United States Department of Transportation
Annual Modal Research Plans
Fiscal Year 2017

Federal Transit Administration
9-12-2016
Vince Valdes

Introduction

The Federal Transit Administration (FTA) is pleased to provide this annual research plan which describes major research program priorities, funding, objectives, activities, outcomes, departmental collaboration, statutory requirements, and stakeholder input processes. FTA's research program is authorized in 49 U.S.C 5312, as amended by the Fixing America's Surface Transportation Act (FAST Act), signed in December 2015. In FY2017, FTA will develop a new five year research plan consistent with the FAST Act, and continuing to build upon FTA's FY2015 and FY2016 research priorities of mobility, safety, asset management and asset innovation. In addition to the research program eligibility, FAST authorizes two additional programs to be carried out with the $ 28M authorized for Section 5312 from the Trust fund: the Transportation Cooperative Research Program (TCRP) at $5M a year, and a low and no vehicle component assessment facility initiative at $3M a year. The FAST Act also contains a provision for an additional $ 20M for Section 5312 from the general fund subject to annual appropriations. For FY2016, Congress did not appropriate additional general funds for Section 5312.

Section 5312 of Title 49 U.S.C., as amended by the Moving Ahead for Progress in the 21st Century (MAP-21) outlined three general categories of eligible projects: research projects; innovation and development projects; and demonstration, deployment, and evaluation projects. Typically, research and innovation projects are applied research, while demonstration and deployment are development. Though the FAST Act renamed Section 5312 Public Transportation Innovation, it did not change these three categories of research projects. The predominance of FTA's projects is demonstration and deployment projects that test out findings from earlier studies with projects of national significance. These projects are usually selected competitively with grantees that can apply theory to practice. The primary goal of demonstration and deployment projects is to discover promising new innovative methods, processes, products, and activities that improve public transportation efficiency, effectiveness, quality, and enhances travelers' experiences.

There are three important contextual elements to how FTA developed this modal research plan. First, the programs are categorized as either research or development in keeping with the research categories of both MAP21 and the FACT act– FTA does not create new technologies but other public and private sector partners may develop or apply new technologies to public transportation innovation research needs through FTA funding. Second, FTA does not fund basic research. Third, none of FTA's programs include specific projects that are over $ 5M per year. There are demonstration and deployment programs in mobility and safety that are funded at or above $ 5M but there are different projects within those programs that are all under $ 5M.

The programs described in this plan promote FTA's strategic goals of economic competitiveness, environmental sustainability, and improving the quality of life in communities' by expanding rides to health/wellness, education, employment, recreation, and social connections.

In parallel with the DOT-wide research strategic planning activity, FTA is in the midst of developing a five year research strategic plan. Key next steps in this process include:

- analyzing stakeholder input from my online dialogue outreach activity;
- reviewing accomplishments and gathering feedback from an external National Academies' Advisory Committee convened by FTA – the Transit Research Analysis Committee;
- assessing cross-modal partnerships and collaboration.

FTA is working to expand cross-departmental partnerships, collaboration, and information sharing. Currently, FTA has active research partnerships with several of the modal research offices on projects within the mobility program. FTA collaborated on the Smart Cities initiative, and FTA provided resources including funding and personnel in support of the Accessible Transportation Technology Research Initiative. In addition, projects working on intelligent transportation systems associated with connected and automated vehicles have a long history of collaboration, information sharing and mutual support.

With regard to safety, transit cooperative research program, and asset management & asset innovation projects, FTA has many informal exchanges and works closely with FHWA on the biennial Conditions and Performance report. FRA research findings may help inform FTA rail research needs and issues. Safety standards and activities within FHWA and NHTSA that seeks to reduce injuries and fatalities or address driver fatigue may also benefit public transportation safety research. Asset management and asset innovation projects with low or no emission and state of good repair for public transportation capital have commensurate benefits to the FMCSA. And, public transportation research projects developed and led by the Transportation Cooperative Research Program are often multi-

modal in nature, and FTA is involved with a new initiative driven by OST-R to find better ways to leverage the collective expertise of TRB across the DOT modes. Going forward over the next year, FTA will work to create more formal collaboration and information exchanges across the department.

FTA is also pleased to continue to benefit from collaboration and project leadership with VOLPE. Our current VOLPE initiatives include:

- The Small Business Innovation Research Projects;
- FAST Section 3025 Study on the Safety of Certain Transportation Facilities and Locations, "Parking Study";
- Employee Safety Reporting System Guidance and Pilots; "Close Call Reporting";
- Transit Automation Case Study.

