

# Florida Department of Transportation



## TRUCK PARKING AVAILABILITY SYSTEM

### PROJECT SYSTEMS ENGINEERING MANAGEMENT PLAN (PSEMP)

# DRAFT

Version 1.0

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PREPARED FOR:

#### **Florida Department of Transportation**

Central Office – TSM&O Section

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### Document Control Panel

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## List of Acronyms

APL	Approved Product List
ATMS	Advanced Traffic Management System
CEI	Construction, Engineering and Inspection
CO	Central Office
CCTV	Closed Circuit Television
CPM	Critical Path Method
DBB	Design-Bid-Build
DMS	Dynamic Message Sign
DTPS	Dynamic Truck Parking Signs
FDOT	Florida Department of Transportation
FHP	Florida Highway Patrol
FMS	Freeway Management System
FTE	Florida Turnpike Enterprise
ITS	Intelligent Transportation Systems
ITS-FM	ITS Facilities Management
MUTCD	Manual of Uniform Traffic Control Devices
MVDS	Microwave Vehicle Detection System
NITSA	National Intelligent Transportation System Architecture
O&M	Operations and Maintenance
OIT	On-Site Integration Test
OPT	Operational Performance Test
PITSA	Project Intelligent Transportation System Architecture

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PSEMP	Project Systems Engineering Management Plan
RITSA	Regional Intelligent Transportation System Architecture
RRSP	Road Ranger Service Patrol
RTMC	Regional Transportation Management Center
RTVM	Requirements Traceability Verification Matrix
SITSA	Statewide Intelligent Transportation System Architecture
SOP	Standard Operating Procedures
SwRI	Southwest Research Institute
TIM	Traffic Incident Management
TMC	Traffic Management Center
TPAS	Truck Parking Availability System
TPDS	Truck Parking Detection System

## **1. Document Overview**

This document is the Project Systems Engineering Management Plan (PSEMP) for the FDOT Truck Parking Availability System (TPAS). A PSEMP is a plan that helps manage a project by utilizing systems engineering processes (SEPs).

The document is organized as follows:

- Section 2 – Need for a PSEMP
- Section 3 – Applicable Documents
- Section 4 – Applicable Systems Engineering Processes
- Section 5 – Project Management and Control.

## **2. Need for a Project Systems Engineering Management Plan**

The Federal Highway Administration (FHWA) requires states that desire federal assistance for Intelligent Transportation System (ITS) deployment project to use a SEP to qualify for financial assistance (FHWA, Accessed 2015). The PSEMP documents tasks to be performed for the coordination and control of all ITS device deployments.

The Florida Department of Transportation (FDOT) guide to writing a PSEMP is used in the creation of this document (Florida Department of Transportation, 2006).

### **2.1 Project Identification**

Project Name: FDOT Truck Parking Availability System  
Financial Project Identification (ID): F431623092.

### **2.2 Purpose and Scope**

This document serves as the PSEMP for the FDOT TPAS. It provides planning guidance for the technical management, procurement, installation, and acceptance of the TPAS project, which includes:

- Deployment of ITS infrastructure to improve surface transportation efficiency and monitoring throughout four FDOT Interstate corridors:
  - I-4
  - I-10
  - I-75
  - I-95
- Configuration of SunGuide® software
- Changes to RTMC standard operating procedures (SOP)
- Possible changes to RTMC staffing levels
- Changes to the field maintenance scope of services
- Changes to Florida Highway Patrol duties at commercial vehicle weigh stations
- Changes in Road Ranger Service Patrol (RRSP) coverage.

The ITS components will be operated from all the Regional TMCs (RTMCs) since they encompass the Interstate corridors in consideration in the full realization of the TPAS. The Florida Statewide ITS Architecture (SITSA) includes a module for TPAS (ATMS17 – Regional Parking Management), but the Regional ITS Architectures (RITSAs) will need to be amended to include the ATMS17 in most cases.

A white paper (Florida Department of Transportation, District 2, February 2015) has demonstrated the concept of TPAS on I-95 in District 2. The new Intelligent Transportation System (ITS) traffic operations equipment will include:

- Detectors for counting trucks entering and leaving the parking facility
- CCTV verification of parking use
- Dissemination of parking information to truck drivers and fleet operators.

