North Florida TPO
Transportation Planning Organization
PLAN · FUND · MOBILIZE

Smart Region Master Plan

How smart technologies and strategies will create a safer, more efficient and reliable transportation system to improve our region's economic competitiveness, sustainability and quality of life.

June 30, 2017

SMART REGION MASTER PLAN

North Florida will become the nation's first Smart Region by identifying and implementing new and emerging transportation-related technologies through an integrated Transportation Systems Management and Operations (TSM&O) approach to address the region's needs.

Implementing new technologies and strategies will create a safer, more efficient and reliable transportation system to improve our region's economic competitiveness, sustainability and quality of life.

EXECUTIVE SUMMARY

Introduction

A Smart Region uses innovative and emerging technologies to collect, analyze, and apply data from many sources to enhance the region's livability. While many of these technologies have been deployed independently with great success, harnessing the power of coordinated data will provide new and innovative means to improve citizens' quality of life. Aspects of a Smart Region include waste, water, energy, healthcare and transportation, among others. Its true power is realized when the silos between each piece are broken down and transportation data, for example, is fully integrated with systems from health care.

The North Florida Smart Region Master Plan's focus is on transportation, specifically the needs of the community and how transportation is integrated with other public assets to define a regional vision for information technologies and communications. Implementing new technologies and strategies will create a safer, more efficient, and more reliable transportation system to improve the region's economic competitiveness, sustainability and quality of life. This plan builds on the North Florida Transportation Planning Organization's (North Florida TPO) Regional Intelligent Transportation Systems Master Plan. The three documents that laid the groundwork for the Smart Region Master Plan include the Intelligent Transportation Systems (ITS) Master Plan (2010), Path Forward 2040 Long Range Transportation Plan (LRTP) (2014), and the C2JAX (2016) proposal that was developed in response to the United States Department of Transportation (USDOT) Smart Cities Challenge.

Figure A represents the vision of the Smart Region Plan. The text in the middle represents the four types of projects, while the circular text around the outside of the graphic represents the core objectives of the Smart Region plan. The core objectives include: eliminate fatalities, improve travel time reliability, reduce greenhouse gas emissions, provide ladders of opportunity and grow North Florida.

As the image shows, the data management system is central to the functionality of a Smart Region. For this reason, it is recommended that a Regional Data Policy Task Force be created to navigate policy and logistics issues related to a data management system. Two other task forces are recommended to navigate policy and logistics issues for automated and connected vehicles.

Proposed Projects

The list of proposed projects is broken down by the four main Smart Region categories: local intelligence, electrification, services and data management system. **Table A** shows a list of the projects and details which projects meet each of the five needs identified.

Next Steps

The recommended next steps are as follows:

1. Develop the three recommended task forces.

   The Regional ITS Coalition currently covers planning and operations for ITS in North Florida. As part of the Smart Region planning activities, it is recommended that the scope of that coalition be broadened and rebranded as the Smart Region Coalition. Under that coalition, it is recommended that three task forces be developed to address the key issues that are raised as part of the development of a Smart Region:

   Data Policy Task Force. At the core of the Smart Region plan is the need for enhanced data collection, integration and sharing that will enable the North Florida region to better prepare for connected and autonomous vehicles and other emerging technologies identified in this plan. The Data Policy Task Force will need to address security, privacy, the use of cloud-based computing and other related issues. This task force will feed its results directly into the development of the Regional Data Exchange and help to shape data policies for transportation throughout the region.

   Regional Connected Vehicle Task Force. Over the next two years, the National Highway Traffic Safety Administration (NHTSA) is expected to mandate that all new cars be equipped with Vehicle-to-Vehicle communications systems by 2021, and all new vehicles sold will be equipped with the technology by 2023. The result of this mandate is that every vehicle will both broadcast key safety information and be able to receive safety information from other vehicles and the infrastructure. The Regional CV Task Force will be tasked with prioritizing and coordinating deployment of infrastructure-based CV technologies to ensure regional consistency with standards, applications, data policy and security.

   Automated Vehicle Task Force. One of the focal areas of the Smart Region Plan is to prepare the region for Automated Vehicles as they become available both for fleets and consumers. The Automated Vehicle Task Force will plan for this disruptive technology as it relates to the transportation system operations. This may include developing concepts for dedicated Automated Vehicle lanes to support early adopters and working with developers and planning agencies to address AV pick-up and drop-off points.

2. Identify funding sources and prioritize projects.

While this plan presents a comprehensive menu of technologies and projects that focus on using emerging technologies to improve the safety and mobility of all transportation users in North Florida, it is not a fiscally constrained plan. Over the past few years, the U.S. Department of Transportation (DOT) and others have provided funding through a variety of competitive grants and other sources that have been used to support the implementation of emerging technologies, including projects in Tampa, Florida, Columbus, Ohio and San Francisco, California. The implementation of the North Florida Smart Region Plan will likely require additional funding. The leadership within the TPO, FDOT and others in the region will need to identify additional public and private funding sources to implement portions of the plan.

One of the objectives of the Smart Region Plan is to provide opportunities for economic development in the region. Once the plan is approved and adopted, the TPO should work with economic development groups in North Florida, such as the Chambers of Commerce, to socialize the plan, its objectives and

benefits. The Smart Columbus team has been very effective at leveraging private investment by companies who see the Smart City concept as a means of growth. Early stakeholder meetings for this effort generated interest from similar organizations in the North Florida region. The TPO should continue to discuss and promote the plan, highlighting projects underway and the benefits derived from those projects.

The data management system is at the core of the Smart Region plan. While agencies in the region already have their own data management systems, one of the objectives of a Smart Region is to integrate those systems and incorporate new data sources into a regional system. The first component of building the data exchange is to develop a preliminary concept, identify the regional data sources that will feed the integrated system and define the primary technical requirements. These may include data formats, database requirements, and security and access controls to begin final design and incremental development activities. This step would also define individual project requirements to ensure seamless integration. The TPO has planned to fund this first phase which will begin to define these elements and develop a more comprehensive scope, budget and implementation schedule for the regional data exchange.

3. Move forward with "quick-win" projects.

The regional plan consists of over forty emerging technologies and individual projects that can be implemented over time as funding becomes available and, in some cases, as the technology becomes mature or standardized. However, there are quick-win projects that can be implemented throughout the region in the near term that will provide short-term benefits to the regional transportation system and maintain momentum in the overall Smart Region Plan implementation. Some of these projects include the Regional Data Exchange, the Baptist Hospital Train Alert system and supporting the deployment of the various autonomous shuttle projects that have been proposed, including the U2C by JTA.

4. Move forward with the remaining projects as funding and agency priorities permit.

The Smart Region Plan identifies over forty projects or sub projects. Although there are a few quick-win projects requiring minimal investment, some of the projects are more substantial, require a commitment to long-term operations or may not be a priority for some regional partners. As the various transportation partners in the region develop their plans, the Smart Region Plan should be consulted to find projects that can be included in those plans to ensure that the benefits envisioned for each project and the plan are realized.

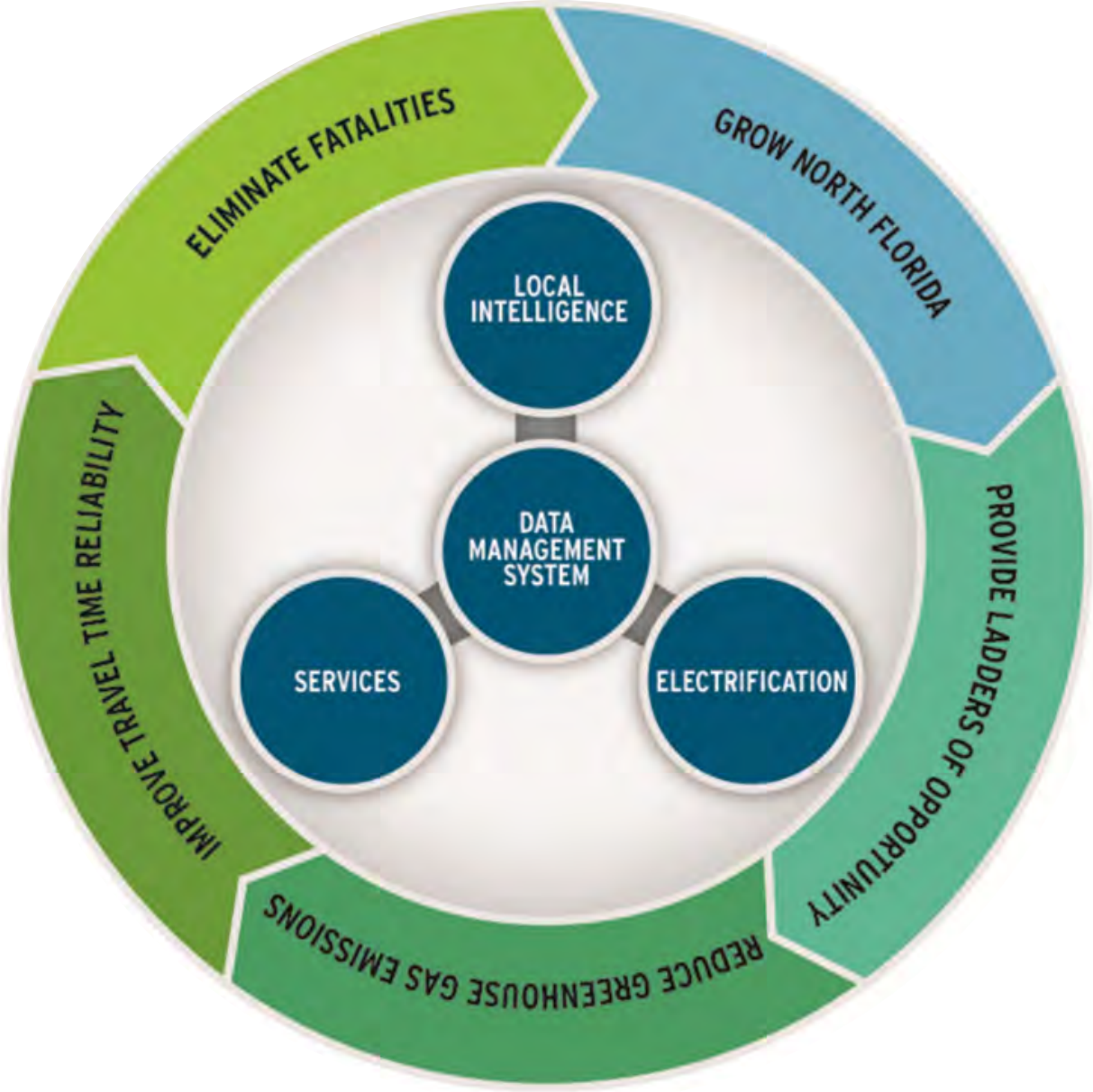

Figure A. North Florida Smart Region Vision

Table A. Project Needs Matrix

	Objectives Addressed				
	Eliminate Fatalities	**Improve Travel Time Reliability**	**Reduce Greenhouse Gas Emissions**	**Provide Ladders of Opportunity**	**Grow North Florida**
Local Intelligence					
Connected Vehicle Corridor Deployments	■	■	■		■
Regional Greenwave Data		■	■		■
Bicycle and Pedestrian Warning System	■		■	■	■
Truck Priority System on Heckscher Drive		■	■		■
Baptist Hospital Rail Crossing Alert System	■	■	■		
Region-wide Rail Crossing Data Management and Information System		■	■		
Critical Bridge Failure Detection System	■				■
Street Flooding Sensors and Notification System	■	■			
Automatic Vehicle Locators in Public Vehicles	■	■	■	■	■
Bus Rapid Transit Crash Avoidance System	■	■			■
Transit Signal Priority		■	■	■	■
Smart Truck Parking at Talleyrand and Blount Island	■	■	■		■
JAXPORT Gate Closure Notification System	■	■	■		■
Integrated Corridor Management	■	■	■		
Smart Delivery Truck Parking and Availability System		■	■		■
Parking Management and Information System		■	■		■
Electrification					
Smart Street Lighting Upgrades	■		■		
Expand Electric Vehicle Network		■	■		■
Solar Road Pilot			■		
Smart Kiosks					■
Services					
Ultimate Urban Circulator (U^2C) Expansion		■	■		■
Electric Autonomous Vehicle Shuttles		■	■	■	■
Automated Vehicle Smart Parking Lot					■
Intermodal Container Transfer Facility (ICTF) Connector for Trucks		■	■		■
Special Event Traffic Management System		■	■		
Smart Card for Multiple Uses				■	
Mobility as a Service First Mile/Last Mile (FMLM) Partnership			■	■	■
Car Sharing Incentives for Low Income Neighborhoods				■	■
FMLM Connectors in Special Neighborhoods				■	■
Data Management System					
Upgrade Regional Fiber	Enables the other projects to be successful in fulfilling the objectives and integrates the data to be more useful.				
North Florida Integrated Transportation Data Exchange					
Enhanced Interagency Data Sharing System					
North Florida Region Traffic Application and Total Trip Planner					

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1 PURPOSE

This study's purpose is to develop a Smart Region Master Plan for North Florida. More information on smart regions can be found in **Section 3.** The study's focus is on transportation and how it is integrated with other public assets and needs, and to define a regional vision for information technologies and communications. Implementing new technologies and strategies will create a safer, more efficient and more reliable transportation system to improve the region's economic competitiveness, sustainability and quality of life. This plan builds on work completed by the North Florida Transportation Planning Organization (North Florida TPO) to create a regional vision for deploying Intelligent Transportation Systems (ITS), so the region gets the most possible from its transportation network.

2 BACKGROUND

North Florida is home to the first permanent European settlement in the U.S. Over the last 450 years the impact of technology and mobility has shaped the region. Many of the nation's first ports, road and railroads began in North Florida. In the 1950s, the automobile revolution and the construction of the Interstate System drove the region's urban form, social fabric and economy.

The new information age is once again transforming the economy and communities. The technologies that connect people, jobs, social, health care and recreation are also changing mobility and infrastructure needs. New transportation technologies are emerging that could save lives – friends and family members – while allowing for more productivity during travel. The North Florida TPO intends to maximize the impact of these technologies by creating a robust "Smart Region" capable of sharing data between numerous platforms and agencies. This Smart Region Plan focuses on the transportation aspect of a smart region.

North Florida has already laid groundwork for a smart region master plan. The following documents were created previously and have been used to inform its development:

ITS Master Plan (2010)

Many projects in the 2010 ITS master plan are complete. Some accomplishments of the plan include:

- My511 traveler information system
- 54 miles of freeway management systems
- 35 miles arterial management systems
- Jacksonville Sports Complex contraflow system
- Jacksonville Transportation Authority I-Stop electronic stop signage at 15 locations
- Jacksonville Transportation Authority's Automatic Vehicle Locations (AVL)
- ITS transit signal priority
- Road Weather Information System (RWIS)

Path Forward 2040 LRTP (2014)

Identified regional needs and plans for TSM&O strategies.

Connect to Jax - C2JAX: A smarter, better Jacksonville (2016)

The Connect to Jax document was developed as a response to the USDOT Smart City Challenge in 2016. The Smart City Challenge was a competitive grant for $40 million to incorporate smart region elements into a city. There were 78 applicants and seven finalists. The City of Columbus, Ohio won the grant. Some highlights from the seven finalists included a mobility challenge, smartphone applications, focus on energy efficiency, services for low income neighborhoods and developing a smart network to provide a holistic understanding of the transportation system.

The Jacksonville application focused on a need to complete the ITS infrastructure foundation, expand the infrastructure and enhance the network capabilities. These needs were a focus of the Smart Region Master Plan.

3 Smart Region

A Smart Region utilizes innovative and emerging technologies to collect, analyze, and utilize data from many sources to enhance the region's livability. There are many aspects to a smart region, including waste, water, energy, healthcare, and mobility. The focus of this Smart Region Plan is on the safe and efficient movement of goods and people.

A smart region collects information from a wide variety Internet of Things (IoT) technologies and merges data from multiple sources into one data management system. With a diverse and widespread dataset, in-depth analyses can be conducted and new connections can be made that haven't previously been discovered within the region. A smart region brings with it a hotbed of activity surrounding emerging technologies that draw in tech startups and other businesses. This can create growth in addition to providing unique and cutting-edge services to the region. This Smart Region plan was developed with a partnership of federal, state and local governments, the U.S. Navy and the private sector.

3.1 Smart Region Building Blocks

Smart cities and smart regions are made up of a few key building blocks. It is essential that each building block be functional, so the system can provide full benefits as a smart region. **Table 1** shows the Smart Region Building Blocks.

Table 1. Smart City Building Blocks

Vehicle and Infrastructure Based Data
Local intelligence such as sensors, cell data and community input provide real-time data about what's going on for all aspects of the transportation system.

Local/Regional Communications Network
Data collected from local intelligence needs to be transmitted to a central data warehouse to be analyzed and used. Radio towers, fiber networks, and cell networks make it possible to send information between the transportation system and the data management systems, as well as between the data management systems and roadway users.

Data Management
Data management systems include the state Advanced Transportation Management System (ATMS), emergency dispatch and power control centers.

Data Integration and Distribution
Data from various sources in the data management phase are brought together to create a cohesive dataset. This data can then be distributed to public and private entities who will analyze the data and make informed decisions from it.

Data Analytics
Public and private entities use their own software to analyze data gathered in the data integration and distribution phase to provide information and make decisions.

Actionable Information
Based on results from data analytics, signal timings can be updated, lanes can be managed, and the public can be informed of current conditions in the transportation network via dynamic message signs, 511 systems, smartphone applications and other means of communication.

Informed Decision
With the actionable information provided, users can make more informed decisions when planning their trips about when to go, which route to take, where to park and whether an alternative mode of transportation is more desirable. In the long-term, public and private entities can use data trends to make informed decisions.

4 Vision

The vision of the North Florida Smart Region Plan is as follows:

"North Florida will become the nation's first Smart Region by identifying and implementing new and emerging transportation-related technologies through an integrated Transportation Systems Management and Operations (TSM&O) approach to address the needs of our region."

Integrating planning across infrastructure, social and technology domains is the foundation of the "Smart Region" being planned on a regional scale as part of this project for Duval, Clay, Nassau, and St. John's counties. The study area is shown in **Figure 1.**

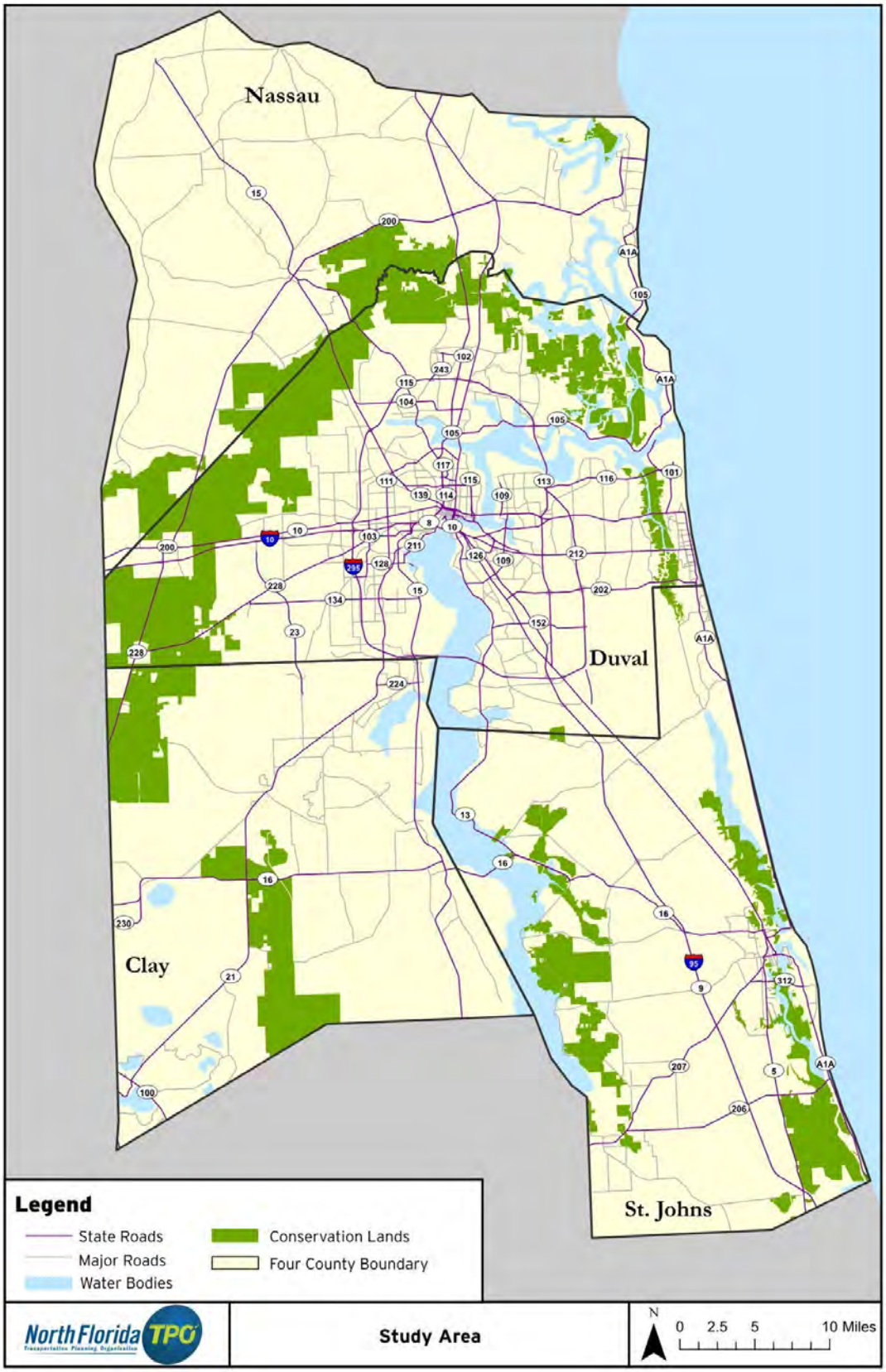


Figure 1. Study Area

Figure 2 represents the vision of the Smart Region Plan. The text in the middle represents the types of projects, while the circular text around the outside of the graphic represents the core objectives of the Smart Region plan.

