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June 12, 2017

Dear Secretary Elaine Chao,

The City of Arlington is pleased to partner with the University of Texas at Arlington, the Arlington Convention and Visitors Bureau, EasyMile, and Texas Health Resources, among other technology and service providers, for a dynamic, on-demand transportation service project for the Advanced Transportation Congestion Management Technologies (ATCMTD) USDOT grant. As one of the fastest growing states in the country, Texas is at a pivotal moment where the rate of population growth, infrastructure needs, and technological advancement are challenging our ability to deliver quality mobility services. The ATCMTD grant will enable the City of Arlington to accelerate deployment of innovative technologies and offer a wider range of mobility options to underserved populations.

The City of Arlington also writes in support of the Texas Innovation Alliance's ATCMTD application and recognizes the portfolio of applications representing the diverse interests of our state. We strongly believe that the path forward is a collaborative effort of public agencies, research institutions, and industry partners who are committed to advancing emerging technologies to solve community challenges. Leveraging the Texas Innovation Alliance – a statewide network of local, regional, and state agencies as well as research institutions, Texas is well-positioned to deploy, scale, and deliver results.

Arlington's grant project seeks to create a dynamic micro-transportation system, serving both fixed stops and demand responsive locations, using electric autonomous vehicles and driver operated passenger vans. The system will be designed to offer enhanced mobility to the City's growing senior population, the young professional population, and low income populations, as well as the broader community. Service will be provided throughout the entire City, connecting residents and visitors to key destinations, employment opportunities, and the DFW regional commuter rail system. Citizens will be able to request rides through a smart phone app, website, telephone, or at a number of interactive kiosks located throughout the City. The micro-transportation vehicles will reduce travel time and congestion through signal prioritization controlled by Arlington's state-of-the-art Transportation Management Center.

Projects made possible by ATCMTD will enhance regional congestion management technologies and deliver economic benefits by improving overall system performance to achieve efficient and reliable movement of people, goods, and information. Together, the combination of regional and state applications represents the greatest return on investment to the state and to our communities.

We look forward to joining the larger community of practice who are dedicated to openly sharing best practices. The City of Arlington, and the State of Texas, are open for innovation, and we are ready to pioneer creative partnerships to advance congestion management technologies. Thank you for your consideration as Texas continues to move forward together to advance and introduce technologies that will have transformative community impact.

Sincerely,

A handwritten signature in black ink, appearing to read 'W. Jeff Williams', with a stylized, cursive script.

W. Jeff Williams, P.E.
Mayor

Micro On-Demand Rideshare System



Required Project Table

Project Name	Micro On-Demand Rideshare System
Eligible Entity Applying to Receive Federal Funding	City of Arlington, Texas
Total Project Cost (from all sources)	\$8,663,425
ATCMTD Request	\$4,331,591
Are matching funds restricted to a specific project component? If so, which one?	Autonomous Vehicles, On-Demand Transportation System
State(s) in which the project is located	Texas
Is the project currently programmed in the: <ul style="list-style-type: none"> • Transportation Improvement Plan • Statewide Transportation Improvement Program • MPO Long Range Transportation Plan • State Long Range Transportation Plan 	No
Technologies Proposed to Be Deployed	<ul style="list-style-type: none"> • Mobile Application for on-demand rideshare transportation system • Connected Vehicle DSRC equipment at traffic signals and in transportation vehicles for TSP and Safety • Kiosks • Autonomous vehicles • Smart street lights

Project Description

Introduction

Centrally located in one of the fastest growing regions of the country, the City of Arlington is a diverse community in the North Texas area. Its location combined with the City's proximity to major highways and the Dallas-Fort Worth International Airport has made Arlington a draw for residents, visitors, and businesses alike. During its 150 year history the City has evolved from a frontier outpost to a major regional hub for technology and tourism. Over the past few decades Arlington has transitioned from a bedroom community to a core city of the Dallas-Fort Worth metroplex. Today Arlington serves nearly 400,000 residents, 14 million annual visitors, and major employers such as the University of Texas at Arlington, General Motors, and Texas Health Resources.

Arlington's transportation system is characterized by a strong network of roadways focused on moving vehicles efficiently and safety through the City. Well-connected two-, four-, and six-lane streets link 99 square miles to two major interstates, one U.S. Highway and several State highways. Additionally, the Trinity Railway Express (TRE) Line crosses along the northern edge and provides connection to the Dallas Area Rapid Transit (DART) system. Recently Arlington piloted the Metro ArlingtonXpress (MAX) bus route to connect visitors and residents along its North/South alignment to the TRE commuter rail line. Despite some successes, this pilot project did not provide the connectivity that is needed to meet the mobility needs of students, seniors, employees, and visitors to the City's vibrant downtown, university, and sports districts.

For Arlington to sustain its quality of life, more must be done to meet the mobility needs of these subpopulations. Shifting demographic trends and preferences necessitate the consideration of new alternative modes of transportation. Arlington therefore seeks to deploy a program of new, cutting edge transportation technologies to address these challenges and better serve the needs and preferences of older adults, Millennials, low income populations, and those with disabilities. In particular, Arlington aims to address the following societal challenges:

- Arlington's population is 9.1% over the age of 65 (34,554 residents), many of whom wish to remain active participants in the community and need access to necessities, such as groceries and medical care. Personal vehicle use is difficult for this population, yet traditional public transportation is not feasible due to the low density of the neighborhoods where they reside.
- Arlington is home to the University of Texas at Arlington, the second largest UT campus with a global enrollment of 57,000 students, and the City has an influx of young adults (26.6% of the City's total population is aged 18-34) who desire to live in communities and cities with varied travel options beyond personally-owned

automobiles. Attracting and retaining these residents is crucial to ensure Arlington’s long-term economic vitality.

- Arlington is home to a number of industries with lower wage jobs, such as tourism and retail. Yet comprehensive transportation services are currently lacking, making access to these jobs difficult for individuals who do not own a personal vehicle.
- 17.5% of Arlington’s residents, including 26% of individuals under 18, are currently living below the poverty line. Many residents above the poverty line experience financial difficulty, with 43% of renters and 20% of homeowners paying 35% or more of their household income in housing costs.
- Arlington’s paratransit service, Handitran, currently experiences high demand that could be relieved by additional mobility options in the City for disabled populations.

This project will address the mobility needs for each of these populations, as well as for all residents and visitors to Arlington, through the use of a micro on-demand rideshare system that will serve a nearly limitless number of dynamic stops where travelers can congregate to board a rideshare vehicle. A limited number of fixed stops will also serve popular destinations within the City. This “pop-up public transportation” system will utilize a centralized software system and a fleet of both driver-operated and autonomous vehicles to provide a more personalized transportation experience at a significantly lower cost than what typical transportation network providers (TNP) or taxis provide. Figure 1 illustrates the proposed system concept.

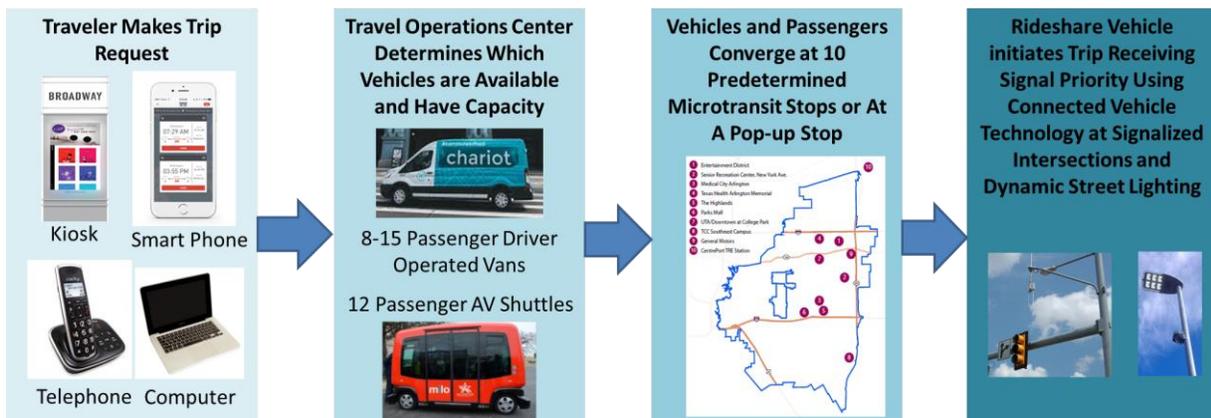


Figure 1. System Concept: Micro On-Demand Rideshare at both Fixed and Dynamic Stops Using Manned and Autonomous Vehicles, Facilitated by Signal Priority and Smart Streetlights

The rideshare service will be enhanced by connected vehicle technologies granting these vehicles signal priority. Smart LED streetlights and WiFi enabled kiosks at select locations will allow travelers without Internet access to request a ride and use the system.

This project will cover the entirety of Arlington and connect its citizens to major community destinations and the region’s commuter rail system, improving mobility for seniors, young adults, low income individuals, and commuters alike. As the City continues to transition to a more populous and urban community, the transportation system needs to grow to meet the changing needs of residents.

This project directly addresses USDOT’s desire to deploy *Technologies to Support Connected Communities*. The proposed Micro On-Demand Rideshare System will provide the opportunity for multimodal transportation options, merging the benefits of TNC-provided dynamic ride-sourcing with the economic, environmental, and congestion relief advantages of a public transportation system. In particular, low-income, disabled, and older adults will experience significantly improved mobility while connected vehicle technology will provide safety and reliability benefits. The table below (Table 1) details how this project aligns with the expected benefits of the Advanced Transportation and Congestion Management Technology Deployment program.

