



U.S. Department of Transportation
Federal Transit Administration

Accelerating Innovative Mobility (AIM) Demonstration

Travel Rewards Research Pilot Los Angeles County Metropolitan Transportation Authority (LA Metro)

Los Angeles, CA

Team and Budget

Key Partners: Duke University Center for Advanced Hindsight, Harvard School of Business, Uber, Waze Carpool, Rideamigos, Transit App, Metropia

Budget Summary:

AIM Demonstration Federal Amount	AIM Demonstration Cost Share	Total Cost
\$700,000	\$587,000	\$1,287,000

Innovation: Project Approach

As part of overall post COVID-19 crisis recovery plans, this research pilot seeks to encourage people back to public transit by incentivizing forms of mobility other than driving alone. LA Metro, together with the leading behavioral economics researchers at the Duke Center for Advanced Hindsight and Harvard School of Business, will partner with mobility technology firms to develop a research pilot to identify the most cost-effective incentive to shift single-occupancy vehicle (SOV) trips to public transit or another non-SOV mode (shared ride-hail, carpool, vanpool, walk, bike, telecommute) and understand the best way to structure, deliver, and time incentives to get the best return on investment (ROI). The pilot will also leverage existing public transit, microtransit, and multimodal programs managed by Metro and its countywide partners and will support fare integration between Metro’s Transit Access Pass (TAP) with private mobility providers. Research results will inform transportation demand management (TDM) policies for LA County and nationwide. The idea for the pilot came from a 2018 forum hosted by Metro’s Office of Extraordinary Innovation called “Think You Can Solve Traffic?” designed to solicit private industry solutions to solving traffic problems in LA County. From that forum came several proposals to develop a travel rewards incentive program to get more riders to choose transit over driving alone.

Challenges Project Is Designed to Address

LA County has a well-known traffic problem and, in the post COVID-19 “new mobility normal” recovery, LA Metro will need to be innovative in its approach to attract people back to shared modes of transportation and to further embrace telecommuting. According to the Inrix 2017 Scorecard, Los Angeles is the most

congested city in the world, with an average of 102 hours per person wasted in traffic each year, and more than 70% of all trips are SOV trips, according to the National Household Travel Survey (NHTS). Recent investments in expanding the transit system by Metro and its partners have increased access and mobility across the region; however, before COVID-19, ridership was down (as it was nationwide) and congestion was on the rise, and ridership has fallen further since the crisis began, with ridership down 68% from April 2019. This research pilot aims to examine how leveraging the interplay between existing transit infrastructure, private app-based mobility services, and behavioral science can enable Metro to address declining transit ridership and achieve its Vision 2028 goal of doubling non-drive-alone trips by 2028. Making progress toward this goal will improve economic productivity, energy efficiency, affordability, reliability, and utility of travel by offering more accessible mobility services that improve quality of life for all.

Although many residents of LA County and other parts of the U.S. aspire to use alternatives to SOVs, as they may cost less, help them exercise more, and/or make them happier or less stressed, very few actually do. This could be because the alternatives are not convenient or because individuals are in the habit of driving alone, even if doing so may be considered irrational. This program will leverage an understanding of these irrationalities and other behavioral principles to develop and test financial or programmatic incentives that will work with the grain of human biases and irrationalities, including the following:

- Financial rewards for taking transit, shared ride-hail rides, or peer-to-peer carpooling
- Personalized trip planning/fresh starts
- Work from home/telecommute
- Active transport

LA Metro's technology integration approach will be to leverage the mobile applications that can monitor travel behavior of its key partners—Uber, Waze Carpool, Metropia, Transit, Rideamigos—and offer an integrated suite of mobility options and deliver incentives in real time for non-SOV trip-making (transit, carpool, telecommute, walk, bike). Also, LA Metro will explore the values and effects on ridership with integration between private mobility platforms and Metro's TAP transit pass and the new TAP mobile app.

Anticipated Outcomes, Benefits, Impacts

The project will focus on understanding how people choose to travel around the county and region. Not only will it encourage people to take transit and other alternatives to driving alone, it also envisions rewarding them for their actions. It will also help Metro's goals of reducing traffic and travel times in LA County. The results of the pilot will be shared with other transit agencies, allowing them to learn from and consider adopting the lessons learned by Metro's innovative pilot. The findings will inform LA Metro's Countywide TDM program and policies and evidence-based policy making at the local city, regional, state, and federal levels regarding incentives to promote non-SOV trip-making. This work will continue the work that began as part of the Metro-created Recovery Task Force exploring how Metro can further encourage telecommuting as a tool to solve traffic congestion.

Artificial Intelligence Communication Platform for Revenue Expansion

Capital Area Transit System (CATS) Baton Rouge, LA

Team and Budget

Key Partners: Hitachi

Budget Summary:

AIM Demonstration Federal Amount	AIM Demonstration Cost Share	Total Cost
\$250,000	\$50,000	\$300,000

Innovation: Project Approach

This project will create a multi-channel messaging and mobile wallet platform that removes the barriers between passengers and operators. For passengers, the platform will provide information about public transit status, delays, and updates and facilitate additional real-time communication services with operators and promotions from public transit partners. For public transit operators, the data insights gained from this platform will enable a holistic understanding of the passenger journey, leading to operational improvement and improved service offerings for an enhanced passenger experience. For example, service providers can offer incentives to passengers for proactive “load balancing,” such as the ability to send coupons to a percentage of riders subscribed to receiving status for a certain route on a specific date and time coinciding with the end of a sports event to encourage riders to catch a bus at a particular stop at the same time. Another example could involve sending coupons from retail establishments near different stops to a variety of riders to distribute riders across different routes as opposed to a single route. Solution facets include full journey visibility, schedule alignment, passenger load balancing, and passenger engagement.

Challenges Project Is Designed to Address

Many public transit passengers rely on multimodal transportation (bus, microtransit) to reach their destinations. However, these services often are uncoordinated, resulting in a poor passenger experience, and often are exacerbated at peak times, causing significant negative impact to public transit operations. In addition, things such as cleanliness or broken equipment and amenities can significantly impact passenger experiences and often can be addressed quickly but may not be addressed in a timely manner, as public transit operators cannot easily monitor their facilities and equipment to determine service deficiencies.

The primary concern of many passengers is on-time transit service. Any solution starts with enabling reliable real-time communication on service status; however, the difficulties of maintaining these technologies and ensuring that information is current and in sync is a major challenge that, if unaddressed, can degrade the

passenger experience if not well-executed. It is important that a unified solution with a central interface be deployed to minimize the overall management for providing information.

Finally, the platform's use of social media technology can be used to monitor and alert maintenance conditions in real time. Passengers often will turn to social media to complain about a broken restroom or an issue with a transit vehicle's seating area, which can be detected by the technology. By monitoring these channels, public transit agencies can quickly respond to complaints and remedy the situations.

Anticipated Outcomes, Benefits, and Impacts

The proposed platform will create an opportunity for CATS to use a digital form of engagement with its riders and the community that is highly accessible, scalable, and flexible. This engagement can enhance CATS' ability to capture and respond to community requirements; especially under crisis, when communication is critical, this platform will be highly effective and will enable CATS to deliver a smoother and richer rider experience.

Implementing App-Based, Inter-Agency Fare Purchase and Trip Planning in the Rocky Mountain West

Regional Transportation District (RTD) Denver, CO

Team and Budget

Key Partners: Colorado Department of Transportation (CDOT), Masabi, Transit, Denver South Transportation Management Association, Via Transportation, Inc.

Budget Summary:

AIM Demonstration Federal Amount	AIM Demonstration Cost Share	Total Cost
\$687,000	\$336,000	\$1,023,000

Innovation: Project Approach

Public transit riders across the U.S. are keen users of mobile apps with intuitive interfaces and seamless integrations. As the mobility landscape continues to change, the onus is now on public agencies to offer tools to improve rider experience that are polished and powerful. RTD's integrated fare payment project solves this by offering one transaction flow for purchasing tickets for multiple agencies and modes. Riders can enter a destination, compare their transit options, elect to ride RTD and Bustang, CDOT's intercity bus service, as segments of their trip, and buy a fare from each agency in one flow. In addition to being easier, this removes the necessity and risk of entering payment details into multiple apps. Once the flow is complete, the fares will be accessible in the Transit app for activation and validation.

RTD hopes that this project will advance trip planning and fare payment nationwide. The model being used is replicable with startup costs that are quite low, providing the opportunity for a faster rollout than some other industry innovations. RTD will work with FTA through the AIM program to disseminate knowledge gained and lessons learned to other public transit agencies to help continue the push for more advanced fare payment platforms.

Challenges Project Is Designed to Address

Today, riders whose trip includes a transfer from RTD to another mode of public transit must purchase individual tickets in multiple transactions, which is confusing and inconvenient. Bustang offers mobile tickets in a separate mobile app, so a transfer between RTD and CDOT public transit services requires the use of multiple apps for purchasing and tracking tickets. This makes it difficult to attract new riders and retain existing riders. This project will address these challenges by consolidating trip planning and fare payment for RTD and CDOT transit services into one application. Through this, the end-user will be able to plan and pay for a trip in the Transit app, eliminating the need to juggle multiple phone apps during the journey.

RTD intends for this project to be a proof-of-concept to FTA and other transit agencies around the U.S. It will be evaluated not by the total number of tickets purchased but through feedback from passengers who use the app. Successful project implementation should result in positive passenger experiences as well as dissemination of best practices and lessons learned so that implementation of integrated fare technology can be replicated nationwide.

Anticipated Outcomes, Benefits, and Impacts

Planning a trip across multiple agencies and buying tickets for each is a process with unnecessary friction that discourages potential new riders. The project will provide a single, intuitive mobile app to plan a trip and buy and manage tickets for multiple modes, helping connect rural Colorado with the Denver metropolitan area and Denver International Airport. Streamlining fare payment across transportation providers will improve the overall passenger experience and modernize how trips are planned and paid for.

Transit agencies across the country face similar challenges when contemplating how to best meet the needs of their riders with first-class mobile apps without large costs to initiate and maintain them. Partnering with leading providers of mobile apps such as Transit and Software-as-a-Service (SaaS) ticket platforms such as Masabi allows public transportation agencies to meet these challenges while maintaining low costs and operational overhead.

As public transit agencies learn to navigate how to operate in a post-COVID world, it is clear that technological innovations will play an important role. Making it easier to keep existing riders and attracting new ones are benefits this project will provide to RTD, CDOT, and the public transit industry. Additionally, all Coloradans who use CDOT and RTD transit services will benefit from a more modern, streamlined fare payment experience.

Creating the World's First Integrated Mobility Solution in Georgetown

Georgetown, DE

Team and Budget

Key Partner: Via Transportation Inc.

Budget Summary: Funds will be used for software configuration, service zone configuration and development, and monthly operational costs (per vehicle participating in the pilot) associated with deployment. Additional funds are included to support AIM Incubator efforts.

AIM Demonstration Federal Amount	AIM Demonstration Cost Share	Total Cost
\$317,692	\$131,868	\$449,560

Innovation: Project Approach

Infrequent bus service and limited access to bus stops, particularly in rural communities, can result in low ridership on key corridors, yet it is imperative to provide service to these users. Delaware Transit Corporation (DTC) currently provides transit service to Georgetown's 7,500 residents, with service frequencies ranging from 1.5–2 hours on fixed routes serving Georgetown and neighboring communities. This infrequency is a disincentive to choose bus service as an option and a hardship for those who have no choice, such as the 6% of households without access to a vehicle. Certain demographic groups, such as veterans, people with disabilities, older adults, those with no or low income, and people of color, are most reliant on public transit and most impacted by limited service.

Georgetown's Integrated Mobility Solution (IMS) will be custom-tailored to increase frequency and choice in rural areas by improving connections for those with limited means, ability, and options. To accomplish this goal, Via's IMS software will integrate Georgetown's public transit systems into one holistic network by providing a single, integrated mobile booking and ticketing app for all available modes including fixed-route vehicles and by implementing software that converts paratransit vehicles, local taxis, and other mobility providers to microtransit providers. A phone option will be available for those without smartphones. The solution is cost-effective and does not add more vehicles to the network, with net benefits for the environment and traffic congestion.

Although on-demand microtransit has been successfully piloted in dozens of cities around the world, Via's IMS is the first concept worldwide to go beyond traditional microtransit vans and fixed-route buses to include local transportation providers as an expansion of the transit supply. This serves additional benefits of resuscitating the depressed local taxi sector while also supporting third-party mobility providers (e.g., non-emergency medical transportation providers) that often seek contract work. Providing public transit in

rural communities is a fiscal and operational challenge faced by agencies across the U.S. This pilot provides a baseline of how to use Via's IMS to best serve the mobility needs of rural areas in a scalable approach.

With a limited supply of microtransit options in rural Sussex County, this pilot will introduce and test new public transit connectivity and increased benefits for Georgetown users and riders county-wide. In turn, the pilot will strengthen rural industry (manufacturing and agricultural sectors) and the local economy by connecting residents and employees to jobs and expanding the labor pool.

Challenges Project Is Designed to Address

Georgetown is a key employment and health service hub, but limited bus routes and infrequent service schedules impede access to jobs and medical and social services. These barriers to transit access are especially acute for individuals with disabilities, veterans, older adults, low-income residents, and people of color residing in Georgetown. Without robust transit, residents and employees rely on a private vehicle or the for-hire industry to connect them to jobs, healthcare, and other community resources, but these are more costly options than relying on public transit.

