

**FDOT**

**TRANSPORTATION**  
**SYMPOSIUM**

# Truck Parking Availability System



Marie Tucker and Jeff Frost

# Presentation Overview

- Truck Parking Availability System (TPAS)
- Research Projects
- Federal Grants
- TPAS Deployment Locations
- Deployment Mechanisms
- Project Schedule
- TPAS Documents
- TPAS Architecture
- Data Dissemination



# Truck Parking Availability System (TPAS)

## TPAS Supports

- Federal Motor Carrier Safety Administration (FMCSA) Hours-of-Service regulation
- Safe and convenient parking options
- Just-in-time delivery
- Advance planning for freight operation
- Reduced truck parking violations
- Electronic monitoring and dissemination of information



# Florida International University (FIU) Research

## Part 1: Identify current supply and demand of public parking

- Identified needs to “balance” parking use
- Developed key requirements for TPAS



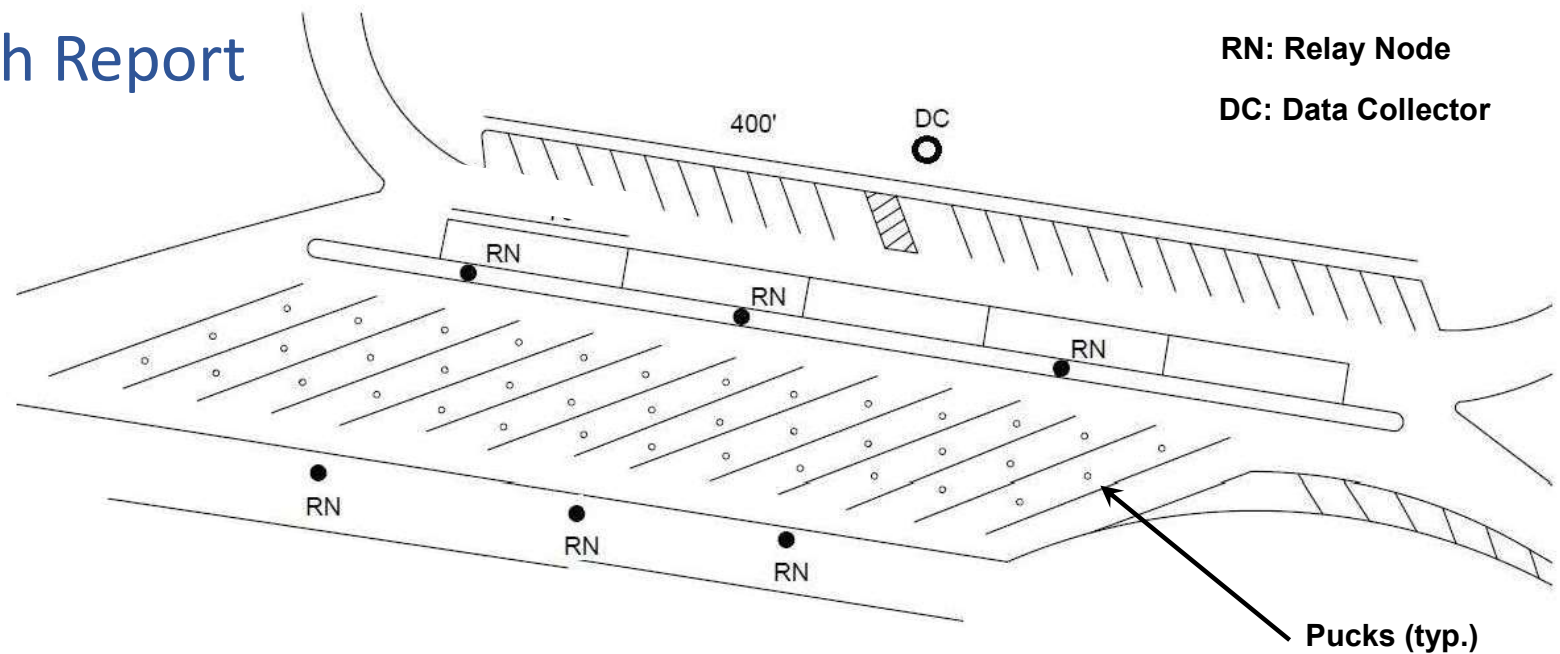


# Florida International University (FIU) Research

## Part 2: Assess technology to improve parking management

- Leon County Pilot Project with in-pavement sensors

### FIU Research Report



Leon County Truck Parking

# Project Delivery



Three-stage approach to statewide comprehensive truck parking solution

# FDOT Pilot Project

- Location: I-95, St. Johns County, FDOT district 2
- Project used MVDS sensors to count trucks at ingress/egress of truck parking lot
- Provide advanced notification of truck parking availability