Table 1. Project Alignment with Expected Benefits of the ATCMTD Program

ATCMTD Expected Benefits	Project Element Delivering Benefit	Goal
Reduced traffic-related fatalities and injuries	V2V and V2I technology improves safety and reliability.	✓
Reduced traffic congestion and improved travel time reliability	Micro transportation vehicles will convert travelers from POV to rideshare vehicles. V2I TSP at major signalized intersections provides travel time reliability.	✓
Reduced transportation-related emissions	Rideshare service removes POVs from the road, providing emissions benefits. V2V and V2I improve signal efficiency and reduce emissions from idling.	✓
Optimized multimodal system performance	Introduction of the proposed system represents establishment of a Citywide transportation service.	✓
Improved access to transportation alternatives, including for underserved populations	The system will concentrate fixed stops at locations serving older adults and low-income persons, providing much needed transportation service for these populations.	✓
Public access to real time integrated traffic, transit, and multimodal transportation information to make informed travel decisions	The system includes a mobile travel application, Internet travel application, Kiosks, and telephone based traveler information systems with real-time availability.	✓
Cost savings to transportation agencies, businesses, and the traveling public	The system will enable users to achieve mobility similar to their POV and TNP experience, but at a cost reflective of public transportation.	✓

Description of Applicants

City of Arlington. Founded in 1876, the City of Arlington has a current population of 383,000 residents over an area of 99.5 square miles. Arlington is in the Dallas–Fort Worth (DFW) Metroplex, one of the fastest growing metropolitan areas in the country and currently home to more than 7.1 million residents. Arlington is strategically situated within the center of the Metroplex, located approximately 15 miles east of downtown Fort Worth and 20 miles west of downtown Dallas. Arlington is approximately 8 miles from DFW International Airport, the fourth busiest airport in the world in terms of aircraft movement.

Arlington has a rich history, evolving from a frontier outpost and site of Native American battles to a major research and development hub. Today it is famed for professional sports and amusement attractions, but it also has a high technology concentration that includes nanotechnology research, computer chip manufacturing and the Center for Innovation Arlington, a technology incubator designed to introduce leading edge university research into the world of commerce.

Arlington enjoys a number of strategic positions with respect to industry concentration:

- A strategic leader in automotive manufacturing including a General Motors assembly plant, complimented by critical elements of the automotive supply chain, including metal fabrication, electronic components, glass and plastics production, and increasingly high technology and software development.
- A prime destination for business and professional services due to easy highway and airport access, affordable housing, and nearby amenities that include the Dallas Cowboys, Texas Rangers, Six Flags Amusement Park, and The Parks Mall at Arlington.
- A leader in medical device manufacturing with a high concentration of students in the medical professions and hospitals (Texas Health Memorial Hospital, Medical City Arlington, and the nearby UNT Health Science and UT Southwestern Medical Centers).
- A high concentration of college students, hosting the University of Texas at Arlington, Tarrant County College Southeast Campus, Arlington Baptist College and campuses of Everest College, Kaplan College, and Concorde Career College.
- In addition, DFW boasts the highest concentration of aerospace manufacturing workers in the state, one of the county's largest airports, headquarters of American and Southwest Airlines, and regional operations of leading aerospace companies including Lockheed Martin, Bell Helicopter, Raytheon, and Boeing.

As Arlington has evolved into a major economic driver for the region, the City's demographics have changed considerably. Growth in the automotive and aerospace sectors led to one of the nation's highest population growth rates between 1950 (7,692) and 1990 (261,721). Because of this Arlington became known as a "boomburg" in the post-World War II era. Since 1990 Arlington has added another 100,000+ new residents. Like many communities, Arlington has a high concentration of residents at opposite ends of the population spectrum: a growing number of Millennials and seniors now reside in the City.

Another trend that is increasingly impacting Arlington is poverty. 17.5% of the City's residents, including 26% of individuals under 18, are living below the poverty line.

Additionally, 43% of renters and 20% of homeowners are paying 35% or more of their household income in housing costs, according to the 2011-2015 American Community Survey 5-Year Estimates. This reflects a growing American trend of increasing poverty outside of the primary cities in metropolitan regions. High transportation costs associated with automobile ownership can exacerbate this problem for households that lack access to inexpensive and reliable alternative transportation options. Within the City, there are clear zones that have a high density of households below the poverty level as illustrated in Figure 2. The proposed rideshare system will help these residents travel from these central zones to the high employment zones throughout the City.

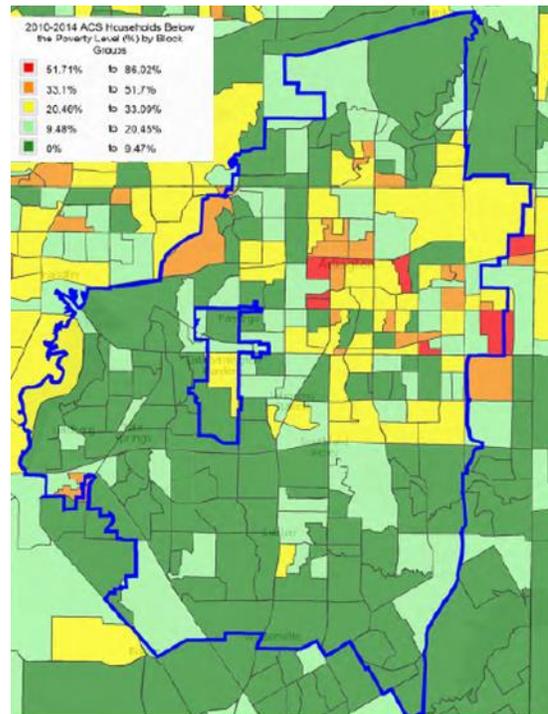


Figure 1. Arlington has a Growing Percentage of Households Below the Poverty Line with Concentrations In the Central Part of the City.

This project would be managed through the Department of Public Works and Transportation under the guidance of Director Mindy Carmichael, P.E. One of the department's primary directives is to improve traffic safety and reduce congestion, and it puts technology to work to make that happen. The department relies on technology to decrease travel time for drivers on major arterial streets, especially during peak hours. Staff at the City's state-of-the-art Traffic Management Center can adjust traffic signals in real time to improve corridor efficiency, shorten travel time, decrease intersection delays, and reduce the number of vehicular stops.

University of Texas at Arlington (UT Arlington). UT Arlington is a growing Carnegie Research-1 "highest research activity" powerhouse committed to life-enhancing

discovery, innovative instruction, and caring community engagement. With a projected global enrollment of close to 57,000, the UT Arlington includes nearly 10,000 students living on or near the Arlington campus. Further, about 65 percent of the University's 210,000 alumni live in North Texas and contribute to an annual economic impact of \$12.8 billion in the region. UT Arlington offers more than 180 different degree programs, and has a strong presence in transportation. UT Arlington is a Consortium Member of the Transportation Research Center for Livable Communities, A RITA Tier I University Transportation Center, sponsored by the USDOT. UT Arlington is partnering with the City to ensure optimization of the rideshare system, assist with community engagement, and evaluate the effectiveness and reproducibility of the project.

EasyMile. EasyMile is a high-tech startup company specialized in providing autonomous vehicles, software, and first and last mile smart mobility solutions. Founded in 2014, the company is headquartered in Toulouse, France, with offices in Singapore and Denver, CO. It also operates through value added resellers notably in Japan, Taiwan, and the Middle East. EasyMile, with its workforce of 90 engaged employees, is a privately held company. As a private partner to the City, EasyMile has committed to providing technical support and public workshops related to autonomous vehicles.

Arlington Convention and Visitors Bureau. The ACVB is the official destination marketing organization for the City of Arlington, Texas. The ACVB provides Arlington's 14 million annual visitors with information on local events, attractions, travel assistance, and other information. For this project, the ACVB is partnering with the City to provide in-kind services for marketing and outreach related to the rideshare system.

Texas Health Resources. THR is a non-profit organization that operates a network of hospitals and related health facilities in the North Texas region, including the Texas Health Arlington Memorial Hospital and THR headquarter offices. These facilities provide health care to all of Arlington's residents and visitors and are frequent destinations for older adults. THR will be providing in-kind assistance to market and promote the rideshare system to patients and visitors.

North Central Texas Council of Governments. The North Central Texas Council of Governments (NCTCOG) is a voluntary association of local governments. NCTCOG was established to assist local governments in planning for common needs, cooperating for mutual benefit, and coordinating for sound regional development. NCTCOG's purpose is to strengthen both the individual and collective power of local governments and to help them recognize regional opportunities, eliminate unnecessary duplication, and make joint decisions. NCTCOG serves the 16-county region of North Central Texas, and has over 230 member governments including all 16 counties, numerous cities, school districts, and special districts.

Figure 3 summarizes the expected organizational structure for this grant. The City of Arlington will serve as the primary fiscal agency. Collaboration and communication between the City of Arlington and all of the partners is ongoing and well established.