The key goal of this project is to expand transit cost-effectively to ensure a desirable service that more people will want to use. With an average of 0.3 riders per mile on fixed bus routes serving Georgetown, operations are not cost-effective. This results in limited resources re-invested into the system for operational and service improvements. Other goals are to provide affordable public transit options in a designated Opportunity Zone that is also home to a correctional facility, manufacturing and agricultural plants, and health care facilities.

Via's IMS solution will create a more desirable service for users, with more public transit options and improved control of their trips. Via will create a new app that integrates trip booking, planning, tracking, and payment into one platform, functions currently offered by different services and apps. Program performance will be measured by number of passengers, average wait times, vehicle distribution, rider growth, service coverage, financial performance, and rider satisfaction.

Anticipated Outcomes, Benefits, and Impacts

Rural communities in Delaware have long complained about the lack of public transit options. Transit agencies across the U.S. recognize the unique needs of rural residents—many are older adults, many are low-income, and many represent different ethnic groups that often are most reliant on public transit and most impacted by infrequent bus schedules tending to supplement the unavailability of transit through car ownership or car sharing and/or trips taken by local taxis. For those with limited means, this adds to financial hardship and also limits employment and housing opportunities and access to other services.

This pilot will make public transit more desirable by closing the gap in wait times, providing users with an app (or information via phone call) that gives them real-time trip information, expanding access to bus routes/stops inaccessible due to first/last mile challenges, and offering trip savings with public transit options that are less costly than private vehicle use and/or trips taken a full distance in a local taxi. More public transit options also will increase the desirability of Georgetown and its surrounding communities as an employment and job center. Rural industries are key economic engines in Delaware that must be supported in ways that retain and attract a solid workforce.

As a result of this project, it is expected that public transit usage in Georgetown will increase and that the perception of public transit in rural communities will improve given increased rider satisfaction due to the availability of more, reliable, convenient, and affordable options to travel via bus. These outcomes will support an expansion of this IMS solution throughout other communities (rural, suburban, urban) seeking solutions to first/last mile connectivity challenges, the provision of public transit for different and trending mobility needs, and cost-effective and innovative options to traditional service delivery.

Transit App Integration: Pinellas Suncoast Transit Authority (PSTA) Direct Connect Service

Pinellas County, FL

Team and Budget

Key Partner: Transit App

Budget Summary:

AIM Demonstration Federal Amount	AIM Demonstration Cost Share	Total Cost
\$120,000	\$30,000	\$150,000

Innovation: Project Approach

PSTA's Direct Connect program was the first first/last mile program in the U.S. to leverage the innovative technology of ride-hailing companies. In Fiscal Year 2019, riders took over 25,000 rides using the program. The service offers riders \$5 off Uber and taxi trips and \$25 off wheelchair-accessible vehicle trips to and from 26 designated locations adjacent to higher-frequency bus routes in Pinellas County. To use the service with Uber, riders must apply a designated promo code inside the Uber app. Approximately 90% of trips taken with Direct Connect use Uber.

Transit App has been integrated with Uber since 2014, allowing Transit users to hail and take Uber rides from within Transit. In 2018, Transit launched its multimodal trip planner, which allows the app to generate real-time trip planning for fixed-route service with ride-hailing (and other shared modes), helping users see their best first/last mile options. Since July 2019, Transit has displayed PSTA Direct Connect locations in the app with links to more information about the program. This project will build on that work to make the innovative PSTA Direct Connect program fully accessible from within Transit, PSTA's official app.

This year, PSTA's Transit Development Plan (TDP) was incorporated as the foundation for the transit component of Pinellas County's 2045 Long Range Transportation Plan (LRTP). Within that document, the Pinellas County region's metropolitan planning organization (MPO) outlined a policy to "support technology innovations and micro-mobility strategies to strengthen first/last-mile connections between transit stops or station areas and travelers' origins and destinations." This policy advances an objective to "provide improved mobility and accessibility for everyone by better connecting people to places, eliminating transportation barriers to expanded economic opportunity and enhancing community quality of life."

Challenges Project Is Designed to Address

As a mobility management leader, PSTA provides countywide bus service and operates four programs that use Transportation Network Companies (TNCs), taxis, and wheelchair van services to provide riders with on-demand connections; Direct Connect provides first/last mile trips to 26 bus stop locations served by core

and frequent local routes. Late Shift provides late night/early morning on-demand rides for low-income riders outside the system's span of service. PSTA also operates an on-demand alternative to traditional paratransit service and an on-demand municipal health ride service. This project will add PSTA Direct Connect multimodal trips as an option in Transit's trip planner alongside fixed-route bus service and other shared mobility options. Currently, the Uber app does not currently support transit routing capabilities in Pinellas County, nor does it support multimodal routing in any market. This limitation means that riders need to manually stitch together multimodal routes across multiple apps to plan a trip, which can be a daunting task for even the savviest transit riders.

To book a multimodal trip that uses Direct Connect, riders currently need to separately juggle bus estimated times of arrival (ETAs) and trip plans for different viable routes and Uber ETAs, determine whether they have enough time to make a bus connection, find the most efficient transfer points, etc. This makes using the program challenging for riders and does not allow PSTA to analyze data regarding how riders are combining ride-hailing services with the PSTA fixed-route network. All these capabilities will be enabled through creation of an intuitive user experience within Transit that will also provide PSTA with more granular data on riders' multimodal journeys.

Proposed performance measures include (but are not limited to) program ridership, trip times, trip costs, number of app (Transit) downloads (following integration launch), and social media program post-impressions.

Anticipated Outcomes, Benefits, and Impacts

Transit will customize its multimodal routing engine so that multimodal trips that surfaced in the app that link fixed-route and Uber trips will be program-eligible. This user interface integration will advance the use of shared-use mobility services by simplifying the multimodal trip booking and payment process. This will improve Direct Connect program accessibility for transit riders in Pinellas County and will create a replicable business model for this type of project to be launched in other service areas within the Transit platform. Mobility innovation partnerships such as this are essential to the development of functional Mobility as a Service (MaaS) platforms. This integration will increase access to transit services and decrease travel times by providing multimodal options. Almost 15% of PSTA riders open Transit on an average weekday, and over 10,000 riders use the app at least once a month. This reach will help introduce the Direct Connect program to more riders. Program use will be monitored by tracking performance measures such as ridership and travel times.

This public-private partnership will allow PSTA to enhance its first/last mile program and provide the public transportation industry with valuable trip planning and booking data. Integrating Direct Connect into Transit will provide PSTA more granular data on a rider's journey, including origin and destination information on each leg of a multimodal trip, the line to which the rider connected, and at what stop and timestamps. Transit will also aggregate the data to provide PSTA with general insights into rider behavior.

GRTA KOKO Bird’s AIM for the Future Freedom of Mobility

Municipalities of Agat, Santa Rita, Naval Base, and Piti, Guam

Team and Budget

Key Partners: RouteMatch by Uber, University of Guam

Budget Summary:

AIM Demonstration Federal Amount	AIM Demonstration Cost Share	Total Cost
\$1,950,106	\$446,480	\$2,396,586

Innovation: Project Approach

The Guam Regional Transit Authority (GRTA) KOKO Bird’s AIM for the Future Freedom of Mobility project will provide innovative and inclusive Mobility on Demand (MOD) public transportation services to connect citizens and military personnel of rural, southwestern villages and the U.S. Naval Base Guam (NBG) to the island’s commercial centers. The service will provide these areas with innovative and inclusive access for residents of three rural communities (Agat, Santa Rita, Piti) and NBG to Hagatna through southern Dededo, the island’s primary commercial, employment, (Opportunity Zone), and healthcare areas.

In providing the new MOD services, GRTA will lease eight ADA-accessible vehicles for operations, provide customer-focused access to service through advanced technology, create a newly-branded service, and provide customers with “complete trip concierge” services. GRTA will use RouteMatch’s Mobility Platform technology to provide innovative on-demand customer trip scheduling, service management, and trip concierge and payment services through a new GRTA mobile app and existing website. GRTA will also provide all customers, including those who are unbanked and underbanked, with access to these services by telephone and in-person at GRTA offices, with additional outlets to be determined during the service preparation phase.

GRTA’s market research component, led by the University of Guam, will evaluate and study the MOD service, including demographics, rider preference, data analysis, and lessons learned. The report will address the challenges and successes of the pilot project as a documented study with an independent university-level analysis in solutions for future innovations on mobility in Guam. The results will allow GRTA to replicate the successes of the pilot for other island communities around the nation and in Guam.

Challenges Project Is Designed to Address

The project will provide innovative service delivery, technology, and partnerships to meet customer-focused needs and the goal of providing new, innovative on-demand complete trip transit services for rural and

military communities utilizing advanced, inclusive technology. Lacking available public transportation options, the MOD service will provide innovative and inclusive access for residents of three rural communities (Agat, Santa Rita, Piti) and the NBG. The proposed innovative rural and military MOD service will use transformational, advanced customer-focused scheduling/pay technologies and GRTA ADA ramp-equipped vehicles, enabling customers to have a complete trip experience. As part of the project, specific metrics will be developed in the early stages of the project to measure rider impacts.

Anticipated Outcomes, Benefits, and Impacts

The project will make available innovative and inclusive MOD public transportation services and technology to connect citizens and military personnel of rural, southwestern villages and NBG to the island's commercial centers. Anticipated project benefits include the following:

- Greater mobility – At present, the idea of a complete transportation solution outside of owning a car is unheard of on the island. This project will not only result in technology evolution but also a transportation revolution similar to how Uber has impacted many communities. This will allow for all citizens in the MOD zone via mobile phone, online, call, and in-person at GRTA to schedule a ride anywhere in the zone, including older adults, NBG civilian employees, active-duty military and their families, students, persons with disabilities, veterans, and low-income persons.
- Spur economic growth in the MOD service area – In providing greater mobility options, GRTA anticipates spurring economic growth in the proposed MOD zone. For example, military personnel and their families living in housing areas along the Patriotic Route will have access to employment, healthcare, shopping, airport, hotels, and recreational activities without driving. All persons will benefit from improved mobility regardless of their location, age, income, or ability.
- AIM Incubator or national peer-sharing model – To provide project replicability, scalability, and learning opportunities for other rural, island, and military communities, GRTA is partnering with the University of Guam to research and measure the project's community impacts.

Technological Solution to Coordinating Regional Transportation, Creating Efficiency in Service

Region 8 Regional Transit Authority Delaware, Dubuque, and Jackson County, IA

Team and Budget

Key Partners: Goodwill Industries of Northeast Iowa, Inc., Mental Health/Disability Services of the East Central Region, Hills & Dales, Unified Therapy Services, Inc., Dubuque Community School District Transition Facilitator, United Way of Dubuque Area Tri-States, Sunnycrest Manor

Budget Summary:

AIM Demonstration Federal Amount	AIM Demonstration Cost Share	Total Cost
\$120,000	\$30,000	\$150,000

Innovation: Project Approach

The Delaware, Dubuque, and Jackson County Regional Transit Authority (RTA) proposes to leverage technology via a password-protected portal to help improve coordination among local agency and community partners when scheduling trips for clients. This will allow for shared costs, ultimately lowering costs and reducing wait time for clients. Agencies will be able to schedule more trips than in the past, expanding local service availability to the general public. Local officials will demonstrate improved RTA service availability to the public and agency partners with a redesigned website. Displaying RTA's peak and off-peak times will enable all clients and caregivers to schedule appointments so their trips fit into RTA's services, and agency partners will have the ability to schedule appointments during RTA's off-peak times, reducing wait time for their clients.

RTA strives to provide better communication on service and delays to all of its riders. The new GPS app will help alleviate concerns of clients when waiting for the bus to arrive. Clients and caregivers will be able to check their cellphone to see where the bus is located in real time and monitor bus movement. The app will be more convenient than calling RTA dispatch for updates on bus location.

Challenges Project Is Designed to Address

The goals of the RTA Regional Coordination Program are to improve coordination among agency partners when scheduling trips for its clients, thus reducing wait times, demonstrate improved availability of RTA services to all riders to aid in trip and appointment scheduling, and provide better communication in real time with riders and caregivers. All technology improvements will result in an improved rider experience, helping RTA retain current riders and attract new riders. The coordination program will enable RTA to streamline its services, allowing it to operate more efficiently and be more cost-effective.

With the new technology, RTA intends to reach a goal of three community events and five Iowa City trips coordinated and shared by at least two or more of its agency partners during the first year of implementation. The number of clicks on the redesigned website's regional map displaying peak and off-peak times will be tracked. The GPS app will track the number of times the bus location display in the app is accessed.

Anticipated Outcomes, Benefits, and Impacts

RTA's community partners have expressed a need for coordination and sharing trips for their clients, never possible until now. This project will be successful with the help of seven community partners, each of which has committed to supporting the project by assisting in the development of each component and using the technology once available. RTA will collaborate with these partners to gather data on their cost savings and overall satisfaction using the portal.

The technology solution will help the vulnerable population served by the RTA and the general public. The redesigned website will result in all clients spending less time waiting, both before and after appointments, and Medicaid clients will spend less time on the phone coordinating their trips with their appointment times. Communication will be greatly improved with the addition of the app and will reduce concerns of local clients when waiting for a bus to arrive. RTA will conduct public surveys to gather data on satisfaction levels with the redesigned website and the app.