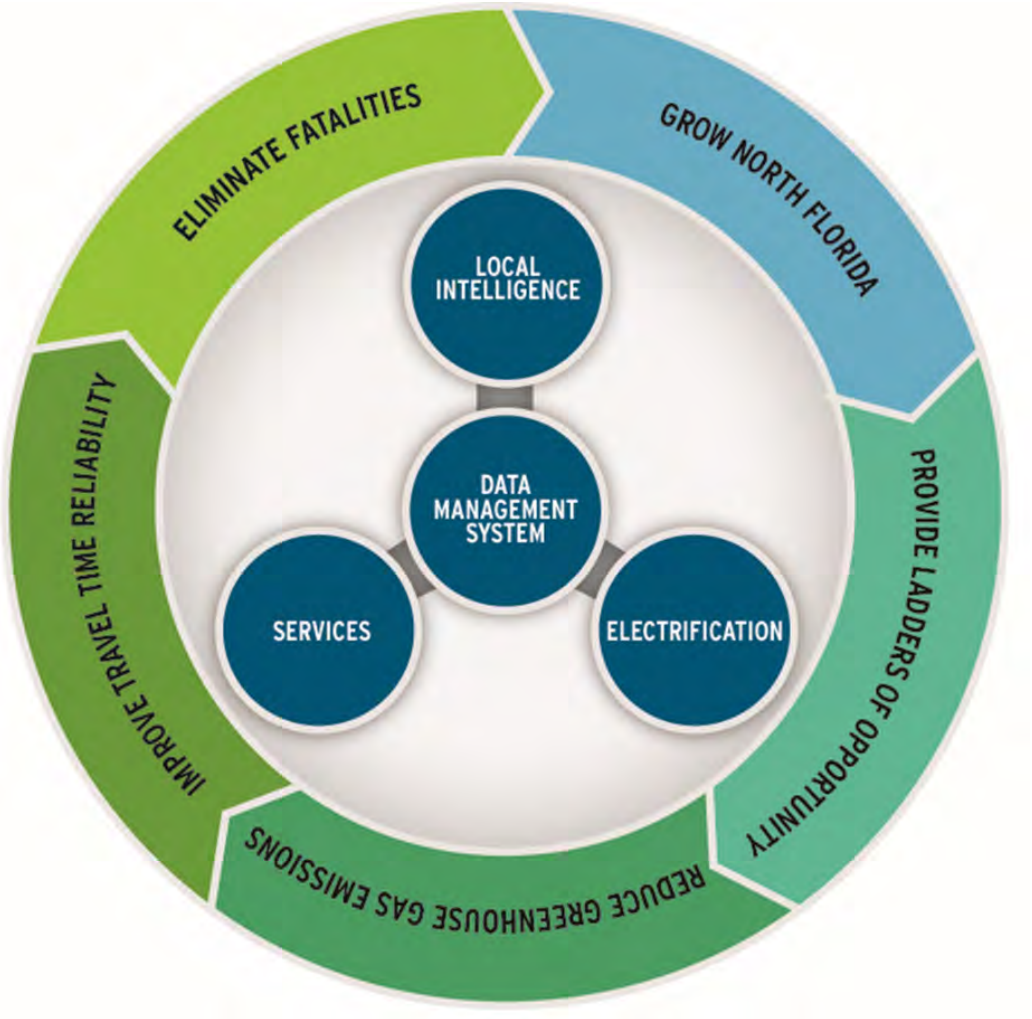


Figure 2. North Florida Smart Region Vision

The North Florida Smart Region vision has five core objectives. Each of the potential projects and concepts was vetted through these objectives prior to their inclusion in the plan. These five main objectives are:

1. **Eliminate Fatalities** – provide a safer transportation network to work toward a goal of zero deaths.
2. **Improve Travel Time Reliability** – provide a transportation network that is consistent and reliable for users.
3. **Reduce Greenhouse Gas Emissions** – provide multi-modal options and reduce congestion.
4. **Provide Ladders of Opportunity** – provide multi-modal options that are accessible, reliable and affordable for individuals with varied needs.
5. **Grow North Florida** – provide a transportation network that encourages commerce and presents business opportunities through Smart Region implementation.

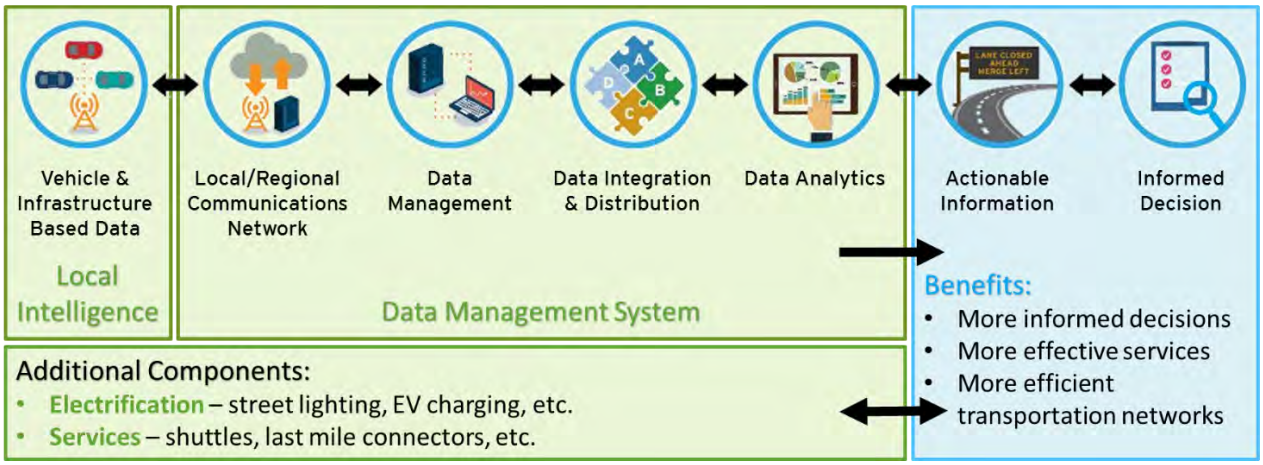
To accomplish these objectives, projects have been broken into four categories. Projects in these categories may relate to the smart region building blocks described previously, or they may be a service resulting from a developed smart region. The four project categories are as follows:

1. **Local Intelligence** – focuses on the Vehicle and Infrastructure Based Data portion of the Smart City Building Blocks.
2. **Electrification** – introduces amenities that are provided or enhanced with the help of a Smart City foundation.
3. **Services** – provides services that are achieved and enhanced with the help of a Smart City foundation.
4. **Data Management System** –advances a city with smart elements into a truly Smart City.

The Data Management System is the heart of a Smart City or Smart Region. It is what brings the individual pieces together and makes a comprehensive dataset that can be used to drive informed decisions and actionable information. Some projects in the Smart Region Master Plan can be useful without the data management system, but the data management system maximizes the impact that each project can have. Without it, the effectiveness of this Smart Region Master Plan is diminished.

The projects fit in to the smart region components as shown in **Figure 3.** The local intelligence section may seem like a small component in the figure. However, this is where all the data collection components fit into the network. The data management system section contains all the projects that are *essential* for a smart region to succeed. This is where all the individual data collection pieces come together and are integrated into a common system. Electrification and services are additional projects that don't necessarily fit into the building blocks of a smart region, but are greatly enhanced by the information gathered and disseminated by a smart region.

Figure 3: Smart Region Components



The plan assesses strategies and tactics and proposes a set of projects that can be implemented in the short- or long-term and address the region's unique needs.

Table 2: Needs Matrix

	Objectives Addressed				
	Eliminate Fatalities	Improve Travel Time Reliability	Reduce Greenhouse Gas Emissions	Provide Ladders of Opportunity	Grow North Florida
Local Intelligence					
Connected Vehicle Corridor Deployments	■	■	■		■
Regional Greenwave Data		■	■		■
Bicycle and Pedestrian Warning System	■		■		■
Truck Priority System on Heckscher Drive		■	■		■
Baptist Hospital Rail Crossing Alert System	■	■	■		
Region-wide Rail Crossing Data Management and Information System		■	■		
Critical Bridge Failure Detection System	■				■
Street Flooding Sensors and Notification System	■	■			
Automatic Vehicle Locators in Public Vehicles	■	■	■	■	■
Bus Rapid Transit Crash Avoidance System	■	■			■
Transit Signal Priority		■	■	■	■
Smart Truck Parking at Talleyrand and Blount Island	■	■	■		■
JAXPORT Gate Closure Notification System	■	■	■		■
Smart Delivery Truck Parking and Availability System		■	■		■
Parking Management and Information System		■	■		■
Electrification					
Smart Street Lighting Upgrades	■		■		
Expand Electric Vehicle Network		■	■		■
Solar Road Pilot			■		
Smart Kiosks					■
Services					
Ultimate Urban Circulator (U^2C) Expansion		■	■		■
Electric Autonomous Vehicle Shuttles		■	■	■	■
Automated Vehicle Smart Parking Lot					■
Intermodal Container Transfer Facility (ICTF) Connector for Trucks		■	■		■
Special Event Traffic Management System		■	■		
Smart Card for Multiple Uses				■	
Mobility as a Service First Mile/Last Mile (FMLM) Partnership			■	■	■
Car Sharing Incentives for Low Income Neighborhoods				■	■
FMLM Connectors in Special Neighborhoods				■	■
Data Management System					
Upgrade Regional Fiber	Enables the other projects to be successful in fulfilling the objectives and integrates the data to be more useful				
North Florida Integrated Transportation Data Exchange					
Enhanced Interagency Data Sharing System					
North Florida Region Traffic Application and Total Trip Planner					

5 NEEDS

5.1 ELIMINATE FATALITIES

In 1997, Sweden adopted a movement called "Vision Zero" which is aimed at eliminating fatalities and serious injuries related to road traffic. Since then, many cities in the U.S. have either formally or informally adopted similar initiatives. The North Florida TPO has informally adopted the Vision Zero initiative.

Nearly 30,000 vehicle crashes occurred and 218 people lost their lives in North Florida during 2015 . **Table 3** shows the 2015 crash history.

Table 3. 2015 Crash History

County	Total	Fatal
Clay	2,817	33
Duval	22,423	133
Nassau	1,013	15
St. Johns	3,344	37
Total	**29,597**	**218**

Source: Florida Highway Safety and Motor Vehicles, Traffic Crash Facts: Annual Report 2015.

Crashes cost the region $4.6 billion per year and contribute to travel delays on the entire roadway system.[1]

5.1.1 AGGRESSIVE AND DISTRACTED DRIVING

As part of the *Regional Strategic Safety Plan* prepared by the North Florida TPO, the Argyle area was identified where aggressive and distracted driving resulted in an area with significantly more crash frequency than in other areas of the region. The seven-square mile encompassing the intersection of SR 21 Blanding Boulevard and Argyle Forest Boulevard has more than 500 crashes per year, the most crashes of any intersection area in the region.

The North Florida TPO previously conducted public information programs within the area and traffic operations and safety improvements were recently completed. However, traffic delays and the number of crashes continue to be an issue in this area.

5.1.2 BICYCLE AND PEDESTRIAN SAFETY

In the report titled *Dangerous by Design 2014*, Smart Growth America and the National Complete Streets Coalition ranked the Jacksonville metropolitan region the third worst region in the nation for pedestrian safety based on a method that considers total pedestrian deaths, number of residents and estimates of the percent of people who walk to work.

Table 4 and **Table** 5 summarize the number of bicycle and pedestrian crashes and fatalities by county.

[1] Based on the 2017 Annual Mobility Report

Table 4. Bicycle and Pedestrian Crash History, 2014-2015 2-year Average

County	Residents (1)	Bicycle Crashes	Bicycle Crashes per 100,000 Residents	Pedestrian Crashes	Pedestrian Crashes per 100,000 Residents
Clay	197,403	52	26.34	65	32.93
Duval	890,066	290	32.58	443	49.77
Nassau	75,231	14	18.61	20	26.58
St. Johns	207,443	57	27.48	60	28.92
Total	**1,370,143**	**413**	**30.14**	**588**	**42.92**

Sources: Florida Highway Safety and Motor Vehicles, *Traffic Crash Facts: Annual Report 2015*. Florida Office of Economic Development *2014 Medium Population Forecasts*

Table 5. Bicycle and Pedestrian Fatalities 2014-2015 2-year Average

County	Bicycle Fatalities			Pedestrian Fatalities		
	2014	2015	Average per 100,000 Residents	2014	2015	Average per 100,000 Residents
Clay	2	0	0.51	6	2	2.03
Duval	1	3	0.22	35	39	4.16
Nassau	0	0	0.00	5	3	5.32
St. Johns	2	5	1.69	9	7	3.86
Total	**5**	**8**	**0.47**	**55**	**51**	**3.87**

Sources: Bicycle data adapted from the Center for Disease Control website on bicycle safety. Pedestrian data was adapted from the Smart Growth America Dangerous by Design 2014 report.

The national average of bicycle fatalities per 100,000 residents ranges from 0.25 to 0.26 per 100,000 in population per the Centers for Disease Control. St. Johns County and Clay County are both above the national average, with the City of St. Augustine as a major hot-spot for these crashes.

The National Highway Traffic Safety Administration estimates that 1.5 pedestrian fatalities occur each year per 100,000 residents. The average crash rate in each county exceeds the national average. Based on data provided by the Centers for Disease Control, nearly half of all pedestrian fatalities involved alcohol, and most deaths occurred in dense urban areas, not at intersections, and at night.

The Bike Walk Alliance also ranks the nation's 68 largest cities based on the number of pedestrian fatalities per 100,000 walking commuters and the number of bicycle fatalities per bicycle commuters. This study ranked Jacksonville as the worst city in the nation for fatalities per pedestrian commuters and fatalities per bicycle commuters.[2]

These per-capita averages are based on the residents of each county. Florida had 105 million visitors in 2015. The high number of tourists is one potential reason for the higher per-capita average. Therefore, this problem should be addressed with tourists in mind.

[2] http://www.bikewalkalliance.org/storage/documents/reports/2016benchmarkingreport_web.pdf

Figure 4. Cyclists in downtown St. Augustine

The Florida Department of Transportation (FDOT) and local agencies include bicycle and pedestrian safety as a primary consideration in the design of highways and streets. However, there are limitations to the extent that infrastructure design alone can prevent bicycle and pedestrian crashes. Ultimately, the safety of everyone on or near the region's transportation network is dependent upon personal responsibility and compliance with all traffic laws. External distractions such as cell phones and music are one of the major causes of bicycle and pedestrian crashes. Educational efforts haven't eliminated crashes, so we need to look to technology to help solve the problem. New technologies are emerging that will assist bicyclists, pedestrians and drivers is better identifying conflicts and reduce crashes.

As part of the *Regional Strategic Safety Plan* completed by the North Florida TPO in 2012, hot-spots were identified where bicycle and pedestrian crashes most commonly occur. The *Regional Strategic Safety Plan* identified crashes involving pedestrians, bicyclists and mopeds as vulnerable road user crashes. **Figure 5** shows these hot-spots with the intensity based on the economic impact of the crashes. For example, a fatality was identified to have an economic impact of $6.38 million versus an injury of $229,777.

Bicycle and pedestrian crashes were combined as vulnerable road users and the hot spots are summarized in **Table 6.**

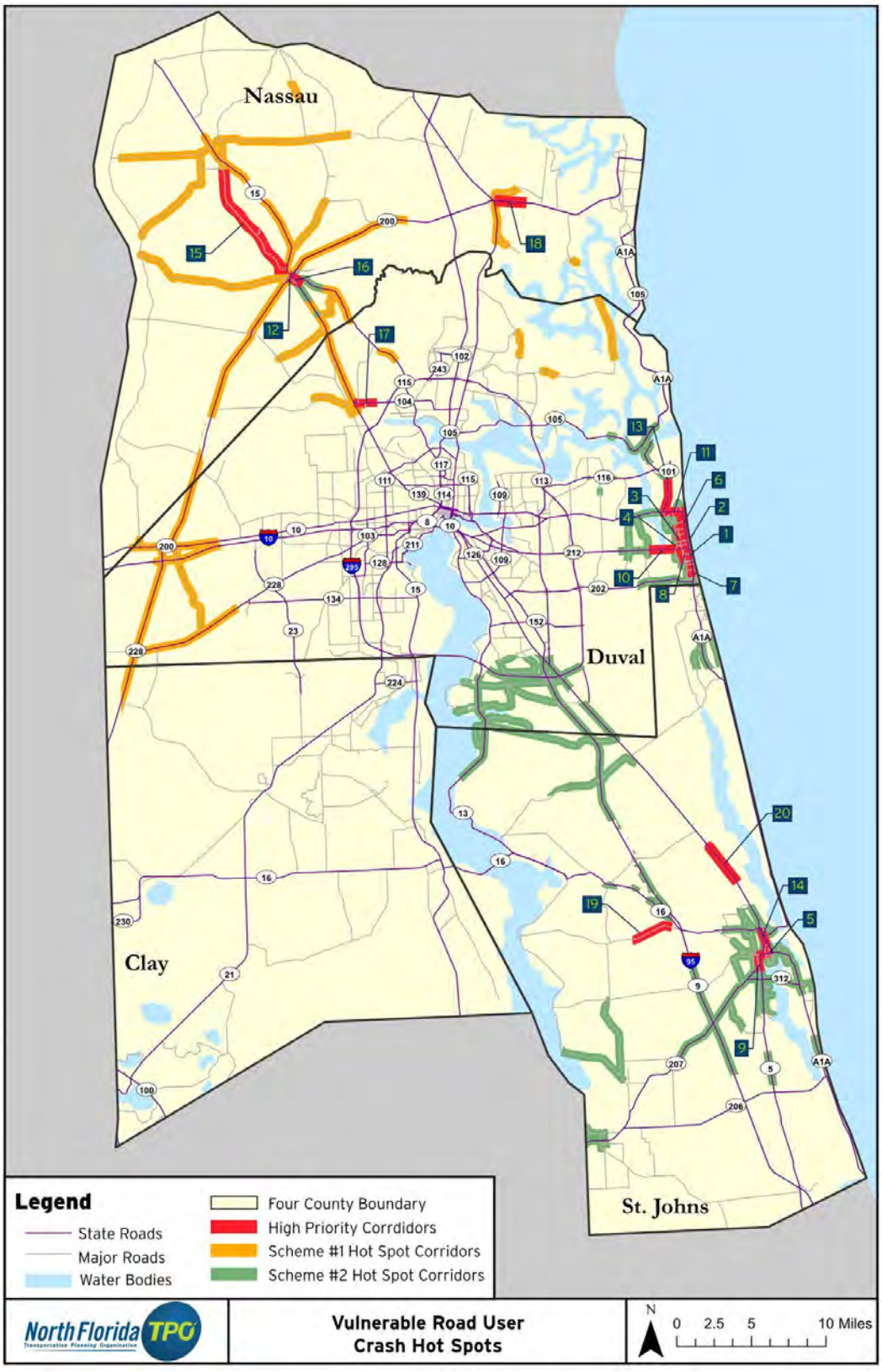


Figure 5. Vulnerable Road User Crash Hot Spots

Table 6. Priority Corridors for Vulnerable Road User Crashes

Rank	Facility	From	To	Vulnerable Road User Crash Rate	Overall Crash Rate
1	1st St S	12th Ave S	US 90 Beach Blvd	3.34	47.38
2	1st St N	US 90 Beach Blvd	15th Ave N	2.35	30.49
3	N 8th Ave	Penman Rd	1st St N	1.9	27.08
4	4th Ave N	Penman Rd	1st St N	1.84	28.18
5	King St	Palmer St	SR A1A Avenida Menendez St	1.66	17.99
6	SR A1A 3rd St	US 90 Beach Blvd	SR 10 Atlantic Blvd	1.1	15.14
7	SR A1A 3rd St	CR 203 Ponte Vedra Blvd	US 90 Beach Blvd	1.04	19.06
8	10th St N/S	12th Ave S	20th Ave/Seagate Ave	0.76	16.03
9	South Dixie Hwy	W King St	SR 207 Pinecrest ST	0.66	5.69
10	US 90 Beach Blvd	San Pablo Rd	1st St N/S	0.65	12.57
11	SR 10 Atlantic Blvd	SR A1A Mayport Rd	SR A1A 3rd St N	0.52	5.25
12	CR 108 River Rd	S Mickler St	US 1 S Kings Rd	0.49	39.38
13	SR A1A Mayport Rd	SR 10 Atlantic Blvd	SR A1A	0.43	4.05
14	US 1 Ponce De Leon Blvd	Old Dixie Hwy	Sr 16	0.36	4.76
15	CR 115 Old Dixie Hwy	US 1 Kings Rd	Henry Smith Rd	0.16	1.34
16	Mickler St	CR 108 River Rd	US 1 S Kings Rd	0.09	4.98
17	SR 104 Dunn Ave	US 1 New Kings Rd	I-295	0.06	2.3
18	SR 200/SR A1A	US 17	Chester Rd	0.04	2.16
19	CR 208	CR 13A Pacetti Rd	I-95	0.04	0.37
20	US 1 Dixie Hwy	Island Landing Dr	International Golf Parkway	0.04	0.72

