




# FASTLANE GRANT 2016 APPLICATION

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**GRANT REQUEST:** $11.5M
**GRANT TYPE:** Minor Project, Predominantly Rural

FDOT

FLP Office of Freight, Logistics and Passenger Operations

TSM&O Transportation Systems Management & Operations
*Managing and Operating for an Efficient Transportation System*

NSFHP FASTLANE | GRANT 2016

| PROJECT NAME: TRUCK PARKING AVAILABILITY SYSTEM (TPAS) | |
|---|---|
| Previously Incurred Project Cost | $2,454,300 |
| Future Eligible Project Cost | $21,651,562 |
| Total Project Cost | $23,983,850 |
| NSFHP Request | $11,529,600 |
| Total Federal Funding (including NSFHP) | $12,529,600 |
| Are matching funds restricted to a specific project component? If so, which one? | No |
| Is the project or a portion of the project currently located on National Highway Freight Network | Yes |
| Is the project or a portion of the project located on the National Highway System?<br>• Does the project add capacity to the Interstate system?<br>• Is the project in a national scenic area? | Yes<br>No<br>No |
| Do the project components include a railway-highway grade crossing or grade separation project? | No |
| Do the project components include an intermodal or freight rail project, or freight project within the boundaries of a public or private freight rail, water (including ports), or intermodal facility? | No |
| If answered yes to either of the two component questions above, how much of requested NSFHP funds will be spent on each of these projects components? | N/A |
| State(s) in which project is located | Florida |
| Small or large project | Small |
| Also submitting an application to TIGER for this project? | No |
| Urbanized Area in which project is located, if applicable | Predominantly Rural |
| Population of Urbanized Area | N/A |
| Is the project currently programmed in the:<br>• TIP<br>• STIP<br>• MPO Long Range Transportation Plan<br>• State Long Range Transportation Plan<br>• State Freight Plan | <br>Yes<br>STIP and State Freight Plan |

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# 1. PROJECT DESCRIPTION

## INTRODUCTION

Truck parking shortages are a national safety concern. The results of insufficient or underutilized truck parking spaces can have negative social and economic impacts. Due to the lack of truck parking availability information and lack of safe and convenient truck parking spaces, tired truck drivers may continue to drive while searching for a place to park and rest, resulting in fatigue associated crashes. Additionally, truck drivers may park at unsafe locations such as on the shoulders of roads or ramps or in vacate lots, causing safety related issues.

**This project will deploy a Truck Parking Availability System (TPAS) on 74 public facilities within the State of Florida, covering the entire Florida Interstate system including a significant portion of the National Highway Freight Network within Florida.**

The need for truck parking is a nationally recognized problem that is addressed in the *National Freight Strategic Plan*. In response to the requirements of MAP-21 Section 1401 (Jason's Law), this project will deploy a Truck Parking Availability System (TPAS) on 74 public facilities within the State of Florida, covering the entire Florida Interstate system including a significant portion of the National Highway Freight Network within Florida. The system will provide real-time truck parking availability information to the truck drivers to make informed decision on safe and efficient truck parking spaces. The project builds upon the ongoing nationwide efforts such as the recent Mid America Association of State Transportation Officials (MAASTO) grant to deploy a similar system in ten other states and will ensure interoperability of the system for dissemination of information to the commercial vehicle operators as well as third-party information providers.

## BACKGROUND

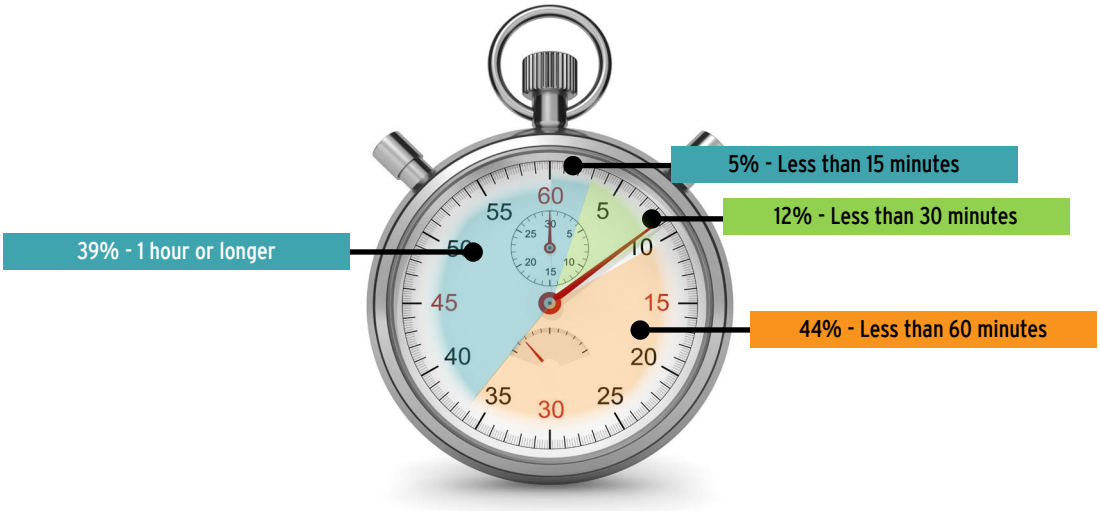
According to the 2012 research study conducted by Florida International University (FIU), Florida experiences overflow parking at rest areas while others remain underutilized indicating the need for improved truck parking information management. See supporting documentation for the report.

**In October 2013, a survey of nearly 4,000 truck drivers revealed that eighty-three percent (83%) of the respondents routinely took longer than 30 minutes to find parking.**

In October 2013, a survey of nearly 4,000 truck drivers revealed that eighty-three percent (83%) of the respondents routinely took longer than 30 minutes to find parking; thirty-nine percent (39%) took longer than one hour[1]. Due to this, several truck drivers resort to unsafe and illegal methods of parking on Interstate mainline shoulders, on the ramps or in vacant lots. As a result of the lack of identifiable parking locations, truck drivers nearing the end of their allotted Hours of Service (HOS) are nearing fatigue limits, presenting a public safety hazard. Finally, non-necessary driving increases environmental and community impacts through increased emissions and congestion of the roadways. To address these issues, Florida Department of Transportation (FDOT) has developed a plan to deploy TPAS and meet the goals and objectives outlined in MAP-21, the National Strategic Freight Plan, and the Florida Freight Mobility and Trade Plan.

[1] *2013 Safe Truck Parking Survey PowerPoint by Desiree Wood, Hope Rivenburg, and Andrew Warcaba Associates*

**FIGURE 1. 2013 TRUCK DRIVER PARKING SURVEY RESULTS**



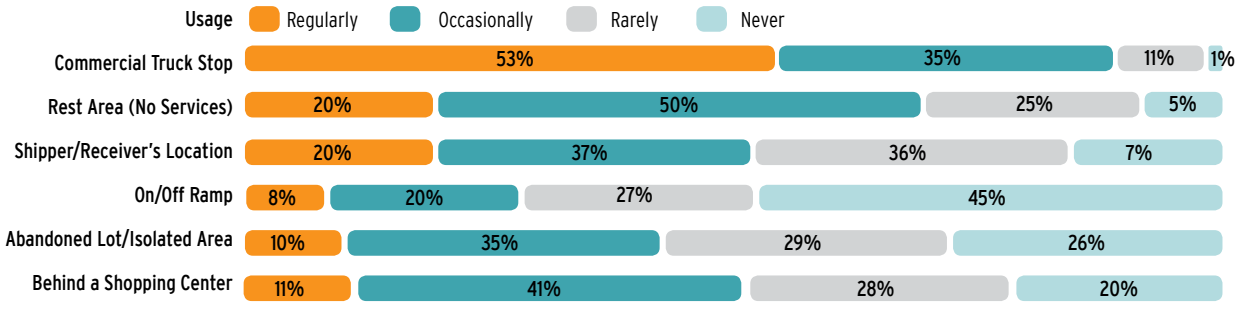

*Source: Modified from 2013 Safe Truck Parking Survey PowerPoint by Desiree Wood, Hope Riveburg, and Andrew Warcaba Associates*

The Federal Motor Carrier Safety Administration (FMCSA) regulates Hours of Service (HOS) for truck drivers and mandates their rest periods. FMCSA requires truck drivers rest for at least 10 hours per day after every 14-hour shift or risk fines and disciplinary action. However, the truck drivers face two main issues in their trips:

- Lack of safe and convenient parking options
- Lack of real-time information regarding parking availability and way-finding

The seriousness of this situation was addressed in Section 1401 of MAP-21, referred to as "Jason's Law." In 2009, commercial truck driver Jason Rivenburg sought a safe spot to rest before delivering a load of milk early the next morning. Tragically, Jason's unfamiliarity with parking options nearby led him to park at an abandoned gas station, where he was murdered. Jason left behind a young son and a wife pregnant with twins. As a result of this incident, Jason's wife championed "Jason's Law," which moves solving the truck parking crisis from an industry issue to a national issue, expanding eligibility for states to use federal highway funds for truck parking projects. **Figure 2** provides information about typical location usage by truck drivers.