The project will benefit the RTA and potentially many other public transit systems around the U.S. This technology solution could be replicated by rural transit systems that also are struggling with coordination of personal mobility.

Engaging South Cook Residents to Advance Fair Transit

Cook County Department of Transportation and Highways (CCDOTH) Cook County, IL

Team and Budget

Key Partners: Northeast Illinois Commuter Railroad (Metra), Chicago Transit Authority (CTA), Pace Suburban Bus

Budget Summary:

AIM Demonstration Federal Amount	AIM Demonstration Cost Share	Total Cost
\$330,000	\$220,000	\$550,000

Innovation: Project Approach

The novel partnership among CCDOTH and the Chicago area's three transit agencies seeks to boost ridership and spur economic growth by providing communities in South Cook County (some of which have experienced great hardships during COVID-19) with more affordable and convenient public transit services to build a stronger Chicago region. Reaching beyond its traditional role in the transit arena, CCDOTH has committed to a plan to offset revenue losses for Metra, Pace, or CTA associated with the project and will support other investments to improve convenience and reduce costs when transferring between local (Chicago-area) public transit services. Project goals include a pricing and partnership structure that can be applied to cities across the U.S. to provide more affordable public transit to underserved neighborhoods. The project offers new transportation opportunities for both residents and employers.

The goals of this project are to improve service, reduce fares, and create a seamless rider experience across public transit services. The project will evaluate the impact that each element has on ridership, transfer volume, survey response rate, and qualitative data from riders. This will require the development of innovative survey techniques that can be applied during and after the pandemic, which will include administering surveys virtually through phone notification and incentivizing participants with a gift card for a completed survey. The dataset will be shared with FTA for application to other public transit systems.

Metra, CTA, and Pace run on different payment platforms, which makes transfers between services onerous and expensive. The final step of the project will entail combining all ticketing onto one platform, Ventra, and providing reduced-price transfers. CCDOTH will fund research, development, capital, and operational expenses for new transfer technology for implementation success that can be replicated across other agencies facing similar challenges.

Challenges Project Is Designed to Address

This project will address challenges associated with adaptation to and recovery from the COVID-19 pandemic and simplify connections across public transit services for passengers in the Chicagoland transit system. Since pandemic-related lockdowns began in March 2020, rates of public transit use in South Cook County have declined less than other parts of the region, as a disproportionately large number of essential workers use these services. In spite of the huge decline in revenues, public transit agencies continue to operate, ensuring that workers have a means of getting to their jobs and informing riders about COVID-19 response measures. CCDOTH is teaming with the region's public transit providers to reduce fares, improve service, and ensure greater seamlessness across all transit operations in the region. This project will support public engagement efforts and evaluation surveys to assess the impacts of the fare reduction and recovery strategies on public transit ridership.

Current challenges in providing robust, flexible, and accessible transportation options include response to pandemic concerns, existing fare structures, existing routes and schedules, and the inability to seamlessly transfer among public transit providers. This project seeks to address these problems by funding their solutions incrementally. The overall project goals of improving service gaps and frequency, reducing fares, and achieving interoperability in terms of seamless transferability are the regional needs that CCDOTH is a key partner in addressing.

CCDOTH will apply recovery strategies and innovative public engagement tools that incorporate pandemic responses and effective outreach to existing and potential new riders within the project area with a focus on lower-income and transit-dependent groups. Local project officials will embark upon strategy development, effective outreach options, and analysis and evaluation to refine and deploy local efforts—specifically, to develop a reduced fare impact evaluation survey that will allow for the collection of necessary insight on rider preferences, challenges, constraints, routes, destinations, and other factors not only beneficial to, but necessary for, service planning information. This project will have applicability to other regions' public transit systems.

Anticipated Outcomes, Benefits, and Impacts

Expected outcomes of this project include innovative service delivery that will be made evident upon implementation of reduced fares along the Metra Rock Island and Metra Electric commuter rail lines to accelerate COVID-19 public transit recovery. Eliminating the extra costs associated with using these rail lines will make their use more attractive to local residents, reduce travel time, and increase access to other parts of the region. City riders will be able to select the closest public transit option without surcharge and may reduce the number of connections needed to reach their destinations. A large portion of households in proximity to these rail lines already spend over 50% of their income on transportation, and the pandemic has exacerbated this. Fare reductions and easier transfers will foster more affordable connections between neighborhoods and to the Chicago Central Business District.

CCDoTH will measure transit recovery strategies and administer an evaluation survey to determine the impact of reduced fares implemented by the project. Local officials will conduct a series of comprehensive outreach events with the general public, stakeholders, transit operators, and local government officials. Results of each survey will be analyzed, with feedback incorporated into subsequent deployments. A variety of methods will be used to ensure survey responses, including a hybrid approach of paper-based and virtual

tools to facilitate on-board, in-station, and mail-in surveys. Data gathering and analysis are key components to communicating the impacts of this project.

This project has CCDOTH reaching beyond its traditional role in public transit that typically includes only supporting the development of bus and rail transit infrastructure on county roads to providing financial support to public transit agencies for both operating expenses and improvements to expand fare media interoperability. Over the course of the project, CCDOTH will accelerate the development, implementation, and adoption of innovative technologies toward integrated payment solutions and interoperability that improve mobility and enhance the rider experience. An aspirational benefit is that travelers in South Cook County will choose public transportation as their preferred mobility option. The city of Chicago, South Cook County, and parts of Will County have origins and destinations that can be reached via this public transit market, thereby promoting economic development in those communities. This project will further advance innovative partnerships to solve public transit ridership and challenges simultaneously.

Mobility Concierge Service

Indianapolis, IN

Team and Budget

Key Partner: Indianapolis Pacers Bikeshare

Budget Summary:

AIM Demonstration Federal Amount	AIM Demonstration Cost Share	Total Cost
\$400,000	\$100,000	\$500,000

Innovation: Project Approach

Part technology platform and part enhanced customer service, IndyGo seeks to create a Mobility Concierge program capable of coordinating trips between providers, including both trip-planning and payment integration, for the purpose of reducing some transportation barriers that persist throughout the Indianapolis area. The Mobility Concierge service will bridge the gaps that result from multimodal, cross-jurisdictional travel such as rider knowledge of the most efficient or affordable mode or path, what trip option(s) are available when trip linking is required, how to integrate transit into a full trip, and where other options, whether they include a public transit trip or not, are available. The proposed project also aims to reduce the burden of navigating multiple payment portals. A coordinated, multi-jurisdictional, multimodal planning and payment service will improve the mobility experience of all public transit users in the region.

Challenges Project Is Designed to Address

Currently, Indianapolis lacks a unified regional transit system and operator. There are three fixed-route operators in Indianapolis-Marion County and the immediately adjacent counties—IndyGo, Access Johnson County, and the Central Indiana Regional Transportation Authority (CIRTA). IndyGo is, by far, the largest fixed-route transit operator in the region, with CIRTA providing workforce shuttles and Access Johnson County providing fixed-route service in Johnson County. There is no fixed-route service in Indiana’s third-largest county, Hamilton County.

Outside the “compact zone” of Indianapolis (areas built pre-World War II), Marion County has sprawled significantly, and many primary arterials in the county have no sidewalks or side paths, resulting in an extremely dangerous environment for pedestrians. Therefore, a first/last-mile connection to and from public transit is critical for the region. Currently, riders are unable to plan trips across multiple modes and/or across multiple mobility providers, something the Mobility Concierge aims to address.

The regional fragmentation of mobility services creates a situation in which jobs are difficult to reach, particularly in suburban areas within and outside of Marion County. The Mobility Concierge service will allow

users to plan, book, and pay for trips across multiple modes of transportation and mobility service providers, thereby improving accessibility to economic, health, and educational opportunities.

Anticipated Outcomes, Benefits, and Impacts

Upon full implementation of the Mobility Concierge service, IndyGo anticipates an outcome of a substantially more accessible Central Indiana, and the ability to plan and pay for multimodal trips will become much easier for end-users. Instead of being required to navigate multiple trip-planning applications and payment methods, there will be a single, integrated option that can be planned and paid for via a MyKey transit account. For those without access to a smartphone or if the trip cannot be completed via the mobile app (e.g., a demand-response provider that cannot process mobile payments), the trip can be booked via the customer service call center.

IndyGo will continuously monitor how the service is used and how it performs. Performance measures will include total passenger miles per hour and total trips provided per hour for all trips, including TNCs and third-party transportation providers; performance of service for Americans with Disabilities Act (ADA) passengers, the unbanked, and other vulnerable populations; and origin and destination data to inform future service planning.

Outcomes of the Mobility Concierge service will be shared with FTA and the transit/mobility industry to inform future decisions around service planning and accessibility on a national scale.

Innovative Solution to Dynamically Manage Resource Capacity in Real-time in the Post-COVID Normal and Beyond

Lexington, KY

Team and Budget

Key Partners: Lextran, TripShot, University of Kentucky (UK), IBI Group

Budget Summary:

AIM Demonstration Federal Amount	AIM Demonstration Cost Share	Total Cost
\$422,625	\$106,600	\$528,625

Innovation: Project Approach

The key innovative development of this project will be a two-way real-time information exchange between campus riders and dispatchers that will create a platform on which customers can plan a trip in a MaaS model and dispatchers at Lextran and UK can better deploy resources through real-time supply and demand management.

Lextran, in cooperation with TripShot, will provide integrated mobility technology in a campus environment that includes dynamic schedule and capacity management to provide built-in capability to dynamically track and manage system resources to assist with capacity management and a validation approach that considers COVID-19 changes. Lextran currently does not have an effective way to validate students boarding its vehicles, and it is expected that additional work may be needed for the validation process to meet UK's requirements and current best practices for health and safety.

Challenges Project Is Designed to Address

Agencies that serve university campuses through high-frequency headway-based service historically have struggled to deal with planning resources to manage peak load and crowding. This challenge is exacerbated by lack of fare information, as most university riders typically are allowed to ride based on visual identification of an ID card. Given the unpredictability brought by COVID-19, this challenge is likely to become even more prevalent as agencies will have to manage passenger loads to comply with social distancing guidelines, thus requiring them to dynamically adjust provided capacity throughout the day using a mix of fixed-route shuttles and on-demand vehicles.

Lextran serves the UK campus in partnership with the UK Transportation Department with a fleet of 14 vehicles. As social distancing guidelines are expected to continue for the next few years, Lextran will need a flexible platform that can manage all dedicated vehicles available at Lextran and UK as well as other non-

dedicated vehicle options (e.g., TNCs). Also, although UK has several alternative modes available to its students and staff, there is no electronic discovery and booking platform to present them with available options in real-time. Therefore, although Lextran and UK vehicles are equipped with vehicle tracking and operations management technologies for individual resource (fleet/drivers) pools, local officials will need a system that can manage all resources in real time and help make decisions on a real-time resource supply.

To meet this need, Lextran has partnered with UK, TripShot, and IBI Group to develop a unified MaaS solution platform that will provide real-time information on the next available vehicle from Lextran, UK, and other providers. This single platform will allow students to plan, reserve, and stay informed about a selected vehicle and will enable Lextran to verify UK riders and track them as they board and alight vehicles automatically in a contactless fashion. The platform will be powered by a flexible central cloud-based application that constantly monitors system capacity (e.g., availability of dedicated vehicles/drivers and non-dedicated resources, current headway, etc.), service performance, service disruptions and other service indicators to make real-time decisions.

Anticipated Outcomes, Benefits, and Impacts

This project will demonstrate, in an ideally-constrained environment, how technology can be used to strengthen and build upon strategic relationships among agencies and institutional partners. The project will be focused on Lextran, but such a platform will be useful to all transit agencies for which significant ridership comes from college and university affiliates or other large institutional partners such as employers in downtown areas. The platform has the potential to address how agencies have students pay for transit and how they can report on the value of public transit to their institutional partners and may demonstrate how they should address campus services needs post-COVID-19 where demand for dynamically-scheduled and dispatched services will increase. Such a platform also can allow a conventional service provider to act as a mobility manager by bringing different private and public sector partners under one technology platform to serve customer needs that may be dynamic and varied in nature.

College and university campuses provide an ideal location for testing such a platform, as a high proportion of students and staff have access to a mobile phone and the institutions often seek innovative technologies and partnerships. Additional innovations such as Robo-Taxi, delivery services, and others could also be tested through this platform.

PVTA ODX

Pioneer Valley Transit Authority (PVTA) Western MA

Team and Budget

Key Partners: Pioneer Valley Transit Authority (PVTA), Pioneer Valley Planning Commission (PVPC), University of Massachusetts–Amherst Networks for Accessibility, Resilience and Sustainability (NARS) Lab

Budget Summary:

AIM Demonstration Federal Amount	AIM Demonstration Cost Share	Total Cost
\$617,000	\$176,000	\$793,000

Innovation: Project Approach

The goal of the PVTA origin-destination transfer (ODX) project is to make traveling on public transit easier for riders by consolidating PVTA's web app suite to enable integrated multimodal trip planning, access to reliable real-time transit information, and fare payment. To that end, PVTA has been coordinating with agencies that provide innovative mobile ticketing solutions on Fare Payment as a Service (FaaS) and Software as a Service (SAAS) platforms that are affordable, easily-deployable, adaptable, and future-proof. These platforms will advance PVTA's ability to adopt new fare policies such as contactless pay, special pricing, and fare capping to promote equity, improve operational efficiency, and greatly enrich the travel experience.

