transit operators, local government officials, and many other constituents – including construction organizations, financiers, real estate developers, and community representatives – to identify problems and participate in developing appropriate solutions.
3. Improve communications, technical information transfer, and dissemination.
4. Provide a means of addressing a variety of near-term transit problems in cooperation and in coordination with Federal public transportation research.

Anticipated Program Activities:

Solicit research ideas from practitioners and the public: Issue a broad call to public transportation and related industries for members of the public to identify challenges common in practice.

Research Project Selection: Screening Committee conducts an initial review of proposed projects. Those that merit further consideration move to the TOPS Commission for final review, ranking, and selection. Research Project Panel Development and request for proposals from research organizations. Solicitation of volunteers to serve on expert practitioner panels and identify liaisons from FTA.

Conduct Research: Research project panelists review proposals and select contractors to produce individual research deliverables.

Dissemination: APTA carries out dissemination under the direction of TRB and, in cooperation with partners, shares research results through events, bulletins, webinars, and email blasts.

Potential Program Outputs, Outcomes and Impacts:

TCRP will continue to serve as one of the principal means by which the public transportation industry can develop innovative near-term solutions to meet demands placed on it. TCRP has an established reputation for providing useful reports and other tools to help public transportation practitioners solve problems and inform decision makers.

Outputs: Call to public transportation stakeholders and related industries for members of the public to identify challenges to be addressed. Enlist a Screening Committee to conduct an initial review of proposed projects. Production of approximately 20 publications; 68 research studies are in progress. Continue the dissemination under the direction of the TRB and, in cooperation with partners, share research results through events, bulletins, webinars, and email blasts.

Outcomes: Solutions that will increase transit workplace and passenger safety; reduce emission due to increased adoption of zero-emission vehicles; increase mobility through technology tools; reduce operating costs to make transit more affordable; improve maintenance practices; and improve access to employment and services.

Impacts: Reduction of transit-related injuries and fatalities due to unsafe workplace practices, vehicle collisions and assaults on operators and passengers; a reversal of climate change due to the elimination of emissions from public transit vehicles; and support universal access to transportation.

Potential Economic or Societal Impacts:

TCRP's research will present innovative solutions to enable transit agencies to provide service that will improve the quality of life for the community. For example, the research will yield strategies to eliminate transportation as a barrier to accessing good-paying jobs, quality education and community amenities. Research results will also help improve air quality by providing information on how transit agencies can reduce greenhouse gas emissions by adopting zero-emission vehicles. Research on fare policies can determine how zero or reduced fares can improve the economic condition of low-income households and provide more equitable transit service.

Potential Progress Made Toward Achieving Strategic Goals:

TCRP will advance DOT's progress toward achieving strategic goals by selecting research proposals that address how the topic supports the goals and promoting research results that further the goals. Research results will provide tools and strategies on how to reduce the number of transit-related collisions and workplace accidents. Research results will advise transit agencies on how to create an agency that is sustainable and prepared to adapt to future environmental and social challenges.

Collaboration Partners:

- *Internal partners*: Other DOT operating administrations as appropriate.
- *Other Federal partners*: When appropriate, Coordinating Council on Access and Mobility partners.
- *External partners*: APTA, COMTO, and the National Transit Institute (NTI). When appropriate, FTA Technical Assistance Centers.

Technology Transfer and Performance
$2,000
($000)

Program Description:

This program will build from results and lessons learned from previous years. The program will assist public transportation agencies in applying proven research solutions to improve transit service delivery. In addition, the program will continue to facilitate the implementation of research and technology development and to advance the interests of public transportation, monitor, report on, and improve outreach efforts to drive research to practice. Examples include the new quarterly publication of FTA research newsletter to inform the transit industry stakeholders about FTA-sponsored transit research activities and the development of FTA's research marketing and communications plan.

In FY 2022, FTA entered into an agreement with CALSTART to provide Research to Practice support by identifying the best methods to share research results with transit professionals and develop a plan to implement those methods. This plan will help FTA ensure that the millions of dollars spent researching, developing, and demonstrating innovative transit methods, tools, and techniques can be easily adopted and deployed by transit agencies across the country, proving a return on taxpayer investment. CALSTART will scan the transit industry and other industries to determine how best to conduct Research to Practice efforts for the transit industry and will help FTA to start implementing these efforts guided by a strong plan.