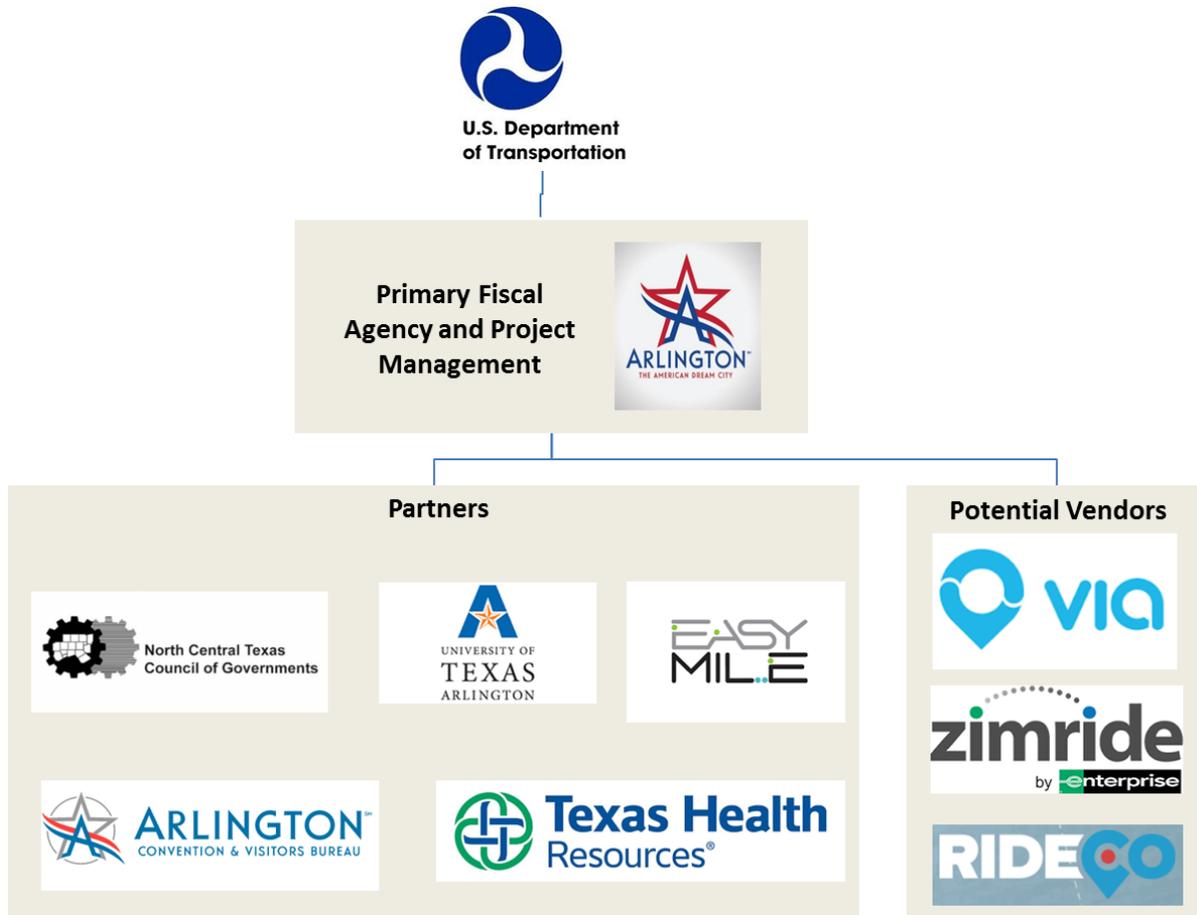


Figure 2. Project Organizational Structure

Project Area

This project will encompass the entire City of Arlington and provide important connectivity to major destinations including the City’s downtown district, the UT Arlington campus, medical centers, senior centers, employment centers, and entertainment venues such as Six Flags and the professional sports stadiums.

Addressing Societal Issues and Challenges

Arlington is a thriving and growing city with many of the challenges facing other rapidly growing, first ring suburban cities. However, as Arlington shifts from a bedroom community of Dallas and Fort Worth to a core city itself, new issues and challenges need to be addressed, particularly with respect to housing, transportation, and improving the quality of life and economic opportunities for all residents, employees,

and students. Arlington's previous efforts to establish a public transportation service utilizing large diesel buses have not been favored by the voting public. However, there is significant need throughout the city and increasing requests for some sort of public transportation. Through the process of creating Arlington's Comprehensive Plan (2015), demographic analyses showed distinct areas of the City with high percentages of older adults and low income populations. Community engagement efforts revealed seniors would be more satisfied if they had transportation options other than personal vehicles to maintain their mobility. In addition, low income residents expressed the desire for transportation to and from employment centers. Young adults are also more apt to stay in Arlington if a variety of transportation modes are available to them. These transportation preferences present a unique opportunity for the City to increase mobility for these target populations while at the same time serving all residents and visitors.

The goals and objectives of the Micro On-Demand Rideshare System are closely aligned with those of USDOT's advanced transportation technology initiatives and will significantly assist the City and the region with addressing the following societal issues:

Improving Mobility of Seniors. Arlington has a growing population of older adults (19.4% of the population is over age 55) who increasingly need mobility options other than a personally operated vehicle. At the same time, they expect to have the same levels of service that their automobiles currently provide. The on-demand rideshare system, which will include a select number of fixed sites convenient to senior destinations, will provide rapid-response and reliable transportation to this segment of the population. As Arlington's population continues to age, the proposed system will provide access to medical care, basic necessities, recreation activities, and social events, enabling residents to age in place.

Economic Vitality. Arlington is home to a broad base of employers in the professional services, technology, and medical fields. Additionally, the City's many colleges attract a high number of Millennials. This generation has increasingly expressed a desire for alternative modes of transportation as well as varied housing options. To sustain economic growth, the City needs to provide transportation and housing options to attract and retain young residents. Arlington is currently experiencing new development in the form of mixed use, live-work-play centers in various locations throughout the City. The proposed rideshare system will offer the flexibility to create transportation options "on-the-fly" to link pockets of residents across the City, unlike traditional, fixed-route public transportation service.

Poverty and Access to Lower Wage Jobs. Poverty in Arlington is a significant and growing issue, with 17.5% of the City's residents, including 26% of individuals under 18, living below the poverty line and 43% of renters and 20% of homeowners paying 35% or more of their household income in housing costs. Automobile ownership is often out of

reach for this demographic, and past initiatives to deploy traditional public transportation service in Arlington have proved to be challenging. The many entertainment, sports, shopping, parks and other destinations have broadened the economic base of Arlington and has fueled significant employment growth within the City. Many of these jobs are lower-wage positions typically associated with hospitality, tourism, and retail sectors. The proposed rideshare system will provide a critical connection between low income areas and available jobs by providing a level of service similar to a private TNC, but at a cost that is comparable to a traditional public transportation system. This linkage will provide financial relief for households that experience high transportation costs associated with automobile ownership and TNCs. Additionally, a limited number of strategically located stops with kiosks, will allow those residents without a smart phone or credit card to access the rideshare system.

Relevance to ATCMTD Vision, Goals, Focus Areas, and Technologies

The proposed technology solution is focused upon developing an Advanced Public Transportation System that integrates new rideshare-oriented travel options for Advanced Mobility and Access Technologies to Support Human Services for Elderly and Disabled Individuals.

Our goal of introducing a connected, integrated, and on-demand micro rideshare transportation system is heavily dependent upon technology such as signal prioritization and software applications to track and manage a fleet of autonomous and non-autonomous micro transportation vehicles. The project will address issues and challenges in safety, mobility, sustainability, and economic vitality of the City and the region. This is **not** a pilot deployment but is the accumulation of many years of outreach, planning, and research to establish a **permanent** transportation service in Arlington. The City is committed to this project and intends to utilize the ATCMTD grant to accelerate the deployment of technologies to bring the safety, mobility, and economic development benefits to a wider segment of the community **more rapidly** than would otherwise be possible.

With respect to the USDOT priority focus areas, the proposed system directly addresses USDOT's desire to deploy *Technologies to Support Connected Communities*. The Micro On-Demand Rideshare System will provide the opportunity for multimodal transportation options, merging the benefits of TNC-provided dynamic ridesourcing with the economic, environmental, and congestion relief advantages of a public transportation system. We envision, as discussed above, that the service will be available throughout the City, but will also be focused on serving low-income, disabled, and older adults through a limited number of fixed stops. These segments of the population will experience significantly improved mobility, particularly due to the Installation of Connected Vehicle based Equipment on Vehicles and at Signalized Intersections. Providing signal priority/pre-emption through Connected Vehicle

technology will enable these micro on-demand vehicles to minimize or avoid waiting at stoplights. As a result, travelers will experience the safety and convenience benefits they would expect from personally operated vehicles with increased reliability and decreased travel times.

Table 2 provides a cross-walk of the goals and desired focus areas of USDOT with the planned project. As observed in the table, this project will accomplish many of the goals and crosses several of the desired focus areas.

Table 2. Summary of how the System will meet the Goals of the ATCMTD Program

Goals of the ATCMTD Program	How We will Meet Goal
Reduced costs and improved return on investments, including through the enhanced use of existing transportation capacity	The system’s dynamic rideshare operations are based upon technology allowing the City to deliver public transportation performance and costs with smaller vehicles operating on existing roadways.
Delivery of environmental benefits that alleviate congestion and streamline traffic flow	The system will promote the use of public transportation and connectivity to commuter rail and will deliver benefits similar to carpooling. V2I TSP will reduce idling at signals for the rideshare vehicles, further enhancing environmental benefits.
Measurement and improvement of the operational performance of the applicable transportation networks	The system will include connected vehicle technology allowing for information gathering on demand, ridership, and traffic speeds/flow.
Reduction in the number and severity of traffic crashes and an increase in driver, passenger, and pedestrian safety	Rideshare vehicles will be equipped with connected vehicle DSRC radios to enable V2V and V2I safety applications. This rideshare service will also allow a safer mobility option for seniors who may no longer be able to safely operate a personal vehicle.
Collection, dissemination, and use of real time transportation related information to improve mobility, reduce congestion, and provide for more efficient and accessible transportation	This goal is at the heart of the proposed project and is one of the primary objectives. Providing low-cost, but reliable and on-demand transportation to seniors, low-income groups, and travelers with disabilities will greatly improve quality-of-life and mobility of these population segments.
Monitoring transportation assets to improve infrastructure management, reduce maintenance costs, prioritize investment decisions, and ensure a state of good repair	Each vehicle in the rideshare system will be instrumented with connected vehicle equipment and capable of providing a wide variety of information for system management, including road weather information (BSM, Part II), pothole detection, speed, and traffic queues.

