Surface Transportation Security and Reliability Information System Model Deployment

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Final
Concept of Operations

Submitted by:
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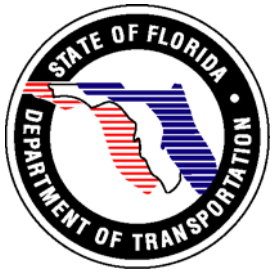

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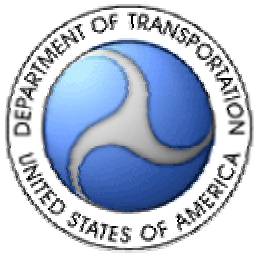

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16. Abstract

FDOT began design of a Surface Transportation Security and Reliability Information System Model Deployment in May 2003. This model deployment focuses on enhancing the security and reliability of the surface transportation system through the widespread availability of real-time information. The model deployment will examine how security and reliability can be improved under several situations or scenarios.

The ConOps document is intended to be part of an initial effort to collect requirements, develop system concepts and configurations, and to establish how these systems shall operate and interact in the future. This document will provide an understanding of how the various procurements shall be configured and what elements shall be included as part of the procurements. The Draft and Final versions of the ConOps is intended to be a "living" document that reflects the evolving requirements for each of the specific procurements. This ConOps document along with the Requirements Document forms the basis for the development of the various sub-systems within the iFlorida system.

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1.0 Scope

This section provides an overview of the Concept of Operations (ConOps) document.

1.1 Introduction

In March 2003, the Florida Department of Transportation (FDOT) was selected to participate in a highly innovative model deployment with the Federal Highway Administration (FHWA). The formal name of the program is the Surface Transportation Security and Reliability Information System Model Deployment (DTFH61-02-X-0089). However, as its goal is to provide an information infrastructure, it is more commonly referred to as the "Infostructure" MDI. The objective of the model deployment – called iFlorida – is to demonstrate the wide variety of operational functions that are enabled or enhanced by a surface transportation security and reliability information system. The model deployment will:

- Expand and integrate existing data collection and monitoring systems;
- Collect and share data;
- Use the data operationally to improve transportation system security, safety, reliability and performance; and
- Where appropriate, distribute the data to the traveling public.

The model deployment will demonstrate today's best practices and innovative approaches for the collection, processing, use, dissemination, sharing, and archiving of transportation information. As part of this model deployment, existing surveillance and monitoring systems will be augmented to fill gaps, and overall coverage will be enhanced with new sensor types, increased data rates, or increased coverage density. Existing institutional arrangements will be expanded to facilitate the enhancement of operational functionality and integration.

1.1.1 Program Objectives

The objectives of the iFlorida program (Program) are captured in the four "i"s of information, integration, intelligence, and innovation. The Program is designed to deliver information required by operating agencies to manage the transportation network more securely, reliably and efficiently and deliver the decision support information that travelers need to make best use of transportation facilities.

The Program will accomplish this through the seamless integration of information and telecommunication systems, incorporation of the highest levels of intelligence and the adoption of appropriate innovation. To be specific, the Program will:

- Expand the existing data collection, transportation management and information delivery infrastructure;

- Integrate data collection, monitoring and management systems both in normal operation and during times of crisis;
- Collect and share data;
- Use data operationally to improve transportation system management;
- Distribute decision-quality data to the traveling public;
- Establish a model for others and share the lessons and experiences learned along the way;
- Define performance measures, collect performance data and evaluate results;
- Illustrate how transportation, hurricane evacuation, weather information and security management can be integrated from both technical and organizational perspectives.

The iFlorida Team will achieve these objectives through the application of resources, experience and expertise within the framework of our proposed approach.

1.1.2 Project Partners

The iFlorida Project Team is composed of representatives from all public and private partners involved in iFlorida. These include:

Public Agencies

- Brevard County
- City of Daytona Beach
- City of Orlando
- FDOT District 2
- FDOT District 5
- FHP, Troops D and G
- Florida Division of Emergency Management
- Florida's Turnpike Enterprise
- Greater Orlando Airport Authority
- LYNX
- METROPLAN
- OOCEA
- Orange County
- Seminole County
- USDOT
- University of Central Florida's Advanced Transportation Systems Simulation
- University of North Florida
- Volusia County

Private Organizations

- 3M
- Boeing Autometric

- Cambridge Systematics, Inc.
- International Speedway Corporation
- Meteorlogix
- PBS&J

Together, their role is to facilitate full program team communications. To this end, iFlorida Project Team partners have agreed to host full program team meetings on a rotating basis.

1.2 Identification

This ConOps applies to the iFlorida project. The ConOps document is utilized to describe the operations concept for a specific system that can be implemented. Since not all of the iFlorida procurements are deployable systems some will not be discussed in this document. Below is a listing of all iFlorida procurements under their corresponding procurement bundle. Those procurements that are in listed in italics will be specifically detailed as part of the ConOps.

- **Central Florida Field Components**
  - *Field Components Design/Build (1)*
  - 3M Equipment
  - *City of Orlando Agency Integration (2)*
- **Weather**
  - *Central Florida RWIS (3)*
  - *Road Weather Forecasting (4)*
- **Security Command and Control**
  - *Security Command and Control (5)*
  - Security Cameras
- **Data Fusion, Sharing and Use**
  - *iFlorida Conditions System (6)*
  - *Statewide TTMS Upgrade (7)*
  - *Data Warehouse Expansion (8)*
  - *iFlorida Operations (9)*
- **Broadband Wireless**
  - *Broadband Wireless Trial (10)*
- **Probe Vehicle Test Bed**
  - *Probe Vehicle Test (11)*
- **Studies**
  - METROPLAN Data Mining
  - Network Reliability / Traffic Modeling
  - Speedway Evaluation Plan / RTMC Vulnerability
- **Evaluation Support**
  - Evaluation Support

1.3 Document Overview

The iFlorida ConOps utilizes the guidelines presented in the IEEE 1362-1998 standard. This standard, entitled "IEEE Guide for Information Technology – System Definition – Concept of Operations (ConOps) Document" provides the basis for document development. The standard's general ConOps document structure has been modified to support the multifaceted project nature of the iFlorida endeavor. In order to be able to focus on the core ConOps elements for each one of these procurements, a separate section for each of the 11 key procurements has been developed.

The ConOps document is intended to be part of an initial effort to collect requirements, develop system concepts and configurations, and to establish how these systems shall operate and interact in the future. This document will provide an understanding of how the various procurements shall be configured and what elements shall be included as part of the procurements. The Draft and Final versions of the ConOps is intended to be a "living" document that reflects the evolving requirements for each of the specific procurements. This ConOps document along with the Requirements Document forms the basis for the development of the various sub-systems within the iFlorida system.

1.4 System Overview

The iFlorida system will be designed and implemented at the Florida Department of Transportation District 5's ("Department") Regional Traffic Management Center (RTMC). The System is an Internet-based information system to collect, fuse and disseminate transportation system conditions on the Florida Intrastate Highway System throughout the state as well as more detailed and multi-modal conditions in the Central Florida region. For more information on iFlorida, visit http://www.iflorida.net.

The System will incorporate automated data from the Florida Highway Patrol's Computer Aided Dispatch (CAD) system, Florida DOT's Traffic Telemetered Monitoring System (TTMS), the Department District 5's Surveillance Motorist Information System (SMIS), the Orlando Orange County Expressway Authority's Travel Time Data Server, and segment weather conditions, alerts and forecasts to be provided as part of the iFlorida model deployment program.

The System will include an operator interface to enable appropriate personnel from the Department, its partner agencies, and approved private contractors/consultants to enter incident/event reports directly into the System, both from the RTMC and remotely via a standard Internet browser. The System will also serve as the main statewide traveler information Internet Web site portal.

Within the system, a more granular level of monitoring will be established for the Orlando area, including the covered arterials, transit, and aviation elements.

In addition to the automated interfaces, for all limited-access roadways and covered arterials, the appropriate organizations or contracted operators will insert information, geo-located and linked to its corresponding segment(s), regarding any event that impacts

the expected flow of traffic, such as construction, maintenance, incidents, weather events, and special events.

The Department's Regional Traffic Management Center (RTMC) personnel will enter transit events verbally reported from LYNX regarding service disruptions, changes, and additions. RTMC personnel will enter information verbally reported from the Orlando International and the Orlando-Sanford International Airports regarding landside transportation (e.g., parking), generalized airport delays, and estimated wait times at security screening. Transit agency data and/or Airport data will be disseminated via a Central Florida website (http://www.iflorida.org). The RTMC will determine if significant Transit Agency (LYNX) data and/or Airport data should also be disseminated to the Central Florida 511 telephone system.

A two-way feed will be established with the Data Warehouse. The System will provide statewide and Orlando area segment reports as well as raw weather, FHP CAD and operator-entered incident and event data to the Data Warehouse. The Data Warehouse will provide its segment forecasts to the System.

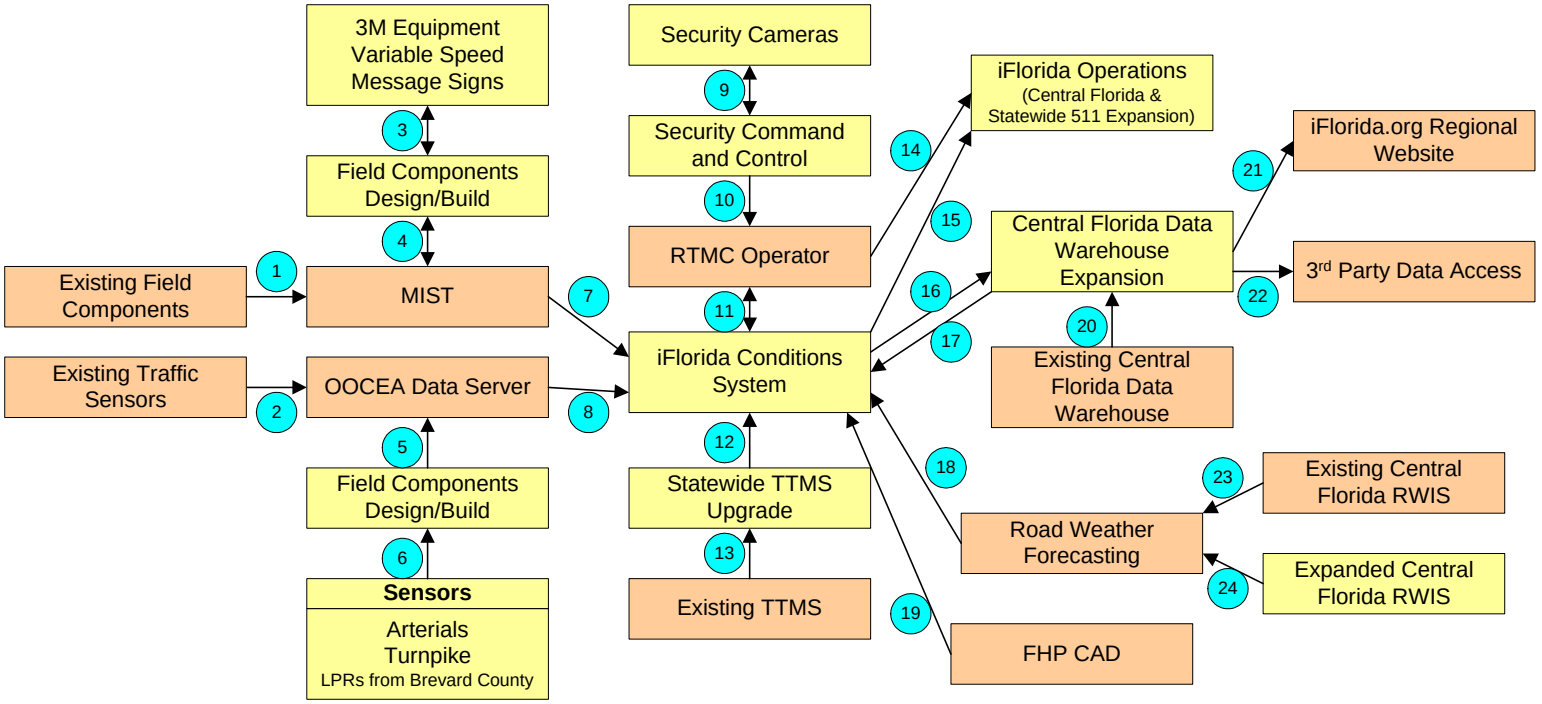
Figure 1.1 illustrates the overall system data flow.