5.1.3 Highway Rail Crossings

In 2013, 2014 and 2015, 39 crashes occurred at highway-rail grade crossings in North Florida. About 20 trains a day travel through the region across approximately 100 highway crossings. Table 7 summarizes the number of crashes involved with each railroad by county. Only one fatality occurred within the region during the analysis period.

Table 7. Number of Highway-Rail Incidents, 2013-2015

County	Amtrak	CSX	FEC	First Coast	Norfolk Southern	Talleyrand Terminal	Total
Clay	2	2	0	0	0	0	4
Duval	7	14	2	0	9	1	33
Nassau	0	1	0	1	0	0	2
St. Johns	0	0	0	0	0	0	0
Total	**9**	**17**	**2**	**1**	**9**	**1**	**39**

Source: Federal Railroad Administration Office of Safety Analysis

Temporary blockage of the highway-rail grade crossings also occurs during train assembly or operations near the FEC Bowden intermodal yard off US 1 Philips Highway north of SR 202 J.T. Butler Boulevard and south of SR 109 University Boulevard.

During these conditions, if an ambulance, police or fire/rescue vehicle were dispatched to an emergency, these blockages could cause delays. These delays could be avoided by notifying emergency vehicles and dynamically routing them around the temporary blockage.

This scenario is particularly acute near the entrance to Baptist Hospital downtown. **Figure 6** shows a train crossing at a rail crossing near the Baptist Hospital. When some trains cross the St. Johns River, a queue may form and trains block the entrance to the emergency room receiving area. With advance notification, emergency vehicles traveling northbound may take an alternative route or be directed to an alternate facility. When minutes count, this advance notification of a highway-rail grade crossing being blocked can save lives.

Figure 7 shows the locations of the hospitals in the study area and the highway-rail grade crossings within the region.

Figure 6. Train blocking highway crossings near Baptist Hospital

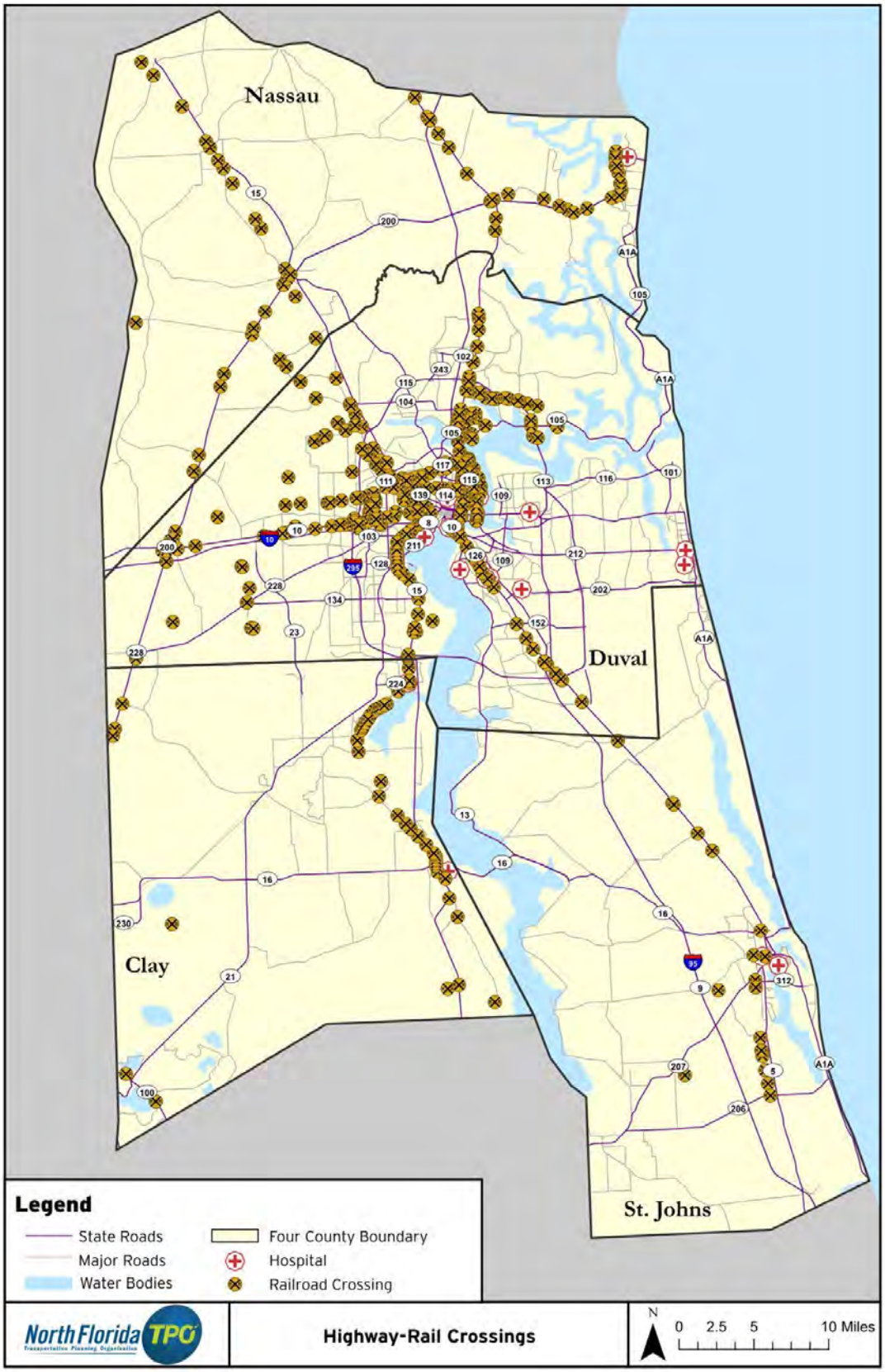


Figure 7. Highway-Rail Crossings

5.1.4 Flood Warning Systems

During extreme high tides and other weather events, streets in low lying areas in the region are prone to flooding, presenting significant safety hazards for travelers and emergency vehicles. Providing traveler information to reroute drivers can keep them away from these hazardous locations. Sensors in outfall pipes or key drainage structures can provide incident managers with information regarding high water that can be relayed to drivers and fleet operators to divert their trips or stop before they enter dangerous conditions.

Potential applications of flood warning system projects in flood prone areas include:

- Black Creek in Clay County
- McCoys Creek in Duval County
- Jacksonville Beaches in Duval County
- San Marco in Duval County
- Fernandina Beach in Nassau County
- St. Augustine in St. Johns County

These areas are shown in **Figure 8**.

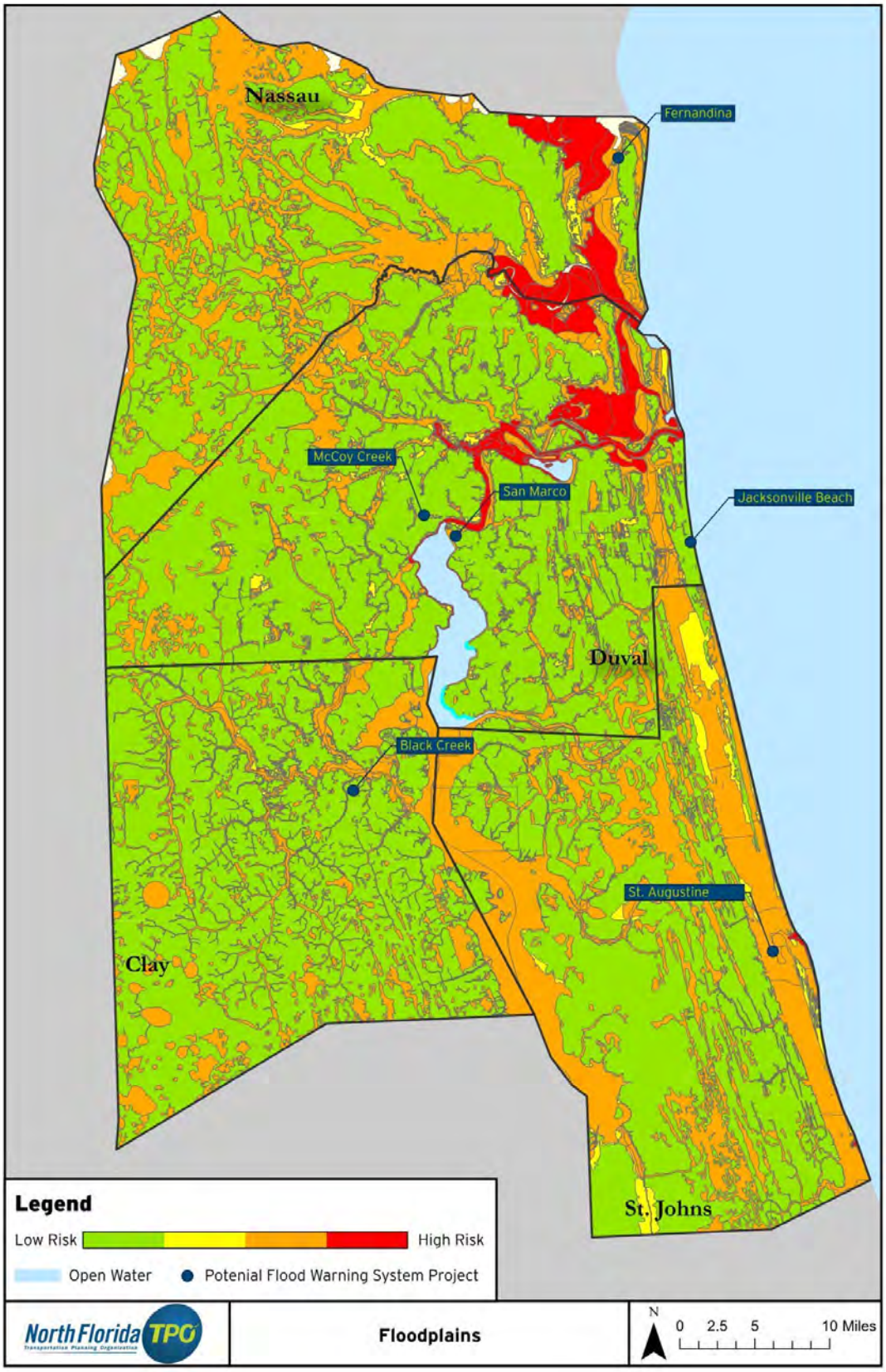


Figure 8. Floodplains

5.1.5 Crime Detection and Notification

In 2015, 7,009 violent crimes, including 108 murders occurred within the region as summarized in **Table 8**.

Table 8. Violent Crimes by County in 2015

County	Population	Murder	Forcible Sex Offenses	Robbery	Aggravated Assault	2015 Total Violent Crime
Clay	201,227	5	35	86	354	580
Duval	905,574	97	727	1,454	3,629	5,907
Nassau	76,536	2	17	12	66	97
St. Johns	213,566	4	38	31	352	425
Total	**1,396,903**	**108**	**817**	**1,583**	**4,401**	**7,009**

Source: Florida Department of Law Enforcement, UCR Offense Data

Technologies that notify law enforcement when gunshots are fired can be installed as part of lighting or signal systems. These notifications will alert law enforcement officers before a phone call or other notifications are received. By being able to respond sooner to assess an incident and determine if rescue services are needed, there is potential to improve the survivability of the victims of violent crimes. The systems are also helpful to law enforcement investigators when shots were fired at the scene.

Through cooperation with Sherriff's Offices in Clay, Nassau and St. Johns counties and Jacksonville, areas with high gun-related crimes can be identified and incorporated in other Smart City deployments. **Figure 9** shows a map that displays the concentration of violent crimes in Duval County in 2015.

Other sensors can be deployed in lighting or signal systems that detect various gasses or chemicals which can be used to detect these types of events and track the spread of a gas cloud in the event of a release, supporting law enforcement activities and evacuation efforts. This data could be conveyed to law enforcement and the traffic management center to support coordinated response efforts in the event of an incident.

Figure 9. Assault Locations
Source: Jacksonville Sherriff Office

5.2 Improve Travel Time Reliability

5.2.1 Congestion and Reliability Needs

According to the 2017 Annual Mobility Report, congestion cost the region $900 million in lost productivity in 2015, a 10 percent increase over 2014. The severely congested roadways within the region, those that experience one or more hours of severe congestion defined as unstable or stop-and-go traffic (LOS E or F), are shown in **Figure 10.**

Recent trends in the region include a return in traffic volumes, congestion and delay to pre-recession (2008) levels. In 2015, vehicle-miles traveled increased 6.1 percent over 2014.

The operations of the regional freeway network have improved significantly because of investment in freeway incident management systems. Response times have improved by nearly one-half since 2011.

For the first time in 2014, travel time reliabilities and the duration of severe congestion were reported along the most congested corridors within the region using real-time traffic data collection technologies. **Table 9** shows 2015 congestion duration and reliability data for key corridors.

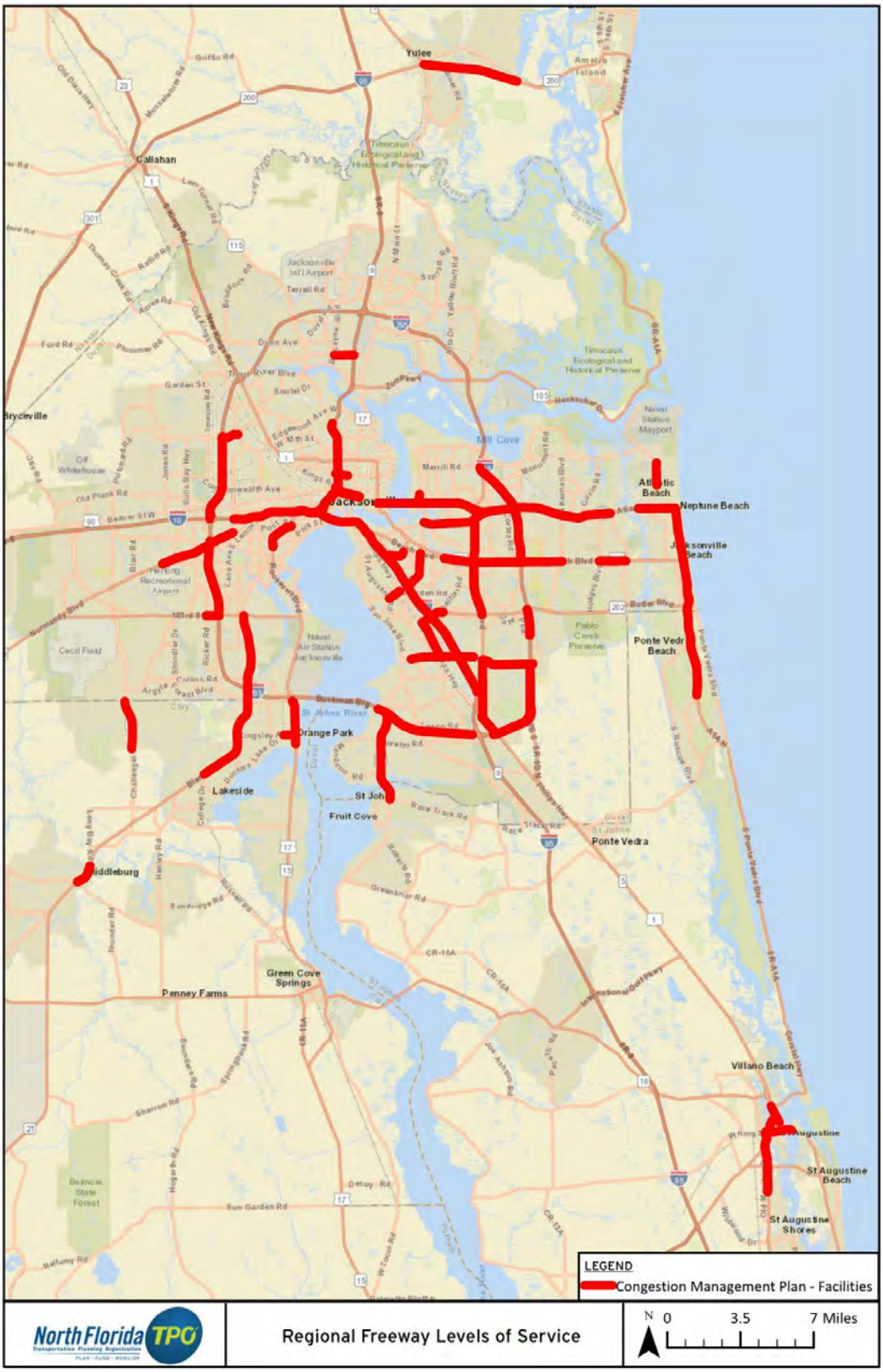


Figure 10. Congested Facilities

Table 9. Summary of Corridor Reliability

Facility	From	To	Direction	Reliability	Duration of Congestion (hrs)
				2016	2016
I-10	Stockton Street	Acosta Expressway	Eastbound	93%	3.75
			Westbound	89%	4.25
I-95	Baymeadows Road	University Boulevard	Northbound	94%	1.75
			Southbound	94%	2.25
SR 10 Atlantic Boulevard	Hodges Boulevard	San Pablo Road	Eastbound	90%	-
			Westbound	98%	0.25
SR 21 Blanding Boulevard	Kingsley Avenue	Collins Road	Northbound	86%	-
			Southbound	83%	4.5
SR 200 Buccaneer Trail	I-95	Chester River Road	Eastbound	90%	0.25
			Westbound	98%	0.25
US 17 Roosevelt Boulevard	Wells Road	Collins Road	Northbound	96%	0.25
			Southbound	91%	0.25
US 90 Beach Boulevard	I-295	Hodges Boulevard	Eastbound	100%	-
			Westbound	99%	-

Source: *2017 Annual Mobility Report*

Of the corridors surveyed, SR 21 Blanding Boulevard has the worst reliability in both directions, and I-10 experiences the longest duration of congestion per day.