**FIGURE 2. PARKING LOCATION USE**




*Source: Modified from 2013 Safe Truck Parking Survey PowerPoint by Desiree Wood, Hope Riveburg, and Andrew Warcaba Associates.*

## WHY TPAS?

The National Freight Advisory committee recognizes Intelligent Transportation System (ITS) as a viable alternative to solve the truck parking issues and cited fatigue prevention as a means to improve the safety of the truck drivers[2].

Building additional parking spaces is a capital intensive process and does not optimize the use of existing public and private parking systems. Therefore, Florida developed this project that involves deployment of Intelligent Transportation Systems (ITS) for the 74 public facilities along I-4, I-10, I-75, I-95, and I-275. This project will efficiently manage truck parking information and dissemination of real-time parking availability information to truckers to make informed decision during or prior to making their trips. Going beyond public sector parking space availability, a high-level discussion is ongoing to establish formal regional partnership with the private truck stops via third party involvement to receive truck parking availability information from private truck stops and disseminate parking availability information to the truck drivers via road-side signs, on-board equipment, the Florida 511 website, and smartphone applications.

## PROJECT'S REGIONAL AND NATIONAL SIGNIFICANCE

Florida moves 762 million tons of freight traffic annually out of which approximately 77% is moved by trucks. This makes truck freight the leader in transporting goods within, into and out of Florida. Florida trucking accounts for approximately 11% of vehicle miles traveled and is trending upward due to the increase in the port activities at the 11 deep water seaports in the state. As a result, demand is increasing for freight parking along the state's Interstate system as well as the need to optimize use of private truck stops along the Interstate system.

This project will enhance safety and convenience for truck drivers. TPAS will help truck drivers meet their HOS requirements by significantly reducing the amount of time spent to find parking spaces. TPAS will significantly improve efficiency of Florida and Interstate commerce. The project will add to the national freight parking systems information network approved under MAASTO grants for installing truck parking information management system. ***This project will ensure that the system built in Florida is interoperable with the system being built under the 2015 MAASTO grant using early coordination.*** **Figure 3** illustrates the extent of Florida's commercial goods movement.

**FIGURE 3. FLORIDA COMMERCIAL GOODS MOVEMENT**


*Source: Modified from Federal Highway Administration, Freight Analysis Framework 3, 2012 Provisional Data*

[2] *National Freight Advisory Committee, "Recommendations to U.S. Department of Transportation for the Development of the National Freight Strategic Plan", 2014.*

## FLORIDA'S INITIATIVES

FDOT completed a two-part research project with FIU to assess parking lot utilization and technology use. The first part determined the supply and demand characteristics for commercial truck parking in Florida. The second part assessed the us of technology to improve parking management and deployed two test locations.

The first test deployment was on I-10 at the Leon County Rest Areas west of Tallahassee. After reviewing the research by the FMCSA on technology use, the research team assessed wireless ground sensors which combined magnetic induction and infrared sensing to accurately determine vehicle presence. A closed-circuit television (CCTV) camera was also installed at each location for manual verification.

The second pilot location on I-95 in the Jacksonville area assessed Microwave Vehicle Detection System classifiers to count commercial vehicles. The sensors were located in such a way that they can count truck traffic entering and exiting the rest areas without mixing with the car traffic. The truck parking availability information was determined using the difference in ingress and egress traffic and the total available truck parking spaces. CCTV cameras were also installed to periodically manually verify available parking spaces. Also installed at this test location was a static sign with an embedded dynamic message sign (DMS) located upstream of the exit prior to the rest area to notify commercial vehicles of the availability of commercial vehicle parking spaces (see **Figure 4**).

FDOT also completed planning, feasibility analysis, preliminary engineering and design work, project specifications and estimates, concept of operations, systems engineering, utility coordination and environmental review and mitigation for TPAS deployment on I-4, I-10, I-75, I-95, and I-275. The design project (see **Figure 5**) was split

**FIGURE 4. I-95 PILOT LOCATION DMS**


*Source: FDOT*

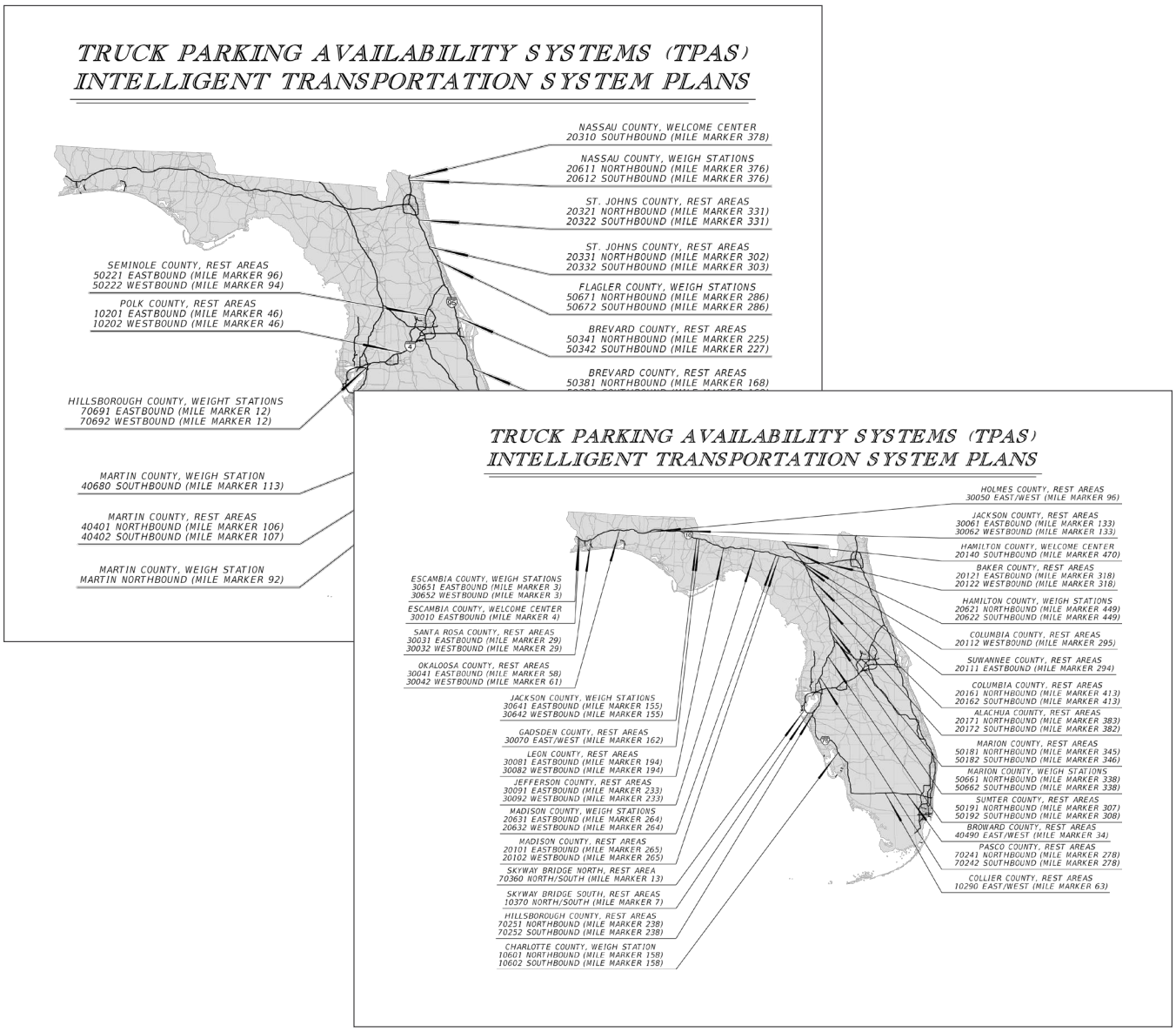
in two phases: Phase I design plan includes TPAS deployment along I-95 and I-4, and Phase II design plans , both designed under FPID 438096, includes TPAS deployment on I-10, I-75, and I-275.