The Statewide ITS Architecture and Standards Application Plan maintained by FDOT contains the relevant standards for all elements and data flows associated with the ITS components in the ITS architecture. This Standards Application Plan will be enhanced and maintained through the course of the iFlorida program, and national standards that are made available through the Standards Development Organization will be addressed where appropriate. Every effort will be made to implement designs that are compliant with existing, mature, ITS Standards and that are within the financial scope of the iFlorida program. Beta version ITS Standards will not be tested or implemented.

As part of the system design required in the iFlorida program, Design Criteria Packages will be developed from the initial scopes of work, performance criteria, and functional requirements for each project element in the application and enhanced and refined to be sufficient to support design/criteria packages for procurement as defined in Section 287 of the Florida Statutes.

These Design Criteria Packages will contain sufficient locations, designs, standards, and specifications to procure projects using the design-build procurement technique. If a traditional design and bid technique is preferred, FDOT will complete design prior to procurement. However, with the time allowed for system design, procurement, installation, and testing, a design-build procurement method is preferred at this time.

Maintenance of the System for the life of the iFlorida operational evaluation period (currently scheduled to end April 30, 2007) will be part of this project.



Legend

Included within iFlorida
Outside iFlorida
Data Flow

Data Flows

1. Existing Field Component data for MIST
2. Existing Traffic Sensor data for OOCEA Data Server
3. Two-way communications with Field Devices
4. Two-way communications with Field Devices
5. Traffic Sensor data
6. Traffic Sensor data
7. FDOT D5's Surveillance Systems data
8. Data Server data
9. Video streaming data and video camera control
10. Security Bridge Events
11. Conditions System Operator Interface
12. TTMS data
13. TTMS data
14. 511 Announcement Recordings
15. Selected Pre-Recorded .WAV files
16. Raw Incident/Event Reports, Meteorlogix data, TTMS data, and Data Collection Link Reports.
17. Central Florida Data Collection Link Forecasts
18. Road Weather Forecasting data
19. FHP CAD data
20. Central Florida Archived data
21. Central Florida traffic information website Data Warehouse data feed
22. 3rd Party Central Florida archived data
23. Existing Central Florida RWIS data
24. Expanded Central Florida RWIS data

Figure 1.1: Overall System Data Flow

2.0 Referenced Documents

Documents have been utilized in the development of the ConOps document include:

- iFlorida Final Work Plan, Version 1.0, PBS&J, June 2003
- Functional Requirements, iFlorida – Statewide and Central Florida Conditions System, FDOT, August 2003.
- Design and Implementation of the Central Florida Data Warehouse (CFDW) – Year 1: The TCSP Funding, UCF, October 2002.
- Design and Implementation of the Central Florida Data Warehouse (CFDW) – Year 1: The TCSP Funding, Approved Revision 6.0, UCF, May 2003.
- iFlorida Field Components Specification, PBS&J, June 2003.
- Scope of Work – Weather Forecasting by Road Segment, Meteorlogix, Version 2.3, FDOT, July 2003.
- Scope of Work – Security Command and Control, Boeing Autometric, FDOT, July 2003.
- iFlorida Conditions System Functional requirements Meeting Summary. PBS&J, July 9, 2003.
- Conditions System ITN Concept Meeting #2 Presentation, PBS&J, July 16, 2003.

In addition, information from several interviews with stakeholders and a site visit to the RTMC was utilized in the development of the ConOps. The information contained in this document has been reviewed and confirmed in a workshop environment with the iFlorida Stakeholders on July 23, 2003.

3.0 Operational Concept Elements

A separate section has been dedicated to each of the relevant procurements. Each section identifies specific operational concept elements for that procurement. The following is the structure utilized for each one of these sections.

- Current System Situation – This section describes the current situation and/or existing systems as well as the problems or needs associated with the current situation or system.
- Justification for and Nature of Changes – This section discusses and summarizes initial needs and requirements of the existing systems previously discussed. A separate document (i.e., Requirements Document) will provide a detailed breakdown of the requirements for the system.
- Concepts for the Proposed System – This section will describe the desired system that results from the identified changes in the preceding section. The system will be described at a high-level and identify operational features that are to be provided without specifying design details. Note: Some projects are in the procurement stage or are directly related to specific hardware.
- Operational Scenarios – A scenario is a step-by-step description of how the proposed system should operate and interact under a given set of circumstances. Scenarios should be described in a manner that will allow readers to walk through

them and gain a general understanding of how all the various parts of the proposed system function and interact.

- Summary of Impacts – This section describes the operational impacts of the system on the users and stakeholders of the system.
- Analysis of the Proposed System – This section provides an analysis of the benefits, limitations, advantages, disadvantages, and alternatives and trade-offs considered for the proposed system.

The following sections will provide specific ConOps information for each of the individual procurements.

3.1 Procurement 1 – Field Components Design/Build

This procurement will encompass the design and deployment of various field elements associated with the iFlorida project. This deployment is broken down into several subprojects:

- Deployment of data sensors (e.g., license plate, transponder based automatic vehicle identification, or another suitable technology) on limited access roads
- Deployment of data sensors on principal arterials
- Deployment of CCTV cameras at select arterial locations
- Installation of fiber optic cable to link LYNX and the RTMC via a fiber backbone, as well as over 28.8 miles of aerial fiber along arterials in the Orlando Metropolitan area
- Variable Speed Limit System
- SR 528 Corridor Monitoring System
- Brevard County Agency Integration

3.1.1 Current System Situation

Travel time / speed monitoring data collection – There is currently no system to actively calculate probe-based travel times (e.g., using transponders, license plate readers, etc.) in the Orlando Metropolitan area. However, a probe-based travel time system is being developed by the Orlando Orange County Expressway Authority (OOCEA) and should be online by late 2004 / early 2005.

This system will utilize the toll transponders used by many motorists in the region to facilitate probe-based data collection. As a vehicle carrying an appropriately mounted toll transponder passes a reader, its transponder ID number is read. After the vehicle passes the next reader and the tag is read again, the OOCEA Data Server (the data processing system) calculates the travel time and average speed for that vehicle across the segment. Travel times/speeds for a number of vehicles are then aggregated (data anomalies discarded) to produce an "average" travel time/speed for a given period of time; the method by which this occurs will depend on the data fusion method selected.

Arterial CCTV Cameras –Ten CCTV cameras are currently deployed on arterial streets in the Orlando Metropolitan area. These cameras are part of the overall CCTV camera system for the region and are operated out of the FDOT District 5 RTMC; the RTMC operates 24 hours a day, seven days a week. The cameras and control software utilize the Sony 360° Camera Chameleon surveillance product. Additionally, Orange County is planning to deploy at least eight CCTV cameras on arterials as part of a separate effort.

Fiber Optic Network - Fiber optic cable has been deployed in past years at various locations throughout the region. To date over 200 miles of backbone fiber has been installed. The following agencies are currently connected via this fiber backbone:

- FDOT District 5 (Headquarters (Deland) and RTMC)
- Orlando Orange County Expressway Authority (OOCEA)

- Cities of Orlando and Daytona Beach
- Seminole and Volusia (including EOC) Counties
- University of Central Florida
- Florida Turnpike (to be connected by mid-2003)

Brevard County Agency Integration – There is currently no existing level of inter-agency integration in Brevard County.

3.1.2 Justification for and Nature of Changes

As this procurement has several different aspects, there are a number of different goals and justifications for the various elements of the deployment.

Travel time / speed monitoring data collection – An overall goal for travel time / speed monitoring on limited access roadways is to achieve 100% coverage in the Metropolitan Orlando area. There is also a need to acquire travel time / speed data on arterials in order to provide information on alternatives to limited access highway routes, as well as facilitate system performance monitoring. Arterial roadways selected for deployment as part of this project are part of the Consortium's top priorities. (The Consortium's 5-year plan calls for 50% of arterials in the Orlando Metropolitan area to be covered.)

Arterial CCTV cameras – There is a need to provide cost effective visual coverage of key arterial intersections/interchanges. This will support verification of incidents as well as weather, pavement, and traffic congestion conditions.

SR 528 Corridor Monitoring System –As part of this project, there is a desire to increase roadway sensor and CCTV coverage along SR 528 and SR 520. This increased coverage is needed to support hurricane evacuations, incident management, and special events.

Telecommunications Network Enhancements and Brevard County Agency Integration – With the expansion of several systems to provide increased data sensor and CCTV coverage, additional fiber-based communications infrastructure is needed. Additionally, part of the purpose of the iFlorida project is to facilitate increased coordination between various local agencies. To support this increased coordination, the involved agencies need to be interconnected via a common communications infrastructure. Both the LYNX and Brevard 911 Center need to be connected to the fiber trunk system in order to allow them to gain access to RTMC data and video information. Moreover, additional communications infrastructure is needed to provide redundancy for the existing communications system.

Variable speed limits – There is a desire to test a variable speed limit (VSL) system in order to determine its effectiveness in increasing safety and roadway capacity. A number of VSL signs will be deployed and tested along I-4 in the Orlando Metropolitan area to accomplish this desire.

3.1.3 Concepts for the Proposed System

The following sections discuss various subprojects that meet the needs addressed in the previous section.

Travel Time Data Collection – This subproject will require selection and procurement of the most appropriate (cost-effective and reliable) type of reader stations (e.g., License Plate Readers, AVI Transponder Readers, or another suitable technology) for deployment in the Orlando Metropolitan area. Sensors of the type selected by the design-build firm will be procured and installed along arterial roadways (35 sites) and roadways operated by Florida's Turnpike Enterprise District (15 sites) in the Orlando metropolitan area. Figure 3.1.1 illustrates the proposed reader locations.

