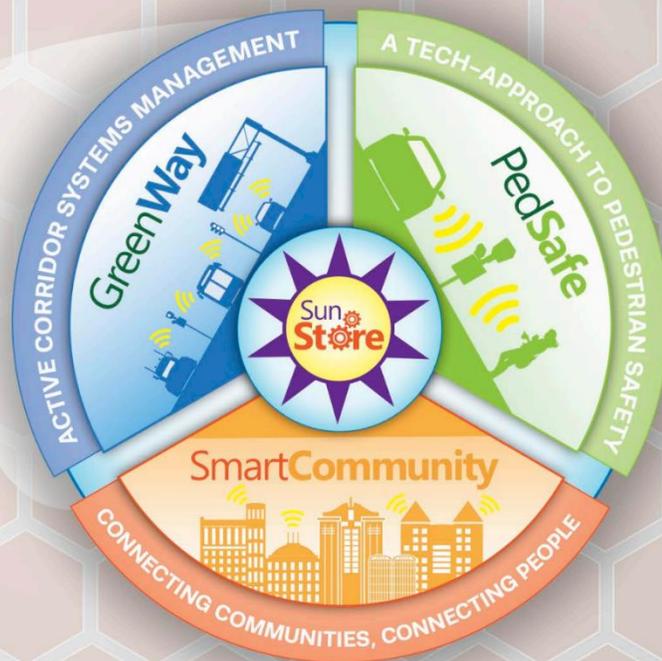


Connecting the East Orlando Communities

Volume 1 - Technical Application



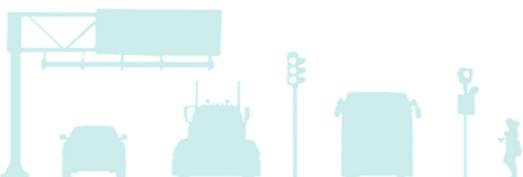
Advanced Transportation and Congestion
Management Technologies Deployment
Initiative Notice of Funding Opportunity
Number 693JJ317NF0001

In Partnership With



UNIVERSITY OF
CENTRAL FLORIDA

Project Name	Connecting the East Orlando Communities
Eligible Entity Applying to Receive Federal Funding	Florida Department of Transportation
Total Project Cost (from all sources)	\$65,031,289
ATCMTD Request	\$11,946,279
Are matching funds restricted to a specific project component? If so, which one?	Yes. Matching funds from local agencies are being used for deployments or upgrades on systems in their respective jurisdictions. Details are provided in Volume II.
State(s) in which the project is located	Florida
Is the project currently programmed in the: <ul style="list-style-type: none"> • Transportation Improvement Program (TIP) • Statewide Transportation Improvement Program (STIP) • MPO Long Range Transportation Plan • State Long Range Transportation Plan 	Yes – elements/phases of the project are already programmed in the TIP, STIP, and long range transportation plans. Minor updates to the TIP/STIP would be needed to advance the deployment phase if awarded.
Technologies Proposed to Be Deployed (briefly list)	<ul style="list-style-type: none"> • Advanced traveler information systems • Advanced transportation management technologies • Infrastructure maintenance, monitoring, and condition assessment • Advanced public transportation systems • Transportation system performance data collection, analysis, and dissemination systems • Advanced safety systems, including vehicle-to-vehicle and vehicle-to-infrastructure communications, technologies associated with autonomous vehicles, and other collision avoidance technologies, including systems using cellular technology • Advanced mobility and access technologies, such as dynamic ridesharing and information systems to support human services for elderly and disabled individuals



Mrs. Elaine Chao - Secretary
United States Department of Transportation
1200 New Jersey Ave, SE, Washington, DC 20590

RE: *Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD) Initiative Grant Application*

Dear Secretary Chao:

The Florida Department of Transportation (FDOT) continues to move from a “shovel ready” approach to a “connection ready” philosophy. Connection Ready goes beyond the threshold of whether a project can be quickly implemented. Connection Ready is a focus and plan for how projects connect communities, transportation modes, technologies and data, economic drivers, investments, short and long-range plans, and, ultimately, a focus on how to best connect people. New connections will improve the safety, livability, economic opportunities, and mobility of a region, city, neighborhood, and individual.

Commitment: USDOT's ATCMTD Initiative is an extraordinary opportunity to advance key connection opportunities in East Orlando and the Central Florida region by leveraging local, regional and state resources with federal funds to improve mobility and safety. The \$12 million of Federal funding requested will be matched by \$53 million in non-federal funds or in-kind assets. In addition, FDOT has programmed \$47 million over the next five years (the limit of the work program) for the operations and maintenance of the program so the user and community benefits will exist long after the grant has been implemented.

Technology: The FDOT, MetroPlan Orlando (the MPO for Orange, Seminole and Osceola Counties) and the University of Central Florida (UCF) will utilize the grant to advance the following opportunities:

1. **PedSafe** is an innovative pedestrian and bicycle collision avoidance system currently being designed by the FDOT. PedSafe will connect advanced signal controller capability, use of Connected Vehicle (CV) technologies, and existing communication capabilities to reduce the occurrence of pedestrian and bicycle crashes. As a region and a state that annually tops the Dangerous by Design list of most dangerous areas for walking, development and implementation of PedSafe is an immediate priority with multiple benefits. The application will be easily transferable throughout the country.
2. **GreenWay** is a FDOT project to connect Advance Sensor Technology, Conditional Transit Signal Priority (TSP), Adaptive Deployment Traffic Signal Interface with Track Positive Train Control (SunRail), and Smart Parking technology with Signal Performance Metrics (SPM), Expand Integrated Corridor Management (ICM), and Signal Control Analytics and Visualization. GreenWay is designed to better utilize the multimodal transportation system by actively managing over 1,000 traffic signals within the region. Data managed in the proposed SunStore will be connected with GreenWay to support Real Time Operation through a regional Decision Support System (DSS). This connection will allow strategic planning for special events to include consideration of all modes and users and will provide a unified approach to system operations and management.
3. **SmartCommunity** is an integrated program that connects people to the places they need to go and the services they need to receive. Through a Mobility on Demand (MoD) framework, SmartCommunity leverages existing ridesharing and car sharing products to offer residents access to cars when required. SmartCommunity's trip planning application, Transit AVL, and Transit Kiosks will provide real-time multimodal travel information to integrate trip planning with modal choice options. SmartCommunity will allow travelers in the same area to share information and coordinate trips to destinations such as employment centers, education facilities, the grocery store, and medical treatment centers. SmartCommunity will have a benefit for low income and underserved populations in the area and help to connect the community to the region.

4. **SunStore** is an ongoing FDOT initiative to connect and integrate the many data sources created and utilized by the FDOT. SunStore includes Master Data Management, Data Fusion, and Sensor Fusion for increased data quality. SunStore interfaces with Florida's Data Integration and Video Aggregation System to make transportation data available to universities, research institutions, and businesses to encourage and support innovation. Data in SunStore will be used to support the PedSafe, GreenWay, and SmartCommunity deployments.

Implementability: The East Orlando area to implement PedSafe, GreenWay, and SmartCommunity was strategically chosen to be part of a Smart City vision for the Central Florida Region. The area is anchored by the University of Central Florida and is part of a CV environment that includes an existing FDOT CV test bed to the north and a Central Florida Expressway CV demonstration project to the south. The area experiences bike and pedestrian safety issues, congestion, and limited connectivity to the broader transportation system. The area is ideal for congestion management technology due to the existing robust communication and multimodal network, a population of people comfortable and equipped with technology (such as university students), and a transit, bicycle, and walking dependent population. It is expected that the community will see immediate benefits related to pedestrian and bicycle safety, and increased accessibility to traveler information and mode choices. This expectation of change and improvement will be measured and documented using a range of defined performance measures. This area is truly Connection Ready!

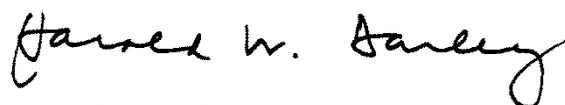
Scalability/Portability: But a successful implementation and use of the grant funding in East Orlando is just the beginning. The lessons learned and technology and processes developed will quickly be applied to the currently developing Creative Village in Downtown Orlando. The Creative Village will be a 68-acre transit oriented, urban infill neighborhood in the heart of Orlando that supports a dynamic mix of uses including office/creative studios, higher education, PS-8 education, mixed-income residential, retail/commercial and hotel. It is expected that the Creative Village will add over 10,000 students and residents to downtown Orlando. With vertical construction underway, the Creative Village is Connection Ready! This pattern of using and improving upon the technology developed by the grant can be repeated throughout the Orlando and Central Florida area. Over \$100 million in non-federal funds or in-kind assets has been committed to make these connections happen. The presence of over 65 million visitors to the region will serve as demonstration of the benefits of the project implementation.

We are proud of the work that is underway in the region and the connections we have made. Our success has been based on collaboration with counties, municipalities, transportation agencies, and UCF. In this spirit, 28 local governments and regional agencies have approved Resolutions in support of the grant application. This letter confirms our full commitment and endorsement for the grant application in response to the Notice of Funding Opportunity (NOFO) dated April 12, 2017. We look forward to working with your team on this exciting opportunity. We are Connection Ready!