5.2.2 Integrated Corridor Management

According to the Federal Highway Administration (FHWA), Integrated Corridor Management is the coordination of individual network operations between parallel facilities that creates an interconnected system capable of cross network travel management. In an ICM corridor, because of proactive multimodal management of infrastructure assets by institutional partners, travelers could receive information that encompasses the entire transportation network. They could dynamically shift to alternative transportation options—even during a trip—in response to changing traffic conditions. For example, while driving in a future ICM corridor, a traveler could be informed in advance of congestion ahead on that route and be informed of alternative transportation options such as a nearby transit facility's location, timing and parking availability.

In 2012, as part of the Regional ITS Master Plan, the I-95 and US 1 Philips Highway corridor from Atlantic Boulevard to I-295 was identified as a candidate for integrated corridor management. These two facilities are parallel roadways that provide the best opportunity to implement dynamically assigned detour routes during recurring or non-recurring congestion incidents to optimize delays. Studies of the current traveler behavior along I-95 southbound in this segment indicated that drivers will only detour today when an incident occurs on I-95 if the congestion will add 20 or minutes to their through-trip. I-95 is one of the most congested corridors in the region. It has only an 89 percent reliability and is experiencing 3.75 hours of severe congestion per day. Initial modeling of the corridor indicated that optimizing the delay could save 15-30 percent of delays.

Providing advanced traveler information along US 1 Philips Highway is needed where drivers can make a reasonable decision to detour. Out of town travelers are reluctant to use US 1 Philips Highway since they do not know the alternate routes to re-enter I-95. In 2015, FDOT installed dynamic detour signing at the interstate ramps and along US 1 Philips Highway to direct travelers. However, because of major construction projects along US 1 Philips Highway and I-95 the system has not been completed.

5.2.3 Key Freight Corridors

North Florida is home to a multimodal freight network and facilitates air cargo, rail, international shipping ports and trucking. It is considered a significant regional economic driver. Table 10 summarizes the total amount of freight moved by trucks and rail in 2012.

Table 10. Summary of Freight Tonnage (millions of tons per year)

Origin and Destination	Truck	Rail	Total	Percentage
Internal to area	34.9	0	**34.9**	18%
Originates in area				
and is destined to within Florida	18.5	0.2	**18.7**	10%
and is destined to outside Florida	8	0.6	**8.6**	5%
Is destined for the area				
And originated from within Florida	7.5	0.4	**7.9**	4%
And originated from outside Florida	8.9	11.6	**20.5**	11%
Port related	11.7	0.6	**12.3**	6%
Through traffic	70	18	**88**	46%
Total	159.5	31.4	**190.9**	100%
Mix Percent	84%	16%	100%	

Source: Freight Analysis 2012 Data

Norfolk Southern, CSX and Florida East Coast (FEC) are the three major railroads that operate within North Florida.

SR 105 Hecksher Drive, which provides access from I-95 and I-295 to the Blount Island and Dames Point Port Terminals operated by JAXPORT, is one of the key freight corridors in North Florida. Trucks are 15 percent of its traffic volume and travel time reliabilities are critical for this corridor.

5.2.4 Parking Needs

St. Augustine is the oldest continuously settled city within the United States. The historic character of the city is enjoyed by the 13,000 residents and more than 3 million visitors each year. The businesses that serve the tourists are the city's economic engine and these businesses rely on frequent deliveries from commercial vehicles to supply them. These needs must be balanced with the needs to preserve the city's infrastructure, protect its historic nature, maintain quality of life and sustain economic prosperity.

The greatest demand for truck parking is near the Spanish Quarter. The demand is driven by the need to supply the numerous restaurants, retail and other business in the economic center of St. Augustine. Truck parking demand exceeds capacity at the most convenient locations for commercial deliveries to access these businesses. The truck parking areas are most congested in the morning hours and along Carrera Street, SR A1A Avenida Menendez near Hypolita Street and US 1B King Street. When spaces are not available, trucks circulate the city through neighborhoods resulting in unneeded congestion and pavement wear. The additional pavement deterioration increases road maintenance costs for the city and Florida Department of Transportation (FDOT).

As businesses continue to grow and the need to serve them increases, the demand for trucks will also increase. Business growth will continue to escalate the conflicting needs to provide additional automobile parking for residents and tourists within the community and maintain the historic character and quality of life. This growth and these demands will need to be met while maintaining the community's unique historic character.

5.3 Reduce Greenhouse Gas Emissions

Per the Environmental Protection Agency (EPA), fossil fuel combustion made up approximately 82 percent of energy consumed in the United States in 2015[3]. In the same year, energy use represented 83.1 percent of all greenhouse gas emissions. Since fossil fuel combustion makes up such a large portion of greenhouse gas emissions, it is vital to focus on reduction. Optimizing the transportation network and providing alternative fuels are both steps that North Florida can take to reduce greenhouse gas emissions.

In 2015, the North Florida TPO published its Alternative Fuels Master Plan, which indicated that replacing conventional fuels with alternative fuels can have the following projected benefits:[4]

- Reduced costs of fueling, operating and maintaining vehicles
- Improved operational performance (i.e. Energy efficiency)
- Enhanced risk management (e.g. reduced price volatility and/or supply volatility)
- Reduced dependence on foreign suppliers
- Economic development (e.g. infrastructure investment, new markets, etc.)
- Job creation
- Reduced nuisance (e.g. noise, odor, etc.)
- Improved public health from improved air quality and reduced toxicity
- Better regulatory compliance
- Reduced toxicity (e.g. fuel spills and other accidents)
- Reduced local air pollution
- Decreased greenhouse gas emissions

In addition to using alternative fuels, smart region technologies and projects can help reduce greenhouse gas emissions by promoting electric vehicles, facilitating ride sharing and public transit, thereby reducing congestion.

5.4 Provide Ladders of Opportunity

From the USDOT's "Ladders of Opportunity" initiative:

> *"America's highways, railways, airports, ports and transit systems help drive our economy. There is a regrettable legacy of aligning and designing transportation projects that separated Americans along economic and even racial lines. At a time when our nation has so much infrastructure to repair and replace, we have a chance to do so in a much more inclusive way that will simultaneously expand economic opportunity and socioeconomic mobility throughout America. The choices we make about future transportation projects, the people they touch and places they connect, will play a role in determining how widely opportunity expands throughout America. Together, we can build a stronger and more connected nation, a healthier economy, and more vibrant communities."*

[3] Draft *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2015 (Feb 2017)* Figure 2-5
[4] *North Florida Alternative fuels, Vehicles & Infrastructure Master Plan (2015)*

Ladders of Opportunity help connect low-income, cash-based, and/or transit-dependent residents to critical destinations such as health services, grocery stores and jobs.

North Florida is home to Jacksonville, which is the largest city by geographical area in the United States, and the 12th largest city by population. This creates a definite need to focus on ladders of opportunity to move at-risk populations to health care, goods, services, and jobs that will help them to be successful.

5.5 Grow North Florida

Implementing Smart Region projects can provide many opportunities for growth within North Florida including:

- An optimized, connected and safer street network can be attractive to businesses and residents looking to move to North Florida.
- Optimized freight networks can improve operations of existing freight business and attract new business.
- Enhanced data from new technologies can create a hub for startup tech companies who will use the data for new research and applications.
- A more complete transit network can connect transit-dependent riders to more jobs and create an inviting environment for transit-by-choice riders.

6 Policy Recommendations

Policy plays a large role in the smart cities world, since new and emerging technologies test the limits of what is considered feasible.

Three task forces are proposed to address the policy and other challenges facing the smart region plan: Regional Data Policy Task Force, Connected Vehicle Task Force, and Regional Automated Vehicle Task Force.

In addition to addressing policy issues and other challenges, the task forces could help attract conferences and experts for project implementation.

6.1 Regional Data Policy Task Force

The Regional Data Policy Task Force is to address policy issues related to the proposed central data management system and provide policy and guidance to the development team. Ideal members of the task force include representatives of the following entities:

- FDOT
- North Florida TPO
- Jacksonville Transportation Authority
- Counties and Cities
- JAXPORT
- Jacksonville Aviation Authority
- Ocean Highway and Port Authority (Port of Fernandina)
- St. Augustine-St. Johns County Airport Authority
- Potential Data Contributors
- Potential Data Users
- Other Key Stakeholders such as the U.S. Navy, Mayo Clinic, and other major employers in the region

Goals for the task force should include the following:

1. Develop an overall data management system architecture
2. Assess the housing location for the central data management system (locally operated vs. cloud based)
3. Decide who will manage the day-to-day operations of the central data management system
4. Determine procurement methods for the design, construction, operations and maintenance of the central data management system
5. Develop policies regarding which entities should contribute data and/or have access to the central data management system and how those entities should have their access managed
6. Adopt standards to support regional interoperability
7. Address issues surrounding potential proprietary data in the central data management system
8. Address any other issues regarding the central data management system

Initially, the Regional Data Policy Task Force will meet frequently to address the up-front goals of the system. After the system is in place, the task force will meet less frequently to address any issues that may arise.

6.2 Regional Connected Vehicle Task Force

The Regional Connected Vehicle (CV) Task Force's purpose is to develop a regional approach to CV deployment to ensure operations are consistent across the entire region and don't change based on jurisdiction. Consistency includes standards and technology, data management and data sharing, security, device management, regional business models and operations and maintenance. Ideal members of the task force include representatives from the following entities:

- FDOT
- North Florida TPO
- Jacksonville Transportation Authority
- Counties and Cities
- Other Key Stakeholders such as Chambers of Commerce, U.S. Navy, Mayo Clinic and other major employers in the region

It is recommended that the CV Task Force coordinate closely with the Regional Data Policy Task Force to ensure consistency between the two.

Goals for the task force should include:

1. Serve as the primary body responsible for guiding connected vehicle investments, including the timing of those investments
2. Develop a regional business model to support deploying CV technology in the North Florida region
3. Work with the Regional Data Policy Task Force to address data management and sharing issues
4. Determine technologies and standards to apply to CV projects in the North Florida region
5. Provide recommendations for corridor deployments, including priorities and project limits
6. Work through potential policy issues with deployment and operations
7. Identify funding opportunities for CV projects
8. Address any other issues that arise for CV technologies in the North Florida region

The Regional CV Task Force should meet on a consistent basis to continually address its goals.

6.3 Regional Automated Vehicle Task Force

The Regional Automated Vehicle Task Force's purpose is to develop a regional approach to CV deployment in terms of standards and technology, data management and data sharing, and regional business models. Ideal members of the task force include representatives from the following entities:

- FDOT
- North Florida TPO
- Jacksonville Transportation Authority
- Counties and Cities
- Other Key Stakeholders such as the U.S. Navy, Mayo Clinic, and other major employers in the region

The task force goals should include the following:

1. Investigate the potential paradigm shift toward AV drop-off and pick-up
2. Start discussing the question "What happens to parking lots in 40 years?"
3. Investigate any policy issues surrounding automated vehicles

The Regional Automated Vehicle Task Force should meet on a consistent basis to continually address its goals.

7 Proposed Projects

Projects are categorized based on the four project categories as described previously. Each project has the following information:

Description: Provides detail about the project.

Time Frame: The time frame provides a high-level look at a feasible time frame for the project. Agency priorities and funding availability can impact time frame.

Complexity: The complexity is a relative indication of how straightforward the project is. Simple projects may deal with technology and practices that are widely used today. More complex projects will require coordination between groups and reliance upon technology that is less widely available.

Cost: The project costs are estimated at a very high level to prioritize projects and determine funding availability. A more in-depth cost analysis should be performed before a project is pursued.

Objectives Addressed: This section discusses which of the five Smart Region objectives are addressed for each project and describes how the project addresses the objective.

Strategy: This section provides information and suggestions for how to accomplish the project, and may describe what the project will look like.

7.1 Local Intelligence Projects

These projects focus on the Vehicle and Infrastructure Based Data portion of the Smart City Building Blocks.

7.1.1 Connected Vehicle Corridor Deployments

Description: Deploy dedicated shortrange communications (DSRC)-based connected vehicle technologies throughout the North Florida region. Includes specific applications like Signal Phase and Timing (SPaT) broadcasts, Transit, Emergency Vehicle and Truck Priority systems.

Timeframe: Long-term. Based on National Highway Traffic Safety Administration (NHTSA) Rulemaking, a significant number of vehicles will not be equipped with this technology until at least 2021, with a goal of all new cars sold in the U.S. to include the technology by 2023.

Complexity: Simple

Cost: $40,000 per site including planning, design, hardware, installation and backhaul. Deployment cost of $800,000 per year for 10 years in addition to operations and maintenance costs, assuming 2,000 signalized intersections in the region.

Objectives Addressed:

- **Eliminate Fatalities –** CV technology can improve safety and reduce fatalities by providing crash detection notifications. NHTSA estimates that when fully deployed, 82 percent of all non-impaired crashes can be eliminated.
- **Improve Travel Time Reliability** – Reduced intersection crashes when the technology is widely deployed in vehicles. Improved efficiency by trucks. Reduced potential for conflicts between priority calls in vehicles via feedback mechanisms to drivers. Reduced non-recurrent congestion from a reduction in the number of crashes.
- **Reduce Greenhouse Gas Emissions** – Improved efficiencies caused by connected vehicle deployment can reduce greenhouse gases.
- **Grow North Florida** – CV technology deployments provide business opportunities in the way of design, construction, operations and systems maintenance. A more functional transportation network and increased safety will be attractive to potential new residents.

Strategy: Build on the prior Long-Range plan, which identified priority corridors for Dedicated Short-Range Communications (DSRC) and fiber backbone corridors, but reprioritize deployment efforts to fit the current direction for vehicle-to-infrastructure (V2I) technology, specifically deployment on arterial streets rather than freeways.

Potential priority deployment corridors include:

- SR 21 Blanding Boulevard (15.87 mi)
- SR 13 San Jose Boulevard (14.72 mi)
- SR 5/US 1 Philips Highway (17.70 mi)
- SR 200 from I-95 to Fernandina Beach (14.52 mi)
- SR 212 Beach Boulevard (14.11 mi)
- SR 90 Atlantic Boulevard (10.02 mi)
- SR 15/US 17 Roosevelt Boulevard (12.68 mi)

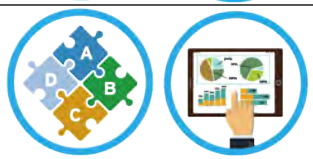
Effective corridor deployments of connected vehicle technology will require each of the smart region building blocks to be functional. See **Table 11** for a description of how this project is part of the smart region process.

In January of 2017, the USDOT issued the Notice of Proposed Rulemaking (NPRM) for Motor Vehicle Safety Standard (MVSS) 150 that would mandate vehicle to vehicle (V2V) communications in all new vehicles produced starting in model year 2021. The proposed rule is based on research and development by the USDOT and the automakers. The rule proposes a solution to permit vehicles to share basic

operational information (speed, heading, location, etc.) to reduce vehicle-to-vehicle crashes. The proposed rule is based on the 5.9GHz Spectrum dedicated for V2V and Vehicle to Infrastructure (V2) communications, which, when combined with the standards developed by the Society of Automotive Engineers (SAE) and the Institute of Electrical and Electronics Engineers (IEEE), makes up the requirements for Dedicated Short Range Communications (DSRC).

If the proposed rule becomes a final rule, new opportunities will open-up for V2I communications, including a suite of applications at traffic signals. These include broadcasting of Signal Phase and Timing (SPaT) data to vehicles, new applications for transit and emergency vehicles for priority and preemption, pedestrians and bicycles to improve safety of vulnerable road users, and trucks to improve mobility and reduce emissions by improving efficiency along the corridor. Deploying DSRC at signalized intersections is the core project that will be used by other projects in this smart region plan to enhance upon the capabilities of the connected vehicle program, improving safety and efficiency for all road users.

Table 11. Connected Vehicle Corridor Smart Region Process

	**Vehicle and Infrastructure Based Data** Sensors throughout the region collect many types of traffic data
	**Local/Regional Communications Network** and **Data Management** Receivers send data via fiber optic or wireless network to the RTMC (Optional)
	**Data Integration and Distribution** and **Data Analytics** Developers include data in their applications, while RTMC can use data to prioritize projects, broadcast messages to users, and dispatch emergency vehicles
	**Actionable Information** Various dissemination methods are used to inform the public of traffic conditions. Certain data can be used to retime signals and post messages to signs
	**Informed Decision** Short term – Travelers can make routing and speed decisions based on data being broadcast Long term – Data can be used to choose new projects and measure the effectiveness of existing projects

7.1.2 Regional Greenwave Data

Description: Make traffic signal status available to third-party app developers and to the integrated data management system.

Timeframe: One to three years

Complexity: Simple

Cost: $0 at each signal if supported by currently deployed traffic signal controller, backhaul and central signal software. Potential for zero cost through a public-private partnership (PPP) with one developer. An open system could cost $250,000 for central software updates and up to $5,000 for controller updates at each site, assuming sufficient backhaul data bandwidth is available.

Objectives Addressed:

- **Improve Travel Time Reliability** – vehicles traveling at the prescribed green band speed will help reduce the shockwave effect caused by stop and go traffic, which will improve travel time reliability. Additional data will be available to support other application development, including real-time monitoring of signal state.
- **Reduce Greenhouse Gas Emissions** – reduced stop and go traffic will in turn reduce the greenhouse gas emissions, which are increased when vehicles need to accelerate from a stop.
- **Grow North Florida** – in addition to drawing in third-party app developers who would use the greenwave data, improved travel time reliability and enhanced connected vehicle functionality within the North Florida region would motivate businesses and residents alike to locate to the area.

Strategy: Put real-time signal status information in an open database and allow industry partners to include the data in their applications. Develop a campaign to encourage application use. See **Table 12** for a description of how this project is part of the smart region process. Potential corridors to install this application include:

- US 90 State Street- Union Street Corridor
- SR 200 Nassau
- Other corridors where there is a backhaul connection

Table 12: Regional Greenwave Data Smart Region Process

	**Vehicle and Infrastructure Based Data** Signal systems poll data about signal status every second
	**Local/Regional Communications Network** and **Data Management** Signal systems post data through one-way communication to regional data environment
	**Data Integration and Distribution** and **Data Analytics** Developers include data in their applications
	**Actionable Information** and **Informed Decision** Drivers receive the data and can make an informed decision about their speed in the corridor, which can provide them with better travel times.

7.1.3 Bicycle and Pedestrian Warning System

Description: Deploy pedestrian and cyclist detectors in key pedestrian areas that can alert vehicles to the presence of pedestrians and cyclists. Additionally, these sensors can be used to increase pedestrian walk times when needed. If Wi-Fi enabled sensors are procured, travel time data can be generated to support the region's BlueTOAD deployment.

The longer-range vision is to integrate the pedestrian detection (infrared or video) with DSRC V2I radios broadcasting alerts regarding pedestrian presence to vehicles for use in an in-vehicle display.

Timeframe:

- **Deploy sensors:** one to three years
- **Connect with DSRC:** five years

Complexity: Simple to install the sensors but more complex to get the sensors to work with DSRC

Cost: $10,000 per signal for the pedestrian sensor and visual pedestrian alert. Integration with DSRC would be part of a DSRC deployment and is covered in the connected vehicle corridor deployments project.

Objectives Addressed:

- **Eliminate Fatalities** – when motorists receive an in-vehicle warning of nearby pedestrians and cyclists, they can be alert for pedestrians even if they can't immediately see them in their field of vision. This can result in a reduction of pedestrian- and bicycle-involved vehicle crashes.
- **Reduce Greenhouse Gas Emissions** – providing a safer environment for pedestrians and cyclists can encourage more users to consider walking and cycling as a travel option. By choosing these modes over a single-occupancy motor vehicle, greenhouse gas emissions can be reduced.
- **Grow North Florida** – Providing a safer environment for pedestrians and cyclists can encourage residents and tourists who prefer to walk and bike. In addition, providing this data can draw in entrepreneurs who would like to use the pedestrian data to create or enhance a product or service.