Goals of the ATCMTD Program	How We will Meet Goal
Delivery of economic benefits by reducing delays, improving system performance and throughput, and providing for the efficient and reliable movement of people, goods, and services	The system will provide reliable and affordable transportation options for seniors, young adults, disabled and low-income populations to access healthcare, jobs, activities and other necessities. V2V and V2I will improve corridor performance, reduce delays, and reduce emissions.
Accelerated deployment of vehicle-to-vehicle, vehicle-to-infrastructure, and automated vehicle applications, and autonomous vehicles and other advanced technologies	Connected vehicle technologies will be used to provide Rideshare Signal Priority on North/South signalized intersections. Approximately 73 intersections will be equipped. A micro on-demand rideshare system such as the one being proposed is poised to be converted to a fully autonomous vehicle system once this technology has been proven. To begin this transition, the City is proposing to include two autonomous vehicles in the initial deployment on non-public, mixed-use trails. During the life of the project, the City expects to transition these autonomous vehicles to public streets in specifically identified areas, illustrating the first steps towards a fully automated system.
Integration of advanced technologies into transportation system management and operations	Advanced rideshare, V2V and V2I technologies will be a key component of the overall transportation system in the City and will be used to manage events, daily commutes, and everyday travel needs.
Demonstration, quantification, and evaluation of the impact of these advanced technologies, strategies, and applications towards improved safety, efficiency, and sustainable movement of people and goods	The concept of on-demand rideshare systems is not new and has been piloted in several cities throughout the nation. These pilots demonstrated the need for strong marketing and education and consideration of geographic factors. However, the pilots have also proved that the concept of dynamic rideshare is successful in delivering its intended benefits and deriving synergies between public transportation and ridesourcing approaches. Arlington is ideally situated for the next phase of this evolution with its extended North/South geography, demand for connections to defined employment centers, and large visitor population. Performance metrics and evaluation of the system will be performed by the City and its Partners.
Reproducibility of successful systems and services for technology and knowledge transfer to other locations facing	The proposed system could easily be replicated in other locations looking for flexible, advanced public transportation options due to its low start-up costs, use of existing infrastructure, scalability and ability

Goals of the ATCMTD Program	How We will Meet Goal
similar challenges.	to be phased in over time. This service paves the way for the use of micro on-demand AVs to provide first-mile/last-mile service to traditional fixed route transit systems or to on-demand services in cities without an established transit system. Overall effectiveness and lessons learned from the proposed system will be disseminated widely by the City and its Partners to aid other areas seeking to deploy these technologies and approaches.

Technology Solutions and Transportation Services

The proposed project will address all of the goals of the ATCMTD program and improve the mobility and economic opportunities for the residents and visitors to the City of Arlington. We are proposing a solution that is both innovative and has the potential for widespread adoption in cities across the US. With a significant and growing segment of the population in Arlington struggling to maintain their mobility either due to loss of cognitive or physical abilities as a result of aging or due to economic constraints on vehicle ownership, the City is poised to maximize a micro-transportation system. Our residents and visitors want personalized mobility service at a price they can afford. The following section describes each project element in detail.

ON-DEMAND MICROSHUTTLE FLEET

The proposed project has as its cornerstone the engagement of an on-demand, micro transportation fleet of 40, 12-14 passenger, ADA compliant shuttles. These vehicles will respond to on-demand trip requests from travelers using a mobile

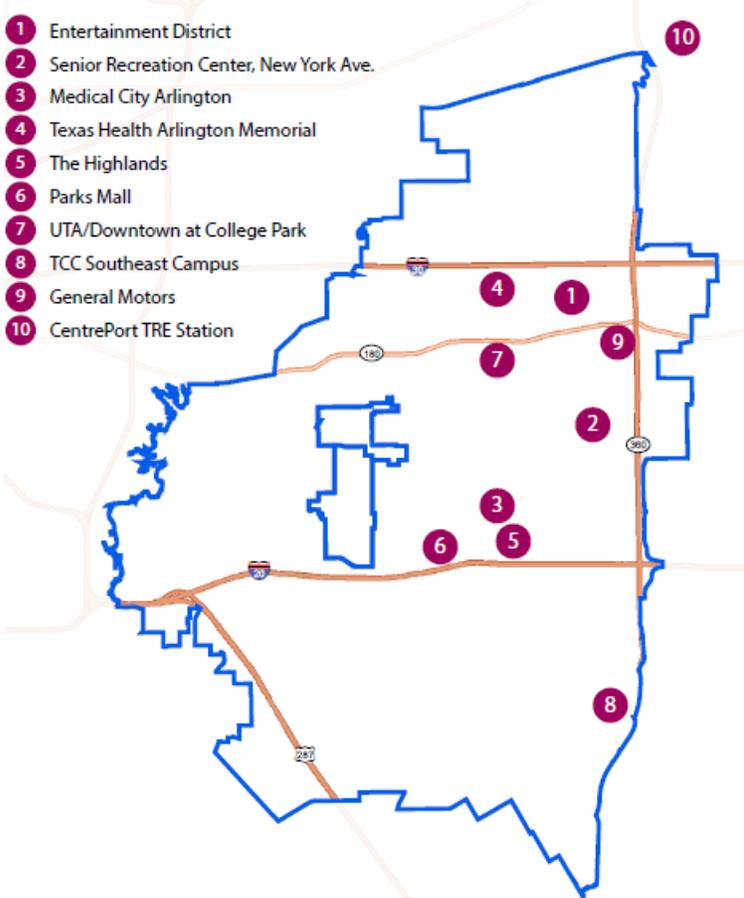


Figure 3. Fixed Stop Locations will be Supplemented with On-Demand or Pop-Up Stations

phone, computer, tablet, interactive kiosk, or through a telephone reservation/dispatch system. Shuttles will be dispatched to permanent stations or to dynamic pop-up stops where travelers can congregate for the shuttle.

Rideshare vehicles will be dispatched to one of 10 permanent stations at key travel destinations throughout the city (see Figure 4). Permanent stops will also include kiosk technology to allow travelers without smart phone or Internet access to use the system. Additionally, smart street lights will provide free Wi-Fi for waiting travelers and will provide safe locations for the pop-up stations.

The ability to create dynamic stops will mean that no traveler will have to walk more than 5-10 minutes to a pop-up stop. These stops will serve as aggregation points for potential riders and will be designated by local landmarks, cross-streets, and GPS coordinates. Additionally, there will be the opportunity to request door-to-door service for passengers with disabilities that would prevent them from walking to a pop-up stop. Kiosks at fixed locations will allow those residents without a smart phone or credit card to access the rideshare system

AUTONOMOUS VEHICLE TECHNOLOGY

Arlington recognizes that the future of transportation will likely include autonomous vehicles. As such, the City intends to lease and operate two autonomous vehicles (Figure 5) on a shared, paved path serving a fixed route between parking and the entertainment venues. During the life of the project, once regulations allow for on-street AV deployment, the City envisions utilizing the AV's as part of the on-street rideshare system in specific areas of the City. Deploying and testing AV technology in the City will allow for faster integration into the rideshare system as the technology matures.

FIXED STOP TECHNOLOGY

Each of the rideshare fixed stops will be enhanced with technologies designed to improve and facilitate utilization of the service. In particular, each of the fixed stops will include a touch screen kiosk that can be used to request a ride and will provide real-time updates on arrival times of the vehicle (see Figure 6). To promote equity and the ability of all travelers to access the system, including those without regular access to the Internet, public access wireless routers will be integrated in the kiosks and installed in streetlights in the



Figure 4. Two Fully Autonomous Vehicles will Provide Service on a Non-Public Right-of-Way Linking Arlington's Entertainment



Figure 5. Example of an Interactive Kiosk

surrounding vicinity of the fixed stops. Anyone within a 10 minute walking radius of one of the fixed stops will have the ability to join a free, public access Wi-Fi network and connect to the Internet to make travel arrangements or for other purposes. We are intending to equip these kiosks with the necessary equipment to accommodate cash-based travelers.

TRIP PLANNING AND REQUEST SOFTWARE

Vehicles will respond to on-demand trip requests made by travelers using a mobile phone, computer, tablet, kiosk, or through a telephone reservation/dispatch system as illustrated in Figure 7. Arlington will leverage previous deployments utilizing this kind of technology to derive lessons learned when planning and executing our dynamic rideshare planning software suite. One particular feature that will be required of software vendors is the ability to give priority to persons with disabilities and mobility needs in positioning pop-up dynamic stops to minimize travel.

There are several different providers and vendors of such dynamic transportation software and systems. The City will secure the services of one of these providers following award of the grant to establish and run this service. In preliminary discussions with potential vendors such as VIA, who operates a micro on-demand service in New York; RideCo, who provides centralized software and hosting services for operators; and Zimride, who operates a ridesharing/carsharing service in cities across the country, we understand that all three potential vendors are interested in engaging in Arlington.

A key difference between the service being proposed and those that are commonly encountered with other ridesourcing Transportation Network Companies (TNCs) such as Uber and Lyft is cost and availability. The proposed system can be offered at substantially lower costs because travelers are not “picked-up” individually but are expected to congregate at common locations and be dropped off at other common locations. In short, this service is not a point-to-point service with multiple passengers (e.g., Uber pool), but is a hub-to-hub service with the hubs being dynamically generated to minimize first-mile/last-mile travel across the 120-14 potential passengers. The trip software is the key component that creates the optimized locations for the pop-up hubs where travelers are to meet for the on-demand vehicle. Experts at the University of Texas at Arlington, one of the City’s Partners, will evaluate vendor service models to ensure the selected vendor and software is capable of delivering the performance necessary for the City.