Sincerely,



Steve Martin, PE
District Secretary | FDOT District Five



Harold W. Barley
Executive Director | MetroPlan Orlando

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1 SUMMARY TABLE

Selection Criteria		Description	Reference
Technical Merit			
1	Degree that the proposed technology deployment aligns with vision, goals and focus areas in Section A of this announcement.	HIGH - The project aligns with the program’s vision by integrating Smart City systems and communications into routine functions to address the region’s issues and challenges in safety, mobility, sustainability, economic vitality and air quality. The project’s ability to achieve specific Goals and Focus Areas identified in Section A are identified with a  icon throughout the document.	§2.1, 2.4, 2.9, 2.10
2	Readiness of the proposed technology(ies) to be deployed, and the likelihood of success of the applicant to deploy and sustain the proposed technology(ies), including the proposed approaches to addressing any regulatory environment and other obstacles to deployment.	HIGH - The Department has committed funding for the implementation of SunStore and the design for GreenWay and PedSafe projects - the project is Connection-Ready, and the grant funding will be utilized for deployment. Funding for operations and maintenance is committed in FDOT’S work program.	§2.12
3	Scalability or portability of the proposed technology deployment to other jurisdictions.	HIGH - The project is designed with scalability and portability in mind, with this initial deployment in a subregion of East Orlando. The broader vision is for a future scaled deployment in the City Beautiful’s Central Business District and on routes of significance throughout the Central Florida region and statewide.	§2.3
4	Commitment to evaluate the effectiveness (i.e., cost-benefit) of activities proposed.	HIGH - The project has developed a methodology and dedicated funding to evaluate of activities. Based upon lessons learned from recent CV pilot deployments, the appropriate data collection equipment will be identified and included for the evaluation. UCF has also partnered on the project to re-search the project's effectiveness and provide real-time enhancements to maximize effectiveness.	§2.8
Staffing			
1	Degree that the Application includes a program/project management structure or organization that will successfully oversee the proposed technology deployment.	HIGH - The project includes a fully staffed team of experts with strong working relationships, and the project manager is currently overseeing over \$150 million in ITS program funds. The team is already working together within their defined roles to successfully prepare the project for deployment.	§3
2	Expertise and qualifications of key personnel for managing or conducting appropriate aspects of the proposed technology deployment through the period of performance.	HIGH - The key personnel identified for this project have the expertise and qualifications to successfully deploy and operate the project through the performance period. They are local experts that work in the area and know the area. The project's scalability and portability will continue to strengthen the Department's workforce capability as similar projects are developed and deployed.	§3
Cost			
1	Cost will be considered in the award decision. The cost information will be analyzed to assess cost reasonableness and conformance to applicable cost principles. Applicants must provide the required matching funds, and supporting detail for these funds.	HIGH - The project requests \$12M in federal funding, which will be matched with \$53M committed in non-federal matching funds or in-kind assets. The requested funds do not exceed the maximum and will be matched at a rate of 4.4:1 in non-federal funds or in-kind assets or services from its partners (FDOT, MetroPlan Orlando, UCF, local agencies). The cost estimate was vetted through Siemens, a technology provider, to verify accuracy.	Volume 2
2	Funding availability will also be considered in the award decision. This evaluation factor will not be rated, but will be considered in the award selection.	Available - The project requests \$12M in federal funding, less than the maximum for the grant, and will match the awarded funds with \$53M committed in non-federal funds or in-kind assets and services.	Cover
Project Prioritization			
1	The Department will prioritize projects that also enhance personal mobility and accessibility.	HIGH - The project utilizes transportation technology, data, and services to better connect people to essential services including employment centers, health care, education facilities, healthy food, and recreation. The project removes physical barriers to access with deployments focused on enhancing transit services and pedestrian/bicycle accessibility.	§2.1
2	The Department may consider whether a project’s design is likely to generate benefits for all users of the proposed project, including non-driving members of a community adjacent to or affected by the project.	HIGH - The project has a primary focus on improving safety and mobility for all users, including improved pedestrian/bicycle safety and improving public access to real time integrated traffic, transit and multimodal transportation information to make informed travel decisions.	§2.1

2 PROJECT NARRATIVE

Florida is facing a new and rapidly developing environment with an aging and increasingly diverse population, both culturally and economically. Demand on the transportation system has never been higher. In addition to growth and diversity, Central Florida has one of the highest frequencies of pedestrian crashes. The Florida Department of Transportation (FDOT) and MetroPlan Orlando are committed to solving the challenges of this growing demand on the system, supporting underserved communities with safe transportation options, and improving safety and mobility for all modes of transportation.

One area with unique mobility challenges in the East Orlando area, home to the University of Central Florida (UCF) and the Central Florida Research Park (CFRP). UCF currently has the **second highest number of enrolled students in the U.S.**, with more than 64,000 students. Recent growth at UCF has increased enrollment from about 34,000 students in 2000 to its present level. About 2,000 faculty members and 9,000 staff members work at UCF. Immediately abutting UCF, the CFRP is the **largest research park in Florida**, home to more than 10,000 employees in over 100 companies. About \$1.4 billion in federal contracts is awarded by the U.S. military each year for activities in and around the vicinity of the CFRP.

Despite the high level of activity and momentum in the East Orlando area, workers, residents, and students continue to struggle with mobility issues, including pedestrian safety, transit reliability, and non-recurring congestion due to special events. Furthermore, due to its location on the fringes of the Orlando urbanized area, the East Orlando area's single primary connection to major employment, cultural, and entertainment destinations is a tolled freeway.

FDOT District Five and its partners see a golden opportunity to leverage technology to connect the workers, residents, and students in the East Orlando area. Throughout the years, FDOT has

worked with local partners to lay the groundwork for technology deployment, including a robust communication and data storage system. Most recently, FDOT began the design, development, and population of a regional data store—named **SunStore**—that will serve as the backbone of the region's Transportation Systems Management & Operations (TSM&O) efforts. In summary, this area and this region are *Connection Ready*.



In addition, the demographics of the area suggest that the residents are younger and better educated. They are likely to embrace, use, and help develop the innovative technology that is needed to enhance mobility opportunities.

But a successful implementation of smart technology is just the beginning. The lessons learned and technology and processes developed will immediately be applied to the currently developing Creative Village in Downtown Orlando, connecting the residents and employees in the City's Central Business District to employment opportunities, healthcare choices and educational institutions.

2.1 Proposed Programs

The technology solutions being proposed will connect with and leverage the existing technology infrastructure to create a unified transportation management system. The East Orlando area will provide the demonstration of the technologies for future deployment across Florida's many urban and rural areas. We are proposing the following three interrelated programs: **PedSafe**, **GreenWay**, and **SmartCommunity**. Brief introductions to the programs are presented in this section, with additional details provided in §2.5 Services and Systems.

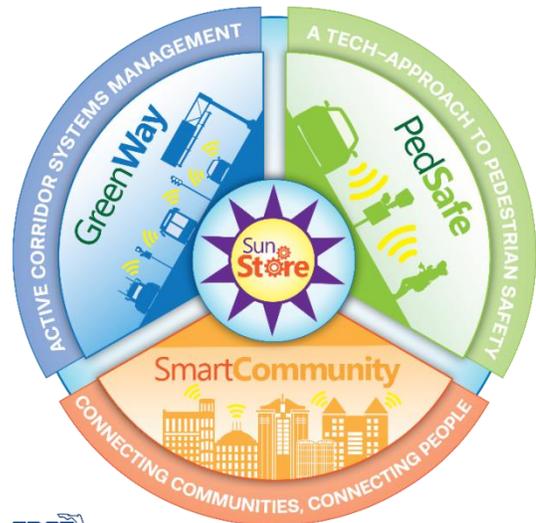
2.1.1 PedSafe

The growth in enrollment and jobs in the East Orlando area has led to the opening of retail, restaurants, and housing choices. As the mixture of the vehicular, pedestrian and bicycle traffic has grown, many crashes involving pedestrians or bicycles with vehicles have occurred throughout the community. Between 2006 and 2014, 259 crashes involving pedestrians or bicycles have occurred along Alafaya Trail, University Boulevard, and McCulloch Road, of which, 11 were fatalities and 207 were injuries.



This is a dire and complex problem which requires a combination of solutions, including infrastructure, enforcement, education, and technology. **PedSafe** is an innovative pedestrian and bicycle collision avoidance system that uses connected vehicle (CV) technologies to reduce the occurrence of pedestrian and bicycle crashes at high crash rate locations. Connections to existing traffic signal systems will provide information on phasing changes along with pedestrian detection at each intersection to manage potential conflicts and congestion within the PedSafe area.

- **Problem #1:** Pedestrian phases are ending with pedestrians still in crosswalks.
Solution: PedSafe will dynamically adjust signal timings to allow for completion of pedestrian movements.
- **Problem #2:** Buses, trucks, and large vehicles have a hard time noticing pedestrians and bicyclists.
Solution: PedSafe will use connected vehicle technology to warn drivers, and pedestrians, of a potential conflict.
- **Problem #3:** Long cycle lengths discourage pedestrians from using signalized crosswalks.
Solution: PedSafe will monitor pedestrian activity and break cycles during off-peak periods to provide enhanced pedestrian service.



The following ATCMTD goals are directly addressed by the PedSafe program:

- ✓ Reduction in the number and severity of traffic crashes and an increase in driver, passenger, and pedestrian safety: PedSafe integrates CV technology, existing signal systems, and mobile applications to reduce the occurrence of pedestrian-bicycle conflicts at intersections
- ✓ Accelerated deployment of vehicle-to-vehicle, vehicle-to-infrastructure, and automated vehicle applications, and autonomous vehicles and other advanced technologies: PedSafe is built upon CV and V2I technology and will accelerate deployment of such technology
- ✓ Integration of advanced technologies into transportation system management and operations: PedSafe not only senses pedestrian presence and potential conflicts but interacts with signal timing infrastructure to provide enhanced pedestrian service at intersections

Additional details on PedSafe are provided under Section 2.5.

2.1.2 GreenWay

The GreenWay Program is designed to reduce congestion and increase reliability by actively managing traffic signals within the East Orlando area.

