Brevard County
Advanced Traffic Management System (ATMS)

Project Systems Engineering Management Plan (PSEMP)

February 25, 2013
Version 2.5

Prepared for:
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Acronyms and Abbreviations

ADA	Americans with Disabilities Act
ATMS	Advanced Traffic Management System
CCTV	Closed Circuit Television
CEI	Construction, Engineering and Inspection
CFR	Code of Federal Regulations
ConOps	Concept of Operations
EIA	Electronic Industries Alliance
EOC	Emergency Operations Center
FDOT	Florida Department of Transportation
FHP	Florida Highway Patrol
FHWA	Federal Highway Administration
ITS	Intelligent Transportation System
MOE	Measures of Effectiveness
MOP	Measures of Performance
MTR	Minimum Technical Requirements
MUTCD	Manual on Uniform Traffic Control Devices
NITSA	National ITS Architecture
O&M	Operations and Maintenance
PERT	Project Evaluation and Review Technique
PM	Project Manager
PSEMP	Project Systems Engineering Plan
PSTMC	Public Safety and Traffic Management Center
QA	Quality Assurance
QC	Quality Control
QM	Quantitative Measures
QMP	Quality Management Plan
RITSA	Regional ITS Architecture
RTVM	Requirements Traceability Verification Matrix
SEMP	Systems Engineering Management Plan
SEP	Systems Engineering Processes
SIC	SunGuide® ITS Checklist
SITSA	Statewide ITS Architecture
TMC	Traffic Management Center
TPM	Technical Performance Measure
TRIP	Transportation Regional Incentive Program

1. Document Overview

This document is the Project Systems Engineering Management Plan (PSEMP) for the Brevard County ATMS Project. A PSEMP is a plan that helps manage and control a project using the System Engineering Plans (SEPs) process

The document is organized as follows:

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

The development and management of the Brevard County ATMS SEMP is based on a number of guidelines and builds upon planning, reports, and documentation developed prior to the development of this PSEMP, including:

- State and Federal Guidelines
- Project Planning Reports
- FDOT ITS Strategic Plan
- Brevard County ITS Strategic Plan
- FDOT Inspection and As-Built Guidelines (Appendix A)

The development of this PSEMP and other project management materials for the Brevard County ATMS project were developed in reference to guidelines and information presented at the Florida Department of Transportation's (FDOT) SEMP website, which can be found at the following link:

http://www.dot.state.fl.us/trafficoperations/ITS/Projects_Deploy/SEMP.shtm

The development of this PSEMP was prepared in reference to State guidelines and systems engineering processes as defined in

- Deliverable 1-10: Technical Memorandum, Florida's Statewide Systems Engineering Management Plan, Version 2, March 7, 2005.
- Technical Memorandum: Writing a Project Systems Engineering Management Plan (Version 4, September 29, 2006).

1.1 Framework:

As previously noted, the PSEMP represents the plan for project execution and management that was based on the Systems Engineering model and associated processes. The regulations that frame the development and implementation of a PSEMP are born from Federal Regulations related to ITS projects, more specifically, 23 CFR 940.

1.2 23 CFR 940:

On April 8, 2001, the Federal Highway Administration (FHWA) issued Rule 940 entitled Intelligent Transportation System Architecture and Standards. The intent of the Rule is to require procedures for implementing sections of the Transportation Equity Act for the 21st Century (TEA-21) requiring ITS projects to conform to the National ITS Architecture (NITSA) and standards.

As a requirement of 23 CFR 940, any project receiving federal-aid that moves into design is required to follow a systems engineering analysis (including development of a PSEMP) that is commensurate with the project scope.

2. Need for a Project Systems Engineering Management Plan

The FHWA requires[1] states that desire federal assistance for ITS deployment projects to use a SEP to qualify for financial assistance. The PSEMP documents tasks to be performed for the coordination and control of all ITS device deployments.

Florida's Statewide SEMP is used as a reference guide in the creation of this PSEMP.

