



# Beyond Traffic: The Smart Tampa Vision

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U.S. Department of Transportation



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## A Message from the Mayor

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Welcome to Tampa!

Tampa is the 3<sup>rd</sup> largest city in the state of Florida and the metropolitan heartbeat of Tampa Bay, a region of more than 3 million people. Tampa is a city of resilience—a city built by the determination of immigrants from Cuba, Italy, Spain, South and Central Americas, Scotland, and others. Thousands came to Tampa in search of prosperity, safety, and equal opportunity, but what the early architects of this great city brought to Tampa was just as valuable as what they sought. They brought a vision and a motivation that laid the groundwork for a better tomorrow, a vision we are still building on today.



Our journey from a small port town to the 53<sup>rd</sup> largest city in the United States has been one of perseverance and vision. It's that vision that led us out of the Great Recession. While there was no blueprint for our recovery, we emerged stronger. Today, we stand united as a vibrant city rich in diversity and culture. Diversity is a pre-requisite for creativity and innovation, and by extension, our economic competitiveness. We have never been more competitive for business, for intellectual capital, or for trade as we are today. We are home to championship winning sports teams, a collection of museums and cultural assets, and world-class educational institutions.

We are building communities that provide a true live, work, and play environment; communities that foster public safety, healthy living, and the highest quality of life. In downtown Tampa, we completed the Riverwalk, a project championed by 6 mayors and pushed through 40 years until its completion in 2015. This waterside walkway features Tampa's most valuable natural asset, the Hillsborough River, and connects our downtown in a new innovative way.

In the Channel District, our port is exporting more goods than ever before and connecting us with international markets. In West Tampa, we are reimagining neighborhoods that are safer, provide choices, and afford residents more opportunity to raise a family. And soon Tampa will be home to the world's first WELL Certified district, a community with a modern focus on health and wellness, walkability, clean air, and sustainable development.

**We are pleased to respond to the Smart City Challenge and present our vision for the future. We are a city on fire, a city with swagger, a city reimagined. Now, it's time to grow smarter.**

Thank you for your consideration.

A handwritten signature in blue ink that reads 'Bob Buckhorn'.

Mayor Bob Buckhorn

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# 1. SMART CITY VISION

Tampa and its partners are pleased to respond to the U.S. Department of Transportation (USDOT) Smart City Challenge. Our **Smart Tampa** vision is to spearhead the deployment of bold and innovative concepts involving advanced technologies, data, and applications to help improve safety, increase mobility, enhance security, boost productivity, and protect the environment.

## *Why Tampa for the Smart City Challenge?*






- ✓ Tampa is a hub of cultural diversity—veterans, seniors, millennials, low-income and middle-class—which makes it possible to develop and demonstrate solutions that impact a wide range of the population groups. Tampa is part of the emerging mega-region along the I-4 corridor (as cited in *Beyond Traffic 2045*).
- ✓ Tampa provides a wide range of transportation modes (surface, air, rail, and water) that allow for effective demonstration of multi-modal smart city concepts, which can be transferred to other cities across the nation.
- ✓ Florida offers one of the friendliest regulatory environments in the U.S. for automated vehicles (AVs). Meridian, a pioneer in vehicle automation, has been operating its autonomous shuttles at Tampa’s MOSI (Museum of Science and Industries) for several months, and this operation has already transported more than 40,000 passengers, making it the world’s most extensive trial of autonomous vehicles involving the general public. In addition, Audi conducted several trials of its highly automated vehicles on Tampa’s highways. We will use this vast experience to successfully deploy the urban automation vision element in Tampa.
- ✓ The USDOT/Tampa Hillsborough County Expressway Authority (THEA) Connected Vehicle (CV) Pilot Deployment in Tampa is establishing a real-world environment that will allow vehicles, roadside infrastructure, and mobile devices to communicate with each other, offering Tampa unprecedented opportunities to provide improved safety and mobility solutions enabled by connectivity. We will build off of the strong foundation that the CV Pilot Deployment will provide.
- ✓ Approximately 50 buses in Tampa have already been installed with Mobileye technology. We will leverage the experiences and data from the existing installations to more effectively deploy Mobileye technology that will be made available through the Smart City Challenge.
- ✓ We have assembled an impressive group of public, private, and academic partners who are all committed to accomplishing the Smart Tampa vision. Our team includes the following partners:
  - *Public* – City of Tampa (lead), THEA, Florida Department of Transportation (FDOT), Hillsborough Area Regional Transit Authority (HART), Hillsborough Metropolitan Planning Organization, Tampa Downtown Partnership (TDP), Tampa Bay Area Regional Transportation Authority (TBARTA), Tampa International Airport (TIA), Port Tampa Bay, AARP.
  - *Private* – Booz Allen Hamilton, Tampa Electric (TECO), Google/Waze, Zipcar, Siemens, Meridian, Coast Bike Share, vRide, Audi, Bosch, SPP.
  - *Academic* – University of South Florida (USF)/Center for Urban Transportation Research (CUTR), Embry-Riddle Aeronautical University, University of California Berkeley.
- ✓ We have developed a comprehensive list of concepts for all 12 USDOT vision elements. Our holistic and integrated approach to implementing these concepts ensures that they synergistically combine to address various challenges in Tampa, and result in multiple benefits.
- ✓ The city has made significant investments (over \$240 million) to improve the livability of downtown Tampa, support the transformation of the surrounding neighborhoods connected to the business district, and spur economic development. Our private sector partners have also invested millions of dollars and human resources in developing the solutions that we plan to implement as part of our Smart Tampa vision.

## 1.1 Challenges and Solutions for Smart Tampa







The Smart Tampa initiative plans to leverage the USDOT’s Smart City Challenge funding to address such challenges faced by our region in the context of growth, urbanization, climate change,


security, and the sharing economy. Table 1 summarizes our proposed high-level concepts (under each of the 12 vision elements) that we plan to implement using the Smart City Challenge funds, along with corresponding challenges that these concepts are expected to address.

**Table 1: Smart Tampa High-Level Concepts and Challenges Addressed**

Technology Elements and Proposed Concepts		Challenges Addressed
 Urban Automation	<ul style="list-style-type: none"> <li>Automated vehicles on Reversible Express Lanes</li> <li>Low-speed fully automated electric shuttles in downtown and at TIA</li> <li>Automated marine and ground security vehicles at Port and TIA</li> <li>Bus-on-Shoulder-System with Mobileye and active safety systems</li> </ul>	<ul style="list-style-type: none"> <li>Demand for point-to-point downtown shuttle</li> <li>Port carries significant hazmat and fuels close to downtown</li> <li>Increased security concerns from fast-boat attacks</li> <li>MacDill Airforce base security risk</li> </ul>
 Connected Vehicles	<ul style="list-style-type: none"> <li>Additional applications leveraging THEA CV Pilot Deployment</li> <li>Safety: Red light violation warning</li> <li>Environment: Eco-approach and departure</li> <li>RESCUME: Emergency Communications and Evacuation</li> </ul>	<ul style="list-style-type: none"> <li>Sustainable environmental and safety solutions to address existing car culture (as we transition to Transit Oriented Development or TOD)</li> <li>Unfavorable weather patterns, and impending sea level rise will have an impact on 27,757 households in working class neighborhoods within flood zones.</li> </ul>
 Intelligent Sensor-based Infrastructure	<ul style="list-style-type: none"> <li>Road-side: weather, air quality, noise, traffic cameras, etc.</li> <li>In-vehicle: position, velocity, weather, etc.</li> <li>In-building: Indoor navigation beacons at Convention Center</li> <li>Leveraging of USDOT's road weather products (Vehicle Data Translator, Motorist Advisory and Warnings, and Enhanced Maintenance Decision Support Systems)</li> </ul>	<ul style="list-style-type: none"> <li>Limited parking availability and location info causing congestion during peaks and special events</li> <li>No means of communication to users regarding parking availability in garages or on street</li> <li>Poor record on pedestrian safety</li> <li>Limited open-data availability</li> <li>Limited accessibility options for visually disabled in urban spaces</li> </ul>
Innovative Approaches to Urban Transportation Elements and Proposed Concepts		Challenges Addressed
 Urban Analytics	<ul style="list-style-type: none"> <li>Platform for data ingestion, processing, and decision making support</li> <li>Predictive analytics tools based on historical and current data</li> <li>Goal driven capability build out</li> <li>User-friendly and unified interface</li> </ul>	<ul style="list-style-type: none"> <li>Record flooding event in 2015 with an ineffective communication means to disseminate safety information</li> <li>Emergency management especially during critical weather events such as hurricanes and flooding.</li> <li>Congestion ranked 12th worse in U.S.</li> <li>Legacy traffic control infrastructure</li> </ul>
 User focused Mobility Services and Choices	<ul style="list-style-type: none"> <li>Integrated Mobility Platform for Tampa (IM-T) application</li> <li>Solutions such as kiosks for vulnerable communities who cannot afford smart phones</li> <li>Tampa senior center on-demand dynamic shuttle</li> <li>Indoor navigation for improving accessibility to visually impaired</li> </ul>	<ul style="list-style-type: none"> <li>Lack of multi-modal information</li> <li>Limited mobility options for vulnerable populations (seniors, low-income, disabled)</li> <li>Limited accessibility options for visually disabled in urban spaces</li> <li>Increase of the retirement community, Tampa has 12% of the population aged 65 and older</li> </ul>



Technology Elements and Proposed Concepts		Challenges Addressed
 <p>Urban Delivery and Logistics</p>	<ul style="list-style-type: none"> <li>• Data-driven, connected urban freight movement</li> <li>• App for Port to reduce check-in wait times</li> <li>• Freight-specific dynamic travel planning application</li> <li>• Sensor-enabled dynamic routing for trash collection</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of advanced traveler information systems for goods transport</li> </ul>
 <p>Strategic Business Models and Partnering Opportunities</p>	<ul style="list-style-type: none"> <li>• Leveraging of capabilities and distributing risk, costs, and revenue</li> <li>• Public-private partnerships (PPP) to enhance Zipcar, Coast Bike Share, and HART</li> <li>• PPP between Tampa Electric and Tampa for smart grid</li> <li>• Leveraging of private partner's technology investments for deployments</li> </ul>	<ul style="list-style-type: none"> <li>• Limited avenues to leverage entrepreneurs</li> <li>• Limited adaptation to newer business models</li> <li>• Need to leverage sharing economy</li> </ul>
 <p>Smart Grid, Roadway Electrification, and Electric Vehicles (EVs)</p>	<ul style="list-style-type: none"> <li>• Vehicle-to-grid and vehicle-to-home smart charging pilot</li> <li>• Infrastructure for EVs (static and dynamic charging)</li> <li>• Smart grid enabling intelligent infrastructure communication</li> <li>• Leverage of smart grid communication to automate traffic signals</li> </ul>	<ul style="list-style-type: none"> <li>• Limited EV infrastructure</li> <li>• Partial smart grid</li> <li>• Inefficient energy grid</li> </ul>
 <p>Connected, Involved Citizens</p>	<ul style="list-style-type: none"> <li>• Citizen-to-Citizen (C2C) crowdsourcing platform</li> <li>• Crowdsourced social events senior center shuttle</li> <li>• Collaboration with AARP on training for those that are not up to speed on newer technologies</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of multi-modal information</li> <li>• Limited mobility options for vulnerable populations (seniors, low-income, disabled)</li> <li>• Limited public access to existing data sources</li> <li>• Demand for more community input on local issues</li> <li>• Need to educate on the value of transit and new transportation technologies</li> <li>• Need to leverage sharing economy</li> </ul>
Smart City Elements and Proposed Concepts		Challenges Addressed
 <p>Architecture and Standards</p>	<ul style="list-style-type: none"> <li>• Leveraging of Connected Vehicle Reference Implementation Architecture (CVRIA) and Systems Engineering Tool for Intelligent Transportation (SET-IT)</li> <li>• Identification and communication of gaps in existing interfaces/standards</li> <li>• Support of standards for urban automation, CVs, sensor-based infrastructure, smart grid, user-focused mobility</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of comprehensive standards for Smart City elements</li> </ul>
 <p>Low cost, efficient, secure, and resilient ICT</p>	<ul style="list-style-type: none"> <li>• Use of cloud to eliminate capital expenditures and enable scalable computing</li> <li>• Data governance to address privacy concerns</li> <li>• Securing of architecture for edge devices and back-end systems</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of existing infrastructure for open data-sharing</li> <li>• Limited public access to existing data sources</li> <li>• Demand for more community input on local issues</li> <li>• Need to leverage sharing economy</li> </ul>

Technology Elements and Proposed Concepts		Challenges Addressed
 Smart Land Use	<ul style="list-style-type: none"> <li>• Shared parking app</li> <li>• Meet-Up Bike and Walk to School or Work App</li> <li>• Enhanced community participation tools</li> </ul>	<ul style="list-style-type: none"> <li>• Limited adaptation to newer business models</li> <li>• Need for TOD</li> </ul>

## 1.2 Implementation and Operations Approach

Tampa's approach to implementing and operating the Smart Tampa vision described in this proposal will follow a four-step continuous improvement process that leverages the Plan-Do-Check-Act Model:

- **Plan** – Develop a comprehensive implementation plan for the Smart Tampa demonstration. Establish objectives and processes needed to deliver results. Develop structure, methods, and processes to measure effectiveness.
- **Do** – Launch Smart Tampa according to the details documented in the comprehensive implementation plan. In some scenarios, it may become evident early in the implementation that changes are immediately required to ensure that Smart Tampa can successfully run to completion. Implement changes using change management processes, ensuring that such changes are well documented and understood by the project team and the USDOT. Communicate the changes to all Smart Tampa participants. The Smart Tampa participants must know what their responsibilities are throughout the implementation.
- **Check** – Monitor the usage of various demonstration concepts. Understand how each concept/application is being used by the participants throughout the demonstration. Document the behaviors and findings of the demonstration participants. Report the results of each concept/application monitoring to affected team members of Smart Tampa. Monitor the physical and technical environment and track technical issues throughout the demonstration. Use the demonstration participants as a base for extrapolating the Smart Tampa system performance measures. Employ standardized evaluation reports and surveys to gain understanding of the advantages and disadvantages of each demonstration concept/application.
- **Act** – System enhancements or documentation updates are common requirements resulting from the demonstration operations monitoring. Understand how the demonstration participants interact with the concepts/applications and perform their transportation functions such as driving, riding, biking, and walking. Work with the USDOT to share data and lessons learned. Openly collaborate and commonly agree on changes needed to improve the functionality and/or performance of each concept/application.

## 1.3 Program Management Approach

The Smart Tampa initiative will be led by the Mayor's Office and managed through the Department of Transportation and Stormwater Services. To successfully manage this initiative, we will create a Smart Tampa Board, which will include the heads of participating city departments, as well as representatives appointed by the Mayor. The board will meet bi-weekly in the initial stages (and less frequently in later stages) to review progress, risks, and partnerships. In addition, we will stand up a Program Management Office (PMO) to run the day-to-day efforts of the initiative, and will apply the Project Management Body of Knowledge (PMBOK) principles as we move through the various phases of program implementation and operation. Additionally, we will establish clear lines of communication between Tampa and the USDOT for important decisions and participate in efforts to share lessons learned from this initiative with other cities.



**Tampa is fully committed to spearhead the demonstration of forward-looking Smart City concepts involving advanced technologies, data, and applications to help improve safety, increase mobility, enhance security, boost productivity, and protect our environment.**

## 2. POPULATION CHARACTERISTICS OF TAMPA

Tampa is a mid-sized city with a population of 335,709 according to the 2010 Census. It has a dense urban population of 2,960 people per square mile (113.4 sq-mi). Tampa represents a significant portion of the population of its local urbanized area with a ratio of 13.7 percent. Tampa's daytime population is more than double its night-time population. In 2015, the population within Tampa's corporate limits was approximately 356,000 people; this number is projected to grow to over 480,000 by 2040, as shown in Table 2. Because vacant land within the corporate limits is scarce and there is little potential to annex undeveloped property, the vast majority of this growth must occur through downtown residential development, transit-oriented development along major commercial corridors, and infill of the city's existing residential neighborhoods.

**Table 2: Tampa Population Projections**

POPULATION	2015	2020	2025	2030	2035	2040
Temple Terrace	36,245	38,304	40,062	40,579	41,887	43,134
Plant City	40,530	44,146	49,740	64,555	69,113	71,523
Tampa	355,850	384,153	410,669	433,103	457,322	481,128
Unincorporated County	857,723	940,112	1,014,852	1,075,680	1,136,625	1,194,597
COUNTYWIDE TOTAL	1,290,348	1,406,715	1,515,323	1,613,917	1,704,947	1,790,382

*Source: Metropolitan Planning Organization Imagine 2040 Long Range Transportation Plan*

Today, over 355,000 people from 3 counties in the region work within the city limits, and this number continues to grow. This growth will be concentrated predominantly in three major business centers:

- **Downtown** – A mix of corporate offices and civic-related employment as well as cruise ship terminals, future USF medical school, and Tampa General Hospital
- **Westshore Business District and TIA** – Corporate offices, regional retail, hospitals, and airport-related industries
- **USF Area** – USF campus (48,000 student Research 1 university), three major hospitals, Busch Gardens amusement park, and industrial park areas.

## 3. TAMPA CITY CHARACTERISTICS

Tampa is the third-largest city in Florida. The region's largest airport, port, university, two professional sports arenas, and central business district are all located within the city limits, which makes it the economic hub of the Gulf Coast. Tampa provides a wide range of transportation modes (surface, air, rail, and water) that allow for effective demonstration of our proposed Smart City concepts, which can be transferred to other mid-sized cities across the nation.