The proposed GreenWay program incorporates Central Florida's Active Detection Technology (ADT) and elements of Orlando's Smart City initiative to improve the multimodal movement of people and goods. Available information from traffic signals will be fused, normalized and then processed by deterministic or stochastic models. Real-time results will then be presented in a consumable format to Signal Timing Engineers to use in actively managing traffic signal systems. Alerts will also be provided connecting the response of emergency services, bus, and commuter rail.



- **Problem #1:** Data on intersection performance is expensive, time-consuming, and only available for short snapshots of time.
Solution: GreenWay will equip traffic signals with technology that will enable FDOT to monitor intersection usage and performance in near-real time from the comfort of its new traffic management center.
- **Problem #2:** When special events such as UCF football games happen in East Orlando, traffic grinds to a halt.
Solution: GreenWay will deploy adaptive signal technology that automatically adjusts signal timing based on actual conditions, improving traffic flow and reducing demand on law enforcement resources for traffic management.
- **Problem #3:** Due to lack of coordination, train crossings result in more delay to vehicles than necessary.
Solution: GreenWay will connect railroad crossing signals to trains using Positive Train Control (PTC) to reduce delay without impacting safety.

- **Problem #4:** Transit riders regularly complain about long waits when transferring, and especially about those “near misses”.
Solution: GreenWay will implement transit signal priority to enhance on-time arrival for all transit vehicles, but especially when transfers are involved. A connected vehicle pilot in Tampa, FL is already leveraging that technology to implement transit signal priority. This same technology could also be used to reduce delays for emergency response vehicles.

The following ATCMTD goals are directly addressed by the GreenWay program:

-  **Reduced costs and improved return on investments, including through the enhanced use of existing transportation capacity:** GreenWay will improve the efficient use of existing capacity through adaptive signal control and transit signal priority.
-  **Delivery of environmental benefits that alleviate congestion and streamline traffic flow:** Through the use of improved signal coordination, GreenWay will reduce stopping and starting vehicle platoons resulting in less fuel consumption and fewer emissions.
-  **Measurement and improvement of the operational performance of the applicable transportation networks:** GreenWay incorporates Central Florida's Active Detection Technology to improve the multimodal mobility through real-time measurement and active management of traffic signal systems.
-  **Reduction in the number and severity of traffic crashes and an increase in driver, passenger, and pedestrian safety:** GreenWay includes CV technology deployments at select locations including queue warning, curve speed warning, and vehicle

turning in front of bus warning. Applications such as these are already being demonstrated in Tampa, FL and New York City.



Collection, dissemination, and use of real time transportation related information to improve mobility, reduce congestion, and provide for more efficient and accessible transportation, including access to safe, reliable, and affordable connections to employment, education, healthcare, freight facilities, and other services:

GreenWay incorporates Central Florida's Active Detection Technology to improve multimodal mobility through real-time measurement and active management of traffic signal systems connecting to East Orlando residents, employment centers, the UCF campus, and healthcare facilities. All data produced by GreenWay will be fed into FDOT's SunStore, making it easily accessible to its partners.



Monitoring transportation assets to improve infrastructure management, reduce maintenance costs, prioritize investment decisions, and ensure a state of good repair: GreenWay includes connections to SunStore and the Regional Traffic Management Center to diagnose equipment failures and create maintenance tickets in real-time.



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: GreenWay incorporates Central Florida's Active Detection Technology to actively manage East Orlando's arterial corridors, reducing system delays for commuters, students, and freight vehicles on the road.



Accelerated deployment of vehicle-to-vehicle, vehicle-to-infrastructure, and automated vehicle applications, and autonomous vehicles and other advanced technologies: GreenWay includes deployment of CV technology for safety applications and autonomous shuttle deployment for shuttling between UCF and off-campus housing.



Integration of advanced technologies into transportation system management and operations: GreenWay's deployment of CV technology, AV technology, and automated traffic signal performance measure technology will integrate with SunStore and FDOT's and Regional Traffic Management Center to advance the regional effectiveness of its TSM&O program.

Additional details on GreenWay are provided under Section 2.5.



2.1.3 SmartCommunity

SmartCommunity is an integrated program that aims to connect communities by connecting people to the places they need to go and the services they need to get. The SmartCommunity proposal is rooted in a regionwide emphasis around USDOT's Smart Cities initiative, which has engaged leaders in the community to think about ways to use technology to improve quality of life.

Deploying SmartCommunity in the East Orlando area is expected to alleviate or eliminate current and future challenges, including access to regional destinations, sustainable energy production, and the steep burden of transportation costs on residents. The deployment will integrate well with UCF's plans for a 50-acre, 12 MW Solar Farm. The Solar Farm targets the key University Climate Action Plan goals of achieving 15% renewable energy by 2020, with a firm commitment to sustainability by offsetting 28 tons of CO₂ annually and providing clean energy.

- **Problem #1:** The East Orlando area's only primary connection to the rest of the region is a tolled freeway. The need for multimodal access is expected to grow with the completion of the Creative Village in downtown Orlando.

Solution: The SmartCommunity program has a strong transit component that will efficiently connect this community to the rest of the region. SmartCommunity's transit services will be data-centric, providing operators and users with real-time information on bus arrivals and performance.

- **Problem #2:** The energy needs of the East Orlando area have continued to grow as the area attracts more workers, residents, and students. **Solution:** SmartCommunity proposes both central and distributed renewable energy production in more locations. UCF already produces



solar energy, and is contemplating a 12-megawatt solar plant which will save \$2M in utility bills each year.

- **Problem #3:** Workers, residents, and students in the East Orlando area must spend significant parts of their income on automobiles.

Solution: Through a Mobility on Demand (MoD) framework, SmartCommunity leverages existing ridesharing and carsharing products to offer East Orlando residents access to cars when they need them, reducing the need for car ownership.

The following ATCMTD goals are directly addressed by the SmartCommunity program:

- ✓ Collection, dissemination, and use of real time transportation related information to improve mobility, reduce congestion, and provide for more efficient and accessible transportation, including access to safe, reliable, and affordable connections to employment, education, healthcare, freight facilities, and other services:

SmartCommunity's trip planning application, Transit AVL, and Transit Kiosks will provide real-time multimodal travel information to integrate trip planning with modal choice options and improve mobility. The program's dynamic ridesharing application will allow travelers to coordinate similar trips together and encourage carpooling within the area.

- ✓ Integration of advanced technologies into transportation system management and operations: SmartCommunity will include smart parking applications to improve the distribution of traffic and parking throughout the community and to effectively manage demand during events. The program's dynamic ridesharing application will allow travelers to carpool.

Additional details on SmartCommunity are provided under Section 2.5.

2.2 Entities Entering Agreement

The **FDOT** will be the entity that will enter into the agreement with the FHWA and deliver the project.



The FDOT is an executive agency, which means it reports directly to the Governor. The FDOT is decentralized in accordance with legislative mandates. Each District is managed by a District Secretary has major divisions for Administration, Planning, Production and Operations.

The FDOT Central Office will play a key role in ensuring transportability and scalability of projects. They will be responsible for updating Department policy, procedure, design standards, and specification to support advancements made within the projects. Additionally, FDOT software is managed from the Central Office and the same staff will be used to manage the software development effort as part of this work. Design, construction, integration, operations, and maintenance will occur at the District level using District staff. This includes data management functions.

2.2.1 Key Partners

The following organizations will play active roles throughout the life of the project:

MetroPlan Orlando:

MetroPlan Orlando will play a key leadership role to ensure projects meet their intended purpose and that local agency support is maintained throughout the project's life.



MetroPlan Orlando covers 22 cities and towns in Orange, Seminole and Osceola Counties. About 2 million people live within its planning boundary. As a regional organization, MetroPlan Orlando can use its broad coverage to facilitate collaboration among agencies. As such, MetroPlan Orlando will lead a group of counties and cities that have

all passed resolutions of support for the project's objectives (see Volume 2). MetroPlan Orlando's TSM&O Advisory Committee and the existing FDOT D5 TSM&O Consortium group will serve as forums for information dissemination and feedback.

Central to MetroPlan Orlando's role in the region is promoting scalability, prioritization, and performance monitoring. These will be valuable in making sure that the proposed programs ultimately benefit the entire region.

University of Central Florida:

UCF will play a central role by bringing its research capabilities and existing Smart Cities initiative to advance the objectives of the proposed programs.



UCF is already taking steps to address the challenges that the proposed programs are intended to alleviate, but the support of USDOT and FDOT District Five would mean a significant boost to their efforts to become a model for smart transportation. UCF will lead the Transportation system performance big data collection and analysis.

Local Municipalities:

FDOT's success with major projects has been based on strong collaboration and cooperation with counties, municipalities and other transportation agencies. In this spirit, 28 local governments and regional agencies have approved resolutions in support of the grant application that accompanies this letter (see Volume 2). This reflects our region's commitment to work together with implementing grant-related activities and deployments.

2.3 Geographic Description and Map

2.3.1 East Orlando

The East Orlando area is home to more than 200,000 residents and 30,000 employees. The University of Central Florida (UCF) has the highest number of enrolled students in the U.S., with about 63,000 students. The majority of UCF's student population lives on campus or in the student housing developments surrounding the campus. High tech businesses have a substantial presence in East Orlando, including Siemens Westinghouse, Lockheed Martin, and the Central Florida Research Park (CFRP) – the largest research park in Florida and headquarters of the nation's simulation and training industry.

Florida Hospital East Orlando is a major employer and healthcare provider. The hospital employs more than 500 doctors, provides healthcare services to more than 80,000 patients annually, and has the busiest emergency department in Central Florida.

The limits of the project area are illustrated on the following page.