2.1 Project Identification:

- Project Name: Brevard County ATMS
- Financial Project Identification(s) (ID):
  - 428957-1-52-01
  - 428919-1-52-01
  - 428920-1-52-01
- Federal Aid Project Number: ARRA 641-B

2.2 Project Description:

The Brevard County ATMS project is a collaborative effort between FDOT District 5 and Brevard County. This project consists of the design and construction of ITS infrastructure and ITS sub-system components along the following corridors in Brevard County, Florida:

- SR 500 (US 192) from the I-95 Southbound Ramps to Dairy Road
- SR 518 (Eau Galle Blvd/Montreal Ave) from CR 509 (Wickham Road) to Pineapple Ave.
- SR 520 (King Street) from Clearlake Road to Banana River Drive
- SR 5 (US 1) from Peachtree Street to Eyster Blvd.
- SR 5 (US 1) from Lake Washington to Babcock Street
- SR 50 (Cheney Hwy) from I95 to SR 405
- SR 405 (Columbia Blvd) from SR 50 (Cheney Hwy) to SR 5 (US1)
- Palm Bay Road from Minton Road to Robert J. Conlan Blvd.
- Minton Road from I95 overpass to Emerson Drive NW
- CR 509 (Wickham Road) from SR 5054 (Sarno Road) to SR 500 (US 192)

ITS sub-systems for the project are defined as: a fiber optic network system (FON), a vehicle detection system (VDS), a closed circuit television (CCTV) camera system, a travel-time data collection system, and an adaptive signal control system for the traffic corridors. These systems are inclusive of central control software, local software, and hardware (such as but not limited to servers, computers and switches). Central command operations are housed and performed at the joint Brevard County Traffic Management Centers (TMCs) located at:

Brevard County Public Works Engineering Office
2725 Judge Fran Jamieson Way, A211
Viera, Florida 32940-6605

Brevard County Traffic Operations
580 Manor Drive
Merritt Island, Florida 32952

Brevard County Emergency Operations Center
1746 Cedar Street
Rockledge, Florida 32955

The ITS network was extended sufficiently close to the municipal facilities of the Cities of Titusville, Melbourne, and Palm Bay, and terminals have been installed allowing the Cities to have monitoring capabilities over the entirety of the ATMS components.

2.3 Funding:

Beginning in May of 2010, FDOT District 5 in conjunction with Brevard County, entered into an agreement to use unencumbered American Recovery and Reinvestment Act (ARRA) funding as a monetary source to deploy ITS upgrades to the US 192 corridor from I-95 to Dayton Drive. FDOT District 5 began development of a Request for Proposal (RFP) for a design/build solicitation for the project under a maximum bid price solicitation format in the amount of $276,924.00. During development, the project was rolled into a larger effort due to further coordination between FDOT District 5 and Brevard County as a result of additional funding availability. Inclusive of the roll-up of projects was another ARRA funded project, the SR 518 corridor from Wickham Road to SR 5 (US 1) in Brevard County.

In August of 2010 Brevard County's Transportation Planning Organization (TPO) reported additional funding availability to FDOT District 5 in the amount of $4,681,405.00. This funding became available through the TPO's "SU-ON" and "SU-OFF" funding sources. Additionally, funding from FDOT District 5's ARRA unencumbered sources increased to a total amount of $874,558.00. In November, extra funding was provided to the project by additional contributions from the County's MPO. The greater amount of funding has resulted in the project's final form described in this PSEMP.

In October of 2010 Brevard County's Project estimates were re-calculated. Estimates depict that the Project was over budget by $1.4 million and could not be constructed as scoped at the time of the revised estimate. The Brevard County TPO added an additional $1,474,165.96 to the project budget of which $814,167 was added to the "SU-ON" funding and $660,000 added to the "SU-OFF" funding. An additional amount of $194,939.76 has been added to the project for work orders and supplemental agreements. The final funding total reached $7,750,458.76 as the final funding source for the project.