The program will advance the Department's mission by establishing processes and an inclusive and innovative culture to effectively serve communities and responsibly steward the public's resources. The program will also enhance the ability of transit agencies to deploy the results of research and technology investments and assess any governance barriers identified in demonstration programs. The program will serve as a framework through which the outreach and implementation of research and technology development in the areas of Safety, Economic Strength and Global Competitiveness, Equity, Climate and Sustainability, Transformation, and Organizational Excellence are utilized and communicated.

Collectively, the research results from this program support all of the Department's strategic goals, with Organizational Excellence as the primary goal.

Major Program Objectives:

1. Continue the outreach to enable public transit agencies to effectively utilize promising research findings in their operations
2. To deploy proven research solutions.
3. To improve transit service delivery.

Anticipated Program Activities:

Research to Practice Project: To identify the best ways to communicate FTA research results to the transit industry with the goal of having transit agencies put those results into practice.

Research newsletter: To inform the transit industry stakeholders about FTA-sponsored transit research activities.

Research Marketing and Communications Plan: To identify and implement strategies and tactics to increase awareness of FTA-funded research in the transit industry.

Outreach and Dissemination Project: Produce FTA final reports and publications; ensure the products are 508 compliant and accessible to the public transportation industry and the public.

Potential Program Outputs, Outcomes and Impacts:

In order to share the results of FTA research investments, FTA will ensure research reports are published on FTA's website and in DOT's National Transportation Library (NTL) Repository & Open Science Access Porta (ROSA-P) and the findings are marketed through appropriate means.

Outputs: Publishing of FTA's Newsletter on time and on schedule; track and report the deployment of new innovations; number of reports posted in ROSA-P and FTA's public webpage.

Outcomes: Increased understanding of effective strategies; broader adoption and collaboration; accelerated innovation building on the experiences of others.

Impacts: Broadened support and adoption for FTA research results and technologies; and broader dissemination of reports and evaluations.

Potential Economic or Societal Impacts:

The economic impact of the program is demonstrated by the effective use of Federal funds by allowing program managers and collaborating partners to allocate time and resources to developing the content of the research products instead of formatting documents. The societal impacts are demonstrated by ensuring all FTA reports and publications are 508 compliant and accessible to the public transportation industry, academia, and the public in general.

Potential Progress Made Toward Achieving Strategic Goals:

FTA has published over 200 reports in FTA's public website, accessible at https://www.transit.dot.gov/research-innovation/fta-reports-and-publications and ROSA-P's FTA collection, accessible at https://rosap.ntl.bts.gov/cbrowse?pid=dot%3A42631&parentId=dot%3A42631. All reports are 508 compliant. FTA has established report production policies, processes, and an inclusive and innovative culture to effectively serve communities and responsibly steward the public's resources, meeting the DOT's strategic goal of Organizational Excellence.

Collaboration Partners:

- *Internal partners*: OST-R, and NTL.
- *External partners*: APTA, CTAA, TRB, and CUTR.

Chapter 2 – FY 2024 RD&T Programs

The AMRP FY 2024 outlook year chapter in the annual plan is not developed in alignment with the President's budget request of the same year due to the AMRP development schedule per 49 U.S.C. Chapter 65 Sec. 6501 Research Planning.

Strategic Transit Automation Research Program

Program Description:

In FY 2024, the Strategic Transit Automation Research (STAR) Program will continue to build upon research outcomes to advance the research, development, and deployment of transit bus automation and the application of automated driving systems learnings from prior years' investments. Research activities will still be organized around four complementary work areas – Enabling Research, Integrated Demonstrations, Strategic Partnerships, and Workforce Transition as appropriate. In addition, the Program's continued emphasis on stakeholder engagement, knowledge transfer, and technical assistance ensures that complementary work being done by the public sector, the private sector, and academia is effectively communicated and leveraged. Collectively, the STAR program will support the Department's strategic goals of Safety as its primary goal and Transformation as its secondary goal.