Pilot TPAS Sign on I-95 in St. Johns County



St. Johns County Truck Parking

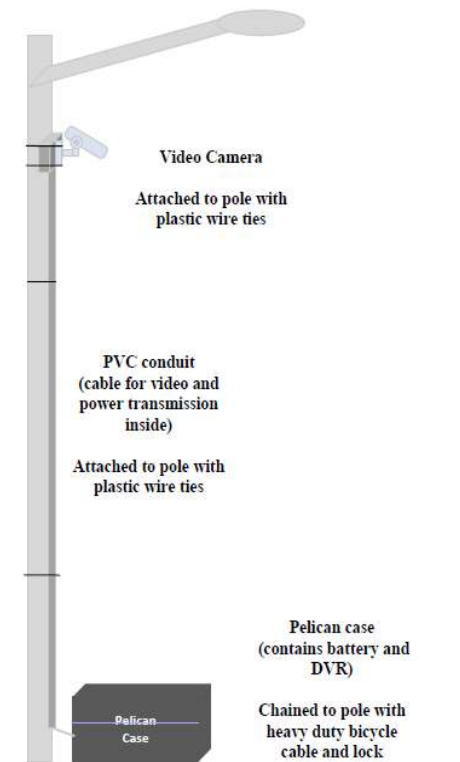
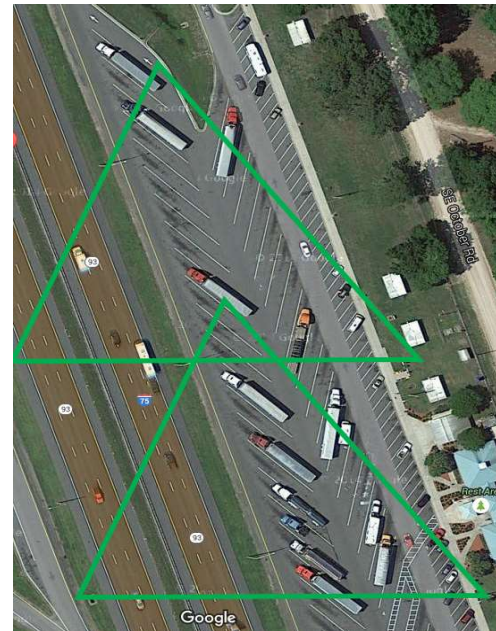
# University of Florida (UF) Research

Evaluation of in-ground sensors to examine their capabilities

- Tested four different vendors

Ground-truth data through video logs

Three products listed on Innovative Products List (IPL)



**Video Camera Mounting Details**



# University of Florida (UF) Research

## SensIT

- Detection using magnetic and infrared (IR) sensors
- Frequency band at 902-928 MHz.
- In-ground sensor power using battery
  - Battery life: 5-10 Years
- Relay Node power using battery
  - Battery life: 5-7 Years
- Data aggregator (data collector)
  - Power: 100-240Vac, 50-60 Hz



SensIT

# University of Florida (UF) Research

## Sensys

- MicroRadar detection
- Frequency band at 2400-2483.5 Mhz
- In-ground sensor power using battery
  - Battery life: 8 Years
- Repeater power: Battery
  - Battery life: 8 Years
- Data aggregator input power
  - External power 22-26 VDC (24 VDC nominal)



**Sensys**

# University of Florida (UF) Research

## CivicSmart

- MicroRadar detection
- Frequency band at 2405-2480 MHz
- In-Ground sensor power using battery
  - Battery life: 8 Years
- No Repeater or Relay node
- Data aggregator can work on commercial as well as solar power
- Data aggregator power
  - 8.2 VDC rechargeable battery pack
  - External power 12 VDC
  - 10 Watt solar panel power



**CivicSmart**

# University of Florida (UF) Research

## Performance Accuracy Requirements

- Turnover Accuracy – 90%
- Occupancy Accuracy – 95%
- Detection system test conducted over two 15 hour (6:00 pm to 9:00 am) sessions

## Developmental Specification 660

### **VEHICLE DETECTION SYSTEM.**

**(REV 12-20-16)**

ARTICLE 660-2 is expanded by the following:

**660-2.5 Truck Parking Detection System:** Furnish and install a truck parking detection system in accordance with the details shown in the Plans. The detection system must be capable



# Federal Grants

FDOT Received two (2) federal grants

- Federal AID: \$ 1 Million
- FASTLANE: ~ \$11 Million



## FASTLANE GRANT 2016 APPLICATION

CONTACT INFORMATION  
JEFF FROST

Commercial Vehicle Operations Program Manager



**AID Demonstration**  
Accelerated Innovation Deployment

*Funding for agencies to use innovations to deliver projects faster, better, and smarter.*

## Commercial Vehicle Parking System Project

<b>Location</b>	Florida: I-95 and I-4 Corridors
<b>Award Recipient</b>	Florida Department of Transportation
<b>Innovation</b>	Commercial Vehicle Parking Availability Notification System
<b>Award Fiscal Year</b>	2015



**Project Aspect** Operation

### Description

This project will provide reliable real-time information about commercial vehicle parking availability to dispatchers and commercial vehicle drivers allowing for educated decisions on parking at rest areas and weigh stations. FDOT has completed the Concept of Operations and a draft Project Systems Engineering Management Plan and system engineering analysis is in progress. Final design efforts for the installation of the detection system is in progress. The FDOT will also make software enhancements to process the new system's data in the SunGuide® software. A systems manager approach to the design, oversight, integration, operations and maintenance is being employed.

<b>Grant Award</b>	\$1,000,000
<b>Partner</b>	HNTB
<b>Duration/Status</b>	18 months / Preliminary Engineering
<b>Project Contact</b>	<b>Jeffery Frost</b> Incident Management/Commercial Vehicle Operations Program



# TPAS Deployment

## Deployment TPAS System

- Rest Areas
- Weigh Stations
- Welcome Centers



# TPAS Locations

- 45 rest areas
- 20 weigh stations
- 3 welcome centers



<b>Number of Truck Parking Spaces Monitored</b>	<b>2,352</b>
Wireless Detection System (WDS)	1,875
Microwave Vehicle Detection System (MVDS)	477

# Deployment Mechanism

	Funding	Corridor	Sites	Vendor	Winning Bid Price	Procurement
<b>FDOT District 5 (Phase I)</b>	AID Grant, State Funds	I-4, I-95	5 Rest Areas, 2 Weigh Stations	SENSIT	\$1,828,183.00	Adjusted Score Design Build
<b>FDOT District 3</b>	State Funds	I-10	1 Welcome Center, 12 Rest Areas, 4 Weigh Stations	CivicSmart	\$4,412,092.00	Low Bid Design Build
<b>FDOT District 4</b>	State Funds	I-95, I-75	5 Rest Areas, 2 Weigh Stations	Sensys	\$2,285,285.00	Adjusted Score Design Build
<b>FDOT District 7</b>	State Funds	I-4, I-75	3 Rest Areas, 2 Weigh Stations	SENSIT	\$1,947,000.00	Adjusted Score Design Build
<b>FDOT District 5 (Phase II)</b>	FASTLANE Grant, State Funds	I-75	4 Rest Areas, 2 Weigh Stations	Sensys	\$1,614,614.00	Low Bid Design Build
<b>FDOT District 2</b>	FASTLANE Grant, State Funds	I-10, I-75, I-95	2 Welcome Centers, 12 Rest Areas, 6 Weigh Stations	CivicSmart	\$3,698,384.00	Low Bid Design Build
<b>FDOT District 1</b>	FASTLANE Grant, State Funds	I-4, I-75	4 Rest Areas, 2 Weigh Stations	CivicSmart	\$1,441,170.64	Adjusted Score Design Build



# Project Schedule

TPAS Schedule																											
Task	Number of Locations	2017												2018												2019	
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F
DISTRICT 5 PROCUREMENT	7				★																						
DISTRICT 5 CONSTRUCTION																											
DISTRICT 3 PROCUREMENT	17							★																			
DISTRICT 3 CONSTRUCTION																											
DISTRICT 4 PROCUREMENT	7							★																			
DISTRICT 4 CONSTRUCTION																											
DISTRICT 7 PROCUREMENT	5							★																			
DISTRICT 7 CONSTRUCTION																											
DISTRICT 5 PROCUREMENT	6								★																		
DISTRICT 5 CONSTRUCTION																											
DISTRICT 2 PROCUREMENT	20												★														
DISTRICT 2 CONSTRUCTION																											
DISTRICT 1 PROCUREMENT	6												★														
DISTRICT 1 CONSTRUCTION																											