2.4 Purpose and Scope:

Florida's Statewide Systems Engineering Management Plan (SEMP) provided an extensive description and definition for control and management of the planning, design, construction, integration, and operations of Intelligent Transportation Systems (ITS). This document served as the PSEMP for the Brevard County ATMS of the Florida Department of Transportation (FDOT) District 5. It provided planning guidance for the technical management, procurement, installation, and acceptance of the Brevard County ATMS project which included design and construction of traffic management facilities within the County of Brevard. The project included the design, construction, integration, and operations of the following primary system components:

- Traffic signal controllers/cabinet upgrades;
- Closed circuit television (CCTV) cameras;
- Adaptive signal control;
- System detector stations; and
- Fiber optic communications network

The following documentation provided a detailed plan for managing the project within a Systems Engineering framework. The project incorporated systems engineering principles and protocols for the life-cycle of the system as guided by Title 23, Code of Federal Regulations, Part 940 – Intelligent Transportation System Architecture and Standards (23 CFR 940).

Further details of the project can be obtained by reviewing other documents, such as the project Concept of Operations (ConOps), Quality Assurance (QA) Plan, Operating and Maintenance (O&M) plan, etc (refer to section 3 for a detailed list of applicable documents).

2.5 Technical Project Summary Schedule:

Following is the overview of the project's current schedule:

- Advertisement……………………………………………09/13/2010
- Letting / Notice to Proceed (NTP) ……………………07/11/2011
- Construction Completion…………………………….. 02/28/2013
- Unit Testing………………………………………………05/28/2012 - 02/28/2013
- Subsystem Testing……………………………………...01/02/2012 - 04/07/2013
- Substantial Completion………………………………...02/28/2013
- Burn-In……………………………………………………04/08/2013 - 05/07/2013
- Final Acceptance………………………………………..05/07/2013

Project is behind schedule. The Project Summary schedule has been updated to reflect the delayed completion date. The original construction schedule was for 366 days. The current construction schedule has been modified to 667 days.

2.6 Relationship to Other Plans:

The following section was intended to identify related state, district, and local agency documentation of plans for ITS within the region of the Brevard County ATMS project; FDOT District 5, Brevard County, and various cities throughout Brevard County.

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

The FDOT Ten-Year ITS Cost Feasible Plan (CFP) is a 10-year program and resource plan that identifies ITS projects in the overall context of Florida's ITS Corridor Implementation Plans (FY 09/10 - FINAL published March 2010)[2]. It represents a commitment of state and district managed funds over a 10-year period to provide ITS funds in a coordinated statewide program to develop ITS infrastructure on Florida's major intrastate highways. It is limited access facility specific as published to date. The Brevard County ATMS project is an arterial facility deployment and therefore is not included in the Ten-Year ITS Cost Feasible Plan.

2.6.2 Relationship to Florida's Statewide ITS Architecture (SITSA)

In February of 2006, FDOT District 5, in conjunction with the state and all other Districts throughout Florida, developed the Statewide Intelligent Transportation System Architecture (SITSA) update project[3]. This effort was made to update the previous 2001 Florida SITSA plan to accommodate the changes and future plans of Florida ITS improvements and to ensure all requirements with the National Intelligent Transportation System Architecture plan (NITSA), as required by FHWA, were met. As part of the update, various District 5 specific market packages were identified. Of them, specific

ATMS market packages were identified that relate to the goals of the Brevard County ATMS project. Specifically, they were:

- ATMS01 – Network Surveillance
- ATMS06 – Traffic Information Dissemination

2.6.3 Relationship to Other "On-project" Plans

2.6.3.1 FDOT ITS Strategic Plan:

The FDOT ITS strategic plan is a statewide ITS plan that outlines various elements of ITS and that addresses four primary goals:

- Safe transportation for residents, visitors, and commerce;
- Protection of the public's investment in transportation;
- A statewide, interconnected transportation system that enhances Florida's economic competitiveness; and
- Travel choices to ensure mobility, sustain the quality of the environment, preserve community values, and reduce energy consumption.