Tampa has a well-connected network of freeways (38 miles), highways (21 miles), arterials (316 miles), and three major bridges across the Tampa Bay. THEA has various ongoing projects including Bus Toll Lanes, Automated Vehicle demonstration, and the USDOT Connected Vehicle (CV) Pilot Deployment. Also, Tampa has all-electronic Reversible Expressway Lanes (RELs), allowing for express travel between the City of Brandon and downtown Tampa.

HART operates the public transportation in Tampa, which includes public bus, paratransit, and a streetcar line. HART covers an area of approximately 1000 sq. miles with a fleet of nearly 200

buses. The streetcar system runs between the Ybor City historic district and downtown Tampa. HART offers its customers innovative tools such as OneBusAway, which relays real-time bus information to smart phones. The ongoing relationship between HART and USF/CUTR (a USDOT University Transportation Center) has proven effective for deploying innovative transportation technologies in Tampa. Water taxis are available on a charter basis for tours along the downtown waterfront and the Hillsborough River. TBARTA provides bus, light rail, and other transportation options for the seven-county Tampa Bay area.

TIA is Tampa's main airport and the primary location for commercial passenger airline service into the Tampa Bay area. Tampa's intercity passenger rail service is based at Tampa Union Station, a historic facility, adjacent to downtown between the Channel District and Ybor City. Useta Rail Yard on Tampa's east side services CSX as a storage and intermodal freight transport facility. Port Tampa Bay handles about one-third of all cargo moving in and out of the state of Florida, and the cruise port handles about 900,000 passenger moves a year.

Tampa led or co-led several large federally funded initiatives, including 2012 HUD Choice Grant, 2013 TIGER Grant, and 2012 Republican National Convention. With commitment from Tampa's Mayor Buckhorn; heads of nine City of Tampa departments; and multiple public, private, and academic partners, Tampa has the leadership and capacity to successfully carry out the Smart City Challenge demonstration.

Tampa has the latest ridehailing/rideshare systems in the nation—services like Uber and Lyft and carpooling apps are available. In addition, a bike sharing program called Coast Bike Share allows users to find and reserve bikes via a mobile app in Tampa. Coast Bike Share offers nearly 300 rental bikes distributed at 30 hubs in or near downtown, which commuters and HART riders can use for the first and last miles of their daily trips. In addition, Zipcar currently has three locations in Tampa, and supports services for members with disabilities including vehicles with hand controls and service animals.

TECO is currently investing millions of dollars and human resources in new energy technologies that support Tampa's smart grid evolution. Limited transportation by privately operated neighborhood electric vehicles (NEVs) is available, primarily in downtown Tampa and Ybor City. Also, ChargePoint, the world's largest and most open electric vehicle (EV) charging network with over 25,200 locations, has several charging stations in Tampa.

Tampa is a leader in promoting open, machine-readable data. The city hosts an open data site, and Mayor Buckhorn has hosted hackathons with the tech startup community. Tampa's website and citizen-facing services have been upgraded to the latest open source platforms and are fully enabled for mobile access. Tampa worked with key business providers to install free WiFi at major parks, attractions, and business locations throughout the city. HART and USF/CUTR provide standards-compliant open data on transit schedules and transit arrivals. Coast Bike Share publishes anonymized trip data, which is used to understand usage and improve service.

## **4. ANNOTATED PRELIMINARY SITE MAP**

The proposed Smart City Challenge implementation area comprises Tampa's vibrant downtown, the Port Tampa Bay, historic Ybor City, and the TIA. Figure 1 indicates the locations of key issues and proposed Smart City concepts that align with the USDOT vision elements.



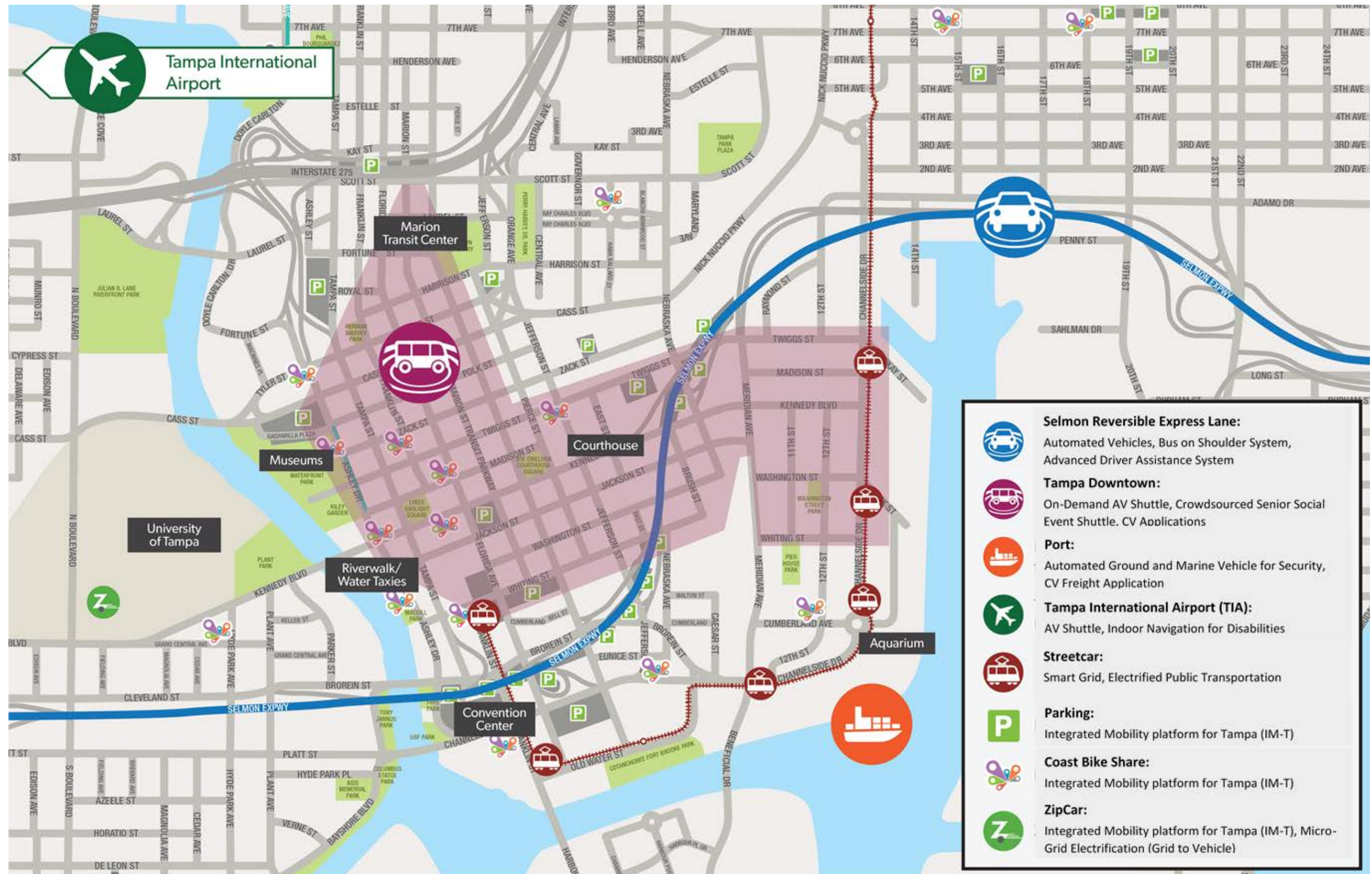


Figure 1: Annotated Preliminary Site Map



## 5. SMART CITY VISION ELEMENTS

The Smart Tampa vision offers bold and innovative ideas to demonstrate and evaluate the benefits of various Smart City concepts that align with the USDOT's 12 vision elements. An impressive set of carefully chosen partners representing Tampa's agencies, infrastructure network operators, and service providers will work together (see Figure 2) to address the USDOT's Smart City goals and Tampa's challenges, focusing specifically on empowering vulnerable populations, making more efficient use of existing infrastructure through innovation, fostering a sharing economy, and improving resilience to climate events.

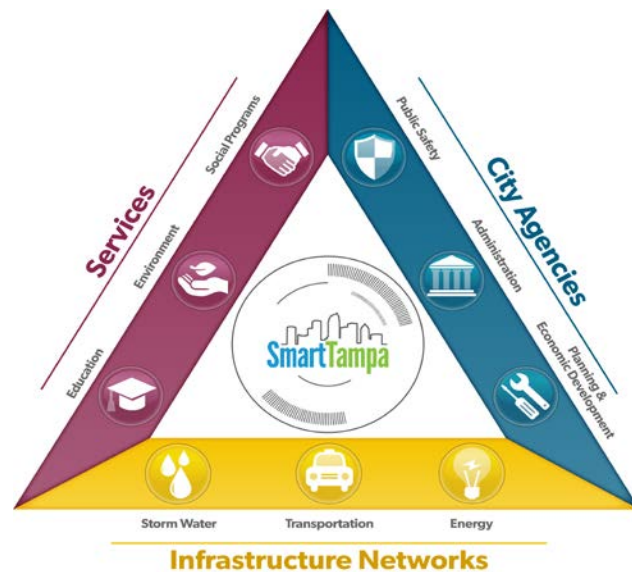



Figure 2: Smart Tampa Partners






The following subsections describe the high-level concepts (under each of the 12 vision elements) that we plan to implement using the Smart City Challenge funds.

### 5.1 Vision Element #1: Urban Automation



- Automated vehicles on Reversible Express Lanes
- Low-speed fully automated electric shuttles in downtown and at TIA
- Automated marine and ground security vehicles at Port and TIA
- Bus-on-Shoulder-System with Mobileye and active safety systems

**Lead Partners**

Our proposed concepts under this vision element will demonstrate adoption, use, and impacts of urban automation on public roads. Working with our public and private partners, Tampa will demonstrate the capabilities of various automated vehicle technologies and engage with other cities to accelerate nationwide adoption.

#### 5.1.1 Automated Vehicles on REL

With support from THEA, Tampa will deploy several vehicles with highway pilot (SAE Level 3) on the REL (see Figure 3). Audi, a pioneer in vehicle automation, will work with Tampa to deploy and test these vehicles, using the city employees as operators. These vehicles will operate in real traffic on a daily basis. THEA will also make available 5 to 7 mile segments of the REL for AV testing at times when portions of the REL are closed for the daily lane reversal process.



Figure 3: Automated Vehicles on REL



In addition, HART will deploy Bus on Shoulder Systems (BoSS) on the REL (see figure) to increase the capacity of existing infrastructure. The BoSS vehicles will incorporate the Mobileye systems to be provided to the final selected city. Additionally, lateral control of buses provided by Bosch will improve BoSS operations, especially during Tampa’s challenging climate events like the record flooding in 2015.

### 5.1.2 Autonomous Shuttles in Downtown Tampa and at TIA

Our partner Meridian will deploy SAE Level 5 fully automated low-speed multi-passenger shuttles in downtown and at the TIA. Tampa Downtown Partnership (TDP) will lead the deployment of an on-demand downtown shuttle that connects existing transportation options (Amtrak, Greyhound, Coast Bike Share, water taxis, and street cars) and important destinations in Tampa (scenic riverfront, museums, and signature parks). The complementary shuttle will provide increased mobility and accessibility opportunities to vulnerable populations. Tampa’s Downtown Guides will serve as operators of the shuttles, providing city information and helping passengers with disabilities. This service will meet the needs of downtown’s workforce (58,000), residents (8,100), and visitors (3.6 million). Certain stretches of the shuttle routes will also provide wireless charging capabilities.



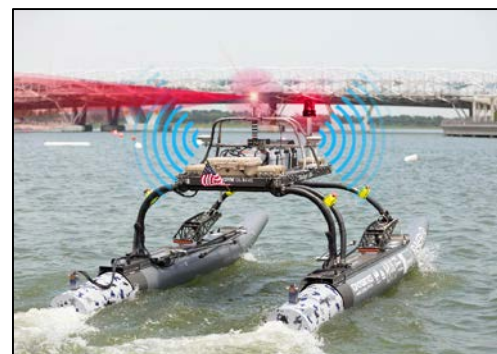
**Figure 4: Meridian Shuttle at TIA**

TIA is building an automated people mover (APM) to connect its terminal to the economy parking garage and the Consolidated Rental Car Facility (ConRAC). The APM will drop off travelers a considerable distance from their parked cars in the garage. A Meridian shuttle will transport 8 to 10 passengers and their luggage between the APM drop-off point and their vehicles, making their trip from terminal to car completely automated. This shuttle service will be continuous during the peak periods and on-demand during off-peak periods.

Smartphone apps and kiosks will be provided for ride hailing. Meridian’s Supervision platform will record all real-time parameters (sensor data, actuation orders, etc.), and this data will be shared with the USDOT and insurance companies. Meridian will also work with the USDOT, Florida Department of Transportation (FDOT), and Tampa on understanding the vehicle certification process.

### 5.1.3 Port and Airport Security





Our partner Embry Riddle Aeronautical University (ERAU) will work with Port Tampa Bay to deploy their Marine automated surface vehicles (ASVs), which are already equipped with autonomous navigation and advanced sensors. Port security applications will include cruise ship security zone monitoring, hazardous material leak monitoring, and detection of fast boat approaches. ERAU will also deploy its autonomous ground vehicles to patrol the cruise port terminals for security issues. These vehicles will be equipped with facial recognition technology to identify authorized personnel. In addition, the ASVs will also monitor for threats in the waterways along TIA’s runway approach paths.



**Figure 5: ASVs in Port Tampa Bay**

Upon identification of potential issues, the ASVs will respond accordingly (e.g., alert port security, warn unauthorized vehicles, and allow the security office to investigate threats).

## 5.2 Vision Element #2: Connected Vehicles

	<ul style="list-style-type: none"> <li>• Additional applications leveraging THEA CV Pilot Deployment</li> <li>• Safety: Red light violation warning</li> <li>• Environment: Eco-approach and departure</li> <li>• RESCUME: Emergency Communications and Evacuation</li> </ul>	<p><b>Lead Partners</b></p>   
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For the Smart City Challenge, we will build on the strong foundation (connected vehicles, roadside units, and mobile devices) that the USDOT/THEA CV Pilot Deployment ([http://www.its.dot.gov/pilots/pdf/03\\_CVPilots\\_Tampa.pdf](http://www.its.dot.gov/pilots/pdf/03_CVPilots_Tampa.pdf)) will provide for CV implementation in Tampa. Specifically, we will deploy additional CV applications (leveraging software available through the USDOT's Open Source Application Development Portal or OSADP) that will address additional challenges beyond those that are originally targeted and planned in the THEA CV Pilot.

The CV concepts will be implemented with support from our partners Audi and Booz Allen. Audi has the necessary vehicle systems and applications expertise, and Booz Allen has been supporting the USDOT for the past 10 years in CV research and development and is also a key partner in the THEA CV Pilot Deployment. The following are our proposed CV applications.

1. **Red Light Violation Warning (RLVW)** – The RLVW application will leverage the Intersection Movement Assist concept used in the THEA Pilot to enable connected vehicles approaching instrumented signalized intersections in Tampa to receive information from the infrastructure regarding the signal phase and timing (SPaT) and the geometry of the intersection. The RLVW application will use its speed, heading, and acceleration profile, along with the SPaT and geometry information to determine whether the vehicle will likely enter the intersection in violation of a traffic signal. If the violation seems likely to occur, the driver will receive a warning.
2. **Eco-Approach and Departure** – Similar to the RLVW application, the Eco-Approach and Departure application in equipped vehicles will receive intersection geometry and SPaT information from instrumented signalized intersections. Based on this information, the application will provide speed advice to drivers, allowing them to adapt the vehicles' speed to pass the next traffic signal on green or to decelerate to a stop in the most eco-friendly manner. If possible, with support from Audi, we will also explore the concept of automated longitudinal control for the Eco-Approach and Departure.
3. **Emergency Communications and Evacuation (EVAC)** – To address transportation challenges in Tampa due to adverse weather events such as hurricanes and flooding, we will deploy this CV application to provide travelers/evacuees with information such as passable routes and current traffic and road conditions. We will provide this service in coordination with many agencies including Tampa police, fire and rescue departments, emergency management, and public and private transportation providers.

Pertinent data (without any Personally Identifiable Information or PII) collected will be made available via the USDOT's Research Data Exchange (RDE).

## 5.3 Vision Element #3: Intelligent, Sensor-Based Infrastructure

	<ul style="list-style-type: none"> <li>• Road-side: weather, air quality, noise, traffic cameras, etc.</li> <li>• In-vehicle: position, velocity, weather, etc.</li> <li>• In-building: Indoor navigation beacons at Convention Center</li> <li>• Leverage USDOT's road weather products (VDT, MAW, and EMDSS)</li> </ul>	<p><u>Lead Partners</u></p> <div>   </div>
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Our concept integrates existing sensor data (e.g., from Bluetooth readers and bike detection sensors) with new data sets from additional sensors to be installed, allowing Tampa to improve the operations and maintenance of the transportation network.

Siemens will help deploy the additional **roadside** and **in-buildings sensors**, and will combine the data from these sensors with **in-vehicle** data (from THEA CV Pilot vehicles) to provide the foundation (see Figure 6) for road weather applications. Specifically, we plan to install weather sensors on vulnerable infrastructure (low-lying roadways, coastal property, etc.) to help predict where the heaviest rainfalls and flooding will likely occur, with the help of our Stormwater Services Division. The collected road weather data sets will be fed through the USDOT's Vehicle Data Translator (VDT); outputs from the VDT will be used in USDOT-developed road weather applications. Specifically, we plan to use the Motorist Advisory and Warnings application to provide flood alerts to city residents and motorists, and will use outputs from the Enhanced Maintenance Decision Support Systems to provide roadway maintenance alerts for efficient city operations during adverse weather events.