Further details of the demonstration project’s scope may be obtained from the white paper and the Concept of Operations (ConOps) (Florida Department of Transportation-HNTB, 2015). The ConOps also includes discussion of how the project will be approached in two phases. In Phase I, I-4 and I-95 would be built (Districts 1, 2, 4, 5, and 7). In Phase II, I-10 and I-75 would be done (Districts 1, 2, 3, and 7). Phase II would closely follow the design of a similar system on I-94 in Michigan that is presented in the ConOps. Phase II is not discussed further in this PSEMP, but may be addressed in a follow-up document. This PSEMP is for Phase I only.

**2.3 Technical Project Summary Schedule**

The project milestones (Table 1) are based on the FDOT Task Work Order 2, May 14, 2015. As the project progresses, the milestones and corresponding dates indicated below are subject to change and would be reflected in updates to the program schedule in Table 1.

Subtask Name	Duration (Calendar Days)	Scheduled Start	Scheduled Finish
Demonstration Project	xx	xx	Tue, March 24, 2015
ConOps	87	August 3, 2015	October 29, 2015
PSEMP	54	October 4, 2015	November 27, 2015
Detection Layout Templates	24	August 28, 2015	September 21, 2015
Final Design Phase 1	156	August 28, 2015	January 31, 2016
Advertisement for Bids <sup>1</sup>	28	April 1, 2016	April 1, 2016
Award	1	April 29, 2016	April 29, 2016
Final Acceptance	1	April 29, 2017	April 29, 2017

**Table 1: Project Schedule**

<sup>1</sup> Advertisement for Bids and the radio communication elements may need to be separated by District.



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## 2.4 Relationship to Other Plans

### 2.4.1 Relationship to Florida's Ten-Year ITS Cost Feasible Plan

The Ten-Year ITS Cost Feasible Plan (CFP) is a 10-year program and resource plan that identifies ITS projects in the overall context of Florida's ITS Corridor Implementation Plans. It represents a commitment of state- and district-managed funds over a 10-year period to provide ITS funds in a coordinated statewide program to develop ITS infrastructure on Florida's major intrastate highways. The TPAS project is ***not*** expressly represented in the Ten-Year ITS CFP. Unless the project is funded out of existing project budgets, an amendment to include this TPAS project in the CFP may be necessary to move the project forward.

The FDOT's current Ten-Year ITS CFP (2014-2024) is available online at:

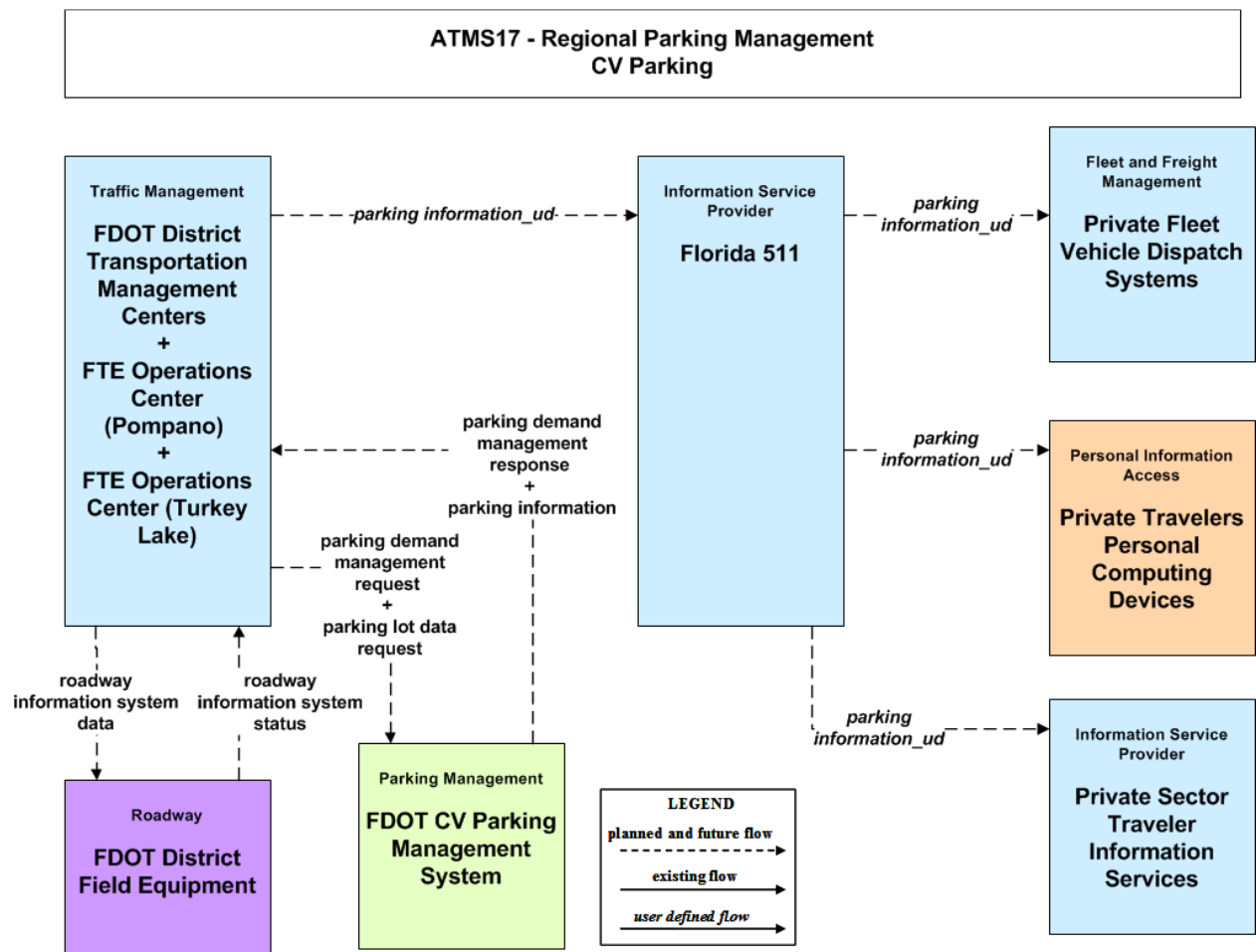
<http://www.dot.state.fl.us/trafficoperations/ITS/ITS.shtm>, under the Cost Feasible Plan keyword link.

### 2.4.2 Relationship to the Florida Statewide Intelligent Transportation System Architecture

As discussed in the TPAS ConOps, the TPAS is modeled in the SITSA with ATMS 17 Service Package: [http://www.consystem.com/florida/state/web/files/mpimages/ATMS17-1\\_DS.htm](http://www.consystem.com/florida/state/web/files/mpimages/ATMS17-1_DS.htm).

ATMS 17 - Regional Parking Management for Commercial Vehicles - that comprises a generic system for parking information (Florida Department of Transportation, Accessed September 2015) and whose User Services diagram is shown in Figure 2. In the figure reference is made to FTE – Florida Turnpike Enterprise, which is not part of this TPAS effort, though one day may be included.

The ATMS 17 User Services diagram comprises a system for parking information where the RTMC controls field equipment such as Dynamic Message Signs (DMS), Dynamic Truck Parking Signs (DTPSS ) and CCTV cameras. Parking space data is sent from the public rest area to the RTMCs' SunGuide TPAS software. The analyzed data is sent to the Information Service Provider (ISP), which is Florida 511 software, and that information is sent to the commercial vehicle operators directly, via their fleet managers and from other ISPs, such as Waze, Divewyze, etc.



**Figure 1: SITSA Graphic for ATMS17 – Regional Parking Management Commercial Vehicles** Source: [http://www.consysfec.com/florida/state/web/files/mpimages/ATMS17-1\\_DS.htm](http://www.consysfec.com/florida/state/web/files/mpimages/ATMS17-1_DS.htm).

More information on the current RITSA and SITSA is available online at: <http://www.consysfec.com/florida/default.htm>.