FY 2017 RD&T Program Funding Details

RD&T Program Name	FY 2017 Pres. Budget ($000)	FY 2017 Basic	FY 2017 Applied	FY 2017 Development	FY 2017 Technology
Mobility	9000		1000	8000	
Safety	6000		1000	5000	
Asset Innovation/Asset Management	8000		500	7500	
TCRP	5000		5000		
Totals	28000		7500	20,500	

FY 2017 RD&T Program Budget Request by DOT Goal(s)

RD&T Program Name	FY 2017 Pres. Budget ($000)	Safety	State of Good Repair	Economic Competitiveness	Quality of Life in Communities	Environmental Sustainability
Mobility	9000			2000	7000	
Safety	6000	6000				
Asset Innovation/Asset Management	8000		5000			3000
TCRP	5000			5000		
Totals	**28000**	**6000**	**5000**	**7000**	**7000**	**3000**

Mobility
($9000K)

Program Description:

The definition of "mobility" continues to evolve dramatically with the rise of new multimodal concepts, traveler needs and emerging capabilities. These fundamental changes in the way transportation service is offered also influence the form of our communities. Options such as mobile way-finding, bicycling (including bikesharing), on-demand ridesharing, and even a possible future that includes autonomous vehicles mean that mobility options—particularly in urban areas—will alter the nature of public transit. The traditional transportation split between public transit and the personal automobile will give way to a traveler-centric mobility portfolio offering seamless service through peer auto-sharing schemes, on-demand taxi trips, demand-responsive paratransit, and other innovative transportation methods.

The 2017 Mobility Research Program will consist of two components: 1) Mobility on Demand (MOD), and 2) transit vehicle automation related activities to strengthen transit agencies and communities' capacity as they navigate the dynamic, evolving landscape of personal mobility. MOD Sandbox demonstrations ($6-8 million) will explore innovative business models, use cases and partnerships with enhanced mobility options, improved travel decision tools, convenient and seamless travel and fare payment.

Program Objectives:

The overarching objects of FTA Mobility research is to engage in advanced research and innovation, encourage the development of complementary and supplemental mobility options, improve the overall experience for public transportation travelers, and adapt to new mobility options by public and private transportation providers.

FY 2017 Mobility Research will focus on the following objectives:

- To identify, understand, and promote technical and operational choices in personal mobility – including technologies, techniques, applications, operations, and institutional arrangements which demonstrate potential and warrant further consideration.
- To investigate and document innovative ways to dynamically optimize existing infrastructure operations and mobility resources to prioritize for shared-use, personal mobility.
- To develop and promote a seamless transportation system which engages all modes for enhanced mobility for all travelers.

Anticipated Program Activities:

The FY 2017 Mobility Research program will include the following components:

MOD Sandbox Demonstrations (continuous) ($6-8 million)

MOD Sandbox Independent Evaluations (continuous) ($250,000): Interim findings and lessons learned from MOD Sandbox demonstration and independent evaluations, and transit vehicle automation use cases

MOD Performance Metrics (continuous) (previously funded)

MOD Stakeholder Outreach (continuous) (separately funded): Outreach materials to raise awareness of and share information about FTA Mobility research efforts.

MOD Knowledge and Information Clearinghouse (new) ($200,000): Informed input for planning and executing future USDOT-sponsored transit automation development and demonstration projects; Information on useful practices of Federal, state and local policies and institutional issues related to mobility

Transit Automation Use Case Scenario Analysis ($400,000): Research study to identify and review vehicle automation technologies; to include a plan for future transit automation development and demonstration projects.

FTA will also continue to work with its modal partners in the department in support of the Accessible Transportation Technologies Research Initiative (ATTRI). In FY 2016, FTA set-aside 2.5M to support ATTRI and fund transit-specific ATTRI demonstrations during FY 2016 and 2017.

Expected Program Outcomes

The expected outcomes of FTA's mobility research, in general, are to:

1. Improve transportation efficiency by promoting agile, responsive, accessible, and seamless multimodal service inclusive of transit through enabling technologies and innovative partnerships.

2. Increase transportation effectiveness by ensuring that transit is fully integrated and a vital element of a regional transport network that provides consistent, reliable and accessible service to every traveler.

3. Enhance the customer experience by providing each individual equitable, accessible, traveler-centric service leveraging public transportation's long-standing capability and traditional role in this respect.

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
Mobility on Demand (MOD)	ITS Joint Program Office, FHWA (ATTRI)
Transit Automation	ITS JPO, FHWA,

How does the Program meet statutory requirements?

FTA does not have specific statutory requirements in FAST for Mobility research; however, research projects funded under 5312 must focus on one or more of the statutory areas, which includes providing more effective and efficient public transportation service, including services to seniors, individuals with disabilities, and low-income individuals; and mobility management, improvements, and travel management systems; and data and communication advancement systems – all of which fall within our current mobility research portfolio.

How does the Program incorporate public and stakeholder input into the research planning process?