Major Program Objectives:

- To improve safety, including the deployment of automated buses and integration of automated technologies.
- To increase efficiency and productivity of transit operations.
- To enhance customer experience and satisfaction through improved service frequency and flexibility

Anticipated Program Activities:

Anticipated program activities will continue to include work in the fundamental STAR Plan areas of Enabling Research (e.g., policy analysis and implementation, standards development, guidance), Integrated Demonstrations, and Strategic Partnerships. FTA will also continue to engage stakeholders and provide knowledge transfer and technical assistance to the transit industry.

Safety NeXt

Program Description:

In FY 2024, FTA will continue the expanded Safety NeXt research initiative to advance transit safety at all levels by leveraging innovative technologies, processes, and applications to monitor, predict and plan operations and maintenance. It will also conduct research and undertake application development and demonstration that reduce worker injuries and mitigate cybersecurity risks; increase operator, rider, bicyclist, and pedestrian safety including transit supportive infrastructure, such as pedestrian and bicycle networks, to safely bring people to and from transit services and their "last mile" destinations; and improve monitoring and maintenance of transit assets.

This program will continue to support the Department's strategic goal of Safety by making the public transportation system safer for all people, and work toward a future where transportation-related serious injuries and fatalities and system vulnerabilities are eliminated.

Major Program Objectives:

- To reduce fatalities and injuries and improve safety culture with the use of transformational innovative technologies, practices, and systems.
- To improve transit operational safety by leveraging state of art technologies and practices to monitor and maintain critical transit assets.
- To advance innovation, best practices, and guidance to make transit, road, and street systems safe for riders and operators.

Anticipated Program Activities:

Anticipated program activities include continuing to conduct research using the Safe System Approach, and actions on recommended scenarios to reduce fatalities and injuries, as well as improve safety culture for riders and operators including exploration of transit supportive infrastructure for pedestrian and bicycle networks to safely bring people to and from transit services and their "last mile" destinations, with the use of transformational innovative technologies, systems, and practices. The program will also continue to conduct research in bus operator human factors safety, automated track detection and flight automation using unmanned aerial systems, and to reduce transportation cybersecurity vulnerabilities, threats and risks, and develop solutions that support all public transit agencies.

Advanced Digital Construction Management Systems Program

Program Description:

In FY 2024, FTA will continue to explore ways to promote, implement, deploy, demonstrate, showcase, support, and document the application of advanced digital construction management systems, practices, performance, and benefits as authorized under 49 U.S.C. § 5312(b)(4). The program will continue exploration, development and deployment of the most promising technologies, practices, strategies, and opportunities to advance new digital construction management, and support DOT's strategic goals of equity, climate and sustainability, and transformation.

Major Program Objectives:

- To establish, implement and deploy the advanced digital construction management systems program throughout the construction lifecycle.
- Maximize interoperability, boost productivity, reduce project delays and cost overruns, and enhance safety and quality.
- Facilitate advanced digital transformation, technology adoption and implementation success by fostering partnering with internal and external partners.

Anticipated Program Activities:

Anticipated program activities include conducting an industry scan on current transit construction management systems, business tools/models, and best practices; assessing gaps; and coordinate with key public and private entities to identify future actions. Program activities will also establish partnerships within DOT and with other federal agencies to leverage current research projects and investments. FTA will also execute strategic partnerships/agreements to accelerate the goals of the program.

LoNo Component Testing

Program Description:

In FY 2024, FTA will continue to operate and maintain a facility to conduct testing, evaluation, and analysis of LoNo emission vehicle components, and to conduct directed technology research. The facility can also acquire equipment and complete capital projects related to testing LoNo emission vehicle components or research related to advanced vehicle technologies that provides advancements to the entire public transportation industry. The program is authorized under 49 U.S.C. § 5312(h), and will continue to support DOT's strategic goals of transformation and climate and sustainability. This new authorization increased statutory funding for the LoNo- CAP Centers, and added an important provision to allow the LoNo-CAP Centers to do directed research on new and emerging technology components, intended for use in low or no emission vehicles.