Figure 6: Roadside, In-Vehicle, and In-Building Sensor Network

## 5.4 Vision Element #4: Urban Analytics

	<ul style="list-style-type: none"> <li>• Platform for data ingestion, processing, and decision making support</li> <li>• Predictive analytics tools based on historical and current data</li> <li>• Goal driven capability build out</li> <li>• User friendly and unified interface</li> </ul>	<p><u>Lead Partners</u></p> <div>   </div>
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With the data-rich environment envisioned for Tampa, analytics will play a key role in evaluating and improving urban performance with enhanced awareness and decision support tools. Booz Allen is a leader in developing data analytics solutions that ingest data to create and extract insights that support decision-making processes. Urban analytics is the extension of data analytics that brings together Smart City components and vision elements, and is the engine required to operationalize Tampa's Smart City concept. Figure 7 illustrates how urban analytics functions as the core to support the full realization of the benefits of Smart Tampa's concepts. The data from various vision elements and components of Smart



Tampa will be fed into the analytic engine. The urban analytics platform supports decision makers, facility managers, and facility users in Tampa to realize their Smart City goals, such as improving efficiency and resilience. The information and insights will be delivered via an intuitive, unified visualization dashboard developed with user objectives in mind.

Urban analytics will support the monitoring and management of traffic, incidents (both transportation and non-transportation), energy consumption and production, air-quality, and road surface condition and quality (including pothole monitoring and the presence of water or other substance that adversely affect roadways), as well as the allocation and dispatch of resources during emergencies. Tampa's instrumented roadways will provide real-time data for assessing and monitoring facilities and improving the use of existing infrastructure. We will develop predictive analytic tools that use a combination of historical and real-time data to perform predictive mappings and develop proactive control strategies. For example, predictive systems could be used to alert Tampa's Traffic Management Center (TMC) staff if the arterial system is approaching saturation, who can thereby proactively introduce strategies such as signal timing optimization. Beyond traffic management, this tool can help prepare Tampa for climate events (e.g., allowing the fire department to proactively place their rescue vehicles to avoid troubled roadways and still perform operations). Additionally, the platform can be used to learn more about the accessibility challenges of vulnerable populations.

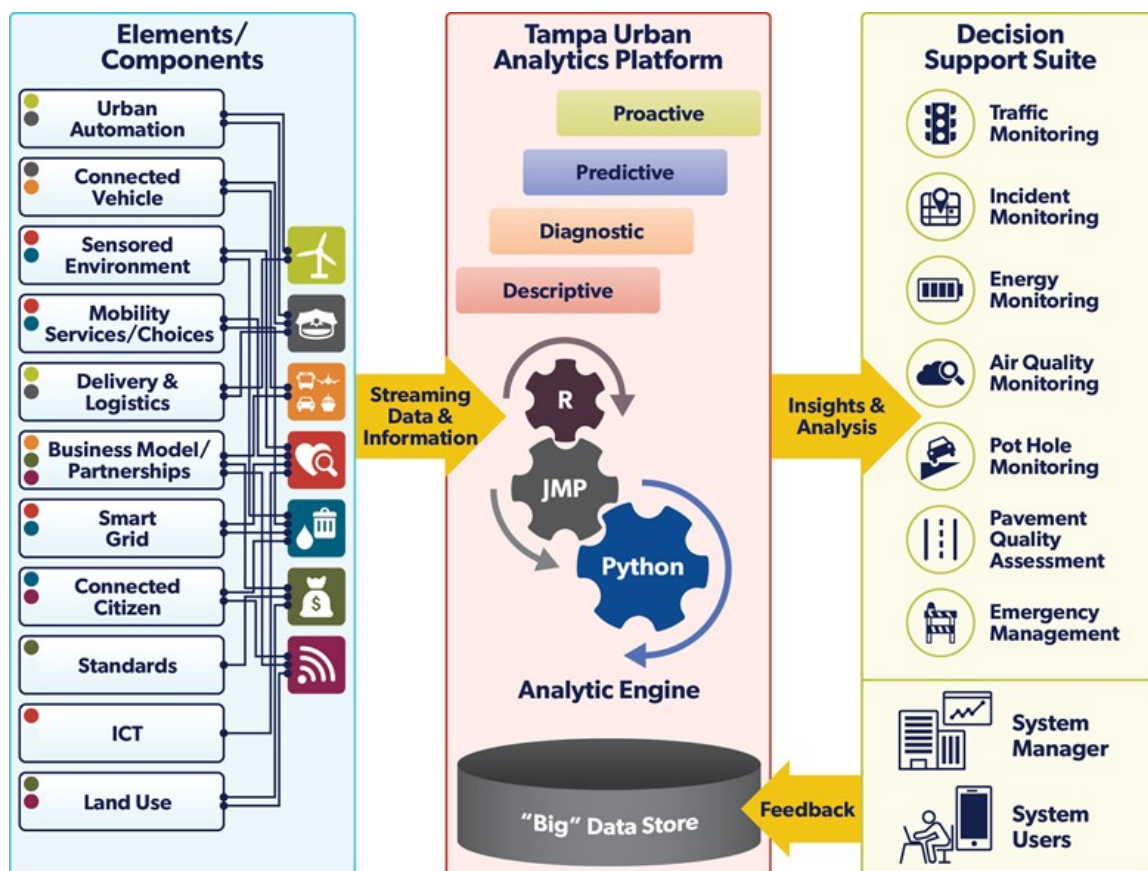





Figure 7: Urban Analytics: Central to the Operationalization of Smart Tampa Concepts



## 5.5 Vision Element #5: User-Focused Mobility Services and Choices

	<ul style="list-style-type: none"> <li>• Integrated Mobility Platform for Tampa (IM-T) application</li> <li>• Tampa senior center on-demand dynamic shuttle</li> <li>• Indoor navigation for improving accessibility to visually impaired</li> </ul>	<p><u>Lead Partners</u></p>  
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### 5.5.1 Integrated Mobility Platform for Tampa (IM-T)

Under this vision element, we propose to develop a first-of-its-kind **IM-T** that integrates all travel modes and transportation choices within a single interface.

Unlike existing platforms and applications, this platform will consider multiple travelers simultaneously, clustered by their most chosen routes, and enable the creation of ride-share suggestions. The proposed design is accessible to all travelers, including the elderly and disabled, through a smartphone app, dial-in number, or kiosks in designated locations. Users enter a destination and receive customized trip options with the factors needed to make an informed decision. To develop and deploy this bold and innovative concept (see Figure 8 for illustrations of the IM-T app), Tampa has partnered with Waze, Coast Bike Share, HART, Meridian, Zipcar, and vRide, and will leverage existing payment platforms, non-fixed route transit (Flex routes), and the OneBusAway transit arrival information system.

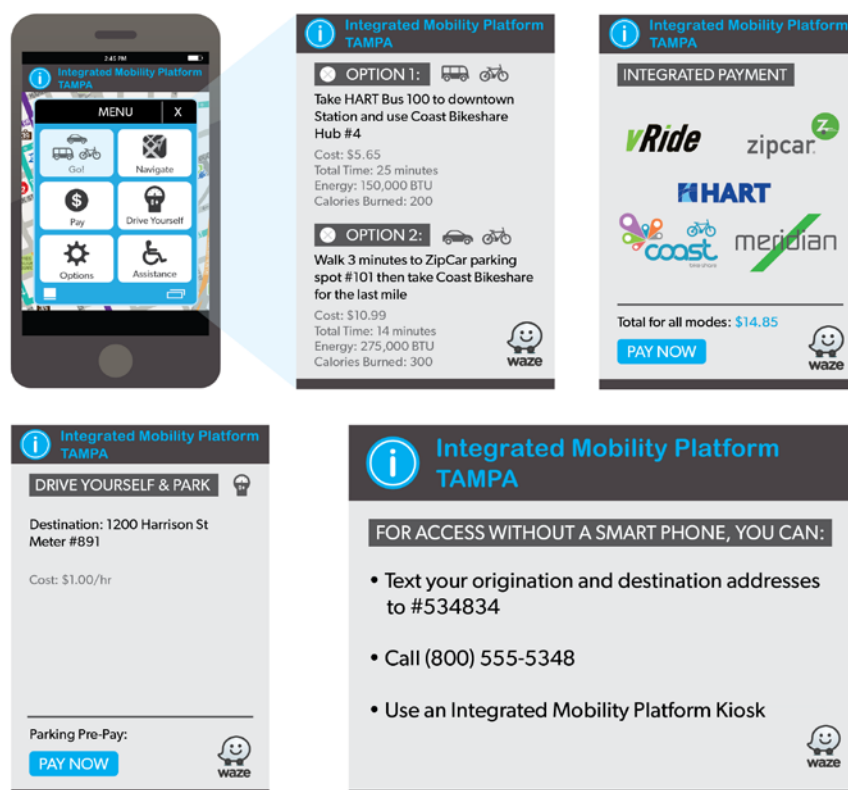


Figure 8: Illustrations of the IM-T App

### 5.5.2 Tampa Senior Center On-Demand Dynamic Shuttle

The urban core of Tampa has a number of senior citizen facilities. Some centers have designated shuttles, others do not and rely mainly on public transit and paratransit services for their residents. Using existing shuttle vehicles from the HARTFlex program's ADA accessible shuttle services and adding new shuttles as needed, we will establish an on-demand dynamic shuttle to aggregate trips requested in real time from different senior centers. In addition, we will integrate this solution with the existing OneBusAway service in Tampa. Users will be able to schedule the on-demand dynamic shuttle via a website, mobile application, phone call, or mobility station located outside each participating center. These mobility stations will include electronic equipment capable of

hailing a shuttle via a touch-tag sensor that works with the senior center’s identification card or mobile ticket. Senior center front desk staff will also be trained to call the shuttle via website or mobile application for a requesting senior resident. The service will begin by operating between selected areas, such as participating senior centers and the downtown core as well as identified popular travel areas for senior citizen residents. As the service grows and travel demand increases, we will examine the possibility of expanding the service area by teaming with more senior centers in Tampa.

### 5.5.3 Indoor Navigation for Improved Accessibility

Personal navigation applications are important for disabled and elderly populations, and these applications often depend on GPS, which is unreliable in many locations (e.g., inside buildings and parking garages). Beacon positioning systems (BPS) offer an alternative to obtain localization and contextual information. We will install these sensors inside the Tampa Convention Center. Figure 9 illustrates the proposed indoor navigation deployment.

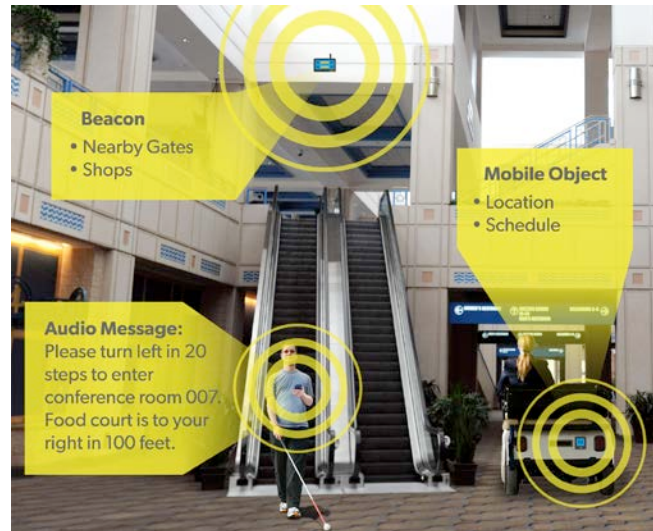





Figure 9: Proposed Indoor Navigation Deployment

## 5.6 Vision Element #6: Urban Delivery and Logistics



	<ul style="list-style-type: none"> <li>• Data-driven, connected urban freight movement</li> <li>• App for Port to reduce check-in wait times</li> <li>• Freight-specific dynamic travel planning application</li> <li>• Sensor-enabled dynamic routing for trash collection</li> </ul>	<p><u>Lead Partners</u></p> <div data-bbox="998 1176 1201 1239">  </div> <div data-bbox="1209 1228 1404 1281">  </div>
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The I-4/Selmon Expressway Connector witnesses a flow of around 12,000 trucks per day that use a dedicated truck lane as they move into (and from) the Port Tampa Bay. A freight-specific dynamic travel planning application will leverage existing data on roadway conditions (accidents, incidents, etc.) and information on Port Tampa Bay entry/exit delays, and provide dynamic truck routing information to local fleet operators interested in participating in this deployment. Port Tampa Bay will also improve its operational efficiency by increasing access to information and streamlining check-in procedures. The application will provide freight movers with up-to-date check-in wait times and allow drivers and companies to coordinate their arrivals and departures to reduce wait times. Furthermore, the application will also include a digital pre-check-in feature to reduce processing time at the gate.

In addition, waste management trucks in Tampa will become more efficient through sensor-enabled dynamic routing and eco-approach and departure. Trash collection points will be instrumented to monitor trash volume and inform our Department of Solid Waste and Environmental Program Management when trash emptying is necessary. A centralized dynamic routing algorithm hosted on the Urban Analytics platform (See Section 5.4) will then optimize

truck routing. Trash trucks will also be equipped with the Eco-Approach and Departure application to improve fuel efficiency.

## 5.7 Vision Element #7: Strategic Business Models and Partnering Opportunities

	<ul style="list-style-type: none"> <li>• Leveraging capabilities and distributing risk, costs, and revenue</li> <li>• PPP to enhance Zipcar, Coast Bike Share, and HART</li> <li>• PPP between Tampa Electric and Tampa for smart grid</li> <li>• Leveraging private partner's technology investments for deployments</li> </ul>	<p><b>Lead Partner</b></p> 
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Recognizing the limited public resources available to successfully execute the proposed Smart Tampa concepts, as well as the private sector's appetite for deploying innovation, Tampa has identified the business models necessary to develop *and sustain* its Smart City vision. TDP has been instrumental in creating strategic public private partnerships (PPPs) that provide attractive options for distributing risk, operating costs, and revenue streams. Three PPPs that TDP developed in conjunction with this proposal leverage public investments in infrastructure and regulatory risk reduction to incentivize private investment in operation, including deployment of shared cars (Zipcar), bike share (Coast Bike Share), and electric shuttles (Meridian). Additionally, multimodal travel will be enhanced through a partnership between public transit (HART) and Coast Bike Share, including price promotions and plans to unify payment cards.

Strategic private sector partners will bring resources to help fulfill the vision elements. Audi and Meridian are providing their expertise to ensure safe and accelerated deployment of AVs. Bosch and Siemens have offered their expertise for implementing off-the-shelf and customized solutions to meet Tampa's challenges. Waze will provide access to a robust information management system and will partner on developing new features for Tampa. Multimodal shared economy partners Zipcar, vRide, and Coast Bike Share have agreed to work with the team to create an integrated transportation interface for users. Coast Bike Share and HART are partnered through promotions to increase cross-utilization.

Tampa's very own UTC, USF/CUTR, has a long-standing research relationship with HART and Tampa. CUTR is providing its expertise to ensure cutting-edge technologies are transitioned into practice, especially related to enhancing mobility for elderly users and developing data standards. Partner ERAU is a core member of the Federal Aviation Administration's Unmanned Aerial System Center of Excellence. The Transportation Research Sustainability Center (TSRC) of U.C. Berkeley is providing unique expertise in the Mobility On-Demand and integrated/shared mobility services. All three academic partners will continue to train the future workforce through Smart Tampa's applied research.

Tampa and TECO have outlined a PPP to expand investments in EV infrastructure and leveraging the smart grid communications platform to enhance Smart City capabilities across the traffic management system environment and the electric grid. AARP brings the perspective of the elderly population to this project, and the nine participating City of Tampa departments will ensure broad interest group representation.

## 5.8 Vision Element #8: Smart Grid, Roadway Electrification, and Electric Vehicles



- Vehicle-to-grid and vehicle-to-home smart charging pilot
- Infrastructure for electric vehicles (static and dynamic charging)
- Smart grid enabling intelligent infrastructure communication
- Leverage smart grid communication to automate traffic signals

### Lead Partner



There is increased consumer interest in choosing EV options, with close to 900 EVs and over 80 charging stations in Tampa. With the funding that Vulcan will provide to the final selected city, our partner TECO will deploy the following concepts:

- Implementation of a vehicle-to-grid and vehicle-to-home smart charging pilot in the downtown core, with data available to the public for research and development
- Implementation and evaluation of static and dynamic inductive charging, with data available to the public for research and development.
- Opportunities in the downtown core include:
  - Designated areas for shared EVs (e.g., Zip Car, Uber, Lyft)
  - Parking spaces dedicated to EVs
  - Piloting of a dynamic inductive charging corridor through downtown
  - Residential parking spaces dedicated to EVs in high-rise condominiums
  - Installation of solar charging stations for the public and downtown workplace charging
  - Installation of traditional charging stations at downtown workplaces.

TECO is currently building an advanced communication network as a platform for communicating with sensors and automation technology across the city and supporting smart grid deployment in Tampa. The Vulcan funding can also support Tampa by providing this communication infrastructure for automating all 560 traffic signals to create a new advanced traffic management system, which will help Tampa in alleviating traffic congestion and lowering vehicular incidents, as well as reducing drive time, fuel usage, and carbon emissions.