FTA has established a mechanism with dedicated funding to support mobility research stakeholder outreach and knowledge transfer with an extensive base of contacts in the transit, light/heavy vehicles and MOD arenas. The targeted audiences include both the traditional stakeholders (transit agencies, DOTs and their consultants) as well as nontraditional stakeholders, such as those in the telecommunications, highway, automotive, and technology sectors. In addition, the network of mobility research stakeholders also provide connections to several renowned subject matter experts in the field, including Brendon Hemily and Carol Schweiger (both independent consultants well-

known in the transit industry), Susan Shaheen of UC Berkeley's Transportation Sustainability Research Center, Shared-Use Mobility Center headquartered in Chicago, and the Transit Center headquartered in New York City.

Safety

($6000K)

Program Description:

The Federal Transit Administration (FTA), as the steward of the nation's public transportation system, is obligated to provide the resources necessary for safe, efficient, and effective operations for transit customers, employees, and others through an expanded role in safety regulation mandated by the Moving Ahead for Progress in the 21st Century Act (MAP-21) and Fixing America's Surface Transportation Act (FAST Act). The goals of the FTA safety research program are to improve public transportation safety, support the regulatory role, and FTA's responsibility to develop a safety oversight framework.

Program Objectives:

The Safety Research program's outcomes are is to improve public safety by reducing transit-related injuries, fatalities, safety events and system reliability (State of Good Repair). A comprehensive evaluation framework is being implemented to measure the success/failure of research projects. Typically, outputs will be measured as an absolute reduction in crashes, fatalities, and injuries. These outputs will be expresses as ratio measures to include some variable "X" per 100 million vehicle or passenger miles.

The specific objectives for projects funded under the program are to:

1. Advance the development of materials and technologies to reduce the number of transit-related fatalities and the severity of transit-related injuries, and improve the overall state of good repair of transit assets
2. Increase the knowledge about human/machine interface and reduce the potential for safety-related incidents.
3. Lead to improvement of safety culture at transit agencies and enhance public confidence in transit, as well as support stakeholder coordination and outreach.
4. Support the development of transit safety standards, best practices and lessons learned in safety operations.

Anticipated Program Activities:

1. Safety Demonstration Program ($5 million):

This program will leverage and continue to fill the gap on the current portfolio of safety demonstration projects started under Innovative Safety, Resiliency, and All-Hazards Emergency Response and Recovery (SRER) Program. The Safety Demonstration Program will be established as an annual, open competition, program to build a portfolio of demonstration projects focus in assisting transit agencies with the following outcomes: 1) improving operational safety, 2) strengthening infrastructure resiliency, and 3) improving the state of good repair for transit assets. This program will address the immediate research needs of transit agencies and provide a predictable funding stream for transit agencies to explore innovative demonstration projects focused on safety. The funding listed will be used for multiple project selections during the anticipated annual solicitation cycle.

2. FTA Standard Development Program ($1 million):

FTA Standards Development Program focuses on safety standards development (not exclusive to safety standards development). This is a follow up effort to a current FTA Safety Standards Strategic Plan project. FTA will work with organization(s) with specific expertise in public transportation industry to provide technical assistance to FTA in the development of safety standards. FTA Standard Development Program tasks include: a) Additional research on any standard that has been determined not adequate and needs to be modified or enhanced; b) Additional research on any standard that needs to be modified in order to be applicable to transit; c) Standards development on gaps identified by the existing research; d) Expand and re-establish partnerships with industry Standard Development Organizations (SDOs) or possibly other standards development workgroup directed by FTA leadership and e) Additional research, data collection and economic impact analysis on possible safety standards for rulemaking or voluntary adoption.

3. Bus Visibility Research & Demonstration ($2 million):

This demonstration will try to address the issue of blind spots on the current fleet of buses without additional electronic devices or adding technological complexity to the drivers and vehicles. The demonstration projects funded through this program will find "passive solutions" with manufacturers, transit agencies and other industry partners to design/redesign the front end of 40 ft. transit buses to increase the visibility of bus drivers by modifying A-pillar design, mirror location, glare reducing glass/film, etc.

4. Employee Safety Reporting System Demonstration & Guidance ($2 million):

FTA, working with Volpe, will define, design, demonstrate, evaluate and implement Employee Safety Reporting Systems at Transit Agencies as part of broader safety management system adoption. As part of this regulation, FTA is proposing to require transit agencies to set up employee reporting systems to collect data about safety concerns from their employees. With this in mind, FTA would like to provide guidance to transit agencies to help them set up and operate effective employee safety reporting systems.

5. FAST Safety-related Research studies ($600,000)

FTA will be working with the National Academies and VOLPE to conduct at least two statutorily required safety studies, the latter of which has multi-modal implications given the scope is to evaluate the safety at various transportation facilities. See. FAST Section 3021 and 3025.