### 2.4.3 Relationship to other “On-project” Plans

The other on-project planning level documents that have been developed previously by the FDOT for this ITS Project include:

- Truck Parking Demonstration Project White Paper (Florida Department of Transportation, District 2, February 2015)
- Concept of Operations (Florida Department of Transportation-HNTB, 2015).

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### 3. Documents

The following documents are referenced and used in preparing this TPAS PSEMP.

- AASHTO. (2005). *A Policy on Design Standards - Interstate System, 5th Edition*. Washington, D.C.: American Association of State Highway and Transportation Officials.
- AASHTO. (2011). *A Policy on Geometric Design of Highways and Streets, 6th Edition*. Washington, D.C.: American Association of State Highway and Transportation Officials.
- FHWA. (Accessed 2015). *23 CODE OF FEDERAL REGULATIONS (CFR) PART 940, Intelligent Transportation System Architecture and Standards – Final Rule (latest edition)*. <http://www.gpo.gov/fdsys/granule/CFR-2008-title23-vol1/CFR-2008-title23-vol1-part940>.
- Florida Department of Transportation. (2006). *Writing a Project Systems Engineering Management Plan, Version 4*. [http://www.dot.state.fl.us/trafficoperations/ITS/Projects\\_Deploy/SEMP/060929-PSEMP-V4.pdf](http://www.dot.state.fl.us/trafficoperations/ITS/Projects_Deploy/SEMP/060929-PSEMP-V4.pdf).
- Florida Department of Transportation. (Accessed September 2015). *Florida Statewide ITS Architecture*. Retrieved from [http://www.consystem.com/florida/state/web/files/mpimages/ATMS17-1\\_DS.htm](http://www.consystem.com/florida/state/web/files/mpimages/ATMS17-1_DS.htm).
- Florida Department of Transportation, District 2. (February 2015). *Truck Parking Information System (TPIS)*.
- Florida Department of Transportation-HNTB. (2015). *Truck Parking Availability System - Concept of Operations*.
- Iteris, ITS National Architecture 7.0.website. (n.d.). Retrieved from <http://www.iteris.com/itsarch/index.htm>.
- USDOT FHWA. (May 2012). *Manual on Uniform Traffic Control Devices*. Washington, D.C.: <http://mutcd.fhwa.dot.gov/pdfs/2009r1r2/mutcd2009r1r2edition.pdf>.

### 4. Applicable Systems Engineering Processes

Key processes that may be used are:

- Developing the project ITS architecture (PITSA)
- Creation of High-level Requirements (ConOps) and White Paper for District 2 I-95 Demonstration Project
- Creation of Detailed Requirements
- Trade-off Studies, Gap Analyses, or Technology Assessments
- Technical Reviews
- Risk Identification, Assessment, and Mitigation
- Creation of the Requirements Traceability Verification Matrix (RTVM)
- Creation of Performance Measure Metrics
- System Test, Integration, and Acceptance Planning.

These are discussed individually in the following sections.

#### 4.1 Developing the PITSA

A Project ITS Architecture (PITSA) is required if the Regional ITS Architecture (RITSA) does not include the applicable service package(s). A review of the FDOT Districts 1, 2, 4, 5 and 7

reveals the RITSA include Service Package ATIS17 Regional Parking Management. The description of this service package lacks reference to commercial vehicle parking management envisioned by TPAS. Therefore a PITSA is required. In this case, however, the PITSA is identical to the SITSA Service Package ATMS 17 Regional Parking Management for Commercial Vehicles (See Figure 1, Section 2.4.2). Therefore, the PITSA is defined as the SITSA so no further development of a TPAS PITSA is required for TPAS Phase 1.

An extension of TPAS in Phase II will complete the Interstate rest areas and include private truck stop parking. At this time Florida's Turnpike Enterprise (FTE) is not planning to implement TPAS.

Each applicable RITSA will need to be updated to include elements of the ATMS17 Service Package required for TPAS equipment (e.g., CCTV, detectors) as shown in SITSA Service Package ATMS17 Regional Parking Management for Commercial Vehicles.