Bid Opening ★

# TPAS Integration

TPAS device communication integration with existing ITS communication network

- Minimal interruption to existing ITS infrastructure and RTMC operations
- No fiber splices allowed to existing ITS fiber network
- Connect to available ports in existing MFES Switch in ITS cabinet
- Existing fiber network is untouched

## TPAS Device Power

- Reduce additional utility bills
  - Use of Existing ITS service drops where feasible
  - Connect to existing ITS cabinet to draw power for TPAS sign
- NO UPS and/or solar power provided to the TPAS cabinets

Fiber Patch Panel



Available ports in MFES Switch



**FDOT EXISTING ITS CABINET**

# TPAS System Engineering Documents

## Deployment TPAS System

- Project Systems Engineering Management Plan (PSEMP)
- Concept of Operations
- Truck Parking ConOps Companion
- Requirement Verification Traceability Matrix (RTVM)
- TPAS Guidelines for RTMC Standard Operating Procedures (SOPs)



**TRUCK PARKING AVAILABILITY SYSTEM**  
Concept of Operations (ConOps)



**TRUCK PARKING AVAILABILITY SYSTEM**  
**PROJECT SYSTEMS ENGINEERING**  
**MANAGEMENT PLAN (PSEMP)**

Truck Parking Availability System Guidelines for RTMC Standard Operating Procedures



Truck Parking Availability System (TPAS) Guidelines  
For RTMC Standard Operating Procedures(SOPs)  
(Note: this guideline will be part of overall RTMC SOP)



**District 1**

I-75 and I-4 Truck Parking Availability System

Requirements Traceability Verification Matrix (RTVM)

Truck Parking ConOps Companion  
Software Architecture and System Requirements

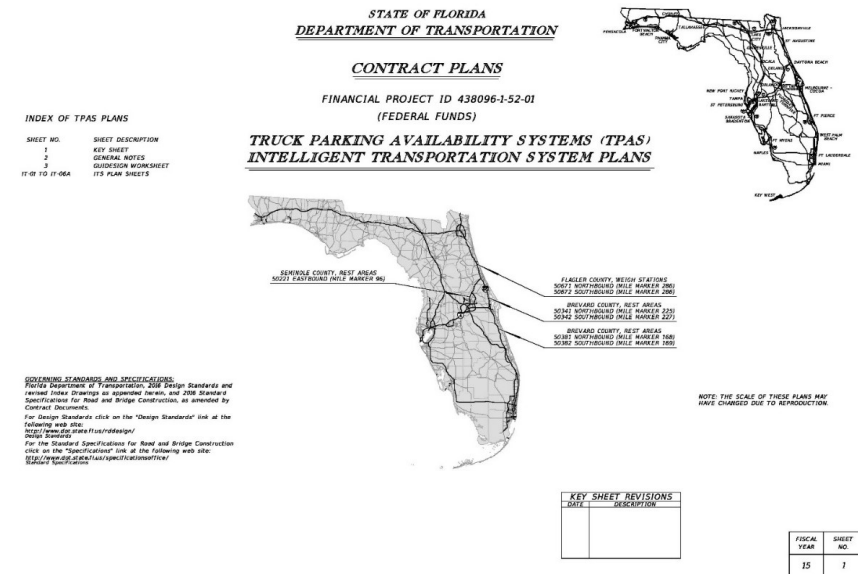
Version 0.3

November 18, 2015



# TPAS Concept Plans and Guide Sign

- Concept Plans Development
  - For each Design Build Project
  - Identified TPAS Sign location
  - TPAS system integration details
- Guide Sign Worksheets
  - Rest Area, Welcome Center and Weigh Station TPAS Signs
  - TPAS Sign Placed Inside Rest Area to Guide Trucks Towards Available Parking Rows





# TPAS Certification Documents

## Certification Documents

- Environmental Evaluation Report
- Environmental Certification
- Utility Certification
- Rail Certification
- Right of Way certification

STATEWIDE COMMERCIAL VEHICLE TRUCK PARKING  
SYSTEM

### Environmental Evaluation Report

December 2015

#### Project Limits:

Districtwide Rest Areas and Weigh Stations

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
STATUS OF ENVIRONMENTAL CERTIFICATION  
FOR FEDERAL PROJECT

550 250 13  
ENVIRONMENTAL MANAGEMENT  
UNIT

Financial Management No. 438096-1-52-01

Federal Aid No. PARK 001 A

Project Description (include project title, limits, and brief description of the proposed scope of work):

The sites are located within Brevard, Flagler and Seminole counties along I-95 and I-4. A wireless presence detection system (sensors) will be installed within existing paved truck parking spaces to monitor available truck parking. This system will relay information to the Regional Traffic Management Centers via ITS infrastructure and Sunguide(r).