Expected Program Outcomes:

1. Demonstrate the feasibility of innovative solutions and technologies to improve the safety of transit operations. FTA expects agencies to share their successes under this program to the rest of the transit industry. i.e., the reduction of crashes, fatalities, and injuries.
2. Complete a comprehensive Review of Public Transportation Safety Standards and establish Federal Minimum Public Transportation Safety Standards for the industry including the development of standards in other areas such as connected vehicle, automation, electric vehicles, charging infrastructure, etc.
3. Identify and suggest the adoption of standards that improve visibility of new transit buses.
4. Promote the adoption of employee safety reporting system across the country as well as the use of the data to improve transit agencies safety policies and practices.

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
Safety Demonstration Program	
Transit Standards Development Program	
FAST Research Study (Section 3025)	

How does the Program meet statutory requirements?

The Safety Research, Demonstration and Standards Development Program directly respond to the following sections in the FAST Act.

FAST Act Section 3020: Review of Public Transportation Safety Standards

FAST Section 3021: Study on Evidentiary protection for public transportation safety program information.

FAST Section 3025: Study on the Safety of certain transportation facilities and locations.

FAST Act Section 5314: Technical Assistance and Workforce Development (including Standards Development)

FAST Act Section 5312: Public Transportation Innovation

Asset Management and Innovation
($8000K)

Program Description:

With a back log of transit infrastructure in need of repair approaching $100 billion and growing, the Federal Transit Administration has a goal of bringing transit into a "State of Good Repair". Statutorily referenced in 49 USC Section 5328 and MAP -21 Section 20019, the transit asset management plan will implement an approach for assessing needs and prioritizing investments for bringing the nation's public transit system into a state of good repair (SGR).

In addition to asset management, FTA has a long history of asset innovation, specifically related to vehicle technologies and supporting cleaner technology. FTA has previously and will continue to conduct research on and demonstrations of zero emission vehicles, facilities, and technologies to identify innovative and sustainable uses of transit vehicles and services.

The goals of FTA transit asset management and asset innovation research are:

1. Provide research to transit industry for developing and demonstrating various asset management technology and tools
2. Provide guidance and best practices to assist transit agencies, big or small, to establish transit asset management plans
3. Provide mechanism for mainstreaming and determining performance specifications for low and no emission transit bus components through university-based laboratory testing
4. Increase transit industry safety through innovative design of transit assets

Program Objectives:

The Transit Asset Management research will be one of the major efforts by the FTA to assist grantees meet many of the following five major objectives:

1. National Transit Asset Management System – measure asset condition, set and meet performance measures target
2. Develop TAM/SGR Plan
3. Report condition, target, progress, etc.
4. Set performance targets
5. Technical Assistance

There are several TAM/SGR and Asset Innovation research projects:

1. Demonstration of Innovative Track Asset Management Practice ($2M) - Use autonomous track asset management system (vehicle/track interaction and track geometry monitoring system mounted under the rail vehicles) with the integration of non-contact track inspection technologies, data analysis, data management and maintenance.
2. Bus Driver Visibility Demonstration ($2M) - This demonstration will address the issue of blind spots on the current fleet of buses without additional electronic devices or adding technological complexity to the drivers and vehicles. It is expected that the results of these demonstrations and actual solutions by each demonstration should be followed up with an effort to create a consensus Bus Visibility Performance Standard to be included in the APTA Bus Procurement Guideline so transit agencies can include it in their procurement specifications.
3. Low and No Emission Vehicle Component Testing Program ($3M/year; $15 million over 5 years) – FTA will competitively select one or more university-based facilities to conduct assessments of low and no emission vehicle components intended for use in transit buses.
4. Low and No Emission Program Evaluation ($500,000) – FTA continues to work with the National Renewable Energy Lab (NREL) to evaluate its previously funded low and no emission demonstration programs. During FY 2017, FTA will be evaluating the FY 13-14 Demonstrations to better assist both grantees and industry with assessing performance, capability, and reliability of these technologies, with the ultimate goal of furthering the commercialization of zero emission vehicles.

Anticipated Program Activities:

1. This research project will demonstrate the transferability of such system to transit (currently used in freight and passenger rail industry), its effectiveness compared to existing transit track management practices and evaluation of the system. This system has been introduced and in use on passenger and freight railroads for a number of years. The vehicle/track interaction monitor and track geometry system can detect lateral track irregularities, long and short wavelength of vertical track irregularities and wheel/rail impacts.
2. This research project will demonstrate both innovative active (technology based) and passive (vehicle design) strategies to increase bus operator visibility.
3. This research project will test the life cycle of low and no emission components for transit vehicles.
4. Program Evaluation

Expected Program Outcomes:

1. The benefit will be the ability of transit agencies to continuously monitor, assess and determine trend of track conditions rather than wait for the result of high-rail inspection vehicles or track geometry vehicles (normally twice a year).
2. Reduction in left turning crashes and corresponding fatalities and injuries involving transit buses. Not to mention a reduction in transit agency liability claims.
3. Determine performance specifications and life cycle metrics for components.