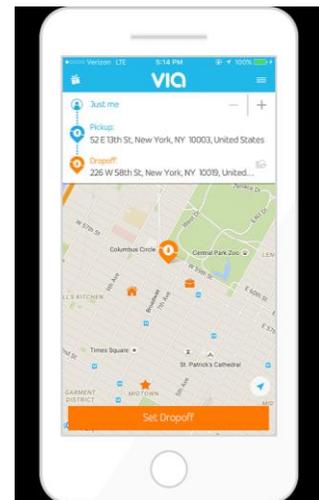


Figure 6. Trip Planning Software Such as That Utilized by VIA will be Utilized to Connect Travelers with Rideshare Service

Via, an on-demand rideshare startup company, compared their service to other ridesourcing services, stating:

What separates Via from an increasingly crowded ride-hailing field is its dynamic-routing system that adjusts to new trip requests in real-time. Via's system takes a number of factors into consideration before deciding whether it's reasonable to add a new passenger: space in the vehicle, of course, as well as origin and destination, required route deviation, and additional wait time. Live route updates are all made through a back-end system that requires no distraction for the driver.

Connected Vehicle Technology

We are proposing to enhance the travel experience and increase the travel time reliability and efficiency of the micro on-demand system through the use of Connected Vehicle Signal Priority at signalized intersections on the main travel corridors. This will provide an additional benefit and motivation for travelers to utilize the system. Signal priority (and if needed pre-emption) will be accomplished through the inclusion of a Dedicated Short Range Communications (DSRC) radio at signalized intersections on the main thoroughfare. These radios will be competitively sourced, but are expected to be compliant with SAE 2735, IEEE 802.11p, IEEE 1609.2, and RSU specification V4.1. We will apply for FCC authorization to utilize these wireless communication devices. The DSRC equipment will be installed by City staff. DSRC radios will be equipped in all shuttle vehicles (i.e., OBEs) as retrofit devices by City staff. Location information for vehicles will be transmitted to the Traffic Management/Operations Center via a combination of DSRC, Wi-Fi and cellular service.

This project makes use of the best that technology has to offer, combining back-office processing and dispatch systems with on-demand travel and signal priority. We are committed to this project and have already conceived of a preliminary system physical architecture with associated data elements being exchanged between system components as identified in Figure 8.

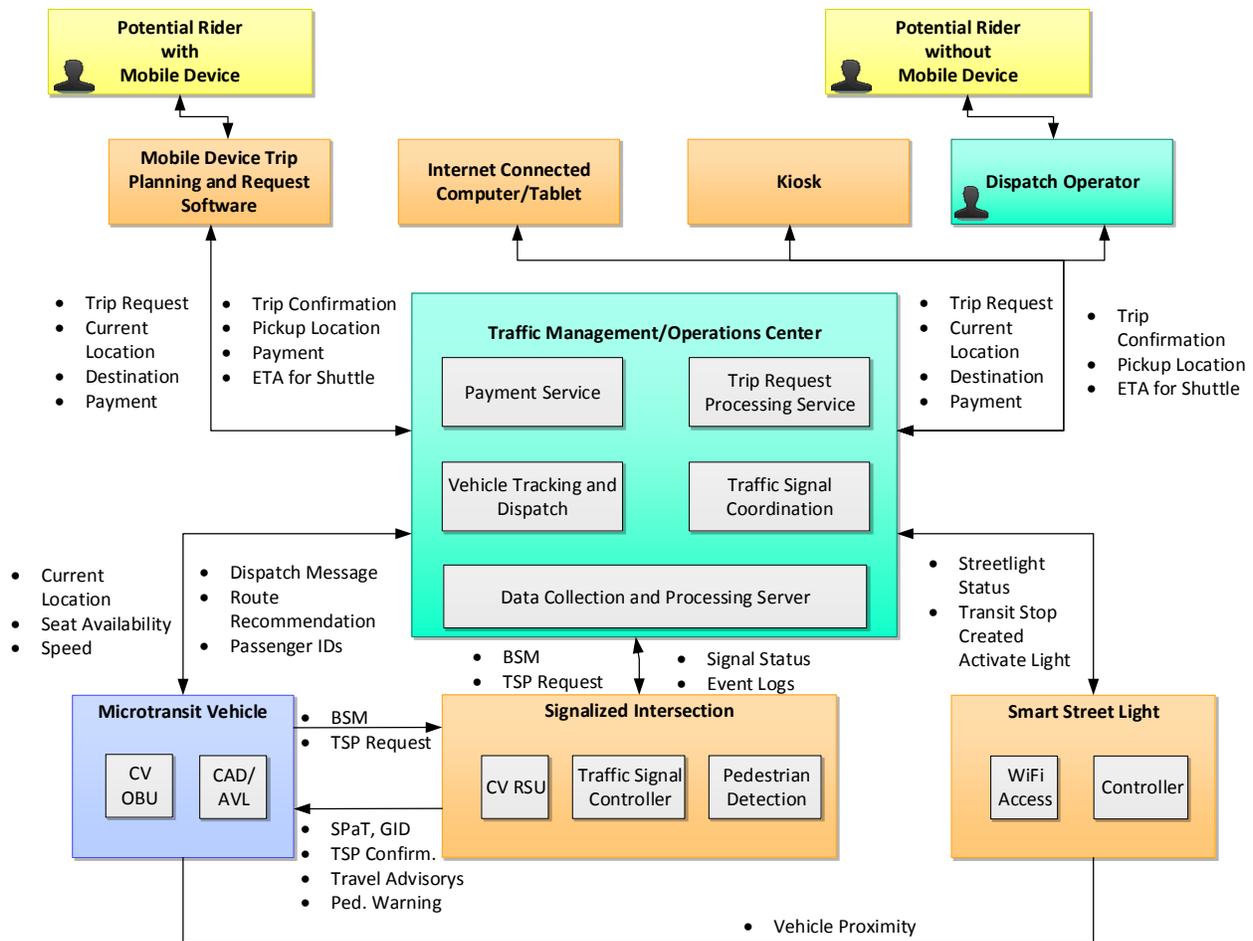


Figure 7. Preliminary Functional Physical System Architecture

Previous micro on-demand deployments of this type of technology in Kansas City, Boston, San Francisco, New York, Waterloo, and other cities provide a wealth of lessons learned and a guide for what can be done to make on-demand transportation an integral component of a community. Our proposed project differs significantly from prior micro on-demand projects in that we are not constraining the service to certain geographical zones within the city, but we are integrating fixed stations at popular destinations with pop-up stops throughout the rest of the city. Additionally, when the current MAX bus service pilot project concludes on December 31, 2017, there will be no remaining transit operations within the City outside of paratransit service. The need and demand for transportation options is significant while supply of services is minimal.

Deployment Plan

The technology being deployed as part of this project will establish an on-going micro on-demand rideshare system in the City of Arlington. We intend for this service to be a full-production, integrated part of our transportation operations. The City will assume full responsibility for the ongoing maintenance and sustainment of the system. To accomplish the goals and objectives of the proposed system, we have organized

activities and aligned schedules using a detailed Work Breakdown Structure (WBS). A high-level version of the WBS is presented in Figure 9.

TASK 1. PROJECT MANAGEMENT



Development of the PMP will be one of the first tasks initiated on this project. Regular status updates will be provided to USDOT annually as required by the grant and periodically as needed and desired by USDOT.