Major Program Objectives:

- To operate and maintain LoNo-CAP testing centers to conduct testing, evaluation, and analysis of LoNo emission vehicle components and infrastructure.
- To conduct directed technology research innovating new low no emission components and strengthening domestic supply chain.
- To support the country's transit buses to move toward a cleaner and more energy-efficient future.

Anticipated Program Activities:

Anticipated program activities include continuing to develop and demonstrate next generation of batteries and increasing density of electric drive systems, and initiate research in LoNo emerging component technologies, transit chassis, and infrastructure. This program will also continue to explore advancement of US manufacturing and supply chain.

Small Business Innovation Research Program (SBIR)

Program Description:

The SBIR Program will build on the momentum of FY 2023. In FY 2024, the program will prioritize the goals of the Biden-Harris Administration by funding product development research in strategic areas such safety, economic strength and global competitiveness, equity, climate and sustainability, and transformation. FTA's SBIR program will seek technological innovations that incorporate green technologies and help combat the negative impacts of climate change. In addition, FTA's SBIR program will continue to promote racial and social equity by fostering and encouraging participation in innovation and entrepreneurship by women and socially and poor persons. The goal of FTA's SBIR program is to help small businesses grow by funding product development research in strategic areas such as safety, infrastructure, mobility, and other topics important to transit. The program supports innovative solutions that help solve complex challenges and invests in promising early-stage innovations that may otherwise be too high of a risk for private investors. This program supports the Department's strategic goal of Economic Strength and Global Competitiveness.

Major Program Objectives:

- Stimulate technological innovation.
- Meet Federal research and development needs.
- Foster and encourage participation in innovation and entrepreneurship by women and socially or poor persons.
- Increase private-sector commercialization of innovations derived from Federal research and development funding.

Anticipated Program Activities:

In FY 2024, there is potential for FTA's SBIR program to focus on advanced technologies that are emerging disruptors and innovation accelerators. FTA anticipates the potential for research in the areas of modeling/simulation, machine learning, standards based electric charging systems, using unmanned aerial vehicles to assist with maintenance needs, and data integration tools that helps FTA ensure equity/accessibility in planning and implementing public transit services.

Environmental Sustainability and Resiliency

Program Description:

In FY 2024, FTA expects climate change to continue to be a significant and growing risk to the safety, reliability, and sustainability of transportation infrastructure and operations, not to mention impacts to human health and vitality. Though strong progress would be achieved by 2024 with the significant investments in FTA Bus, Bus Facilities and Low or No (LoNo) Emissions grant awards, transit agencies will need FTA's support to monitor where further research and resources are needed to help aid in the continued transition to LoNo emission vehicles to support the transit sector becoming carbon-neutral by 2050. This set of innovative research activities will continue to build upon the findings of the research conducted in 2023 in batteries, charging systems, zero-emission cutaways, and operational issues related to transitioning from diesel/hybrid system to battery electric or hydrogen fuel cell systems. In 2024, FTA expects to have findings in these and related areas from research conducted in the new advanced laboratory activities of the LoNo Component Assessment Centers. We will also have information on transit industry perspectives for low or no emissions research from surveys and other assessments conducted in FY 2023. The purpose of this program will also stay the same as in FY 2023 which is to make public transportation systems more sustainable and resilient by harnessing novel renewable energy methods and advancing research and innovations in climate solutions to reduce carbon footprint. This program supports the Department's strategic goals of climate and sustainability, economic strength and global competitiveness, and transformation.

Major Program Objectives:

1. Foster sustainable and resilient systems for transit vehicles and infrastructure that are carbon neutral by 2050.
2. Establish a learning lab that facilitates electrification and climate smart innovations and research.

Anticipated Program Activities:

Building upon the findings of the Transit Vehicle Innovation Centers' outreach to the transit community, FTA will continue to research and develop promising practices in support of the goal to help public transit agencies transition to carbon-neutral fleets by 2050.

Transit Defined Systems

Program Description:

In FY 2024, FTA will create new program to purpose-build and purpose-design systems and vehicles that enhance transit rider experience and transit accessibility across different user populations and communities. This new program will explore the use of new innovations and emerging technologies in creating smart systems that are designed for transit needs and use. It will have focused research and investment in new vehicle form factors (particularly electric cutaway chassis), vehicle systems and diagnostics, battery chemistry and recycle, hydrogen infrastructure and distribution, and smart connected systems for transit.