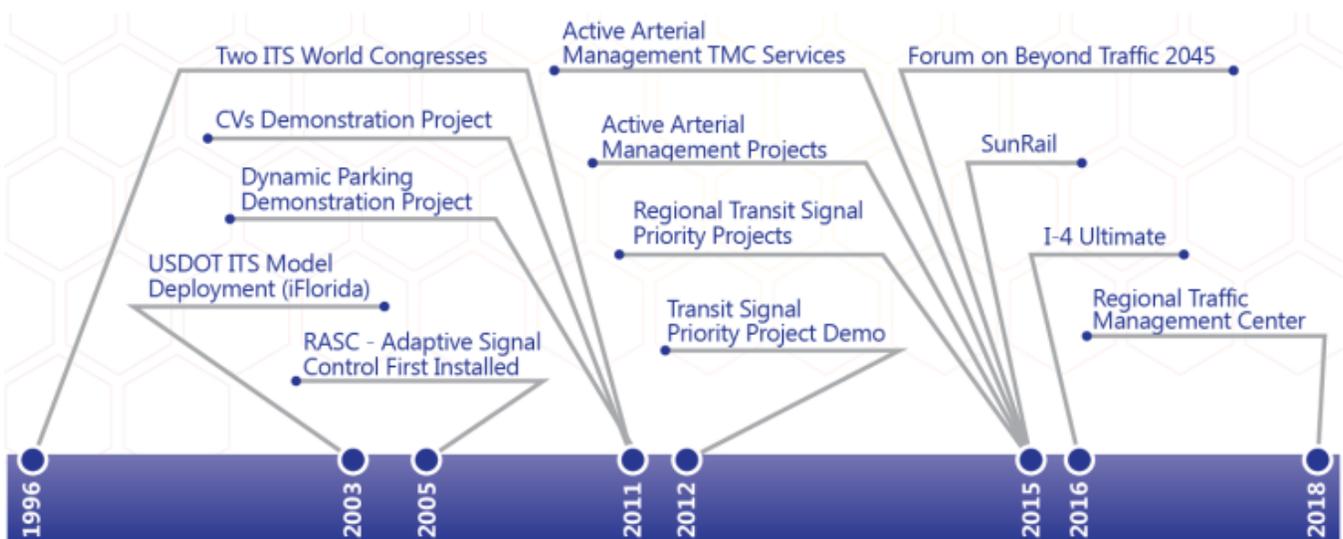
2.3.2 Central Florida's Innovative History

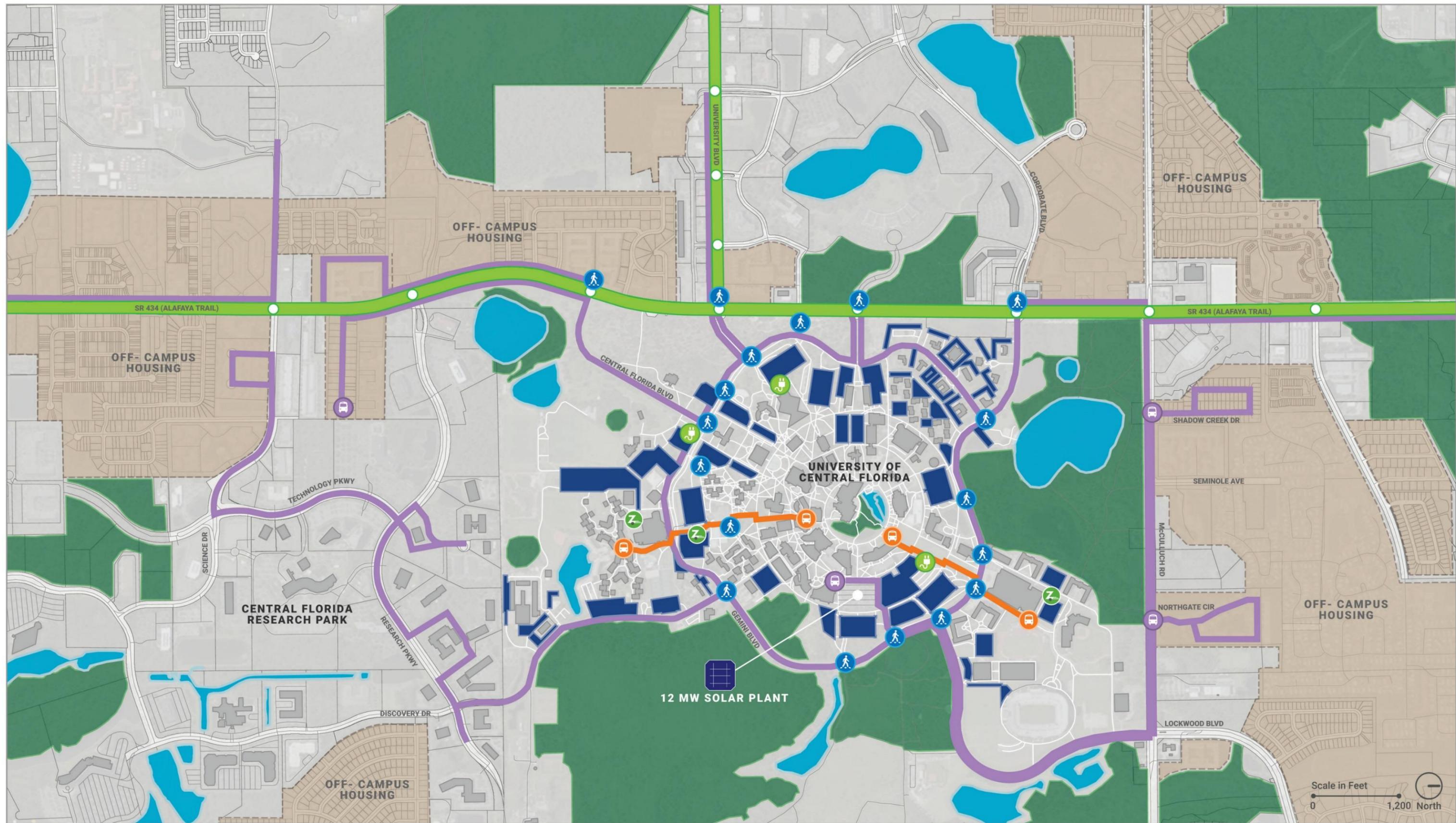
Central Florida has a proud history of delivering innovation to FHWA and the rest of the country. In 1992, Central Florida became the testing ground for a groundbreaking FHWA pilot of in-car navigation called *TravTek*. Twenty-five years later, it is rare to find new cars without the technology first tested here in Central Florida.

In 1997, Central Florida became the first region in the US to implement Bus Rapid Transit (BRT). The Central Florida Regional Transportation Authority's *LYMMO* serves downtown Orlando's residents and workers with free BRT running on exclusive lanes. Many cities, from Cleveland to Washington, now look to BRT to make their transit systems more reliable and efficient.

In 2003, FDOT District Five yet again pushed the boundaries on transportation technology deployment through the *iFlorida* pilot conducted with support from FHWA. Through the *iFlorida* project, FDOT District Five instrumented major freeways to deliver real-time information to travelers. Nowadays, most people expect to have this information at their fingertips every time they travel.

FDOT District Five and its Central Florida partners want to continue pushing the boundaries on smart technology deployments that improve the quality of life of our residents and the millions of visitors we receive each year.





East Orlando Deployment Area

PedSafe

 PedSafe Intersections

GreenWay

 GreenWay Corridor & Intersections

SmartCommunity

 Advanced Parking Management
 Autonomous Shuttles

 EV Charging Stations
 Zipcar Carsharing

 Existing Shuttle Routes



Central Florida Region | Scalability and Portability Potential

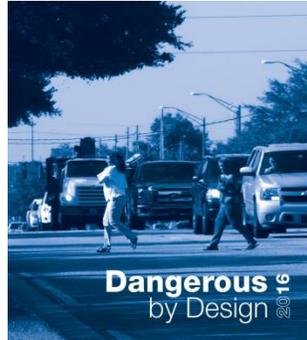
Not to Scale

2.4 Real World Issues and Challenges

The project was created to address Central Florida's real-world issues and challenges.

Traffic-Related Crashes and Fatalities

Central Florida experiences a high level of traffic-related crashes. Orlando consistently ranks in the top four cities in Florida for crashes in all focus areas of Florida's Strategic Highway Safety Program, including serious injuries and fatalities and pedestrian or bicycle related crashes. The Orlando metropolitan area has ranked in the top three dangerous locations for pedestrians and bicyclists over the past several years, with more than 600 related deaths since 2005 ([Dangerous by Design](#)). State and local visions and action plans encourage action to improve safety and reduce traffic-related crashes and fatalities across the region. A recent study completed by Orange County focused on pedestrian safety along SR 434 within the project's deployment area, and coordination has occurred to implement safety improvement recommendations in this area. UCF has also prioritized innovative safety research and has become a leading university in this field. PedSafe has a particular focus on technology deployments to improve pedestrian safety, and the CV deployments within GreenWay include vehicle safety applications such as advanced queue warning and curve warning systems.



Traffic Congestion and Travel Time Reliability

Orlando is one of the top 40 congested areas in the nation, causing delays approximately three hours each day and accounting for nearly 30 percent of the area's total VMT ([MetroPlan Orlando's Tracking the Trends Report](#)). Travel time index has been above 1.2 the past several years, ranking Orlando in the top 35 cities for travel time reliability

issues. As a result, **excess fuel emissions continue to increase**, having an adverse impact on air quality and the environment. GreenWay technology deployment is designed to alleviate congestion, improve travel time reliability, and reduce excess fuel emissions through integrated corridor management and adaptive signal control. GreenWay will help alleviate recurring congestion in the normal peak hours, but it will also provide the adaptability needed to manage fluctuating demand and diversion traffic during nonrecurring congestion resulting from incidents and/or weather events. UCF is currently working with FDOT in developing Integrated ATM strategies for Central Florida.