The on-bus mobile ticket validators deployed through this project will expand PVTA's data sources and provide rich insight into transit patterns. PVTA's existing data warehouse includes data from Automatic Passenger Counters (APCs), Global Positioning Systems (GPS), and fare boxes, which provide a plethora of information but are limited. Although they provide information on where and when travelers get on and off the PVTA system, they cannot be used to infer trip origin and destination (OD) patterns or transfer points, which are essential for effective and comprehensive service planning. Data from the on-bus validators will provide a rich source of more accurate and complete information about public transit usage and travel patterns over time.

PVTA's ODX model will exploit the latest advances in machine learning to predict passenger trajectories and infer the destination and transfer locations of trips based on state-of-the-art spatial, temporal, and logical algorithms. Outputs from the ODX model will be used to estimate passenger miles, develop load profiles and crowding models, and improve service planning and demand, energy, and emissions modeling. The ODX model will include a build-out of an interactive dashboard coupled with data visualization for further exploration of travel patterns in the transit network. The ODX model and novel extensions will be designed to be fully portable and readily-trained to replicate trip trajectories for input data from other transit agencies and thus nationally significant as a plug-and-play planning tool for other transit agencies.

Challenges Project Is Designed to Address

PVTA was established in 1974 and is the second largest transit agency in Massachusetts. It provides public transportation services to 24 communities in Hampden and Hampshire counties and serves 21 Opportunity Zones. Its service area covers over 600 sq. mi. with a population of almost 600,000. In FY19, PVTA provided over 10 million fixed-route rides and over 250,000 paratransit trips. Its fixed-route system is split into three main areas—Springfield Area Transit Company (SATCo), which operates in the southern portion of Hampden County and typically serves 60% of riders; UMass Transit Services (UMTS/UMass), which operates PVTA's routes in the Five College area in eastern Hampshire County and serves 31% of riders, on average; and Valley Area Transit Company (VATCo), which operates in the northwest portion of PVTA's service area and serves approximately 9% of riders.

According to a National Association of City Transportation Officials (NACTO) report and as observed within PVTA's existing system, conventional boarding approaches with cash payment cost agencies and passengers millions of hours and dollars each year. As PVTA has learned more about the benefits of streamlining boarding and fares, it has sought to explore alternatives that reduce boarding times and dwell times and increase the speed of overall service, leading to more competitive travel times and greater reliability of the transit system. PVTA recently deployed visually-validated mobile ticketing as one stage in a broader plan to implement cashless boarding. The deployment of validators through this project will complete that stage of the plan by acting as the proof-of-payment (PoP) fare control. The complete package will also prepare PVTA and riders for future cashless upgrades including tap credit card transactions, all-door boarding, off-board PoP, etc., and future fare policies such as low-income options, fare capping, etc.

The integrated app suite with the validators is expected to greatly enhance personal mobility and customer experience by enabling integrated trip planning and fare payment, decreasing barriers imposed by cash fares, flattening the real cost of transit through new cost-effective solutions, reducing friction in the payment process during boarding, and improving travel times for transit riders in the Pioneer Valley. The system will also allow tickets to be used and activated offline to ensure that riders can still travel when a network connection is unavailable, guaranteeing rural connectivity.

The proposed ODX model exploiting the latest advances in machine learning will provide more accurate information about OD pairs, fare media usage, commuter vs. non-commuter trip patterns, and transfer trips occurring across the system. Thus, the model will help PVTA conduct effective and comprehensive service planning to enhance mobility for riders from different locations and of varying ages, income, or abilities. The ODX model will be applicable for analyzing travel demand concepts, hubs and corridors, transfer points, service frequency needs, and travel time improvements.

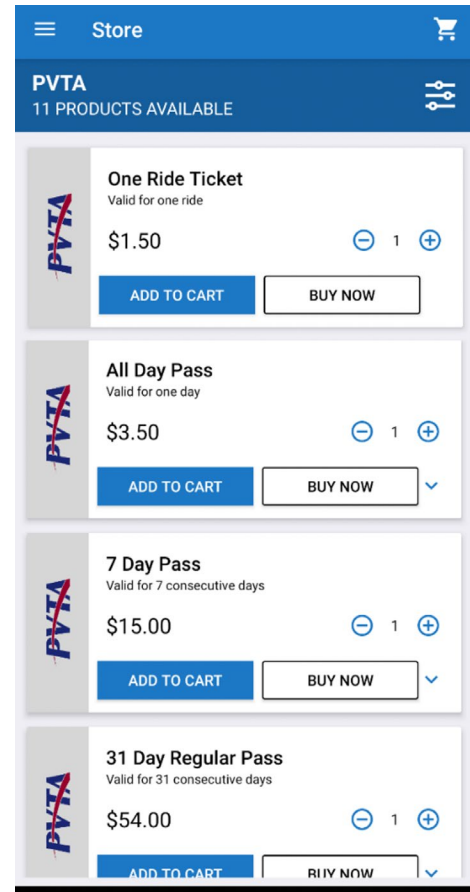
Anticipated Outcomes, Benefits, and Impacts

The PVTA ODX project's intended impacts include:

- Enhanced mobile and web app suite for trip planning, ticket purchase, and fare payment
- Expanded prospects for transit partnerships with schools and local businesses
- Streamlined boarding and fare payment for riders
- Reduced boarding times, dwell times, and fare evasion
- Improved speed, travel time, and reliability of the transit system
- Enhanced data regarding OD pairs, fare media usage, commuter vs. non-commuter trip patterns, and transfer trips occurring across the system

- Increased access for older adults, students, and individuals with limited personal mobility
- Increased rural access to other communities
- Improved equity and accessibility to public transit through current and planned policy options such as student or low-income passes, fare capping, etc.
- Accessible plug-and-play planning tool for other transit agencies
- Use of public-private partnerships for demonstration, data sharing, and knowledge transfer

These benefits and outcomes will be measured through metrics such as number of passes sold through the web app suite, number of participants in workforce or school partnerships, number of passes sold on rural routes, share of special group riders (e.g., older adults, youths, low-income persons, persons with disabilities, the unbanked, etc.), change in average dwell time at bus stops and resulting impact on travel time and on-time performance, percentage of trips with OD pairs matched by the ODX model, percent of positive responses to questions related to fare on public participation surveys, number of special fare programs such as fare capping and other incentives introduced, and impacts on ridership.



Equal Access Mobile Payment Beyond Smartcard Accounts

Maryland Department of Transportation Division of Transit Services Montgomery County, MD

Team and Budget

Key Partner: Flowbird, Inc.

Budget Summary:

AIM Demonstration Federal Amount	AIM Demonstration Cost Share	Total Cost
\$468,820	\$117,205	\$586,025

Innovation: Project Approach

Montgomery County's innovation approach is to expand payment options to the public that will also address Federal Title VI capability for smartphone payments by the County's unbanked transit riders. The current regional smartcard payment system provided by the Washington Metropolitan Area Transit Authority (WMATA), in conjunction with Cubic, is updating the SmarTrip system to permit smartphones with Near Field Communication (NFC) to replace their SmarTrip card account to pay for regional fares. This requires patrons to enable NFC capabilities on their smartphone prior to boarding to allow electronic fare validation when entering the public transit system. Although this is a step toward all electronic validation methods using a smartphone in lieu of the smartcard fare media, it is missing a key component for Title VI in that it does not allow unbanked transit riders to obtain and add value to their smartcard account.

Montgomery County's initiative will allow the mobile ticketing vendor to add value to the mobile ticketing application on a patron's account and use Bluetooth technology for mobile ticketing validation so patrons can "tap" their SmarTrip card or mobile ticketing application in the same location or use a validator that has NFC and Quick Response (QR) code reading capability at the same location. Currently, other public transit agencies have multiple validators and allow users to place their smartcard or smartphone mobile app next to the respective validator. The County's objective is to make the type of validation transparent to the public. In addition to the ticket vending machines being deployed at Montgomery County's new FLASH bus rapid transit (BRT) stations, the vendor and the County will work with selected retailers near the FLASH BRT routes to allow users to use cash to add value to their mobile ticketing account similar to that done with the SmarTrip system. (Note: The current vendor of the SmarTrip system, Cubic Corporation, has a closed loop proprietary system.)

This simplified solution can be deployed to agencies surrounding the Washington, DC region searching for cost-effective means to alternatively control fare rates and fare collection without the need to alter

WMATA's SmarTrip system. Addition of a similar approach to these areas will allow patrons to transfer between systems, which may become critical as the Maryland Transit Administration's (MTA) Purple Line light rail system begins revenue service in the future.

Challenges Project Is Designed to Address

The goals of the project are multi-faceted and include the following:

- Eliminate “flash passes” and provide only electronic validation to expedite boarding and reduce fare disputes between patrons and bus operators.
- Provide electronically-validated free bus transfers and reduced payments for transfers between bus and rail for riders using different payment methods in the RideOn, WMATA, and Baltimore MTA transit systems, including future regional partner systems and not just smartcard payments.
- Provide unbanked transit riders with the ability to use smartphones to pay fares. Riders will be able to add value to their smartphone account at transit centers, selected transit stations, and participating retailers, as is currently done with WMATA's smartcard system. This will move transit agencies one step closer to foregoing the labor-intensive and expensive processes of handling cash payments.
- Establish an integrated database that combines a proprietary regional smartcard system and mobile payment system by two different vendors. In addition to providing convenient options for fare payment, a mobile payment capability with an integrated database will allow cash-paying riders the benefit of transfer cost savings as those with a smartcard.

The accomplishment of these objectives will allow partners in the regional transit area to extend the flexibility of their fare collection methods to include alternatives to SmarTrip cards, something extensively discussed across the region as the MTA's Purple Line is under construction and smaller surrounding agencies seek to find ways to navigate the more widely-deployed electronic mobile payment option in the metropolitan area sought by the local population. This project will also allow small rural transit agencies to deploy mobile ticketing for fare collection without the expense of deployment of a full-blown fare collection payment system.

Anticipated Outcomes, Benefits, and Impacts

Montgomery County transit riders will benefit from the different options for fare payment that provide free transfers between bus routes on RideOn buses, which includes on-demand Flex service and discounts between RideOn and WMATA's Metrobus and Metrorail service, all payments being electronically-validated (eliminating flash/visual passes), a common location for electronic fare transactions, and a consolidated database for fare collection. Currently, free transfers between buses and discounted fares between bus and rail are possible only if riders use the SmarTrip card for payment; riders paying by cash must pay for each bus or rail ride separately.

The project will allow patrons paying by cash the same benefit as those that use SmarTrip cards. Currently, with RideOn service, bus operators manually record the fare type for over 35 different visual passes allowed in the RideOn system. Incorporating mobile ticketing on smartphones will address the majority of visual passes, and the remaining types will be addressed by providing updated badges/ID cards that have NFC capability.

Due to the complexity of large-scale, multimodal transit systems, use of mobile technologies is expensive to deploy within most current large fare collection systems due to their complexity. Deploying a simple

approach to mobile ticketing solutions and creating a single database with transactions from the regional WMATA proprietary system and the mobile ticketing system will provide scalability for large and small agencies to use an incremental approach to introduce mobile payment technologies to public transit systems without extensive cost and complexity and still fulfill the reporting requirements of the National Transit Database (NTD).

Providing a Pathway Towards Transit Flexibility and Convenience for the Transportation Disadvantaged Highland Park, MI

Team and Budget

Key Partners: IXR Mobility, WL Beal Associates, Bestmile Technology

Budget Summary:

AIM Demonstration Federal Amount	AIM Demonstration Cost Share	Total Cost
\$225,500	In Kind \$58,500	\$284,000

Innovation: Project Approach

The City of Highland Park’s integrated mobility app project will provide a seamless, multimodal journey using public transportation linked with car-sharing and bike-sharing and other mobility enhancements. As part of the project, local officials will integrate trip planning, contactless payment functionality, and traffic management improvements into a seamless, easy-to-use online app for local communities, with a special emphasis on economically-disadvantaged areas.

Challenges Project Is Designed to Address

The project is designed to develop, test, and deploy enhanced mobility options to help alleviate the limited accessibility alternatives in Highland Park. The project’s success will center on an amalgam of factors, including integrated traffic information to better inform and enable travelers to choose between different mobility options, removal of barriers between different mobility alternatives, smartphone technology for booking and payment options, and the use of real-time vehicle tracking data.

Anticipated Outcomes, Benefits, and Impacts

As Highland Park grows and economic prosperity increases, the City is using planning and development strategies to deliver fast, safe, and environmentally-friendly transportation to residents and businesses using integrated mobility technology to allow local stakeholders to devise effective and sustainable mobility options.

This project will establish a collaborative platform to align Highland Park’s mobility objectives with parallel initiatives for the local community’s evolving mobility system, develop and execute a vision with strategies that clearly articulates what the future mobility system for the city should look like, and engage the community and respond to user needs and usage patterns with the goal to scale-up seamless multimodal platform services to advance innovative mobility practices in the public transportation industry.



IXR Mobility, a Detroit transportation company, offers free rides to older adults and individuals with disabilities to get tested for COVID-19

Southern Minnesota MaaS Platform Project

Blue Earth, Brown, Dodge, Fillmore, Freeborn, Houston, Le Sueur, Mower, Nicollet, Olmsted, Steele, Waseca, and Winona Counties, MN

Team and Budget

Key Partners: Minnesota Department of Transportation (MnDOT), area transit agencies, private sector intercity bus service providers, other shared mobility providers, University of Minnesota

Budget Summary:

AIM Demonstration Federal Amount	AIM Demonstration Cost Share	Total Cost
\$628,000	\$157,000	\$785,000

Innovation: Project Approach

The MnDOT Office of Transit and Active Transportation will build a regional Mobility as a Service (MaaS) platform for southern Minnesota to test how such a platform can improve coordination of transit services and private-sector shared mobility across a diverse area covering rural, suburban, and urban environments.