Strategy: Install pedestrian detectors at desired intersections. In the short term, install a flashing pedestrian warning beacon. In the long term send data via DSRC to vehicles and, if desired, via the fiber network back to the RTMC.

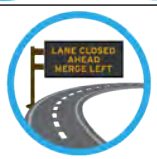
Potential locations:

- St. Augustine (Old City)
- SR A1A from SR 202 J. Turner Butler Boulevard to SR 10 Atlantic Boulevard at the Jacksonville Beaches
- US 90 State Street-Union Street Corridor

Figure 11 shows an example of a detection zone. See **Table 13** for a description of how this project is part of the smart region process.

Figure 11. Crosswalk Detection
Source: http://www.flir.com/traffic/display/?id=67433

Table 13. Bicycle and Pedestrian Warning System Smart Region Process

	**Vehicle and Infrastructure Based Data** Infrared sensors detect the presence of pedestrians
	**Local/Regional Communications Network** and **Data Management** Receivers send data via fiber optic or wireless network to the RTMC (Optional)
	**Data Integration and Distribution** and **Data Analytics** Developers include data in their applications, RTMC can use data to prioritize pedestrian projects (Optional)
	**Actionable Information** Drivers receive the data and can determine their speed in the corridor which can provide them with better travel times
	**Informed Decision** Driver is aware of pedestrian presence and can be more vigilant

7.1.4 Truck Priority System on Heckscher Drive

Description: Provide signal priority to truck movements on Heckscher Drive into Blount Island Marine Terminal.

Timeframe: Five to 10 years

Complexity: Simple for some aspects and complex for others

Cost: $40,000 per intersection and $2,000-$5,000 per truck if DSRC radios are required; $250,000 for software development and testing (currently in prototype development by USDOT).

Objectives Addressed:

- **Improve Travel Time Reliability** – Trucks take longer to accelerate from a stop than passenger vehicles. When trucks are not stopped at the front of a queue at a signal, more vehicles are able to get through the signal in a single cycle.
- **Reduce Greenhouse Gas Emissions** – Larger vehicles such as commercial trucks emit more greenhouse gases than smaller vehicles, particularly when accelerating from a stop. By extending green times to allow trucks to get through, the greenhouse gases the truck would have emitted can be reduced.
- **Grow North Florida** – providing priority to freight in this location can help make our port more competitive.

Strategy: Install an adaptive signal system at New Berlin Road, I-295 SB and NB Ramps, New Berlin Road/Legend Lane, and Dave Rawls Boulevard/Blount Island Drive which can detect the presence of trucks nearing the intersection and extend the green time accordingly. **Figure 12** shows the proposed locations of truck priority detection signals. Trucks would be equipped with a DSRC radio broadcasting truck presence. Traffic signals would respond to the truck presence by providing priority to trucks through an early or extended green phase based on logic programmed into the controller and side street detection. This is an extension of the Multi Modal Traffic Signal System (MMITSS) project operated by the Connected Transportation System (CTS) Pooled Fund Study and funded, in part, by the USDOT.

Figure 12. Proposed Truck Priority Signals

7.1.5 Baptist Hospital Rail Crossing Alert System

Description: Alert dispatchers and first responders in route to the hospital of train activity that could slow their progress. Provide dynamic routing around active highway-rail grade crossings.

Timeframe: One to five years

Complexity: Complex

Cost: Detection - $150,000. Alert System integrated into the RTMC and the Computer Aided Dispatch system - $250,000

Objectives Addressed:

- **Eliminate Fatalities** – Minutes matter for people being transported to the hospital in an ambulance. Advanced warning of train delays can save lives when ambulances can route around the delay.
- **Improve Travel Time Reliability** – Knowing in advance about train delays and viable reroutes can greatly improve travel time reliability for patients, visitors and hospital employees.
- **Reduce Greenhouse Gas Emissions –** When fewer vehicles are idling at a train crossing, greenhouse gas emissions are reduced.

Strategy: At a functional level, this application will include notification of gate closings in the traffic management center responsible for the dispatching and routing of the emergency vehicles. That center could then use varied forms of notification (electronic and voice) to advise the emergency vehicle of the crossing closure. Routing of the emergency vehicle could then be performed using several alternate equipment packages identified in the National ITS Architecture.

In addition to notifying emergency vehicles of crossing closures, travelers en route can be notified if an alternate route is available in advance of the crossing. Mechanisms for providing the information could include flashing beacon signs, dynamic message signs or highway advisory radio.

Figure 13 shows the proposed alternate routes for access to Baptist Hospital. See **Table 14** for a description of how this project is part of smart region process.

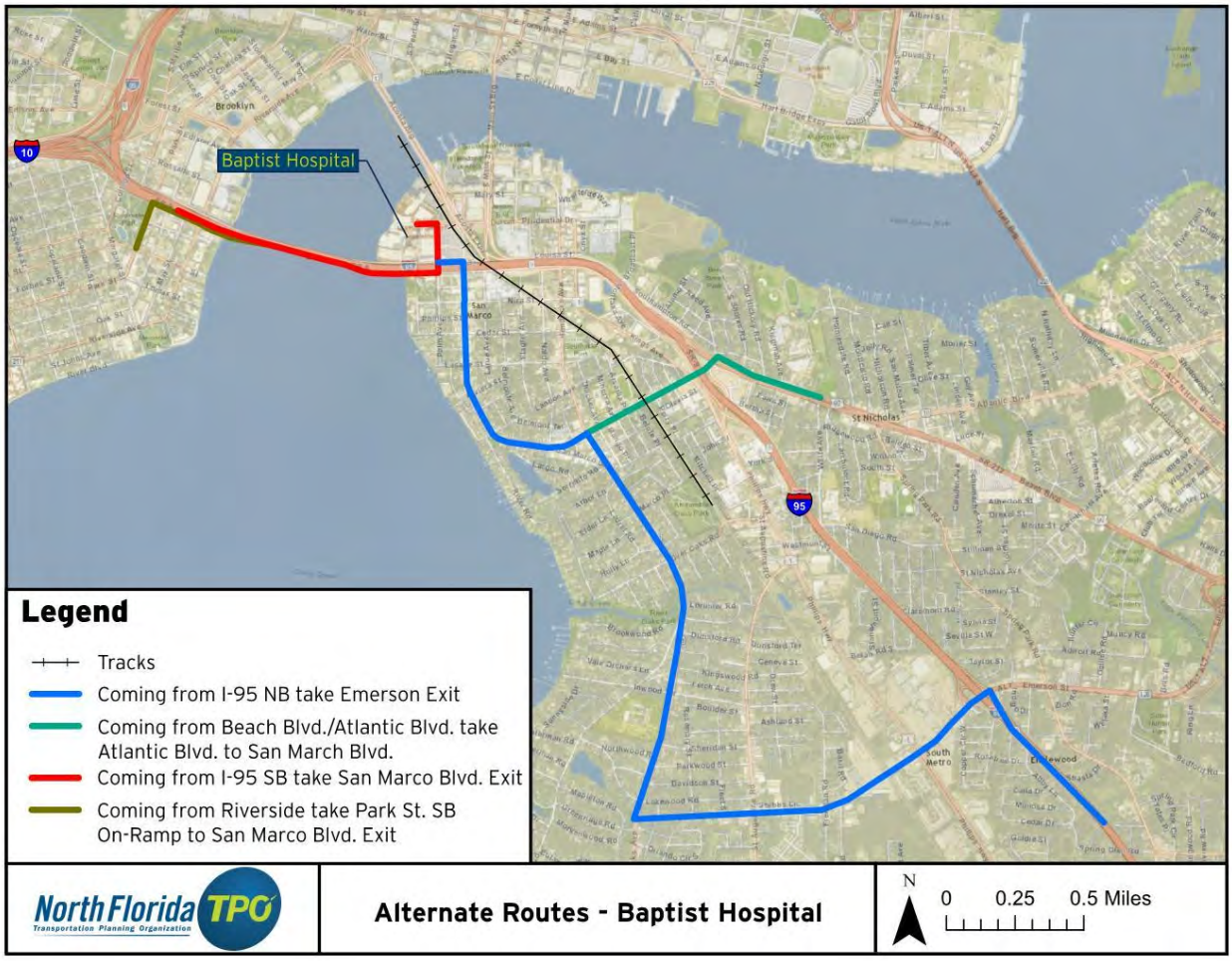


Figure 13. Alternate Routes – Baptist Hospital

Table 14. Baptist Hospital Rail Crossing Alert System Smart Region Process

	**Vehicle and Infrastructure Based Data** Sensors detect the presence of trains nearing the hospital area.
	**Local/Regional Communications Network** and **Data Management** Train alert is sent via fiber network or wireless communications to the RTMC and dispatchers.
	**Data Integration and Distribution** and **Data Analytics** RTMC uses the data to redirect traffic, set special signal times, and disseminate important messages to users.
	**Actionable Information** and **Informed Decision** Dispatchers advise first responders that an alternate route is necessary. Advisory messages allow the public to make informed routing decisions.

7.1.6 Regionwide Rail Crossing Data Management and Information System

Description: Provide regional real-time, highway-rail crossing status and dynamic routing information to the public

Timeframe: Five to 10 years

Complexity: Simple

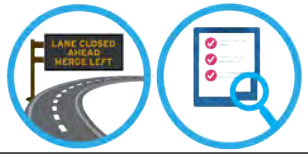
Cost: Detection Systems - $500,000 (including detectors and communications). Software module for 511 software - $200,000

Objectives Addressed:

- **Improve Travel Time Reliability** – Knowing in advance about train delays and viable reroutes can greatly improve travel time reliability for commuters and visitors alike.
- **Reduce Greenhouse Gas Emissions** – When fewer vehicles are idling at a train crossing, greenhouse gas emissions are reduced.

Strategy: Work with the rail companies to deploy sensors in advance of rail crossings. See **Table 15** for a description of how this project is part of the smart region process.

Table 15. Region wide Rail Crossing Data Management and Information System Smart Region Process

	**Vehicle and Infrastructure Based Data** Sensors detect the presence of trains nearing rail crossings.
	**Local/Regional Communications Network** and **Data Management** Train alert is sent via fiber network or wireless communications to the RTMC and dispatchers.
	**Data Integration and Distribution** and **Data Analytics** RTMC uses the data to redirect traffic, set special signal times, and disseminate important messages to users.
	**Actionable Information** and **Informed Decision** Dispatchers advise first responders that an alternate route is necessary. Advisory messages allow the public to make informed routing decisions.

7.1.7 *Critical Bridge Failure Detection System*

Description: Install strain gauges on key bridges in North Florida to detect potential bridge failures before they happen. Bridge fatigue or failure can be caused by collisions from naval vessels, construction work, or other unforeseen loading.

Timeframe: One to three years for installation, and up to five years to acquire long-term data trends

Complexity: Simple

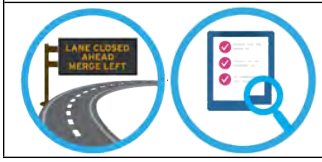
Cost: $50,000 per bridge, $250,000 for software and data storage/management, $100,000 per year for operations and ongoing analytics for all 22 bridges.

Objectives Addressed:

- **Eliminate Fatalities** – advanced notice of potential bridge failures can give the authorities enough time to close the bridge and reroute traffic before an incident occurs.
- **Grow North Florida –** this project can attract a company or university to administer and monitor as a pilot project for a larger business model.

Strategy: Deploy sensors on key bridges, develop data analytics and warning system. Data analytics will determine the difference in normal strain and problematic strain. However, it will take time to collect enough data to know what is considered abnormal. See **Table 16** for a description of how this project is part of the smart region process.

Table 16. Critical Bridge Failure Detection System Smart Region Process

	**Vehicle and Infrastructure Based Data** Sensors placed on the bridge monitor strain.
	**Local/Regional Communications Network** and **Data Management** Data is sent via fiber optic or wireless network to the RTMC in real-time.
	**Data Integration and Distribution** and **Data Analytics** The RTMC catalogs the data and sets alarms to notify of bridge strains that surpass certain thresholds.
	**Actionable Information** and **Informed Decision** The RTMC can make informed decisions about bridge maintenance and conduct long-term planning for future bridge work.

7.1.8 Street Flooding Sensors and Notification System

Description: Deploy sensors at key locations to monitor water levels and provide advanced alert of imminent flooding/high waters.

Timeframe: One to three years

Complexity: Simple

Cost: $25,000 per site including basic backhaul. $150,000 central system to display high water at RTMC and provide data to SunGuide, $5,000 per year for operations and maintenance.

Objectives Addressed:

- **Eliminate Fatalities** – Sensors deployed in areas prone to flooding can provide advanced warning of imminent flooding.
- **Improve Travel Time Reliability** – Advanced knowledge of flooded streets can help motorists choose an alternate route before encountering the flooded area.

Strategy: Deploy sensors in key locations and connect to communication equipment to send data directly to the RTMC. Work with the water management district to see where sensors are already located, and integrate existing data into the central data management system.

See **Table 17** for a description of how this project is part of the smart region process.

Table 17. Street Flooding Sensors and Notification System Smart Region Process

	**Vehicle and Infrastructure Based Data** Sensors detect water levels.
	**Local/Regional Communications Network** and **Data Management** Sensors transmit information via wireless or fiber network back to the RTMC.
	**Data Integration and Distribution** and **Data Analytics** RTMC can analyze the data and predict when flood conditions are imminent.
	**Actionable Information** Flood warnings are disseminated to residents.
	**Informed Decision** Residents and the government can make decisions to keep people safe.

7.1.9 Automatic Vehicle Locators (AVL) in Public Vehicles

Description: Install AVL technology in public vehicles such as emergency vehicles, public works vehicles, and public transit vehicles. Sensors could include basic GPS data to be used to supplement other travel time data or more advanced systems that link the vehicle data systems or independent sensors. Data could include location/speed data, weather data from windshield wipers, pavement condition data from laser sensors for ride quality or other data as available.

Timeframe: Long term – depends on agency priorities as each agency has different fleet capabilities and geographic areas. Some agencies already have AVL systems deployed and this task would only require integrating that data into the central data repository.

Complexity: Simple

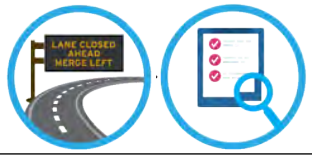
Cost: Varies depending on ultimate project objective. Commercial Off the Shelf (COTS) solutions available for $50/vehicle/month including hardware and service, but with limitations on data that is available for the agency. More advanced systems cost upwards of $2,000 per vehicle with potential additional monthly costs for data transmission. Data system cost dependent on data being gathered and analytics required. Budget $100,000 to integrate GPS data into regional travel time data and $250,000 per module for other data elements.

Objectives Addressed:

- **Eliminate Fatalities** – In an emergency, such as a car crash or structure fire, minutes matter. Knowing the exact location of all emergency vehicles is invaluable for quickly dispatching the necessary help to each emergency. Quicker response times can help to reduce fatalities.
- **Improve Travel Time Reliability –** GPS Data from public transit vehicles can be used to inform the public of nearby transit options and timing. Long-term tracking of this data can provide insight to trends in transit schedules.
- **Reduce Greenhouse Gas Emissions –** Providing enhanced transit information creates a more attractive and reliable transit system. This enhanced reliability can draw users to public transit systems instead of using their single occupancy vehicle to make the trip.
- **Provide Ladders of Opportunity –** Enhanced transit information can enable transit dependent riders by providing them with more accurate and precise information regarding their transit routes. This enhanced reliability provides more freedom of movement.
- **Grow North Florida –** Enhanced transit data can create a more reliable transit system, which attracts users to the downtown area. Additionally, the data can be collected and used by local startups to provide transit information. Long-term tracking can provide useful insights into the operations of public vehicles.

Strategy: The first step for this project is to develop a strategy based on data needs and fleet availability. Some agencies in North Florida already have AVL technology installed, including the Jacksonville Transportation Authority. For these vehicles, integrating the data with the central data management system will be the only necessary step. Install AVL technology in all other public vehicles, including emergency vehicles, public works vehicles, and other public transit vehicles. Consider whether additional sensors should also be installed to track pavement or weather conditions. Provide a live feed of each vehicle's location back to the central data management system. See **Table 18** for a description of how this project is part of the smart region process.

Table 18. AVL in Public Vehicles Smart Region Process

	**Vehicle and Infrastructure Based Data** GPS units collect vehicular data about speed, heading, and location.
	**Local/Regional Communications Network** and **Data Management** Data is sent via fiber optic or wireless network to the RTMC in real-time.
	**Data Integration and Distribution** and **Data Analytics** The RTMC can view the location of public vehicles in real-time and distribute desired information to third party app developers for services such as Next Bus.
	**Actionable Information** and **Informed Decision** The RTMC can employ signal preemption for emergency vehicles and signal priority for transit services. The public can plan their transit rides with more precise information.

7.1.10 Bus Rapid Transit (BRT) Crash Avoidance System

Description: Equip BRT vehicles with a crash avoidance system

Timeframe: One to three years

Complexity: Simple

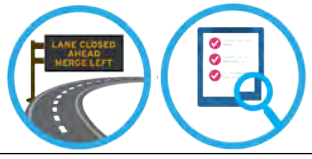
Cost: $8,000 per vehicle. $100,000 for data collection system at bus barn to collect operational and performance metrics data.

Objectives Addressed:

- **Eliminate Fatalities** – Sensors on buses can provide advanced warning of a potential imminent crash. These sensors protect other roadway users as well as the passengers on the bus and can prevent fatalities. Some studies have shown these systems can reduce bike and pedestrian crashes by providing better situational awareness for the bus driver.
- **Improve Travel Time Reliability** – Even minor crashes with a public transit vehicle can cause large delays for passengers. Reducing the number of transit vehicle crashes improves travel time reliability.
- **Grow North Florida** – Pedestrian sensors pay for themselves in lowered insurance liability and reduced number of crashes. The money that would be spent on those liabilities can be diverted to other efforts that grow North Florida.

Strategy: Install sensors on BRT vehicles that detect and relay information to drivers. See **Table 19** for a description of how this project is part of the smart region process. After BRT deployment, this technology could be applied to other public transit routes and vehicles as well.

Table 19. BRT Crash Avoidance System Smart Region Process

	**Vehicle and Infrastructure Based Data** In addition to preventing collisions in real-time, the Crash Avoidance System collects data about crash detection and other metrics.
	**Local/Regional Communications Network** and **Data Management** Data is sent via fiber optic or wireless network to the RTMC in real-time.
	**Data Integration and Distribution** and **Data Analytics** The RTMC can view the data and find trends over time.
	**Actionable Information** and **Informed Decision** The RTMC can make geometric changes or provide special signing at high-conflict locations.

7.1.11 Transit Signal Priority

Description: Provide transit signal priority (TSP) in key transit corridors throughout the region using DSRC for the signal from the transit vehicle.

Timeframe: One year if using existing technology, near-term if using DSRC technology.

Complexity: Complex

Cost: $3,000 per bus or emergency vehicle; $100,000 for integration into emergency vehicle systems (one switch for lights, sirens and DSRC broadcast).

Objectives Addressed:

- **Improve Travel Time Reliability** – Providing signal priority to transit vehicles improves travel times and improves consistency.
- **Reduce Greenhouse Gas Emissions** – Improved travel times will make transit a more desirable option than single-occupancy vehicles. By converting some users from single-occupancy vehicles to transit, greenhouse gas emissions will be reduced.
- **Provide Ladders of Opportunity** – Travel time benefits will provide new opportunities to transit-dependent users by reducing their travel time and expanding potential areas of employment. Travel time benefits also make doctor visits more convenient, increasing health and quality of life.
- **Grow North Florida** – providing priority to transit can encourage more users to choose transit, opening new neighborhoods and travelers to shopping areas.

Strategy: Coordinate with the Jacksonville Transportation Authority and FDOT to determine where TSP sensors would be most valuable. Install emitters on buses and sensors on signals to call the green phase for buses approaching the intersection. See **Table 20** for a description of how this project is part of the smart region process.