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
CERTIFICATION FOR CONSTRUCTION

575406-02  
RIGHT OF WAY  
UNIT

R/W ITEM/SEGMENT NO.: 4380961  
CONSTRUCTION ITEM/SEGMENT NO.: 4380961  
F.A.P. NO. (Construction): PARK 001 A  
COUNTY: DIST/STATEWIDE  
LETTING DATE:  
MANAGING DISTRICT: 5  
STATE ROAD:  
DESCRIPTION: STATEWIDE COMMERCIAL  
VEHICLE TRUCK PARKING SYSTEM

The undersigned hereby certifies as follows:

Title to all property and easements needed for the above construction project is vested in the Florida Department of Transportation (Department) or a state or local government. The Department has obtained sufficient authority to construct and maintain the proposed improvements on property and easements owned by state or local governments. Further:



Florida Department of Transportation  
801 North Broadway Avenue  
Tallahassee, FL 32301

RICK SCOTT  
GOVERNOR

JIM BOYD  
SECRETARY

#### MEMORANDUM

Date: January 8, 2016  
To: Craig Toth, HNTB Project Manager  
From: Robert E Lee, Rail and Motor Carrier Office Manager (Interim)  
Copies: H. Michael Dowell,  
Subject: No Rail Involvement Certification  
FM#: 438096-1  
Description: Truck Parking Availability System (TPAS) Phase 1

DISTRICT UTILITY CERTIFICATION  
FOR FEDERALLY FUNDED DESIGN-BUILD PROJECTS

January 20, 2016

Financial Project Id.: 438096-1-52-01  
F.A. Project No.:  
Project Description: I-95 and I-4 Truck Parking Availability System  
County: Flagler, Volusia, Brevard, Seminole  
State Road: SR 400 (I-4), SR 9 (I-95)

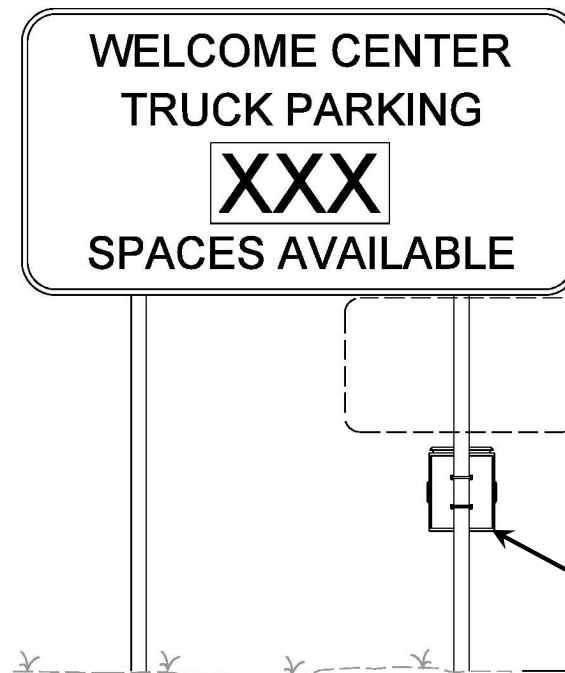
DISTRICT UTILITIES CERTIFICATION



# TPAS Sponsorship Sign

## TPAS Supplemental Sponsorship Sign

- 6' X 4' Size of the Supplemental Sponsorship Sign
- Supplemental Sign located right justified below TPAS Sign
- FDOT received FHWA Approval



Florida Division  
February 20, 2018

3500 Financial Plaza, Suite 400  
Tallahassee, Florida 32312  
Phone: (850) 553-2200  
Fax: (850) 942-9691  
www.fhwa.dot.gov/fldiv

In Reply Refer To:  
HDA-FL

Mr. Mike Dew  
Secretary of Transportation  
Florida Department of Transportation  
605 Suwannee Street  
Tallahassee, FL 32399-0450


Dear Secretary Dew:

Thank you for the January 24, 2018 letter requesting approval of the Truck Parking Availability System (TPAS) Sponsorship proposal on Florida Department of Transportation (FDOT) Weigh Stations, Rest Areas, and Welcome Center Facilities. The proposal seeks the opportunity to affix sponsorship acknowledgement plaques below TPAS signs in advance of truck parking locations within Interstate right-of-way throughout Florida.