Access to Transportation Alternatives

Orlando struggles to provide access to multi-modal transportation options, particularly for the underserved populations. Land use patterns and transit service headways tend to deemphasize transit as a preferred option in Central Florida. However, GreenWay deployments will upgrade corridors with transit signal priority, improving bus travel times and on-schedule performance. The integration of SmartCommunity with SunStore will also provide travelers with real-time information on transit options in order to make informed trip-making decisions. SmartCommunity will also include a ridesharing program allowing travelers in the same area to share information and coordinate trips to locations such as employment centers, education facilities, the grocery store, and medical treatment centers. The program will also introduce autonomous shuttles into the shuttle fleets between UCF's main campus and the surrounding residential areas. Table 1 describes the technologies included within each program and how it aligns with the stated ATCMTD focus areas.

Table 1: Alignment to ATCMTD Focus Areas

ATCMTD Focus Areas	Existing Program	Proposed Programs		
	SunStore	PedSafe	GreenWay	SmartCommunity
Multimodal Integrated Corridor Management (ICM)				
CV Tech at Intersections and Ped Crossings				
Freight Community System				
Tech to Support Connected Communities				
Infrastructure Assessment				
Rural Technology Deployments				



- Denotes where the proposed programs align with the stated ATCMTD Focus Areas

2.5 Services and Systems

FDOT has invested heavily in services and systems within Central Florida that form the backbone of the grant application, allowing us to leverage previous and future investments for an anticipated 440 percent match on the investment by the United States Department of Transportation (USDOT). The following proposed programs will build upon the existing and planned infrastructure as outlined below.

1. **PedSafe** is an innovative pedestrian and bicycle collision avoidance system currently being designed by the FDOT. PedSafe will connect advanced signal controller capability, use of Connected Vehicle (CV) technologies, and existing communication capabilities to reduce the occurrence of pedestrian and bicycle crashes. The application will be easily transferable throughout the country.
2. **GreenWay** is an FDOT project to connect Advance Sensor Technology, Conditional Transit Signal Priority (TSP), Adaptive Deployment Traffic Signal Interface with Track Positive Train Control (SunRail), and Smart Parking technology with Signal Performance Metrics (SPM), Expand Integrated Corridor Management (ICM), and Signal Control Analytics and Visualization. GreenWay is designed to better utilize the multimodal transportation system by actively managing over 1,000 traffic signals within the region. Data managed in the proposed SunStore will be connected with GreenWay to support Real Time Operation through a regional Decision Support System (DSS). This connection will allow strategic planning for special events to include consideration of all modes and users and will provide a unified approach to system operations and management.
3. **SmartCommunity** is an integrated program that connects people to the places they need to go and the services they need to receive.

Through a Mobility on Demand (MoD) framework, SmartCommunity leverages existing ridesharing and car sharing products to offer residents access to cars when required.

SmartCommunity's trip planning application, Transit AVL, and Transit Kiosks will provide real-time multimodal travel information to integrate trip planning with modal choice options. The program will also introduce autonomous shuttles into the shuttle fleets between UCF's main campus and the surrounding residential areas.

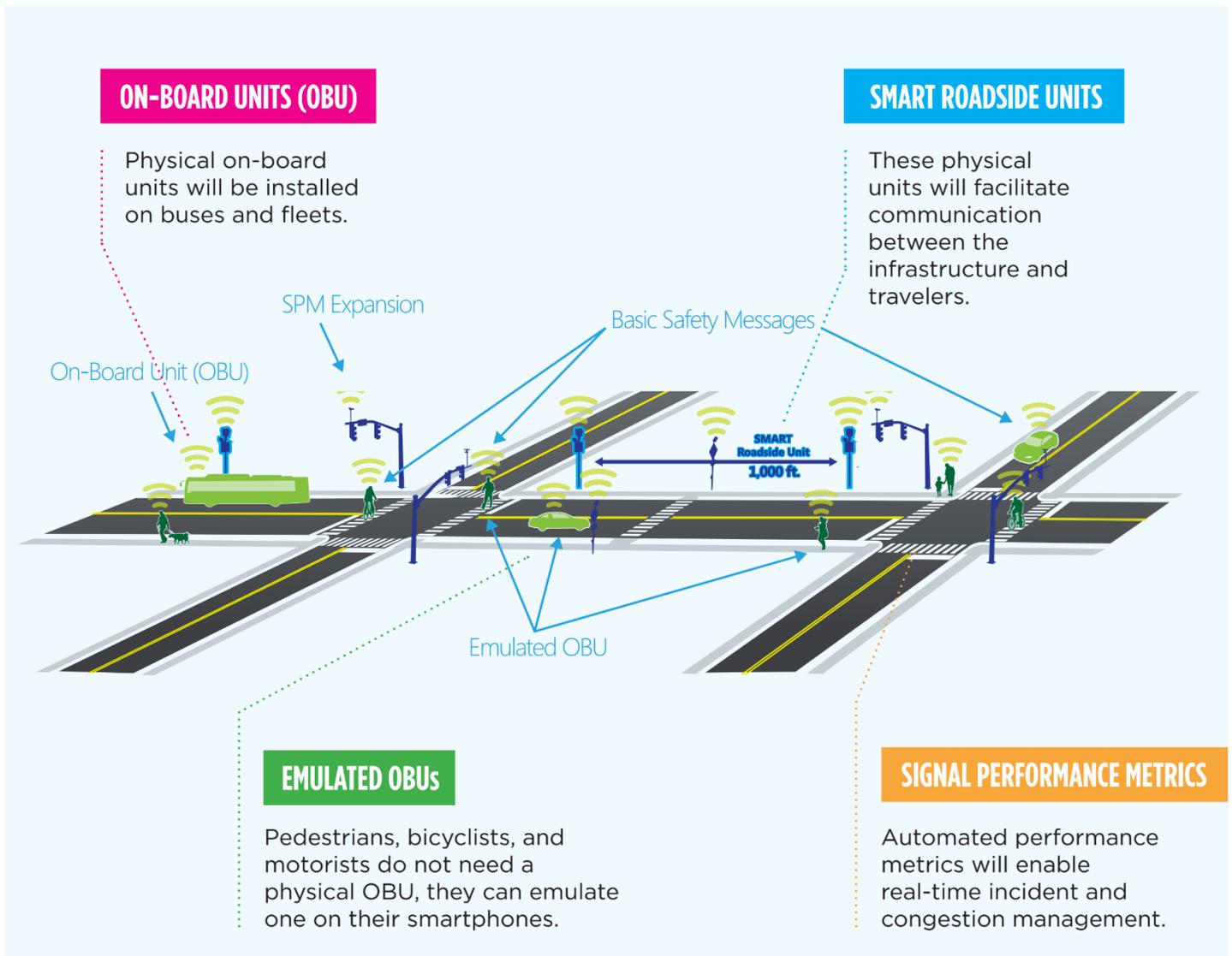
4. **SunStore** is an ongoing FDOT initiative to connect and integrate the many data sources created and utilized by the FDOT. SunStore includes Master Data Management, Data Fusion, and Sensor Fusion for increased data quality. SunStore interfaces with Florida's Data Integration and Video Aggregation System to make transportation data available to universities, research institutions, and businesses to encourage and support innovation. Data in SunStore will be used to support the PedSafe, GreenWay, and SmartCommunity deployments.

The East Orlando geographic area was strategically chosen to be part of a Smart City vision for the Central Florida Region. The area is anchored by the University of Central Florida and is part of a CV environment that includes an existing FDOT CV test bed to the north and a Central Florida Expressway CV demonstration project to the south. The area is ideal for congestion management technology due to the existing robust communication and multimodal network, a population of people comfortable and equipped with technology (such as university students), and a transit, bicycle, and walking dependent population. This area is truly Connection Ready!



PedSafe

Introduction: PedSafe is an innovative pedestrian and bicycle collision avoidance system that uses connected vehicle (CV) and existing technologies to minimize or eliminate pedestrian and bicycle crashes.



According to FDOT D5's 2016 Bike and Ped Count Program, four out of every five bicyclists ride on the sidewalks and use the crosswalks.

PedSafe Program Description: PedSafe will utilize SunGuide, the proven statewide Advanced Traffic Management System as the software backbone and will deliver audible Basic Safety Messages to vehicles, bicycles and pedestrians. Pedestrian detection technology has been coordinated with three providers providing a choice of hardware and software that perform presence detection of pedestrian and/or other objects as well as interface with the controller for signal phasing and timing data. PedSafe uses both DSRC and standard high-speed communications (3G and 4G) to communicate with vehicles, bicycles and pedestrians using the CV's on-board unit (OBU) or an OBU emulator such as a smartphone. Roadside units are placed to facilitate instantaneous infrastructure to vehicle, bicycle and pedestrian communications. Existing fiber optic communications will be leveraged to communicate with the central SunGuide ATMS system and the signal system.