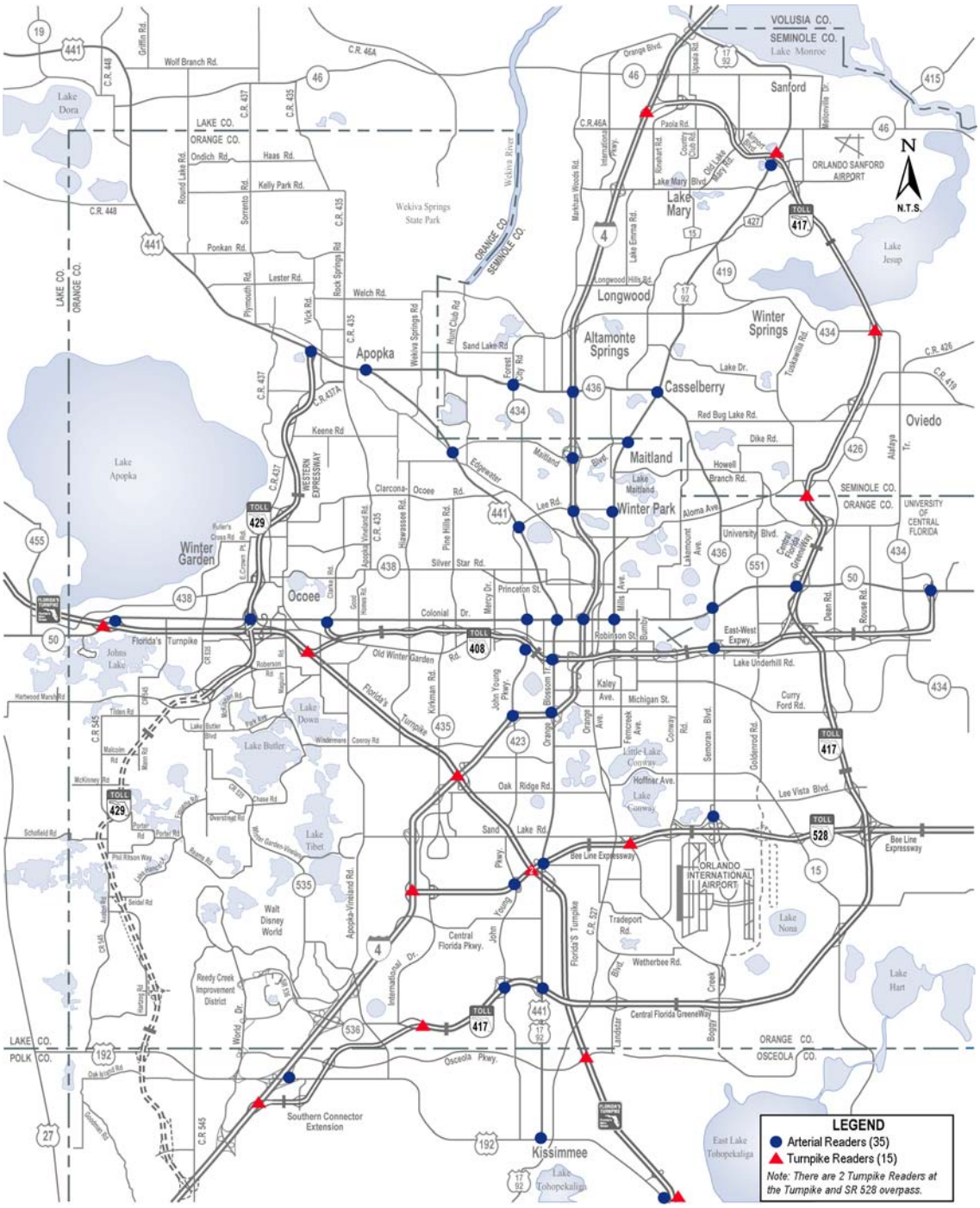


Figure 3.1.1: Proposed Travel Time Reader Locations

The subproject will deploy reader stations at key locations on limited access facilities operated by the Florida's Turnpike Enterprise District, including SR 91 (the Turnpike mainline), the western end of SR 528 ("Beeline") and the northern and southern ends of SR 417. This project will provide 55 miles of new coverage and complete the limited-access roadway flow-monitoring network in the region. Fifteen (15) reader stations will be necessary – six on SR 91, six on SR 417 and three on SR 528, to enable the

monitoring of 14 new road segments. In all cases both directions of travel shall be monitored. Communications with these readers will occur through integration with existing fiber or fiber deployed as part of this project, dedicated dial-up, wireless means, or some other suitable communication medium.

The subproject will also extend travel time data collection to the key arterials in the area and provide 128 miles of new coverage. The region's seven highest priority principal arterials will be equipped with 35 reader stations, creating 35 distinct road segments. The reader stations deployed on metropolitan Orlando arterial roads shall provide full coverage of the selected arterial intersections. In all cases, at least two directions of travel shall be monitored at each reader station, with some sites requiring greater coverage levels. Communications with these reader stations will occur through integration with existing fiber or fiber deployed as part of this project, dedicated dial-up, wireless means, or some other suitable communication medium.

All raw data collected by the reader stations will be transmitted to the Florida Department of Transportation District 5 RTMC. Designing and implementing the communications system necessary to transmit reader station data to the RTMC, as well as aggregating and preparing the raw data for transmission to the OOCEA is in the scope of this project, as is the ability to monitor the operational status of the reader stations and communications. Outside the scope of this project, the data will subsequently be transmitted from the RTMC to OOCEA'S Data Server for analysis.

Arterial Closed Circuit Television Cameras (CCTV) - This subproject will require the procurement and installation of CCTVs at or near intersections along arterial roadways in the Orlando metropolitan area where fiber currently exists or will be deployed as part of this Procurement. Figure 3.1.2 depicts the proposed locations of these CCTVs. Consequently, video data collected by these CCTVs will be transmitted to the RTMC via fiber connection.

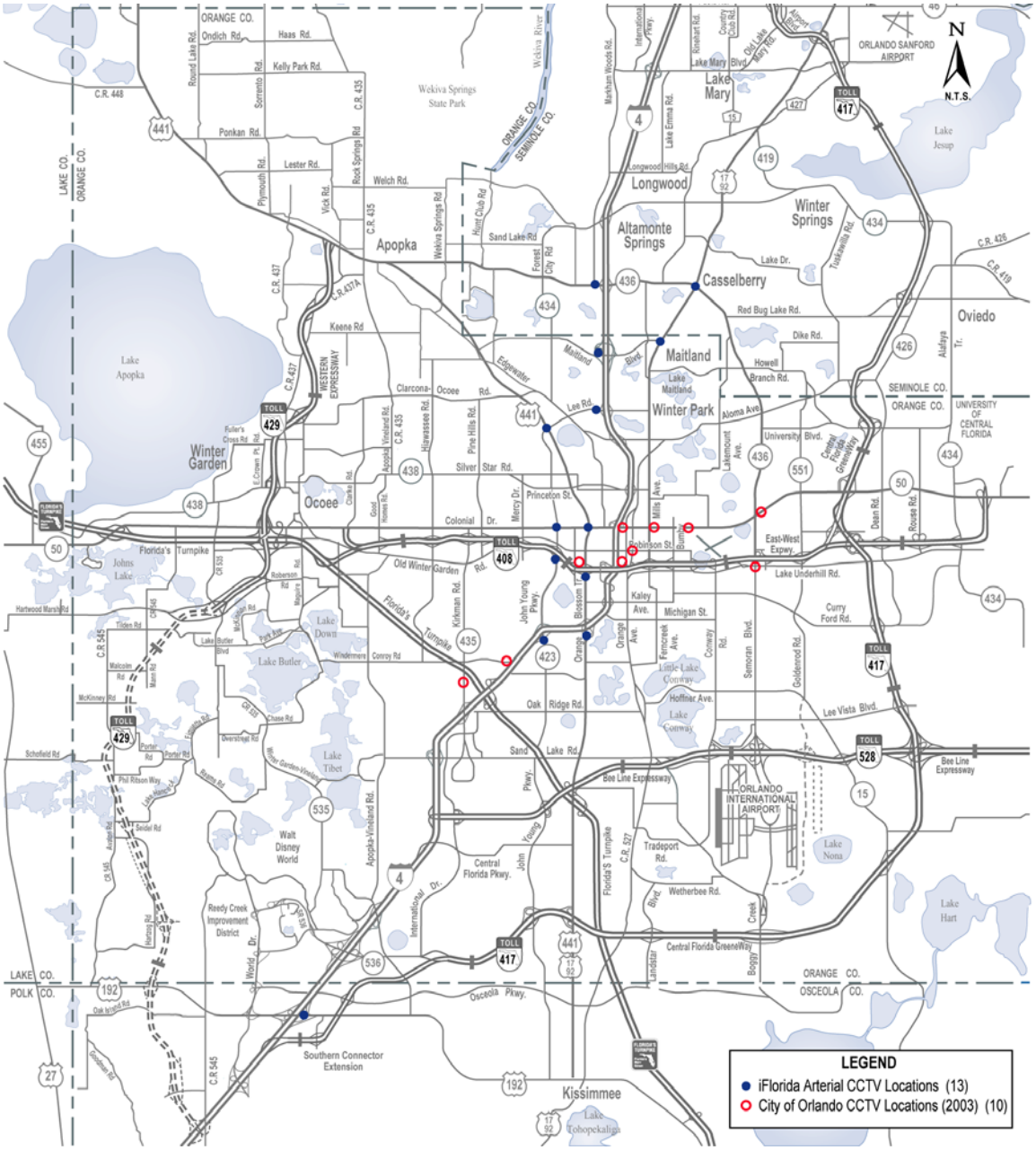


Figure 3.1.2: Proposed Arterial CCTV Camera Locations

In cases where one of these proposed deployment locations provides coverage of an arterial roadway intersecting I-4, the camera shall be deployed such that its focus falls primarily on the arterial roadway, located such that it compliments the coverage of the arterial from existing I-4 cameras.

Telecommunication Network Enhancements - This subproject will require the installation of an aerial fiber connection between LYNX's South Street Facility and the fiber backbone running along SR 408, as well as the installation of approximately 28.8 miles of aerial fiber along arterials in the Orlando Metropolitan area (including SR 50,

US 17/92, SR 423, SR 436, and US 192). The Department has identified the segments of roadway along which additional fiber optic cable will need to be deployed as part of this subproject. All fiber installed as part of this project will be deployed, integrated with existing fiber (to be coordinated with the Department, OOCEA, Orange County, Seminole County, Osceola County, Brevard County, LYNX, the City of Orlando, and the Florida Turnpike Enterprise District as appropriate), and connected to the necessary field devices and workstations.

Variable Speed Limit Trial - This subproject will require the installation of twenty-two (22) Variable Speed Limit Signs along the I-4 Corridor within the Orlando Metropolitan area. The Department shall furnish variable Speed Limit signs to the selected design-build firm. All Variable Speed Limit signs will be connected to the Department's Fiber backbone running along I-4 and controlled by equipment at the Department's District 5 RTMC.

SR 528 Corridor Monitoring System (Brevard County) - The subproject will require the installation of "3M" Micro-Loop Stations along SR 528 and SR 520 and their connection to Type 170's E field controllers and integration into MIST at the RTMC. Table 3.1.1 depicts the locations of the 3M Micro-Loop Stations. The Department shall furnish micro-loop stations to the selected design-build consultant.

	Field Component Locations	**On/Near Existing or New Fiber**
3M Micro-Loop Stations (SR 528)		
Micro-Loop Station 1 and one Type 170E Field Controller	A1A/SR 528 @ Dave Nisbett Drive)	No
Micro-Loop Station 2 and one Type 170E Field Controller	SR 528 (eastern side of causeway crossing the Banana River)	No
Micro-Loop Station 3 and one Type 170E Field Controller	SR 528 @ Banana River Dr.	No
Micro-Loop Station 4 and one Type 170E Field Controller	SR 528 (eastern side of causeway crossing the Indian River)	Yes
Micro-Loop Station 5 and one Type 170E Field Controller	SR 528 @ US 1/SR 5	Yes
Micro-Loop Station 6 and one Type 170E Field Controller	SR 528 @ SR 407	Yes
Micro-Loop Station 7 and one Type 170E Field Controller	SR 528 (approx. 3.5 miles west of SR 407 interchange)	Yes
Micro-Loop Station 8 and one Type 170E Field Controller	SR 528 @ SR 520	Yes
3M Micro-Loop Stations (SR 520)		
Micro-Loop Station 9 and one Type 170E Field Controller	SR 520 @ SR 528	Yes
Micro-Loop Station 10 and one Type 170E Field Controller	SR 520 @ SR 524	No
Micro-Loop Station 11 and one Type 170E Field Controller	SR 520 @ SR 519	Yes
Micro-Loop Station 12 and one Type 170E Field Controller	SR 520 @ A1A	No

Table 3.1.1: 3M Micro-Loop Station Locations

This subproject will also require the procurement and installation of two license plate reader-based travel time data collection sites monitoring both directions of travel along SR 520 (as with the reader stations described previously, all raw data collected by these license plate readers will be transmitted to and monitored from the Department RTMC), the procurement and installation of two CCTVs on the eastern edges of SR 520 and SR 528, and the installation of approximately four and one-half miles of (underground/bridge mounted) fiber optic cable along SR 528 and the Bennett Causeway (ending approximately 200 feet beyond the approach slab on the eastern side of the Indian River).

The Department has identified the segments of roadway along which additional fiber optic cable will need to be deployed as part of this subproject and the proposed sites for all field component deployments. The design-build firm shall connect to the fiber network all field components deployed in areas where fiber is currently available or will become available as part of the project. Field components not having access to fiber shall be linked to the RTMC via another communications medium (e.g., dedicated dial-up or wireless).

The design-build firm shall ensure that the portion of this subproject requiring deployment of fiber from the existing backbone along SR 528 across the Bennett Causeway (Indian River) is completed and accepted by September of 2004 to support the implementation of other projects.