Collectively, this program supports the Department's strategic goals of sustainability and transformation.

Major Program Objectives:

- To conduct purpose-driven research and innovation to modernize transit systems.
- To foster sustainable and resilient systems for transit vehicles and assets that are carbon neutral by 2050.

Anticipated Program Activities:

Learning Laboratory: Continue to establish a learning laboratory that ideates and creates battery chemistry and recycling, hydrogen infrastructure and distribution, smart connected systems for transit including exploration of diagnostics tools, and wind and solar farm hybrids that reduce carbon footprint and enhance national vitality.

Transit Battery and Drive System Research: Develop next generation batteries with improved lifespan, safety, and affordability for transit vehicles, improving the performance and durability of electrolytes that carry ions within batteries, and increasing the power density of electric drive systems and finding innovative ways to recycle batteries.

Transit Chassis Equity: Work with transit industry to design, prototype, and demonstrate transit chassis that meet transit needs including low floor platform that facilitates modular design and configuration for different battery and vehicles types and uses, travelers and communities.

Mobility neXt

Program Description:

In FY 2024, FTA's Mobility neXt program will continue to focus on uncovering the next iteration of the most promising technologies, practices, and strategies to accelerate public transportation transformation – preparing for and leading a more equitable and sustainable future. The program will seek opportunities to mobilize Federal and private sector investments in mobility research to advance mobility concepts, technologies, and solutions, and support public transportation to achieve equitable and climate smart mobility outcomes. The Mobility neXt program will support the Department's strategic goal of Transformation as its primary goal and Equity as its secondary goal.

Major Program Objectives:

- To research and demonstrate future public transportation service models, enabled by common mobility data exchange standards and tools, that accelerate transformation of public transportation providers as integrated mobility managers. This will connect all modes and services through open architecture and interoperable systems for enhanced mobility of all travelers, and allow for dynamic, flexible systems that can respond quickly to changes in travel demand and meet changing traveler expectations.
- To understand traveler behaviors and explore enabling technologies and policy tools to improve personal mobility through environmentally sensitive, personally optimized mobility decisions based on curated choices provided to travelers tailored to their individual preferences and circumstances.

Anticipated Program Activities:

Anticipated program activities include continuing to conduct exploratory research on transformational mobility data analytics, technological solutions, and traveler behavioral research and their potential to significantly enhance travelers' mobility and change mobility choices. The program will continue to fund demonstration projects that explore and test smart operational concepts, smart traveler tools, and/or advanced mobility strategies. Mobility neXt will also maintain a community of practice for mobility innovation to improve public transportation equity, efficiency, and effectiveness, and accelerate transformation by fostering collaboration and knowledge-sharing among public and private stakeholders.

Transit Enhanced Living (TEL) Program

Program Description:

Mobility is an essential means to connect social functions and purposes in life. As such, movements of people, goods and information are useful indicators of quality of life. Today, we witness unmet or underserved mobility needs, especially in certain segments of populations, and/or geographical areas. Consequently, this immobility (or under mobility) leads to compromised life outcomes, such as poor health, lower income, and missed opportunity. The society as a whole also suffers from lost productivity and lost opportunity that would otherwise be possible.

In FY 2024, FTA plans to launch the TEL research program to harness the interdependency between mobility and life, and to understand and inform public policy decisions to focus beyond removing mobility barriers, and transform mobility as an enabler for better quality of life for everyone, including people of color, lower income individuals, school children, older adults, pregnant women, and travelers with disabilities. TEL will include a suite of foundational research, human-centered designs, and experimentations to support innovative collaborations among local and regional stakeholders, such as local public transit providers, community development organizations, small businesses, regional health and human service and economic development agencies. The program will ensure inclusive mobility is an integral part of local community-designed strategies, such as Small Area Plans (SAPs).

It is anticipated that the TEL research program will have an extensive network of stakeholders from the public and private sectors, and beyond the mobility industry, such as health care, education, and economic and community development organizations.