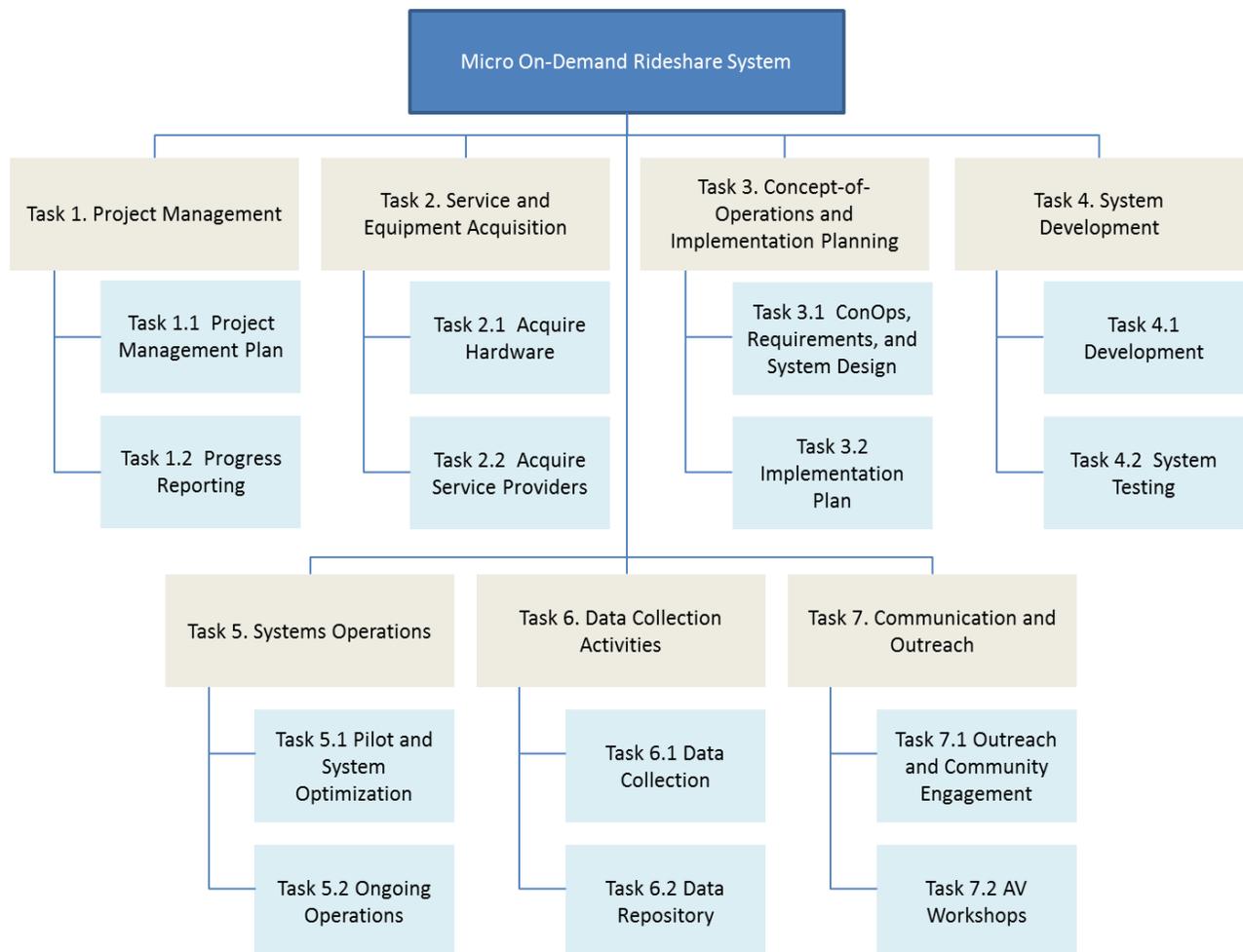


Figure 8. High-Level Work Breakdown Structure of the Project Rideshare System

TASK 2. SERVICE AND EQUIPMENT ACQUISITION

Following the completion of the PMP, the City will engage and begin the processes of acquiring the equipment and services needed to implement the project. In general, we will employ Arlington’s standard procurement practices to obtain these services and

equipment. Table 3 summarizes the anticipated equipment and services that are expected to be procured by the City following award.

Table 3. Anticipated Equipment and Services That Will Be Procured by the City Following Award

Description of Material/Service	Expected Quantity	Procurement Process	Expected Procurement Schedule Requirements
Equipment and Hardware			
Fleet of Driver Operated Shuttles	40	Competitive	60 Days
Fleet of Autonomous Vehicles (EZ10 from EasyMile)	2	Under Contract	30 Days
Connected Vehicle (DSRC) Roadside Equipment (RSE)	73	Competitive	120 Days
Connected Vehicle (DSRC) On-Board Equipment (OBE)	42	Competitive	120 Days
Interactive Kiosks	10	Competitive	60 Days
Smart Street Lights Wi-Fi Access	40	Existing City Negotiated Contract	30 Days
Services			
Concept of Operations and Planning Support	1	Competitive	120 Days
Micro On-Demand Software/Service Provider and System Operator	1	Competitive	120 Days
Data Acquisition and Hosting Provider	1	Grant Partner	30 Days
Connected Vehicle System Integrator and Installer	1	Competitive	120 Days

TASK 3. CONCEPT OF OPERATIONS AND IMPLEMENTATION PLANNING

Activities in Task 3 focus on planning and refining the design and implementation roadmap for the project. Included in this task are those elements of the System Engineering Process that are focused on the development of a Concept of Operations document, a System Requirements Specification, and a System Architecture/Design Document. Each of these documents will be prepared to be consistent with USDOT’s overall guidelines and expectations on such planning documents and will generally be consistent with IEEE standards for these planning tools. City staff will develop these documents with assistance from UT Arlington partners and a supporting consultant/service contractor.

TASK 4. SYSTEM DEVELOPMENT

It is the City’s intention to utilize as much Commercial-off-the-Shelf (COTs) equipment and software as possible to accelerate the deployment. In particular, among the several

different organizations that are currently providing micro on-demand services or software in cities across the U.S., we will evaluate which provider best provides a turn-key, though customizable, service that can be readily adopted and implemented in Arlington. As such, we expect the majority of the development activities to be those that are associated with further integration into the City's existing services and traffic operations practices. For example, developing procedures and linkages between the existing paratransit service and the new rideshare service will be an important development activity.

Following the System Development activities, a small scale deployment in a limited set of locations throughout the City will be conducted as a comprehensive field test of the system. During this testing, vendor staff, City staff, and other volunteers will attempt to utilize the system as end-users to identify any gaps in service, procedures, or software that need to be corrected prior to a full deployment.

TASK 5. SYSTEM OPERATIONS

As part of this task, City staff will manage the selected vendor's operation of the proposed system. However, prior to the launch of citywide operations, a Pilot Deployment that includes 2-3 of the fixed stops and geographically constrained service area will be conducted. This Pilot is expected to be a 60 day exercise to ensure that the system is fully operational and to allow for data to be collected so that the vehicle/traveler matching algorithms can be refined prior to full operations. At the conclusion of the Pilot, the City will announce the launch of the citywide system and begin full operations. We are expecting that this system will continue operations in perpetuity, but at a minimum will be operated for four years. Vendor operations will be managed by City staff as part of their ongoing traffic operations activities.

TASK 6. DATA COLLECTION ACTIVITIES

While one primary goal of the ATCMTD program is to promote the adoption of technology-based deployments, we fully understand that underpinning this goal is the strong desire to provide case examples and best practices for technology deployment activities including data that supports cost/benefit analyses. Recognizing this need, the City has engaged UT Arlington to serve as the primary organization responsible for collecting, processing, and distributing data generated during this project. We anticipate collecting a wide variety of different types of data as part of this project, summarized in Table 4.

Table 4. Data Collected to Support Evaluation of the System and Cost/Benefit Estimation

Description of Data to be Collected	Anticipated Data Collection Methodology	Frequency
UT Arlington will measure improvement in accessibility to major job destinations. UT Arlington will do a comparison of time to major job sites using the system vs. private auto.	System data and personal automobile probes	Two months prior to operations and then monthly during the first year of operation
Ridership and trips delivered	System Data	Ongoing
Satisfaction with service	On-board survey and mobile application	Ongoing
Travel Characteristics <ul style="list-style-type: none"> • Time of day • Day of week • Trip Purpose • Origin/Destination • Demographics • Trip Cost • Travel Time 	System Data	Ongoing
Utilization of TSP	System Data	Ongoing
System and Operational Costs	Records Analysis	Yearly
Locations of Pop-Up Stops and their frequency	System Data	Ongoing
Crash data within City Limits	Public Records	Ongoing

TASK 7. COMMUNICATION AND OUTREACH

As this will be a new service offered to residents and visitors to Arlington, a comprehensive communications and outreach plan and activities are needed to generate interest and ridership. The City will engage with community leaders, stakeholders, and the general public through a series of press releases, community events, informational fact sheets and flyers, and other such engagement activities. Our Mayor will announce the opening of the operational system at a press event that will be attended by City leaders, our partners, and other community leaders.

One of the considerations and components of this project is to begin to educate and familiarize the public with the concept of alternative travel options and modes of travel. In particular, the concept of a micro on-demand system is naturally extended into a system of autonomous shuttles. For this reason, we believe it is of critical importance to include the two autonomous vehicle shuttles as part of the system. We intend to conduct public workshops and engagement activities to introduce residents and visitors

in Arlington to this technology as well as the concepts of an on-demand rideshare service. Our partners will assist with this task, as EasyMile has committed to hosting at least one such event showcasing autonomous vehicles with City leadership and community leaders. In addition, Texas Health Resources, UT Arlington and the Arlington Convention and Visitors Bureau have committed to providing outreach and educational efforts for the micro on-demand rideshare system. City staff will continue these activities with support from UT Arlington on soliciting community feedback as part of our ongoing operations.

Regulatory Challenges

There are no regulatory issues that would prevent this project from being fully executed. The City will control and oversee the vehicle operations as well as the traffic signals, streetlights, and rights-of-way where the technology will be deployed. The City already has approval to operate a transportation service within the City limits as evidenced by the existing MAX service currently operating.

By limiting the autonomous vehicles to City-owned, shared mobility paths representing a fixed route for the shuttle, any potential issues with licensing or operating these vehicles on public streets is avoided. Eventually, as these vehicles become street-legal, the City will begin to transition them to on-street utilization. Because we are proposing to use DSRC equipment that is compliant with USDOT RSU v4.1 standards, provided by vendors that have previously had their OBE equipment prequalified by one of the three USDOT designated testing agents, we do not anticipate any difficulties in obtaining FCC clearance to operate this equipment.

Quantifiable System Performance Improvements and Quantifiable Safety, Mobility, and Environmental Benefit Projections

Micro on-demand transportation and the larger topic of Mobility as a Service (MaaS) have been the focus of discussions during the past decade, more so now that technology has made such services both practical and economical. There have been several cities that have attempted to establish micro or on-demand services including San Francisco, New York, Toronto, Kansas City, Boston, and others. While the benefits of these systems are currently challenging to quantify, their deployments suggest that these systems do provide performance improvements such as:

- **Reducing Greenhouse Gas (GHG) Emissions Due to Privately-Owned Vehicle (POV) Travel.** A recent study conducted by The Atmospheric Fund & Coop Carbone found that in the Greater Montréal Area, micro rideshare systems could deliver GHG reductions of up to 174.2kt carbon dioxide equivalent (“CO₂e”) over five years (or 3.8% of emissions from personal transportation) by capturing just 5% of personal car travel with a mixed micro rideshare fleet. In the Greater Toronto and Hamilton Area, the identification of specific use cases (i.e., well-defined, commonly

used travel patterns) provides an opportunity to introduce micro systems at scale to address key travel needs. In this region, micro on-demand rideshare systems could offer potential GHG reductions of up to 588.42kt CO₂e over five years (or 5.7% of emissions from personal transportation) by replacing personal car travel with a mixed micro on-demand fleet¹.” These GHG reductions are largely driven by the multi-passenger aspect of the micro on-demand rideshare service compared to personal automobile, and it is therefore not unreasonable to expect an even greater impact in the City of Arlington where the great majority of commuters currently use their cars to get to work. About 86 percent of workers drive alone to work and 12 percent carpool. Fewer than 2 percent walk to work and less than 1 percent commute by bicycle.