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
Demonstration of innovative track asset management practice	
Low and No Emission Component Testing	
Bus Driver Visibility	

How does the Program meet statutory requirements?

Low and No Emission Component Testing required by FAST Act (49 U.S.C. 5312 (h)

Other research meets intent of "FAST Act Section 5312: Public Transportation Innovation" for the conduct of research on system capacity, capital improvements, advanced vehicle design, advancements in vehicle technology, asset maintenance and repair systems, and alternative fuels.

How does the Program incorporate public and stakeholder input into the research planning process?

All program research projects originated with the transit industry. In the execution period, there will be consistent effort to involve transit agencies, peer group and the industry.

Transit Cooperative Research Program
($5000K)

Program Description:

The FY 2017 Transit Cooperative Research Program (TCRP) will continue as a cooperative agreement through the National Academy of Sciences to carry out activities to support FTA's public transportation innovation projects, especially relating to ensuring research to practice and projects recommended by an independent governing board. This independent board has a critical role to suggest public transportation research, development, and technology transfer activities that further the effectiveness, efficiency, and quality of public transportation. Since its inception, TCRP produced over 600 publications for the public transportation industry. The engagement inherent in TCRP studies brings together the transit industry, interested stakeholders, and the public creating various communities of practice. This production of new knowledge reinforces partnerships, promotes experience sharing, and strengthens relationships from the transit GMs on the TOPS committee to agency staff who work together on project panels. TCRP is a trusted and enduring forum for the transit community to share ideas and best practices to improve public transportation in communities across the country. TCRP is vital partner with FTA to field practical short-term research that directly benefits public transit practitioners. TCRP's mission is to promote, select, and conduct research and disseminate research findings to improve the practice and performance of public transportation.

Program Objectives: The scope of TCRP includes a variety of transit research fields including planning, service configuration, equipment, facilities, operations, human resources, maintenance, policy, and administrative practices.

1. Lead and complete research that is consistent with, and supportive of, FTA's strategic research goals and TCRP strategic priorities through a process guided by a broad group of industry stakeholders.

2. Support the growth and continued excellence of the nation's public transportation infrastructure to meet the mobility, environmental, safety, and energy objectives of public transportation systems.

3. Solve operating problems, help public transportation adapt to new technologies, meet service area/frequency needs, and introduce innovations into the transit industry. Field approaches to research that are local, problem-solving in nature, and are able to easily transfer into useful practice in to public transit providers and to the broader transportation industry.

Anticipated Program Activities:

1. Twice yearly, issue requests for research problem and synthesis statements statement. The TCRP Oversight and Project Selection (TOPS) committee meets twice annually to discuss, identify, prioritize research needs, and select approximately 15 problem statements.

2. Selected statements are developed by TRB staff, the TCRP project panel, and FTA liaisons collaboratively into requests for proposal which TCRP releases to solicit bids to carry out the research. Proposal submissions are evaluated, a winning proposal is selected and then TCRP the project team oversees the applied research product to offer insights, guidance, and feedback. Final results are published on the TRCP website.

4. Appoint and coordinate expert technical panels to guide research.

5. Publish, disseminate, and promote research reports and findings.

Expected Program Outcomes:

Since its inception, TCRP produced over 600 publications for the public transportation industry. The engagement inherent in TCRP studies brings together the transit industry, interested stakeholders, and the public creating various communities of practice. This production of new knowledge reinforces partnerships, promotes experience sharing, and strengthens relationships from the transit GMs on the TOPS committee to agency staff who work together on project panels. TCRP is a trusted and enduring forum for the transit community to share ideas and best practices to improve public transportation in communities across the country. Key outcomes for TCRP are to:

1. Enhance the transit customer travel experience by identifying ways to increase customer satisfaction, improve access to transportation options, expand service time/geography, and connect to life activities.

2. Help transit take advantage of technology and integrate affordable and sustainable technology solutions that improve transit service quality in mobility, accessibility, operations, and community access.

3. Increase effectiveness and efficiency of public transportation through identifying processes and methods that support continuous improvement in public transportation industry services, safety, asset management, and operations.

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
TCRP	OST-R

How does the Program meet statutory requirements?

Administering this program meets the FAST Act Section 5312 Public Transportation Innovation requirement to fund, issue, and manage a cooperative agreement with the Transportation Research Board to manage the Transit Cooperative Research Program at $5 million per year from FY16 – FY20 for the duration of the FAST Act allocated from the Trust Fund.

How does the Program incorporate public and stakeholder input into the research planning process?

TCRP works with a broad range of stakeholders including:

The American Public Transportation Association (APTA); The Community Transportation Association of America; Conference of Minority Transportation Officials; EasterSeals Project ACTION; National Rural Transit Assistance Program; National Transit Institute; and the Transportation Research Board.