Table 20. Transit Signal Priority Smart City Process

	**Vehicle and Infrastructure Based Data** Signal data is collected at signals connected to the data management system.
	**Local/Regional Communications Network** and **Data Management** Data is sent via fiber optic or wireless network to the RTMC in real-time.
	**Data Integration and Distribution** and **Data Analytics** The RTMC can see when pre-emption is occurring and find trends over time.
	**Actionable Information** and **Informed Decision** The RTMC can control certain aspects of the signals when necessary, or use the pre-emption information to make long-term decisions.

7.1.12 Smart Truck Parking at Talleyrand and Blount Island

Description: The JAXPORT Talleyrand Terminal located along the St. Johns River in the eastside neighborhood of Jacksonville is a major truck terminal for automobiles and roll-on/roll-off freight. Trucks currently queue at the gate facilities which back up onto Talleyrand Avenue, resulting in safety, operational and environmental concerns. Trucks blocking travel lanes requiring other vehicles to pass increases crash potential. Capacities are reduced and congestion increases. Also, the trucks idle while waiting for the gate resulting in wasted fuel and unneeded vehicle emissions.

Timeframe: Five to 10 years

Complexity: Simple

Cost: $500,000 at each site for sensors and basic backhaul, with $10,000 per site per year for operations and maintenance. Additional cost for signage.

Objectives Addressed:

- **Eliminate Fatalities** – Providing advanced truck parking information to truck drivers can reduce the number of improperly parked trucks on freeway ramps and other locations. Improperly parked vehicles pose a danger to both motorists and truck drivers.
- **Improve Travel Time Reliability** – This project can improve travel time reliability for truck drivers by giving them the necessary information to make informed parking decisions in advance.
- **Reduce Greenhouse Gas Emissions** – Providing advanced truck parking information to truck drivers can reduce the time they spend looking for parking, reducing the amount of time the truck is running while looking for a parking place.
- **Grow North Florida** – This project is consistent with JAXPORT's strategic plan. Additionally, the truck parking information could be given to third-party app developers who can use the information to enhance functionality of their applications.

Strategy: Deploy sensors to monitor the number of available spaces at key truck parking locations at Talleyrand and Blount Island. No application to be developed or integrated into 511 application as that task is anticipated to be done by FDOT Central Office and by the private sector. See **Table 21** for a description of how this project is part of the smart region process.

Table 21. Smart Truck Parking at Talleyrand and Blount Island Smart City Process

	**Vehicle and Infrastructure Based Data** Sensors detect the number of open spaces.
	**Local/Regional Communications Network** and **Data Management** Raw data is sent via fiber network or wireless communications to the RTMC.
	**Data Integration and Distribution** and **Data Analytics** RTMC publishes the data to dynamic signs. Additionally, the RTMC provides a data feed for app developers to further distribute the data to users.
	**Actionable Information** and **Informed Decision** Drivers see the information on signs and apps and can plan accordingly.

7.1.13 JAXPORT Gate Closure Notification System

Description: Provide information to truck drivers about JAXPORT gate closures. Drivers with gate closure information can pull off at a truck parking location before the gate closes. This will reduce congestion and the number of improperly parked trucks on freeway ramps and other locations.

Timeframe: Five to 10 years

Complexity: Simple

Cost: $250,000 for closure system including terminal at the gate for operator and two small DMS in advance of the gate. $200,000 to develop a reward-based system for heeding the gate closure notification. No costs were assumed for the potential to acquire truck parking spaces.

Objectives Addressed:

- **Eliminate Fatalities** – Providing advanced truck parking information to truck drivers can reduce the number of improperly parked trucks on freeway ramps and other locations. Improperly parked vehicles pose a danger to motorists and truck drivers.
- **Improve Travel Time Reliability** – This project can improve travel time reliability for truck drivers by giving them the necessary information to make informed parking decisions ahead of time.
- **Reduce Greenhouse Gas Emissions** – Providing advanced truck parking information to truck drivers can reduce the time drivers spend looking for parking which in turn reduces the amount of time the truck is running while looking for a place to park.
- **Grow North Florida** – Gate status information could be given to third-party app developers who can use the information to enhance functionality of their applications.

Strategy: Deploy sensors to monitor the status of the gates and direct truck drivers to a nearby first in/first out lot to give truck priority once the gate opens. A reward system may be beneficial for truck drivers to heed the gate closure notifications. Such rewards could include a queue jump or other incentives. Mobile integration would be accomplished through FDOT 511 application and private developers. See **Table 22** for a description of how this project is part of the smart region process.

Table 22. JAXPORT Gate Closure Notification System

	**Vehicle and Infrastructure Based Data** Sensors detect the gate status.
	**Local/Regional Communications Network** and **Data Management** Raw data is sent via fiber network or wireless communications to the RTMC.
	**Data Integration and Distribution** and **Data Analytics** RTMC publishes the data to dynamic signs. Additionally, the RTMC provides a data feed for app developers to further distribute the data to users.
	**Actionable Information** and **Informed Decision** Drivers see the information on signs and apps and can plan accordingly.

7.1.14 Integrated Corridor Management

Description: Complete construction and implementation of integrated corridor management with the I-95 and US 1 Phillips Highway corridor.

Timeframe: Less than one year

Complexity: Simple

Cost: $15,000 for signal plan implementation

Objectives Addressed:

- **Eliminate Fatalities** – when the motorist receives information to take an alternate route it minimizes the chance a second or fatal crashes will occur.
- **Improve Travel Time Reliability** – reduced travel times for drivers during traffic incidents or periods of high congestion.
- **Reduce Greenhouse Gas Emissions** – Emissions can be reduced by routing vehicles around incidents or congestion which would otherwise cause the vehicles to idle or take longer to get through the incident.

Strategy:

Additional activities needed to fully implement the system include:

- Deploy additional dynamic message signs at key decision points.
- Improve signals and deploy integration.
- A set of eight detour scenarios were previously evaluated and initial signal timing plans need to be updated and implemented.
- Collect real-time traveler information on US 1 Philips Highway which will be feasible when the signal upgrades are implemented to actively manage the corridor.
- Refine algorithms developed during the prior studies to optimize the total delay within the corridor during recurring and non-recurring congestion.
- Provide traveler information to 511 and private sector traveler information companies so the data can be shared in multiple outlets.

See **Table 23** for a description of how this project is part of the smart region process, and **Figure 14** for a map of the ICM route.

Table 23. Integrated Corridor Management for I-95/Phillips Highway

	**Vehicle** and **Infrastructure Based Data** Sensors detect traffic conditions on freeway and alternate route.
	**Local/Regional Communications Network** and **Data Management** Raw data is sent via fiber network or wireless communications to the RTMC.
	**Data Integration** and **Distribution** and **Data Analytics** RTMC uses the data to determine whether to redirect traffic, set special signal times, and disseminate important messages to users.
	**Actionable Information** and **Informed Decision** Drivers see the information on signs and apps and can choose to take the alternate route. Signal times can be adjusted for increased directional demand.

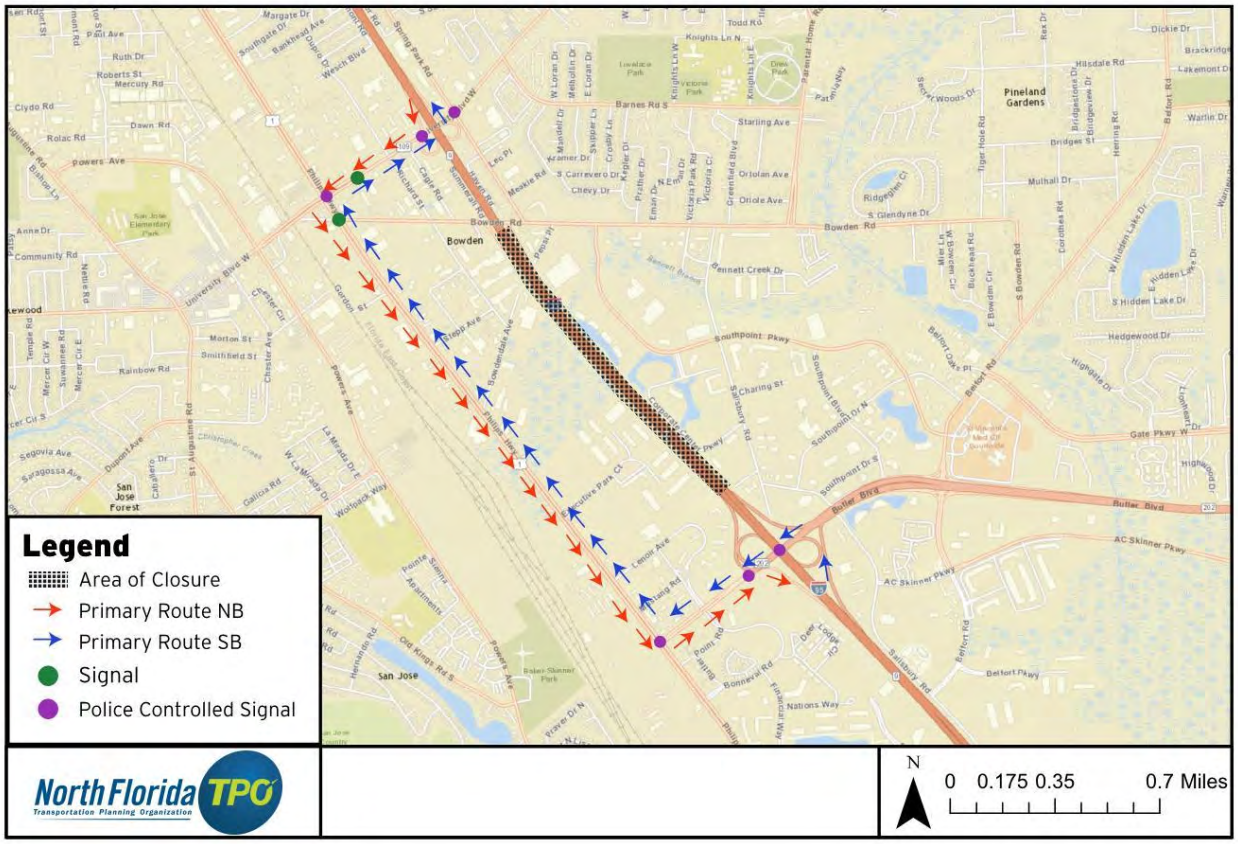


Figure 14. Integrated Corridor Management on I-95/Phillips Highway

7.1.15 Smart Delivery Truck Parking and Availability System

Description: A study completed in 2016 recommended a commercial vehicle management plan that addresses parking, traffic and historic preservation needs in the city of St. Augustine. A comprehensive parking strategy was developed through an extensive planning process including parking inventories, traffic data collection, truck parking occupancy studies, a user's survey, and public workshops.

Implementing the commercial vehicle management plan from the St. Augustine Truck Parking Management Plan is recommended.

Timeframe: Less than one year, depending on when funding is available

Complexity: Complex

Cost: $525,000 to deploy all strategies, $24,200 per year for operations

Objectives Addressed:

- **Improve Travel Time Reliability** – Managing downtown truck parking can reduce instances of double-parking in the street which disrupts the normal flow of traffic. Minimizing it can help with travel time reliability.
- **Reduce Greenhouse Gas Emissions** – Reducing the interruption to downtown traffic flow by managing truck deliveries can reduce greenhouse gas emissions by reducing the time a truck might look for an adequate delivery location. It can further be reduced by minimizing the resulting disruption to the flow of traffic.
- **Grow North Florida** – Improved traffic flow conditions in St. Augustine will make it a more attractive place to work and shop.

Strategy: There are a few different strategies that can be employed to assist with truck parking in St. Augustine.

Implementing Time Restrictions in Loading Zones – This strategy involves using signing and enforcement to provide additional spaces for delivery trucks and larger vehicles during the morning (before 10 a.m.) and reserve some spaces during business hours to meet the needs of truckers who need to stay longer durations until 5 p.m. which is consistent with their peak demand. Consistent with the demand for automobile parking, these spaces would revert to automobile parking when their demand is the greatest. This strategy will also incentivize delivery vehicles and larger trucks to make deliveries during the off-peak periods, providing a more efficient allocation of the limited parking available in the City of St. Augustine. The costs to implement this strategy are $12,500 associated primarily with changes in street signs.

Redesign of Existing Parking Areas – Existing parking lots at Tolomato lot, Spanish Street loading zone, Toques Street loading zone and the Court parking lot will be modified to provide a more flexible configuration to accommodate trucks. The improvements proposed include milling and resurfacing the pavement, new pavement markings and landscaping islands. The total cost is $150,000.

Smart Parking Management Systems – Leveraging intelligent technologies to manage spaces and enforcement will allow the city to be more efficient and ensure a consistent and accurate enforcement program. New payment methods such as pay-by-phone apps will be more convenient for users and provide them greater opportunities to ensure they are compliant with parking restrictions. The costs to implement these technologies are estimated at $350,000.

Restructuring Permits, Fines and Loading Zone Fees – Updating the permits, fines and loading zone fees will incentivize greater compliance and a more equitable distribution of resources. There are no direct

costs associated with implementing these policies, but costs will be associated with administrative time to modify the city ordinance and enforcement.

Truck Routes – Creating a network of streets to access enhanced parking space allocation and management will reduce noise and pavement wear and damage in areas where large trucks are not consistent with historic areas, structures and neighborhoods. Estimated costs are $12,500 for new street signs.

Each strategy can be implemented independently or in combination with other strategies. These costs do not include operations and maintenance costs which are estimated to be $24,200 for the system. These costs do not include administrative and enforcement costs which were not estimated.

A public information campaign is also recommended as part of any implementation to inform and educate the public and commercial vehicle operators of these changes. **Figure 15** shows a map of the proposed truck parking improvements.

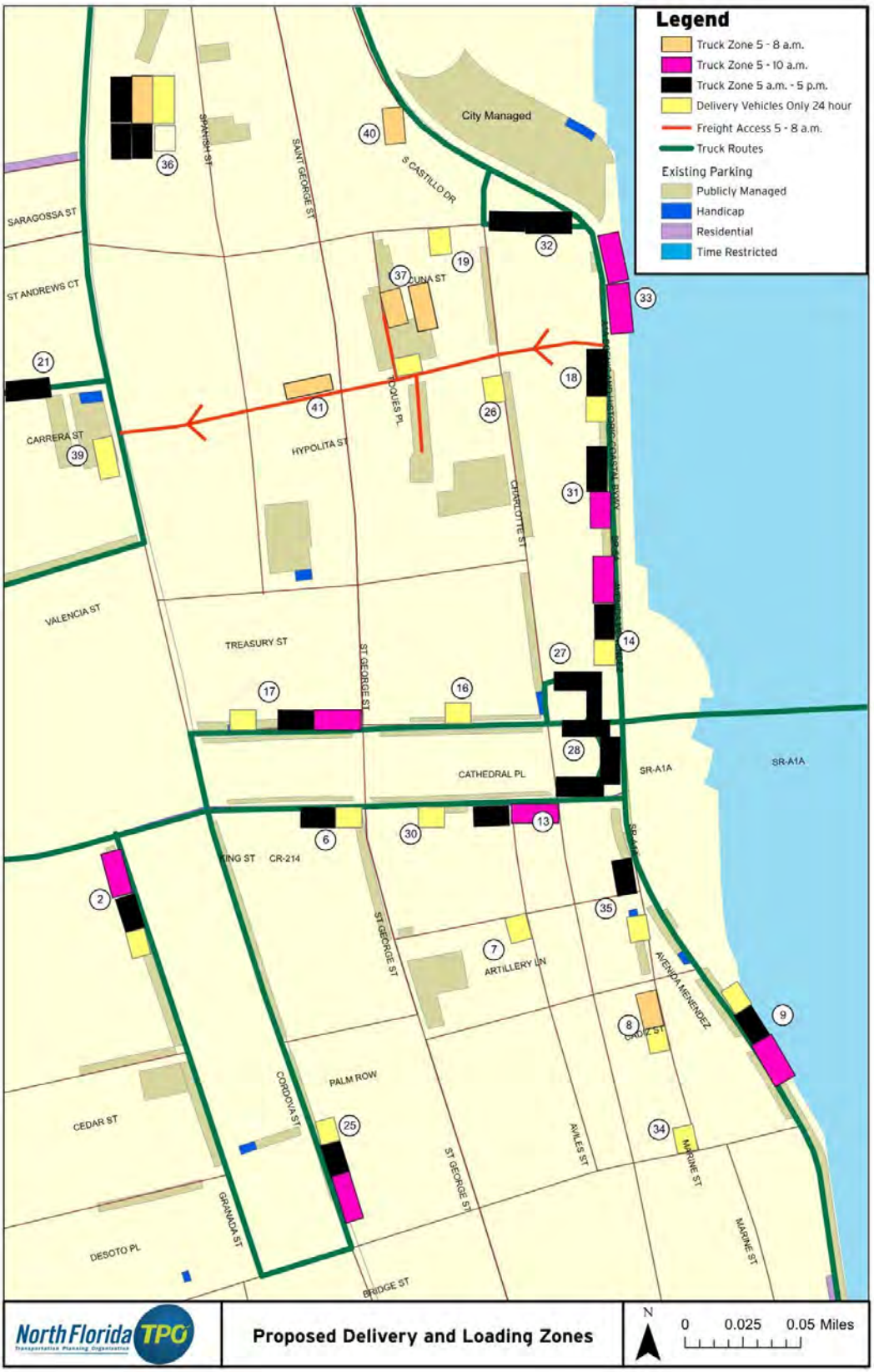


Figure 15. Proposed St. Augustine Truck Parking Improvements

Table 24. Downtown St. Augustine Parking Management and Information System

	**Vehicle** and **Infrastructure Based Data** Sensors and kiosks track the location of open parking spaces.
	**Local/Regional Communications Network** and **Data Management** Data is sent to the parking vendor.
	**Data Integration** and **Distribution** and **Data Analytics** The parking vendor manages the data and sends desired information to the RTMC, which can be used to prioritize future parking projects.
	**Actionable Information** and **Informed Decision** The vendor and the RTMC can disseminate parking information via apps and dynamic signs.

7.1.16 Parking Management and Information System

Description: Assist motorists in finding parking in or near downtown Jacksonville to get to their destination.

Timeframe: One to five years

Complexity: Simple for downtown parking areas but complex in other areas.

Cost: $350,000

Objectives Addressed:

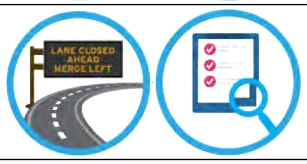
- **Improve Travel Time Reliability** – Advanced knowledge of parking availability can greatly improve travel time reliability for motorists who need to find a place to park in the downtown area.
- **Reduce Greenhouse Gas Emissions** – Motorists can cut down on the distance they drive to find a parking spot when parking availability information is easily attainable.
- **Grow North Florida** – Making parking easier for motorists will attract more businesses downtown.

Strategy: There are a few steps to be completed as part of this project.

1. Coordinate with local parking vendors to integrate their lot occupancy data into a central system.
2. Develop one parking availability dissemination method.
3. Provide a payment system via a smartphone application, parking kiosks or a combination of options.

See **Table 25** for a description of how this project is part of the smart region process.

Table 25. Downtown Jacksonville Parking Management and Information System

	**Vehicle** and **Infrastructure Based Data** Sensors and kiosks track the location of open parking spaces.
	**Local/Regional Communications Network** and **Data Management** Data is sent to the parking vendor.
	**Data Integration** and **Distribution** and **Data Analytics** The parking vendor manages the data and sends desired information to the RTMC, which can be used to prioritize future parking projects.
	**Actionable Information** and **Informed Decision** The vendor and the RTMC can disseminate parking information via apps and dynamic signs.

7.2 ELECTRIFICATION PROJECTS

Introduces amenities that are provided or enhanced with the help of a Smart City foundation.

7.2.1 Smart Street Lighting Upgrades

Description: Replace existing City street lights with LED lighting and potentially add other Smart City applications (WiFi, environmental and sound sensors, etc.).

Timeframe: One to 10 years

Complexity: Simple to install the basic sensors, more complex to integrate it into the RTMC system

Cost:

For LED upgrade only:

- Jacksonville: See Jacksonville lighting replacement plan.
- St. Augustine: $2 million roughly – depends on scope

Costs to add additional sensors to the network will depend on agency priorities. There may be potential savings if the project is procured through a public-private partnership.