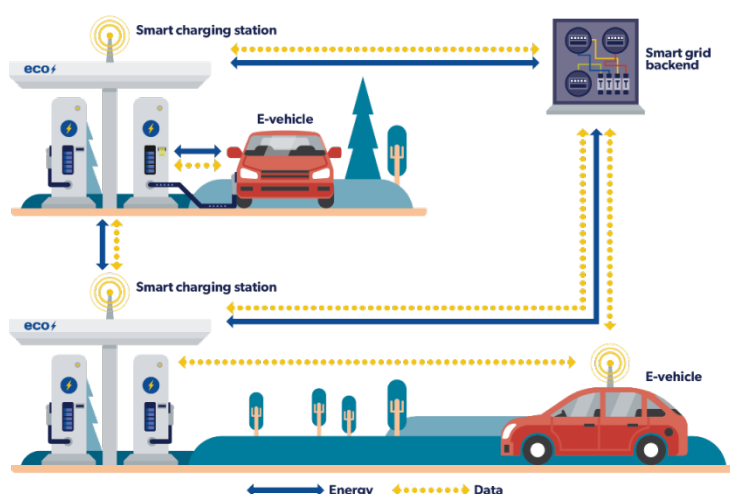





Figure 10: Electric Charging Stations Network

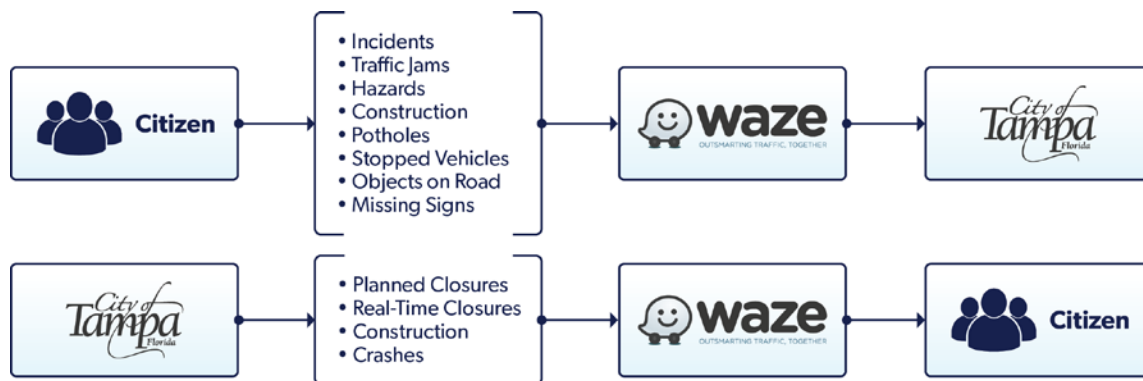


## 5.9 Vision Element #9: Connected, Involved Citizens

	<ul style="list-style-type: none"> <li>• Citizen-to-citizen (C2C) crowdsourcing platform</li> <li>• Crowdsourced social events senior center shuttle</li> </ul>	<b>Lead Partners</b>	 
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### 5.9.1 Citizen-to-Citizen (C2C) Crowdsourcing Program

In partnership with Waze, Smart Tampa will create a new C2C Crowdsourcing program.



**Figure 11: Citizen to Citizen Crowdsourcing of Information**



In this program, Tampa will receive crowdsourced information generated by Waze users in Tampa. For example, every time a Waze user reports a pothole in the roadway, Tampa will be notified in real time. By storing this data, Tampa will be able to run sophisticated analytics (using the Urban Analytics platform) to determine the areas that show the most regularity in pothole reporting. With this added insight, Tampa could then make informed maintenance policy decisions. There are many possibilities because the crowdsourced data coming from Waze includes accidents, vehicles stopped on the road, hazards, flooding, and traffic jams, among others. Under its partnership with Tampa, Waze can share with drivers any city-owned open-data made available through its existing channels. Waze can also be leveraged as a form of direct communication with Tampa drivers by displaying events and incidents reported by Tampa.

### 5.9.2 Crowdsourced Social Events Senior Center Shuttle

In conjunction with the Urban Tampa Senior Center Dynamic Shuttle, Smart Tampa will add a crowdsourced social events concept. Using display screens in the common areas of each participating senior center, weekly events requiring shuttle travel will be displayed up to weeks in advance. This will enable senior center members to sign up for the events in advance. The dynamic shuttle will be routed by existing algorithms in the most efficient manner to drive all interested residents to and from events. Events will be scheduled in advance by senior center management, as well as proposed “on the fly” by senior center members themselves. These more impromptu events will be proposed by center residents and then displayed in real time at all participating centers. After a 2-hour sign-up window for the proposed event(s), if there was adequate demand for a shuttle, the event will be locked in and a shuttle will be deployed. If the event does not attract enough demand to warrant use of the dynamic shuttle, members will still have the option to use a

smaller paratransit vehicle. This approach introduces an aspect of social gamification among senior centers and aims to promote active lifestyles and social activity among senior center members.

## 5.10 Vision Element #10: Architecture and Standards

	<ul style="list-style-type: none"> <li>• Leverage CVRIA and SET-IT</li> <li>• Identify and communicate gaps in existing interfaces/standards</li> <li>• Support standards for urban automation, connected vehicles, sensor-based infrastructure, smart grid, user-focused mobility</li> </ul>	<p><u>Lead Partner</u></p> 
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Tampa endorses and embraces the challenges and rewards of using a standards-based reference architecture as the foundation for the Smart City solutions providing interoperability with other deployments and a consistent, reliable transportation experience for all users. As part of deploying the Smart Tampa concepts, Tampa and its partner Booz Allen are committed to developing interfaces using the CVRIA as the foundation, and new interfaces will be developed to the extent feasible, using existing networking, data, or other standards. All interfaces, current or new, will be specified through the SET-IT tool, and relevant feedback will be provided to the USDOT for incorporation into the CVRIA. Where gaps in functionality or necessary changes to existing standards are identified, or where the need for new standards are identified, these requirements will be specified and provided to the USDOT for possible coordination and remediation with relevant standards developing organizations (SDOs).

While the initial application of CVRIA and SET-IT have focused on connected vehicle and automated vehicle applications, Booz Allen will leverage its knowledge and experience with these USDOT assets, and extend the “platform” to integrate new and innovative Smart City solutions for Tampa, both within the ITS domain and for new use cases leveraging existing or emerging transportation domains such as smart grid integration and urban automation, logistics, and delivery. Booz Allen is fully committed to supporting the USDOT National Architecture Team as they integrate the CVRIA into the National Architecture and expand it to incorporate these and similar Smart City solutions.

Several of the vision elements (Urban Automation, Connected Vehicles, Sensor based Infrastructure, and Communications Technology) inherently have a strong baseline in terms of architecture and standards. Other vision elements, such as the *Smart Grid*, *Roadway Electrification*, and *Electric Vehicles* and the *User-focused Mobility Services and Choices*, have relevant or emerging standards that facilitate their adoption for Smart City solutions and eventual integration into the National ITS Architecture. For example, the USDOT and the U.S. Department of Energy (DOE) supported initiatives to develop relevant standards enabling the Smart Grid, Roadway Electrification, and Electric Vehicles vision element. The USDOT contributed to this joint effort through support for development and evolution of National Transportation Communications for ITS Protocol (NTCIP) standards, particularly in the area of Electrical and Lighting Management Systems, while the DOE supported electrical distribution standards through the National Institute of Standards and Technology’s Smart Grid Interoperability Program, specifically with IEEE 1901-2010 and IEEE 2030-2011. To illustrate this in more depth, Tampa can examine the *User-focused Mobility Services and Choices* vision element where several data formats for open multimodal transportation data are now available in Tampa. For some modes

(e.g., fixed-route transit), these formats are well established, while standardized formats for other modes (bike share, flex route, crowd-sourcing) are still emerging. We will track such developments and adopt them as appropriate.

## 5.11 Vision Element #11: Low-Cost, Efficient, Secure and Resilient Information and Communications Technology (ICT)

	<ul style="list-style-type: none"> <li>• Cloud to eliminate capital expenditures and enable scalable computing</li> <li>• Data governance to address privacy concerns</li> <li>• Secure architecture for edge devices and back-end systems</li> </ul>	<u>Lead Partner</u>
		



Tampa's ICT infrastructure will be the enabling technology that captures sensor and other types of open data in real time, provides a processing environment to support multiple Smart City vision elements, and then disseminates the resulting information to targeted groups in the user community. Within the context of a Smart City, providing unrestricted and continuous public access to ever growing amounts of open data requires an ICT architecture that is capable of providing a resilient, scalable, secure, and affordable infrastructure. Therefore, in many respects, Tampa considers the ICT as a fourth utility alongside water, sewage, and electricity. The following describes key elements of Smart Tampa's ICT deployment strategy.

Tampa will leverage a public Cloud service provider to deploy core components of the ICT architecture since this option provides numerous advantages. Financially, the biggest advantage is the elimination of capital expenditures that would be destined to stand up a traditional in-house data center. From a technology perspective, the cloud option provides Tampa with a scalable computing capability that can be provisioned in a matter of a few hours and would be cost prohibitive if deployed in a Tampa-owned data center. The cloud environment also provides a greater amount of fault tolerance and failover than would be typically affordable in a Tampa-owned infrastructure (e.g., by providing load balancers and alternative data centers). From a software perspective, the ICT will leverage open standards to ensure interoperability with new sources of data as these become available in the future. Use of open standards is also important for Tampa, as it facilitates the use of Free and Open Source Software (FOSS) platforms when developing our Smart Tampa applications. Much of the Big Data software technology that will be central to the Urban Analytics capability, for example, can be deployed in clusters running FOSS software such as Hadoop and Spark.

In addition, Tampa will define data governance policies to address how data privacy issues will be handled within the Smart Tampa ICT, especially as these relate to PII. This is the case regardless of whether the data in question is streamed in real time within the ICT and/or stored to disk for subsequent analysis. Our team member Booz Allen has extensive experience in helping to define appropriate public sector data governance strategies and translate these policies into a framework capable of being implemented within the data center. For the USDOT's CV program, Booz Allen has designed and implemented a data cleansing capability in the Southeast Michigan Operational Data Environment (ODE) to ensure that real-time streaming data from CVs has been filtered pursuant to privacy policies.

Lastly, in the area of security, our ICT architecture will ensure that edge devices, such as sensors, can only connect to the ICT if they are trusted devices and known to be free of viruses/malware when connecting. Booz Allen’s experience in developing the Security Credential Management System for the USDOT’s CV program provides a strong background in securing one particular class of edge device (i.e., the CV). Within the ICT network itself, the team plans to deploy a continuous monitoring capability via an Intrusion Detection System to add an additional layer of security to the network.

## 5.12 Vision Element #12: Smart Land Use

	<ul style="list-style-type: none"> <li>• Shared parking app</li> <li>• Meet-Up Bike and Walk to School or Work App</li> <li>• Enhanced community participation tools</li> </ul>	<u>Lead Partner</u>
		

Tampa will demonstrate the power of connected technologies to shift people from cars and sprawl to vibrant, mixed-use nodes of development, by leveraging the existing transit and bike/pedestrian infrastructure. Our proposed concepts include:

- **Shared Parking App** – A parking option will be added to the IM-T application proposed in Vision Element #5, which identifies available parking within a certain distance of a user’s destination. This includes both public parking and unused parking that is made available for public use by participating private businesses, thus contributing to more optimized use of available land and shared economy.
- **Meet-Up Bike and Walk to School or Work App** – Commuters can choose to meet up with a local group minutes before their departure. The mobile app identifies a nearby location for bicyclists or pedestrians to meet up and commute together, thus promoting walkable bicycle-friendly land use and public health.
- **Enhanced Community Participation** – A connected community participation tool to increase the public’s awareness of, accessibility to, and input into Tampa’s planning process, so that the community itself can help optimize the use of available transportation choices for improved access to employment, housing, education, and health services.

The above tools will be accessible to all community groups, including low-income, elderly, and veterans, through the use of smart phones and alternative methods (e.g., kiosks).

## 5.13 Integrated Approach for All Vision Elements

Figure 12 depicts Smart Tampa’s holistic, integrated approach to implement the Smart City concepts described above. It illustrates how our demonstration concepts align with multiple vision elements, how they synergistically combine to address various challenges in Tampa, and how the various vision elements result in multiple benefits. Our approach will optimize the use of available Smart City Challenge funds to deploy and demonstrate solutions that can be transferred to other mid-sized cities across the country, and produce measurable impacts.



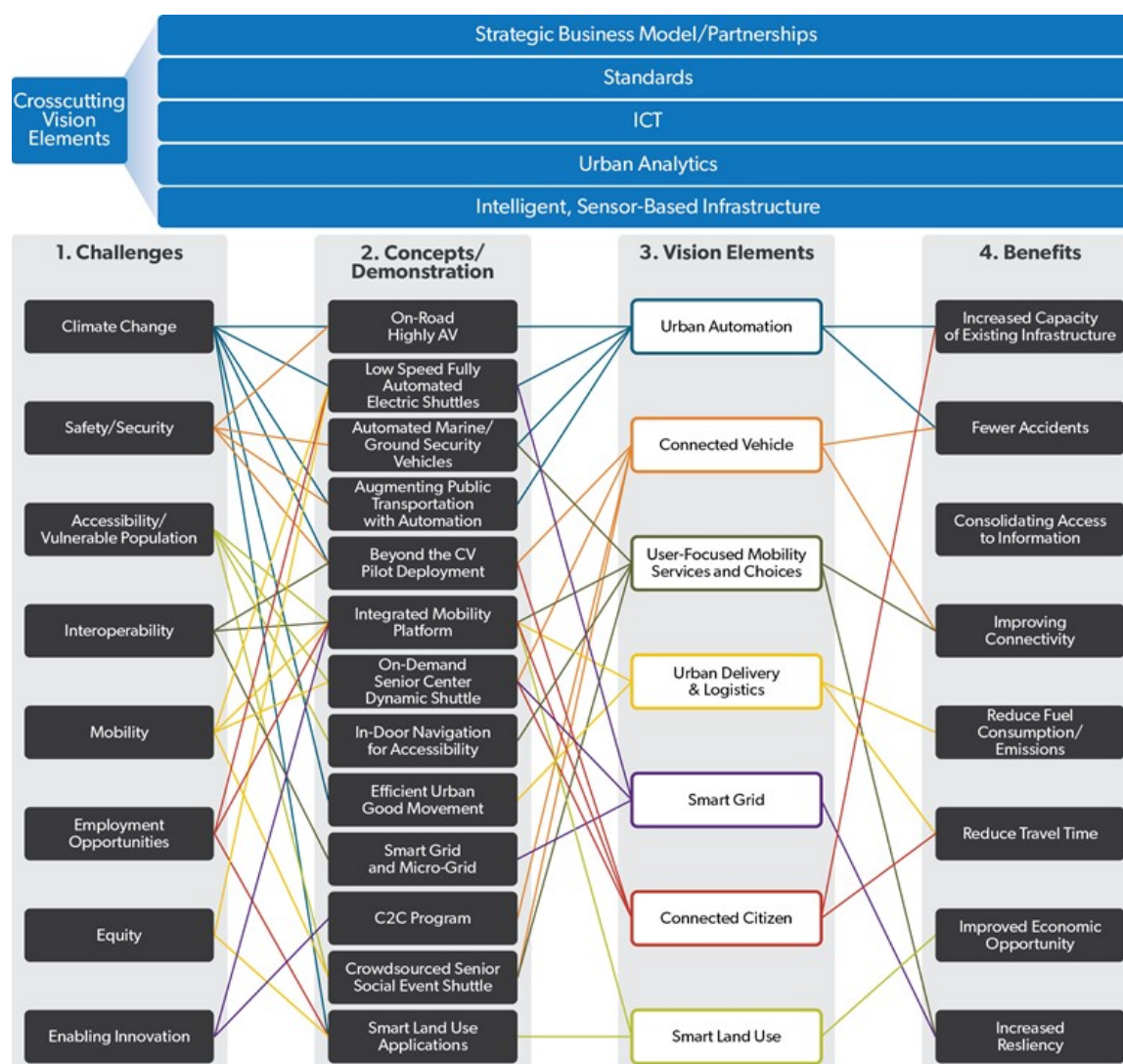


Figure 12: Holistic Integrated Approach Connecting Challenges, Concepts, and Benefits

## 6. RISKS ASSOCIATED WITH THE DEPLOYMENT VISION

Table 3 summarizes potential key risks associated with the deployment of our Smart Tampa concepts, along with their rating (High, Medium, and Low) and our proposed mitigation approaches.

Table 3: Potential Key Risks for Smart Tampa Concepts

Vision Element	Potential Risk	Mitigation Approach
<i>Technical</i>		
<b>Low cost, Efficient, Secure, and Resilient Information and Communications Technology</b>	The security of automated and connected communications systems will continue to be a challenge for the foreseeable future (High).	Our team member Booz Allen will continue to engage with efforts to develop and implement robust cybersecurity solutions

Vision Element	Potential Risk	Mitigation Approach
<b>Intelligent, Sensor-Based Infrastructure</b>	Erroneous sensor data poses a risk to quality of information and inappropriate decision support (Low).	The team will apply robust data validation techniques for eliminating erroneous data and producing and disseminating reliable information.
<b>Urban Analytics</b>		
<b>Smart Grid</b>	EVs will place new loads on the electric system, which could exacerbate peak load issues (Low).	TECO will use a smart grid that communicates with charging infrastructure and vehicles to smooth peak loads.
<b>Urban Analytics</b>	Processing real-time data in time for it to be useful for various applications, and predictive and proactive strategies (Medium).	Leverage team members' experience in data analytics and processing, apply advanced analytics tools and techniques such as Bayesian Networks.
<i>Policy / Institutional</i>		
<b>Smart Land Use</b>	Emergence of new technologies change how local agencies operate and maintain transportation systems and require policy updates (High).	Promote strong intergovernmental coordination to fully embrace and integrate the technologies across the region.
<b>Urban Automation</b>	The regulatory uncertainty surrounding automated vehicle certification (Medium).	Leverage Florida's friendly regulatory environment and actively engage the USDOT and other agencies to develop robust certification procedures.
<b>Urban Automation</b> <b>Urban Delivery and Logistics</b>	Vehicle automation and ADAS systems are known to make transit and delivery workers uncomfortable. Employees are concerned with being monitored by technology deployments and potentially losing jobs from automation (High).	HART and TBARTA have developed methods for implementing driver assistance systems in ways that minimize operator non-compliance. Furthermore, all proposed solutions augment existing services instead of replacing services.
<b>User-Focused Mobility Services and Choices</b> <b>Connected, Involved Citizens</b>	Potential equity issues by excluding certain disadvantaged populations (Medium).	For citizens who don't own smartphones, kiosks and low-tech solutions will be provided. Accommodations will be made for differently abled individuals.
<b>Strategic Business Models and Partnering Opportunities</b>	Managing multiple partners can be challenging, and not all partners may participate throughout the period of performance (Medium).	Obtained commitment letters from each partner. All the partners will be actively engaged through regular communications, and managed through a committee of representatives from each lead partner. Identify alternative solution providers.