Brevard County Agency Integration - The purpose of this subproject is to facilitate the sharing of video from the Department's video conditions system (for viewing purposes only) with the Brevard County Emergency Operations Center (EOC) and the Florida Highway Patrol Troop D Substation via integration into the existing Hurricane Evacuation System fiber backbone along I-95 and SR 528. The subproject will require the installation of approximately six miles of aerial fiber optic cable. In addition, the design-build firm shall furnish, install, and make fully operational a ceiling mounted television (32 inch minimum) with decoder and remotes at the Brevard EOC, and connect the EOC with a managed hub to the RTMC in Orlando, allowing for the real time sharing of high quality video using an S Video connection. Moreover, the design-build firm will provide a fiber "drop" at the FHP substation for the purpose of establishing a link to the RTMC (however, no workstation of other equipment is to be provided as part of this project). All fiber installed as part of this project will be deployed, integrated with existing fiber, and connected to the necessary field devices and workstations.

3.1.4 Operational Scenarios

Under normal conditions, roadway sensors will be collecting a variety of data on various roadway traffic characteristics, including: travel time/speed, traffic counts, and occupancy. This data will be fused and processed by existing systems, as well as the iFlorida Conditions System (developed under a separate iFlorida procurement).

Several alert scenarios relate to the devices' deployed under this procurement. Below are several sample scenarios for an alert mode.

Incident on SR 417 – Due to the provision of information indicating reduced speeds and significantly increased travel times for a given roadway segment, an alarm is initiated on the monitor of the RTMC operator. At the same time, the system wide web-based speed map has been adjusting the color code for this roadway segment accordingly. The RTMC operator subsequently utilizes a nearby CCTV camera (controlled from the RTMC) to further investigate the alarm and discovers that there has been an accident and two lanes of traffic are blocked. The RTMC operator then initiates the proper response procedures and coordinates with other RTMC staff and representatives of other agencies as appropriate. In addition, the RTMC operator coordinates with a representative of the 511-telephone system to disseminate an appropriate message concerning the accident.

Hurricane Evacuation of the east coast of Florida – A category 3 hurricane is heading towards the eastern coast of Florida and is anticipated to make landfall just south of Daytona. Local residents have been advised to evacuate coastal areas and seek refuge inland. Utilizing the Hurricane Evacuation System (HES) and new monitoring infrastructure deployed as part of iFlorida, traffic congestion levels are monitored on key evacuation routes. The HES only monitors the Brevard County area. At present, the monitored region includes a few miles on I-95 and SR 528. Other key evacuation routes are listed on the Florida Emergency Management website (http://public.mapping.floridadisaster.org/). Subsequently, RTMC staff observe that one of the posted evacuation routes is not being utilized anywhere near capacity, while other routes are at/above capacity. To remedy this situation, the RTMC operator utilizes the DMS system to inform motorists of the availability of the alternate route.

Recurring congestion along I-4 in Downtown Orlando – During a typical weekday afternoon, traffic begins to build-up in the downtown area due to the increased demand placed on the road by those leaving work. As the speed of traffic begins to decrease below the currently posted speed limit, the RTMC operator observes the slowdown and posts a reduced speed limit on the variable speed limit signs between John Young Parkway and Maitland Boulevard. This is done to: a) discourage erratic driving, and b) reduce the speed differential of the traffic stream. Subsequently, drivers along I-4 see the new posted speed limit and adjust their speed appropriately, thereby smoothing the flow of traffic through the downtown area and reducing the probability of there being one or more incidents.

Flooding at a major intersection – Due to strong afternoon thunderstorms, the intersection of Orange Avenue and SR 50 has flooded. This situation is observed by a City of Orlando Police officer and called into their dispatcher. The dispatcher subsequently enters this information into their terminal, thereby passing it on to the iFlorida Conditions System. As a result, the various agencies connected to the fiber optic backbone are alerted to the flooding situation and several of them take action. LYNX broadcasts a message to their drivers who will be passing through that intersection to be on alert and avoid high water. The RTMC places an advisory message on the 511-

telephone services and utilizes a local CCTV camera to monitor the situation. As the water level drops, the various agencies remove the relevant notices and inform impacted staff that the roadway is now clear.

3.1.5 Summary of Impacts

With the deployment of all of the various devices that compose this project throughout the central Florida region, the various operating agencies in the area will be provided with a greater awareness of the overall operational characteristics of the transportation system. Specifically, this project will result in:

- Increased data and video coverage
- More reliable data and video coverage
- Increased agency coordination
- Additional information to be offered to travelers in real-time
- Additional useful data for operations and capital planning
- Increased real-time diversion around incidents and onto less congested routes
- Changes in trip characteristics including:
    - Delay of departure
    - Route choice
    - Mode choice

3.1.6 Analysis of the Proposed System

This section provides an analysis of the benefits, limitations, disadvantages, alternatives and tradeoffs considered for the deployment.

- Benefits – The benefits expected to result from this deployment are discussed in the previous section.
- Limitations – The primary limitation is that full coverage of all roadways will not be achieved. Only 50% of key arterials will have coverage. The density of coverage on both limited access facilities and arterials will be limited.
- Advantages – The approach being implemented will build off of existing investments (e.g., use of the OOCEA Data Server for data analysis). In addition, the procurement has been structured to supply hardware and communications infrastructure elements. This will reduce the level of risk because the requirements for what needs to be provided are relatively concise. The contract is for design and deployment only, with all maintenance activities contracted out under a separate effort.
- Trade-offs made – Various technologies for calculating roadway segment travel times have been tested in central Florida. It has been demonstrated that transponder tag readers and license plate readers perform similarly and that both would likely meet the data collection needs associated with this deployment. As such, the selection of technology used to conduct the probe data collection portion of the project is being left up to the design-build firm in order to obtain the

maximum price/performance benefit. Moreover, a conscious effort was made to balance the density versus coverage of these data collection devices.

3.2 Procurement 2 – City of Orlando Agency Integration

3.2.1 Current System Situation

At present, the City of Orlando maintains 24-hour/7 days a week/365 days a year Traffic Management Center (TMC) located in the City Parking Garage #1, 53 West Central Boulevard. TMC staff operating out of this facility is responsible for the operation and maintenance of the Regional Computerized Signal System (RCSS). The RCSS is a multi-jurisdictional traffic signal control system that coordinates 384 traffic signals within the borders of Orange County, Florida. The City of Orlando's partner in the use of this system is Orange County. The City of Orlando staffs and operates the TMC on behalf of Orange County thereby providing some level of inter-agency coordination for the purpose of providing motorists with a seamless transition when crossing jurisdictional boundaries. The TMC also provides a telephone help line for reporting traffic problems.

Prior to November 2001, fire, police communications for the City of Orlando, and the City of Orlando's Emergency Operations Center (EOC) were housed in three separate facilities. However, in November 2001, fire communications operations, followed in January 2002 by police communications operations, were moved into a new facility called the Orlando Operations Center (OOC). This center replaced the EOC as the City of Orlando's emergency preparedness and public safety hub. The City of Orlando's Office of Emergency Management (OEM) maintains the OOC at 110 Andes Avenue. This center is currently Orlando's hub for public safety coordination. It co-locates police, fire, and 911 emergency management staff into a single location.

Currently, the major constraint is that the City of Orlando's TMC staff does not have the ability to instantly coordinate/share information with OEM public safety department staff. Another significant constraint is that the various OEM departments and staff do not currently have access to the systems used by TMC staff, specifically CCTV cameras.

3.2.2 Justification for and Nature of Changes

The goal of the project is to relocate the City of Orlando TMC in order to ensure that all City of Orlando Traffic Management and OEM operations occur within the Orlando Operations Center. This will provide the City of Orlando with an integrated Operations Center and enable the City of Orlando Traffic Management staff to provide a more coordinated response to traffic incidents and events. The net effect of having an integrated Operations Center will be a reduction in incident and event response times. As a result, congestion associated with these incidents and events will be reduced, thus possibly saving time, lives, and money.

3.2.3 Concepts for the Proposed System

The concept is to co-locate all of the City of Orlando's public safety departments and traffic management functions into an integrated Operations Center. The project will integrate all City of Orlando computerized signal systems and local traffic management

functions into the Orlando Operations Center, while at the same time providing access to the City's communication backbone. This will enable City police, fire, and 911 emergency operations real-time access to traffic management staff and regional transportation information/CCTV images.

3.2.4 Description of Tasks

The relocation of the City of Orlando's Traffic Management Center (TMC) into the Orlando Operation Center will require several major subtasks, which will ensure a complete and operational system that is fully integrated into the existing facility.

- Complete design of the build out of the new facility for the TMC. Design was previously taken to the 90% level. Technology updates need to be evaluated as to their impact on the design.
- Construct and furnish approximately 3000 square feet of floor space with offices, operator consoles and a video display wall that will be used to view the CCTV images. The building infrastructure will be verified that it has the capacity to handle the additional electrical and air conditioning loads. Where necessary the infrastructure components will be expanded or enhanced.
- The technology components of the TMC will be relocated to the OOC. The communication backbone is already in place that connects the old TMC to the OOC, and also with the Florida Department of Transportation's Regional Traffic Management Center (RTMC). Space has been reserved for the equipment racks that house the traffic management system computer network servers, and the fiber optic communication equipment. The video display wall will be disassembled in the TMC and then installed and calibrated in the new location.
- A telecommunications room will be constructed in the old TMC facility equipment to house the communication equipment that will remain at this communication hub site.
- A video signal will be provided to the OOC's Warning Point where the audio-visual control equipment for this facility is located. This is vital in order for the police, fire and emergency management to have access to the CCTV images.

3.2.5 Operational Scenarios

Under everyday conditions, incident and events will continue to come into the Orlando Operations Center via 911, cell phone, and radio. With the integration of the TMC into the OOC and the availability of information from the iFlorida Conditions System website (i.e., segment travel times and localized weather information), Orlando public safety agencies will have the additional capability of detecting incidents and events via significant increases in segment travel times and the scanning of CCTV images. Additionally, the exact location of incidents and events of which TMC staff become aware due to a call to 911 may be more quickly confirmed via an examination of current CCTV images and changes in segment travel times. Overall, as a result of the coordination and co-location of staff, everyday traffic management functions will be conducted more efficiently and effectively.

Under emergency conditions, that is, a major incident or event expected to impact fire, police, emergency services, and travelers over an extended period of time and require the activation and implementation of emergency management plan(s), the Orlando Operations Center will be the focal point for all emergency management activities. In this mode, all necessary public safety and transportation management resources and staff will be more efficiently and effectively utilized.

3.2.6 Summary of Impacts

The operational impact of this project to its stakeholders will be a faster, more coordinated public safety response to transportation incidents and events in the Orlando Metropolitan area. More data and increased CCTV coverage will be available to a larger number of City of Orlando agencies.

3.2.7 Analysis of the Proposed System

This section provides an analysis of the benefits, limitations, advantages and tradeoffs considered for the project.

- Benefits – Significant efficiencies to be gained by this project include:
    - Improved operations support
    - Overall increase in situational awareness
    - Decrease in incident and event response times
    - Decrease in time to clear incidents and events
    - Improved coordination
    - More data and increased CCTV coverage available to a larger number of agencies
- Limitations – The density of coverage on arterials is limited.
- Advantages – Reflect an integrated regional approach to operations that includes:
    - Relocation of TMC to existing Orlando Operations Center builds upon integrated approach to operations
    - Supports Orlando's single operations center investment strategy
- Trade-offs made – The City of Orlando performed a single versus dual facility mode of operation analysis. Results indicated that a single facility was more cost effective and efficient.

3.3 Procurement 3 – Central Florida RWIS

3.3.1 Current System Situation

At present, weather-related data provided in Florida generally addresses local area and regional conditions (both current and forecasted information). There are 17 Road Weather Information System (RWIS) sites currently being deployed in northern Florida (FDOT District 2 and District 3). This system is part of a larger project based on a cooperative effort between the National Weather Service (NWS), the FDOT ITS Office, and the University of North Florida. As part of this project, these 17 weather sites will be integrated into the National Weather Service's statewide MESONET, through which information is made available to the media and various entities within the state.