## PROJECT ARCHITECTURE

The project is included in the Statewide ITS Architecture (SITSA) and will be integrated in the FDOT's central system software, SunGuide®. The truck parking system can be operated centrally or by individual FDOT RTMCs. The FDOT ITS wide area network (WAN) and local area networks (LAN) will be utilized for transferring information between the FDOT central server and TPAS infrastructure, roadside signs and Dedicated Short Range Communication system.

Florida is also looking at developing an API to exchange parking information between all parties called Data Integration and Video Aggregation System (DIVAS). The goal of the DIVAS is to streamline the data processing and video aggregation

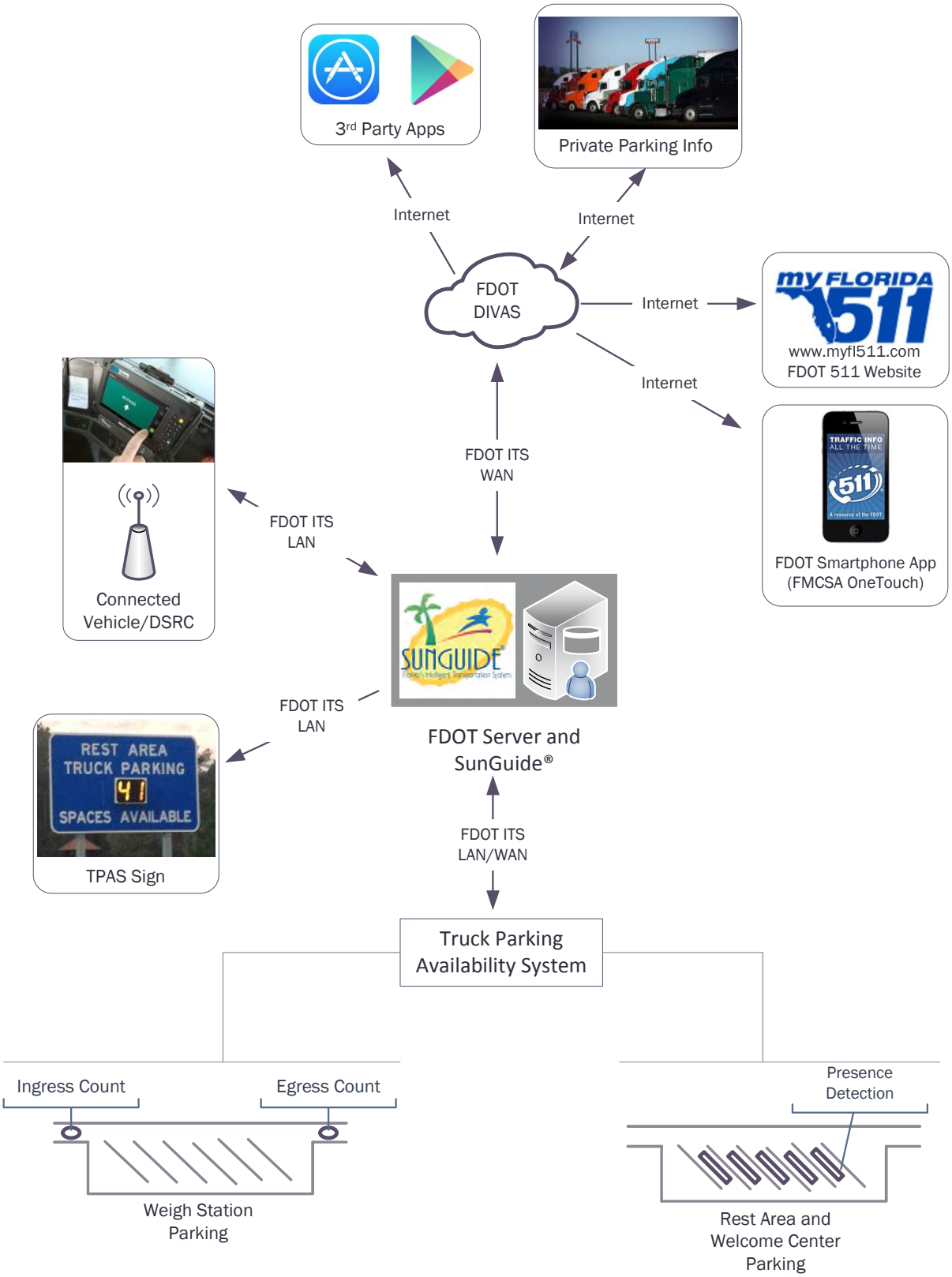
**FIGURE 5. PHASE I (LEFT) AND II (RIGHT) DESIGN PLANS**




*Source: FDOT*

and improve the ability to share with third parties by creating a centralized location for accessing FDOT data. DIVAS will also be the engine that supplies data to the FL511 system as we move forward as well as develop a third-party data feed that other entities can utilize to obtain data and video from the FDOT districts. This increases the scalability of the project for any future expansion and allows for enhanced data sharing. **Figure 6** provides the TPAS project architecture.

**FIGURE 6. TPAS ARCHITECTURE**



## TECHNOLOGY SELECTION

### › Detection Technology

The public rest areas and welcome centers will be outfitted with individual parking lot presence detection. The three-detector array was determined optimal to detect smaller vehicles that occasionally use commercial vehicle parking areas. This information will be transmitted via localized wireless network to the relay node, which eventually feeds the presence detection information to the data logger. The data logger will be tied to the existing ITS infrastructure, which feeds the information to the FDOT District's Regional Traffic Management Center (RTMC) for information use and dissemination. Microwave detector technology capable of vehicle classification was chosen for use at entrances to parking areas at weigh stations. These detectors strategically located to collect truck traffic ingress and egress count information and relay the data to the District's RTMC via existing FDOT ITS infrastructure.

### › CCTV Technology

CCTV technology and supporting infrastructure will be included for rest area, welcome center and weigh station parking areas. For rest areas and welcome centers, the CCTV camera images will be monitoring by the RTMC operators and used to verify parking availability information. The RTMC operators will use existing CCTV camera images to ensure TPAS parking availability DMS are displaying the correct message. At weigh stations, FDOT and Florida Highway Patrol (FHP) weigh station personnel will monitor the CCTV camera images. Cameras will utilize high resolution digital components. Cameras will be located and mounting height selected to optimize viewing of truck parking areas.

**FIGURE 7. CCTV TECHNOLOGY**

*Source: HNTB Corporation*

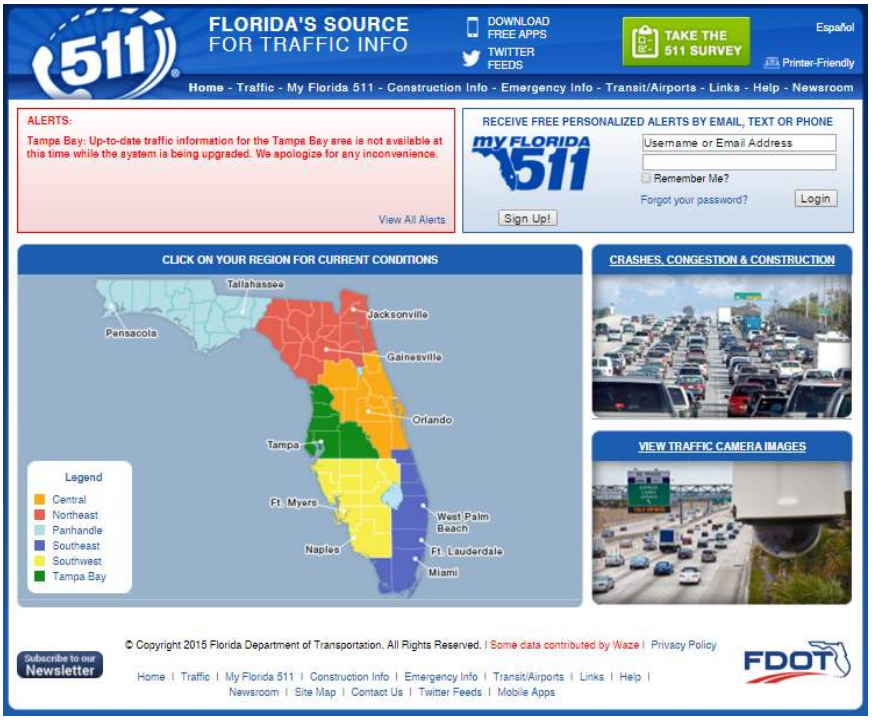
### › Roadside Technology

The roadside signs will be located one to two miles ahead of an interchange upstream of the truck parking lot. This will be a combination static/embedded dynamic message sign to display the parking spot availability number. The road side signs will be connected to the FDOT District RTMC using existing ITS infrastructure (fiber/radio). The static sign and DMS character height and shape will comply with the Manual of Uniform Traffic Control Devices (MUTCD).