MnDOT will partner with eight transit agencies, private sector providers of intercity bus service, and additional shared mobility providers to offer a digital platform on which residents and visitors can plan, book, pay for, and track trips in a single place. MnDOT will create an open Application Programming Interface (API) environment to allow this functionality to be available on its consumer app and the apps of service providers and third-party trip planning platforms, integrating transportation service information, financial transactions, and real-time trip updates. This approach will include the wide use of existing data standards such as General Transit Feed Specifications (GTFS) and General Bikeshare Feed Specification (GBFS) as well as developing new transactional data standards for demand-response services. Partnering with researchers at the University of Minnesota, MnDOT will seek to understand how the MaaS platform can improve service delivery for transit-dependent riders and reduce single-occupant vehicle (SOV) trips among the general public through better service coordination and innovative pricing models.

Aggregated historical service provider trip data and consumer trip search data from this platform will be used by local transit agencies, regional planning groups, and MnDOT to identify gaps in needed services and to improve transit service delivery and efficiency. By using data standards and open APIs to bring together a diversity of providers across dozens of rural communities, two small urban areas, and one metropolitan area into a single platform, the project will seek to provide an innovative, scalable model to build a statewide platform in the future that can be easily replicated from the most rural communities to the largest cities.

Challenges Project Is Designed to Address

The project will seek to demonstrate how MaaS technology and use of data standards can improve rider experience and enhance transit and shared mobility transportation so it is competitive with SOV travel. By building an open architecture using data standards, the platform will give public transit and the private sector a reliable transportation ecosystem to innovate new services and methods of delivery.

Although the overall level of transit and shared mobility services in Minnesota has increased in the last decade, regional planning initiatives have identified lack of a digital trip planning and e ticketing platform as the largest limiter to serving the needs of all communities. In addition, a majority of public transit and shared mobility transportation services provided in Greater Minnesota are delivered as demand-response, and the transportation industry currently lacks a standard for demand-response transactional trip data, a major barrier to better service coordination between transportation providers. MnDOT sees the development of a mobility platform, first on a regional basis and then on a statewide level, as the best way to ensure maximum interoperability, coordination, and level of service. By using existing data standards and developing new ones, the platform can allow any transportation provider to participate and any trip planning app to show users all options. This unified approach ensures that all parts of Minnesota will enjoy the benefits of such a platform and provide a space for continuing mobility innovation in rural and small urban communities as well as metropolitan centers.

Anticipated Outcomes, Benefits, and Impacts

The Southern Minnesota MaaS Platform project will build a technology ecosystem that will include trip planning, e-ticketing, data analysis, and an API management tool to facilitate communication of all service providers in an open architecture environment. MnDOT hopes that the platform will allow residents and visitors to see all their transportation options and improve their experience with public transit and shared mobility, making them desirable choices for local/regional travel. MnDOT also seeks to improve the viability and sustainability of public transit and shared mobility by improving connections with existing riders and new riders and through better coordination of services for increased efficiency.

A University of Minnesota research team will record the impact of the MaaS platform on users to measure how the technology is improving their experience and moving current SOV drivers to shared mobility options. MnDOT will compare the ability of participating public transit systems to meet community transit needs before and after implementation to evaluate whether MaaS is an effective tool to help Minnesota meet its public transit service goals. Throughout the project MnDOT will meet with participating public transit agencies and regional transportation planning organizations to determine whether MaaS is the right tool to assist them in their planning and coordination objectives.

Cost-Effective Advanced Driver Assistance System (ADAS) to Ensure ADA-Compliant Level Boarding for Bus Rapid Transit

Kansas City, MO

Team and Budget

Key Partners: Robotic Research, LLC; Compass Transportation and Technology, Inc.; Jerome M. Lutin, Ph.D., LLC; Robocist, Inc.

Budget Summary:

AIM Demonstration Federal Amount	AIM Demonstration Cost Share	Total Cost
\$600,000.00	\$150,000.00	\$750,000.00

Innovation: Project Approach

The Kansas City Area Transportation Authority’s (KCATA) mission is to connect people to opportunities through safe, reliable public transportation, and its vision is to deliver innovative solutions that enhance mobility and improve the community. KCATA is undertaking this project to meet the objectives of its mission and vision and advance FTA’s mobility innovation goals and the state of practice. KCATA identified inconsistent spacing between buses and level boarding platforms as an operational problem, a concern that is not unique to Kansas City. This project will demonstrate an innovative, cost-effective ADAS precision-docking technology to provide ADA-compliant level boarding for KCATA’s Prospect MAX BRT line to ensure better access for all customers, especially those with disabilities. The ADAS-based technology solution is innovative and practical and will be transferrable to many other existing and proposed BRT systems with level boarding.

Challenges Project Is Designed to Address

KCATA is actively working to improve access to persons with disabilities and those who are mobility-impaired. The problem of achieving an ADA-compliant gap for bus level boarding is shared by several other BRT lines in the U.S. The technology that will be tested by KCATA and its partner Robotic Research does not involve integration with foundational braking or steering systems or extensive modifications to the guideway and is expected to be far less costly than prior technology demonstrations. The project will demonstrate specific technologies in several key areas, including precise measurement of gaps between the doors and the platform as well as accurate, easily-understandable docking guidance that does not distract driver attention. A human machine interface (HMI), controlled by a central computing unit, will be implemented as a tablet facing the driver. When approaching the platform, the tablet will display a birds-eye view of the vehicle and its surroundings, which will be generated from two cameras strategically placed on the roof, one in front of the vehicle and the other on the side facing the platform. The location and orientation of the platform

will also be displayed on the HMI tablet, and the general location of the platform and information about the specific stop can be gathered from GPS data. The exact location of the curb will be measured by a high-fidelity Lidar mounted on the roof. Suggested adjustments to the trajectory will be indicated on the HMI to help the driver follow the proper course. As the bus approaches the platform, the HMI will provide visual and auditory signals indicating the distance to the curb. If an imminent crash is detected, the signals will become more urgent and noticeable. Once the vehicle is parked alongside the platform, Lidar will be used to calculate the exact distance from the bus to the platform for the front and rear doors, which will be displayed to the driver as quantitative feedback, allowing refinement of the technique over time. The proposed design may change during the initial phases of the program based on updated feedback from stakeholders and the system design process.

Performance evaluation measures include safety, functionality, maintainability, driver acceptance, customer acceptance, commercialization potential, and effectiveness as an AIM Incubator. Each ADAS-equipped bus will be equipped with an automatic data recorder to measure the gap and log each docking, both manual and ADAS-assisted. Data will be transmitted to a server where events will be matched with drivers and then stored and analyzed. Surveys will provide the basis for evaluation of driver and customer acceptance.

Like other transit agencies, KCATA provides shadow paratransit service to accommodate people with disabilities. In 2018, it provided 288,377 unlinked demand-response trips at an average operating cost of \$40.65 per trip, and its BRT routes provided 1,160,189 unlinked trips at an average cost of \$5.24. By improving access to BRT for persons with disabilities, KCATA will provide them with the ability to use its highest-quality and most convenient bus service, at the same time reducing operating costs by allowing mobility-impaired riders to be transported more efficiently.

Anticipated Outcomes, Benefits, and Impacts

KCATA's ADAS deployment on the MAX Prospect BRT line will focus on improved service and is expected to improve the perception of BRT by improving level boarding, reducing gaps between the bus and platform, and encouraging greater use of level boarding stations for BRT lines. Improved service will increase the ability of transit systems to attract additional riders, and more riders will assist the ability to finance future BRT systems.

Robotic Research will create a Program Evaluation and Expert Review (PEER) Working Group for this project to support KCATA that will be responsible for preparing interim and final project reports and an evaluation plan and report, monitoring data collection and analysis, preparing a report on the potential for commercialization, and preparing an implementation plan for the AIM Incubator for KCATA to facilitate its continued operation and knowledge transfer.

The project will provide a novel form of public-private partnership that leverages innovative technology developed by Robotic Research and could provide a model for other public transit agencies and other technologies, creating opportunities beyond the current AIM program. In addition, a key part of this effort developed through KCATA's AIM Incubator will be a business model that will allow other transit properties to determine the business case and cost-effectiveness of deploying this technology; the business model will include opportunities to assess tradeoffs regarding the scale of deployment.



Transforming Public Transit with Rural On-Demand Microtransit

Wilson, NC

Team and Budget

Key Partners: North Carolina Department of Transportation (NCDOT), Via

Budget Summary:

AIM Demonstration Federal Amount	AIM Demonstration Cost Share	Total Cost
\$250,000	\$62,500	\$312,500

Innovation: Project Approach

The City of Wilson is developing and testing an innovative, on-demand microtransit pilot project through a public-private partnership that replaces inefficient traditional services and improves the economy, rider experience, and resident well-being. Like many rural areas, Wilson’s public transit challenges include a lack of first/last mile infrastructure, low population density that make running fixed-route public transit service inefficient to operate, infrequent service, and unique trip routing and budget constraints.

Wilson’s legacy bus system does not provide adequate access to economic opportunities, especially for households without reliable vehicle access. These challenges had consequences for residents and the economy—in Wilson, 22.3% of people live in poverty, including 29.9% of children; 6.1% are unemployed (compared to 4.4% in North Carolina overall), and 20.8% are food insecure, including 26.8% of children. To address these challenges, the City of Wilson, NCDOT, and Via are replacing the fixed-route system with an on-demand microtransit system on which riders can book a ride to and from any location in the city simply by requesting a ride through a mobile app or over the phone. In the first three weeks of service, which began in September 2020, this new service matched pre-COVID levels of ridership from the legacy fixed-route system and has seen continued growth. Local officials will use AIM funds to expand service hours and/or the geographic zone served, including adding approximately 150 vehicle hours per week and adding Sunday service, overnight service, extended hours, and additional peak-hour vehicles and will systematically determine the largest service gaps through rider surveys and ridership data.

Challenges Project Is Designed to Address

The City of Wilson’s budget constraints historically have limited its ability to pilot innovative services such as microtransit, upgrade its transit fleet beyond its useful life, update a 20-year-old fixed-route design (despite land-use and population changes,) and expand service beyond 6:00 AM–6:00 PM with unreliable 60-minute headways and no Sunday service; the legacy transit system was costly, inefficient, and did not serve the area’s mobility needs. This AIM pilot expansion will allow the City to further the success of the new, on-demand service by extending service hours based on the period of greatest need, which will increase access to

employment, healthcare, and shopping and offer broader access across Wilson to residents who lack alternative transportation. The project also will enable the formation of partnerships to pilot microtransit expansion and share lessons learned on how rural agencies and municipalities across the U.S. can incorporate innovative operational models, business models, and financing agreements to improve public transit. Innovations include real-time, on-demand dispatch, pick-up/drop-off, routing, and scheduling technologies and financing through a fare recovery discount, in which Via will provide an upfront discount to the City and recoup costs from fare revenue, incentivizing the company to grow ridership. Lessons learned from piloting innovative models through public-private partnerships will include increased knowledge for state and local officials on launching and expanding micro-transit, improved operational performance and rider experience, reducing average headways from 60 minutes to 15 minutes, and increased budget efficiency through improved rider experience and broader coverage (larger service zone and increased service hours) at similar annual cost to the fixed-route system.

Anticipated Outcomes, Benefits, and Impacts

The City of Wilson, along with its project partners Via, NCDOT, and other local stakeholders, will leverage this service to pilot an alternative transportation structure that may serve as a model for other rural transportation partners facing similar challenges and increase transportation accessibility and improve traveler experience, addressing the needs of local residents and employers and boosting the regional economy. Some specific items include:

Issue	Improvement	Description
Lack of reliable transportation services	Decreased average headway from 60 min to 15 min	Major population segments who will benefit: <ul style="list-style-type: none"> • 38.7% residents in low-density areas • 17.7% older adult residents • 11.4% residents with a disability • 4.2% residents without a vehicle
Limited employment access	Geographic expansions and service hour increases to expand use of service for travel to/ from work	Major population segments who will benefit: <ul style="list-style-type: none"> • 22.3% of individuals and families living in poverty • 6.1% unemployed individuals Local officials will expand service boundaries to include major employers outside the city to further increase access to employment opportunities
Limited access to food and healthcare	Options for residents unable to use service during current hours	Major population segments who will benefit: <ul style="list-style-type: none"> • 26.8% of food-insecure households

The project will pilot innovative models while considering all parties involved in the program’s transportation ecosystem, including riders without credit cards – voucher-based cash option, with several purchase (retail) locations across the city; riders without smartphones – phone-booking option, including updates through a Standard Messaging System (SMS) if rider has a cellphone; and riders who use a wheelchair – include wheelchair-accessible vehicles in fleet and include option in rider profile so ride requests are automatically routed to appropriate vehicles.

Overall, the project will operate at cost similar to legacy fixed-route service by increased efficiency and through innovative financing such as Via fare recovery, which incentivizes rider growth and lowers upfront costs. The project will advance learning on how rural transit agencies across the U.S. can leverage and scale public-private partnerships to innovate and address longstanding issues and promote cost-effective transportation structures.