All processes and reports are available for public download free of charge and any member of the public is invited to submit research problem statements.

APTA carries out dissemination activities. As part of the National Academies, TCRP adheres to National Academy processes and procedures regarding public notification and publication of materials and meetings.

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Mobility
(Improving mobility of people and goods)

Program Description:

In FY 2018, FTA mobility research program will continue to explore new and transformative approaches to travel. Research activities will focus on innovative, user-focused research initiatives which leverage emerging mobility services, and integrate transit networks and operations, real-time data, connected travelers, and enabling technologies to allow for a more traveler-centric, transportation system to benefit all travelers.

The Mobility on Demand (MOD) will continue to build off of the long-term strategic vision for an integrated, connected, and traveler-centric mobility system reliant on data interoperability and availability of all modes of transportation, MOD aims to leverage innovative technologies and practices currently under development in both public and private sectors, incorporate lessons learned from other USDOT programs, and influence additional research and development leading to a more interconnected transportation system benefitting all travelers and roadway users.

Program Objectives:

The overarching objects of FTA Mobility research is to engage in advanced research and innovation, encourage the development of complementary and supplemental mobility options, improve the overall experience for public transportation travelers, and adapt to new mobility options by public and private transportation providers.

FY 2018 Mobility Research will focus on the following objectives:

- To develop strategies with the greatest potential to improve personal mobility and increase the likelihood that lessons learned can be documented, improved upon, and transferred.
- To identify the technical, policy, and institutional mechanisms for realizing the value of high potential Mobility on Demand strategies, including identifying technical and policy gaps and issues, and working with appropriate partners to address them.
- To showcase the applicability of specific technical, policy, and institutional solutions through the development and testing of existing or prototype applications, development of innovative partnerships, and/or other key strategy components.
- To provide communities implementing new mobility strategies with the tools and information needed to expand on existing efforts.

Anticipated Program Activities:

The FY 2018 Mobility program will include the following components:

MOD Sandbox Demonstrations (continuous)

MOD Sandbox Independent Evaluations (continuous): Findings and lessons learned from Round 1 MOD Sandbox demonstration and independent evaluations.

MOD Stakeholder Outreach (continuous): Updated outreach materials to raise awareness of and share information about FTA Mobility research efforts.

MOD Knowledge and Information Clearinghouse (continuous): Frequently refreshed MOD information and knowledge clearinghouse

MOD Deployment Planning (new)

MOD Policy and Decision Support Tools (new)

MOD Academy for Training and Education (new): FTA will determine the information needs, topics, and nature of MOD technical assistance to transit agencies. Based on this determination, FTA will develop and deliver MOD training and education materials and activities to transit agencies.

Expected Program Outcomes:

The goals of FTA's mobility research, in general, are to:

• Improve transportation efficiency by promoting agile, responsive, accessible, and seamless multimodal service inclusive of transit through enabling technologies and innovative partnerships.

• Increase transportation effectiveness by ensuring that transit is fully integrated and a vital element of a regional transport network that provides consistent, reliable and accessible service to every traveler.

• Enhance the customer experience by providing each individual equitable, accessible, traveler-centric service leveraging public transportation's long-standing capability and traditional role in this respect.

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
Mobility on Demand (MOD)	ITS Joint Program Office, FHWA

How does the Program meet statutory requirements?

n/a

How will the Program incorporate public and stakeholder input into the research planning process?

FTA will continue and strengthen the ongoing MOD stakeholder outreach efforts based on frequent stakeholder dialogues and lesson learned with respect to cost-effective and efficient methods to engage stakeholders in the research planning process. The MOD Knowledge and Information Clearinghouse will continue to be a focal/virtual platform to facilitate active stakeholder participation in MOD research.

Safety
(Promoting Safety)

Program Description:

The Federal Transit Administration (FTA), as the steward of the nation's public transportation system, is obligated to provide the resources necessary for safe, efficient, and effective operations for transit customers, employees, and others through an expanded role in safety regulation mandated by the Moving Ahead for Progress in the 21st Century Act (MAP-21) and Fixing America's Surface Transportation Act (FAST Act). The goals of FTA safety research program will continue as in previous fiscal year. The goals will be to improve the public transportation safety and the support the regulatory role and FTA's responsibility to develop a safety oversight framework.

Program Objectives:

The Safety Research program's goal in FY18 is the continuation of improving public safety by reducing transit-related injuries, fatalities, safety events and system reliability (State of Good Repair). The comprehensive framework started in FY18 to measure success/failure of research projects, will continue. Program outputs will be measured as an absolute reduction in crashes, fatalities, and injuries. These outputs will be expresses as ratio measures to include some variable "X" per 100 million vehicle or passenger miles.