Major Program Objectives:

- To establish a framework to study and inform policy discussions to use mobility as an enabler to improve quality of life for everyone.
- To promote awareness and understanding of the interdependency between mobility (DOT) and other relevant government functions (non-DOT) such as housing, food, health and human services, education, labor, etc.
- To design and conduct experiments and assess technical, institutional, and regulatory feasibilities and impacts of various enabling technologies and innovative policy tools and practices on mobility and life outcomes.
- To facilitate widespread deployment of proven solutions.

Anticipated Program Activities:

Anticipated program activities during the inaugural year (FY 2024) include developing a comprehensive research program plan with extensive stakeholder involvement, convening and/or leveraging existing Federal interagency working group, producing a context

diagram that aids visualization and communication of interconnections between mobility and various life functions, and the initial development of modeling capability to allow rapid impacts estimation of innovative mobility solutions and policy interventions.

Transit Cooperative Research Program (TCRP)

Program Description:

In FY 2024, this statutory program will provide applied research with near-term, practical results addressing key challenges facing the public transportation industry. TCRP will publish research reports to address critical issues such as bus service reliability, equity analysis, data sharing, tax increment financing for transit projects, and women in the public transportation workforce. The TCRP Oversight and Project Selection (TOPS) Commission selects the highest priority projects annually and is supported through a panel of expert practitioners from the industry and managed by TRB staff. TCRP sponsors research projects that identify solutions that will advance DOT's Strategic Goals.

Major Program Objectives:

- To identify transit problems in need of research and development (R&D) investigation; and to establish a priority ranking for them.
- To provide an opportunity for transit operators, local government officials, and many other constituents - including construction organizations, financiers, real estate developers, and community representatives - to identify problems and participate in developing appropriate solutions.
- To improve communications, technical information transfer, and dissemination.
- To provide a means of addressing a variety of near-term transit problems in cooperation and in coordination with Federal public transportation research.

Anticipated Program Activities:

Anticipated program activities in FY 2024 include:

Solicit research ideas from practitioners and the public: Issue a broad call to public transportation and related industries for members of the public to identify challenges common in practice.

Research Project Selection: Screening Committee conducts an initial review of proposed projects. Those that merit further consideration move to the TOPS Committee for final review, ranking, and selection. Research Project Panel Development and request for proposals from research organizations: TRB staff solicit volunteers to serve on expert practitioner panels and identify liaisons from FTA.

Conduct Research: Research project panelists review proposals and select contractors to produce individual research deliverables.

Dissemination: APTA carries out dissemination under the direction of TRB and, in cooperation with partners, shares research results through events, bulletins, webinars, and email blasts.

Technology Transfer and Performance

Program Description:

In FY 2024, the program will build from results and lessons learned from previous years. The purpose of the program is to serve as FTA's marketing and information dissemination program, which will continue to empower FTA to develop a strategy to share lessons learned from FTA-funded research projects. The program will also continue to enhance the ability of transit agencies to deploy the results of research and technology investments and assess any governance barriers identified in demonstration programs. It will also identify the dissemination and outreach methods that work best for public transportation professionals and develop a plan for FTA based on those methods.

In FY 2024, the program will serve as the marketing agent for FTA research and for the value of transit in general. It will amplify messages through various means to make public transportation more appealing and to attract the future workforce for the industry. The program will create national campaigns, social media, infographics, dashboards, interactive tools, data analytics, and dissemination support for FTA funded research projects and programs.

The program will support the Department's strategic goal of Organizational Excellence.

Major Program Objectives:

- Continue the outreach to enable public transit agencies to effectively utilize promising research findings in their operations.
- To deploy proven research solutions.
- To improve transit service delivery.

Anticipated Program Activities:

Anticipated program activities include continuing to produce FTA final reports and publications and ensure they are 508 compliant and accessible to the public transportation industry and the public. FTA will continue to ensure that research reports are published on FTA's website and in DOT's National Transportation Library (NTL) Repository & Open Science Access Porta (ROSA-P), and that the findings are marketed through appropriate means. FTA will also crate activities to attract, recruit, develop, retain, and train a capable, diverse, and collaborative workforce of highly skilled, innovative, and motivated employees by making public transportation an employer of choice.

For More Information on DOT's Research see

https://researchhub.bts.gov/search