The Federal Highway Administration (FHWA) has reviewed the FDOT proposal for TPAS Sponsorship Acknowledgement plaques. Based on Order 5160.1A, Policy on Sponsorship Acknowledgement and Agreements within Highway Right-of-Way, dated April 7, 2014, I hereby approve FDOT's proposal.

If you have any questions, please do not hesitate to contact Jorge J. Rivera at (407) 867-6406 or Kevin Burgess at (850) 553-2229.

Sincerely,

  
James Christian, P.E.  
Division Administrator

cc: Brian Blanchard, Assistant Secretary for Engineering and Operations, FDOT  
Marsha Johnson, Strategic Initiative Office, FDOT  
Nicholas O. Finch, Associate Division Administrator, FHWA  
Khoa Nguyen, Technical Services Director, FHWA

**Supplemental  
Sponsorship Sign**

**TPAS Sign Cabinet**

# TPAS Architecture

## Data collection

- In-ground sensors
- Ingress and egress sensors

## Data communications

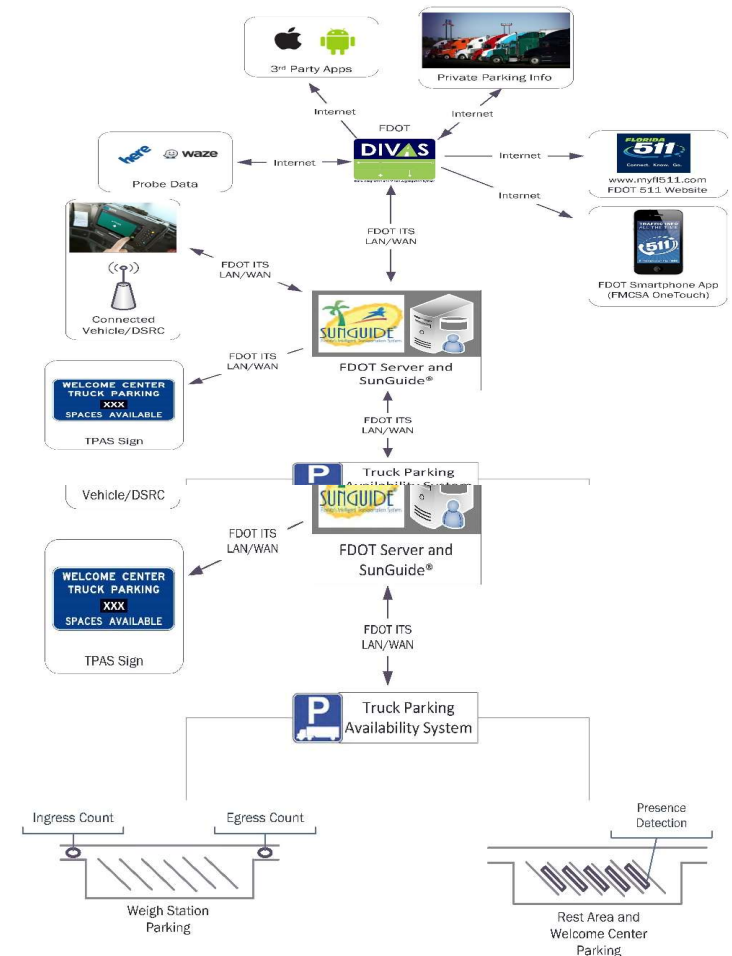
- Existing ITS network

## Data collection, processing, and storage

- RTMC using SunGuide® system

## Data dissemination

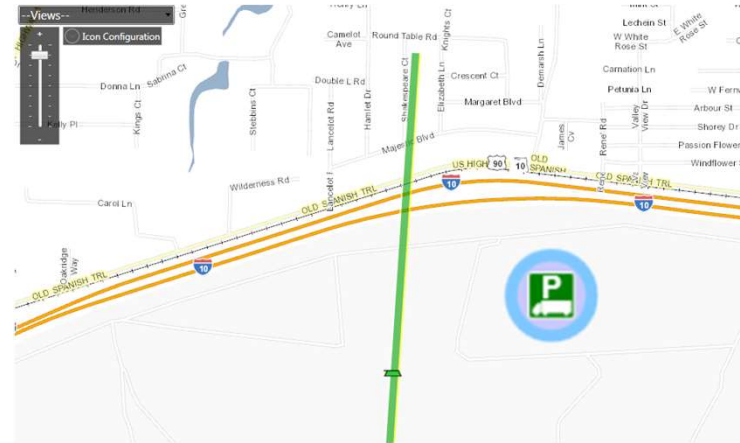
- Embedded roadside Dynamic Message Sign (DMS)
- Connected Vehicle and Dedicated Short Range Communications (DSRC) - Future
- Florida 511