- **Improved Mobility.** Concrete estimates of mobility improvements due to micro on-demand rideshare systems are currently hard to estimate with any degree of accuracy. However, anecdotal evidence from the overwhelming growth in private TNCs and public mobility-as-a-service trials in places such as Helsinki, Singapore, and Germany under public and private cooperative programs suggest that these services are being used, they can deliver service similar to POV travel, and they can reduce or eliminate personal auto travel. In Arlington, the lack of widespread public transportation alternatives for travel combined with a growing senior, young adult, and low-income population who desperately need alternative, low-cost transport options suggests that this service will have a significant impact on improving the mobility of these segments of the population. In doing so, the system will also help foster economic growth and the continued transition of Arlington from a bedroom community into a thriving economic and destination city.

Vision, Goals, Objectives, and Performance Metrics

Arlington’s overall vision for this project is to demonstrate and quantify the benefits of dynamic micro on-demand systems in a mid-size city with limited existing alternatives for public transportation. We understand that MaaS and the concepts of micro on-demand ridesharing represent the leading edge of technology deployments and that there is a risk that the service will ultimately prove to be unsustainable. As an innovative city, Arlington is willing to accept this challenge and is committed to the goal of providing alternative transportation options for both residents and visitors. As stated previously, our specific objectives of this project are:

1. Improving Mobility of Seniors

¹ “Microtransit: An assessment of potential to drive greenhouse gas reductions,” The Atmospheric Fund & Coop Carbone, Fall 2016

2. Increasing Economic Vitality
3. Improving Access to Lower Wage Jobs
4. Reducing Poverty.

We will accomplish these objectives through the establishment of a new, efficient and low cost micro on-demand rideshare service throughout the city. Therefore, our fifth objective is to establish, manage and deliver the service operations.

Past trials and deployments of micro on-demand rideshare systems have met with both success and failure in cities throughout the world. Overall, the keys to success appear to be tied to ridership as a function of both need and availability of service, the reliability and flexibility of the service to provide travel times comparable to personal automobile, and the costs and revenues generated from service operations. Ultimately, however, the success of the project will not be measured in ridership or revenue but in terms of how well the system addresses the key societal issues facing Arlington. Our key performance measures of success will include both metrics of how well the system functions as well as measures associated with how well the system is addressing these societal issues. Table 5 summarizes some of the key performance metrics for this project.

Table 5. Proposed Performance Measures

Objective	Performance Measures
Improving Mobility of Seniors	<ul style="list-style-type: none"> • Number of trips made by Seniors • Utilization of the system in lieu of POV by Seniors • Reduction in accidents and incidents by Seniors
Increasing Economic Vitality	<ul style="list-style-type: none"> • Density and patterns of pop-up stops in relation to service employers in Arlington • Increase in number of young professional residents
Improving Access to Lower Wage Jobs	<ul style="list-style-type: none"> • Reduction in job unemployment rate among low-wage service positions • Demographic distribution of ridership and utilization of the service • Percentage of system trips utilized for travel to/from work • Travel patterns among residents of low-income sections of the City (changes in origin/destination and mode)
Reducing Poverty	<ul style="list-style-type: none"> • Decrease in the reported costs of transportation among low-income households relative to overall household income • Percentage of population below the poverty line as a function of frequency of trips and utilization of the system
Sustainable System Service	<ul style="list-style-type: none"> • Utilization rates • Travel time reliability • Satisfaction of riders

Partnerships

As described previously, the City will leverage existing partnerships and expertise from public, private, and university partners. In addition to these previously discussed partnerships, and as one of the major cities in Texas, Arlington is an active participant in the **Texas Innovation Alliance**. The agencies in each of the regions that are donating resources, staff time, and facilities as stakeholders are:

- Austin Area – City of Austin, Central Texas Regional Mobility Authority, Capital METRO, Capital Area MPO.
- Bryan/College Station – City of Bryan, City of College Station, and Brazos Valley Council of Governments.
- Corpus Christi – City of Corpus Christi and Corpus Christi MPO.
- Dallas/Fort Worth/Arlington Area – City of Arlington, City of Dallas, City of Fort Worth, City of Grand Prairie, North Central Texas Council of Governments, Tarrant County, Denton County Transit Authority, University of Texas at Arlington.
- El Paso Area – City of El Paso, County of El Paso, and Camino Real Regional Mobility Authority, and El Paso MPO.
- Houston Area – Houston METRO, City of Houston, Harris County, Port of Houston, Houston Galveston Area Council, Texas Medical Center, University of Houston
- San Antonio Area – City of San Antonio, VIA Transit, Alamo Area MPO, Joint Base San Antonio.

Arlington also is a key member of the **Texas Automated Vehicle Proving Ground Partnership**. The Partnership was one of ten recipients across the nation of the USDOT Autonomous Vehicle Proving Grounds Designation. This group of cities and entities across the State is committed to contributing to the autonomous vehicle community of practice through participation in USDOT organized meetings and events, sharing safety testing practices and procedures, participating in standards committee activities, making presentations to professional society events, and generating public outreach materials to advanced understanding of autonomous vehicle technologies. In addition, Texas has an existing autonomous vehicle community through each of the urban test site stakeholders. The Partnership will use this network of people, agencies, and companies to share best practices from autonomous vehicle research, development, and testing. These agencies fully understand the near-term and long-term mobility challenges facing their communities and how autonomous vehicle technologies can play a role in solutions.

Finally, Arlington is fortunate to benefit from a Transportation Advisory Committee (TAC) appointed by the Mayor and City Council. The TAC is a 31-member committee organized to develop recommendations for a future transportation plan for the City. The TAC is tasked with gathering information, analyzing data and developing a strategic

approach that will frame future decisions made by the City Council related to transportation in Arlington. The proposed TAC members include Arlington residents and stakeholders who represent a broad and diverse cross-section of the community. While their recommendations are not quite complete, the TAC has voiced strong support for rideshare services as a transportation solution in Arlington.

Leveraging Existing Infrastructure and Investments

The City boasts a "state of the art" Intelligent Transportation System (ITS) that is based upon industry best practices. Planning for the system began in the late 1990s with federal funding dedicated to traffic management and congestion mitigation. Implementation began in the early 2000s with ongoing current and future improvements.

The City's current system includes a fiber optic communications infrastructure with:

- Over 200 miles of Gigabit Ethernet wide area fiber optic cable
- 345 connected traffic signal controllers and cabinets with Siemens SEPAC controller firmware and NAZTEC TS2 Type 1 traffic signal controllers
- A highly sophisticated computerized central control system based upon a Hewlett Packard server system and a Siemens Tactics Central Traffic Control System.
- 145 pan/tilt/zoom traffic monitoring cameras at key arterial intersections
- Econolite, Peek, Iteris, Gridsmart, ITS Plus, and Wavetronix Smartsensor Matrix vehicle detection systems at over 100 traffic signals
- Dynamic Message Signs (DMS) with 8 overhead locations and 18 portable signs.

All of these systems are connected to and controlled from our Traffic Management Center (TMC). With an active-control approach to traffic management, technologies are integrated into a centralized system that provides unequalled capability and customer service. In the event of an accident or other roadway obstruction, City staff is able to dynamically adjust traffic signal timing to immediately improve traffic flow around the problem. In the case of special event management, City staff are able to provide signal timing adjustments as needed to aid patrons to arrive at and depart from the event in a manner unmatched by venues in other cities. From the TMC, operators are also able to reverse traffic flow on various arterials, convey important messages to venue patrons via DMS, and instantly react to early departures, accidents, or other roadway obstructions.

Leveraging Existing ITS Initiatives

Arlington is a city on the move, and is aggressive in the application of new technologies and procedures to enhance mobility for both residents and visitors. In addition to the extensive foundational elements required for technology deployments such as the micro on-demand system proposed, Arlington intends to leverage existing ITS technology

deployment initiatives, planned ITS activities and improvements, and USDOT and State initiatives to enhance the success and reach of the system.

LEVERAGING ONGOING TECHNOLOGY DEPLOYMENT PROGRAMS

The Micro On-Demand Rideshare System expands a growing list of technology deployments that collectively will greatly enhance mobility, reduce congestion, and address key societal issues within Arlington. There are three ongoing pilot technology projects and two data-related initiatives that will be leveraged to enhance the project.

Connected Signals Pilot Project. The City is partnering with Connected Signals, Inc., on a pilot project to evaluate the company's Enlighten advance traveler information system, which provides motorists real-time traffic signal status and red light wait-time information as they approach signalized intersections. The Enlighten system is co-installed with the City's advanced transportation management system software, enabling the Enlighten system to retrieve traffic signal information and display it on the motorist's onboard display unit. The onboard unit can be an Enlighten device or a smart phone with the Enlighten electronics app installed. Nearly 40 percent of our signals are connected as of now and more signals will continue to be added. This system will allow Arlington to expand a pseudo-transit priority among non-DSRC traffic signals by providing the micro shuttle with information needed to perform eco-arrival/departure at the traffic signals.