The instructional template for developing PSEMPS (Florida Department of Transportation, 2006, p. 6) states that, if a project architecture is not identified in a RITSA, a Turbo Architecture needs to be created for it. Thus, an ATIS17 Turbo Architecture for the Phase I Interstate rest areas will need to be created for each RITSA along with Interface Control Documents (ICDs). The RITSA Turbo Architectures would extend the SITSA to include the stakeholders associated with each RTMC.

## **4.2 Creation of High-Level Requirements**

A Demonstration project was done at a rest area on I-95 and a ConOps (Florida Department of Transportation-HNTB, 2015). When Phase II is pursued, which involves the inclusion of private truck stops in the Interstate corridors, another ConOps or sufficient document, possibly as part of the private truck stop proposal, will need to be submitted by the private-side developer for that portion.

A summary of high-level requirements follows. The primary bullets are functional requirements derived from the ConOps and white paper. The secondary bullets represent high-level technical requirements.

- Integration of TPAS operation into SunGuide software, including:
  - Operator interface to DTSP status viewing
  - Automated DTSP presentation based on Microwave Vehicle Detection System (MVDS) readings
  - Operator interface to DTSP control when recalibrating
  - Integration of DTSP recalibration into SunGuide Events Log
  - Access to CCTV views and Pan-Tilt-Zoom control should be provided from TPAS Operator user interface
- Development of SOP for TPAS DMS/DTSP and CCTV usage
  - Automated TPAS DTSP presentation
  - Manual TPAS DTSP recalibration of space availability
  - Manual upstream DMS messaging
  - Manual CCTV scan of lot to count occupancy for recalibration at start of shift and

- 
- at other times as needed
  - Training module and operator training
  - Operator assignments (designation of responsibilities) for TPAS relative to other responsibilities for other functions in the RTMC
  - Surveillance (CCTV) Coverage Requirements
    - 100% of truck parking in view
    - CCTV cameras to meet FDOT specifications for HD, H.264 and IP technology
    - CCTV cameras to be on FDOT approved product list (APL)
    - CCTV cameras for low light and/or no light surveillance should be considered since TPAS operations will be in low light/no light overnight
  - Traffic Detection (MVDS) requirements
    - MVDS to be located and configured to detect entry/exit of truck parking areas designated for TPAS
    - MVDS data to be fed to SunGuide for occupancy calculation and presentation
  - Truck Parking Space Detection Requirements
    - Detection of every legitimate truck parking space
    - Presence detection for entire time space is occupied, no time outs
    - Detect both large trucks and smaller vehicles that may occupy the truck parking space
  - DTPS Requirements
    - DTPS to be placed sufficiently upstream for driver notification of TPAS status with distance to meet MUTCD requirements
    - DTPS indications will be LED displays with configurations for number of spaces available at the next rest area
    - DTPS display size shall be in accordance with the MUTCD
    - DTPS sign panels and controllers shall be on the APL
  - Communication Requirements
    - TPAS field elements including CCTV, MVDS, DTPS, ITS Field Cabinets shall be connected via Ethernet network over the District fiber optic infrastructure
    - Designer shall contact FDOT for fiber splicing and networking requirements during design
    - Wireless communication permitted until fiber is available
    - All communication to be by state-owned media (fiber/wireless)
  - Electrical Requirements
    - All TPAS field elements shall be connected to commercial electrical power
    - Grounding, surge suppression and lightning protection shall be in accordance with FDOT specifications and standards
    - Stand-alone solar power units may be needed for DPTS in remote locations
  - Integration and Testing Requirements (See Section 4.9 for additional integration and testing requirements)
    - Integration, testing and acceptance plans shall be developed during design and construction per FDOT standards and specifications
    - All necessary operation, configuration, installation, trouble-shooting and maintenance manuals shall be provided by the Contractor
    - Training should be provide on unique aspects of the TPAS DMS/DTPS field elements for network managers, maintenance technicians and Operators

- 
- Enforcement
    - FDOT and Florida Highway Patrol (FHP) should collaborate on enforcement and legal use of truck parking areas
    - FHP to periodically verify truck spaces occupied in weigh stations
  - ITS Facilities Management (ITS-FM)
    - Plans and specifications will require the contractor and/or the integrator to populate ITS-FM with all TPAS field elements per District and Central Office (CO) requirements