This document was used by Brevard County as the foundational resource in the development of Brevard County's ITS strategic plan.

2.6.3.2 Brevard County ITS Strategic Plan

Brevard County developed the Brevard County ITS strategic plan following the format and intent of the FDOT ITS strategic plan. It mimics the format and intent of the FDOT ITS strategic plan with the intent to document the County's overall plan to implement ITS throughout the County. The document also contains the County's business plan to deploy and operate the County-wide ITS. This document is continually reviewed and revised to account for changes in overall County goals and was referenced in the development of this project. The Brevard County ITS strategic plan is the main resource for the selection of corridors of the project. The County-wide ITS strategic map depicting the overall goals of the County is provided for reference in section 4.1 below.

2.6.3.3 Traffic Signal Maintenance and Compensation Agreements

The "Traffic Signal Maintenance and Compensation Agreements" established between FDOT District 5 and other agencies is the governing document outlining the roles and responsibilities of each entity as it pertains to signalized intersections. This agreement includes all definitions of responsibilities as they pertain to all, "…traffic signals, traffic signal systems (central computer, cameras, message signs, and communications interconnect), school zone traffic control devices, intersection flashing beacons, illuminated street name signs, and the payment of electricity and electrical charges incurred in connection with operation of such traffic signals and signal systems…" Due to the evolving nature of ITS and the interchangeability of ATMS's and signal operation, responsible roles for the maintenance of this project are loosely defined. As a result, the definitions of the "Off

System Maintenance Agreement" (see section 2.6.3.4) were developed to further clarify the line of system definitions and responsible roles of each agency.

2.6.3.4 Off System Maintenance Agreement

The "Off System Maintenance Agreement" between FDOT District 5 and Brevard County is the governing maintenance agreement document between the two agencies for non-state roads identified as part of the project. These corridors are specifically identified as Wickham Road, Minton Road, and Palm Bay Road. This agreement establishes various responsibilities and conditions required of and by these agencies per, during, and post construction of the project.

2.6.3.5 Other Documents

The development of the Brevard County ATMS project and PSEMP also required the development of the project's Concept of Operations, Requirements Traceability Verification Matrix (quality assurance/testing), and operations and maintenance (O&M) plans. These documents are designed to complement the contents of this PSEMP and detail the finite elements required of each document. The Concept of Operations Document has been complete. The Requirements Traceability Verification Matrix (testing) and O&M plans are under development and will be utilized towards the end of the project and after operations have been in place.

3. Applicable Documents

The following documents, of the exact issue shown, form a part of this document to the extent specified herein. In the event of a conflict between the contents of the documents referenced herein and the contents of this document, this document shall be considered the superseding document. Additionally, noted documents will be developed in support of, or in conjunction with, the preparation and definitions of this PSEMP.

DOCUMENT	DATE	CONTACT
Statewide Intelligent Transportation System Architecture (SITSA) update project	February 20, 2006; Version 2	Florida Department of Transportation Intelligent Transportation Systems Office 605 Suwannee Street, M.S. 90 Tallahassee, Florida 32399-0450 (850)-410-5600
Brevard County ITS Strategic Plan	July 28, 2008 Version 4	Brevard County Public Works Engineering 2725 Judge Fran Jamieson Way Building A211 Viera, Florida 32940-6605 (321)-633-2077
Brevard County Traffic Signal Maintenance and Compensation Agreement	August 27, 2002	Florida Department of Transportation 719 S. Woodland Blvd. Deland, FL 32720 1-800-780-7102
City of Melbourne, City of Palm Bay, and City of Titusville Traffic Signal Maintenance and Compensation Agreement	September 13, 2002	Florida Department of Transportation 719 S. Woodland Blvd. Deland, FL 32720 1-800-780-7102