Objectives Addressed:

- **Reduce Greenhouse Gas Emissions** Up to 70 percent reduction in energy usage, significantly reduced maintenance
- **Eliminate Fatalities** – Improved lighting and visibility can reduce night crashes and improve public safety. Additional optional sensors such as gunshot triangulation can further increase safety.

Strategy:

Jacksonville:

The City of Jacksonville is replacing street lights from High Pressure Sodium (HPS) bulbs and fixtures to LED bulbs and fixtures. Current rate of replacement is approximately 21,500 lights per year and the anticipated energy use reduction is approximately 50 percent. There is a need to research the details regarding the replacement and determine if additional sensors can be deployed and if the street light system is networked.

Phase 2 of the project, after 10 years, would be to integrate street lights with connected vehicle systems and detectors to change light intensity based on the presence of vehicles, further increasing the cost savings associated with the conversion from HPS to LED. JEA plans to phase in LED replacements over 5 years (21,497 SL's per year).

Table 26. LED Replacement Timeline

Time	HPS	LED	Total SL Count
Streetlight count as of 5/30/16	107,483	6,000	113,483
FY 2017 year-end	85,986	27,497	113,483
FY 2018 year-end	64,490	48,993	113,483
FY 2019 year-end	42,993	70,490	113,483
FY 2020 year-end	21,497	91,986	113,483
FY 2021 year-end	-	113,483	113,483

St. Augustine:

The City of St. Augustine does not currently have an LED replacement plan. The process will require a financial analysis and business model for replacement, followed by procurement.

See **Table 27** for a description of how this project is part of the smart region process.

Table 27. City of St. Augustine Smart Street Lighting Upgrade

	**Vehicle** and **Infrastructure Based Data** Some sensors detect the presence of bicycles, pedestrians, and traffic to turn on lights, while other sensors, such as environmental and sound sensors, collect data to transmit to the RTMC.
	**Local/Regional Communications Network** and **Data Management** Data about on/off times and system malfunctions/maintenance needs are sent via the fiber network to the RTMC (Optional).
	**Data Integration** and **Distribution** and **Data Analytics** RTMC can use the data to mobilize maintenance crews and prioritize projects (Optional).
	**Actionable Information** and **Informed Decision** Maintenance crews are notified of system malfunctions. Depending on sensors equipped, police could be informed of gunshots in the area and other agencies could use additional information.

7.2.2 *Expand Electric Vehicle Network*

Description: Provide new Electric Vehicle (EV) charging stations at key locations around the region.

Timeframe: One to 10 years

Complexity: Simple

Cost: $500,000 for the next phase of the plan (2017) which is currently underway.

Objectives Addressed:

- **Improve Travel Time Reliability** – Numerous charging stations can increase travel time reliability for EVs wanting to charge near their destinations.
- **Reduce Greenhouse Gas Emissions** – Increased access to EV charging stations will reduce the region's dependence on fossil fuels and will increase EV visibility, encouraging increased EV ownership and usage.
- **Grow North Florida** – EV users will be attracted to the region by the number of EV charging stations. With the increased EV population, businesses can consider installing EV charging stations to draw customers which furthers the region's EV-friendliness and ultimately leads to increased EV sales.

Strategy: **Figure 16** shows the existing Jacksonville charging stations**.** Work with the Regional Alternative Fuels master plan, which includes initial vehicle and fueling infrastructure investments for electric vehicle (EV) charging stations, buses, train locomotives, etc.

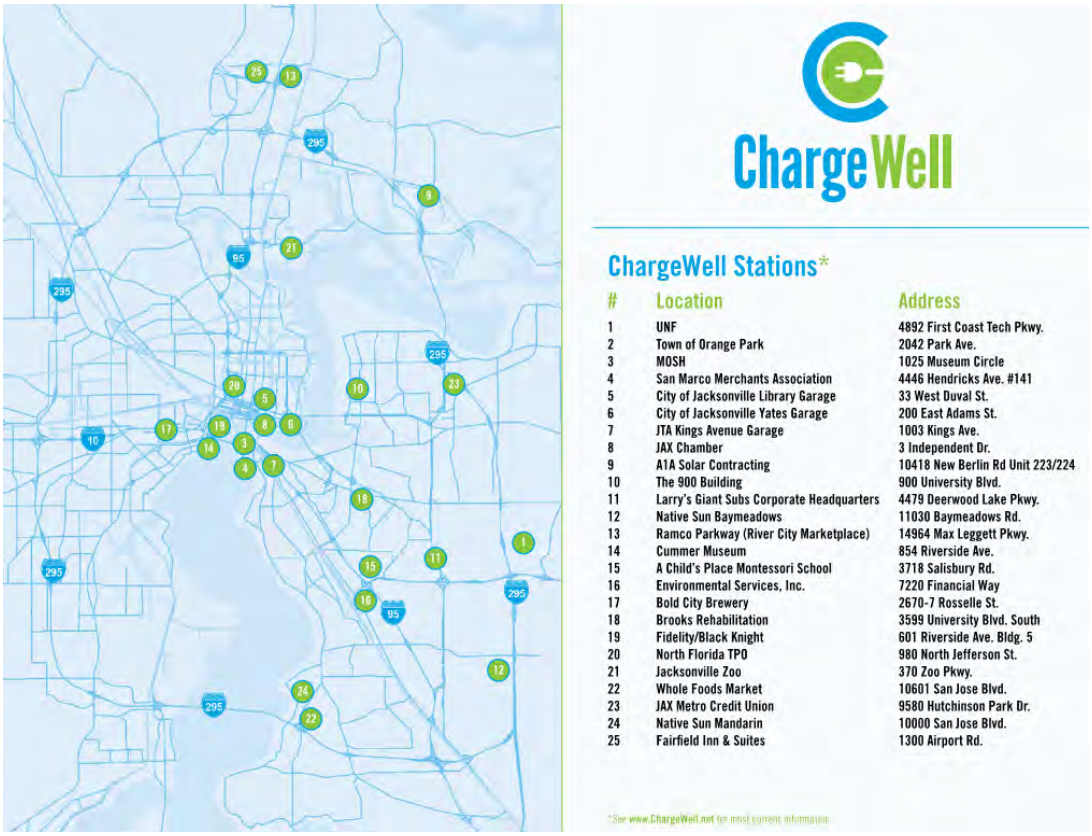


Figure 16. Current Jacksonville Charging Stations

7.2.3 Solar Road Pilot

Description: Install solar panels as part of a parking lot, sidewalk, or road surface to generate electricity.

Timeframe: 10 years

Complexity: Complex

Cost: $500,000 for pilot project and evaluation.

Objectives Addressed:

- **Reduce Greenhouse Gas Emissions** – Use of solar panels to generate electricity can reduce the use of fossil fuels and natural gases.

Strategy: There are currently pilot sites in Idaho, Missouri, the Netherlands and other locations. Based on result of pilot sites, deploy a pilot in the North Florida region at a rest area, parking lot, roadway shoulder, or other isolated location to determine effectiveness of the concept in the area. Perform a study to determine the power generation from the solar panels and the maintenance costs associated with deployment and operations.

Figure 17 shows one example of what a solar road could look like.

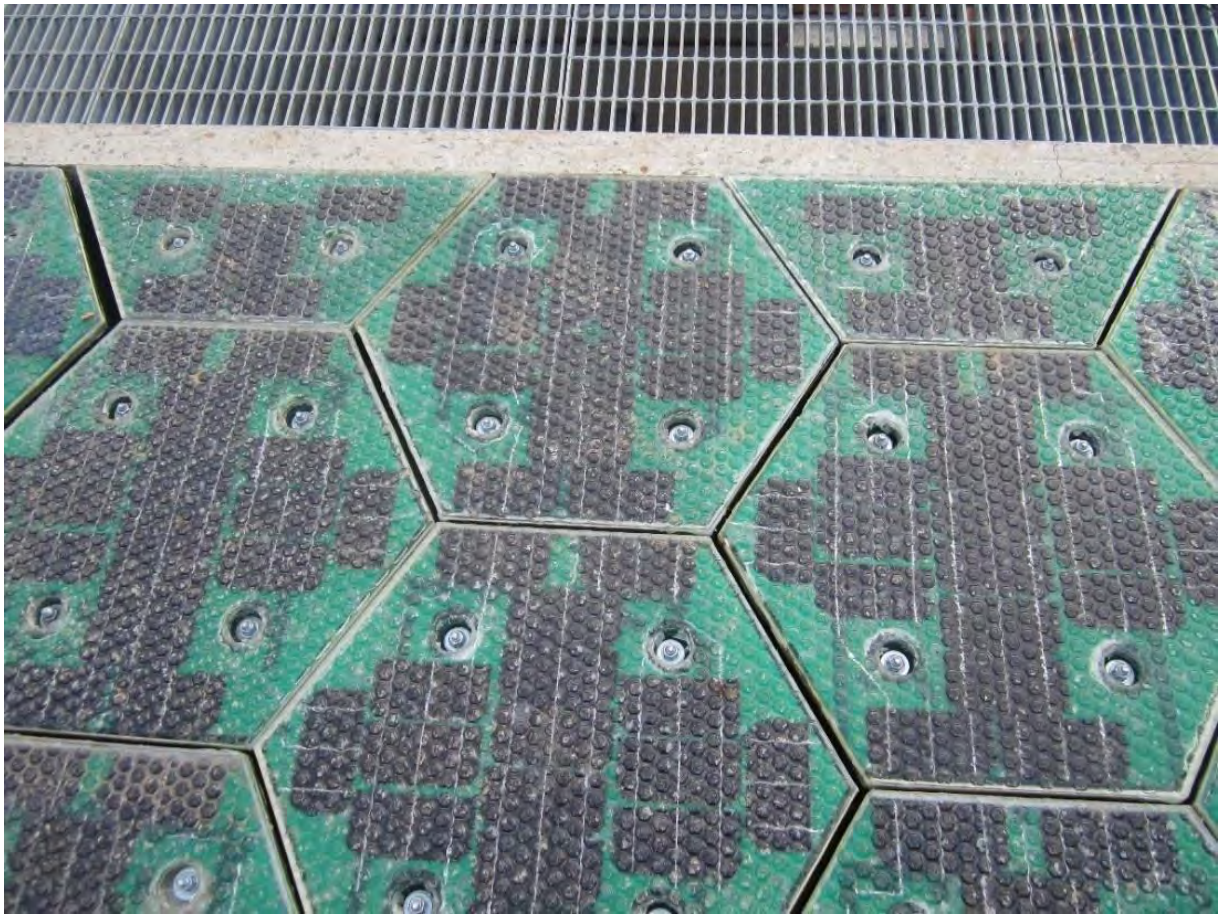


Figure 17. Example of a Solar Road

Source: http://www.bloomberg.com/news/articles/2016-11-24/solar-panel-roads-to-be-built-across-four-continents-next-year

7.2.4 Smart Kiosks

Description: Upgrade existing kiosks in St. Augustine with smart kiosks to dynamically display tourist information as well as smart region information for the area.

Timeframe: One to three years

Complexity: Simple

Cost: $50,000 per kiosk for hardware and installation. $10,000 annually per kiosk for operations and maintenance. O&M and deployment costs can potentially be offset by advertising costs and FDOT would simply be "advertising" on the signs by providing regional travel information as opposed to procuring the kiosks.

Objectives Addressed:

- **Grow North Florida –** This system can be a very visible way to showcase North Florida as a smart region for residents and tourists alike.

Strategy: Replace current informational kiosks with interactive smart kiosks**. Figure 18** provides a comparison between the current St. Augustine Directory and an example of what a smart kiosk could look like.

Figure 18. Current St. Augustine Directory Kiosk (left) and Example of a Smart Kiosk (right)

7.3 SERVICES PROJECTS

Provides services that are achieved and enhanced with the help of a Smart Region foundation.

7.3.1 Ultimate Urban Circulator (U^2C) Expansion

Description: Modernize the Skyway per Jacksonville Transportation Authority's U^2C plan, which will utilize autonomous vehicle technology to revamp and expand upon the existing Skyway coverage area.

Timeframe: 10 years

Complexity: Complex

Cost: See Jacksonville Transportation Authority's U^2C Plan

Objectives Addressed:

- **Improve Travel Time Reliability** – drawing users to the Automated Skyway Express would reduce traffic demand in the downtown corridor, reduce congestion and help create more reliable travel times. With an improved system, the stadium could be used as additional parking with shuttles traveling between stadium parking and downtown during downtown events. The reverse could occur during events at the stadium.
- **Reduce Greenhouse Gas Emissions** – system users could either stop using personal vehicles downtown or park their vehicles and use the public transit system to go between destinations. This will reduce greenhouse gas emissions by reducing vehicle trips.
- **Provide Ladders of Opportunity** – enhanced public transit provides better mobility for transit-dependent riders, giving them access to more businesses and healthcare options.
- **Grow North Florida –** EAV shuttles running on the fixed guideway would have enhanced visibility, and a dedicated path will draw users in and help to create a more walkable downtown. Additionally, the transit system would grow downtown businesses by supporting pre-event activities.

Strategy: Revamp and expand the existing Skyway to create the backbone for a larger autonomous urban circulator system and replace the current monorail vehicles with more modernized vehicles. As of February 2017, the System Expansion Actions included the following:

- Phase 1A: Brooklyn Extension
  - Prepare package – TIGER Grant, other, etc.
- Phase 1: Five Points to Sports Complex
  - PD&E Study
- Bay Street Corridor Development Plan
- Corridor preservation
- Rosa Parks Repurpose Plan
- Operational enhancements

7.3.2 Electronic Autonomous Vehicle (EAV) Shuttles

Six proposed EAV Circulator Shuttles are proposed for the North Florida Region:

- Mayo Clinic EAV Circulator
- St. John's Town Center EAV Circulator
- University of North Florida EAV Circulator
- Inter-Campus EAV Circulator
- St. Augustine EAV Circulator
- Naval Air Station Jacksonville EAV Circulator

These will be discussed in further detail in the following sections. Costs are preliminary due to the rapidly changing nature of EAV shuttle availability and pricing.

7.3.3 MAYO CLINIC EAV CIRCULATOR

Description: Provide shuttles between buildings on the Mayo Clinic campus. Vehicle costs are likely to change significantly over the coming 5-10 years as the technologies for EAV batteries and collision avoidance systems mature and become more mainstream.

Timeframe: Two years

Complexity: Complex

Cost: $100,000 per shuttle per year to lease and operate. Costs could be offset by advertising on the shuttle and a reduction in current shuttle operating costs. $250,000 for a facility to store, maintain and charge the shuttles (could use an existing facility if one already exists).

Objectives Addressed:

- **Improve Travel Time Reliability** – Relieves traffic congestion within the campus and cuts down on the amount of time it takes to find a parking spot.
- **Reduce Greenhouse Gas Emissions** – Reducing the number of vehicles driving through the campus or looking for parking will reduce greenhouse gas emissions from the vehicles.

Strategy: EAV shuttles could travel between the different buildings on the campus and out to remote parking facilities. This would provide access for doctors, patients and visitors. **Figure 19** shows an example of what an EAV shuttle could look like.

Figure 19. EAV Shuttle at Night

7.3.4 St. John's Town Center EAV Circulator

Description: Provide shuttles to circulate between St. John's Town Center and satellite parking lots to relieve parking congestion and improve circulation near the main shopping center.

Timeframe: 10 years

Complexity: Complex

Cost: $100,000 per shuttle per year to lease and operate. Costs could be offset by advertising on the shuttle and a reduction in current shuttle operating costs. $250,000 for a facility to store, maintain and charge the shuttles (could use an existing facility if one already exists). Vehicle costs likely to change significantly over the coming 5-10 years as the technologies for EAV batteries and collision avoidance systems mature and become more mainstream.

Objectives Addressed:

- **Improve Travel Time Reliability** – Relieves traffic congestion within the center and reduces the time it takes to find a parking spot.
- **Reduce Greenhouse Gas Emissions** – Reducing the number of vehicles driving through St. John's Town Center will reduce greenhouse gas emissions, particularly from vehicles
- **Provide Ladders of Opportunity** – Transit-dependent riders can take the bus to St. Johns Town Center today but must walk from the bus stop into the center. Providing a shuttle service from the bus stop can help transit-dependent riders get to work or to shop.
- **Grow North Florida** – The shuttle provides better access to shopping and jobs which helps to grow North Florida.

Strategy: The shopping shuttle is designed to move people between the stores within the shopping center, and the parking shuttle is designed to move people between satellite parking locations and the shopping center. **Figure 20** shows an example of what an EAV shuttle could look like. **Figure 21** provides two proposed EAV shuttle circulation routes.

Figure 20. EAV Shuttle in Daylight

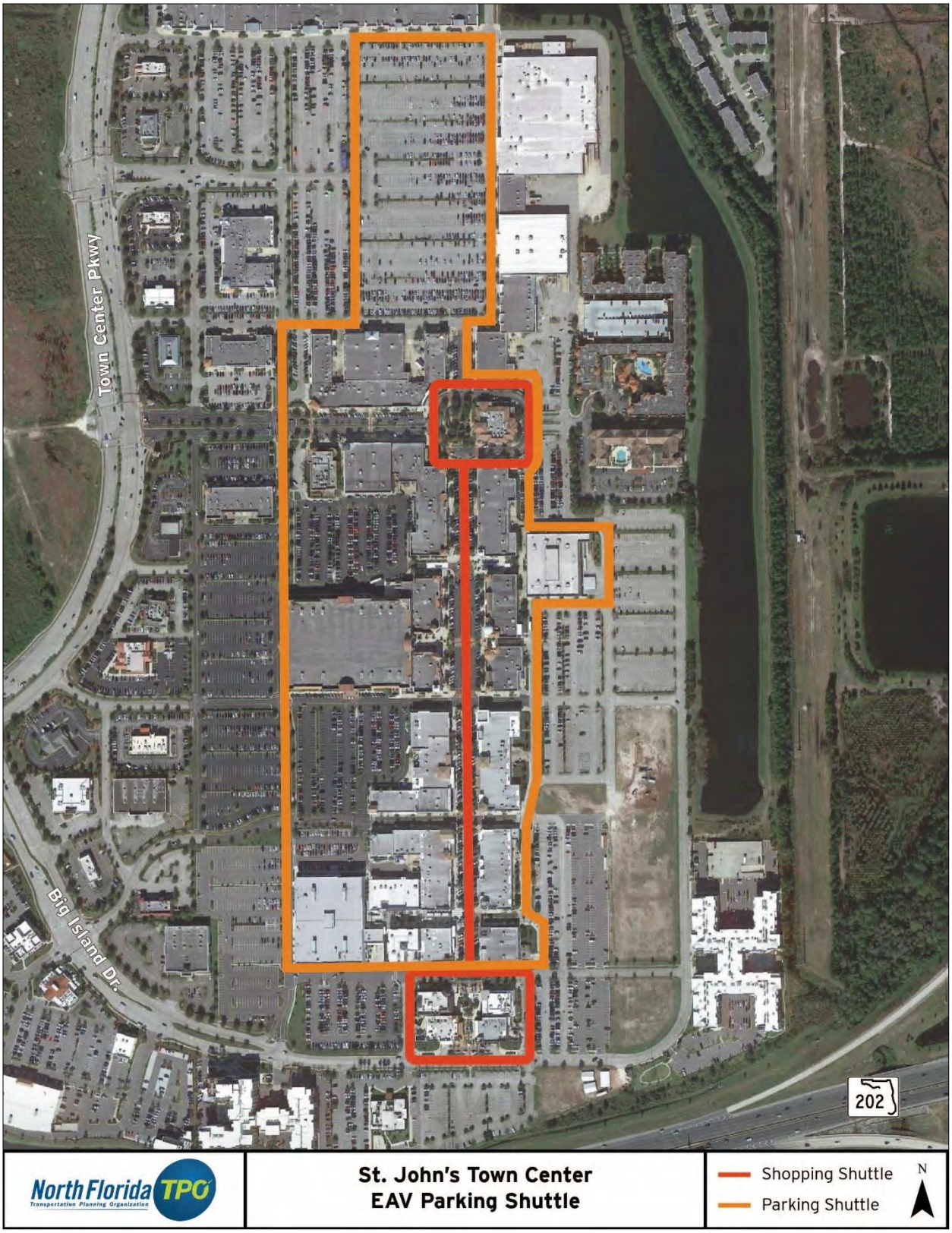


Figure 21. St. John's Town Center Shuttle

7.3.5 University of North Florida EAV Circulator

Description: Provide an EAV shuttle circulator system between the University of North Florida campus and satellite parking lots.