## 7. TEAM PARTNERS

The City of Tampa has assembled a strong team tailored to address the unique multimodal challenges of a rapidly growing coastal city. Few, if any, other teams could bundle together a port, an airport, a UTC, an FAA UAS COE core team member, an electric utility, SAE Level 3 automated traditional automobiles, SAE Level 5 automated low-speed vehicles, multimodal shared economy partners, and a deep bench of leading innovation firms. In total, **nine** City of Tampa departments have committed to executing the Smart Tampa vision. The effort will be led by the Mayor's Office through the Department of Transportation and Stormwater Services. Other departmental partners include the Contract Administration, Planning and Economic Development (includes the Tampa Convention Center), Logistics and Asset Management (Parking, Fleet, and Facilities Management), Parks and Recreation, Technology and Innovation, Revenue and Finance, Tampa Police Department, and Tampa

Fire Rescue. Table 4 lists our partners (in alphabetical order), the vision element(s) they will participate in, and a brief description of their contribution.

**Table 4: Smart Tampa Partners**

Partner	Vision Element	Description/ Contribution
<b>AARP</b>	5	Representing accessibility of aging demographic, training those that are not up to speed on newer technologies
<b>Audi</b>	1, 2	Connected/ automated vehicle original equipment manufacturer (OEM) providing vehicles, expertise, and testing support
<b>Booz Allen</b>	2, 4, 9, 10, 11, 12	Broad transportation and information systems expertise, contributor to many vision elements, program management support
<b>Bosch</b>	1	Leading automotive and automation technology Tier-1 supplier, providing automated vehicle solutions for BoSS
<b>Coast Bike Share</b>	5	Privately operated bike share partnering with TDP to expand service area and helping with integrated transportation information management system
<b>ERAU</b>	1	FAA UAS COE core member; transitioning transportation innovations from lab to market through research agreement; especially for marine, ground, and aerial unmanned/ automated vehicles
<b>FDOT</b>	1, 2	Implementing state transportation innovation, including partnership with HART and TBARTA existing Mobileye deployment on about 50 vehicles
<b>HART</b>	1, 5	Innovative public transportation agency; existing partnerships with FDOT to implement Mobileye systems, USF/CUTR for open data and accessibility; helping with integrated transportation information management system
<b>Meridian</b>	1	Low-speed connected/ automated vehicle OEM providing vehicles, expertise, open data, and certification guidance to public agencies
<b>Siemens</b>	3, 4, 9, 10	Leading smart city technology firm providing expertise
<b>TDP</b>	1, 2, 5, 7, 8, 12	Business model and partnership architect
<b>TECO</b>	8	Smart grid and alternative fuel vehicle deployment, PPP with Tampa on smart grid enabled ITS
<b>TIA</b>	1, 5	Implementing automated shuttle service and improving accessibility for vulnerable populations
<b>Port Tampa Bay</b>	1, 2, 6,	Deploying automated ground and marine vehicles
<b>TBARTA</b>	1, 5	Innovative public transportation agency; partnership with FDOT implementing Mobileye systems; developing integrated transportation information management system
<b>THEA</b>	1, 2	Expressway authority providing roadway access for automated vehicle deployments, and partnering on deploying CV applications
<b>USF/CUTR</b>	4,	USDOT UTC; transitioning transportation innovations from lab to market through research agreement, especially on open data and accessible transportation
<b>vRide</b>	5	Shared vehicle system helping with integrated transportation information management system



Partner	Vision Element	Description/ Contribution
Waze	5, 9, 12	Transportation information management firm helping with integrated transportation information management system
TSRC – U.C. Berkeley	4	Transitioning transportation innovations from lab to market through research agreement, especially for shared mobility and mobility on-demand
Zipcar	5, 8	Shared vehicle system helping with integrated transportation information management system

## 8. EXISTING TRANSPORTATION INFRASTRUCTURE

Section 3 of our proposal described Tampa’s key transportation infrastructure elements, including freeways, arterials, transit services, shared-use mobility services, and Smart Grid and EV charging infrastructure. Additional information is provided below:

### 8.1 Information and Communication Technology (ICT)

In terms of communication technology, Tampa has completed upgrades to many of its key business systems using cloud-based, hosted infrastructure. Tampa has also deployed many other cloud-based systems for parking and public safety services. Over the next 3 years, Tampa’s technology changes will include a migration to a new data center with support for Azure, Amazon, and other elastic computing resources. In addition, Tampa has put a premium on pursuing cloud-first, mobile-enabled business applications solutions when available to meet the demands of the city. Tampa also consolidated and replaced many of its planning, permitting, and neighborhood services business applications with the Accela line of products, all of which embrace full citizen access and move Tampa closer to an end-to-end digital business process.

### 8.2 ITS Infrastructure and Signals

Table 5 lists the number of signals and ITS infrastructure capabilities that exist in Tampa.

**Table 5: Tampa’s Signals and ITS Infrastructure Capabilities**

■ Traffic Signals – 546	■ UPS – State Roads
■ Advanced Controllers – 69	■ LED Indications – Citywide
■ CCTV Cameras – 50	■ Legacy Copper Cable Network – 43 Sections
■ Fiber Optic Cable > 60 mi	■ Twisted Pair Copper > 250 mi
■ Communications Hubs - 3	■ Wireless Radios - 50

## 9. DATA NEEDS AND AVAILABILITY

In a data-rich smart-city environment, large amounts of data will be generated by CVs, citizens, infrastructure sensors, etc. Tampa aims to expand its existing open data, which currently hosts static data, to include new data sources as well as develop Application Program Interfaces (APIs) to provide access to real-time data feeds in a secure, privacy-focused environment. The new technologies and applications will be integrated to enable existing systems to also contribute to the open-data hub and encourage developers to use them for developing applications that can help

improve safety, enhance mobility, and address environmental issues. While our open data approach aims at providing source collected data in a timely format, the ICT systems will be designed to incorporate privacy and security safeguards. This will involve removing PII as well as providing enterprise-level software security to avoid system tampering.

## 9.1 Current and New Data Collection Efforts

Tampa currently offers an Open Data Share website that provides open access to Geographic Information Systems (GIS) shape-files on intersections, roadways, parks, etc. While this site provides a plethora of open data, they are static in nature. HART provides General Transit Feed Specifications (GTFS), GTFS-realtime, and Service Interface for Real-Time Information (SIRI)-formatted data that are used by developers to share real-time bus information. Additionally, the Hillsborough County Sheriff's Office provides an interactive real-time incident data tool that shows the incidents and their attendance status along with estimated clearance times. In addition to these, certain data at the county and state levels are openly shared under Data.gov website including water resource management, flood maps, etc. In terms of the existing data for the different mobility services, Zipcar supports a public API through which third-party sites and applications can access information about Zipcar, including: (1) Home locations of Zipcar vehicles (where the vehicles "live" when not in a trip), and (2) details about specific vehicles including make, model, color, size and type, and price. Coast Bike Share also provides an API in the standardized General Bike Share Feed Specification format for real-time bike rental availability. This type of data (and others) can be used in the development of the proposed platform IM-T (Vision Element #5), EV grid concept (Vision Element #8), and C2C program (Vision Element #9).

As part of the Smart City Challenge, we envision several new data collection efforts from various concepts to support the suite of proposed applications, as well as for the Urban Analytics platform in Vision Element #4. One of the key developments in this would be the creation of a data bus that can receive feeds from infrastructure-based sensors, CVs, probe vehicles and other sensors (weather stations, pavement sensors, etc.). The data bus will be developed in a scalable environment to ingest small and big data sources at varying resolutions to: (1) clean input data from errors and noise, (2) provide privacy protection tools, and (3) secure the system to avoid malicious input. The data bus is also envisioned to provide machine-readable, direct, real-time data APIs for use by public and private developers to improve transportation accessibility among the general public. The team is also working with crowdsourcing private partners such as Waze who could supplement the city-collected data using data provided by citizens.

Table 6 summarizes our preliminary assessment of data currently being collected and new data that needs to be collected for each vision element.

**Table 6: Assessment of Vision Element Existing Data and Needs**

Vision Elements	Data Existing	Data Needs
<b>Urban Automation</b>	<ul style="list-style-type: none"> <li>• Traffic data along freeways and arterials</li> <li>• Priori Maps</li> </ul>	<ul style="list-style-type: none"> <li>• High-definition 3D maps</li> <li>• Real-time weather information</li> <li>• Localization</li> </ul>
<b>Connected Vehicles</b>	<ul style="list-style-type: none"> <li>• RDE</li> <li>• Weather Data Environment</li> <li>• Traffic signal information</li> <li>• Traffic data along existing roadway corridors</li> </ul>	<ul style="list-style-type: none"> <li>• Freight information</li> <li>• Pedestrian information</li> </ul>

Vision Elements	Data Existing	Data Needs
<b>Intelligent Sensor-based Infrastructure</b>	<ul style="list-style-type: none"> <li>• Bluetooth</li> <li>• Traffic data along existing roadway corridors</li> </ul>	<ul style="list-style-type: none"> <li>• Air / water quality information</li> <li>• Energy / water consumption</li> <li>• Pedestrian information</li> </ul>
<b>Urban Analytics</b>	<ul style="list-style-type: none"> <li>• RDE</li> <li>• Weather Data Environment</li> <li>• Traffic signal information</li> <li>• Traffic data along existing roadway corridors</li> <li>• Waze</li> </ul>	<ul style="list-style-type: none"> <li>• High-definition 3D maps</li> <li>• Real-time weather information</li> <li>• Localization</li> <li>• Air / water quality information</li> <li>• Energy / water consumption</li> <li>• Pedestrians information</li> <li>• Freight information</li> <li>• Pedestrian information</li> </ul>
<b>User-Focused Mobility Services and Choices</b>	<ul style="list-style-type: none"> <li>• RDE</li> <li>• Weather Data Environment</li> <li>• Traffic signal information</li> <li>• Traffic data along existing roadway corridors</li> <li>• HART schedules and route information</li> </ul>	<ul style="list-style-type: none"> <li>• Indoor localization</li> <li>• Information on senior citizens</li> <li>• Traveler choices</li> <li>• Payment information</li> </ul>
<b>Urban Delivery and Logistics</b>	<ul style="list-style-type: none"> <li>• RDE</li> <li>• Weather Data Environment</li> <li>• Traffic signal information</li> <li>• Traffic data along existing roadway corridors</li> <li>• Construction plans</li> <li>• Incident information</li> <li>• Waze</li> <li>• Route information</li> </ul>	<ul style="list-style-type: none"> <li>• Freight information</li> <li>• Localization and 3D Maps</li> </ul>
<b>Strategic Business Models and Partnering Opportunities</b>	<ul style="list-style-type: none"> <li>• Existing partnership agreements</li> </ul>	<ul style="list-style-type: none"> <li>• New partnership agreements</li> <li>• Data sharing agreements</li> </ul>
<b>Smart Grid, Roadway Electrification, and EVs</b>	<ul style="list-style-type: none"> <li>• Number of charging locations</li> </ul>	<ul style="list-style-type: none"> <li>• Real time energy consumption</li> <li>• Air quality</li> </ul>
<b>Connected Involved Citizens</b>	<ul style="list-style-type: none"> <li>• RDE</li> <li>• Weather Data Environment</li> <li>• Waze</li> </ul>	<ul style="list-style-type: none"> <li>• Accurate data</li> <li>• Number of citizens reporting data</li> </ul>
<b>Architecture and Standards</b>	<ul style="list-style-type: none"> <li>• Existing CVRIA</li> </ul>	None
<b>Low Cost, Efficient, Secure, and Resilient ICT</b>	<ul style="list-style-type: none"> <li>• RDE</li> <li>• Weather Data Environment</li> <li>• Traffic signal information</li> <li>• Traffic data along existing roadway corridors</li> </ul>	<ul style="list-style-type: none"> <li>• Security breaches</li> <li>• Performance measures</li> </ul>
<b>Smart Land Use</b>	<ul style="list-style-type: none"> <li>• Weather Data Environment</li> <li>• Traffic data along existing roadway corridors</li> </ul>	<ul style="list-style-type: none"> <li>• Real-time parking information</li> <li>• Air quality information</li> </ul>



## 9.2 Transportation Data Integration

One of the key proposed initiatives is the data integration that aims to bring together data from multiple agencies within the same platform. Thus, data from Tampa's transportation infrastructure, county and city-run transit, taxi and other shared-use services, and bike-share, as well as other multi-modal data will be integrated into one single data hub. By doing so, Tampa intends to accelerate shared-use mobility, which can reduce congestion, improve mobility, and mitigate climate change issues without burdening travel time or cost. Additionally, data from our partners such as Waze and other TNCs can also be integrated to make these data hubs and secondary products user-friendly as a venue for the IM-T app. The data integration effort will:

1. Provide a one-stop location where all the data is accessible to users without registration and in a machine-readable format.
2. In addition to a specific format data, provide a developer portal that provides real-time queryable methods to build applications. By doing so, the team intends to expand the scope of analytic tools to support innovation from the developer community.
3. Provide assessment and evaluation logs for interested citizens to conduct independent analyses.

Data collection and software development activities will maximize participation of the third-party developer community and private industry by using permissive licenses such as Apache v2.0 and Open Data Commons.

## 9.3 Cross-Cutting Partnerships

By partnering with Waze, ZipCar, Coast Bike Share, vRide, and HART, the City of Tampa will be able to work more effectively in defining the most common hurdles that drivers in Tampa face daily. For example, Tampa could use Waze data to identify the corridors that are most prone to congestion. Using this information, Tampa could change the signal timing of adjacent roads to divert traffic into these adjacent roads and therefore reduce commuting time among the public.

# 10. ITS AND CONNECTED VEHICLE STANDARDS/ARCHITECTURE

Section 5.10 of our proposal described our approach to using architectures, standards, and processes, as well as our plans for identifying and documenting new interfaces and cooperating with the SDOs to enhance existing standards or help develop new standards.

# 11. MEASURABLE GOALS AND OBJECTIVES FOR THE SMART CITY VISION

The Smart Tampa vision consists of several parallel deployments and projects that work in an intricate way to improve the mobility, safety, efficiency, air quality, and overall quality of life of residents and visitors. The team aims to set measurable goals and objectives for the entire program as well as for individual projects within it. The findings can be used to cross-check and document the benefits of these systems and as a baseline for other cities while prioritizing resources.

## **11.1 Performance Measures**

The team will initiate five different types of performance measures to cover the key areas of transformation that will reflect the new Smart City investment. For individual projects, the team will estimate realistic goals for each of these areas; and thus, a fair comparison can be made after deployment. Tampa has a resourceful database to estimate several of these performance measures for pre-deployment evaluation. Not all deployments are intended to have measurable goals in all of the following categories. The data-rich environment will provide enough data to calculate the benefits of these deployments in the near term, as well as to estimate the benefits in the long term.

### **11.1.1 Safety Performance Measures**

Many of the proposed tools and strategies involve enhancing the safety of travelers, both on the roadway and on the move. The team will use measures, such as crash rates, fatality rates, average time to clear incidents, and probability of secondary crashes, to estimate the improvement in safety due to the deployed applications and strategies. The team will also explore estimating surrogate safety measures to include indirect safety benefits such as number of insurance claims and red-light runs.

### **11.1.2 Mobility Performance Measures**

Mobility measures such as vehicle miles traveled, vehicle hours traveled, number of trips, and vehicle occupancy will be used to evaluate how these systems enhance mobility in Tampa. Certain applications produce surrogate measures of mobility without actually impacting the direct measures. For example, a shared-use multi-modal trip planning application can improve the traveler's quality of traveling and perception of transit services by providing better information on arrivals, but may not improve the actual travel time.

### **11.1.3 Air Quality Performance Measures**

Environmental quality is also quantified since several deployments are selected and designed to mitigate climate change issues. In addition to using environmental sensors, the team will use indirect methods to estimate these measures. For example, freeway speed differential logs between adjacent loop detectors can be used to estimate acceleration characteristics and estimate approximate emissions. The team will also use financial measures such as fuel sold and gas tax earned to estimate energy consumption.

### **11.1.4 Other Performance Measures**

While the above three measures aim to quantitatively define or evaluate the deployments, the team will conduct alternate methods to measure improvement in quality of life, quality of travel, perceived infrastructure reliability, and other factors through voluntary citizen inputs sought through interviews and polls.