Off System Maintenance Agreement	September 2010	Florida Department of Transportation 719 S. Woodland Blvd. Deland, FL 32720 1-800-780-7102
Brevard County ATMS Preliminary Systems Engineering Management Plan	July 25, 2011	Brevard County Public Works Engineering 2725 Judge Fran Jamieson Way Building A211 Viera, Florida 32940-6605 (321)-633-2077
Brevard County ATMS Operations and Maintenance	April 14, 2011	Brevard County Public Works Engineering 2725 Judge Fran Jamieson Way Building A211 Viera, Florida 32940-6605 (321)-633-2077
City of Melbourne, City of Palm Bay, and City of Titusville Interlocal Agreement for ITS Maintenance	June, 2012	Brevard County Public Works Engineering 2725 Judge Fran Jamieson Way Building A211 Viera, Florida 32940-6605 (321)-633-2077
Brevard County Fiber Sharing Agreement	July, 2012	Brevard County Public Works Engineering 2725 Judge Fran Jamieson Way Building A211 Viera, Florida 32940-6605 (321)-633-2077

3.1 Local Agreements

In addition to the applicable documents identified above, local agreements in place that may have some bearing on the project are defined below:

3.1.1 Fiber sharing agreement with FDOT District 5

Brevard County has developed a fiber sharing agreement defining roles and responsibilities between FDOT District 5 and Brevard County for sharing, accessing, and utilizing fiber owned by each agency as well as the process and requirements for installing fiber on each agency's right of way.

3.1.2 Inter-local agreement between Brevard County and Cities within the County

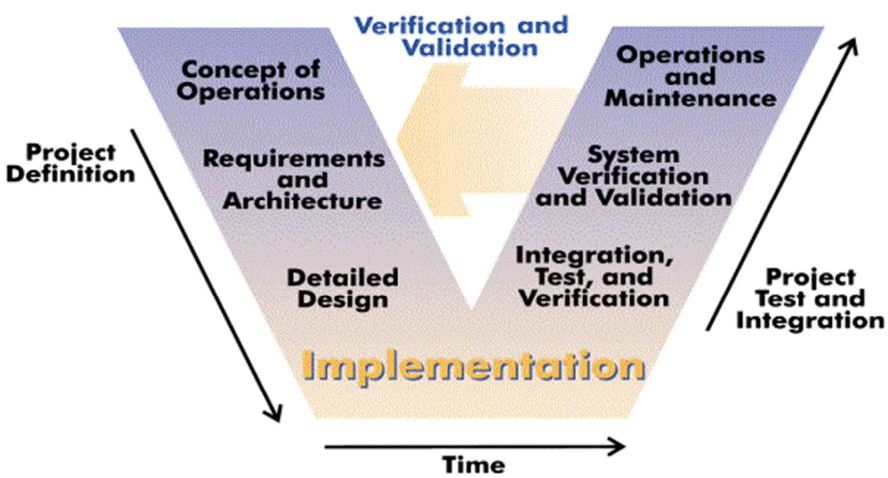
Brevard County has developed the ITS inter-local agreement document between the various cities within the county in conjunction with the development of this project's RFP. The intent of this document is to define all roles and responsibilities of each agency (city or county) as they pertain to this project's and future ITS related county-city cross-jurisdictional boundary efforts. This document defines ITS related elements as opposed to signal operational elements with the intent to clearly define the boundaries of the two systems. Federally funded technical support and equipment will be provided to the regional ITS network outside of the standard signal operations and maintenance agreements mentioned in previous sections (refer to section 2.6.3). This support will focus solely on the continued operations and maintenance of the Brevard County ITS fiber optic network. The ITS inter-local agreement developed by Brevard County in conjunction with all cities within the County establishes the newest rules to be adhered to by each agency. Inter-local agreements between Brevard County and the City of Titusville, the City of Palm Bay, and the City of Melbourne have been executed.