### › Florida 511 Website and Mobile Application

Florida has a robust Advanced Traffic Information System (ATIS) website (www.myfl511.com – see **Figure 8**) and 511 mobile applications that are used for traveler information dissemination and information sharing with other local agencies. The TPAS information will be disseminated via the FDOT 511 website as well the mobile application. FDOT under their new 511 contract has scoped for developing a TPAS module in the FDOT SunGuide® for district use as well as an Application Programming Interface (API) for other public and private party use. FDOT is evaluating an option to distribute data to drivers through existing subscription services such as third-party truck dispatcher subscription services. The API design will also be compatible and interoperable with the MAASTO system.

**FIGURE 8. FL 511 WEBSITE HOMEPAGE**

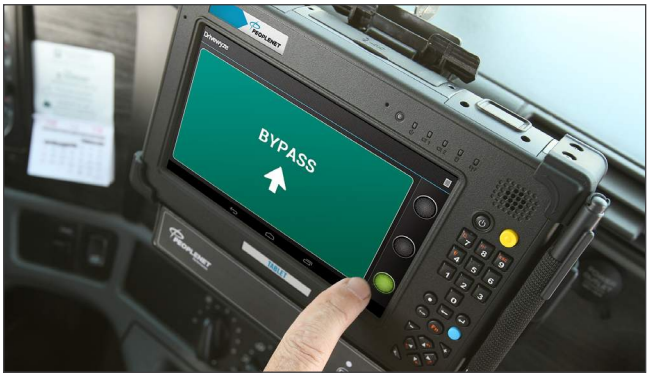



*Source: www.myfl511.com*

### › In-cab/Onboard Equipment

Another innovative way that is being evaluated for disseminating information to truck traffic being evaluated is through Vehicle to Infrastructure (V2I) communication using Dedicated Short Range Communication (DSRC). This technique will be used to disseminate truck parking information to truck drivers using their in-cab onboard equipment to make dynamic route choices. In-cab signal will be displayed via onboard equipment or smart-phones that are FMCSA "one-touch" compliant by relying on hands-free voice activated commands. As part of this effort, a basic safety message will also be evaluated to inform drivers of congestion as well as back of queue information. This effort will also leverage the FDOT's existing partnership with INRIX, WAZE, and HERE data to provide real-time traffic information to truck drivers for informed decision making.

**FIGURE 9. IN-CAB DASHBOARD**




*Source: Image retrieved from Google search. April 5, 2016*

### FLORIDA'S MATCH AND GRANT REQUEST

The Fostering Advancements in Shipping and Transportation for the Long-term Achievement of National Efficiencies (FASTLANE) grant will support deployment of the system technology as well as help offset the total approved project cost including final design, acquisition of equipment, construction engineering and inspection, and construction contingencies.

The total cost of deployment for the project is estimated to be $23.9 million and Florida is requesting $11.5 million from the FASTLANE grant. Florida has received $1.0 million in Federal Accelerated Innovation Deployment (AID) grants in 2015. If FASTLANE grant is approved, the total Federal aid Florida would receive $12.5 million. Florida has programmed $10.0 million in state funds for fiscal year 2017 (beginning July 20, 2016) in addition to $500,000 to match the AID grant. Florida also invested $832,300 for preliminary design and engineering, $112 million in SunGuide® module development and $10,000 in 511 public and private data sharing using mobile and website application. Therefore, the total Florida match amount is $11.4 million, which is 48% of the the total project (AID and FASTLANE) amount to 54% of the total project costs.

## 2. PROJECT LOCATION

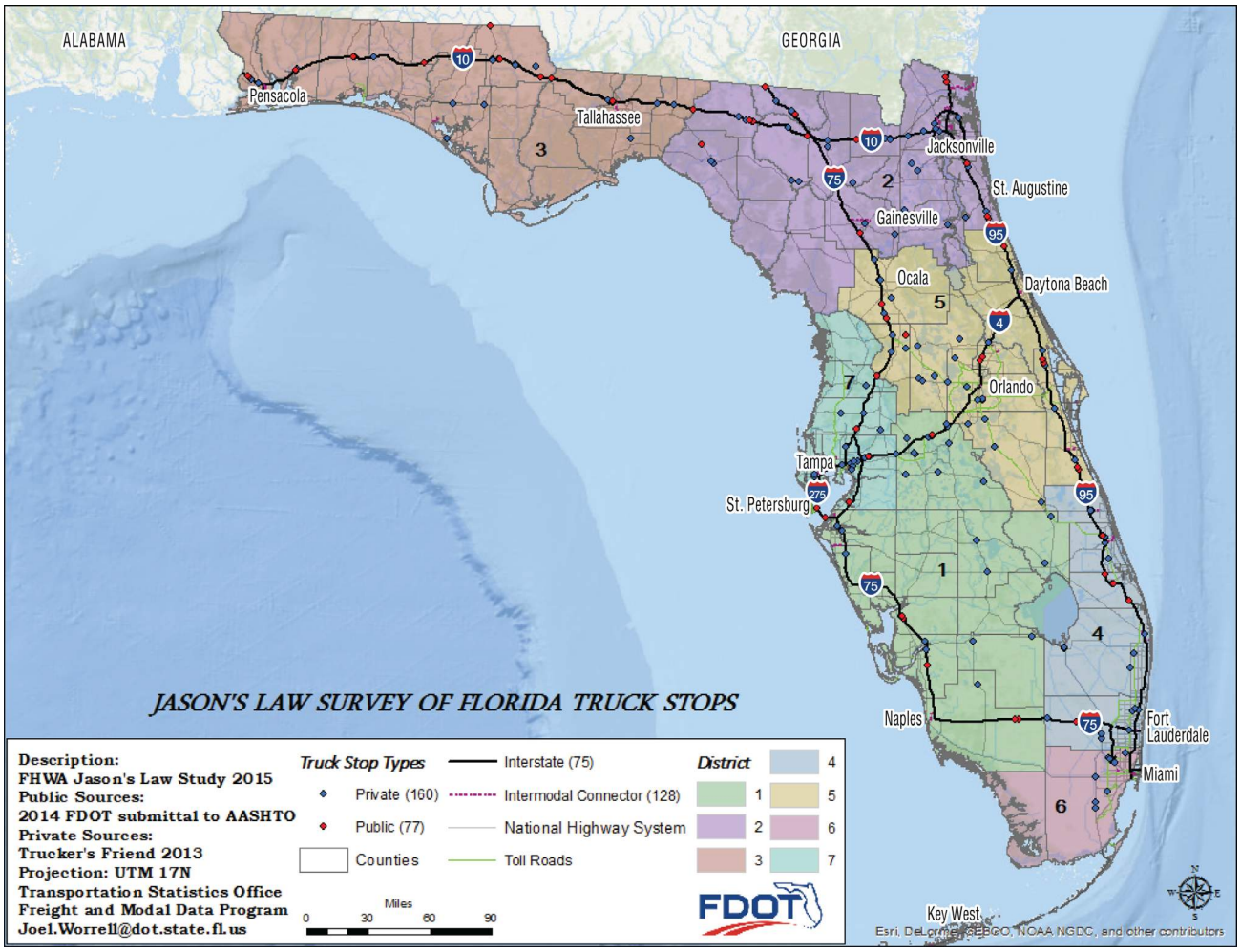
The project is located in six out of eight FDOT districts on a total of 74 public facilities along I-4, I-10, I-75, I-95, and I-275. The public facilities include rest areas, weigh stations and welcome centers. **Figure 10** shows the project location map developed by FDOT for the recent Jason's Law Survey that identifies both public and private truck parking spots. Florida has a total of 77 public truck parking sites, and out of these, 74 sites were selected for the first two-phase deployment based on their proximity to the Interstate and ITS infrastructure as well as availability of rest area facilities. In addition, as a separate FDOT effort, Florida's Turnpike Enterprise (FTE) is evaluating the truck parking availability system on their tolled roads. This effort is under the planning and preliminary engineering phase for TPAS deployment that will become a part of the Florida TPAS system.