### **11.1.5 Benefit-Cost Assessment**

The team will also supplement these assessments using benefit-cost analysis to quantify the breaking point of these investments by converting the performance measures to quantifiable dollars. The team has past experience in developing extensive benefit-cost analysis tools for different programs under the USDOT such as the Applications for the Environment: Real-Time Information Synthesis (AERIS) program and the Dynamic Mobility Applications (DMA)

program. Benefit-cost analysis documentation will be developed as a valuable tool for other cities in comparing the cost effectiveness of applications or deployments.

## 11.2 Post-Deployment Assessment

Contrary to typical post-deployment assessment, the Smart City assessment consists of multiple parallel deployments that could impact the performance measures in intrinsic ways. Several factors contribute to the biases when using the before-and-after data in conducting the analysis. For example, when RLVW and Eco-Approach and Departure applications are introduced (in Vision Element # 2) together on an arterial, it is difficult to estimate the contribution of each in reducing the congestion. For the proposed program, these biases can play an important role in classifying the assessment between different tools, applications, or strategies. Understanding this, the team will use empirical field data to perform the post-deployment assessment. From the experimental design, the team will work systematically to collect pre-deployment and post-deployment data as well as reduce the probabilities of parallel deployments impacting each other's assessment. The team will also use approaches such as correction factors and Bayes methods to reduce or eliminate exogenous factors from these assessments. Ultimately, the team will document the post-deployment assessment results so that other cities can use them to prioritize their deployments.

## 12. PAST PERFORMANCE (CAPABILITY EVIDENCE)

Tampa has a substantial history with implementing evidence-based approaches to achieve intended outcomes, such as “place-based strategies,” to revitalize the urban core. By combining economic development, public improvements, and pedestrian and bicycle improvements, together with incentives to spur private sector investment, Tampa has been the steward of more than \$1 billion over the past 10 years to foster an environment where jobs, housing, and walkable neighborhoods thrive.

Recently, under Mayor Bob Buckhorn's administration, the City of Tampa led or co-led several large federally funded initiatives, including *2012 HUD Choice Grant (Co-Applicant, \$30 million in funding)*, *2013 TIGER Grant (Lead, \$10.9 million in funding)*, and *2012 Republican National Convention (Lead, \$49 million in funding)*. Also, Tampa was deemed a *2015 Promise Zone Second Round Finalist*, and will apply for the 2016 Promise Zone Round and a second HUD Choice Grant.

City officials are **fully committed** to executing the Smart Tampa vision and managing multiple public, non-profit, and private partners. The City of Tampa Revenue and Finance (R&F) Department (*RNC Grant Administrator*) will be tasked with oversight for all components of grant administration. The department consists of the Budget Office, Accounting Division, and a dedicated Grants section equipped with staff that are well versed on federal grant requirements and use best practices in grants administration. R&F staff will work closely with the Smart Tampa program team and management board to implement programmatic components of the plan and daily activities. Additional staff will be hired if necessary to ensure complete oversight for all project activities. All financial transactions, purchasing, and property inventory tracking will be maintained in Tampa's Oracle ERP System. However, data and performance management is administered by using several legacy systems citywide and manual processes. City officials will explore the creation of a data management system with the USF, review the purchase of comprehensive systems to manage a project such as eCivis (grants management/performance), or develop another solution.



## 13. OPPORTUNITIES TO LEVERAGE FEDERAL RESOURCES

Tampa has made significant investments (over \$240 million) to improve the livability of downtown, support the transformation of the surrounding neighborhoods connected to the business district, and spur economic development. The Smart City Challenge grant award to Tampa will foster closer relationships with federal, state, and local partners—creating more opportunities to align federal programs directly with local needs. Examples of existing partnerships and programs that will help in leveraging the USDOT’s Smart City Challenge investment include the following:

Project Title	Total Funds	Funding Agency	Vision Element(s)
<b>Airport ConRac/ APM project</b>	<b>\$500,000,000</b>	<b>USDOT, FDOT, Florida State appropriations</b>	<b>Urban Automation (#1)</b>
<b>Description:</b> The Consolidated Rental Car Center (ConRAC) and Automated People Mover (APM) projects include a 2.3 million square foot rental car center and 1.3-mile APM system connecting travelers from baggage claim areas to the ConRAC and the Economy Parking Garages. These areas are scheduled for completion in the fall of 2017. This system will be connected to the TIA <b>Meridian</b> automated shuttle service in Vision Element #1.			
<b>Connected Vehicle Pilot</b>	<b>\$17,000,000</b>	<b>USDOT</b>	<b>Connected Vehicles (#2)</b>
<b>Description:</b> Tampa City has vast experience in CV projects through supporting multiple USDOT agencies. We currently lead one of three pilots awarded by the USDOT. The Smart City proposal will expand CV applications to include red light violation, eco-approach/departure, and FRATIS..			
<b>Tampa STP Grant</b>	<b>\$196,908</b>	<b>USDOT</b>	<b>User Focused Mobility (#5) Strategic Partners (#7)</b>
<b>Description:</b> This USDOT Surface Transportation Program grant is being used by our partner <b>Tampa Downtown Partnership</b> to expand and improve Tampa transit (with partner <b>HART</b> ), Bike Share (with partner <b>Coast Bike Share</b> ), Car Share (with partner <b>ZipCar</b> ), Wayfinding, and Outreach. These projects intersect with many of the projects in this proposal, including the low-speed electric shuttle program with <b>Meridian</b> .			
<b>Advanced Traffic Management</b>	<b>\$10,732,736</b>	<b>FDOT, City of Tampa</b>	<b>Urban Analytics (#4) Smart Grid (#8)</b>
<b>Description:</b> The City of Tampa partnered with FDOT to improve the capability of traffic managers to monitor traffic flow by installing new traffic surveillance equipment to signalized intersections. This funding will create a public-private partnership, allowing Tampa and partner <b>Tampa Electric</b> to expand investments in leveraging the smart grid communications platform to enhance traffic management system environment and the electric grid.			
<b>Enhancing Airport Wayfinding</b>	<b>\$460,000</b>	<b>ACRP</b>	<b>User Focused Mobility (#5)</b>
<b>Description:</b> This Airport Cooperative Research Program project funds <b>USF/CUTR</b> to address accessibility challenges for the elderly and persons with disabilities through indoor positioning systems used in Vision Element #5.			
<b>Development of Waterfront</b>	<b>\$2,000,000,000</b>	<b>Strategic Property Partners, City of Tampa</b>	<b>Land Use (#12)</b>
<b>Description:</b> This overhaul of the Waterfront district will include sustainable, walkable, bike-friendly infrastructure, and sensors in parking garages. The Smart City Challenge funding will leverage this development.			

## **APPENDIX. LETTERS OF COMMITMENT**

January 20, 2016

Vik Bhide  
Chief Traffic Management Engineer  
City of Tampa Transportation & Stormwater Services

**Re: U.S. Department of Transportation – Notice of Funding Opportunity Number DTF6116RA00002  
“Beyond Traffic: The Smart City Challenge”**

Dear Mr. Bhide:

Booz Allen Hamilton (Booz Allen) is pleased to provide this letter of commitment to support the application that the City of Tampa is submitting in response to the above-referenced Notice of Funding Opportunity.

We have been working closely for several years with the USDOT, USDOE, other federal agencies, and multiple state and local, private, academic, and other partners on research, development, and testing of various topic areas that laid the foundation for the Challenge. Our expertise in several of the Smart City Challenge Vision Elements, along with our knowledge of transportation, telecommunications, energy, public utilities, and health & human services stakeholders, provides the City of Tampa with the right mix of skills to bring innovative approaches and technologies to meet its specific transportation and general urbanized area needs.

In the event that the City of Tampa is selected as one of the Smart City Challenge Finalists, we agree, subject to a negotiated agreement, to support the City in its Smart City concept development and planning activities, as well as its detailed application to USDOT for funding to support implementation of its proposed concept. Should the City of Tampa be selected as the Smart City Challenge Implementation Awardee, and Booz Allen is a subcontractor, we agree to devote the time and expertise necessary to assist the City in accomplishing the objectives of the project. The Booz Allen team expects to make significant and meaningful contributions in multiple areas of the implementation project.

If you have any questions, please contact Ram Kandarpa at 202-203-3926 or [Kandarpa\\_Ram@bah.com](mailto:Kandarpa_Ram@bah.com) for technical matters. Please contact Paul Parrell at 703-984-7931 or [Proposal\\_Parrell@bah.com](mailto:Proposal_Parrell@bah.com) for contractual matters.

Sincerely,



Michael J. Isman  
Vice President  
BOOZ ALLEN HAMILTON, INC





Peter O. Knight Airport  
Plant City Airport  
Tampa Executive Airport

January 28, 2016

Hillsborough County  
Aviation Authority  
P.O. Box 22287  
Tampa, Florida 33622  
phone/ 813-870-8700  
fax/ 813-875-6670  
TampaAirport.com

Secretary Anthony Foxx  
U.S. Department of Transportation  
1200 New Jersey Ave, SE  
Washington, DC 20590

Dear Secretary Foxx,

Thank you for your continued leadership in improving transportation throughout the country. Tampa International Airport is pleased to support the City of Tampa's application for the Smart City Challenge Grant. The City already is at the forefront of connected vehicle testing, and this grant will allow Tampa to expand on similarly innovative programs to improve safety, enhance mobility and address climate change.

Tampa International Airport has a legacy of transportation innovation, starting with its opening in 1971 that introduced the world to airport automated people movers and a revolutionary hub-and-spoke design. Since then, we have continued to embrace transportation advances, adding electric vehicles to the airport's fleet and opening the first compressed natural gas station at an airport in Florida, which was done in partnership with the City of Tampa. We also joined forces with the City to expand reclaimed water use at the airport.

As a member of our Board, Tampa Mayor Bob Buckhorn has supported the increased use of automated people mover technology at the airport; the installation of automated passport control and global entry kiosks to ease the movement of international passengers; and current upgrades to our parking system, which will rely on sensor-based technologies to help drivers find empty parking spaces and track commercial vehicle operations.

Should Tampa be selected for the Smart City Challenge Grant, we are committed to exploring possibilities for future collaboration.

Thank you for your consideration.

Sincerely,

A handwritten signature in blue ink, appearing to read "Joe Lopano", with a stylized flourish extending to the right.

Joe Lopano  
Chief Executive Officer



January 28, 2016

Vik Bhide  
Chief Traffic Management Engineer  
City of Tampa Transportation and Stormwater Services

Re: U.S. Department of Transportation – Notice of Funding Opportunity Number  
DTF6116RA00002 “Beyond Traffic: The Smart City Challenge”

Dear Mr. Bhide:

The Tampa Port Authority, d/b/a Port Tampa Bay, is pleased to provide this letter of support for the application that the City of Tampa is submitting in response to the above-referenced Notice of Funding Opportunity.

Port Tampa Bay is Florida's largest seaport and West Central Florida's most powerful economic engine. The Port generates an annual economic impact of \$15.1 billion to the region and supports in some fashion over 80,000 jobs. The Port works closely with many valued transportation partners at the local, state and federal levels. The Port enjoys a close and valued working relationship with the City of Tampa in many areas, including transportation. It is our understanding that one particular area of focus in the City's grant application deals with drayage optimization, an issue of importance to a port that has approximately 8,000-10,000 daily truck movements. We would be pleased to work with the City of Tampa in this regard to explore opportunities for enhancing vehicle flow in and out of our seaport.

Port Tampa Bay is pleased to support the City of Tampa in this initiative. If you have any questions, please contact Port Tampa Bay's Vice President of Operations, Bob Callahan, at 813-241-1805 or [bcallahan@tampaport.com](mailto:bcallahan@tampaport.com).

Sincerely,

A handwritten signature in black ink, appearing to read 'John T. Thorington', is written over a light blue horizontal line.

John T. Thorington  
Vice President Government Affairs  
& Board Coordination

# VOLKSWAGEN

GROUP OF AMERICA

Vik Bhide  
Chief Traffic Management Engineer  
City of Tampa Transportation & Stormwater  
Services  
1104 East Twiggs Street, Suite 200  
Tampa, FL 33602

Anna-Maria Schneider  
Vice President  
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+1 703 364 7211  
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anna.schneider@vw.com

NAME  
TITLE  
DEPARTMENT  
PHONE  
FAX  
E-MAIL

January 26, 2016

DATE

Dear Mr. Bhide:

The purpose of this letter is to express Volkswagen Group of America Incorporated (VWGoA) interest to support the development of the City of Tampa's Smart City Challenge application in the event the city is selected as one of the five cities chosen by the USDOT in the initial selection round. Furthermore, if Tampa is selected as the ultimate winner of the Smart City Challenge VWGoA will work with the city to support the deployment of agreed upon concepts involving connectivity, automation, and automotive electrification.

VOLKSWAGEN GROUP OF AMERICA, II  
2200 FERDINAND PORSCHE DRIVE  
HERNDON, VA 20171  
PHONE + 1 703 364 7000


VWGoA will work with the city to leverage VW and Audi's expertise and capabilities in the area of connectivity, automation, and automotive electrification to develop a concept to achieve mutually agreeable safety, mobility, and environmental targets set within the project.

In the event that the City of Tampa is awarded, we will work with the city to reach and put in place a mutually agreeable contract and fitting budget in place with the likely necessary DOT flow-down provisions.

In closing, we are excited about the opportunity to work with Tampa in this important area of vehicle safety, electrification, and automation in this deployment to realized safety, mobility, and environmental benefits and look forward to working together on the Smart City Challenge.

Please contact us if you have further questions.

Best regards,

  
Anna Schneider



## United States Senate

WASHINGTON, DC 20510-0905

BILL NELSON  
FLORIDA

January 26, 2016

The Honorable Anthony Foxx, Secretary  
U.S. Department of Transportation  
1200 New Jersey Avenue, Southeast  
Washington, District of Columbia 20590

**RE: City of Tampa - USDOT Smart City Challenge**

Dear Secretary Foxx:

I am pleased to provide this letter in support of the City of Tampa's efforts to obtain a federal grant. The goal of their proposed project is to become the nation's first "smart" downtown facilitating smarter, safer modes of transportation; addressing climate change and fostering a shared economy of the future. I respectfully request your consideration of this organization's application for federal funding.

The City of Tampa is creating a large community of public and private partners to participate in turning their downtown into the nation's first "smart" downtown. If funded, they will implement multiple projects that correlate to the 12 vision elements described by the USDOT including: a smart parking app and sensor based infrastructure; smart grid and vehicle-to-grid technology; connected vehicle applications; climate change resistant infrastructure (flood maps, app, flood sensors); autonomous vehicle and a multi-modal smartcard and car-pooling app. These combined elements will ensure that the City can more viably address energy and transportations challenges of the future.

Again, I encourage your consideration of this worthy cause. If I can be of further assistance in this matter, please do not hesitate to contact me at the address below.

Sincerely,

BN/jm

CC: Ms. Digna Alvarez, Regional Director, U. S. Senator Bill Nelson





January 27, 2016

Vik Bhide  
Chief Traffic Management Engineer  
City of Tampa Transportation & Stormwater Services  
306 E Jackson Street  
Tampa, FL 33602

**Re: U.S. Department of Transportation *"Beyond Traffic: The Smart City Challenge"***

Dear Vik,

The Tampa Downtown Partnership serves as a steward of downtown Tampa, cultivating public and private collaborations and encouraging downtown's physical and economic development. As a proactive leadership organization, we act as an advocate for the downtown community, including over 225 member companies, 8,100 residents, and 58,000 employees.

Our non-profit organization is fully committed to working with the City of Tampa on the USDOT Smart City Challenge. We share USDOT's vision of using technology to connect transportation assets into an interactive network. Our City is perfectly poised to accomplish this. As you can see in the application the right partners are in place, the political leadership is supportive and our community is ready to be an early-adopter.

Our organization's Director of Transportation and Planning (and relevant committees) will be appointed to work closely throughout the process to further develop, and potentially implement some of the high-priority, last-mile micro-transit ideas as outlined in the proposal. Specifically, a nimble downtown circulation system utilizing electric low-speed vehicles is set to launch a limited program late spring. With additional support, this app-based on-demand and point to point free service has the strong potential to grow exponentially. We have also been in touch with Meridian about the potential to offer a fixed-route transport on an automated vehicle. Other mobility options in the planning phase include expansion of the successful one year old bike share system, adding a carshare program and even a water taxi.

We are also a strong supporter of the Tampa Hillsborough Expressway Authority's Connected Vehicle Contract. A "Connected Vehicle Corridor" in the Central Business District of Tampa will allow the Expressway Authority and their partners to advance the technology for several modes of transportation and provide USDOT with data to evaluate the potential benefits of this unique technology in a live City environment.

Thank you in advance for partnering with the City of Tampa. We look forward to providing the right environment and resulting data for the “new normal” in how we move about our urban community!

Sincerely,

A handwritten signature in blue ink, appearing to read 'G. Minder', with a stylized flourish at the end.

Gregory Minder  
Chairman, Board of Directors



January 28, 2016

Vik Bhide  
Chief Traffic Management Engineer  
City of Tampa Transportation & Stormwater Services

**Re: U.S. Department of Transportation – Notice of Funding Opportunity Number DTF6116RA00002  
"Beyond Traffic: The Smart City Challenge"**

Dear Mr. Bhide:

Tampa Electric is pleased to provide this letter of commitment to support the application that the City of Tampa is submitting in response to the above-referenced Notice of Funding Opportunity.