The anticipated projects funded under Safety Program will be a continuation of and possibly build on the projects from FY17. The objectives remain the same as in FY17:

1. Advance the development of materials and technologies to reduce the number of transit-related fatalities and the severity of transit-related injuries, and improve the overall state of good repair of transit assets.
2. Increase the knowledge about human/machine interface and reduce the potential for safety-related incidents.
3. Lead to improvement of safety culture at transit agencies and enhance public confidence in transit, as well as support stakeholder coordination and outreach.
4. Support the development of transit safety standards, best practices and lessons learned in safety operations.

Anticipated Program Activities:

1. Safety Demonstration Program ($10 million):

This will be new funding and themed differently to focus on another high priority area of safety. This program will leverage and continue to fill the gap on the current portfolio of safety demonstration projects started in FY 16. The Safety Demonstration Program will continue as an annual, open competition, program to build a portfolio of demonstration projects focus in assisting transit agencies to address the immediate research needs to provide a predictable funding stream for transit agencies to explore innovative demonstration projects focused on safety.

2. FTA Standard Development Program ($1 million):

FTA Standards Development Program with the focus on safety standards as in FY17.

3. Bus Visibility Research ($2 million):

This demonstration will continue in FY18. The purpose of this project is to address the issue of blind spots on the current fleet of buses without additional electronic devices or adding technological complexity to the drivers and vehicles.

4. Employee Safety Reporting System Guidance ($2 million):

This research project will continue from FY17 into FY18.

Expected Program Outcomes:

1. The expected outcomes of the Safety Demonstration Program will be demonstrating the feasibility of innovative solutions and technologies to improve the safety of transit operations. FTA expects agencies to share their successes under this program to the rest of the transit industry. i.e., the reduction of crashes, fatalities, and injuries.
2. The expected outcome will be the continued development of safety standards. As well as, development of standards in other areas such as connected vehicle, automation, electric vehicle charging infrastructure, mobility on demand, etc.
3. The expected outcome is the adoption of standards that improves the visibility of new transit buses using passive solutions.
4. The expected outcome is the adoption of a decentralized employee safety reporting system across the transit industry as well as the use of the data to improve transit agencies safety policies and practices.

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
Safety Demonstration Program	
Transit Standards Development Program	
Close Call Reporting	
Bus Visibility	

How does the Program meet statutory requirements? The Safety Demonstration and FTA Standards Development Program directly respond to the following section in the FAST Act. FAST Act Section 3020: Review of Public Transportation Safety Standards FAST Act Section 5314: Technical Assistance and Workforce Development (including Standards Development) FAST Act Section 5312: Public Transportation Innovation. The FTA Standard Development Program will be working with Industry Standard Development Organizations & other industry partners. The Safety Demonstration Program will be an annual open competition and the type of projects submitted will provide an indication in what are some of the projects and areas of research that are of interests to the transit industry

How will the Program incorporate public and stakeholder input into the research planning process?

All program research projects originated with the transit industry. In the execution period, there will be consistent effort to involve transit agencies, peer group and the industry through a number of strategies.

Asset Management and Innovation

(Improving the durability and extending the life of transportation infrastructure)

Program Description:

With a back log approaching $100 billion and growing, the Federal Transit Administration has a goal of bringing transit into a "State of Good Repair". Statutorily referenced in 49 USC Section 5328 and MAP -21 Section 20019, the transit asset management plan will implement approach for assessing needs and prioritizing investments for bringing the nation's public transit system into a state of good repair (SGR).

Program Objectives:

The TAM research will be one of the major efforts by the FTA to assist grantees meet many of the following five major objectives:

1. National Transit Asset Management System – measure asset condition, set and meet performance measures target
2. Develop TAM/SGR Plan
3. Report condition, target, progress, etc.
4. Set performance targets
5. Technical Assistance

There are several TAM/SGR and Innovation research projects:

1. Demonstration of Innovative Track Asset Management Practice ($2M) will continue as specified in FY18 and into FY19. This project will research the use of autonomous track asset management system (vehicle/track interaction and track geometry monitoring system mounted under the rail vehicles) with the integration of non-contact track inspection technologies, data analysis, data management and maintenance.
2. Low and No Emission Vehicle Component Testing Program ($15 million over 5 years) – This program will continue as specified in FY17. FTA will competitively select one or more university-based facilities to conduct assessments of low and no emission vehicle components intended for use in transit buses.

Anticipated Program Activities:

1. This research project will demonstrate the transferability of such system to transit (currently used in freight and passenger rail industry), its effectiveness compared to existing transit track management practices and evaluation of the system. This system has been introduced and in use on passenger and freight railroads for a number of years. The vehicle/track interaction monitor and track geometry system can detect lateral track irregularities, long and short wavelength of vertical track irregularities and wheel/rail impacts.
2. This research project will test the life cycle of low and no emission components for transit vehicles.