**Table 1** provides the breakdown of the project sites per district and total number or parking spots available. **The project sites are predominantly located in the rural areas with some nearing the urban areas such as Orlando, Tampa, Jacksonville, Tallahassee, Pensacola and Miami. Figure 10** shows the geographical boundaries and locations of the project sites along with the FDOT District boundaries and counties.

**TABLE 1. DISTRICT BREAKDOWN OF PARKING SITES AND PARKING SPOTS**

| BREAKDOWN BY DISTRICTS | PARKING SITES | PARKING SPOTS |
|---|---|---|
| District 1 | 7 | 171 |
| District 2 | 22 | 621 |
| District 3 | 17 | 542 |
| District 4 | 7 | 294 |
| District 5 | 14 | 498 |
| District 7 | 7 | 238 |
| **TOTAL** | **74** | **2,364** |

**FIGURE 10. GEOGRAPHICAL BOUNDARIES AND LOCATIONS OF PROJECT SITES**




*Source: FDOT*

## I-4

I-4 is an east-west Interstate system corridor connecting three major metropolitan areas in the State of Florida – Tampa in the west, Orlando in the middle and Daytona Beach in the east end. I-4 spans approximately 132 miles. There are six TPAS sites along I-4. The I-4 Average Annual Daily Traffic (AADT) is 128,500 with truck traffic average of 10%.

## I-10

I-10 is an east-west Interstate system connecting Pensacola in the west to Tallahassee in the middle and terminating in Jacksonville in the east. I-10 continues all the way to the west in Los Angeles, California. I-10 spans across Florida for approximately 362 miles. There are 25 TPA sites along I-10. The I-10 AADT is 30,000 with a truck traffic average of 21%.

## I-75 AND I-275

I-75 is a north-south Interstate system connecting Miami/Ft. Lauderdale in the south to Tampa in the middle and interchanges with I-10 in the north. I-75 continues through Georgia and spans all the way north through Michigan. I-75 in Florida for

approximately 471 miles. There are 22 TPAS sites along I-75. The I-75 AADT is 56,100 with truck traffic average of 15%.

I-275 is an Interstate loop that wraps around Tampa Bay on the west side connecting Bradenton, St. Petersburg and Tampa areas. This I-275 segment is approximately 61 miles and has two TPAS sites along I-275. The I-275 AADT is 54,000 with truck traffic average of 7%.

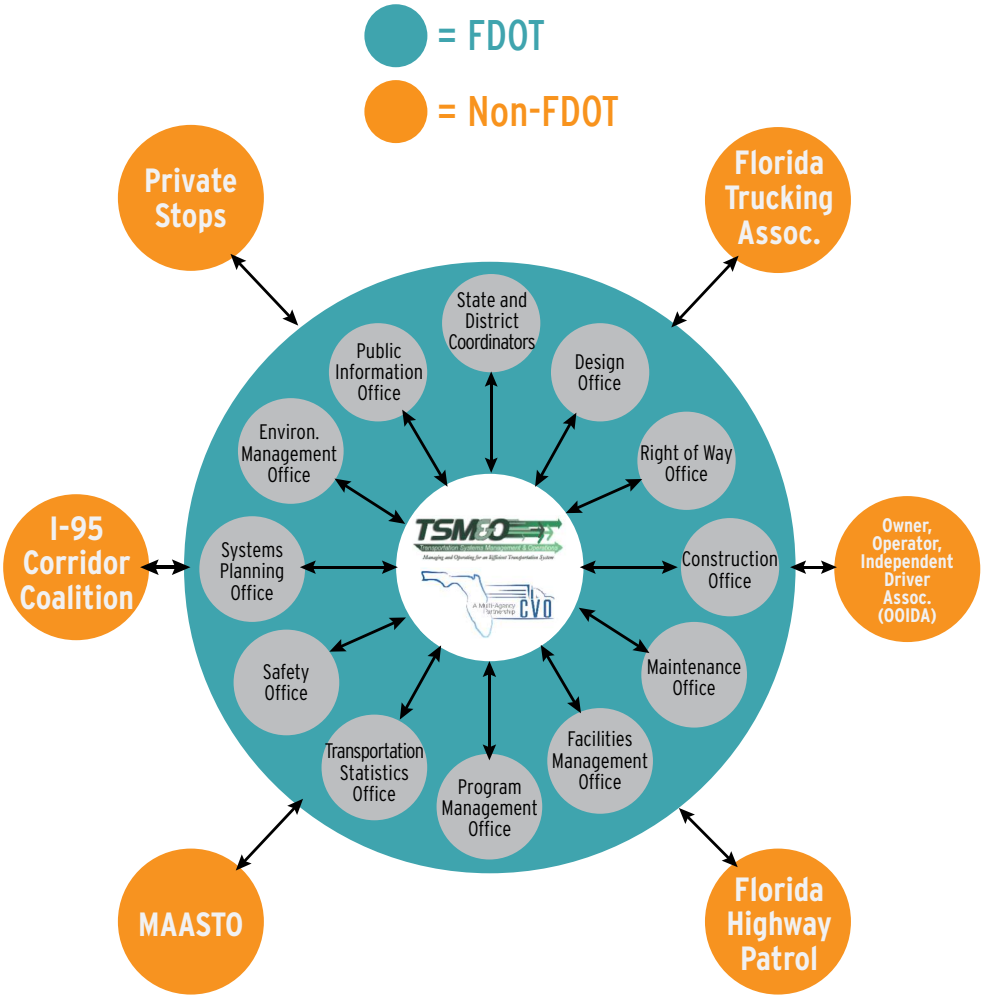
### I-95

I-95 is a north-south Interstate system connecting Miami in the south to Daytona Beach in the middle and Jacksonville in the north. I-95 continues through Georgia and all the way to the north in New York. I-95 in Florida spans approximately 382 miles. There are 19 TPAS sites along I-95. The I-95 AADT is 30,000 with truck traffic average of 21%.

## 3. PROJECT PARTIES

This project is the derivative of partnerships established with various FDOT disciplines as well as other public and private entities. The FDOT cross discipline and third parties associated with this project is shown in **Figure 11**. In addition to the information collected from the roadside systems,

**FIGURE 11. PROJECT PARTIES**



FDOT's new 511 contract to implement innovative ways of collecting the truck parking availability information from all public and private data sources. For example, the third party data source can be aggregated via FDOT's DIVAS. The truck parking information will also be disseminated using road side signs, dynamic message signs, Florida 511 website and mobile applications, on board equipment, and third party apps and websites via DIVAS.

As part of the MAASTO coordination, the Florida system will be designed in such a way that it is interoperable with the mid-west truck parking system deployment. As part of the I-95 Corridor Coalition coordination, the stakeholders will be informed about the Florida truck parking system and be made aware of the standards and requirements to enable opportunities for any future expansion in other states and to ensure interoperability with the Florida system.

As part of coordination with the Florida Trucking Association, a regional partnership is established for timely information dissemination to the truck drivers via on-board equipment and other sources to be able to receive real-time information to make informed decision on where to park.

## 4. GRANT FUNDS, SOURCES AND USES OF PROJECT FUNDS

Florida programmed $10 million in state funds for TPAS deployment in FY 2016-2017 under Statewide Transportation Improvement Program (STIP) for the first phase of the project. The state project funds will be used towards construction, purchasing equipment, final design, utility coordination, Construction Engineering Inspection (CEI), and other project related construction contingencies.

**Table 2** provides breakdown of the total cost of deployment for six districts, 74 parking sites and a total of 2,364 parking spots.

The supporting documentation provides a detailed cost breakdown by district. In addition, FDOT estimated 5% of the total deployment cost of the TPAS system for operations and maintenance cost per year.

**TABLE 2. TOTAL COST BREAKDOWN**

| ESTIMATES BREAKDOWN | COST |
|---|---|
| TPAS Equipment Furnish and Install (MVDS, spot sensors, power, communication, CCTV, signs, etc.) | $16,865,800 |
| District RTMC Hardware and Software Installation Cost | $900,000 |
| **SUBTOTAL** | **$17,765,800** |
| Final Design and Systems Engineering and Outreach Efforts (8%) | $1,421,300 |
| Construction Engineering and Inspection (12%) | $2,131,900 |
| Construction Contingency (15%) | $2,664,900 |
| **TOTAL COST OF DEPLOYMENT** | **$23,983,900** |

*Note: All dollar amounts are rounded to the nearest 100.*

In 2015, Florida received an Accelerated Innovation Deployment (AID) federal grant of $1.0 million with a 50% Florida match to support portion of the system deployment.