Tampa Electric Company is and has been a dedicated energy infrastructure partner with the City of Tampa for over 120 years. We have worked closely with the City in recent years to adopt and implement technological advances and energy infrastructure investment, grow the local economy smartly, and reduce the City's overall impact on the environment. We are currently investing many millions of dollars and human resources in new energy technologies which will help shape the City's transition to a cleaner, sustainable energy future while maintaining energy affordability and supporting Tampa's smart city evolution. Currently, we are deploying the following smart technologies:

- New renewable energy resources in the form of central large-scale and distributed small-scale solar photovoltaic generation;
- A new communications network that will be the backbone for a more automated grid utilizing advanced metering infrastructure (AMI) meters;
- AMI meters (replacing the current first generation automated metering system) that will enable customers to take advantage of critical peak pricing and time of use pricing in order to make better real-time energy use decisions and to reduce electric company fleet miles resulting in lower carbon emissions;
- Increased distribution automation to help with grid efficiency and self-healing networks to make the grid more resilient;
- Energy storage in the form of residential and commercial uninterrupted power supply technologies to improve the ability for customers to ride through momentary interruptions of power for their critical systems.

Tampa Electric's vision for Tampa as a smart city includes a fully automated smart grid that enables advanced and innovative electric transportation solutions, distributed and renewable energy, microgrid security for critical infrastructure loads and sensor-based technologies like advanced traffic management systems. The vision includes the following:

- Electrified Public Transportation
  - Extension and looping of the TECO Line electric streetcar for local transportation within the downtown core including the Channelside district and Ybor City

- Electric light rail to connect the downtown core with the Westshore business district and Tampa International Airport
- Electric autonomous vehicles and electric shared vehicles for first-mile and last-mile connectivity
- Infrastructure for Electric Vehicles
  - Smart electric vehicle charging for seamless operation between the vehicle battery, the smart home and the grid
  - Static and dynamic inductive charging for electric vehicle drivers, autonomous electric vehicles, electric public transit and the sharing economy
  - Electric vehicle chargers placed throughout the entire downtown area to encourage electric vehicle adoption by the downtown workforce
- Downtown City Microgrid
  - Development of one or more downtown microgrids to provide electric supply reliability and resiliency to critical services in the event of a major grid outage
  - Enable the development of distributed generation within the downtown area
  - Enable the development of renewable generation within the downtown area
- Automated Smart Distribution Grid
  - Advanced communication network to provide two-way communication with automation technologies and advanced sensors
  - AMI meters for every customer
  - Automation of City traffic signals and other transportation and safety related sensors
  - Integrated distributed renewable generation
  - Opportunities to create energy storage within the grid
  - Access to smart home technology

This funding opportunity will significantly advance Tampa's smart city journey by accelerating the City's and Tampa Electric's investments in smart grid, roadway electrification, and electric vehicle proliferation.

In the event that the City of Tampa is selected as one of the Smart City Challenge Finalists, we agree, subject to a negotiated agreement, to support the City in its Smart City concept development and planning activities, as well as its detailed application to USDOT for funding to support implementation of its proposed concept. Should the City of Tampa be selected as the Smart City Challenge Implementation Awardee, we agree to devote the time and expertise necessary to assist the City in accomplishing the objectives of the project.

If you have any questions, please contact Kevin Young at 813-228-1075 or [kayoung@tecoenergy](mailto:kayoung@tecoenergy).

Sincerely,



Gordon Gillette  
President  
Tampa Electric & Peoples Gas





January 20, 2016

Mr. Vik Bhide  
Chief Traffic Management Engineer  
City of Tampa Transportation & Stormwater Services

**Re: U.S. Department of Transportation – Notice of Funding Opportunity Number DTF6116RA00002**  
***“Beyond Traffic: The Smart City Challenge”***

Dear Mr. Bhide:

The Center for Urban Transportation Research (CUTR) at the University of South Florida is pleased and excited to provide this letter of commitment to support the application that the City of Tampa is submitting in response to the above-referenced Notice of Funding Opportunity.

CUTR, as a 27 year center for transportation research, training, and technology transfer has formed bonds with the transportation community locally, nationally and internationally. We continue to work closely with the USDOT, USDOE, and other federal agencies, as well as multiple state and local, private, academic, and other partners on research, development, and evaluation of various topic areas that will be highlighted in the Challenge application. CUTR also houses the National Center for Transit Research, a USDOT Tier 1 University Transportation Center focusing on public transportation and alternative forms of transportation.

In the event that the City of Tampa is selected as one of the Smart City Challenge Finalists, we agree to support the City in its Smart City concept development and planning activities, as well as its detailed application to USDOT for funding to support implementation of its proposed concept. Should the City of Tampa be selected as the Smart City Challenge Implementation Awardee, CUTR agrees to devote the time and expertise necessary to assist the City in accomplishing the objectives of the project.

If you have any questions, please contact myself at 813-974-9797, or Steve Reich at 813-974-6435 for technical or contractual matters.

Sincerely,

A handwritten signature in blue ink, appearing to read "Dennis Hinebaugh", is written over a light blue horizontal line.

Dennis Hinebaugh  
Interim Director  
Center for Urban Transportation Research



January 28, 2016

Vik Bhide  
Chief Traffic Management Engineer  
City of Tampa Transportation & Stormwater Services

**Re: U.S. Department of Transportation – Notice of Funding Opportunity Number DTF6116RA00002**  
***“Beyond Traffic: The Smart City Challenge”***

Dear Mr. Bhide:

The University of South Florida is excited to offer all of its resources as a community partner in full support of the application that the City of Tampa is submitting in response to the above-referenced Notice of Funding Opportunity.

The University is home to the nationally recognized Center for Urban Transportation Research (CUTR), established in 1988, which serves as an important resource for policymakers, transportation professionals, the education system, and the public. With emphasis on developing innovative, implementable solutions to transportation problems, CUTR provides high quality, objective transportation expertise in the form of technical support, policy analysis, and research support that translates directly into benefits for its project sponsors.

CUTR conducts nearly \$15 million in research annually for a variety of public and private sector sponsors in Florida and the United States, including the USDOT, the Florida Legislature, and state and local governments, agencies, and organizations. Areas of research include public transportation, vehicle automation, transportation planning, intelligent transportation systems (ITS), transportation demand management (TDM), transportation economics and finance, geographic information systems, access management, alternative fuels, and transportation safety, among others.

CUTR houses the National Center for Transit Research, designated by the U.S. Congress in 1991 and reaffirmed in 1998, and then selected by the USDOT through rigorous competition with other universities in 2002, 2006, 2011 and again in 2013. CUTR also houses the National Bus Rapid Transit Institute, funded by the Federal Transit Administration.

The CUTR Interim Director, Dennis Hinebaugh will work directly with the City and the Smart City Challenge Team to help produce the winning application. Please call on Dennis at 813-974-9797 or myself as we continue to showcase the pride, energy and progressiveness in the community we call Tampa.

Sincerely,

A handwritten signature in blue ink that reads 'Judy Genshaft'. Below the signature, the name 'Judy Genshaft' and title 'USF System President' are printed in a black, sans-serif font.

Judy Genshaft  
USF System President



UNIVERSITY OF CALIFORNIA *Berkeley*  
**Transportation Sustainability**  
RESEARCH CENTER

January 24, 2016

Vik Bhide  
Chief Traffic Management Engineering  
City of Tampa Transportation & Stormwater Services

**Re: U.S. Department of Transportation—Notice of Funding Opportunity Number DTF611RA00002  
“Beyond Traffic: The Smart City Challenge”**

Dear Mr. Bhide:

The Transportation Sustainability Research Center (TSRC) at the University of California, Berkeley is pleased to provide this letter of commitment to support the application that the City of Tampa is submitting in response to the above-referenced Notice of Funding Opportunity.

We believe that among other things, the City of Tampa may be interested in TSRC projects including, but not limited to:

- 1) Data Development and Analysis of Shared Use Mobility Systems
- 2) Data Development, Analysis, and Deployment of Truck Traveler Information Systems
- 3) Data Development and Analysis in First Mile / Last Mile Analysis of Metropolitan Regions
- 4) Industry Analysis of Smart Phone Applications and their Role in Transportation Systems.

In the event that the City of Tampa is selected as one of the Smart City Challenge Finalists, we agree, subject to a negotiated agreement, to support the City in the Smart City concept development and planning activities. Should the City of Tampa be selected as the Smart City Challenge Implementation Awardee, and TSRC is a subcontractor, we agree to devote the time and expertise necessary to assist the City in accomplishing the objectives of the project.

If you have any questions, please feel free to contact me at: [sshaheen@berkeley.edu](mailto:sshaheen@berkeley.edu) or via phone at: 510-642-9168.

Sincerely,

Susan A. Shaheen  
Adjunct Professor, Civil and Environmental Engineering  
Co-Director, Transportation Sustainability Research Center  
University of California, Berkeley



TAMPA-HILLSBOROUGH COUNTY EXPRESSWAY AUTHORITY  
1104 EAST TWIGGS STREET, SUITE 300  
TAMPA, FLORIDA 33602  
PHONE: 813.272.6740  
FAX: 813.273.3730  
WWW.TAMPA-XWAY.COM

January 25, 2016

Mr. Vik Bhide  
Chief Traffic Management Engineer  
City of Tampa Transportation & Stormwater Services  
1104 East Twiggs Street, Suite 200  
Tampa, FL 33602

Dear Mr. Bhide:

BOARD MEMBERS:

REBECCA J. SMITH  
CHAIR

VINCENT J. CASSIDY  
VICE-CHAIR

JOHN GARCIA  
SECRETARY

SECRETARY PAUL STEINMAN  
FDOT DISTRICT SEVEN

MAYOR BOB BUCKHORN  
CITY OF TAMPA

COMMISSIONER LES MILLER  
HILLSBOROUGH COUNTY

DANIEL A. ALVAREZ, SR.  
MEMBER

PATRICK T. MAGUIRE, ESQ.  
GENERAL COUNSEL

On behalf of the Tampa-Hillsborough Expressway Authority, please accept this letter as an expression of our support for the City of Tampa's "Smart City Challenge" Application.

Programs such as the USDOT's Smart City Challenge provides an opportunity for municipalities to take the next steps to implement advanced transportation technology in pursuit of an enhanced quality of life for its citizens. The current financial environment has forced many municipalities to focus on basic core services; nonetheless, the proliferation of technology continues to accelerate, resulting in a rapidly-changing national landscape that local governments must address.

The greatest benefits of advanced transportation technologies can be achieved by early implementation in our urban centers. However, the speed of integration for those technologies in our urban centers is slower due to financial constraints. Programs like the Smart City Challenge can provide the means and direction to implement technology solutions sooner. This program will provide safety, capacity, environmental and financial benefits that far exceed the initial Smart City investment.

Therefore, THEA will be supporting the City of Tampa's Smart Cities program, if selected, by making our staff and facilities available as follows.

- Reversible Lane Section (REL) for testing piloted driving features (Cooperative Adaptive Cruise Control)
- Meridian Ave for testing pedestrian safety features related to connected vehicles
- Access to THEA's Connected Vehicle Pilot Deployment, sponsored by the Office of the Assistant Secretary for Research and Technology, ITS Joint Program Office.

The USDOT challenge aligns with the City of Tampa's desire to keep travelers safe, protect the environment, respond to climate change, and support economic vitality, which is a mission consistent with the strategic goals and values of the Tampa-Hillsborough Expressway Authority.

Sincerely,

A blue ink signature of Joe Waggoner, written in a cursive style.

Joe Waggoner  
Executive Director





January 27, 2016

Vik Bhide  
Chief Traffic Management Engineer  
City of Tampa Transportation & Stormwater Services

**Re: U.S. Department of Transportation - Notice of Funding Opportunity Number DTF6116RA00002  
"Beyond Traffic: The Smart City Challenge"**

Mr. Bhide:

CycleHop, LLC. (D.B.A. Coast Bike Share) is happy to provide this letter of commitment to support the application that the City of Tampa is submitting in response to the above-referenced Notice of Funding Opportunity.

We launched the nation's first large scale implementation of smart bike driven bike share in November of 2014. Alongside a number of partners including the City of Tampa, the Downtown Partnership and others, we have since improved mobility within the city for residents, business travelers and tourists. Our fourth generation bike share system grants users real time data on bicycle availability and the option to reserve bikes in advance, creating seamless transitions from other transit modes, be they bus, rubber wheel trolley, or streetcar.

With our specialized expertise in the bicycle sharing industry and knowledge of how bicyclists navigate the city center we agree support the City of Tampa in its Smart City concept development in the event that the City is selected as one of the Challenge's Finalists.

If you have any questions, please contact Eric Trull at 813-999-3311 or [Eric.Trull@CycleHop.com](mailto:Eric.Trull@CycleHop.com).

Sincerely,

A handwritten signature in black ink, appearing to read "Eric Trull".

Eric Trull  
Program Director  
CycleHop, LLC  
Coast Bike Share



1600 Amphitheatre Parkway  
Mountain View, California 94043

Tel: 650.623.4000  
Fax: 650.618.1806  
[www.google.com](http://www.google.com)

January 26, 2016

Vik Bhide  
Chief Traffic Management Engineer  
City of Tampa Transportation & Stormwater Services

**Re: U.S. Department of Transportation – Notice of Funding Opportunity Number  
DTF6116RA00002 “Beyond Traffic: The Smart City Challenge”**

Dear Mr. Bhide:

Waze is pleased to provide this letter of commitment to support the application that the City of Tampa is submitting in response to the above-referenced Notice of Funding Opportunity.

Under the Connected Citizens Program, Waze’s data-sharing agreement with government entities, Waze has set itself at the forefront of government innovation. By using Waze’s data, governments are now able to conduct real-time experiments in their cities and test hypotheses that then lead to tangible benefits for the public.

It is no exaggeration to say that under the Connected Citizens program, Waze has empowered governments throughout the world with data that allows them to solve some of the most pressing issues in urban mobility.

In the event that the City of Tampa is selected as one of the Smart City Challenge Finalists, we will collaborate on the terms of our data-sharing agreement, to support the City in its Smart City concept development and planning activities to the best of our ability. We expect to leverage our expertise to make significant and meaningful contributions to those areas of the project that relate to us.

If you have any questions, please contact Miguel Guevara, [mgt@google.com](mailto:mgt@google.com).

Sincerely,

Di-Ann Eisnor

---

**Di-Ann Eisnor**

Waze | Head of Growth, Global

[5037298393](tel:5037298393)

January 27, 2016

Vik Bhide  
Chief Traffic Management Engineer  
City of Tampa Transportation & Stormwater Services

Re: U.S. Department of Transportation – Notice of Funding Opportunity Number DTF6116RA00002  
“Beyond Traffic: The Smart City Challenge”



Dear Mr. Bhide,

I'm writing to express Zipcar's support for the City of Tampa's Smart City Challenge Application.

The Smart Cities Challenge is incredibly exciting to us. We pride ourselves on our ability to strategically and successfully partner with the cities in which we operate to enhance transportation options for their residents, and the City of Tampa is no exception. The City of Tampa and Zipcar share a vision for a future in which seamless, multi-modal transportation – car sharing, bike sharing, public transit, walking, etc. – is a way of life for city residents. We believe that Tampa's proposed program will create a truly “smart” city.

We are excited by the potential of Tampa's proposed program, and we look forward to serving as a thought partner in bringing the program to life. If the City of Tampa is awarded the grant, Zipcar would commit to further discussions on how we can partner with and support the City in its efforts. With our 16 years of experience – and the 16 years' worth of rich data from our members about their multi-modal urban mobility preferences that come with it – we are poised to continue to act as a valuable and strategic partner for the City.

We support the City of Tampa's proposal for the Smart Cities grant, and we look forward to working with the City and committing our assets and resources to move this project forward.

Sincerely,

Smokshane West  
Market Manager, Zipcar



**Crissy Ditmore**

Government Account Executive

January 29, 2016

Vik Bhide

Chief Traffic Management Engineer

City of Tampa Transportation & Stormwater Services

**Re: U.S. Department of Transportation – Notice of Funding Opportunity Number DTF6116RA00002  
"Beyond Traffic: The Smart City Challenge"**

Dear Mr. Bhide:

On behalf of the entire vRide organization, we thank you for allowing us the opportunity to submit our letter of support to participate in the City of Tampa's application for the USDOT "Smart City Challenge". vRide, the nation's largest and most experienced provider in commuter vanpooling has historical, current, and ongoing experience working in projects that bring together public and private interests to benefit the community. vRide's current partnership with TBARTA to meet the vanpool component of their Commuter Assistance program allows us to introduce new technology within our existing relationship if Tampa is awarded this grant.

**In summation, vRide is an ideal partner in this project due to our:**

- Deep experience in the provision of vanpool services, with tremendous knowledge and understanding of relevant laws and policy issues.
- Significant local support for the growth of the vanpool program.
- An enhanced safety and risk management program to ensure the safety of the commuters participating in the program.
- Proactive monitoring of each vanpool; gauging program participant satisfaction, while addressing any problems.
- Actively promoting the vanpool program to commuters, employers and other organizations in the city of Tampa.

**vRide provides you even MORE:**

- Advancements in technology designed to enable the vanpool program to grow exponentially;
- Significant investments in marketing resources and sales training;
- The ONLY mobile application for NTD reporting which enables reporting of commute data and environmental savings;
- Significant financial resources, ongoing investments in technology, and improved human performance by virtue of our active partnership with TPG, a leading global private investment firm with \$54.5 billion of capital under management.

**We look forward to participating in this unique opportunity by utilizing existing federal contracting opportunities to offer service and sustain it past the initial funding period.**

Respectfully yours,

A handwritten signature in blue ink, appearing to be "Crissy Ditmore".