3.3.2 Justification for and Nature of Changes

Current RWIS capabilities do not exist in Central Florida. As a result, the goal of this iFlorida project is to augment existing and planned RWIS capabilities by expanding current capabilities in the Central Florida region. The addition of Central Florida weather sites will provide more specific data on road weather conditions, which will in turn support a more comprehensive management of the roadways. Expanded RWIS sensor coverage is desired in order to achieve a larger coverage area and a finer, more precise level of weather information for use in decision-making and the provision of information to travelers.

Specific data on road weather conditions is needed by highway operators to provide comprehensive management of the roadways. Expanded RWIS sensor coverage is desired in order to achieve a larger coverage area and a finer level of detail for use in decision-making and the provision of information to travelers. Specific data required includes:

- Relative humidity
- Air temperature
- Precipitation rate and amount
- Wind speed and direction
- Barometric pressure

3.3.3 Concepts for the Proposed System

The focus of RWIS in Florida is to provide real-time information concerning critical weather and pavement conditions to transportation managers, travelers, and commercial carriers, law enforcement officials, and emergency management centers in order to ensure safe transportation under both everyday and emergency/evacuation conditions. As envisioned, RWIS will provide several methods for accessing current, forecasted, and historical road weather information. Raw data from RWIS will be provided to a number of agencies including Meteorlogix, who will configure the data into usable format. Meteorlogix will provide formatted RWIS data, in the form of Road Weather Forecasting

(reference Section 3.4 of this document), to the iFlorida Conditions System, which will disseminate the data to a statewide website and, for severe traffic conditions, to a statewide 511 traveler information telephone service. The project will demonstrate the integration of weather-related data into both transportation and meteorological databases; and incorporate localized weather-responsive traffic management strategies for low visibility, high wind, wet pavement, and flooded road conditions.

The RWIS gathers raw data from Environmental Sensor Stations (ESS) making it available to both private and public meteorlogical services to process and to provide critical weather related travel impacts to help managers make traffic control decisions and disseminate road weather information to travelers. An ESS is a fixed roadway location with one or more sensors measuring atmospheric, pavement, and/or water level conditions. In addition, RWIS data can be processed by private or public meteorological services, such as the National Oceanic and Atmospheric Administration (NOAA), to improve weather predictions. Three categories of road weather information are significant for traffic management:

- Atmospheric data including air temperature, relative humidity, barometric pressure visibility distance, wind speed and direction, precipitation type and rate, tornado or waterspout occurrence, lightning, storm cell location and track, and air quality.
- Pavement data including pavement temperature, pavement condition (i.e., dry, wet, flooded, icy), and subsurface conditions (e.g., soil temperature).
- Water level data including tide levels (i.e., hurricane storm surge) as well as stream, river, or lake levels near roads

By integrating traffic flow data with timely, accurate, route-specific environmental data, transportation managers can assess weather impacts on the transportation network and implement road weather management strategies. Advisory strategies provide information on prevailing and predicted conditions to both transportation managers and motorists. Posting fog warnings on DMS and listing flooded routes on web sites are examples of advisory strategies. Control strategies alter the state of roadway devices to permit or restrict traffic flow and regulate roadway capacity. Reducing speed limits with VSL signs and modifying traffic signal timing are examples of control strategies. Transportation managers can coordinate with other managers who carry out treatment strategies, which supply resources to roads to mitigate weather impacts (e.g., fog dispersal).

The FDOT strategy for deployment of RWIS was developed in cooperation with the National Weather Service and supports a cooperative approach to surface weather prediction and modeling. The strategy consists of two elements: (1) permanent installation of sensors to support predictive model development and the provision of travel-related information on key corridors for evacuation and intercity travel, and (2) an ad-hoc system of RWIS that can be deployed to support travel advisories as needed. This balanced approach, utilizing a combination of permanent installations and an ad-hoc system, will result in the most efficient system possible for providing continuous

coverage at key locations along vital corridors and maximizing the effectiveness of limited resources.

The existing and planned projects in Florida that incorporate RWIS devices include:

- The Northeast Florida FDOT ITS RWIS research facility (existing) - includes 17 stations in FDOT District 2. Stations are located every 20 miles along I-10, I-75, and I-95.
- Two planned facilities in FDOT District 3. Stations will be located in Pensacola and are components of the Bay Bridge project and the Freeway Management System project.
- Five planned facilities in FDOT District 1. Stations will be located in Collier, Lee, Charlotte, Sarasota, and Manatee counties. These stations are planned as part of the I-75 Freeway Incident Management System project.

RWIS devices are being deployed as part of FDOT ITS Office RWIS research project being conducted by the University of North Florida and Florida State University. The University of North Florida, which is responsible for executing this project, has proposed locations for the RWIS facilities (see Figure 3.3.1), and will also provide the following:

- Procure and install 10 RWIS systems in Central Florida:
    - 5 sites on I-95
    - 3 sites on I-4
    - 1 site on the Turnpike
    - 1 site on SR 528.
- Procure and install 4 wind sensors. These sensors will be deployed on the Bennett Causeway and SR 520 in Central Florida, and on the Buckman and Dames Point Bridges in Northern Florida.
- Procure a mobile weather site to be used in conjunction with the microwave tower network.
- Capture raw RWIS data from the 15 new Central Florida RWIS sites (composed of 10 RWIS stations, 4 wind sensors, and one mobile) and integrate this with data from the 17 RWIS sites currently installed in Districts 2 and 3 forming the statewide RWIS network. This data will be formatted for ingestion by the NWS, Meteorlogix, and others as needed.
- Provide local alerts for specific conditions, such as high winds on bridges or severely limited visibility in troublesome areas.

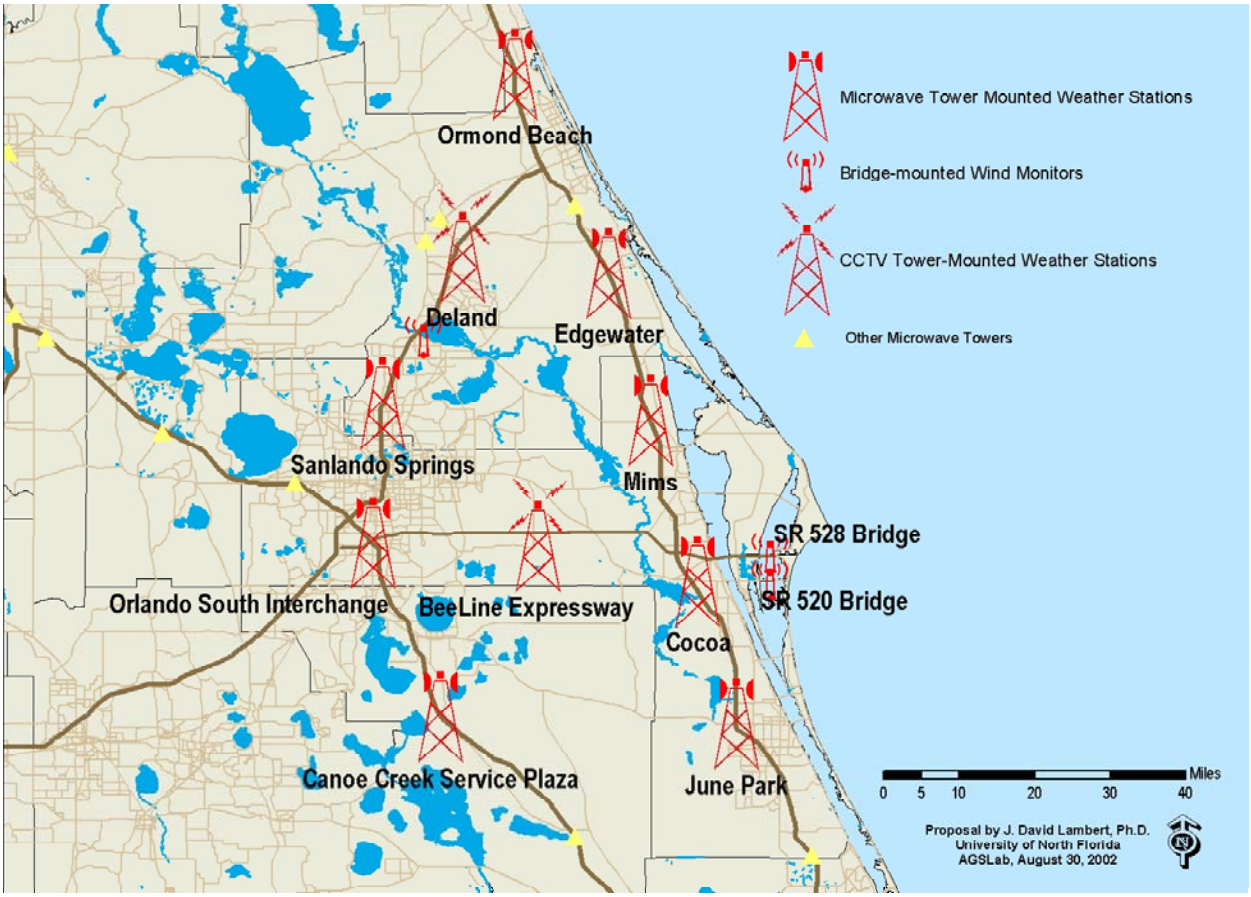


Figure 3.3.1: Proposed Locations of RWIS Facilities

3.3.4 Operational Scenarios

This project will support a single scenario or mode of operation. The project will collect and integrate weather-related data from the Central Florida region with weather-related data from Northern Florida. This integrated weather-related data will be provided to both the National Weather Service and Meteorlogix for further processing.

3.3.5 Summary of Impacts

The operational impact of this project to its users will be to provide localized weather-related data in order to better identify hazardous transportation conditions.

3.3.6 Analysis of the Proposed System

This section provides an analysis of the benefits, limitations, advantages and tradeoffs considered for the project.

- Benefits – Significant efficiencies to be gained by this project include:
  - Fewer deaths
  - Fewer accidents

- Limitations – Limited coverage, especially for visibility events such as fog and smoke.
- Advantages – Reflects an approach designed to minimize risk. This includes:
    - Use of a cost-effective approach that builds upon previous FDOT investments.
    - 17 RWIS sites are currently being deployed, installed and integrated in Northern Florida. The equipment selected for the iFlorida project will be from the same vendor as the Northern Florida project. As all weather-related equipment in Northern Florida should be installed and integrated prior to the deployment of iFlorida-related weather equipment, installation and integration challenges will likely be minimized.
- Trade-offs made – Density of sites versus coverage issues was analyzed, thus a balanced approach is presented.

3.4 Procurement 4 – Road Weather Forecasting

3.4.1 Current System Situation

Weather forecasts can currently be obtained simply by entering a zip code into a weather portal. Although National Weather Service forecasting is improving grid cover, they still remain "area" forecasts.

3.4.2 Justification for and Nature of Changes

Road Weather Forecasting is the prediction of how weather conditions will affect road surface travel conditions. It requires the production of accurate forecasts of temperature, humidity and precipitation at the road surface in order to produce correct warnings on road conditions.

3.4.3 Concepts for the Proposed System

Numerous sources of weather information, both current and forecasted, are available and will be increased through iFlorida. This portion of the weather project takes all those sources as input and develops current and forecasted weather for all defined road segments, both in Central Florida and statewide. The project will also include severe weather alerts and a Road Speed Index, an advisory value that the iFlorida Conditions System will use to calculate estimated travel times.

The resulting output of this project will be time-sliced forecasts for each road segment covered. Forecasts will be available for time periods ranging from 15 minutes (short-term predictions) to 48 hours (longer-term predictions) ahead of time. Using available National Weather Service (NWS) observational data sets from approved NWS reporting locations, as well as data from various Florida-based RWIS stations as input, Meteorlogix will utilize a high resolution numerical weather prediction model to develop highly specific current conditions and forecasts for each statewide, Central Florida, and 511 segment defined in the Conditions System. The Central Florida Data Warehouse will archive all raw and processed weather data.

The selected consultant will coordinate with the Consortium Central Florida Regional Travel's Information web site (http://www.iflorida.org) efforts to determine the best method of displaying current and forecasted weather information.

Additional concepts for the proposed project include:

- Observed and Forecast Local Weather Conditions
  - Included in the list of available parameters shall be precipitation, air temperature, relative humidity, and wind speed/direction.
  - Construction of Road Speed Index forecasts. (Using RouteWatch software).