4. Systems Engineering Processes

The Systems Engineering Process (SEP) defines a formal framework for “systematically” executing a project, in its entirety, from project inception to project completion, for the entire life-cycle of the project. The IEEE 1220-1998 standard is the basis for the FDOT SEMP. The standard specifies the requirements for the SEP and its application throughout a projects life-cycle as well as addresses the issues associated with defining and establishing supportive life-cycle processes early and continuously throughout the project.

The life-cycle of a project and the overlay of systems engineering processes can be graphically defined in what is known as the “V” diagram. The following graphic provides depiction of the “V” diagram for the system engineering model.

Systems Engineering “V” Diagram



Key processes that were used for the Brevard County ATMS project include:

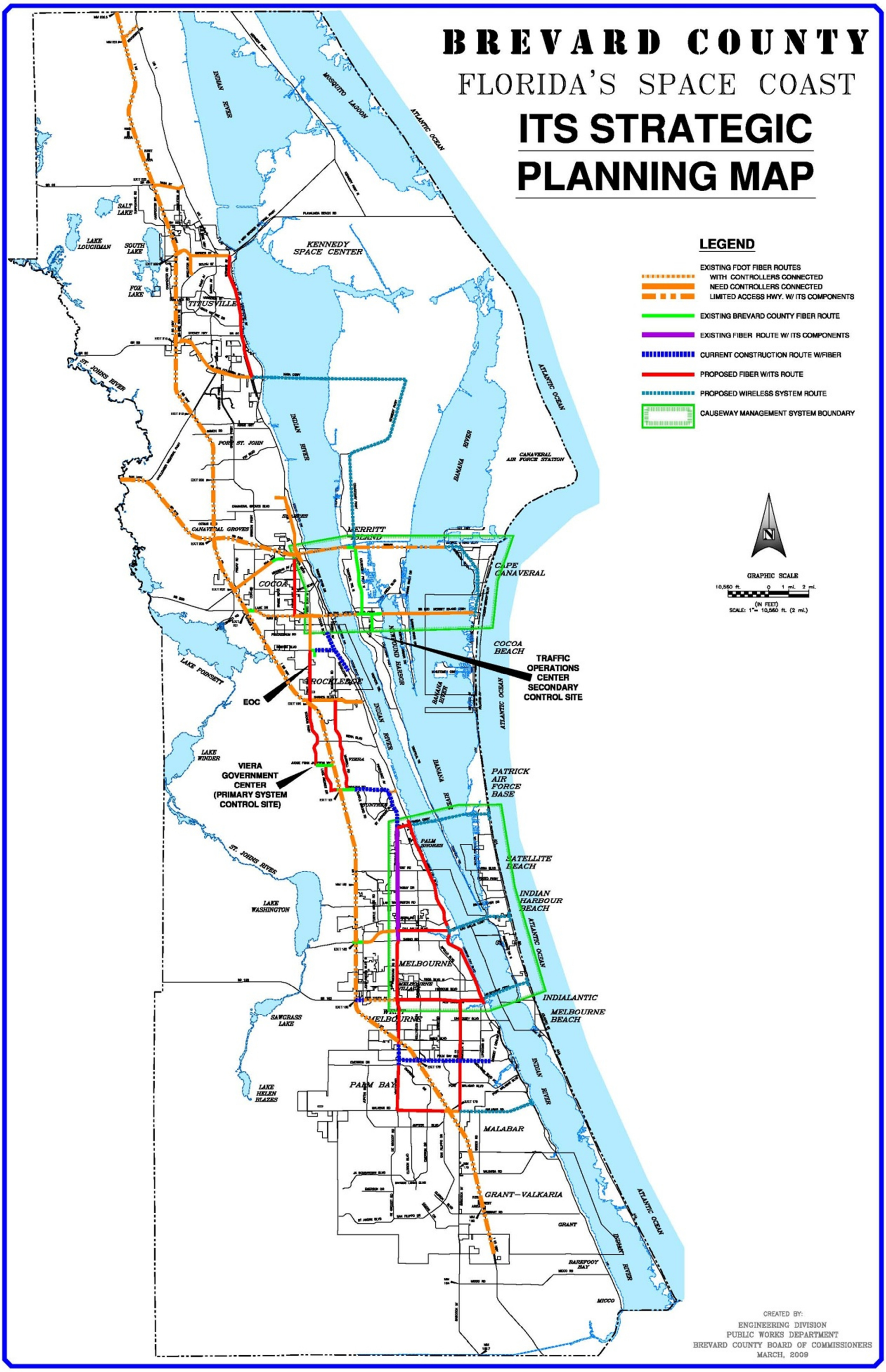
- Preparation of the SunGuide® ITS Checklist (SIC) Form
- Creation of high-level requirements
- Creation of detailed requirements
- Trade-off studies, gap analyses, or technology assessments
- Technical reviews
- Risk identification, assessment, and mitigation
- Creation of the Requirements Traceability Verification Matrix (RTVM)
- Creation of performance measure metrics
- System test, integration, and acceptance planning