- Data Integration and Video Aggregation System (DIVAS)



# TPAS SunGuide® Interface

## TPAS SunGuide® Interface

- Each in-ground sensor vendor
  - Mock set up at Traffic Engineering Research Lab (TERL)
  - Interface Control Document (ICD) using TPAS ConOps Companion
  - In-ground sensor data interface with SunGuide® is adopted during mock set up
- SunGuide® Release 7.0
  - Display truck parking availability at rest areas and weigh stations
  - Truck parking availability posted on DMS signs



Name	Op Status	Last Updated	Roadway/Direction	Available Spaces	Alarm Status
IPSens_01	Active	06/06/2018 14:17	I-10 Westbound, Eastbound	1	No
TPS: I-10 EB MM 194.0 PF1	Out of Service	06/06/2018 13:56	I-10 Eastbound, Westbound	N/A	No
TPS: I-10_MM233.0_PF1	Active	06/06/2018 14:17	I-10 Eastbound	0	No
TPS: I-10_MM233.0_PF2	Active	06/06/2018 14:17	I-10 Westbound	0	No

Device Status

Presence Link: [TPS: I-10\\_MM233.0\\_PF2\\_Link2](#) Active

DMS: [Color DMS Simulator 3](#) Active

Camera: [015\\_WTI\\_SW\\_720H](#) Active

Availability

Reported Availability: 0

Calculated Availability: 0

Correction: 0

New Corrected Availability: 0

[Send Correct Availability](#)

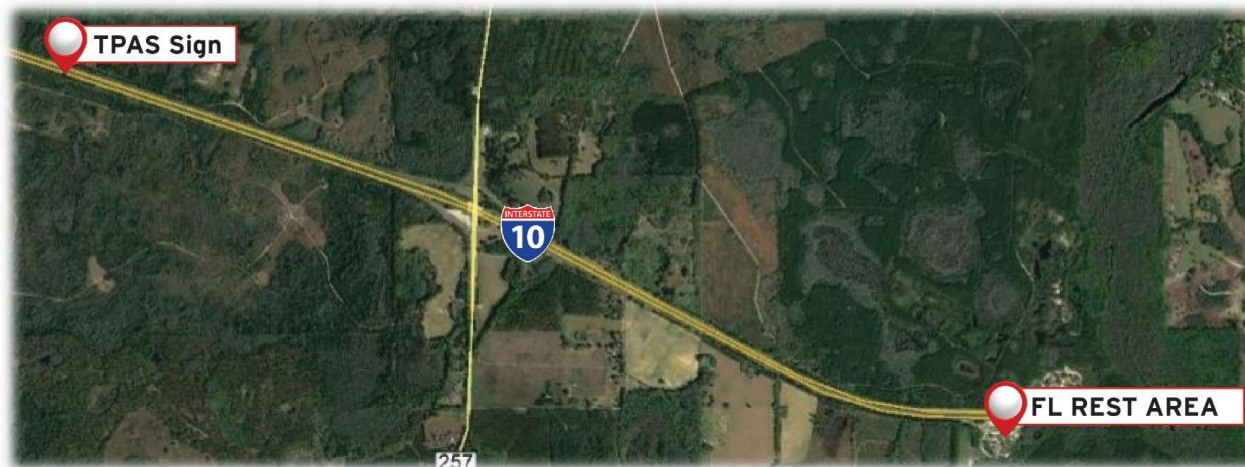
DMSs

[Color DMS Simulator 3](#)