- Storm Cells and Severe Weather
  - Generate a projected track (i.e., estimated time of arrival), for the next 30 minutes, for each storm that meets or exceeds Florida's criteria for a "significant" storm.
  - Threshold criteria for a "significant" storm.
    - Storms that contain a tornadic signature.
    - Storms that contain an 80 % or greater probability of ¾" or larger hail.
    - Storms moving at a speed of 40 knots or greater.
    - Storms that contain a mesocyclone (significant rotation).

- Road Segment Reports
  - The forecast results, severe weather-related data and NWS/RWIS observed data shall be converted directly to FDOT's defined road segments via the RouteWatch software.
  - RouteWatch software output shall be formatted as standard shape files, as well as a text file suitable for e-mail delivery, per incident - per segment.

- RouteWatch Software Output
  - Road Speed Summary (color coded) including:
    - Current Road Condition;
    - Weather Significant Condition using color code;
    - Time information (as this will be "current", as well as "forecast" data);
    - Road Speed Impact Current observational and storm corridor data. This is a short-term "nowcast" of the road speed index (delivered as a "flow factor" where the factor is a percentage (%) of posted speed limits). Road Speed Impact is based upon current precipitation levels for each segment.
  - Thunderstorm and Tornado bulletins for the next hour, as well as 15 and 30-minute forecasts of significant storm motion that will affect a given roadway segment. This nowcast is used to transition from the current road speed to the forecast road speed (derived from a model), and includes:
    - Current observational and storm corridor data;
    - Forecast data (derived from the model) for the next hour;
    - Forecast data (derived from the model) at a time step of every 3 hours - out to 48 hours.
  - Road Alerts to include:
    - Current data based upon NWS observations, RWIS observations, and storm corridors;
    - Forecast data based upon the output of the NWS model at a time step of every three hours - out to 48 hours.

3.4.4 Operational Scenarios

This project will support a single scenario or mode of operation. This project will collect data, process it, and provide refined data sets to the iFlorida Conditions System for its use.

Statewide travelers will be able to access current and forecasted weather via the statewide road segments map found on the "MyFlorida.com" web site (generated by the iFlorida Conditions System). For access to current and forecasted Central Florida-oriented road segment weather information generated by the Conditions System, the "MyFlorida.com" web site will transparently forward users to the Central Florida "iFlorida.org" web site. For access to current and forecasted Central Florida-oriented 511 road segment weather information generated by the Conditions System, the traveler shall utilize FDOT District 5's 511 telephone service.

3.4.5 Summary of Impacts

The operational impact of this project will be the provision of better warnings to travelers and transportation operators concerning adverse travel conditions, as far as 48 hours in advance.

3.4.6 Analysis of the Proposed System

This section provides an analysis of the benefits, limitations, advantages and tradeoffs considered for the project.

- Benefits – Significant efficiencies to be gained by this project include:
    - Fewer deaths
    - Fewer accidents
    - Safer overall travel
- Limitations – New data sets are generated every 15 minutes. System cycle time is fixed at 15 minutes. "Current" weather is defined as the data obtained at the beginning of a 15-minute cycle. However, weather forecasts from 30 minutes to 48 hours pose no problem.
- Advantages – The geo-referenced data set is relatively easy to integrate; also takes advantages of many sources of raw data.
- Trade-offs made – Limitations identified are acceptable.

3.5 Procurement 5 – Security Command and Control

3.5.1 Current System Situation

Within the state of Florida, the Sunshine Skyway Bridge (a 4-mile bridge that spans the Tampa Bay) provides the sole example of security-related monitoring of a bridge. Even so, the recently opened St. Johns River Bridge, located at the Seminole/Volusia County line, provides CCTV detection at critical road junctions on either side of the bridge.

3.5.2 Justification for and Nature of Changes

Several needs exist that warrant the development/deployment of an infrastructure-oriented security monitoring system. These include:

- Need to develop cost-effective methods for security-related monitoring of bridges;
- Need to identify vulnerabilities associated with the state of Florida's transportation assets; and
- Need to protect key transportation assets.

3.5.3 Concepts for the Proposed System

This project will facilitate deployment of security-monitoring devices on two bridges, the Fuller Warren Bridge in Jacksonville and the S.R. 528 Bennett Causeway Bridge in Brevard County. The Fuller Warren Bridge (on I-95) serves as a bypass route through Jacksonville, the largest city in the nation in terms of square miles. The S.R. 528 Bennett Causeway Bridge serves the NASA - Kennedy Space Center area, and is a primary hurricane evacuation route between the Brevard Space Coast and Orlando.

Security-monitoring devices will be deployed both above and below these bridges' decks. These devices will provide motion sensor oriented inputs to an automated security-monitoring system. This monitoring system will process these inputs in order to detect potential security problems, provide alerts, and assist in post-event analysis. A single security application will be deployed as part of this project at each of locations listed below:

- FHP, Troop G, Jacksonville
- FDOT D5, RTMC - D5 staff is collocated with FHP Troop D
- Brevard County 911 Center

Staff at these locations will consequently be able to monitor events at the facilities under surveillance on a 24/7 basis.

During a security-related event, alarms and alerts from the Fuller Warren Bridge will be sent simultaneously to the following offices: Jacksonville FHP Troop G, FDOT D2 TMC, and FDOT D5 RTMC in Orlando.

Similarly, alarms and alerts from the Bennett Causeway Bridge will be sent simultaneously to the following offices:

- FDOT D5 RTMC and FHP Troop D (co-located)
- Brevard County 911 Center and Brevard County Traffic Operations Center (TOC) (co-located)
- FDOT D5 RTMC

Alarms and alerts will automatically trigger the real-time digital recording of events for post event analysis.

Once an agency receives an alert, existing procedures will be used to handle the events appropriately. It is not the intent of iFlorida to develop new procedures to handle security events.

Boeing Autometric will provide automated security monitoring and control via their Visual Security Operations Console (VSOC) application. This application provides the visual alarm annunciation, security surveillance, video assessment capability, and alarm management necessary to support security applications on the two bridges being used as part of this model deployment.

In addition to monitoring the bridges' security cameras and alarm sensors, the VSOC application is capable of presenting a photo-realistic model of the bridges themselves. This virtual reality environment will provide FHP and FDOT staff with excellent situational awareness and improved command and control capability. Moreover, VSOC visually fuses video-oriented motion detector sensor alarms with video surveillance in order to decrease response times and improve the quality of alarms assessment.

3.5.4 Operational Scenarios

In the normal monitoring mode, bridge motion detector sensors will focus on key security related areas (e.g., bridge roadway shoulders, areas beneath the bridge decks, approaches to bridges, etc.) and provide continuous monitoring of all security-related events.

In the alarm/alert mode (which occurs when a bridge mounted security monitoring device is triggered), the VSOC system will automatically notify specific FHP and FDOT locations. Alarms and alerts will also trigger the automatic, real-time digital recording of events for post event analysis.

Bridge-related FHP and FDOT alert recipients are summarized as follows:

- Fuller Warren Bridge
    - Jacksonville FHP, Troop G*
    - FDOT District 2 TMC
    - FDOT District 5 RTMC
- Bennett Causeway Bridge
    - Brevard County 911 Center*
    - Brevard County TMC
    - Brevard County FHP Substation Troop D*

- FDOT District 5 RTMC
- FHP Troop D

* First Responder

First responders will have the ability to initiate automatic call-up of cameras covering the location of a detected alarm and interactive camera call-up for the verification of a security event. Upon review of available information, the first responder will make a determination concerning the validity of the alarm and contact appropriate resources to investigate the event.

As part of the post-event analysis mode, the documentation of both the video and the sequence of alarms and events can assist with post-event decision analysis and provide lessons learned for others.

As per state law, all FDOT video recordings are erased after 30 days. The iFlorida partners have already held meetings with Florida Department of Law Enforcement (FDLE) officials to ensure that any FDOT bridge related security event recordings will be classified as evidence and tuned over to FDLE officials for further action.

3.5.5 Summary of Impacts

The operational impact of this project is to provide its users with the capability to monitor infrastructure assets in real-time without requiring constant operator attention.

3.5.6 Analysis of the Proposed System

This section provides an analysis of the benefits, limitations, advantages and tradeoffs considered for the project.

- Benefits – Test the effectiveness of a fully automated system.
- Limitations – Not cost-effective to monitor conditions when roads are underwater.
- Advantages – Removes operators from monitoring functions and provides a strong security environment for testing exercises.
- Trade-offs made – Cost versus scale of monitoring.

3.6 Procurement 6 – iFlorida Conditions System

3.6.1 Current System Situation – iFlorida Conditions System

Although Statewide and Central Florida data is currently available from a number of "stovepipe" (i.e., stand-alone) sub-systems, this data is not integrated.

3.6.2 Justification for and Nature of Changes

Several needs exist which warrant the integration of existing sub-systems into a single Conditions System. These include the need for:

- A single comprehensive, integrated picture of current system status. For this project, "system" is defined as including the Florida Intrastate Roadway System (FIHS), other covered roadways, LYNX, and the Orlando and the Orlando-Sanford International Airports.
- A single system to support both FDOT transportation management and traveler information needs.
- The capability to accept and integrate data from multiple sources.
- Real-time, accurate, reliable information for individual road segments (Data Collection Links) to facilitate improved transportation decision-making by users.
- The capability to have current and forecasted road weather information embedded into available traveler information.
- The capability for RTMC operators to use relevant system-provided transportation and road weather information as a decision-support tool to assist in regional traffic management.

3.6.3 Concepts for the Proposed System

This project will design and implement the iFlorida Conditions System at the Florida Department of Transportation (FDOT) District 5 Regional Traffic Management Center (RTMC). The Conditions System is an Internet-based information management tool whose role is to collect, fuse, and disseminate transportation system-related conditions information for the Florida Intrastate Highway System (FIHS) throughout the state, as well as more detailed, multi-modal conditions information for the Central Florida region.

Statewide-oriented transportation system conditions information will be disseminated via FDOT's web site (http://www.myFlorida.com). Central Florida-oriented conditions information will be disseminated by the Central Florida Data Warehouse, which will maintain a separate web site (http://www.iflorida.org).

A top-level overview of the Conditions System is presented in Figure 3.6.1.

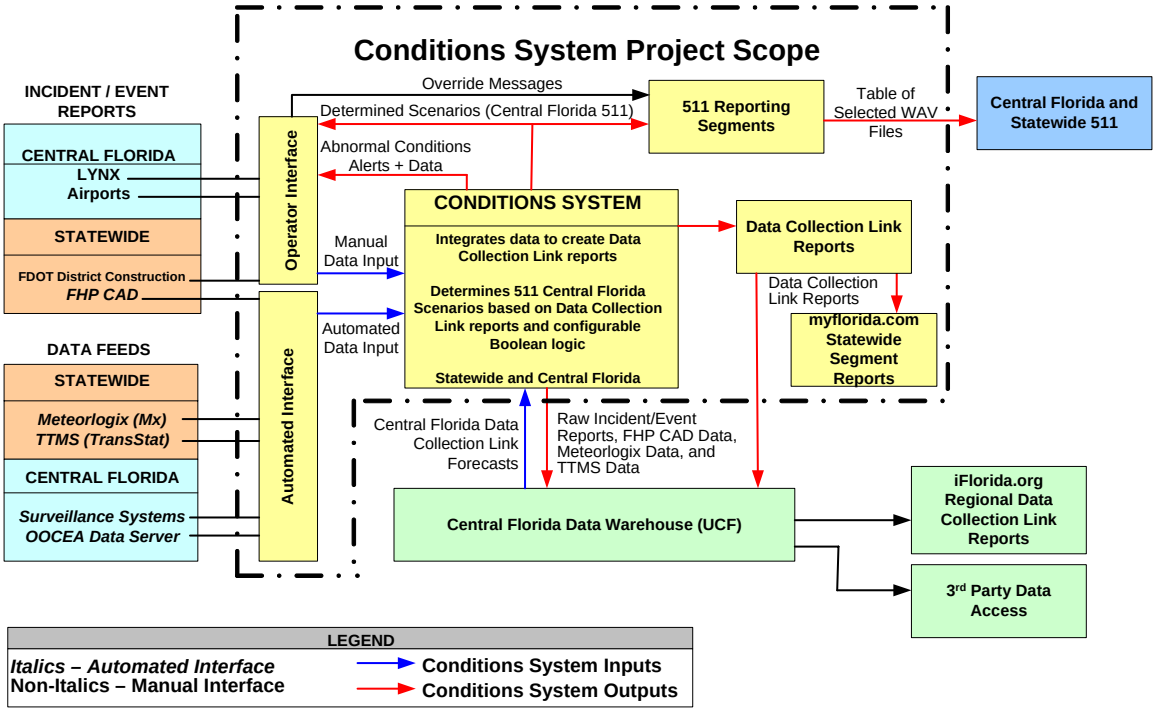


Figure 3.6.1: Conditions System Top Level Overview

The Conditions System will incorporate automated data from the Florida Highway Patrol's (FHP) Computer Aided Dispatch (CAD) system, FDOT's construction information, FDOT's Telemetered Traffic Monitoring Sites (TTMS), FDOT District 5's Surveillance Systems, the Orlando Orange County Expressway Authority's (OOCEA) Travel Time Data Server, available transit and airport information, and Meteorlogix's segment weather conditions, alerts, and forecasts (to be provided as part of a separate iFlorida procurement).