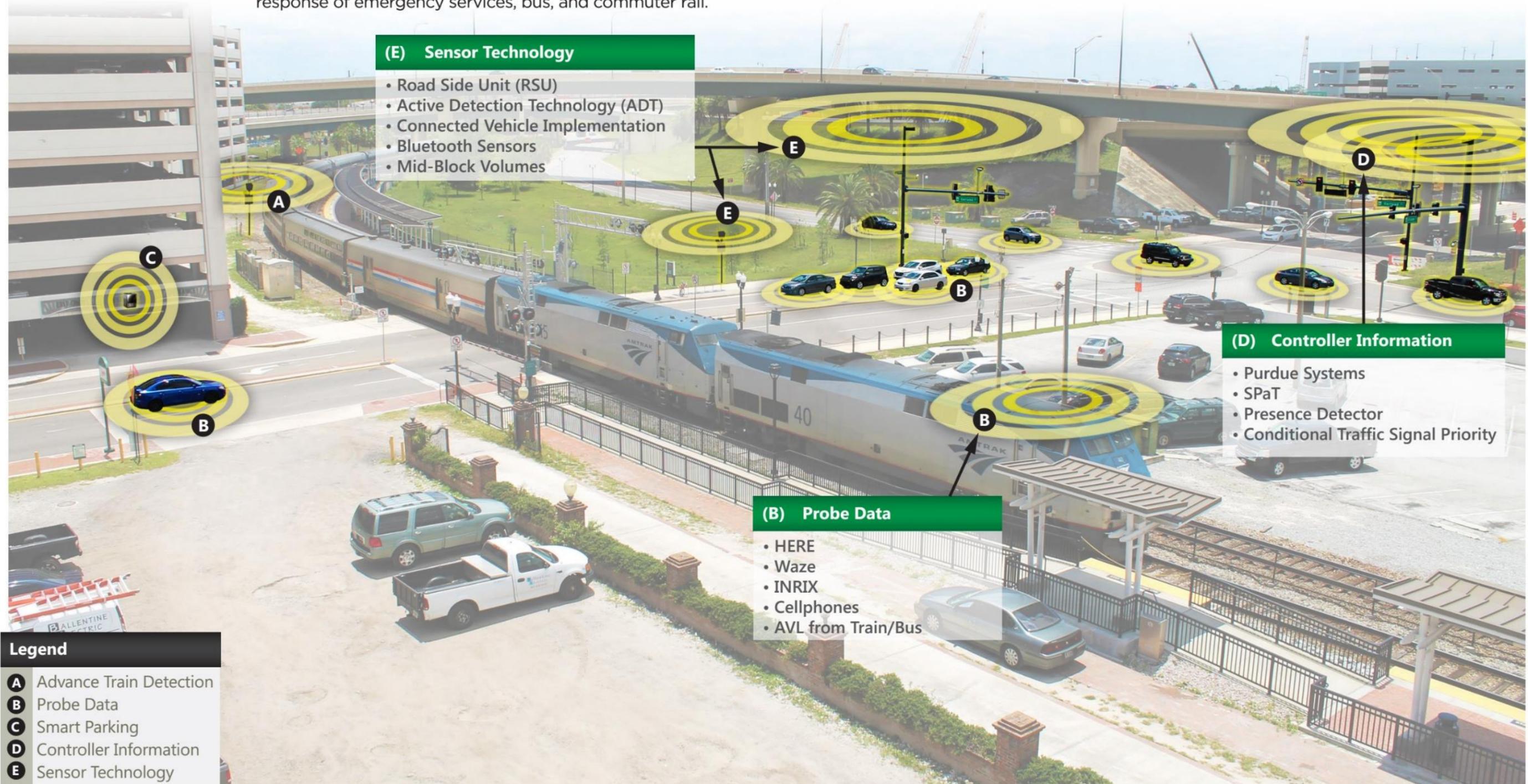
Innovation	Implementability
SmartPhone software as OBU emulator for direct communication and location information with pedestrians and bicycles.	The CV component will mirror Tampa Hillsborough Expressway Authority's CV Testbed Initiative and Central Florida CV Testbed.
Data exchange for private incentive to join in OBU software application development.	All identified locations have existing communications infrastructure in place, currently maintained and operated by the region.
Communicates with CV's OBU on instrumented vehicles.	SunGuide, the proven statewide ATMS system, is the software backbone.
Communicates infrastructure information to vehicles, bicycles and pedestrians.	Addresses vehicles, bicycles and pedestrians that do not have OBUs, by emulating the OBU using a smartphone app.
Supplementary pedestrian and bicycle collision avoidance system at critical intersections.	Delivers audible Basic Safety Messages to vehicles, bicycles and pedestrians.
Incident and congestion management features within the PedSafe area.	US 192 and International Drive are USDOT established CV test beds. Key partners, such as MetroPlan Orlando and UCF, share the same vision of a fatality-free transportation system.

Scalability/Portability	Measures of Success
Smartphone application software will be public property and the State would seek participation to support costs and data sharing by 3rd parties, engaging private industry. Minimizing the need for hardware instrumentation, transferability is increased.	Overall reduction in pedestrian and bicycle crashes. Overall reduction in pedestrian and bicycle fatalities. Overall OBU software applications saturation among users.
Probe information is obtained without extensive instrumentation using the emulated OBU, increasing transportability.	Overall number of confirmed alerts issued.
All data will be in a standard format to facilitate data sharing.	Number of partnerships with private industry.
Pedestrian and bicyclist safety is not a challenge unique to Central Florida. FDOT Central Office is looking to implement new crash-reduction techniques statewide.	Number of PedSafe projects programmed by MPOs. Feedback from user surveys.



GreenWay

Introduction: The proposed GreenWay program incorporates Active Detection Technology (ADT) and elements of Orlando's Smart City initiative to improve the multimodal movement of people and goods. Available information from traffic signals will be fused, normalized and then processed by deterministic or stochastic models. Real-time results will then be presented in a consumable format to Signal Timing Engineers to use in actively managing traffic signal systems. Alerts will also be provided connecting the response of emergency services, bus, and commuter rail.



(E) Sensor Technology

- Road Side Unit (RSU)
- Active Detection Technology (ADT)
- Connected Vehicle Implementation
- Bluetooth Sensors
- Mid-Block Volumes

(D) Controller Information

- Purdue Systems
- SPaT
- Presence Detector
- Conditional Traffic Signal Priority

(B) Probe Data

- HERE
- Waze
- INRIX
- Cellphones
- AVL from Train/Bus

Legend

- A** Advance Train Detection
- B** Probe Data
- C** Smart Parking
- D** Controller Information
- E** Sensor Technology

GreenWay Program Description: The GreenWay Program is designed **to improve safety, increase reliability, and reduce congestion** by expanding existing systems and implementing new signal technologies.

Innovation	Implementability
<p>Signal performance metrics (SPM) Expansion: Purdue software will be expanded from 130 existing locations to more than 1,000 locations throughout Central Florida.</p> <ul style="list-style-type: none"> • Use of adapters will help avoid change of existing controllers, eliminate incompatibility, and produce cost and time savings. 	<p>Stakeholders buy-in secured.</p> <p>Statewide approach to implementation in effect:</p> <ul style="list-style-type: none"> • Data Fusion and normalization software under design. • Advanced Intersection Detectors being installed. • SPM already running. • Interfaces being documented. • Lessons learned from Dallas and San Diego incorporated.
<p>Activate traffic signal flush plans prior to train arrival at railroad crossings using the Positive Train Control (PTC) to provide train type (duration of closure) and prediction of closure.</p>	<p>Positive Train Control (PTC) and traffic signal system interaction via proven technology.</p>
<p>Real-time data collection for traffic management from advanced detection technology expansion at 33 existing signals.</p>	<p>V2I/V2V technology On Board Units (OBUs) will be placed on transit vehicles to obtain probe vehicle information.</p>
<p>Expansion of existing Adaptive Signal Systems to actively control signals on major state roadways.</p>	
<p>Notification of parking availability in public parking garages to reduce circulation.</p>	

Scalability/Portability	Measures of Success
<p>TSM&O Strategic Plan will deploy integrated corridor management (ICM) statewide.</p>	<p>Travel time reliability.</p>
<p>Publicly held intellectual property rights will permit streamlined distribution.</p>	<p>Increased intersection throughput.</p>
<p>Varied data sources allows partial implementation in many locations.</p>	<p>Reduction in crashes and system delay.</p>
<p>Positive Train Control (PTC) nationwide requirement and interaction with signal systems present all over US.</p>	<p>Reduction in vehicle/train crashes.</p>
	<p>On Time Arrival Percentage of buses on SunRail connecting routes.</p>
	<p>Reduction in cost of congestion.</p>
	<p>Reduction in environmental system emissions.</p>

GreenWay

Active Corridor Systems Management

GreenWay Program Support

The GreenWay program will be supported by the expansion of active detection technology in Central Florida. GreenWay includes the framework for data collection in support of regionally coordinated responses to multi-modal network operations.



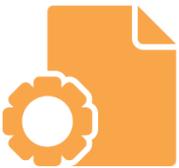
Program Partners

- FDOT Districts
- MPOs & TPOs
- Cities & Counties
- Research Institutions
- Private Industry
- Law Enforcement



Data Collection

Signal Performance Metrics (SPM), and deployment of phases of Active Arterial Management infrastructure (CCTV/s, Bluetooth, etc.).



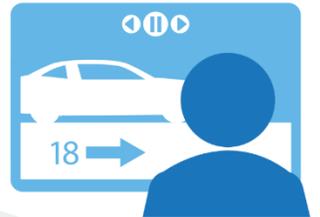
Data Management

FDOT's investments in SunStore will be leveraged by GreenWay to support real-time operations:

- Via a regional decision support system.
- Strategic planning for events to provide unified system management.

Regional Operations

Arterial operations personnel to work in collaboration with our freeway personnel at the Regional Traffic Management Center (RTMC), providing an integrated approach to operations throughout the region.



Regionally Coordinated Responses

Our region is currently defining a Decision Support System (DSS) to automatically implement or provide suggestions to our regional partners for traffic management plans in response to congestion or incidents based on regional data received.