### **4.3 Creation of Detailed Requirements**

FDOT has chosen to procure services through a design-bid-build process (DBB) in three parts:

- The CO will develop the TPAS module in SunGuide under its extant contract with Southwest Research Institute (SwRI) as specified in the SISTA ATMS17 User Service Package.
- The Truck Parking Detection System (TPDS) - data collection and information distribution - will be put out to bid as statewide DBB contracts by the CO.
- ITS field elements, including fiber, cabinets, power, CCTV cameras, poles, and so on will be designed by the FDOT Districts with coordination through the CO and put out to bid by each District for its portion of the TPAS.

In each case FDOT CO will maintain oversight and coordination of the design and construction.

Detailed requirements shall be developed during final design. Most detailed requirements are addressed in FDOT standard specifications, plan preparation manual, and standard design indices. TPAS DTPS requirements may not currently be fully addressed in FDOT standards and specifications. If that remains the case during final design, a technical special provision, a developmental specification or a modified special provision may be required.

### **4.4 Tradeoff Studies, Gap Analyses or Technology Assessments**

With respect to this TPAS, tradeoff studies, gap analyses, or technology assessments are not planned, since a Demonstration Project has already been performed and comparisons of alternative project designs are not necessary.

### **4.5 Technical Reviews**

The FDOT TPAS project reviews are contained in its contract with SWRI and with the DBB contracts for the CO statewide TPDS and the Districts' individual field elements..

For the TPDS only a final plan review is needed. For communication and ITS elements (including any wireless design) technical reviews will be determined by the District or the Central Office at the time ITS design is authorized to proceed. Only one plan set for the TPDS will be needed if the Districts are able to furnish and install power and the field elements.

It is anticipated that the design will be reviewed during the design period at:

- Final Design Plans Submittal.

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#### **4.6 Risk Identification, Assessment, and Mitigation**

The following is an assessment of risks that could affect the scheduled completion of the project. These risks will be supplemented by a risk matrix provided by FDOT in the design phase.

1. SunGuide Software Integration – The existing SunGuide software will be modified to include an interface for the TPAS operations. SunGuide supports all the TPAS ITS equipment: CCTV, DMS/DTPS, and vehicle detectors. The software patch will also allow for data collection and monitoring of the TPAS.

The maintenance and operation of the SunGuide software operations and its supporting systems will need to be coordinated during the contractor integration team work to initiate the new equipment and functions. This coordination, the timeliness of its delivery and its testing and installation at the District level contribute to its risk. Risk Category: **High.**

2. ITS Equipment Design and Construction – Coordination of both the design and construction is required to maintain the project schedule. To mitigate the risk, ongoing communication must be established and sustained between the FDOT designers, construction firm(s) and any subcontractor(s). Risk Category: **Medium.**
3. Local Utility Coordination – The subsurface utility engineering for the project to include power and fiber optic connections will need to be conducted during the design phase. Coordination with the existing utility companies is important to the project schedule. To mitigate the risk, ongoing communication must be established between the FDOT designers and construction firm(s), the FDOT personnel supervising the construction, and the local utility companies. Risk Category: **Low.**

#### **4.7 Creation of the RTVM**

The scope of this multi-District project includes adding functional modifications to the SunGuide software that will apply across the state to accommodate each RTMC's operation of the local TPAS facilities.

The high-level technical requirements in Section 4.2 are to be tracked in a RTMC-specific RTVM. The RTVM will track each high-level technical requirement along with associated detailed technical requirements through final design, installation, integration, testing and acceptance. The RTVM shall identify at least one detailed technical requirement for each high-level requirement. The RTVM will identify at least one integration-and-testing requirement for each detailed technical requirement.

Testing requirements may range from visual observation to a detailed test plan as required to demonstrate detailed requirements were met prior to final acceptance.