The Conditions System will also include an operator interface to enable appropriate personnel from FDOT, its partner agencies, and approved private contractors/consultants to enter incident/event reports directly into the Conditions System database, both from the RTMC and remotely via a standard Internet browser. In addition, the operator interface will be linked to both the Central Florida and Statewide 511 Systems. This link will enable FDOT operators to view alerts and/or abnormal conditions generated by these systems, as well as insert one or more unique ad-hoc announcements (.WAV file) into one or both of these 511 systems. For the Central Florida 511 System, the Conditions System will also select from a list of pre-recorded announcements based on operator-defined, travel time scenarios.

The Conditions System will fuse all available input data into pre-defined Data Collection Links. A Data Collection Link is a segment of roadway bounded by two endpoints for which roadway information (time/speed, incident/event and other transportation information) is collected in a timely fashion. The lengths of the links are approximately 1 to 5 miles for the more detailed Central Florida interstates, expressways, and arterials and approximately 15 to 45 miles for the more generalized statewide Florida Intrastate Highway System (FIHS) roadways. The links will then be aggregated into Data Collection Link Reports for data dissemination.

All input/output associated with the Conditions System will utilize relevant ITS standards to the maximum extent possible. Proposed standards include the Traffic Management Data Dictionary (ITE TM1.03), Standard for Traffic Incident Management Message Sets for Use by Emergency Management Centers (IEEE 1512.1) and/or Standard for Common Incident Management Message Sets for use by EMCs (IEEE 1512.2), and Converting ATIS Message Standards from ASN.1 to XML (SAE J2360). All operator inputs will be Traffic Management Data Dictionary (TMDD) compliant. The Data Collection Link Reports output by the Conditions System will be in XML format (based on SAE's emerging J2354 standard) and provide the following information for each defined road Data Collection Link: TTMS speed and volume data (if relevant), descriptions of all incidents/events, and current and forecasted weather conditions.

Within the system, a more granular level of monitoring will be established for the Central Florida area, including information concerning covered arterials and more detailed transit and aviation elements.

In addition, a number of sub-projects will be developed to support different planned uses of data. These sub-projects include:

- ***Conversion of I-4 Data*** – This sub-project will require the development of code to convert existing Surveillance Motorist Information System (SMIS) speed, volume, and occupancy data collected from loop detectors into travel times for defined road Data Collection Links.

- ***Variable Speed Limit Application –*** This sub-project will require the development of code to recommend speed limit values for each of the 22 signs deployed as part of the I-4 Variable Speed Limit Trial. Recommended speed limit values shall be determined using real-time and Data Collection Link forecast information produced by the Conditions System. This sub-project will only recommend speed limit values; a separate system outside this project will control the Variable Speed Limit signs.

- ***Dynamic Message Sign I-4 Diversion and Travel Times –*** This sub-project will include two parts. The first part will require the development of code to calculate travel times for the SR 417 and SR 423 diversion routes around I-4. The Dynamic Message Signs (DMS) near the SR 417 and SR 423 exits from I-4 will display comparative travel times between these alternate route and I-4.

  The second part of this sub-project will require the development of code to forecast travel times and/or delays that will occur along I-4. Information concerning these travel times and/or delays will be displayed on remaining I-4 DMS. Both parts of this sub-project will require the development of code capable of selecting appropriate text strings to be displayed from a database of potential messages. Message selection shall be based on the forecasted travel times and current traffic conditions. This sub-project shall control all existing I-4 DMS.

  This sub-project shall calculate travel times based on both real-time and Data Collection Link forecast information produced by the Conditions System. This sub-project will only recommend DMS messages; a separate system outside this project will control the DMS'.

3.6.4 Operational Scenarios

In the normal, automatic operating mode, Conditions System data will be collected, fused, and disseminated to FDOT and travelers via the web sites and the 511 systems.

In the alert mode, the Conditions System will automatically provide alerts to the RTMC operator that something requires immediate attention. Below are sample scenarios that would initiate an alert mode.

- **Recurring congestion along I-4 in Downtown Orlando** – During a typical weekday, traffic begins to back up in the downtown area due to the increased demand placed on the road by those leaving work. As the speed of traffic begins to slow below the posted speed limit, the RTMC operator receives an alert from the Conditions System specifying the problem and suggesting a potential solution.

The Conditions System operator subsequently acknowledges the alert and requests that the RTMC operator to change the posted limit on specific variable speed limit signs from 65 MPH to 45 MPH.

The Conditions System operator will now use the system to observe the effect of the speed reduction on traffic. The Conditions System will also have the capability to enable users to view archived data (i.e., speeds) for the periods of time during which the speed limit signs were modified. These tools will enable Conditions System/RTMC operators to make more informed decisions concerning the timing, duration and speeds selected. It is expected that over time, a pattern of optimum speed limit changes will be attained.

Meanwhile, the Conditions System will continue to evaluate the current traffic conditions, determining if a different Central Florida 511 Scenario should be selected based upon current travel times. If the travel times dictate that a different scenario should be selected, then an appropriate pre-recorded announcement (.WAV file) will be delivered to the Central Florida 511 Telephone System and the RTMC operator will be alerted that a change has been made. If the RTMC operator determines that the current traffic conditions warrant a different announcement than the one selected, the RTMC operator has the option to create an override message that will replace the announcement delivered to the Central Florida 511 Telephone System.

- **Calculating a Roadway Diversion Message** – The Conditions System will calculate and compare the travel times a southbound trucker or other traveler might encounter while traveling from the northern intersection of I-4 and S.R. 417 to the I-4 Disney area. For this to occur, two calculations will have to be completed - one for traveling to Disney via I-4 and the other for traveling to Disney via S.R. 417. The Conditions System will perform these calculations using both real-time and Data Collection Link forecasting capability.

  If an accident occurs on either of these two roadways, the Conditions System operator will be alerted and the Conditions System will re-calculate the travel times for these two critical roadways. The Conditions System operator will then request that the RTMC operator change/update the appropriate DMS.

- **Localized Weather Event** – The Conditions System will provide thunderstorm and tornado bulletins (alerts) for the next hour, as well as 15 and 30-minute forecasts for significant storm motion that will likely affect a roadway segment. Weather-related alerts will be available to the RTMC operator via the Operator Interface and to the public via the statewide website and/or the Central Florida website, depending upon which roads are affected. The weather model deployed as part of iFlorida will also provide the Conditions System operator with Road Speed Impact data, current observational data, and storm corridor data. Road Speed Impact is a short-term "nowcast" of the road speed index (delivered as a “flow factor” where the factor is a percentage (%) of the posted speed limits).

Road Speed Impact is based upon current precipitation levels and can provide Conditions System operators with a valuable tool to assist in managing traffic by giving an estimate of how travel times are affected due to inclement weather.

If the RTMC operator determines that the alerts are severe enough to warrant updating the 511 Telephone service, the RTMC operator can create an override message, or messages, which the Conditions System will deliver to the Central Florida and/or statewide 511 Telephone service.

3.6.5 Summary of Impacts

The operational impact of this project is to provide RTMC operators and travelers with a more comprehensive, unified picture of transportation conditions in both Central Florida and Statewide.

3.6.6 Analysis of the Proposed System

This section provides an analysis of the benefits, limitations, advantages, and tradeoffs considered for the project.

- Benefits – Improved traveler information and enhanced traffic operations support.
- Limitations – Information is only as good as the input data (in terms of content, coverage and quality).
- Advantages – Keeping humans in the operational loop makes the system significantly less risky from a development standpoint as compared to a fully automated system.
- Trade-offs made – Extent of automation versus operator cognitive workload.

3.7 Procurement 7 – Statewide TTMS Upgrade

3.7.1 Current System Situation

There are currently 300 Telemetered Traffic Monitoring Sites (TTMS) deployed across the state of Florida. Data from these TTMS', which is primarily used for planning purposes, is downloaded at least daily. In addition, 54 TTMS' can be polled hourly to support emergency operations. These 54 sites are depicted in Figure 3.7.1, and are accessible only by emergency operators via a dedicated web page. Additionally, 6 of the 54 sites are undergoing trials using web cams to provide snapshot type images along with hourly data during emergency situations. Images from these web cams will provide additional information to assist in the confirmation of data sent from the TTMS' themselves.

3.7.2 Justification for and Nature of Changes

Specific roadway-oriented information is required to support emergency operations. The State of Florida Office of Emergency Operations has stated that they require data and images from each of the 54 sites in real-time or near real-time.

3.7.3 Concepts for the Proposed System

At a minimum, this project will need to provide video image capability to all 54 TTMS sites used for emergency operations. Use of these upgraded sites for the provision of improved traveler information will also be undertaken. This project will also investigate the capability of the 54 upgraded sites to support more frequent data and image polling. Additionally, the project will investigate the possibility of using existing microwave and/or fiber communications infrastructure (i.e., where available) to more efficiently distribute the data.

The procurement approach for this project remains under development.

The FDOT Transportation Statistics (TranStat) Office will continue to operate the TTMS' after the upgrades have been made.

3.7.4 Operational Scenarios

The current operational mode is daily polling of the 54 sites, with the capability to shift to hourly polling during emergency situations. The goal of this project is continue a single operational mode, however, at an enhanced polling rate, which is still to be determined.

3.7.5 Summary of Impacts

The operational impact of this project is to provide improved information to support both emergency operations and emergency-oriented traveler information services.

3.7.6 Analysis of the Proposed System

This section provides an analysis of the benefits, limitations, advantages, and tradeoffs considered for the project.

- Benefits – Increased capability for real-time reporting, with the addition of images to assist in the confirmation of TTMS data.

Figure 3.7.1: Telemetered Traffic Monitoring Sites for EOC Real-Time Polling

- Limitations – Initial investment/ongoing operating cost of communications enhancements to the TTMS' has been the primary limiting factor in terms of upgrades to date, and will drive what can be achieved through the iFlorida project. The result of the coverage versus cost analysis factor provides limited, but acceptable, capabilities for statewide emergency operations.
- Advantages – Enhancements leverage existing investments made in the statewide TTMS data collection system.

- Trade-offs made – Cost of communications bandwidth versus polling rates and image types and update rates. Power requirements versus TTMS/camera performance (as all sites rely on solar power and the cost to upgrade to commercial power would be prohibitive).

3.8 Procurement 8 – Central Florida Data Warehouse Expansion

3.8.1 Current System Situation

The University of Central Florida (UCF) has been archiving loop detector based speed data from along I-4 since 1993. UCF is currently working (on behalf of the Florida Department of Transportation) to expand the existing Central Florida Data Warehouse (CFDW) that collects, aggregates, processes, and disseminates/archives this data, as well as that from other existing resources, in one centralized location. As part of this effort, UCF is also in the final stages of developing a Central Florida-oriented regional traveler information web site (http://www.iflorida.org) utilizing currently available data. Additionally, in the future, the data warehouse will incorporate probe based travel time data from the Orlando Orange County Expressway Authority (OOCEA) and other resources (e.g., FDOT sensors deployed along arterial roadways and limited access roads in the Orlando Metropolitan area) as it becomes available.