Timeframe: 10 years

Complexity: Complex

Cost: $100,000 per shuttle per year to lease and operate. Costs could be offset by advertising on the shuttle and current shuttle operating costs. $250,000 for a facility to store, maintain and charge the shuttles (could use an existing facility if one already exists). Vehicle costs likely to change significantly over the coming five to 10 years as the technologies for EAV batteries and collision avoidance systems mature and become more mainstream.

Objectives Addressed:

- **Reduce Greenhouse Gas Emissions** – Create a more walkable campus for the University of North Florida, resulting in fewer emissions and reduced need for parking space.

Strategy: Conduct a study to determine the best routing for a circulator system and technology availability and necessary support infrastructure. In the future this service may also extend to provide access to St. John's Town Center. **Figure 22** shows two phases of a proposed EAV shuttle service. Phase 1 is intended to move students between lot 16 and the northwest side of campus, while phase 2 is intended to replace the current shuttle service between lot 65, lot 16, and the east side of campus.

Figure 22. University of North Florida Campus Map

7.3.6 Inter-Campus EAV Circulator

Description: Provide an EAV shuttle circulator system between the University of North Florida and Florida State College at Jacksonville Southside campus.

Timeframe: 10 years

Complexity: Complex

Cost: $100,000 per shuttle per year to lease and operate. Costs could be offset by advertising on the shuttle and a reduction in current shuttle operating costs. $250,000 for a facility to store, maintain and charge the shuttles (could use an existing facility if one already exists). Vehicle costs likely to change significantly over the coming five to 10 years as the technologies for EAV batteries and collision avoidance systems mature and become more mainstream.

Objectives Addressed:

- **Reduce Greenhouse Gas Emissions** – Create a more walkable campus for the two campuses by providing an inter-campus circulator.

Strategy: Conduct a study to determine the best routing for a circulator system and technology availability and necessary support infrastructure. **Figure 23** shows the potential connection route.

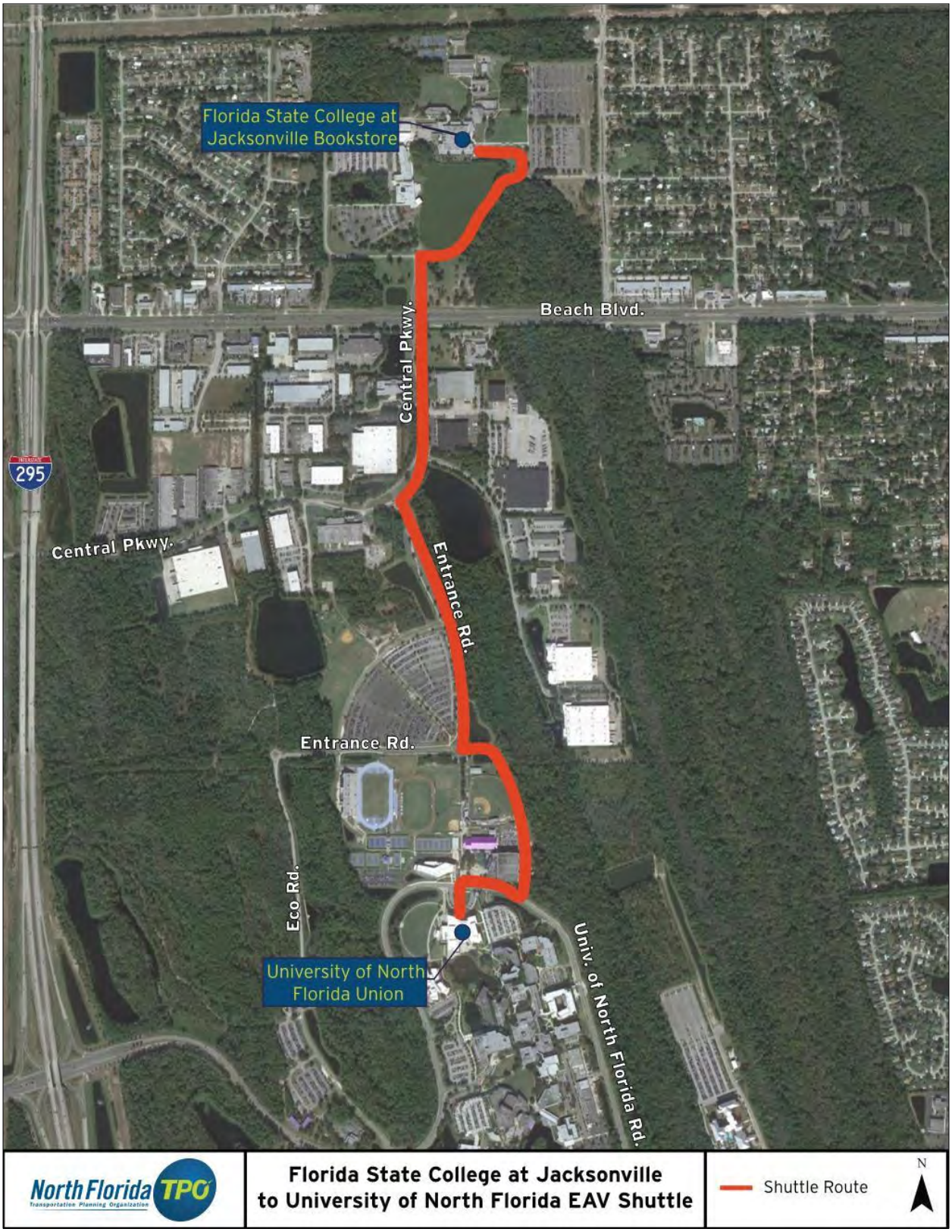


Figure 23. Inter-Campus EAV Circulator Route

7.3.7 St. Augustine EAV Circulator

Description: Provide shuttles from satellite parking facilities to downtown St. Augustine.

Timeframe: 10 years

Complexity: Complex

Cost: $100,000 per shuttle per year to lease and operate. Costs could be offset by advertising on the shuttle and current shuttle operating costs. $250,000 for a facility to store, maintain and charge the shuttles (could use an existing facility if one already exists). Vehicle costs likely to change significantly over the coming five to 10 years as the technologies for EAV batteries and collision avoidance systems mature and become more mainstream.

Objectives Addressed:

- **Improve Travel Time Reliability** – Relieves traffic congestion within the center and reduces the time it takes to find a parking spot.
- **Reduce Greenhouse Gas Emissions** – Reducing the number of vehicles driving through St. Augustine will reduce greenhouse gas emissions.
- **Provide Ladders of Opportunity** – A shuttle service can help transit-dependent riders get from place to place once they're in St. Augustine.
- **Grow North Florida** – The shuttle provides better access to shopping and jobs which helps to grow North Florida.

Strategy: EAVs would travel between the satellite parking facilities and downtown. This project could work with the Smart Kiosks project for providing need to identify technology, shuttle providers and necessary infrastructure. **Figure 24** shows an example of what the EAV Shuttle could look like. **Figure 25** shows the potential shuttle route which moves people along Cordova Street between the existing historic downtown parking facility, the downtown area and the proposed parking facility south of the Lightner Museum.

Figure 24. EAV Shuttle with Doors Open

Figure 25. St. Augustine EAV Shuttle Route

7.3.8 Naval Air Station Jacksonville EAV Circulator

Description: Electric Autonomous Vehicle shuttle circulator system

Timeframe: 10 years

Complexity: Complex

Cost: $100,000 per shuttle per year to lease and operate. Costs could be offset by advertising on the shuttle and reducing current shuttle operating costs. $250,000 for a facility to store, maintain and charge the shuttles (could use an existing facility if one already exists). Vehicle costs likely to change significantly over the coming five to 10 years as the technologies for EAV batteries and collision avoidance systems mature and become more mainstream.

Objectives Addressed:

- **Reduce Greenhouse Gas Emissions** – A shuttle service around the air station will reduce the need for vehicles driving around the station.
- **Improve Transit Service Reliability** – Currently when the Jacksonville Transportation Authority enters the gates of NAS Jacksonville, the bus is treated just like any other vehicle entering the base and must pass the security credential requirements. This security check results in less efficient routing of the Jacksonville Transportation Authority buses along the US 17 Roosevelt Boulevard corridor. Using the circulator for internal purposes will allow Jacksonville Transportation Authority passengers to be picked up and dropped off at a location outside the gate or near the gate at the transfer station near the Yorktown Gate.

Strategy: Conduct a study to determine the best routing for a circulator system, technology availability, and necessary support infrastructure. **Figure 26** shows an example of what an EAV Shuttle could look like, and **Figure 27** shows a proposed route for circulation.

Figure 26. Example of an EAV Shuttle

Figure 27. NAS Jacksonville Proposed Route

7.3.9 AV Smart Parking Lot

Description: Provide dedicated parking lots for AVs, which require less space to park.

Timeframe: Five to 10 years

Complexity: Simple

Cost: $50,000 to restripe an existing parking lot and provide access control to ensure only properly equipped vehicles have access.

Objectives Addressed:

- **Grow North Florida** – Relieves traffic congestion downtown, promotes walkability, reduces the need for parking space in prime downtown locations, and reduces operating costs (no driver needed).

Strategy: Promote the use of AVs by providing dedicated parking lots as a pilot project. Place AV parking lot on an AV parking shuttle route. AVs would travel between the satellite parking facilities and downtown. An ideal location for the AV lot would be near the EV station at St. John's Town Center.

Figure 28. Example of a Smart Parking Lot
Source: http://images.blog.autoshopper.com/4119_fordselfpark_02.jpg

7.3.10 Intermodal Container Transfer Facility (ICTF) Connector for Trucks

Description: Automated vehicle deployment to transfer containers from the Dames Point terminals to the ICTF.

Timeframe: Five to 10 years

Complexity: Complex

Cost: $500,000 for 5 automated container shuttles. $500,000 per year for shuttle operations and maintenance. $250,000 for a storage, maintenance and charging infrastructure for the container shuttles.

Objectives Addressed:

- **Improve Travel Time Reliability** – Connector would improve travel time reliability for the ports by creating a direct access point for them.
- **Reduce Greenhouse Gas Emissions** – A shorter route between the port and the ICTF would reduce greenhouse gas emissions by reducing the per-trip distance to travel.
- **Grow North Florida** – This connector would make the port more attractive by lowering prices needed to transfer goods, resulting in more capacity and more business for North Florida.

Strategy: Create secure roadway link under East Beltway I-295 on Dames Point Road between the Dames Point Terminals and ICTF to avoid gate inspections and reduce travel times. **Figure 29** shows where the connector would be located.

Figure 29. Proposed Intermodal Container Transfer Facility Connector

7.3.11 Special Event Traffic Management System

Description: Use temporary traffic control devices and smartphone applications to help control congestion during major events around the North Florida region.

Timeframe: Five to 10 years

Complexity: Simple and complex

Cost: $500,000 for 10 trailers that include video cameras, BlueTOAD readers, DSRC radios and other sensors to collect transportation data. $20,000 per year for operations and maintenance, $100,000 to integrate into traveler information system and regional transportation management center.

Objectives Addressed:

1. **Improve Travel Time Reliability** – Users can make informed decisions and take advantage of alternate routes to more efficiently transport to and from special events
2. **Reduce Greenhouse Gas Emissions** – Managing traffic flow in and out of special events helps reduce congestion which in turn reduces greenhouse gas emissions.

Strategy: Develop and maintain a stock of temporary traffic control devices that can be deployed at certain events throughout the year. Provide routing information via 511 and third-party app developers. Major events may include:

- **Jacksonville:**
  - Jaguars games
  - Florida vs. Georgia game
  - County Fair
  - TaxSlayer Bowl
  - Monster Truck Rally
  - Jazz Fest
  - St. John's Town Center Black Friday
  - Ham Jam
  - DONNA National Breast Cancer Marathon
- **St. Augustine**:
  - Nights of Lights
  - Easter
  - Spring Break
  - Music Festivals
- **Ponte Vedra Beach:**
  - The Players Championship
- **Fernandina Beach**:
  - Shrimp Festival
  - Blessing of the Fleet

7.3.12 Smart Card for Multiple Uses

Description: Assist cash-based citizens by providing one payment system for multiple uses such as parking payment, transit rides, mobility as a service rides and car sharing.

Timeframe: 10 years

Complexity: Complex

Cost: $2 million to develop, design, and deploy the smart card system, $300,000 per year for operations and maintenance. These costs are based on the Columbus Smart City Proposal.

Objectives Addressed:

- **Provide Ladders of Opportunity** – The smart card is intended to connect more users to different modes of transportation, which can increase mobility for transit-dependent users.

Strategy: Work through SunPass to provide multi-use passes that are compatible with various systems as described above. This requires installing readers for multiple services capable of accepting the smart card as well as a central data management system that can manage the smart card transactions. Additionally, kiosks could be placed at convenient locations around the region to allow cash-based citizens to add funds to smart cards.

7.3.13 Mobility as a Service FMLM Partnership

Description: Provide connections between homes, destinations, and transit stops with a First Mile/Last Mile (FMLM) partnership. Subsidizing services such as Lyft or Uber is cheaper than running buses.

Timeframe: One to three years

Complexity: Simple

Cost: Varies depending on agency priorities, partnerships and procurement methods. For instance, a public-private partnership may help offset the cost of the services.

Objectives Addressed:

- **Reduce Greenhouse Gas Emissions** – Connecting transit users with first mile/last mile service can draw more users by expanding the reach of transit systems. This will result in more transit riders and reduced greenhouse gas emissions.
- **Provide Ladders of Opportunity** – Provide improved quality of life and fully connect transit-dependent riders to jobs and health care.
- **Grow North Florida** – This partnership would provide more business for the car sharing service and would also connect more people to jobs and commerce.

Strategy: Partner with a group such as Uber or Lyft to provide FMLM transportation to transit-dependent riders.

7.3.14 Car Sharing Incentives for Low Income Neighborhoods

Description: Provide coordinated car sharing services to low-income neighborhoods.

Timeframe: One to five years

Complexity: Complex

Cost: Varies depending on agency priorities, partnerships and procurement methods. For instance, a public-private partnership may help offset the cost of services.

Objectives Addressed:

- **Provide Ladders of Opportunity** – Increased quality of life for transit-dependent riders in low-income neighborhoods.
- **Grow North Florida** – implementing a car sharing program can grow North Florida not only by providing enhanced mobility to transit-dependent riders, but also by bringing in the business that administers the car sharing program.

Strategy: Leverage Jacksonville Transportation Authority's grant and other policy initiatives to incentivize car sharing services located in low-income neighborhoods. This will require a combination of working with car sharing companies and payment systems to allow low-income and cash-based users to use the car sharing programs.

7.3.15 First Mile/Last Mile (FMLM) Connectors in Special Neighborhoods

Description: Provide connections between homes and transit stops with FMLM partnerships.

Timeframe: One to 10 years

Complexity: Simple and complex

Cost: Varies depending on agency priorities, partnerships and procurement methods. For instance, a public-private partnership may help offset the cost of installing services.

Objectives Addressed:

- **Provide Ladders of Opportunity** – Increased quality of life for transit-dependent riders in low-income neighborhoods
- **Grow North Florida** – Provide improved quality of life and fully connect transit-dependent riders to jobs

Strategy: Partner with mobility as a service companies, bike and car sharing services, and AV shuttle services. **Figure 30** shows an example of what a bike share station could look like.

Figure 30. Example of a Bike Share Station
Source: http://blogs-images.forbes.com/amywestervelt/files/2011/08/Blue_bstation.jpg

7.4 Data Management System Projects

Focuses on Local/Regional Communications Network, Data Management, Data Integration & Distribution, Data Analytics, Actionable Information, and Informed Decision components to the Smart City Building Blocks. The data management system advances a city with smart elements into a truly Smart City.

7.4.1 Upgrade Regional Fiber

Description: Connect intersections throughout Jacksonville to the RTMC.

Timeframe: One to three years

Complexity: Simple

Cost: $10-12 million, based on costs in the C2JAX Proposal. Costs will vary depending on corridor length and construction complexity.

Objectives Addressed: This infrastructure project supports the functionality of all other projects by providing communications between sensors, the RTMC, and dissemination methods such as dynamic message signs and DSRC radios. While many projects could function without communications to the RTMC, this connection greatly increases the impact of the projects and it's what makes a smart region smart. **Figure 31** highlights the applicable Smart City Building Blocks.

Strategy: Inventory the current fiber network, prioritize gaps to connect, and install fiber optic cable. The existing and proposed fiber network can be found in ***Path Forward 2040.*** Many fiber jobs can be done in concurrence with road jobs.

Figure 31. Local/Regional Communications Network

7.4.2 North Florida Integrated Transportation Data Exchange

Description: Integrate all types of transportation data.

Timeframe: One to three years

Complexity: Simple

Cost: $750,000 to $1.5 million development and design cost, with $150,000 per year for operations and maintenance.

Objectives Addressed: This infrastructure project supports the functionality of all other projects by providing a central location for all transportation-related data to reside and support third party access. While many projects could function without this central data location, the exchange greatly increases the impact of the projects and it's what makes a smart region smart. **Figure 32** highlights the applicable Smart City Building Blocks.

Strategy: Information from multiple transportation sources are brought together on one central server which can be accessed by authorized parties. From there, select information may be broadcast to third parties to use in creating applications for end users.

Figure 32. Data Management

7.4.3 Enhanced Interagency Data Sharing System

Description: Integrate transportation data with human services and health care data

Timeframe: Five to 10 years

Complexity: Complex

Cost: $750,000 to $1.5 million development and design cost, with $50,000 per year for operations and maintenance in addition to the previously noted $150,000 per year operations and maintenance cost for the Integrated Transportation Data Exchange, since this project would build upon the work completed in the previous project.

Objectives Addressed: This infrastructure project supports the functionality of all other projects by providing a central location for all data to reside which can be accessed by other non-transportation-related groups such as emergency dispatch. While many of the projects could function without this central data location, the exchange greatly increases the impact of the projects and it's what makes a smart region smart. **Figure 33** highlights the applicable Smart City Building Blocks.

Strategy: The recommended regional data policy task force will need to work through the logistics of an enhanced interagency data sharing system. The end goal is that information from multiple sources are brought together on one central server which can be accessed by authorized parties. From there, select information may be broadcast to third parties to use in creating applications for end users.

Figure 33. Data Integration and Distribution

7.4.4 North Florida Region Traffic Application and Total Trip Planner

Description: Provide information via a smartphone application regarding traveler information, queue warning, evacuation travel times, shelter/hotel availability in case of evacuation, and dynamic rerouting around incidents or other congestion.

Timeframe: One to 10 years

Complexity: Simple and Complex

Cost: $250,000 for app development and/or updates

Objectives Addressed: This infrastructure project supports the functionality of all other projects by providing a central data dissemination location where anyone can look to find transportation-related information. While many of the projects could function without this application, the application greatly increases the impact of the projects and it's what makes a smart region smart. **Figure 34** highlights the applicable Smart City Building Blocks.

Strategy: Adapt the current 511 system to utilize enhanced data sets and functionality. Additionally, provide real-time smart region information to third-party app developers.

Figure 34. Data Analytics, Actionable Information, and Informed Decision

8 Next Steps

This document has included a description of what a Smart Region is, defined the needs of the region, provided some policy task force guidance, and provided a list of recommended projects. The recommended next steps are as follows:

1. Develop and refine the three task forces listed in **Section 6.**
2. Identify funding sources and prioritize the projects.
3. Begin to build the data management system components. This will include development of a concept of operations and drafting of data sharing agreements. It is intended that the Regional Data Policy Task Force be the driving force for this step.
4. Move forward with a few early winner projects, such as the Baptist Hospital Rail Crossing Alert System. The projects can be selected based on funding availability and agency priorities.
5. Move forward with the rest of the projects as funding and agency priorities permit.