#### **4.8 Creation of Performance Measure Metrics**

Performance measures should be established to achieve the FDOT goal of establishing performance-based transportation management. Some performance statistics to consider are:

- 
- lot occupancy –
    - mean, median, mode, variance, number of spaces/percentage of spaces available/in use by time of day, time periods and durations when lot is at or near capacity
    - number of FHP and RRSP reports on overcapacity ramp parking
  - lot availability accuracy/reliability –
    - how often recalibration is necessary
    - complaints about inaccurate parking information.

Performance measures will be finalized in the design phase and should be as automated as possible to provide consistency of reporting between the RTMCs and so they can be compiled easily for statewide reports on TPAS performance.

#### **4.9 System Verification, Testing, Integration, and Acceptance Planning**

The construction consultant/contractor will provide the test plan. The Construction, Engineering and Inspection (CEI) engineer will use the RTVM and the test plan to determine if a test should be accepted or rejected based on results.

##### **4.9.1 System Verification Plan Guidelines**

The TPAS designer shall prepare detailed plans for testing all furnished hardware, software, and infrastructure. The test plans shall be developed to confirm that all functionality of the SunGuide systems, along with all requirements covered by the approved TPAS component designs are met by the equipment and/or system elements once in place and operational per the terms of the contract documents.

##### ***4.9.1.1 Existing FMS Software and Hardware Testing***

The design firm shall develop methods and testing plans to document the physical and logical configurations of the existing in-place Freeway Management System (FMS), communication infrastructure, network infrastructure, SunGuide software and other RTMC system remain fully functional after TPAS hardware and software implementation and integration.

##### ***4.9.1.2 On-Site Integration Test (OIT)***

The OIT shall test roadside and center elements implemented during this project. The OIT is intended to document and verify the level of conformance of the equipment with the requirements and functionality covered by the approved RTVM and contract documents. The overriding purpose of the OIT is to each site is ready for subsystem testing.

##### ***4.9.1.3 Subsystem Tests***

Subsystem tests shall verify each subsystem from the field element to the RTMC. Subsystems include parking detection, DMS, DTPS, communication network, and CCTV.

##### ***4.9.1.4 System Test***

The system test shall verify end-to-end performance of all subsystems after integration with each District's SunGuide software and database servers.

##### ***4.9.1.5 Operational Performance Test (OPT)***

The OPT shall monitor all aspects of the system elements furnished under day-to-day operating conditions. The OPT shall be performed after successful completion of the System Test. The



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intent is to demonstrate a continuous 30-day period without substantive degradation in performance or failure in compliance with contract and system functional requirements.

#### **4.9.2 Testing Plans**

A detailed plan for each required test shall be prepared as required to demonstrate requirements in the RTVM, Contract Documents and Standard Specifications have been met. A test plan shall be developed to confirm that modified functionality of the SunGuide software performs as intended by the SITSA, the ConOps, the PSEMP and the RTVM.

#### **4.9.3 System Integration Plan**

A system integration plan will be developed in the plans and specifications and referenced in the RTVM. In Phase 1, this task involves four (4) districts, their various differences, and multiple variables along with CO oversight.

#### **4.9.4 System Acceptance Plan**

The System Acceptance Plan shall be in accordance with the Standard Specifications and Contract Documents.

##### ***4.9.4.1 TPAS Subsystems***

Results showing all test parameters meet requirements for all required tests shall be submitted by the Contractor prior to System Acceptance. The Contractor shall provide correction and retesting for any test parameters failing to meet requirements.

##### ***4.9.4.2 ITS-FM***

The Department's ITS-FM database shall be fully populated by the contractor's integrator with all subsystem information. The Contractor shall provide, in North American Datum (NAD), High Accuracy Reference Network (HARN), state-plane, Florida compatible format, a geo- database of the X-Y spatial location of all infrastructure of the TPAS system components.

##### ***4.9.4.3. Fiber/Wireless Subsystems***

Test plans for all new and modified fiber/wireless system components shall ensure these elements are fully tested and documented per the RTVM, contract documents and Standard Specifications.

##### ***4.9.4.4 RTMC Central System Elements***

All RTMC Central System Elements shall be fully integrated and tested as required by the RTVM, Standard Specifications and Contract Documents.

## **5 Project Management and Control**

The ITS Management Team responsibility begins with the project kickoff and ends with operations and maintenance.