Beyond Verification and Validation (V&V) for Communication-Based Train Control/ Ultra-Wide Band Systems: Proving Correctness

New York City, NY

Team and Budget

Key Partner: Prover Technology AB

Budget Summary:

AIM Demonstration Federal Amount	AIM Demonstration Cost Share	Total Cost
\$180,000	\$115,000 (MTA) \$45,000 (Prover Technology AB, MTA Partner)	\$340,000

Innovation: Project Approach

The Metropolitan Transportation Authority (MTA) has embarked upon an aggressive modernization program to replace its antiquated signaling system with modern signaling technologies—Communication-Based Train Control (CBTC) and Ultra-Wide Band (UWB)—in Brooklyn, Manhattan, Queens, and The Bronx. CBTC and UWB technologies are software-intensive, processor-based systems and are often beset with schedule delays due to unanticipated requirement corrections and design faults. Use of the Beyond Verification and Validation (V&V) system modeling techniques is expected solve many of these issues, resulting in quicker system upgrades for the riding public.

The Beyond V&V project will advance FTA’s mobility innovation goals by presenting a new delivery model for processor-based software systems. It will demonstrate how early system modeling, especially for new technologies, results in time and money savings for rail properties accomplished by detecting system requirement problems, safety issues, and design flaws early in the project lifecycle before a system is tested and deployed.

The project also will demonstrate that partnerships between rail properties and formal method experts provide value-added benefits that contribute to the efficiency of system deployments. The MTA’s subject matter expertise and Prover Technology’s formal methods and rail-industry know-how will assure the development of practical and accurate system models for safety assessment and early detection of requirements and design flaws. The project also will demonstrate that adopting the process of formal system modeling early in a project lifecycle is advantageous for rail properties acquiring software-intensive, processor-based systems.

Challenges Project Is Designed to Address

The overall goal of the project is to facilitate faster deployment of the MTA's CBTC-UWB systems. This will be accomplished by establishing high-quality requirement specifications that will be used to create formal models of systems. The system models will be formally assessed, modifications in system requirements and designs will be tracked as a metric, and requirements and design components successfully modeled also will be tracked.

Currently, the MTA process for developing contract specifications does not require formal modeling. Enhancing the specification development process with formal modeling will improve the quality of these specifications, which will result in unambiguous and accurate direction for the MTA's system suppliers. Modeling CBTC-UWB system requirements at an early stage of development will enable the assessment of operational models and design needs prior to investing in costly system developments, resulting in cost savings.

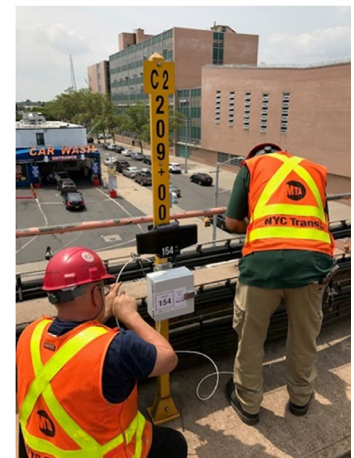
As new technologies are introduced in the MTA–New York City Transit (NYCT) signaling system, older systems must still operate or interoperate with the newly-introduced technologies, including UWB. The MTA has commissioned pilot projects that have demonstrated that UWB is a feasible system for train position-determination and speed; the next goal is to fully integrate UWB into NYCT's CBTC systems. Formal modeling of the CBTC-UWB system will address the challenge of interfacing and interoperating within the existing signaling system environment.

Anticipated Outcomes, Benefits, and Impacts

The Beyond V&V project will improve the requirement elicitation process for system development, resulting in a more efficient construction and development timeline and quicker deployments of new technology signaling systems, such as CBTC-UWB. Subway travelers will benefit from new technology systems sooner, with fewer cost overruns for rail transit operators.

The benefits of adapting the Beyond V&V approach to specification development will be measured in three ways: 1) the Requirements Volatility Metric will be used to measure the stability of system requirements; 2) the Design Stability Metric will be used to quantify the number of design changes necessitated by unforeseen component-architecture errors; and 3) the Test Metric will enumerate the number of test cases necessary for validation and will track the number of tests that pass or fail. Tracking these three metrics will result in cost savings and schedule adherence by tracking issues early in the system lifecycle.

The Beyond V&V methodology will advance the public transportation community's acquisition practices for software-intensive processor-based systems. Applying Beyond V&V's advanced practices (i.e., developing and proving formal system models prior to system builds) will reveal potential cost savings and efficient deployment schedules. Assessment of system models will result in the detection of system requirements and design errors early in a project's lifecycle.



Enhancing Life with Automated Transportation for Everyone (ELATE)

Youngstown, OH, Santa Clara, CA

Team And Budget

Key Partners: Western Reserve Transit Authority (WRTA), Santa Clara Valley Transit Authority (VTA), CALSTART

Budget Summary:

AIM Demonstration Federal Amount	AIM Demonstration Cost Share	Total Cost
\$2,331,000	\$520,000	\$2,851,000

Innovation: Project Approach

This project will allow for the development of two purpose-built, common-specification high automation prototype Accessible Automated Electric Vehicles (AAeV) built based on consensus of 14 transit agencies seeking an automated vehicle platform that can be fully-deployed into their operations. The project will demonstrate a staged approach to the safe operation of transit-focused Society of Automotive Engineers (SAE) Level 4 AAeVs on public streets. Project sponsors will start with testing focused on geographically-limited sites and progress to increasingly complex operating contexts and environments.

The project’s public transit partners have strategic plans to improve their transit operations and provide better service to the community while deploying next-generation technologies, working towards a fully built-out AAeV fleet by 2026. WRTA’s vehicle will travel along several defined commercial streets in mixed traffic, navigating along with bus traffic and allowing for curbside pick-up and drop-off at bus stops and transit centers. VTA’s vehicle will travel along several defined local residential and commercial streets in mixed traffic along two moderate-speed arterial corridors in mixed traffic and allow for pick-up and drop-off at designated stops in campuses, bus stops, and transit centers.

Challenges Project Is Designed to Address

This project will develop two purpose-built, common-specification high automation prototype AAeVs built with a focus on the key needs of transit communities and will bring them to a market that can be deployed at scale by public transit systems across the U.S. To operate effectively, transit vehicles must also work in diverse operational environments that require a variety of vehicle sizes and form factors. Additionally, public transit vehicles must meet federal bus testing requirements for performance, structural integrity, reliability, and durability, among other factors; as public transit evolves to new vehicle form factors, they must also comply with the National Highway Traffic Safety Administration’s (NHTSA) Federal Motor Vehicle Safety Standards (FMVSS).

A variety of Low Speed Automated Vehicle (LSAV) technologies are available on the market today. However, they are not currently deemed crashworthy and accessible for people with disabilities. This AAeV demonstration will be user-centric and include many applications envisioned to ensure passenger safety, including end-to-end passenger trip management, a focus on safe curbside interaction, human-machine on-board interaction, and localized wayfinding using iBeacon technology. The prototype vehicle demonstrated will use universal design principles that encourage adherence to the Americans with Disabilities Act (ADA) and the critical factors described above to ensure future at-scale deployments of next-generation, purpose-built, public transit AV fleets in Ohio and California and across the U.S.

To ensure the project's success, the team will measure and evaluate the overall system's efficiency, provision of greater access to daily transportation for persons with disabilities, creation of a beneficial user experience for all through human machine interface (HMI) features and beyond, and improvements to the overall customer experience. The success of this project will be shown by improvement ratings in performance and how well the new AAeV operates in the two environments while providing connected and automated enhancements for safety, thus generating pathways for greater deployments across the U.S.

Anticipated Outcomes, Benefits, and Impacts

WRTA will test the autonomous shuttle in a small urban central business district transporting riders around downtown Youngstown to provide employees and other passengers with a connection to local businesses and to WRTA's regional transportation network. It will gauge how an autonomous vehicle can operate in a downtown environment to provide convenient trips and connections so that personal vehicle use will be reduced. One benefit of the autonomous shuttle will be the increased ease of travel within and around downtown Youngstown while attracting employees and visitors to the area to travel more effectively rather than driving from place to place and parking. Impacts will be measured by the number of riders using the routes, and travel patterns on the autonomous vehicle route network will be measured by the origins and destinations of rider travel and surveys of their use and satisfaction with the service.

VTA will test the autonomous shuttle in a medium-density urban area by providing on-demand transportation to and from the Veterans Administration Hospital, Stanford Medical Center, and the Palo Alto Transit Center, and Mountainview transit centers and providing passengers with a connection to local businesses, medical treatment, Caltrain, SamTrans, and VTA's regional transportation network. VTA will track how an autonomous vehicle can operate in a suburban environment to provide convenient trips and connections, thus providing alternatives to single-occupant vehicle (SOV) travel, which provides the benefits of increased ease of travel for veterans with disabilities, families, and employees as a more effective trip to and from the VA Hospital complex rather than driving or taking a paratransit trip. Impacts will be measured by the number of riders using the service, and travel patterns on the autonomous vehicle route network will be measured by the origins and destinations of rider travel and surveys of their use and satisfaction with the service while evaluating how well the accessibility features of the vehicle work and the interaction of the vehicle with the passenger. The project also will evaluate the potential mid- and long-term economic implications for transit and paratransit operators related to scaled-up SAE Level 4 AAV operations in terms of capital and operating costs. It will also monitor dwell time spent serving passengers with disabilities and the impact automation has on dwell time and demonstrating safe and efficient management of curb space in various contexts including hospital campuses, urban districts, bus stops, and transit centers.

Shared key measurable outcomes include:

- Tracking of vehicle operations to understand the safety implications of SAE Level 4 ADS capability on urban and suburban streets and arterials in mixed traffic.

- Provision of improved air quality over current shuttle fleet by being a Zero Emissions Vehicle (ZEV).
- Understanding the potential mid- and long-term economic implications for transit and paratransit operators related to scaled-up SAE Level 4 AAeV operations in terms of capital and operating costs.
 - Reducing dwell time spent serving a passenger, with a goal of 30% reduction
 - Reduced staff burden/ responsibilities
- Managing, tracking, and documenting energy usage, understanding the energy implications of AAeVs and in-vehicle edge computing platforms related to electric vehicle drivetrains and charging infrastructure requirements.
- Demonstrating an end-to-end passenger mobility solution consistent with AAeV operation consisting of trip planning, booking, payment, and trip and vehicle tracking for passengers and caregivers to provide a higher-quality service for an underserved population.
- Demonstrating interoperation of SAE Levels 3 and 4 ADS and AAeV vehicles with Connected Vehicle infrastructure to assess how connected vehicle technology can benefit from safe driving, transit signal priority, and congestion management of AVs.
- Demonstrating safe and efficient management of curb space in various contexts, including hospital campuses, urban districts, bus stops, and transit centers.
- Transferring knowledge gained to inform new and ongoing activities to advance the deployment of AAeVs into public transit service across the U.S.

Near Real-Time Large Transit Network Reporting System

Oregon Department of Transportation (ODOT)

Team and Budget

Budget Summary:

AIM Demonstration Federal Amount	AIM Demonstration Cost Share	Total Cost
\$480,000	\$120,000	\$600,000

Innovation: Project Approach

This project will build a web-based repository of transit information based on standardized transit data and census data. Where practical, the repository will be developed with open source software tools and will consist of open source software and take advantage of existing open source investments. The repository data will be accessible via an open Application Programming Interface (API), which will be used to build a powerful user interface providing near real-time and historical transit network information to planners, modelers, and researchers at the local, state, and federal levels.

The data repository and user interface will provide a continuous historic representation of fixed-route and demand-response public transit data. Information will be available across a broad scale, from individual public transit stops to regional, multi-state, or multi-national reporting and at any point or period of time for which there are data. Functionality built on the repository will provide the basis for insights into public transit system changes over time as population shifts, funding changes, and travel patterns evolve.

The tool is intended to provide a new way of “seeing” transit that supports better planning, policies, and investments leading to better-connected, more useful large-scale transit networks. Additional benefits include use of the data platform and API as a basis for future applications and functionality and being an incentive for ongoing creation and maintenance of standardized public transit data.

Challenges Project Is Designed to Address

The project will take advantage of advances in standardized transit data developed over the last decade—General Transit Feed Specifications (GTFS) and related formats, including eligibility and capability extensions. ODOT will also leverage lessons learned from its current TNEXT (Transit Network Explorer Tool) web-based software developed in partnership with Oregon State University in 2014. This positions ODOT to build a scalable tool that allows users to “see” large-scale transit networks in ways not practical before the availability of standardized transit data.

The nature of public transit funding in the U.S. contributes to transit services with a local agency-centric focus. There are many benefits to local focus and control but also some disadvantages, as insufficient

attention often is paid to connections across transit providers and to the function and usefulness of regional, statewide, or larger-scale transit networks. Functionality developed in this project will support easy access to information about large-scale public transit networks. Service gaps, service overlaps, connection opportunities, equity of service distribution, relationships between public transit agencies and between transit service, and population and employment will be easily seen and understood. Information available through the tool will support more effective planning, investments, and management of multi-agency transit networks.

Project goals fall into three tiers—Essential, Expected, and Aspirational. Project performance will initially be based on the degree to which functional goals are accomplished, then by utilization of the tool, then integration of tool information into policies, plans, and investments, and ultimately in positive network changes.