SmartCommunity

Introduction: The proposed SmartCommunity program is an integrated solution to connect people to the places and services that they need.

CONNECTED INFRASTRUCTURE



QUEUE AND CURVE WARNINGS:
Roadside units will alert drivers of upcoming queues and curves.



PARKING AVAILABILITY:
Parking sensors will communicate real-time parking availability to travelers.



AUTOMATED SHUTTLES:
The frequency and span of service of transit can be greatly enhanced with automated shuttles.



TRANSIT SIGNAL PRIORITY:
Connections between transit vehicles and signals will lead to better reliability.

EFFICIENT AND RELIABLE TRANSIT

SUSTAINABLE ENERGY



SOLAR AND RENEWABLE SOURCES:
UCF is already advancing a 12 MW solar power plant.



SELF-POWERED GARAGES:
East Orlando's garages of the future will power themselves through solar arrays on their top deck.



CARSHARE AND RIDEHAIL:
Under a MoD framework, travelers will have access to cars without having to own them.

MOBILITY ON DEMAND (MOD)



MOBILITY KIOSKS:
Connected and tablet-enabled kiosks will provide access to MoD even without a smartphone.

SmartCommunity Program Description: The SmartCommunity proposed program integrates CAV technology, connected infrastructure, renewable energy, and a Mobility on Demand framework to alleviate the day-to-day challenges facing the East Orlando community. In addition to the program’s major components, the SmartCommunity program will leverage elements from the PedSafe and GreenWay projects. The result will be a unified, seamless interface for users and developers. The program will tie in closely to FDOT’s existing SunStore to archive, manage, and serve data to our partners.

Innovation	Implementability
CV technology, including queue and curve warnings, will lead to enhanced safety.	All identified locations have existing communications infrastructure in place, currently maintained and operated by the region.
Automated shuttles will efficiently connect students and workers with their school and work locations.	
Increasing the reliability of transit through transit signal priority, connection protection, and MoD access.	Stakeholder buy-in has been secured.
Investing in solar and renewable energy to reduce environmental impact and utility costs.	Demonstration efforts with Navya, an automated transit manufacturer, have already been done.
Increased mode choice through a MoD framework that combines: <ul style="list-style-type: none"> • Carshare (CV and private), • Ridehail (CV and private), • Transit systems, • Parking, and • Travel time estimates with route and mode choice 	
Parking management through: <ul style="list-style-type: none"> • In-pavement sensors • CCTV • Automated vehicle -based solution 	A proof of concept for real-time parking management is underway in downtown Orlando.

Scalability	Measures of Success
CV Adapters will be based on industry standards (NTCIP).	Reduction in rear-end and lane departure crashes.
New adapters do not require changing architecture of the system.	Percentage Zero or Car-Light Households.
MoD framework to be built to accept a variety of mobility options.	Non-SOV mode share.
The under-development Creative Village in downtown Orlando is a natural next step for scaling the programs.	Percentage of energy consumed that is generated by renewable sources.
The under-development Creative Village in downtown Orlando is a natural next step for scaling the programs.	Percentage Zero or Car-Light Households.
	Number of third party mobility partners.

2.6 Operations & Maintenance

The Central Florida Region has been operating and maintaining ITS, signal and technology related equipment since the 1990s. This has provided the region with over two decades of operations and maintenance experience and demonstrated the commitment to not only building capital improvements, but also operating and maintaining them over time. Central Florida has spent over \$3 million on management and operations over the past two years and over \$6 million in maintenance.

A quality cost estimate - including the capital costs and the ongoing operations and maintenance – is essential to ensure a successful deployment through the full project life. FDOT has engaged Siemens Corporation as a resource to in vetting the quality of the cost estimate for this deployment. To make way for the additional operational cost of GreenWay, the Department first funded operations before funding any capital projects. An additional \$2.6 million is already allocated per year for future GreenWay operations. Maintenance allocations are based on deployment size and activity within the state, meaning budgets will grow with the deployment of sensors. Licensing and TMC costs have been projected and will be covered by existing funding levels. The region is committed to continued operations and maintenance funding of these improvements long after the grant funding is applied.

The region is in the final stages of updating the regional ITS Master Plan to define the future planning of the region as related to TSM&O improvements and regional interaction. The ITS Master Plan builds on the long standing regional TSM&O Consortium, traditional ITS improvements, and advanced features identified within this application.

2.7 Barriers to Deployment

No major regulatory or legislative challenges are expected for his deployment. The legislative environment in Florida is very supportive of connected and autonomous vehicle technology. The state of Florida is ready for CV and AV testing on public roadways thanks to Florida House Bill 7027. In Florida, any person who possesses a valid driver's license may operate an autonomous vehicle in autonomous mode on the roads in the state. The House Bill also allows the use of truck platooning and requires FDOT to conduct a study or pilot projects for autonomous goods movement.

The [Central Florida Automated Vehicle Partners](#), consisting of FDOT D5, City of Orlando, UCF and other regional partners, was recently designated by the USDOT as one of ten nationwide autonomous vehicle proving grounds. UCF is also part of the USDOT's University Transportation Centers program—and it is using its extensive resources in simulation and modeling to become a simulation hub for technology testing, improvements, and human factors. The City of Orlando has joined the Smart Cities Council, a nationwide forum for cities to experiment and share technology lessons with the goal of improving urban livability, workability and sustainability.

As with any cutting-edge project, some institutional and technological challenges are to be expected, including:

- Compatibility with a variety of legacy systems;
- Rapid advances in technology mean that specifications are likely to evolve during the life of the project;
- Maintaining a schedule that is both ambitious and attainable; and
- Development of a long-term operations and maintenance plan that is acceptable to all partners;

The FDOT D5 TSM&O Consortium, an interagency group dedicated to all things ITS and TSM&O, will

be a critical part of overcoming coordination challenges. The group has flourished for over a decade and continues to meet regularly to discuss important topics. Given the longevity and success of the forum, it will be used to keep all the partner agencies informed about the projects from planning to system integration.

2.8 Quantifiable System Performance Improvement

FDOT purchases HERE high-resolution travel time data on a continuous basis. These data are then augmented with data from FDOT's sensors and other data sources, such as WAZE, to obtain high-quality travel time and volume data. FDOT archives this data and uses it to monitor regional roadway speeds before, during, and after implementation of the proposed programs to determine quantifiable system benefits for mobility in virtually real-time.

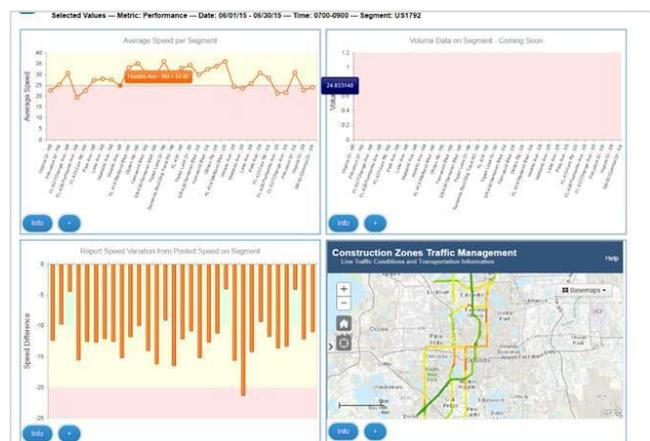
In addition to segment performance data, the GreenWay program will result in high-resolution signal performance data that will help monitor how the program improves traffic flow. For example, using these data it will be possible to determine whether the percentage of vehicles arriving on green increased as a result of optimized progression through a corridor. Similarly, advanced detector data coupled with signal and phasing information will enable actual delay calculations--rather than relying on time-consuming and potentially less accurate models. This will make it easy to calculate the vehicle- or person-hours of recurring and non-recurring delay saved by adaptive signal optimization.

To assess and communicate transit performance, the SmartCommunity program will embrace open data standards (such as [GTFS-RT](#)). These standards are well documented, portable, and widely supported by third-party developers.

Central Florida's arterial operations contract is in the process of designing additional dashboards to show operational performance. The dashboards include the following parameters:

- Customer complaint logs
- Signal IV crash statistics
- Construction activity logging
- Number of new plans generated
- Number of new plans used
- Volume data

Screenshots of the dashboards are presented below.



In short, FDOT has the tools and knowledge in place to commit to a before-after evaluation program that quantifies the system performance improvement of this deployment.

2.9 Quantifiable Safety, Mobility, and Environmental Benefit Projections

The proposed deployment will have quantifiable benefits to safety (reduced crashes), mobility (reduced congestion and improved travel time reliability), and environmental benefits (fuel emissions savings). PedSafe is expected to directly reduce pedestrian crashes through safer crossings, better pedestrian-scale lighting, and CV technology. A seven percent reduction in pedestrian crashes is expected as CV saturation rates increase (VRUITS). GreenWay is expected to reduce recurring congestion on arterial roadways by up to 20 percent, improving travel time reliability by up to 10 percent. Transit on-schedule performance is expected to increase by up to 20 percent as a result of transit signal priority implementation. The safety and mobility benefits will improve fuel efficiency, reducing excess fuel consumption by up to 10 percent.

FDOT commits to an evaluation program that quantifies the safety, mobility, and environmental benefits of this deployment through before-and-after studies. Part of that commitment is the emphasis on automated data collection through the proposed programs, including the deployment of signal performance metrics in GreenWay and collection of safety data from PedSafe.

ATCMTD goal met:



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 FDOT is committed to evaluation of the project to quantify the impact of technology deployment. In addition, the project is committed to funding research that will explore additional strategies to optimize the deployment's effectiveness and provide recommendations for future deployments in other areas of Orlando and Florida.