FDOT also paid for planning, feasibility analysis, preliminary engineering and concept design work, concept of operation, project systems engineering management plan, utilities and railroad coordination, design-build procurement support, project specifications and estimates, and environmental review and mitigation in the amount of $832,300 that is added to the Florida match. In addition, FDOT also paid for SunGuide® module and 511 cost as sown above and are added to FDOT match.

**Table 3** provides the total cost of deployment as well as breakdown of the matching funds. As shown in **Table 3**, the Florida project request is within 60% of the FASTLANE match as well as within 80% of the total federal fund match. The detailed cost is provided in the supporting documentation.

**TABLE 3. FASTLANE AND FEDERAL MATCH COST BREAKDOWN**

| **TOTAL COST OF DEPLOYMENT** | **$23,983,850** |
|---|---|
| **FDOT Fund Match** | |
| FDOT FASTLANE Match | $10,000,000 |
| FDOT Preliminary Engineering, Design and Environmental | $832,300 |
| FDOT Federal AID Match | $500,000 |
| FDOT SunGuide® Module Cost | $112,000 |
| FDOT 511 - Public and Private Interface | $10,000 |
| **Total FDOT Fund Match** | **$11,454,288** |
| Other Federal Funds | |
| Federal AID Grant | $1,000,000 |
| **FASTLANE Funds Requested** | **$11,529,569** |
| **FASTLANE Funds (%)** | **48%** |
| **Total Federal Funds (%)** | **52%** |

*Note: Amount rounded to the nearest $100*

# 5. COST EFFECTIVENESS

## COST

The total deployment cost of the system is $23.9 million and will be encumbered in two fiscal years 2016 and 2017. In addition to the deployment cost, the operations and maintenance (O&M) cost is estimated to be 5% of the systems deployment cost. The O&M cost was discounted for Net Present Value (NPV) for 20 years undiscounted rate, 3% discount rate and 7% discount rate. The cost breakdown is shown in **Table 4**.

**TABLE 4. TOTAL DEPLOYMENT COST BREAKDOWN**

| | |
|---|---|
| Total Deployment Cost | $24,870,200 |
| 2017 Deployment Cost | $12,435,100 |
| 2018 Deployment Cost | $12,435,100 |
| O&M % | 5% |
| Annual O&M Cost | $1,243,510 |

NPV is the difference between the present value of cash inflows and the present value of cash outflows. NPV is used in capital budgeting to analyze the profitability of a projected investment or project. A dollar earned in the future won't be worth as much as one earned in the present. The discount rate element of the NPV formula is a way to account for this.

Therefore, using the 20-year O&M cost of the system and system deployment cost and applying discounted rates and undiscounted, the following NPV of the system cost is obtained:

- Undiscounted: $48,496,890
- NPV (3%): $38,253,846
- NPV (7%): $29,442,471

## BENEFITS

See supporting documentation for a detailed benefit-cost analysis.

## ECONOMIC OUTCOMES (SELECTION CRITERIA)

The economic benefit of the system is divided into three categories, in addition to the intangible benefits of convenience and safety provided to the truck drivers as well as enhancing freight operation and Interstate commerce.

1. Mobility outcomes
2. Safety outcomes
3. Environmental outcomes

The NPV applied to the annual benefits estimated using the following parameters:

- Total number of parking spots: 2,364
- Average utilization factor: 80%
- Number of parking spots utilized per peak: 1,891
- Number of peak periods: 1
- Average gallons spent in looking for parking spaces: 2.5 gallons per vehicle
- Number of miles traveled looking for parking spaces: 14 miles per vehicle
- Average amount of time spent looking for parking spaces: 15 minutes per vehicle
- Annual working days: 260

Some of the assumptions are based on institutional experience and previous studies done under Jason's Law enactment. The NPV for each of the three benefit areas were applied using undiscounted, 3% and 7% discount rates. **Table 5** shows the results obtained from this benefit-cost analysis results.

**TABLE 5. NPV BENEFIT-COST ANALYSIS**

| BENEFIT/COST | UNDISCOUNTED | NPV (3% DISCOUNT) | NPV (7% DISCOUNT) |
|---|---|---|---|
| | | BENEFITS | |
| Safety Benefits | $76,362,558 | $51,148,887 | $31,690,366 |
| Driver Travel Time | $63,922,560 | $42,247,838 | $25,831,499 |
| Environmental | $34,385,185 | $22,563,639 | $13,671,718 |
| **Total Benefit** | **$174,670,303** | **$115,960,364** | **$71,193,582** |
| | | COST | |
| Deployment Cost | $23,983,850 | $20,999,010 | $17,698,659 |
| Maintenance Cost | $21,585,465 | $14,653,914 | $9,202,638 |
| **Total Cost** | **$45,569,315** | **$35,652,924** | **$26,901,297** |
| | | | |
| **B/C** | **3.83** | **3.25** | **2.65** |

The results of the benefit-cost analysis showed that system will yield significant economic benefit with benefit-cost ratio ranging from 2.65 to 3.83, depending on the discount rate used over the 20-year life of the system.

## MOBILITY OUTCOMES (SELECTION CRITERIA)

With the real-time truck parking availability information, truckers will be able to make informed decisions on truck parking during or prior to making trips that will save time and allow dispatchers to pre-plan the trips. Proper information dissemination on truck parking availability will save an average of 30 minutes of driving time for the majority of truck drivers, i.e. less truck trips and more capacity available to the other motorists. Also, trucks parked on freeway shoulders or on the ramps are detrimental to the mobility and safety of the motorist public and are potential incidents waiting to happen. Additionally, trucks searching for parking add to congestion levels to the Interstate system.

The mobility outcomes assumed an average of 15 minutes of travel time saved per parking space with 80% parking space utilization. With an average rate of $26 per hour per truck driver, the following mobility outcomes were attained for the 20-year life cycle.

- Annual cost of travel time saving: $3,196,100
- NPV for undiscounted cost: $63,922,600
- NPV for 3% discount rate: $42,247,800
- NPV for 7% discount rate: $25,831,500

## SAFETY OUTCOMES (SELECTION CRITERIA)

According to a 2003 National Highway Research Program (NCHRP) study, driver fatigue attributed to 15% of fatal crashes involving trucks. The State of Florida alone had approximately 355 crashes in the last three years attributed to the truck driver fatigue. Out of these, there were six fatal, 163 injury and 186 property damage only crashes. FMCSA regulates HOS and mandates rest periods for truck

drivers – at least 10-hour per day after a 14-hour shift, or risk fines or regulatory actions. This rule became more serious after the enactment of Jason's Law in Section 1401 of MAP-21. Providing truck parking availability information will provide safer and more efficient options for truck parking to the truck drivers and freight dispatchers.

10% of the truck driver fatigue related crashes are correctable by reducing the trips truck drivers take to find parking spaces, the cost of crashes by severity was taken from the information provided in the FDOT road design bulletin #14-12[3]. Using this information, the following safety benefits will be realized using the system.

- Annual cost of safety saving: $4,019,100
- NPV for undiscounted cost: $76,362,600
- NPV for 3% discount rate: $51,148,900
- NPV for 7% discount rate: $31,690,400

## COMMUNITY AND ENVIRONMENTAL OUTCOMES (SELECTION CRITERIA)

Florida residents will benefit from reduced emissions and a reduction in overall truck trips and crashes impacting fellow motorists' safety and mobility. The manufacturers and shippers in the region will benefit from the more efficient movement of cargo and drayage, which enhances the global competitiveness of the Florida economy. The port authorities will benefit from the efficient freight parking management in their last mile drayage movement.

The environmental benefits looked at the cost savings in fuel and emissions under the following four main categories that are recognized be Environmental Protection Agency (EPA):

- Green House Gas (GHG)
- Volatile Organic Compounds (VOC)
- Nitrogen Oxide (NOx)
- Particulate Matter (PM)

The GHG emissions assumed 2.5 gallons of diesel fuel saved per trip for each parking space at 80% utilization. The amount of Carbon Dioxide ($CO_2$) emitted per gallon of diesel is 22 pounds according to the United States Energy Information Administration[4]. Also, according to the Standards Council of Canada (SCC) the per pound cost of $CO_2$ to the environment is $43 in 2013 dollars and inflated at the rate of 3% to get a per year cost for the 20-year life cycle cost of the system. The following GHG emission benefits will be obtained due to the reduction in GHG emissions.