3.8.2 Justification for and Nature of Changes

The goal of this project is to provide a repository for data that can subsequently be used for a variety of purposes, including: data analysis, trend analysis, system performance and benefit assessment, and system diagnostics. The Data Warehouse's website will also provide users with roadway Data Collection Link forecasting, produced from the Data Warehouse's predictive modeling, for pre-defined roadway Data Collection Links along the I-4 corridor. The addition of new data sources and types of data will expand the number of opportunities available to develop improved forecasts – with regard to both accuracy and geographic scope.

3.8.3 Concepts for the Proposed System

This procurement will utilize the University of Central Florida to develop the Central Florida Data Warehouse. In addition to data supplied by the I-4 SMIS and the OOCEA Data Server (the feed between the Data Server (located at OOCEA Headquarters) and the Data Warehouse (located at UCF) will be completed as part of a separate ongoing project), new data sources will be collected and integrated, including:

- Meteorlogix weather-related data
- Road weather data from the FDOT RWIS
- FHP CAD Data
- Operator-entered incident and event reports
- Statewide and Orlando area segment reports from the iFlorida Conditions System
- Transit (i.e., LYNX) events regarding service disruptions, changes, and additions should they arise.

- Airport (i.e., Orlando International Airport and Orlando-Sanford International Airport) events regarding major landside transportation issues (such as parking), generalized airport delays, and estimated wait times at security screening should they arise.

The Data Warehouse's Central Florida oriented web site (to be operational in late 2003; with the URL http://www.iflorida.org) will be expanded over time to include coverage of all monitored facilities and other relevant information as it becomes available. Additionally, the Data Warehouse's roadway segment forecasting capabilities will be expanded to cover all iFlorida-defined segments and to factor in information above and beyond simple flow data, such as that related to weather and incidents.

The Data Warehouse will be the location from which all third party access to iFlorida data will be available via a published data feed accessible to all licensed users.

The Data Warehouse will make use of standardized interfaces to the maximum extent possible, both in terms of data input and data retrieval.

The raw data provided to the Central Florida Data Warehouse will be retained for a period of time to be determined.

Redundant architecture methodologies will be incorporated to limit risks involved as a single point of failure.

3.8.4 Operational Scenarios

This procurement has one operational mode, normal. Under normal mode, various subsystems outside of the data warehouse will automatically provide data to the Central Florida Data Warehouse for storage. In addition, data will be retrievable both through automated means and manual access.

3.8.5 Summary of Impacts

The data warehouse will support improved access to greater amounts of information than has been previously available. Usage of this data will enhance the ability to forecast future conditions and provide a better understanding of current conditions. This information will support better congestion and incident management, as well as the provision of better information to travelers. In addition, the data warehouse will provide third parties with the ability to readily access this data.

3.8.6 Analysis of the Proposed System

This section provides an analysis of the benefits, limitations, disadvantages, alternatives and tradeoffs considered for the deployment.

- Benefits – Improved travel reliability, better operations and capital planning, expanded uses/users of data
- Limitations –The data warehouse is currently under development. Specific limitations have not been identified to this point beyond the limitations of storage capacity.

- Advantages – The major advantage is that the data warehouse will provide a single repository for project data.
- Trade-offs made –The data warehouse is currently under development and tradeoffs have not been made yet.

3.9 Procurement 9 – iFlorida Operations

3.9.1 Current System Situation

In June of 2002, the Central Florida 511 service was initiated along 50 miles of the I-4 corridor in the Orlando Metropolitan area, making it the first 511 deployment in the state. The system utilizes an interactive voice response network supported by Tellme. Callers are able to request segment condition reports and quick summary reports along the I-4 corridor. In response, information on current conditions is provided to the caller via recordings produced by "live professional" announcers located at the Regional Traffic Management Center (RTMC). Announcers update conditions information every 20 minutes, or instantaneously if there is an incident on which to report.

3.9.2 Justification for and Nature of Changes

The existing Orlando Metropolitan area 511 system currently covers I-4. It is desired to expand this system, both in geographic coverage, as well as the type and resolution of the information provided. Additional types of information would include transit information and special event information, such as that related to hurricanes. Expansion of the system to cover all limited access highways in the Orlando Metropolitan area is also desired. This expanded system would utilize data made available through other iFlorida procurements. For areas outside of Central Florida and other metro areas having a regional 511 system, a statewide system is needed to provide information on major freeway segments. This system could also provide 511information in urban regions until a regional system is in place. The ultimate goal is to support each of the state's major urban regions with separate 511 systems that utilize local data, integrating and supplementing these systems with a statewide system. The strategy for achieving this goal is being developed as part of the Florida Statewide 511 Conceptual Design Plan.

3.9.3 Concepts for the Proposed System

This procurement focuses on the operations of general traffic management, expanding the Statewide and Central Florida 511 service, and the traveler information systems. 511 will be supported through a number of parallel systems, including: the Statewide 511 System, the Central Florida 511 System, the Southeast Florida 511 System, the Tampa Bay 511 System, and other systems (e.g., the Jacksonville 511 System) as they come on-line. This procurement will serve many operational purposes:

- The Statewide and Orlando area 511 systems will be designed, implemented, operated and maintained through this project, incorporating and formatting the segment reports available from the iFlorida Conditions System as the foundation for content available via this service.
- The iFlorida Conditions System will provide pre-recorded 511 messages in electronic format for automated use on the 511 system. However, a 511 operator will have the ability to override the pre-recorded message.
- A 511 operator will be supplied to the District 5 RTMC as part of this project. They will utilize the iFlorida Conditions System, as well as other inputs to ensure that timely, accurate, and reliable information is available on the 511 System.

- FDOT RTMC Operators will serve as the primary interface with Dynamic Message Signs and variable speed limit signs used in roadway diversion and variable speed limit trials, respectively. While the iFlorida Conditions Systems contractor will develop applications to recommend what information to provide on these signs, it will be up to the operators themselves to review and implement these recommendations as appropriate.
- A major part of this project is to ensure that quality control and proper operator training and procedures are in place to optimally operate the tools iFlorida provides.

3.9.4 Operational Scenarios

There are two operational scenarios associated with this procurement.

- Automated – This is the normal operational mode. When roadway conditions are normal (within defined operational characteristics), operators will only monitor the system. "Within defined operational characteristics" means that all messages needing to be posted on the 511 system are made available automatically and that current conditions fall into specific scenarios developed for the system.
- Override – Override mode is only enacted when abnormal conditions are encountered which require additional attention and possible action outside of the normal operational mode. In this mode, the 511 operator will manually record special messages for each particular situation.

3.9.5 Summary of Impacts

The primary impact will be better information for both travelers and operators of the system, as well as an increased number of tools for use in traffic operations management. With respect to staffing, an additional 511 operator will be utilized to support the increased data analysis role.

3.9.6 Analysis of the Proposed System

This section provides an analysis of the benefits, limitations, disadvantages, alternatives and tradeoffs considered for the deployment.

- Benefits – Improved information for the Central Florida 511 system and complete coverage for 511 statewide. Traffic Operations Management will be improved through new coverage capabilities and the availability of additional/improved information.
- Limitations – Detailed 511 information will be limited to the metro areas with existing regional 511 systems.
- Advantages – The major advantages are that data will be available on a real-time basis to travelers, and that RTMC staff will have more information and better tools to provide information and manage traffic.
- Trade-offs made – To support the needs and desires of the community a 511 operator will be utilized to record messages for posting to the 511 service. This is in lieu of there being a completely automated system.

3.10 Procurement 10 – Broadband Wireless Trial

3.10.1 Current System Situation

In general, wireless in-vehicle applications have only been deployed on a limited basis nationally due to bandwidth and cost related issues. Consequently, adoption and use has been slow for both public and private applications. At present, there are no wireless broadband systems in place for use by FDOT or its partners in the Central Florida region.

3.10.2 Justification for and Nature of Changes

Great advancements have been made over the last several years in the area of wireless communication. Advanced WiFi and comparable technologies are emerging that are cost effective, provide adequate bandwidth, and have sufficient stability and robustness to support transportation-oriented applications. Such technologies are bringing us closer to having the ability to provide data to and collect data from mobile units (vehicles) traveling the roadway in real-time; a concept that has been desired, but unobtainable, for quite some time. In addition, there is a need to provide real-time video surveillance on transit vehicles using wireless communications technology. Video surveillance such as this will assist police in responding to transit incidents, as well as in conducting post-incident analyses.

3.10.3 Concepts for the Proposed System

At this time, the exact concept to be pursued remains under development. It is planned that an Invitation to Negotiate (ITN) will be issued this fall. The following are the overall objectives of this deployment.

- To establish a broadband wireless trial on a limited access roadway in the Orlando Metropolitan area that provides:
    - a high level of broadband capacity
    - the most open communications system possible
- To support the LYNX wireless video trial to be conducted on area transit vehicles
- If possible, support a Florida Highway Patrol (FHP) Internet access trial. As plans exist for a dedicated set of FHP troopers to patrol I-4 (OOCEA facilities and the Florida Turnpike already have such dedicated FHP patrols), it may be possible to upgrade some/all of their vehicles' wireless communications systems to facilitate in vehicle Internet access.
- Facilitate other public and possibly private sector tests of applications making use of the broadband environment created by this trial (keeping in mind those entities who wrote letters of interest/support as part of the initial target group)

3.10.4 Operational Scenarios

Since this procurement is still under development, there are no operational scenarios at this time.

3.10.5 Summary of Impacts

Since this procurement is still under development, there are no impacts at this time.

3.10.6 Analysis of the Proposed System

This section provides an analysis of the benefits, limitations, disadvantages, alternatives, and tradeoffs considered for the deployment.

- Benefits – Improved travel reliability, better operations and capital planning, expanded uses/users of data.
- Limitations – Since the procurement is still under development, no limitations have as of yet been identified. However, limitations will likely relate directly to the tradeoffs made with respect to functionality, coverage, capacity, open protocol, security, and cost.
- Advantages – The major advantage is that it will be possible to transmit/receive data on a real-time basis from in-trip vehicles.
- Trade-offs made – Trade-offs will need to be made between functionality, coverage, capacity, open protocol, security, and cost.

3.11 Procurement 11 – Probe Vehicle Test

3.11.1 Current System Situation

At present, there are no systems in place for use by FDOT or its partners in the Central Florida region that utilize an active communications link between vehicles and roadside infrastructure to facilitate the collection of data to support roadway operations-related activities.

3.11.2 Justification for and Nature of Changes

There is great interest at the national level in developing a system that actively collects data from vehicles moving along the roadway. However, any solution will need to meet several criteria and adequately address a number issues in order to be practical, including:

- Cost of equipment (roadside infrastructure and in-vehicle)
- System maintenance
- Data availability
- Data accuracy and reliability
- Bandwidth of communications link
- Ability to store and process data
- Data security and privacy
- Private sector partnering
- Backhaul communications needs and availability

3.11.3 Concepts for the Proposed System

The idea of a "probe vehicle" is that data will be collected with more active involvement of the vehicle, and possibly including far more data than just a unique vehicle identifier. The exact concept for this procurement is currently under development. The U.S. DOT has been working with automakers and AASHTO to establish an appropriate test scope and location. It remains to be determined whether Florida will serve as a test location.

3.11.4 Operational Scenarios

To be determined.

3.11.5 Summary of Impacts

To be determined.

3.11.6 Analysis of the Proposed System

To be determined.

4.0 Summary

As stated previously, the ConOps document is but one of the several documents that define the parameters from which a system is developed. Over the next several months many of the procurements and associated technical requirements will evolve and become more defined. As this happens the Final ConOps document will reflect the revised baseline and provide an excellent source of validated operational concepts. The Final ConOps will become the basis for the additional analysis required to develop the detailed technical requirements required by the Requirements Document.