2.10 Vision, Goals, and Objectives

VISION

For East Orlando’s workers, residents, and students to be connected to their community and to the broader region. For UCF and the Central Florida Research Park to be more than just users of new technology, and instead actively create and maintain it. To have the engine for transportation and Smart Cities innovation for the rest of the country right here in Central Florida.

GOALS	OBJECTIVES
Increase connectivity to the region for all modes of travel	Use technology to reduce the effects of recurring and nonrecurring congestion
	Provide Mobility on Demand options to disadvantaged communities by expanding access to local transit and transportation options
	Increase mobility options by alternate mode choice such as ridesharing, car sharing, bicycle sharing, and transit availability
	Provide real time travel information to the public for route choice and trip planning
Improve safety for all modes of travel	Leverage technology to increase awareness between drivers and pedestrians to reduce crashes
	Decrease number of vehicle crashes
Promote environmental stewardship	Use technology and strategic planning to decrease delay and vehicle hours traveled (VHT)
	Use Green technology when available to provide energy saving resources such as CV / AV technologies, EV parking, and green building techniques for parking garages
Promote social justice	Remove mobility barriers for individuals in disadvantaged communities
	Leverage technology to provide access to modal options
	Provide seamless route transfers for transit riders

ATCMTD goal met:



Reproducibility of successful systems and services for technology and knowledge transfer to other locations facing similar challenges:

Lessons learned in the East Orlando area **need** to be quickly transferred to the upcoming Creative Village in downtown Orlando. The rest of downtown, the Orlando metropolitan region, and the entire country will follow.

2.11 Public and Private Partnership Opportunities

In an effort to make data available to its citizens to accomplish a connected city vision, the Central Florida area is launching an open source data platform via a web mapping portal that allows access to data for analysis and reporting within Central Florida. This platform is the first of its kind for the region and will also leverage other data made available from state sources. This platform will include further development utilizing citizen feedback. This open data source will support the existing Smart City infrastructure and the proposed GreenWay and PedSafe program elements.

FDOT is also working closely with private industry to make important progress on CV technology. FDOT is an active participant in the Tampa, FL CV Pilot Deployment that will install CV on-board units on the entire Hillsborough Area Regional Transit (HART) streetcar fleet and on approximately 1,600 privately-owned vehicles. The CV applications are designed to improve mobility and

safety. Lessons learned during this pilot will be valuable for collaboration with industry during the deployment of PedSafe, GreenWay, and SmartCommunity.

The private sector will be leveraged for the development of third-party applications such as real-time traveler information mobile apps. Through decades of experience working with private partners, FDOT has learned that the interest of the state and its residents is better served by using interoperable (and ideally open-source) data, standards, and protocols. That way, FDOT is not locked to any one vendor or developer to advance its goal for public and private partnerships.

Opportunities for data sharing and exchange will be explored with these third-party partnerships in an effort to derive a holistic picture of the transportation network, safety, and operations status at any given time. FDOT has already started to collaborate with the tech community to develop a vision for delivering data and services to Central Florida's residents and visitors.

FDOT Tech Industry Partners



(and others)

2.12 Leverage Existing Technology Investments

The Central Florida region is *Connection Ready*. Over the last twenty years, FDOT has built an extensive Intelligent Transport System (ITS) infrastructure that enables fast deployment of advanced technologies. This infrastructure includes more than 1,000 miles of fiber, more than 800 CCTV cameras, and a new regional transportation management center.

FDOT's partners have also made important strides through strategic investments. For example, MetroPlan Orlando has just completed its ITS Master Plan, which will guide the deployment of devices, services, and technologies to improve the region's transportation system.

UCF has taken initial steps to reduce its environmental footprint—including the installation of solar arrays to power its garages and charge electric vehicles.

All of these efforts are complete and ready to be leveraged as part of the PedSafe, GreenWay, and SmartCommunity programs.

FDOT

- Integrated Corridor Management Systems Engineering Analysis Documentation (view through [this](#) link)
- Regional ITS Architecture
- SunStore

MetroPlan Orlando

- ITS Master Plan
- Performance-based signal retiming

UCF

- Solar-powered hot water system
- Solar-powered vehicle charging station
- Wall-mounted solar awning on Engineering I building
- Garage B 108 kW Array

Orange County

- Adaptive signal system on four state roadways
- Greater Orlando Transit Signal Priority Equipment

City of Orlando

- Smart Parking program



2.13 Schedule

A schedule for conducting the technology deployments and for completion of all proposed activities is provided below. The planning and design is already completed or underway for many of the project components, and initial deployments for SunStore are already completed. This project is *Connection Ready*. In addition to the technology deployment, the project is committed to project evaluation and funding research to optimize the effectiveness of this deployment and future deployments planned in Orlando’s Central Business District and throughout Florida.

Project Component/Task	2016		2017				2018				2019				2020				2021			
	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
GreenWay																						
Planning																						
Design																						
Build/Deploy																						
Operations & Maintenance																						
PedSafe																						
Planning																						
Design																						
Build/Deploy																						
Operations & Maintenance																						
SmartCommunity																						
Planning																						
Design																						
Build/Deploy																						
Operations & Maintenance																						
SunStore (Existing Program)																						
Planning																						
Design																						
Build/Deploy																						
Maintenance & Enhancement																						
Project Reporting																						
Project Evaluation																						
Research & Optimization																						

* Annual Review for 2 years

2.14 USDOT ITS Program Leverage

The USDOT's Strategic Plan for ITS research and priorities for the second half of the decade focuses on six categories:

1. CVs,
2. Automation,
3. Emerging capabilities,
4. Enterprise data,
5. Interoperability, and
6. Accelerating deployment

The proposed programs cover all USDOT areas of interest.

PedSafe will build off existing V2X technology, leveraging CV research and applying in a real-world setting to improve pedestrian and bicyclist safety.

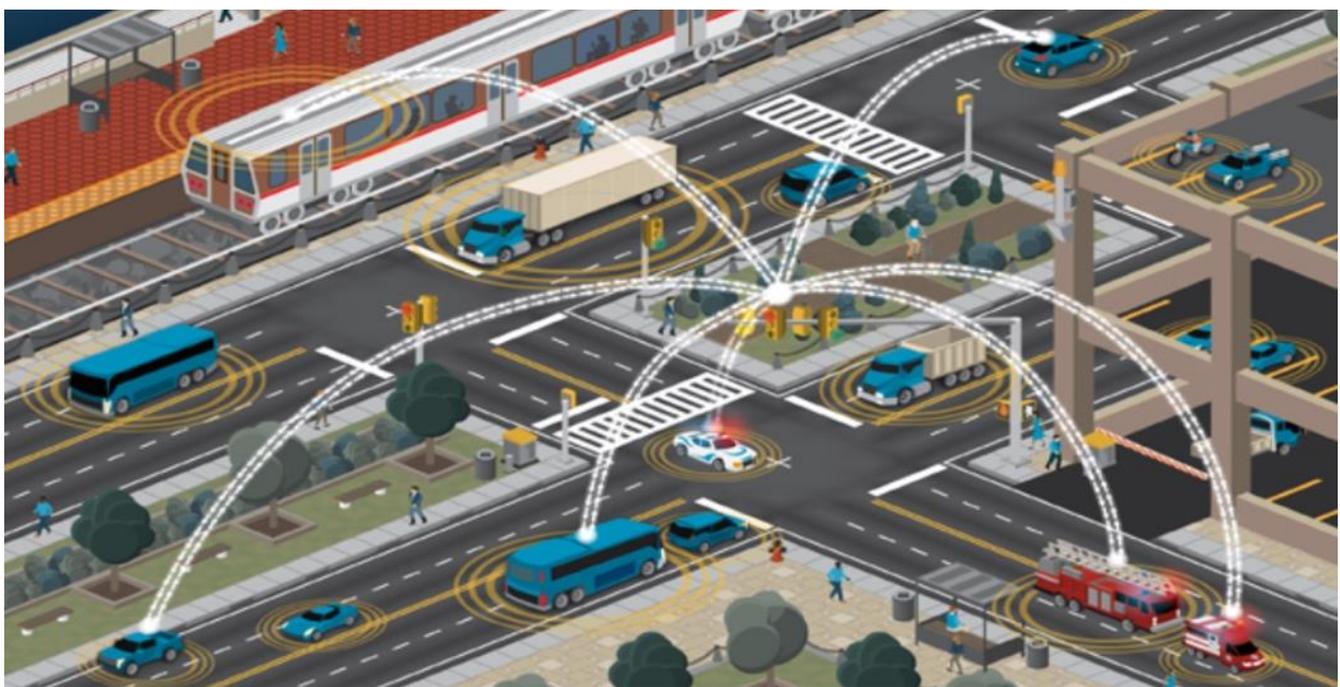
GreenWay's approach to overhauling the way traffic signals work relies on **CV** technology, but is best characterized by a focus on **automation** and **interoperability**. The use of adapters will avoid large upfront costs in changing signal controllers, eliminate incompatibility issues across different signal controller manufacturers, and result in cost and time savings for FDOT. Florida's Approved Products List process will be used for hardware acquisition to ensure effective connectivity among devices.



SmartCommunity will deploy **emerging capabilities**, including technologies included in the Mobility on Demand, Smart Cities, and autonomous vehicle efforts.

All the proposed programs will rely on FDOT's existing SunStore for housing, sharing, analyzing, transporting, and applying **enterprise data** for improved safety and mobility across all modes of travel. This will help **accelerate deployment** of the proposed programs.

The proposal also builds on past USDOT investments such as the USDOT Signal Performance Metrics and the Integrated Corridor Management deployments in Dallas and San Diego.



Appendix A: Resumes of Key Staff