Expected Program Outcomes:

1. The benefit will be the ability of transit agencies to continuously monitor, assess and determine trend of track conditions rather than wait for the result of high-rail inspection vehicles or track geometry vehicles (normally twice a year).
2. Determine performance specifications and life cycle metrics for components

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
Demonstration of innovative track asset management practice	
Low and No Emission Component Testing	

How does the Program meet statutory requirements?

Low and No Emission Component Testing required by FAST Act

Other research meets intent of "FAST Act Section 5312: Public Transportation Innovation" for the conduct of competitive research.

How will the Program incorporate public and stakeholder input into the research planning process?

All program research projects originated with the transit industry and Congress. During conduct of the research, there will be continuous effort to involve transit agencies, peer group and the industry using a variety of outreach strategies.

Transit Cooperative Research Program
(Provide public transportation cooperative research)

Program Description:

The FY 2018 Transit Cooperative Research Program (TCRP) will continue without substantive changes from FY2017. In accordance with the FAST Act, TCRP will remain a cooperative agreement through the National Academy of Sciences to carry out activities to support FTA's public transportation innovation projects, especially relating to ensuring research to practice and projects recommended by an independent governing board. The FY 2017 Transit Cooperative Research Program (TCRP) will continue as a cooperative agreement through the National Academy of Sciences to carry out activities to support FTA's public transportation innovation projects, especially relating to ensuring research to practice and projects recommended by an independent governing board. This independent board has a critical role to suggest public transportation research, development, and technology transfer activities that further the effectiveness, efficiency, and quality of public transportation. With the many changes and national trends driving new delivery models, impacting transit safety, and associated with protecting the environment and driving increased economic competiveness, TCRP will remain a vital partner with FTA.

Program Objectives: The scope of TCRP includes a variety of transit research fields including planning, service configuration, equipment, facilities, operations, human resources, maintenance, policy, and administrative practices.

1. Lead and complete research that is consistent with, and supportive of, FTA's strategic research goals and TCRP strategic priorities through a process guided by a broad group of industry stakeholders.

2. Support the growth and continued excellence of the nation's public transportation infrastructure to meet the mobility, environmental, safety, and energy objectives of public transportation systems.

3. Solve operating problems, help public transportation adapt to new technologies, meet service area/frequency needs, and introduce innovations into the transit industry. Field approaches to research that are local, problem-solving in nature, and are able to easily transfer into useful practice in to public transit providers and to the broader transportation industry.

Anticipated Program Activities:

1. Twice yearly, issue requests for research problem and synthesis statements statement. The TCRP Oversight and Project Selection (TOPS) committee meets twice annually to discuss, identify, prioritize research needs, and select approximately 15 problem statements.

2. Selected statements are developed by TRB staff, the TCRP project panel, and FTA liaisons collaboratively into requests for proposal which TCRP releases to solicit bids to carry out the research. Proposal submissions are evaluated, a winning proposal is selected and then TCRP the project team oversees the applied research product to offer insights, guidance, and feedback. Final results are published on the TRCP website.

3. Appoint and coordinate expert technical panels to guide research.

4. Publish, disseminate, and promote research reports and findings.

Expected Program Outcomes:

1. Enhance the transit customer travel experience by identifying ways to increase customer satisfaction, improve access to transportation options, expand service time/geography, and connect to life activities.

2. Help transit take advantage of technology and integrate affordable and sustainable technology solutions that improve transit service quality in mobility, accessibility, operations, and community access.

3. Increase effectiveness and efficiency of public transportation through identifying processes and methods that support continuous improvement in public transportation industry services, safety, asset management, and operations.

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
TCRP	**OST-R**

How does the Program meet statutory requirements?

Administering this program meets the FAST Act Section 5312 Public Transportation Innovation requirement to fund, issue, and manage a cooperative agreement with the Transportation Research Board to manage the Transit Cooperative Research Program at $5 million per year from FY16 – FY20 for the duration of the FAST Act allocated from the Trust Fund.

How will the Program incorporate public and stakeholder input into the research planning process?

TCRP will continue to work with key partners such as:

The American Public Transportation Association (APTA); The Community Transportation Association of America; Conference of Minority Transportation Officials; EasterSeals Project ACTION; National Rural Transit Assistance Program; National Transit Institute; and the Transportation Research Board.

All processes and reports are available for public download free of charge and any member of the public is invited to submit research problem statements.

APTA carries out dissemination activities. As part of the National Academies, TCRP adheres to National Academy processes and procedures regarding public notification and publication of materials and meetings.

In addition, with the FTA revitalization of the TRAC committee - Transportation Research Advisory Committee - TCRP will ensure that its research lines up with priorities identified by TRAC and with the FY2017-FY2020 Strategic Research Plan which FTA will finalize in late calendar year 2016.