Tier	Description	Details
Essential	Automated feed import/update / management for GTFS, GTFS-flex, and GTFS-ride	Feed timing gap management, feed error detection, feed change detection, feed conflict resolution, feed quality assessment, feed rejection, etc.
Essential	Functionality to mirror functionality provided by TNEXT; tabular reports and exports, on- map and map-based reports, connectivity reports, agency reports, route schedules, geographic area reports, etc.	Better User Interface (UI), improved performance, continuous record of network change, multi-state/country scalability
Essential	Support for GTFS, GTFS-flex, GTFS-ride feed management, manipulation, and reporting	Examples include merge for same agency but different times or for same agency-time but different data sources (GTFS-ride); trim for a defined time frame or based on a defined area of interest; clean to remove unused elements; export derived feeds or feeds as loaded; report on basic feed characteristics; flag dramatic feed changes from prior feeds; detect and report on service changes, etc.
Essential	Support for rider eligibility and service capability extensions to GTFS-flex and GTFS	ODOT Mobility for All project; format definition expected completion Fall 2021
Essential	GTFS, GTFS-flex, GTFS-ride feed metadata	Including capacity to tie tabular reports to specific feeds and feed metadata
Essential	Ongoing tool support and maintenance	For participating states
Expected	Full-featured GTFS-flex reporting	Including reporting integrated with other data (GTFS, GTFS-ride, census); coverage, duplication of services, service gaps, service gaps for special needs users, etc.
Expected	GTFS-ride data management	Develop strategies to manage potentially very large GTFS-ride datasets, think through approach to privacy issues related to GTFS-ride data
Expected	Develop dashboard functionality with simple and configurable, ongoing reporting of country-state-region-agency reporting that can be pasted into public web sites	
Expected	GTFS-ride reporting, analysis	Integrated ridership reporting
Aspirational	Develop large-scale timing information and optimization tools	Capacity to detect network timing problems (long layovers); capacity to suggest timing optimizations given particular goal sets

Tier	Description	Details
Aspirational	Develop traveler-focused directory of transit services	Including transit agency contact info for travelers, service characteristics, hours/days of service, including info for special needs users, service eligibility, service capability
Aspirational	GTFS-flex editor	Tool to create/edit GTFS-flex data
Aspirational	GTFS-ride editor	Tool to create/edit GTFS-ride data

Anticipated Outcomes, Benefits, and Impacts

The project aspires to create a new class of discovery tool that opens up a new perspective on large-scale public transit networks. Given the availability of comprehensive standardized transit data (GTFS, GTFS-flex, GTFS-ride), the tool will have the capacity to “see” and report across multiple states. Over time, ODOT expects availability of the tool to lead to more useful connected transit networks and a better public transit rider experience.

Advancing Geofencing Functionality

Central Falls, RI

Team and Budget

Key Partners: City of Central Falls, Rhode Island Public Transportation Authority (RIPTA)

Budget Summary:

AIM Demonstration Federal Amount	AIM Demonstration Cost Share	Total Cost
\$244,000	\$61,000	\$305,000

Innovation: Project Approach

RIPTA is leveraging its new account-based smart fare collection system called WAVE to act as the foundation for development of geofencing technology, enabling it to set up Global Positioning System (GPS) boundaries at all bus stops in Central Falls. When individuals board a bus within these fenced zones, they will be given a free trip. Using this technology is a new way of offering fare programs that would otherwise require a considerable amount of resources to deploy and distribute. This AIM project will allow RIPTA to establish a novel partnership with a municipality in encouraging new public transit ridership through the distribution of free transit within the geofenced bus stops and see how this impacts rider behavior and its effects within the wider city, including business activity, event participation, and overall quality of life. Using the WAVE system and the geofencing functionality will give RIPTA data that will help it open a new level of analysis to better inform local decision-making regarding public transit service frequency and span, scheduling, fare products and promotional efforts as well as opportunities to establish new partnerships to increase the accessibility of public transit in Rhode Island at large.

RIPTA recognizes that technology is constantly evolving. The use of these solutions to strategically grow ridership in areas of lower, yet potential, ridership and in areas where there is greater potential to encourage mode shift through targeted efforts may yield positive results for public transportation agencies over the long-term.

Challenges Project Is Designed to Address

GPS-based solutions in the transportation sector have been rapidly evolving, with fare collection being a new area of innovative growth. Agencies of all sizes, when offering promotional or targeted products, have had little choice but to offer agency-wide solutions that may not be applicable in all circumstances. Many agencies have not used localized strategies for raising ridership because there is no resource approach that does not involve the creation and management of a much larger program than originally intended. The establishment of geofences and programming of specific conditions within them significantly reduces the resources required to actively test such efforts and gives agencies a far more flexible and robust approach to interact and influence rider behavior.

The City of Central Falls, RIPTA's key partner in this project, is a predominantly minority community with high levels of zero-car ownership and many depending on public transportation to move around the city and the wider state. Many individuals cite transportation costs as a challenge and a major factor in their ability to participate locally, engage in commerce, or enjoy their overall quality of life.

The goals of this project focus on the use of this technology through a friendly incentive—free transit—to encourage new ridership and obtain data in a more targeted fashion that will help RIPTA and the wider public transportation sector find new means of developing novel partnerships. These partnerships will address the needs of the public transit sector and will identify a unique way of helping businesses, non-profit organizations, etc., in getting individuals to consider frequenting those establishments more often and conveniently.

Anticipated Outcomes, Benefits, and Impacts

This project will provide RIPTA (and the wider public transportation sector) with a new approach to establish novel partnerships among operators, local governments, business districts, community service organizations, neighborhood associations, etc., all working together to attract new or more frequent public transit riders. Deploying stop-level geofencing will allow RIPTA to strategically target and work at a localized level instead of applying an agency-wide policy that may require a far more specialized solution. Building these partnerships can help enhance mobility for all, regardless of location, age, income, or ability.

RIPTA is optimistic that deploying this technology will produce positive ridership growth and improve community vibrancy and stimulate economic growth for local businesses throughout Central Falls. The geofences will give RIPTA better insight into rider behavior and how it can leverage its ability to use the data generated to inform more comprehensive decision-making in service planning, better work collaboratively with partners in the future, and help further develop a unified transportation system that works for all.

These outcomes will be measured by evaluating stop utilization, ridership trends on routes serving bus stops in Central Falls, survey results from local businesses (patronage), event attendance, data collected from riders, and many other service-oriented metrics that RIPTA measures currently. The use of GPS has been rapidly evolving over the past decade, with fare collection being a relatively new step forward. GPS solutions are a cornerstone of the wider smart city/governance sphere, and RIPTA's endeavors into this area will be transferrable to other public transportation agencies nationwide.

Real-Time Dispatching and Scheduling for Paratransit/ADA

West River Transit Authority, Inc.,
d/b/a Prairie Hills Transit

Spearfish, SD

Team and Budget

Key Partners: Prairie Hills Transit (PHT), HB Software Solutions

Budget Summary:

AIM Demonstration Federal Amount	AIM Demonstration Cost Share	Total Cost
\$308,912	\$77,228	\$386,140

Innovation: Project Approach

Prairie Hills Transit (PHT) will implement a new real-time dispatching and scheduling system for its paratransit and Americans with Disabilities Act (ADA) operation that reduces data latency so vehicle location updates are conducted in near-zero latency, enabling the use of artificial intelligence (AI) and machine learning techniques to make real-time dispatching decisions automatically. The dispatch system upgrade will allow PHT to monitor its vehicles in near-instant time and be able to expand automated control of dispatch to its entire geographical area and all of its services. The real-time updates will allow riders near-instant information about their ride and notifications via text messages or on maps on their smartphones.

The current mobility landscape is promoting near-instant information dissemination and is the expectation of millennials and the aging population. PHT endeavors to offer a higher quality of service resulting in increased ridership. This AIM project will focus on development of a high-performance containerized architecture for bringing telemetry data, driver messaging, and performance data from the field almost instantaneously based on software and system layers of data. The project will also use a blackboard architecture for the intelligent agents (IA) that monitor trips and routes; the architecture is a distributed computing architecture in which distributed applications, modeled as IAs, share a common data structure called the “blackboard” and a scheduling/control process.

Challenges Project Is Designed to Address

To solve a complex problem such as real-time dispatch, IAs that perform specific functions work cooperatively by looking at a blackboard for specific information of interest and then use the information within the task to perform key functions (e.g., handling late trips). IAs continually update the blackboard with partial solutions when the agent’s capabilities for processing match the state of the blackboard. Requests

for new trips emerging from a location (visual maps) with visual availability of vehicles in the neighborhood will allow dispatchers to better handle on-demand requests and will-calls. With “intelligent monitoring,” the system’s IA technology will apprise dispatchers of impending challenges such as weather- and traffic-related delays, passenger no-shows, etc. The use of transactional, performance, and statistical data in a continuous trending format will allow dispatchers to assess individual driver performance or regional performance. With AI, deciding which vehicle is more suitable for a request can be made automatically and can be relayed to a driver instantly. It can also help to predict late rides based on driver abilities and challenges with passengers on the manifest.

Anticipated Outcomes, Benefits, and Impacts

With integration with Transportation Network Companies (TNCs) and other third-party mobility providers, rides can be offered to authorized providers outside PHT’s fleet. The near-instant data updates also will allow rapid analysis of the vehicle workload and AI technology, such as IAs instantly making suggestions to dispatchers for adjustments (reassigning a ride to another driver).

Outcomes will be measured by new riders added (mobility-disabled or general public), new mobility options for rural communities with currently limited mobility alternatives, on-time performance improvement, new referrals, and clients signing up for subscription trips.

The most important benefit of this newly-developed technology will be a high level of operational efficiency and seamless mobility for PHT customers. Dispatchers are constantly communicating with drivers and responding to customers through phone calls and by email to manage the smooth flow of public transit operations. Dispatchers control a driver’s ability to perform on-time trips, which can impact the quality of service provided to customers and prevent PHT from handling same-day on-demand trip requests. This project will enable more effective transit operations and increased operational efficiency as well as improved mobility for PHT customers.

Memphis Integrated Mobility Framework

Memphis Area Transit Authority (MATA) Memphis, TN

Team and Budget

Key Project Partners: City of Memphis, University of Memphis, Ford Smart Mobility (TransLoc), Marlene Connor & Associates, NMomentum, Community Partners Memphis Medical District Collaborative, Shelby County Health Department, Shelby County Aging Commission, Downtown Memphis Commission, Innovate Memphis, City of West Memphis, AK

Budget Summary:

AIM Demonstration Federal Amount	AIM Demonstration Cost Share	Total Cost
\$483,000	\$320,000	\$803,000

Innovation: Project Approach

Organizations and community agencies in Memphis have been working to improve infrastructure and quality of life for customers, community members, and visitors. The Memphis Area Transit Authority (MATA) has begun implementation of innovative services that complement public transit programs, expand access to existing passengers, and attract new users to the public transportation system. This project will build on prior and existing efforts to enhance mobility options by expanding communication and fare payment processes through technology while reaching out to communities and potential new partners to demonstrate the value of an integrated public transit system, a complete trip model that adds more modes, activities, agencies, and user groups to the mobility framework.

The project team will interact with the community to understand effective ways to communicate the availability of these mobility options and will follow up to gauge their effectiveness from mobility and economic perspectives. The results will include techniques to broaden community mobility programs and provide information to MATA and its partners on next steps.

MATA believes that customers and communities can be positively affected through technology and mobility and that by adding more partners and opportunities, quality of life improvements will result. The outcomes of this effort can then serve to guide MATA and other locales on future policy and planning paths.

Challenges Project Is Designed to Address

Memphis has many residents that rely on public transportation for a variety of services and needs, including employment, education, medical services, food, shopping, recreation, and general quality of life mobility travel. Bus rapid transit (BRT), microtransit, and the GO901 mobile payment app are in progress and will provide more options for more people, an ongoing goal for MATA.

The goals of this AIM project are to evaluate the effects of increased mobility and improved technology on customers and local communities. Project team members from the University of Memphis include transportation engineers, city/regional planners, and experts in healthcare and social work, many of whom have previously worked with MATA and have expertise with equity and access issues regarding public transportation. Initial baseline conditions will be developed, including initial surveys and inputs. Draft performance measures will be developed using quantitative and qualitative factors, and development of a transit connectivity toolbox is being considered to measure the accessibility of existing service to its users and the use of an equity toolbox to ensure that distribution of public transit services meets local demand. The equity toolbox will ensure that more preference is given to transit-dependent users and daily passengers while keeping the number of opportunities to access transit at the same level for the entire population.

Anticipated Outcomes, Benefits, and Impacts

Improvements in technology include MATA's new next-generation fare system with expanded GO901 app payment opportunities, more user-friendly web pages, and integrated mobility services such as microtransit and BRT; all are part of the proposals that MATA is moving forward. The AIM project concept is that by adding more partners to an expanding mobility network and expanding the use of the GO901 app, users can be added, which means better mobility and enhanced quality of life for customers and communities. This will broaden MATA's mobility enhancer role to encourage more organizations to communicate their services through the MATA website and expand use of the GO901 mobile app. By consolidating more payment options and the use of a contactless fare system, MATA believes that these combined enhancements will prove effective.

Project partners from the University of Memphis will establish baseline conditions and measure for post-implementation quantitative and qualitative effects to communicate the differences recorded. MATA will use the results of the project to consider future policy and planning options such as expanded microtransit areas, connections with Transportation Network Companies (TNCs) and other mobility providers, more multi-agency projects with various partners, mobility hubs connecting with more rural and interstate services, etc. The results will be available for others in the public transit industry to better understand how technology and coordination can improve communities.