Crissy Ditmore, Government Account Executive  
vRide Inc.

cc: Ray Chiamonte, TBARTA  
Michael Case, TBARTA





January 20, 2016

Vik Bhide

Chief Traffic Management Engineer

City of Tampa Transportation & Stormwater Services

**Re: U.S. Department of Transportation – Notice of Funding Opportunity Number  
DTF6116RA00002 “Beyond Traffic: The Smart City Challenge”**

Dear Mr. Bhide:

TripSpark Technologies, a division of Trapeze Software Group, is pleased to provide this letter of support for the application that the City of Tampa is submitting in response to the above-referenced Notice of Funding Opportunity.

We have been working extensively for more than twenty years with local, regional, statewide and federal agencies to develop and provide software and hardware solutions for passenger transportation applications. Our innovative products and services are presently deployed worldwide, including solutions for TBARTA's commuter assistance program. Our expertise in several of the Smart City Challenge Vision Elements, along with our knowledge of and experience with public transport and health & human services stakeholders in the Tampa Bay area can provide the City of Tampa with a unique blend of abilities to bring innovative approaches and technologies to meet its specific transportation and general urbanized area requirements.

In the event that the City of Tampa is selected as one of the Smart City Challenge Finalists, we offer, subject to a negotiated agreement, to support the City in its Smart City concept development and planning activities, as well as to assist in the development of its application to USDOT for funding to support implementation of its proposed concept. Should the City of Tampa be selected as the Smart City Challenge Implementation Awardee, and TripSpark Technologies is chosen as a subcontractor, we agree, subject to contract, to provide software products and associated services to assist the City in accomplishing the objectives of the project.

If you have any contractual questions, please contact Brendan Samis at 905-629-8727 x 104911 or [Brendan.Samis@tripspark.com](mailto:Brendan.Samis@tripspark.com). For technical information, please contact Dan Bower at 888-595-4696 x 1823 or [Daniel.Bower@tripspark.com](mailto:Daniel.Bower@tripspark.com).

Sincerely,

A handwritten signature in black ink, appearing to read "Daniel Bower", written in a cursive style.

Daniel J. Bower

Product Manager, Rideshare

29 January 2016

Vik Bhide  
Chief Traffic Management Engineer  
City of Tampa Transportation & Stormwater Services

**Re: U.S. Department of Transportation – Notice of Funding Opportunity Number  
DTF6116RA00002 “Beyond Traffic: The Smart City Challenge”**

Dear Mr. Bhide:

Embry-Riddle is pleased to provide this letter supporting the application being submitted by the City of Tampa to the above-referenced Notice of Funding Opportunity.

I believe our research group brings significant technical expertise and functional capability in support of the proposed effort. We have extensive experience in developing and testing automated and connected systems within and across land, sea and air domains. We have worked closely with the Florida Department of Transportation for the past several years on automation of airport safety and security and on automated services vehicles for tasks such as roadside mowing.

Should the City of Tampa be selected as one of the Smart City Challenge Finalists, and should Embry-Riddle be selected as a subcontractor, we would provide support in concept development and planning and in preparing a detailed application to USDOT for funding to support implementation of its proposed concept.

If you have any questions, please contact me at 386.323.8848 or [reinholc@erau.edu](mailto:reinholc@erau.edu).

Sincerely,

  
Charles Reinholtz  
Professor and Chair, Department of Mechanical Engineering



January 25, 2016

The Honorable Anthony Foxx  
Secretary of Transportation  
United States Department of Transportation  
1200 New Jersey Ave, SE  
Washington, DC 20590

Dear Secretary Foxx:

As a non-profit, non-partisan social welfare membership organization, AARP enhances the quality of life for all as we age. One way that AARP in Tampa Bay is driving social change is by encouraging communities to adopt an "age-friendly" mindset to make their city a great place for people of all ages. Our hope is that the City of Tampa and/or Hillsborough County will join the World Health Organization/AARP Age Friendly Network of Communities in the near future. To that end, we support the City of Tampa's application for the USDOT Smart Cities Challenge.

The Smart Cities Challenge addresses two of the eight WHO/AARP Age Friendly Domains: Transportation and Communication. If approved, we look forward to collaborating with the City as it explores ways to develop and promote a wider array of mobility options for people of all ages and will look for ways to help increase the comfort and proficiency of older Tampa residents with new technologies that provide transportation solutions.

In addition, we believe that the City of Tampa, like other Florida cities, would benefit from new ways to communicate with residents in real time about evolving transportation challenges and look forward to the city's exploration of that part of the Smart Cities challenge grant.

As AARP's Florida state office, we welcome every effort by Florida cities to become more age-friendly and support the City of Tampa in this application.

Sincerely,



Jeff Johnson  
AARP Florida State Director



January 20, 2016

Vik Bhide, Chief Traffic Management Engineer  
City of Tampa  
1104 East Twiggs Street, Suite 200  
Tampa, FL 33602

Dear Mr. Bhide,

Siemens Intelligent Traffic Systems (ITS) is pleased to initiate a relationship with the City of Tampa under the U.S. Department of Transportation Notice of Funding Opportunity Number DTFH6116RA00002 "*Beyond Traffic: The Smart City Challenge*." The grant is an extremely valuable part of bringing innovative and replicable technology to solving our country's most challenging transportation problems.

This letter is to affirm the commitment of Siemens ITS and the City of Tampa to partner on the grant application and proposal for the *Smart City Challenge*. Siemens ITS, alongside the city, will pledge resources such as the involvement of our staff expertise, in supporting the grant application as well as the project implementation upon receipt of a successful grant from the U.S. DOT.

This agreement should be considered non-exclusive and non-binding at this point, but documents the commitment of both parties' intentions to work together toward this common goal.

Signed,

A blue ink signature of Marcus Welz, consisting of stylized, overlapping loops and lines.

Marcus Welz  
Chief Executive Officer  
Siemens ITS

A blue ink signature of Vik Bhide, featuring a series of fluid, connected strokes.

Vik Bhide  
Chief Traffic Management Engineer  
City of Tampa





# Hillsborough MPO

## Metropolitan Planning for Transportation

Commissioner Lesley "Les" Miller, Jr.  
Hillsborough County  
MPO Chairman

Councilman Harry Cohen  
City of Tampa  
MPO Vice Chairman

Paul Anderson  
Tampa Port Authority

Commissioner Kevin Beckner  
Hillsborough County

Wallace Bowers  
HART

Mayor Frank Chillura  
Temple Terrace

Trent Green  
The Planning Commission

Commissioner Ken Hagan  
Hillsborough County

Joe Lopano  
Hillsborough Co. Aviation Authority

Mayor Rick A. Lott  
City of Plant City

Councilman Guido Maniscalco  
City of Tampa

Councilwoman Lisa Montelione  
City of Tampa

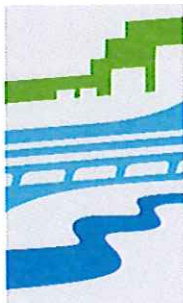
Commissioner Sandra Murman  
Hillsborough County

Cindy Stuart  
Hillsborough County School Board

Joseph Waggoner  
Expressway Authority

Commissioner Stacy R. White  
Hillsborough County

Beth Alden, AICP  
Executive Director



Plan Hillsborough  
[planhillsborough.org](http://planhillsborough.org)  
[planner@plancom.org](mailto:planner@plancom.org)  
813 - 272 - 5940  
601 E Kennedy Blvd  
18<sup>th</sup> floor  
Tampa, FL, 33602

February 2, 2016

Mayor Bob Buckhorn  
City of Tampa  
306 East Jackson Street  
Tampa, FL 33602

Dear Mayor Buckhorn,

RE: Smart City Challenge Grant Application

By vote of the board, the Hillsborough MPO lends its full support to the City of Tampa's Smart City Vision.

The City of Tampa has worked collaboratively with many of the MPO member agencies and planning partners to draft a proposal that will take our existing infrastructure technologies to the next level.

Tampa is already a leader in technology that makes our infrastructure safer and more accessible to all, like the "One Bus Away" open-source software application developed by the USF Center for Urban Transportation Research; the Tampa-Hillsborough Expressway Authority's automated vehicle demonstrations on the Selmon Expressway Reversible Lanes; and Hillsborough Area Regional Transit Authority's public-private partnership to provide on-demand first-mile/last-mile transit connections.

Tampa's Smart City Vision will build on these and other technologies -- including the City's recent commitment to installing advanced traffic management systems throughout the city, and the upcoming Connected Vehicle Pilot Program demonstration project in Downtown Tampa -- to enhance security, provide broader access to real-time information, and improve resiliency and sustainability in our networks.

We look forward to working with you to implement this exciting program, and offer our support in research and analysis.

Sincerely,

Beth Alden, AICP  
Executive Director



**BOSCH**

January 27, 2016

The Honorable Anthony Foxx  
Secretary, U.S. Department of Transportation  
1200 New Jersey Avenue, SE  
Washington DC 20590

Robert Bosch LLC  
38000 Hills Tech Dr.  
Farmington Hills, MI 48331  
Telephone +1(248)553-9000  
[www.Bosch.us](http://www.Bosch.us)

**Re: City of Tampa's Smart City Challenge Proposal**

Dear Secretary Foxx,

It was a pleasure meeting with you on January 7, 2016, at the Consumer Electronics Show (CES) regarding the Smart City Challenge. I am writing to inform you that Bosch has agreed to partner with the City of Tampa to deliver mobility innovations and technology integration solutions should it be awarded the Department of Transportation (DoT) Smart Cities Challenge grant.

Tampa's vision for a smarter approach to mobility addresses emerging transportation technologies, data, and applications. Bosch's expertise in multiple DoT Vision Elements, alongside Tampa's proposed solutions, offer unique, data-driven ideas to improve lives by making all modes of transportation safer, easier, and more reliable.

The development of this preliminary proposal with the input of Bosch and other leading industry and academic organizations makes this proposal worthy of consideration for inclusion in the final five cities that will compete for DoT's award. DoT's groundbreaking initiative will be an excellent platform to accelerate the development and adoption of these technologies and solutions in forward-thinking communities such as Tampa.

Yours sincerely,

Mike Mansuetti  
President

January 29, 2016

Mr. Vik Bhide  
Chief Traffic Management Engineer  
City of Tampa  
Transportation & Stormwater Services

RE: USDOT – **Notice of Funding Opportunity Number DTF6116RA00002 “Beyond Traffic: The Smart City Challenge”**

Dear Mr. Bhide:

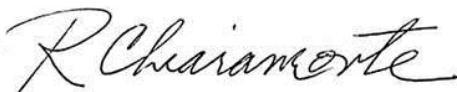
The Tampa Bay Area Regional Transportation Authority (TBARTA) is pleased to provide this letter of commitment to support the application that the City of Tampa is submitting in response to the above-referenced Notice of Funding Opportunity.

As the regional transportation authority created by the Florida Legislature in 2007 to develop and implement a Regional Transportation Master Plan throughout the West Central Florida seven-county region, TBARTA recognizes the interdependent relationship between communities, cities, and counties in reducing congestion, keeping travelers safe, protecting the environment, responding to climate change, connecting underserved communities, and supporting economic vitality.

One of the core services TBARTA provides to accomplish these goals is the Commuter Assistance Program, which provides the regional online ride-matching system that brings together potential vanpoolers and carpoolers with similar routes and schedules to help them save money, while mitigating congestion and pollution, and saving wear and tear on the transportation system in the process. In the past year alone, the program removed nearly 20 million vehicle miles from our roadways, saving over 1 million gallons of gasoline and preventing 10 thousand tons of CO<sub>2</sub> from entering the atmosphere. Provided the opportunity to further integrate smart automation and user-focused connectivity into the existing information infrastructure and fleet will not only help to make the City of Tampa a Smart City, but will help to lay the foundation for expansion to create a Smart Region as well.

TBARTA has worked closely for several years with the Florida Department of Transportation (FDOT), District Seven, the Federal Transit Administration (FTA), and other federal, state and local agencies, as well as private, academic, and other partners on research, development, and testing of topic areas certain to make the Smart City Challenge successful in the City of Tampa. Provided the City of Tampa is selected as one of the Smart City Challenge Finalists, TBARTA is committed to providing support in concept development and planning activities for Urban Automation, Connected Vehicles, and User-Focused Mobility Services and Choices. The TBARTA team expects to make significant and meaningful contributions in the implementation of the project.

Sincerely,



Ramond A. Chiaramonte, AICP  
Executive Director





# CITY OF TAMPA

Bob Buckhorn, Mayor

POLICE DEPARTMENT

Eric B. Ward  
Chief of Police

February 1, 2016

Vik Bhide  
Chief Traffic Management Engineer  
City of Tampa Transportation & Stormwater Services

**Re: U.S. Department of Transportation – Notice of Funding Opportunity Number DTF6116RA00002  
“Beyond Traffic: The Smart City Challenge”**

Dear Mr. Bhide:

The Tampa Police Department (TPD) is pleased to provide this letter of commitment to support the application that the City of Tampa is submitting in response to the above-referenced Notice of Funding Opportunity.

We have been working closely for several years with the Transportation and Stormwater Services Department as a joint team member to support the management of all special events. TPD operates as the first responders to ensure citizens are connected and can receive real time information about traffic management issues such as signal failures, and any incidents that occur at special events around the city.

TPD views its role in the Smart City endeavor as one of collaboration, and a source for data. We will support the team effort by participating in the demonstration project and all events associated with Smart Cities. We commit to continuing our engagement at monthly staff meetings to discuss transportation improvements and keeping our citizens safe. At this time, we have two police officers assigned to assist with transportation management and will continue to ensure that public safety is a top priority as special events are planned and implemented.

In the event that the City of Tampa is selected as one of the Smart City Challenge Finalists, we agree to support the City and all partners in its Smart City concept development and planning activities, as well as its detailed application to USDOT for funding to support implementation of its proposed concept.

Sincerely,

Eric B. Ward  
Chief of Police





**Hillsborough Area Regional Transit Authority**

1201 E. 7th Avenue • Tampa, Florida 33605

(813) 384-6600 • fax (813) 384-6284 • [www.goHART.org](http://www.goHART.org)

January 25, 2016

Vik Bhide, Chief Traffic Management Engineer

City of Tampa Transportation & Stormwater Services

**Re: U.S. Department of Transportation – Notice of Funding Opportunity Number DTF6116RA00002 “Beyond Traffic: The Smart City Challenge”**

Mr. Bhide,

The Hillsborough Area Regional Transit Authority (HART) is pleased to provide this letter of commitment to support the application that the City of Tampa is submitting in response to the above-referenced Notice of Funding Opportunity.

As the public transportation service provider to the City of Tampa, greater Hillsborough County and regional areas, HART will play a significant role in the implementation of any alternative transportation service scenarios as described in the proposal. HART expertise has been demonstrated through innovative customer services such as OneBusAway and as a lead for the forthcoming Regional Fare Collection rollout. We are an ideal fit for several of the Smart City Challenge Vision Elements, as a provider of mobility services which extend beyond the role of what a bus company has traditionally been associated with.

In the event that the City of Tampa is selected as one of the Smart City Challenge Finalists, we agree, subject to a negotiated agreement, to support the City in its Smart City concept development and planning activities, as well as its detailed application to USDOT for funding to support implementation of its proposed concept. Should the City of Tampa be selected as the Smart City Challenge Implementation Awardee, with HART as partner, we agree to devote the time and expertise necessary to assist the City in accomplishing the objectives of the project. The HART team expects to make significant and meaningful contributions in multiple areas of the implementation project.

If you have any questions, please contact Steve Feigenbaum at 813-384-6559 or Justin Begley at 813-384-6553 for technical matters. Please contact Jeanie Satchel at 813-384-6568 for matters regarding an agreement.

Sincerely,

  
Katharine Eagan, AICP  
Chief Executive Officer



February 1, 2016

Secretary Anthony Foxx  
U.S. Department of Transportation  
1200 New Jersey Avenue, SE  
Washington, DC 20590

Secretary Foxx:

On behalf of Strategic Property Partners (SPP), I am pleased to provide this letter of commitment to support the City of Tampa's submission in response to the Smart Cities Challenge. SPP supports Tampa's vision to create the first 'smart' downtown.

Strategic Property Partners is a real estate development joint venture between Cascade Investment, LLC, which is the investment fund owned by Bill Gates, and myself. We plan to create a new district within Tampa's center city. By reshaping 40 acres in Tampa's downtown, we will promote a walkable, sustainable, and connected environment for tenants, residents, students, and guests. Once complete, our urban, multi-use redevelopment will represent approximately 6,000,000 square feet of commercial, residential, and retail space with a total investment exceeding \$2 billion.

Our new district already sits at the nexus of several planned demonstration projects, including the City of Tampa's Advanced Traffic Management System and the Tampa Hillsborough Expressway Authority's Connected Vehicle Pilot Program. We work closely with our partner organizations, all of whom also support this grant application, and also seek to perpetuate other 'smart' initiatives throughout our district.

Over several years, Tampa has made strategic investments in order to make our urban core more walkable and connected. Without our development area, SPP seeks to build on those efforts by reshaping the existing roadway network to feature new bicycle infrastructure, large sidewalks, and other street calming improvements.

A transportation network that functions efficiently and serves all its users is the connective tissue of a city because it allows people connect with each other and with new experiences and opportunities. This grant, if awarded to Tampa, would allow our community to create one unifying network.

SPP share's the city's vision and belief in the potential of sensor based infrastructure to be transformative for our downtown. In the event that the City of Tampa is selected as a Smart Cities Challenge Finalist, our organization stands ready to partner wherever possible to support the planning effort and development of these initiatives for the benefit not just of our district, but Tampa's entire center city.

Sincerely,

A handwritten signature in black ink, appearing to read 'Jeff Vinik', is written over a light blue horizontal line.

Jeff Vinik  
Partner  
Strategic Property Partner