The following areas will be covered in the paragraphs below:

- Organization Structure
- Managing the Schedule with Project Evaluation and Review Technique, and the Critical Path Method (CPM)
- Procurement Management

- 
- Risk Management
  - Subcontractor Management
  - Engineering Specialty Integration
  - Monthly Project Status Reviews
  - Change Management
  - Quality Management (QM)
  - Systems Acceptance
  - Operations and Maintenance/ Upgrade/Retirement
  - Lessons Learned.

### **5.1 Organizational Structure**

Oversight for the project will be done by:

- Paul Clark – FDOT Project Manager
- xxxxxxxx –Technical Project Manager.

The FDOT Districts will operate and maintain the RTMCs' components once the project is deployed.

### **5.2 Managing the Schedule with the Project Evaluation, Review Techniques and the Critical Path Method.**

The high-level schedule milestones which were approved by the FDOT are discussed in Section 2.3. The detailed project schedule is a living document that's included within the Comprehensive Program Plan. The Project Manager, will use this schedule in order to monitor/evaluate the design and construction progress during the design and construction project phases.

### **5.3 Procurement Management**

The construction contractor shall procure the civil work infrastructure, field devices, communication infrastructure and head-end equipment system items to comply with the construction criteria package and the high-level technical requirements it contains.

### **5.4 Risk Management**

Besides the risks identified in Section 4.6, the selected design and construction providers will provide a risk management plan to the FDOT for review and approval.

### **5.5 Subcontractor Management**

The design and construction providers will be responsible for managing any subcontractor that may be needed for the project. The design and construction providers will provide a subcontractor plan to the FDOT for review.

### **5.6.1 Engineering Specialty Integration**

#### ***5.6.1 Integrated Logistics Support and Maintenance Engineering***

This specialty provides the following project input:

- Defines Support Requirements – for example, the mean time to repair (MTTR)
- Supports Considerations that Influence Requirements and Design

- 
- Provides the Necessary Support Package
  - Provides Operational Support at a Minimum Cost.

### **5.7 Monthly Project Status Reviews**

The FDOT will schedule monthly project status reviews with the selected design firm and construction contractor throughout the contract duration. At the review meetings, items such as project schedule, cost, action items, etc., will be discussed in detail and documented.

### **5.8 Change Management**

The selected design firm will address changes in schedule and cost to the FDOT for review and approval.

The CEI consultant will work with the FDOT and design firm to evaluate the effects of the project change.

### **5.9 Quality Management**

The selected design firm and construction contractor will provide a Quality Assurance Plan to the FDOT for review and approval. The Construction Engineering and Inspection (CEI) consultant will work with the FDOT and selected construction contractor to evaluate the quality of the project deployment.

### **5.10 Systems Acceptance**

The selected design firm is responsible for providing a system acceptance test plan to the FDOT for review and approval. The procurement document will describe in detail the contents of the system acceptance test plan.

After the construction contractor has performed the acceptance test, the final inspection of the system will be performed by the FDOT in the presence of an authorized construction contractor representative.

The FDOT will prepare a final acceptance test report based on the results of the system acceptance test and final system inspection. Once the construction contractor has addressed all comments and deficiencies noted in the final acceptance test report to the satisfaction of the FDOT project manager, the FDOT will issue a formal notification of system acceptance. At this point, the FDOT will assume system ownership, and the construction contractor will become responsible for hardware and software warranty and maintenance.

### **5.11 Operations and Maintenance, Upgrade, and Retirement**

The selected construction contractor will prepare an Operations and Maintenance (O&M) Plan that will be reviewed and approved by FDOT prior to system implementation. The O&M Plan, which will include all relevant policies and procedures, will address all scheduled and unscheduled maintenance responses for all hardware and software, communications links and networks, power supplies and processing systems. The plan should also detail any upgrade or retirement activities that may be required during the contractual period.

### **5.12 Lessons Learned**

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As the design progresses, key comments and subsequent action items from each design review meeting will be tracked and documented. Through the system engineering process, project owners will evaluate project performance and track all pertinent issues that arise during the project to ensure that all project requirements are met.