4.1 Project Intelligent Transportation System Architecture (PITSA)

The Brevard County ATMS Architecture is a component of the SITSA. The following diagram depicts a high-level view of the overall processes associated with the development of the Brevard County ITS Architecture.

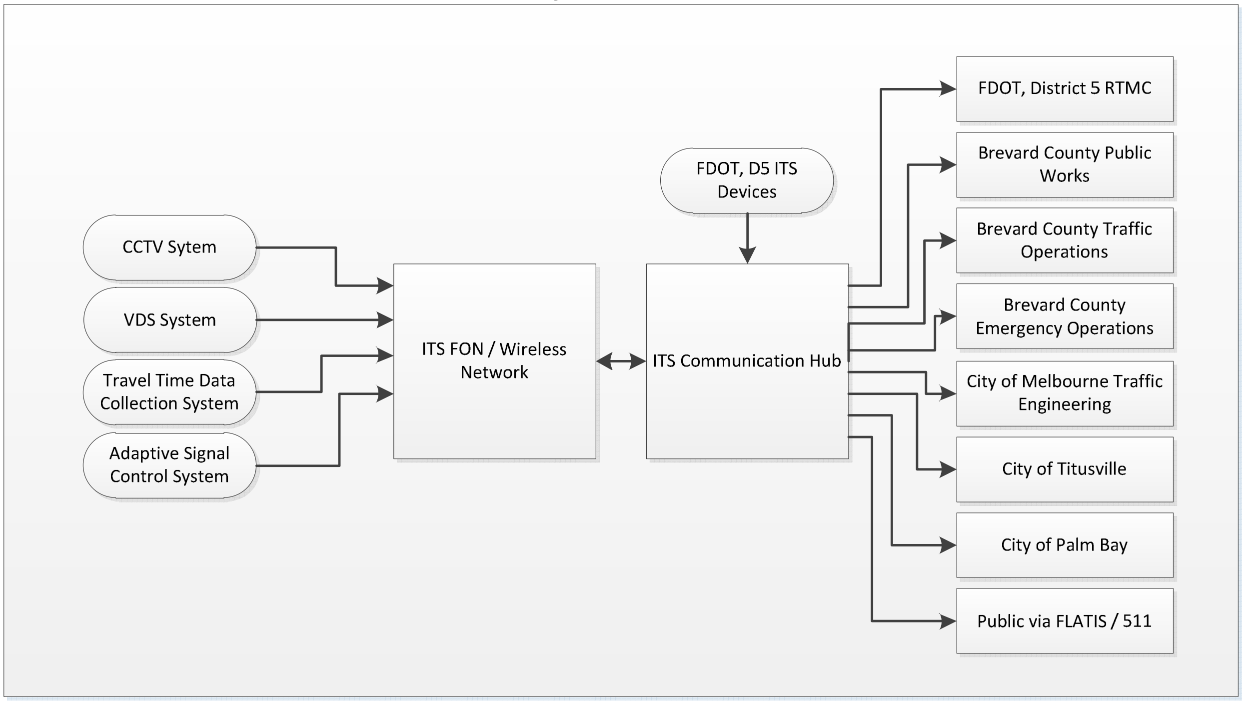
The high level PITSA presented herein (see Figure 1 below) is a copy of the high-level Brevard County ITS Strategic Plan map identifying key corridors and communication paths on the physical level. It is presented here for reference to the overall ITS strategy in place for Brevard County's county-wide system and as a resource in illustrating the corridors chosen for this project.