- Annual metric ton of $CO_2$ savings: 12,477 metric tons
- NPV for undiscounted cost: $15,146,800
- NPV for 3% discount rate: $9,848,600
- NPV for 7% discount rate: $5,897,400

The VOC emissions for heavy duty trucks is 0.48 grams per mile saved per trip for each parking space at 80% utilization. The value per metric ton of VOC emission is $1,999. Therefore, for the 20-year life cycle cost of the system the following benefits will be obtained due to the reduction in VOC emissions.

- Annual VOC savings: $6,512
- NPV for undiscounted cost: $130,200
- NPV for 3% discount rate: $86,100
- NPV for 7% discount rate: $52,600

[3] *http://www.dot.state.fl.us/rddesign/Bulletin/RDB14-12.pdf*

[4] *http://www.eia.gov/tools/faqs/faq.cfm?id=307&t=11*

The NOx emissions for heavy duty trucks is 9 grams per mile5 saved per trip for each parking space at 80% utilization. The value per metric ton of NOx emission is $7,877. Therefore, for the 20-year life cycle cost of the system the following benefits will be obtained due to the reduction in NOx emissions.

- Annual NOx savings: $463,172
- NPV for undiscounted cost: $9,263,400
- NPV for 3% discount rate: $6,122,400
- NPV for 7% discount rate: $3,743,400

The PM emissions for heavy duty trucks is 0.20 grams per mile saved per trip for each parking space at 80% utilization. The value per metric ton of PM emission is $360,383. Therefore, for the 20-year life cycle cost of the system the following benefits will be obtained due to the reduction in PM emissions.

- Annual PM savings: $492,235
- NPV for undiscounted cost: $9,744,700
- NPV for 3% discount rate: $6,506,600
- NPV for 7% discount rate: $3,978,300

The total environmental benefit for the 20-year life cycle of the system is:

- NPV for undiscounted cost: $34,385,200
- NPV for 3% discount rate: $22,563,600
- NPV for 7% discount rate: $13,671,700

See supporting documentation for detailed benefit-cost analysis.

## 6. PROJECT READINESS

The FDOT has performed extensive amounts of background work in order to successfully deploy the system to address commercial vehicle parking needs. Research, preliminary planning, environmental studies, and systems engineering processes have been undertaken to advance to ensure the readiness of the project. The sites initially identified in the TPAS Phase I deployment (25 sites consisting of all of I-95 and I-4) have met all requirements as necessary to receive Federal AID funding obligation. In coordination with the FHWA District office, the Phase I project will first be deployed for the 8 sites located within FDOT District 5 (I-4 and I-95), to meet the funding obligation of the AID grant. The Request for Proposal, attachment and reference documents have been reviewed by FHWA and are under final review by FDOT District 5 with an anticipated advertisement for procurement scheduled in August 2016.

**With the addition of grant funding, it is anticipated (as shown on the schedule below) that the project will be ready to advertise to begin construction (as a design build project) by upon the award/obligation of the funds associated with this grant application.**

The remaining 49 sites within Phase II (I-10, I-75 and I-95) are currently undergoing similar analysis, including preliminary engineering, environmental review and utility coordination in preparation for deployment using a similar contractual vessel (design-build).

It should be noted that this project will build on the extensive Interstate ITS Freeway Management system that the FDOT has deployed across the state. The project will function as an independent utility, and will provide a usable and cost-effective means to address the national issues associated with truck parking immediately upon completion of construction.

**This project will build on the extensive Interstate ITS Freeway Management system that the FDOT has deployed across the state.**

## TECHNICAL FEASIBILITY

The TPAS project uses well-understood technologies and systems to collect truck parking space availability and disseminate this information to truckers. These technologies and systems are well documented, as shown in **Table 6**.

In accordance with 23 CFR 940, the FDOT has developed systems engineering analysis to improve the quality, reduce the risk of schedule and cost overruns, gain stakeholder participation and develop a maintainable system that requires low maintenance expenditures. A Concept of Operations (ConOps) and Systems Engineering Management Plan have been developed to define what the system is expected to do in accordance with FHWA Rule 940.11 Project Implementation systems engineering analysis requirements. Design templates have been created based on the ConOps as applicable to each TPAS application: rest areas, weigh stations, and welcome centers. These templates include all necessary detection, communication and DMS signs. These templates and counts of truck parking spaces were the basis for the design, construction, inspection, integration and construction cost estimates. By the date the TPAS funds are obligated, Phase I project will have been advertised for deployment as an Adjusted Score design build. This will allow further refinement of cost estimates. A draft Project Systems Engineering Management Plan (PSEMP) is also prepared for this project. See supporting documents for draft ConOps and PSEMP documents.

**TABLE 6. TECHNOLOGIES AND SYSTEMS READINESS**

| TECHNOLOGY/SYSTEM | READINESS FOR TPAS IMPLEMENTATION |
|---|---|
| Statewide ITS Architecture (SITSA) | The Florida SITSA contains the truck parking market package. http://www.consystec.com/florida/state/web/files/mpimages/ATMS17-1_DS.htm |
| Concept of Operations (ConOps) | The ConOps for TPAS is complete. |
| Systems Engineering Management Plan (SEMP) | The Project SEMP is complete. |
| Parking space detectors | These are being tested, used in a Pilot project, and are currently being evaluated for inclusion on Florida Approved Product List (APL) https://fdotwp1.dot.state.fl.us/ApprovedProductList/ProductTypes/Index/464 |
| Parking area entrance detectors | These have been tested, widely used and currently on the APL https://fdotwp1.dot.state.fl.us/ApprovedProductList/ProductTypes/Index/356 |
| Closed-Circuit Television (CCTV) to verify detector output | These have been tested, widely used, and currently on the APL https://fdotwp1.dot.state.fl.us/ApprovedProductList/ProductTypes/Index/458 |

*Table 6 continues on next page.*

*Table 6 continued from previous page*

| TECHNOLOGY/SYSTEM | READINESS FOR TPAS IMPLEMENTATION |
|---|---|
| Embedded Dynamic Message Signs (DMS) | These signs have been tested, widely used for toll and express lanes, and currently on the APL https://fdotwp1.dot.state.fl.us/ApprovedProductList/ProductTypes/Index/505 |
| Ethernet on Fiber Optic Communication Network | This network is currently fully operational for ## of the ## sites. When TPAS is implemented, an additional ## sites will have fiber network connectivity. |
| Wireless Microwave Network | This network is fully operational and available for use at sites where the fiber network is not available at the time TPAS is implemented. |
| SunGuide® Central System Software | The SunGuide® Central System is fully implemented at each of the six (6) District Offices that will implement TPAS. The TPAS module is currently under development and will be functional by the end of 2016 http://www.dot.state.fl.us/trafficoperations/its/projects_arch/sunguide.shtm |
| Regional Traffic Management Centers (RTMC) | RTMC have been implemented and are staffed 24 hours per day, seven days per week, and 365 days per year in each of the Districts participating in TPAS. |
| RTMC Operators | Standard Operating Procedures (SOP) are being developed for the Phase I project implemented on I-4 and I-95 in District 5. SOP define operator duties to monitor sparking spaces and embedded DMS messages. The TPAS SOP will be provided to other District RTMC for their use. |
| SunGuide® Central System Software | The SunGuide® Central System is fully implemented at each of the six (6) District Offices that will implement TPAS. The TPAS module is currently under development and will be functional by the end of 2016 http://www.dot.state.fl.us/trafficoperations/its/projects_arch/sunguide.shtm |
| Regional Traffic Management Centers (RTMC) | RTMCs have been implemented and are staffed 24 hours per day, seven days per week, and 365 days per year in each of the Districts participating in TPAS. |
| RTMC Operators | Standard Operating Procedures (SOP) are being developed for the Phase I project implemented on I-4 and I-95 in District 5. SOPs define operator duties to monitor sparking spaces and embedded DMS messages. The TPAS SOPs will be provided to other District RTMC for their use. |

## PROJECT SCHEDULE

With the addition of grant funding, it is anticipated (as shown on the schedule below) that the project will be ready to advertise to begin construction (as a design build project) by upon the award/ obligation of the funds associated with this grant application.