Automatic Traffic Operations Performance Evaluation Pilot Project. The City is partnering with Acyclica Inc., on a pilot project to deploy the company's traffic counting and performance measuring devices at 14 intersections on the City's major corridors. These devices collect traffic data such as volume, speed, origin and destination, percentage turning left or right, etc., from any vehicle with a Wi-Fi device – including the proposed micro on-demand rideshare vehicles. This continuous collection and storage of data (24/7, 365) enables accumulation of massive historic data, any portion of which the system can instantly analyze for performance measures, such as travel time, average speed, intersection delays, and signal synchronization performance. Additionally, this system will provide data that can be used for comparative travel-times analysis comparing POV travel to rideshare system travel.

Waze Connected Citizen Program. The City is participating as a partner in the Waze Connected Citizen Program. The Waze Connected Citizens Program gives the City a comprehensive overall look at real-time road activity, allowing the City to harness real-time driver insights to reduce congestion and make better informed planning decisions. In addition, this will also provide the city with access to data that will be used to better select routes for optimizing the rideshare service.

What Works Cities. The What Works Cities is an initiative of Bloomberg Philanthropies to promote the use and availability of data and evidence in decision making and to

increase public engagement. What Works Cities relies on a four step process in which cities commit to data and evidence use, measure progress towards goals, review results to take stock of progress and then make decisions based on that data and evidence. Arlington will improve its ability to treat data as a strategic asset, leveraging it more effectively for reliable insights and more efficient service provision, and laying the foundation for advanced data practices. This includes a focus on making data more consumable, reliable, and readily available for residents, departmental staff, and leadership by developing policies and processes to routinely inventory, prioritize, release, maintain, track, and visualize data. This work will allow the city to better capitalize upon the system data being generated by the project deployment.

Open Data Portal. The open data site provides the public with the same information the City uses to make decisions. When City employees are reviewing building permits or code complaints, citizens are seeing the same data. Making this information more readily available and consolidated in one place means citizens don't have to figure out which City Department to contact to get their questions answered. The website also aligns with the City Council Priority to "Put Technology to Work." Besides increasing transparency for citizens, the site is also expected to improve efficiency and time management for City staff by answering many of the common questions that citizens may have about their neighborhood. This mechanism will be an important tool for interacting with the public on questions and answers regarding the rideshare system.

LEVERAGING PLANNED ITS ACTIVITIES AND IMPROVEMENTS

Arlington has updated the traffic signal system software to the latest version of TACTICS central system software. This allows the City to have peer-to-peer communication between signals, implement innovative signal timing and operations features, and have the system ready to incorporate future connected vehicle devices. We have also started upgrading our controllers to advanced transportation controllers (ATC) with Linux based operating systems. These upgrades allow City staff to implement several innovative and safety-enhancing operations at signalized intersections. The City will leverage this programmed improvement system for the proposed service by prioritizing the signal controller upgrades to the 73 signalized intersections with Connected Vehicle TSP. These upgrades will be timed to include the addition of DSRC radios to connect to these new controllers at each intersection.

LEVERAGING USDOT AND STATE INITIATIVES

Arlington is clearly leveraging the major investments made by USDOT in the Connected Vehicle Research Program and is utilizing the lessons learned from the Connected Vehicle Safety Pilot, Regional Pilots, and Dynamic Mobility Application research. Signal Prioritization is one of the key applications for connected vehicle technologies as are the other inherent safety applications expected to be included in the equipped radios (e.g., Basic Safety Messages, Emergency Electronic Brake Lights, etc.). We will ensure that

all Roadside equipment is in compliance with RSU V4.1 specifications in addition to the SAE J2735 message sets and the IEEE 802.11p and 1609.2 standards. We intend to fully leverage USDOT's Security Management and Credentialing System as part of the deployed system.

We believe that MaaS is the future of transportation and applaud FTA in sponsoring research in this area through the Mobility on Demand (MOB) Sandbox Program. We recognize that this program will provide many additional lessons-learned that can be used as part of designing and implementing an optimized system. We intend to collaborate with successful grant applicants to share and exchange concepts and leverage resources to the fullest extent possible.

The State of Texas is a leader in transportation and has five of the nation's 15 fastest growing cities; the population is expected to more than double by the year 2050. Texas seeks to manage this disruption proactively rather than allow rapid urbanization to stifle the economy. The Texas Innovation Alliance builds upon the momentum of the USDOT Smart City Challenge, in which Austin was a finalist, and is a direct outcome of the Texas Mobility Summit held on December 1-2, 2016. The Texas Department of Transportation (TxDOT) is supporting the Texas Innovation Alliance. The Summit brought together 9 teams representing 10 cities to galvanize key leadership in developing innovative solutions to Texas' mobility challenges. The teams are committed to continuing the collaboration to advance autonomous vehicle technology throughout the State.

Arlington also participates as a partner in the Automated Vehicle Proving Ground Partnership that was recently identified by USDOT as one of ten designated proving grounds for autonomous vehicles. Within this partnership, Arlington was further designated as a test bed for autonomous vehicles, particularly autonomous transit vehicles. Inclusion of these vehicles, even on fixed, non-public routes, provides an opportunity for Arlington to access the committed resources and expertise of the Autonomous Vehicle Proving Ground Partnership as part of this project.

Schedule

The need for a Micro On-Demand Rideshare System in Arlington is great and an extended delay before deployment would cause additional hardships to seniors and persons below the poverty line and those working at low-paying service jobs. Recognizing this growing problem, the City has already conducted planning activities necessary to bring such a service to Arlington. Winning the ATCMTD grant will enable Arlington to increase the pace of deployment and accelerate the establishment of this service. To this end, the City is proposing an aggressive schedule for this project and is committed to optimizing the schedule as much as possible to field the technology as quickly as possible. Prior to the award, we will begin to prepare procurement packages

and planning documents that will minimize any “process delays” associated with the procurement process. We understand the terms of the grant and have successfully implemented similar grants and technology deployments. As previously discussed, we expect the system to operate in perpetuity, but for the purposes of this grant are proposing a four-year project with the final year of the project transitioning to a largely self-sustaining system. Table 6 summarizes the proposed schedule for the project.

Table 6. Proposed Schedule

Task Name	Duration (Days)	Start	Finish
Project Management	1459	1/1/2018	12/30/2021
Kickoff Meeting	1	1/15/2018	1/15/2018
Monthly Progress Reports	1	1/15/2018	12/15/2021
Service and Equipment Acquisition	200	6/20/2018	1/6/2018
Fleet of Driver Operated Shuttles	90	9/28/2018	12/27/2018
Autonomous Vehicles	90	9/28/2018	12/27/2018
Connected Vehicle (DSRC) RSEs	120	6/20/2018	10/18/2018
Connected Vehicle (DSRC) OBEs	60	9/28/2018	11/27/2018
Kiosks	200	6/20/2018	1/6/2019
Smart Street Lights with WiFi	100	6/20/2018	9/28/2018
Concept of Operations and Implementation Planning	269	1/1/2018	9/27/2018
Concept of Operations	120	1/1/2018	5/1/2018
System Requirements Specification	82	4/16/2018	7/7/2018
Architecture and Design	97	6/22/2018	9/27/2018
System Development	300	9/27/2018	7/24/2019
Development/Acquisition and Customization	210	9/27/2018	4/25/2019
Testing	90	4/25/2019	7/24/2019
System Operations	889	7/25/2019	12/30/2021
Pilot Launch	89	7/25/2019	10/22/2019
System Optimization	70	10/22/2019	12/31/2019
Launch and Operations	730	12/31/2019	12/30/2021
Use of Rangers trails for CAV	730	12/31/2019	12/30/2021
Data Collection Activities	1459	1/1/2018	12/30/2021
Contracted Costs UT Arlington	1459	1/1/2018	12/30/2021
Communications and Outreach	1459	1/1/2018	12/30/2021
Autonomous Vehicle Workshop	30	1/1/2018	1/31/2018
Public Engagement Materials and Events	1459	1/1/2018	12/30/2021
Report to the Secretary	Annually	1/1/2019	12/30/2021

Staffing

Project Management and Key Staff

This project will be staffed and managed using the organizational structure provided in Figure 10. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

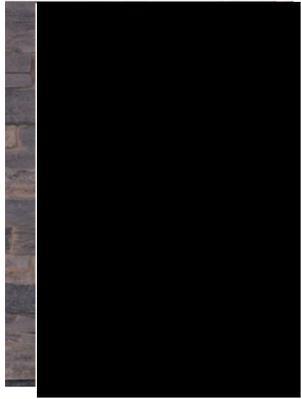


[REDACTED] Key Staff

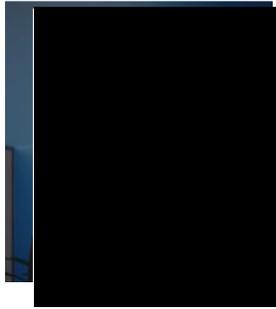
Primary Point of Contact

Ms. Mindy Carmichael will be the primary point of contact for this grant. Her contact information is:

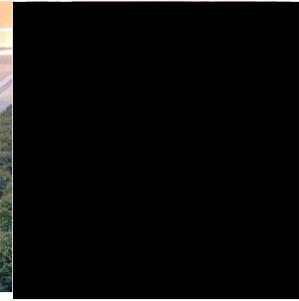
Mindy Carmichael, P.E.
Director of Public Works and Transportation,
City of Arlington
101 W. Abram St.
Arlington, TX 76010
(817) 459-6552
Mindy.Carmichael@arlingtontx.gov



[Redacted text block]



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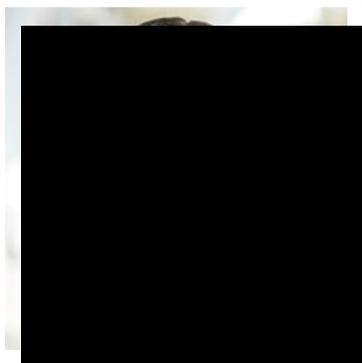
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