Outcomes and benefits of the project include:

- Increased awareness of mobility options based on improved communication and use of technology
- Better understanding of options through increased partner participation
- Enhanced mobility for all community sectors, including essential workers and their families, older adults, students, and individuals with limited personal mobility
- Identified paths forward for MATA as a mobility enhancer to further implement programs, projects, and processes for the customers and communities through equity and accessibility to public transit
- Public-private partnerships for demonstration, data sharing, and knowledge transfer

Shuttle of the Future: Mid-Size Level 4 Autonomous and Zero Emission Shuttle Bus Deployment

Metropolitan Transit Authority (Houston METRO) Harris County, TX

Team and Budget

Key Partners: Phoenix Motorcars, EasyMile, AECOM

Budget Summary:

AIM Demonstration Federal Amount	AIM Demonstration Cost Share	Total Cost
\$1,473,435	\$884,000	\$2,357,435

Innovation: Project Approach

Houston METRO believes automation and electrification are important contributors to the sustainability of public transportation, and FTA and transit agencies globally have been researching and evaluating the potential of automation for many years. With funding more limited than ever, this AIM project will demonstrate how innovative technology may address and even improve existing and future operations.

Houston METRO believes that the EZ Zeus presents a unique opportunity for the U.S. transit industry by being the first shared, electric, autonomous vehicle that is compliant with Federal Motor Vehicle Safety Standards (FMVSS), Buy America, and the Americans with Disabilities Act (ADA). It will apply novel, state-of-the-art technology from EasyMile, an international leader in automation, to a proven, well-known E-450 Ford Chassis that is Altoona-rated for 200,000 miles and 7 years. This unique partnership will introduce a new solution to the transit industry while leveraging many years of operational and manufacturing experience.

The EZ Zeus is 100% electric with a range up to 160 miles, which aligns well as Houston METRO seeks to identify low or zero-emissions vehicles to improve air quality in a region with some of the worst air quality in the U.S. The EZ Zeus will be tested and demonstrated in Phase II of the University District Project, where it will provide for development of the technology for use in a variety of environments—urban, suburban, and rural—in the future.

Challenges Project Is Designed to Address

The goal of the Houston METRO Shuttle of the Future is to develop and demonstrate a mid-size Society of Automotive Engineers (SAE) Level 4 autonomous zero emission shuttle to serve as a first/last mile community connector to areas with limited transit options. This shuttle will be fully-compliant with the Americans with Disabilities Act (ADA), National Highway & Traffic Safety Administration (NHTSA), and Buy America

requirements. Once developed, the vehicle will be deployed and tested on routes developed under Houston METRO's existing University District Project with a focus on integration into a transit fleet. These routes connect underserved communities to jobs, health care and educational opportunities.

Documenting the shuttle's performance through pre-determined testing scenarios and key performance indicators (KPIs) will be a key aspect of this demonstration. Houston METRO and AECOM will work with other project partners to evaluate the effectiveness of the pilot shuttle service from the perspective of passengers and the public. Together, they will collect information with observations made while denoting time of day, day of week, and weather conditions during various activities.

With a population that is growing older and suffering disproportionately with health ailments, shortages of drivers and mechanics, and increasing community and political pressure to move to low or no carbon vehicles, alternative modes must be considered to meet the growing demand for transportation among a diverse group of riders. Early research shows that autonomous technology can be used to close these gaps. Also, the AV market has yet to produce a vehicle that is fully compliant with ADA, NHTSA, or Buy America requirements. This project seeks to address these deficiencies by creating a true AV solution that can seamlessly integrate into any public transit fleet.

Anticipated Outcomes, Benefits, and Impacts

The intended impacts of this project include:

- Increased access for older adults, students, and individuals with limited personal mobility
- Improved equity and accessibility to public transit
- Improved safety and efficiency
- Addressing of first/last mile needs that seamlessly integrate into any public transit fleet that is universally accessible for any urban, metro, or suburban environment
- Provision of a solution that can connect underserved communities to job and educational opportunities
- Creation of a low or no carbon, eco-friendly alternative mode of public transportation
- Use of public-private partnerships for demonstration, data sharing, and knowledge transfer

Overall, this opportunity represents the next evolution of AV transit capabilities. Over the last decade, ADAS have been successfully integrated to improve safety and operations for existing routes, and more recently low-speed/low volume Level 4 automated vehicles have been tested to serve as first/last mile solutions. This deployment represents the next step to continue the advancement of a technology that can improve the safety, service, and ridership of transit systems. This deployment also proposes to evolve automated solutions to increase functional use, address riders in urban communities, and promote safety and accessibility.

The telematics system will be used to collect real-time information and generate data for periodic reports to evaluate the performance of the vehicle. Data from the EasyMile system will also be used to collect and report real-time data on the autonomous functioning of the vehicle. Data collected through the demonstration phase will be critical to understanding the impact of the project and advancing the deployment of the autonomous all-electric shuttle buses into transit applications across the U.S.

Houston METRO and its technology partners will share information with the transit industry on the successes, challenges, and lessons learned from implementation of the pilot project. It will focus on reporting on the pilot through development of white papers and presentations for dissemination in the media, industry publications, and industry/technology events and conferences.

Shuttle of the Future – Phoenix Motorcars



Fast Foil Ferry: Re-imagining the Mosquito Fleet for Accelerating Passenger Ferry Innovation

Kitsap County, WA Region

Team and Budget

Key Partners: Ports of Anacortes, Bellingham and Skagit; Bieker Boats; Glosten; Washington Maritime Blue; DNV GL; Tacoma Power

Budget Summary:

AIM Demonstration Federal Amount	AIM Demonstration Cost Share	Total Cost
\$372,910	\$100,000 cash \$139,000 in-kind	\$611,910

Innovation: Project Approach

This AIM project will advance a robust, replicable business model for an extremely efficient, low-emission public transit concept for a high-speed hydrofoil passenger ferry using lightweight carbon fiber hull construction. The vessel will emit zero on-the-water emissions (electric version) or an estimated 2–3 times less emissions than a conventional fast ferry (long range diesel version). The vision is to relaunch the “Mosquito Fleet” in Washington State’s Puget Sound region to provide increased mobility options while reducing emissions and vehicle traffic—key objectives for the Puget Sound region. Although the vessels are envisioned to be designed, built, and initially operated in the Pacific Northwest, the project offers national significance through a replicable business model for fast ferry passenger service. To date, Bieker Boats and Glosten have developed a concept design of their Foil Ferry in adequate detail to ensure technological and regulatory feasibility and to compare the characteristics of the vessel with existing technology. The preliminary design effort will advance the design to the point where it is ready for shipyards to bid on its construction.

The Foil Ferry promises to connect urban centers with suburban and rural communities. It reduces total cost of ownership by dramatically reducing operating costs, allowing for reduced passenger fares while improving passenger comfort and accessibility by riding above the waves rather than through them. By significantly reducing greenhouse gas and airborne pollutant emissions, it also improves quality of life not just for its passengers, but for other sensitive receptors in the region.

Challenges Project Is Designed to Address

Advancement in battery technology has led to the adoption of battery-electric propulsion in ferry boats. The uptake of all-electric propulsion in ferries has reached a tipping point in battery technology, resulting in a global proliferation of all-electric vessels. To date, this has been limited to displacement hulls, which are heavy and relatively slow. Fast ferries require comparatively lightweight hulls; yet the power required to overcome

wave-making and viscous drag resistance has previously precluded all-electric propulsion. The Foil Ferry accomplishes the innovative leap forward to high-speed, all-electric passenger ferry service by leveraging a state-of-the-art hydrofoil design, lightweight carbon fiber construction, and lightweight batteries. By flying the hull above the water on hydrofoils, wave-making resistance and viscous drag are dramatically reduced. Lightweight batteries and carbon fiber hull and foil design allow for all-electric propulsion for short-range service routes. Alternatively, for longer-range service, the Foil Ferry can be powered by a diesel-electric system that consumes just 30–50% of the fuel of modern conventional fast ferries.

The reduction in fuel consumption due to this efficient design directly creates fuel cost savings, and the smaller and simpler propulsion system results in further cost savings due to simplified maintenance. The Foil Ferry also advances state-of-the-art environmental technologies. The emissions reduction from this new mobility innovation is dramatic due to three levels of improvements—by taking vehicles off the road through this new public transit alternative, by creating efficiency improvements through the vessel’s design, and by using battery propulsion from renewable electricity readily available in the Pacific Northwest (wind, solar, hydropower). Because the hull flies above the water rather than through it, the Foil Ferry also produces an extremely small wake profile (waves), mitigating the impacts of passing vessel traffic on sensitive coastlines.

Anticipated Outcomes, Benefits, and Impacts

This project will advance a robust and replicable business model for Foil Ferry service in Puget Sound and will advance critical design elements and knowledge on capital cost. It will identify the best routes for early adoption of the technology, shore-side infrastructure requirements, and permitting and regulatory requirements and will analyze the economic and environmental impacts this new technology will have on the region. These activities will reduce the perceived risk for potential operators who may be wary of taking a technological leap forward.

The Foil Ferry offers a safe, reliable, and cost-effective option while minimizing the environmental impacts on air, water quality, and marine life. Federal funding will accelerate the collaborative public-private partnership approach to advance the business model and solve the challenges related to technical, safety, operational, and financial feasibility.

This project has national and international significance. The leap forward in innovation for fast ferry technology comes at a time when the national demand for fast ferries is expanding rapidly. By advancing the design and business model for the technology, the potential for adoption is enhanced, opening the door for proliferation of this new technology by ferry systems nationwide. This project is also an opportunity for the U.S. to establish itself as the leader in hydro-foiling fast ferry design and construction. Project benefits will be evaluated based on the success of the proposed design; a fully successful project will include completion of a deployable design available for subsequent bid and construction by shipyards and a viable, replicable business case, including a route study, shore-side infrastructure requirements, permitting/environmental planning, economic impact evaluation, and program/business model) for Foil Ferry implementation.

Seamless Transportation Services for the Greater Morgantown Area

Monongalia County Urban Mass Transportation Morgantown, WV

Team and Budget

Key Partners: West Virginia University, Metropolitan Planning Organization, City of Morgantown, HDR Contractors

Budget Summary:

AIM Demonstration Federal Amount	AIM Demonstration Cost Share	Total Cost
\$40,000	\$10,000	\$50,000

Innovation: Project Approach

Morgantown is a key employment center in West Virginia; it is the heart of the state’s medical and higher education systems and an important retail and manufacturing center. The primary goal of the Monongalia County Urban Mass Transportation Authority (Mountain Line) project is to provide an approach for an innovative, seamless access credentialing system to be used across various modes of public transportation and parking systems. This will allow residents of the city and the surrounding rural area greater access to the Morgantown area’s employment and medical services and increase options for the last mile traveled, which is a limiting factor for rural residents. These services are key to the economic success of the urban and surrounding rural areas.

This goal is consistent with USDOT’s Rural Opportunities to Use Transportation for Economic Success (ROUTES) initiative. Another important goal of this project is to minimize the physical contacts of transportation services among patrons and providers, which is vital as the Mountain Line Transit Authority (MLTA) makes its way through the COVID-19 pandemic. To address this concern, local officials will evaluate the potential for technology to be used as part of the fare collection system to eliminate or at least minimize the need for physical contact between the public and transportation networks operators.

Challenges Project Is Designed to Address

The greater Morgantown area currently has three entities providing transportation and transportation-related services that require payment or attribution of payment for users—MLTA, West Virginia University (WVU), and the City of Morgantown. This project will improve the efficiency of transportation services in the area by strengthening these three entities’ interoperability and innovation. The outcome will be the development of a unified payment collection system for all three parties, which will be accomplished by a

study that will identify the preferred fare collection mechanism and the development of a plan to implement the unified fare collection system.

MLTA operates a public transit system serving Morgantown, Monongalia County, neighboring cities, and nearby airports. In addition to fares and support from FTA, MLTA relies on subsidies from WVU and an excess levy tax on real estate in Monongalia County for funding. Because of these subsidies, MLTA is required to track trips by user. In addition to providing MLTA with a subsidy for riders associated with the WVU, the University owns and operates a unique personal rapid transit (PRT) system that is available to University personnel and students who are charged a transportation fee. The PRT is also open to the public, which is charged a small use fee. WVU also owns and operates a large inventory of parking lots for faculty, staff, and students through decal permitted and hourly payable systems. The City of Morgantown, through the Morgantown Parking Authority (MPA), owns and operates on-street parking and several parking lots and garages, primarily in downtown Morgantown.

Anticipated Outcomes, Benefits, and Impacts

Each of the associated entities uses a different mechanism for collecting fees for their services. This project will identify the best mechanism for unifying the payment of fares, tracking of subsidies for MLTA, and collecting fees for the MPA and use of WVU's personal rapid transit (PRT) system and parking. This process will provide individuals with the ability to seamlessly take advantage of each entity's transportation and parking services. In addition, key aspects that will be explored are contactless payment options to minimize human interactions/interface and reduce duplicative systems. This unified system will create a more efficient access credentialing system and economies of scale to lower the cost to all entities involved. The integrated payment system will be available to local merchants to subsidize parking, PRT use, and Mountain Line ridership to access the downtown area through the system. This innovative cooperation with merchants can enhance economic benefits to transportation providers and area businesses.