**Table 7** provides a detailed summary of the TPAS Project schedule.

**Required Approvals:** No right of way required, no rail involvement required.

## NEPA APPROVALS

NEPA documentation, in the form of a "Categorical Exclusion" under 23 C.F.R. 771.117, has been prepared for Phase I and is currently in process for Phase II. The NEPA documentation is being prepared using the Efficient Transportation Decision Making (EDTM) and Environmental Screening Tool (EST) databases, literature review, agency coordination and field reviews. See item 21, in the FDOT guide document on Page 2-9 at the following link: http://www.dot.state.fl.us/emo/pubs/pdeman/Pt1ch2_100214-current.pdf

**TABLE 7. TPAS PROJECT SCHEDULE**

| PROJECT SCHEDULE | FFY 2017 | | | | FFY 2018 | | | |
|---|---|---|---|---|---|---|---|---|
| | 1Q | 2Q | 3Q | 4Q | 1Q | 2Q | 3Q | 4Q |
| Systems Engineering Documents | Complete | | | | | | | |
| Preliminary Design | Complete | | | | | | | |
| District & Utility Coordination | Complete | | | | | | | |
| Environmental (NEPA) Approvals | Complete | | | | | | | |
| Right of Way Acquisition | Not Applicable | | | | | | | |
| PS&E Approval | X | | | | | | | |
| Obligation of FAST Lane Funds | X | | | | | | | |
| STIP Amendment | X | | | | | | | |
| Design/Build Procurement | | | | | | | | |
| Design Notice to Proceed | | | X | | | | | |
| Final Design | | | | | | | | |
| Release for Construction | | | | | X | | | |
| Construction & Construction Inspection | | | | | | | | |
| Integration & Testing | | | | | | | | |
| System Launch | | | | | | | X | |
| On-Going Operations | | | | | | | | |

## OTHER AGENCY COORDINATION

The Florida Department of Environmental Protection (DEP) monitors all non-NEPA required approvals. All work is within Interstate Highway right-of-way along the roadside or within rest areas, weigh stations and welcome centers. Nevertheless, where the ground will be disturbed or where construction activities will take place, surveys are being performed so that potential impacts to rare and endangered species, wetlands, and habitats can are identified and avoided. Due to the nature of the field elements of the project, the communication infrastructure is largely in place and poles locations for CCTV, DMS, and detectors can be adjusted as necessary to avoid any potential impacts. Environmental approvals and permits from FHWA and the Department of Environmental Protection will be obtained the design build team based on their proposed implementation. In addition, there is no right-of-way impact due to the system deployment as well as no railroad impact.

## STATE AND LOCAL APPROVALS

All work envisioned in the TPAS project will occur within the State's Interstate highway system right-of-way. STIP amendments will be prepared and coordinated with local agencies as necessary. As the complete funding is not currently in place, the STIP cannot be programmed; however, coordination with the anticipated funding has and will continue to occur until the project is realized for construction.

Extensive coordination is also underway that will be completed by the date of funding obligation. Utility agencies have been notified and are providing location of their facilities so they can be avoided. Asset Management and Maintenance sections within FDOT that manage rest areas and weigh stations, right-of-way maintenance, regional traffic management center operations, and ITS maintenance have all been contacted to ensure their needs have been addressed.

## FDOT MODAL COORDINATION

Within FDOT, extensive coordination has occurred between the FDOT Central Office departments that manage programs for commercial vehicles operations (CVO) program, transportation system management and operations (TSM&O), rest areas, weigh stations, and freight planning. Extensive coordination is also underway with each of the District Offices that operate Regional Traffic Management Centers (RTMC) and maintain the ITS infrastructure. In addition, coordination with the FDOT transportation statistics, FDOT commercial vehicle information system and other agencies are occurring.

## PUBLIC ENGAGEMENT (COMMUNITY OUTCOMES*)

Public Information Officers for each District have been engaged. As a result, one rest area on I-4 was identified that had some public concerns. Public engagement for the public parking facilities within Martin County, located in FDOT District 4, will be performed based on prior upgrades to facilities.

## STATE AND LOCAL PLANNING

The Project is in conformance with state and local plans, including the Florida Freight Mobility and Trade Plan (September, 2014)[5]. The plan contains the following objective:

> *"The changes to hours of service laws have put pressure on rest areas that were not designed to meet the amenity needs of*

[5] *http://www.freightmovesflorida.com/docs/default-source/default-document-library/fmtp-investment-element_2014-09.pdf?sfvrsn=2*

*overnight truck parking. The Department of Transportation's Commercial Vehicle Information Systems and Networks (CVISN) Program14, is looking at a pilot project to count trucks entering and leaving truck stops by use of overhead cameras and then placing that information on available parking on a web portal. The Department is also working with developers of private facilities in underserved areas such as south Florida to ensure adequate truck parking is available."*

Truck parking pilot projects were implemented near Jacksonville and near Tallahassee. Both were successful. The project near Tallahassee tested truck detection technologies. The project near Jacksonville test use of signing to convey spaces available.

The need for truck parking management is also referenced in the Statewide ITS Architecture which includes Service Package ATMS-17[6] – Regional Parking Management. Truck parking is a major component of this service package.

If awarded funding, the project will be expeditiously included in the state's Transportation Improvement Program (TIP).

TPAS is entirely on the Interstate System, however, FDOT work program instructions require coordination with local planning. The state and local officials and applicable public agencies were contacted and notified of the project.

[6] *http://www.consystec.com/florida/state/web/files/mpimages/ATMS17-1_DS.htm*

### ASSESSMENT OF PROJECT RISKS AND MITIGATION STRATEGIES

Known risks to successful implementation of TPAS and mitigation strategies are shown in **Table 8**.

## 7. SECONDARY SELECTION CRITERIA

### PARTNERSHIP AND INNOVATION

As part of this project, several regional partnerships have been established between FDOT and Florida Trucking Association, Florida Highway Patrol, and FDOT Districts. As part of the innovation, the information will be disseminated via the Florida 511 website and mobile app.

### COST SHARE

There is minimal cost sharing currently between the public and local agencies and between public and private agencies due to implementation of the system mainly on the public facilities that are on the Interstate system. However, as the system gets deployed on private facilities, a potential of cost sharing to offset some operation and maintenance cost will be explored with the private agencies.

### COST EFFECTIVENESS

As part of the cost-effective solution to the project, two different technologies have been looked at based on facility types. For example microwave radar will be used at weigh stations in lieu of spot detection due to proper delineation of truck traffic from cars at the ingress and egress points. Other cost effective solutions have been looked at such as communication types, letting the project as one project for all six districts, etc.

**TABLE 8. POTENTIAL RISKS AND MITIGATION STRATEGIES**

| POTENTIAL RISK | RISK MITIGATION STRATEGY |
|---|---|
| Design/build request for proposals (RFP) delayed | The Department is implementing Phase 1 of TPAS through the same procurement process. The Department is currently preparing preliminary design and procurement documents for Phase II (FASTLANE Project). The RFP will be ready in time for obligation of FASTLANE Funds. If funds are not obligated, the Department will deliver a scaled down project matching available funding. |
| Environmental approvals are delayed | Environmental approvals are in progress for Phase II and will be completed prior to planned start date. All work is on existing Department-owned property or facilities. The FHWA Division Office has concurred with environmental review for Phase I and has indicated concurrence with approach for Phase II. |
| Design completion is delayed | Preliminary design is underway and will be complete by FASTLANE award. Design is being completed to a minimum of 60% compete for the project. Design is being developed in coordination with potential technology providers. |
| Integration and testing are delayed | The Department and ITS contractors successfully integrated and tested dozens of ITS projects throughout Florida. In the event that integration or testing risks materialize, the Department has available the resources of a highly experienced consultant firm to oversee integration and testing. |
| Technologies do not perform as intended or truckers deem the system unreliable or not useful | A very similar system to TPAS has been successfully implemented in the state of Michigan. This system has proven highly successful and useful to truckers. Additionally, technologies to be used have been and will be been tested and on Florida's Approved Product List (APL). Parking information will be provided by means of roadside DMS as well as through smart-phone type applications. A research project is currently underway, funded by FDOT and being administered by the University of Florida. The research project will field test and independently verify the accuracy of vendor provided technologies at rest areas along I-75. Results of the study will be available prior to deployment of the Phase II system. |

## SUPPORTING DOCUMENTATION

The following supporting documents are provided at http://wws.floridatruckinginfo.net/2016-FASTLANE.shtm:

1. FIU Phase I Study
2. Statewide TPAS Detailed Estimates
3. Statewide TPAS Benefit-Cost Analysis
4. Statewide TPAS ConOps – Draft
5. Statewide TPAS PSEMP – Draft