# Information Dissemination - Signs

## Criteria used for roadside signs

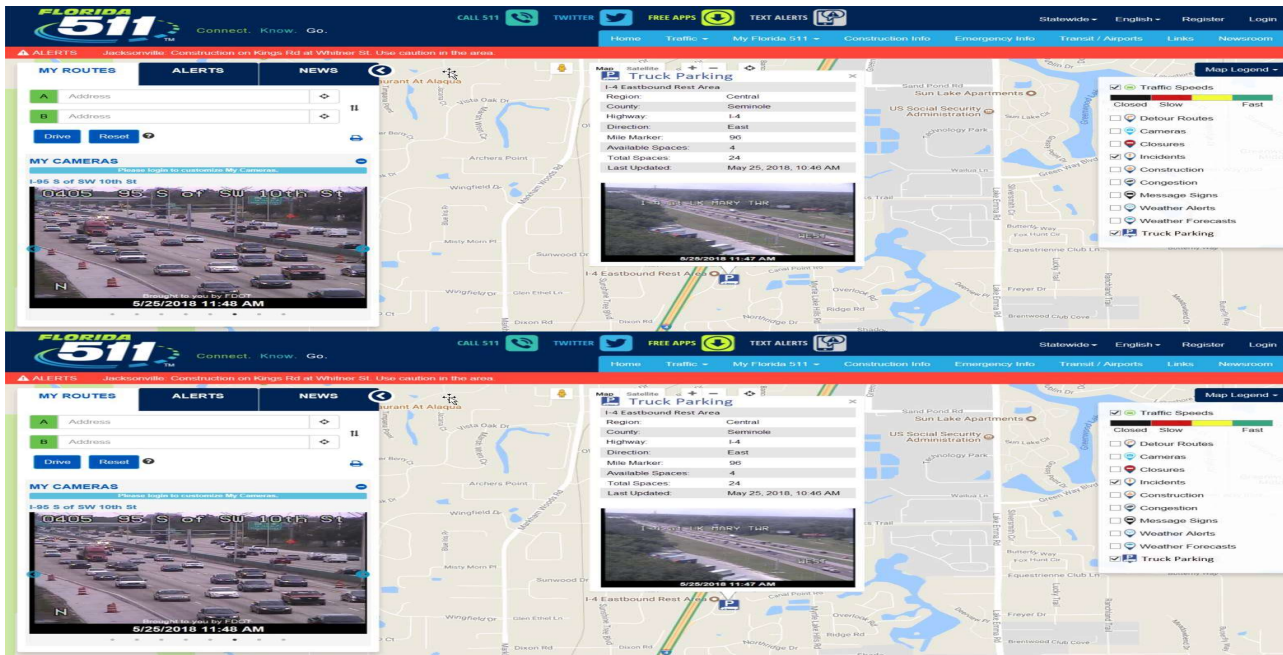
- Two to three miles upstream of the parking facility preferably prior to an upstream exit ramp for better decision-making
- Manual of Uniform Traffic Control Devices (MUTCD) compliant
- Near existing ITS communication and power source
- Near an existing CCTV for message verification



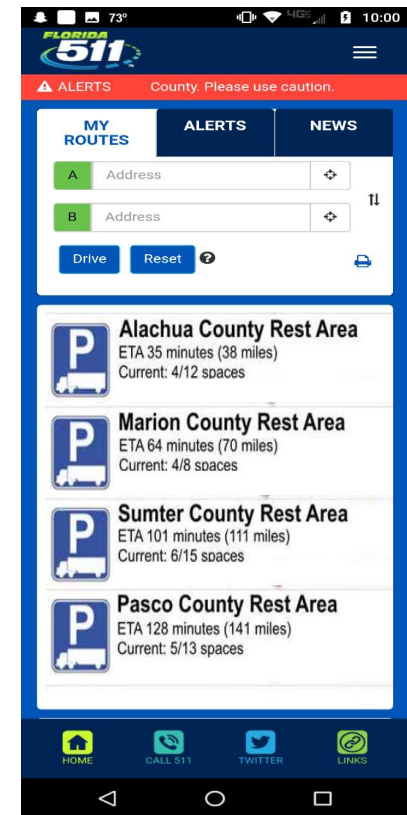


# Information Dissemination - 511

## FL511 Mobile App Truck Parking Facilities List View



FL511 Website Truck Parking Facility Map View



Questions?

Thank you!

Marie Tucker

Commercial Vehicle Operations

Manager

[Marie.Tucker@dot.state.fl.us](mailto:Marie.Tucker@dot.state.fl.us)

Jeffery Frost

Incident Management

Commercial Vehicle Operations

Program Manager

[Jeffery.Frost@dot.state.fl.us](mailto:Jeffery.Frost@dot.state.fl.us)