Figure 1


BREVARD COUNTY
FLORIDA'S SPACE COAST
ITS STRATEGIC
PLANNING MAP
LEGEND
EXISTING FDOT FIBER ROUTES
WITH CONTROLLERS CONNECTED
NEED CONTROLLERS CONNECTED
LIMITED ACCESS HWY. W/ ITS COMPONENTS
EXISTING BREVARD COUNTY FIBER ROUTE
EXISTING FIBER ROUTE W/ ITS COMPONENTS
CURRENT CONSTRUCTION ROUTE W/FIBER
PROPOSED FIBER W/ITS ROUTE
PROPOSED WIRELESS SYSTEM ROUTE
CAUSEWAY MANAGEMENT SYSTEM BOUNDARY
GRAPHIC SCALE
TRAFFIC OPERATIONS CENTER SECONDARY CONTROL SITE
EOC
VIERA GOVERNMENT CENTER (PRIMARY SYSTEM CONTROL SITE)
KENNEDY SPACE CENTER
TITUSVILLE
PORT ST. JOHN
MERRITT ISLAND
CAPE CANAVERAL
COCOA
COCOA BEACH
ROCKLEDGE
PATRICK AIR FORCE BASE
SATELLITE BEACH
INDIAN HARBOUR BEACH
MELBOURNE
INDIALANTIC
MELBOURNE BEACH
WEST MELBOURNE
PALM BAY
MALABAR
GRANT-VALKARIA
GRANT
MICCO
INDIAN RIVER
BANANA RIVER
ATLANTIC OCEAN
MOSQUITO LAGOON
CANAVERAL AIR FORCE STATION
ST. JOHNS RIVER
LAKE POINSETT
LAKE WINDER
LAKE WASHINGTON
SAWGRASS LAKE
LAKE HELEN BLAZES
SALT LAKE
SOUTH LAKE
LAKE LOUGHMAN
FOX LAKE
CANAVERAL GROVES
PALM SHORES
CREATED BY:
ENGINEERING DIVISION
PUBLIC WORKS DEPARTMENT
BREVARD COUNTY BOARD OF COMMISSIONERS
MARCH, 2009

A further defined logical architecture representing the physical architecture of the project is shown in Figure 2.

Figure 2



4.1.1 Market Packages

The market packages identified for the Brevard County ATMS project architecture are defined by the logical and physical framework for the region. The ITS market packages include:

Market Packages	
APTS7	Multi-modal Coordination
Advanced Traffic Management Systems	
ATMS01	Network Surveillance
ATMS03	Surface Street Control
ATMS07	Regional Traffic Management
ATMS08	Incident Management
ATMS09	Traffic Forecast and Demand Management
ATMS19	Speed Monitoring
Commercial Vehicle Operations	
CVO10	HAZMAT Management
Emergency Management	
EM3	Mayday Support
Archived Data Management	
AD1	ITS Data Mart
Maintenance and Construction Operations	
MC01	Maintenance and Construction Vehicle Tracking
MC07	Roadway Maintenance and Construction
MC08	Work Zone Management
MC09	Work Zone Safety Monitoring
MC10	Maintenance and Construction Activity Coordination
Evacuation Coordination	
EC01	Evacuation Coordination

4.2 High-level Functional Requirements

The primary goal of the Brevard County ATMS project was to successfully deploy traffic control and traffic management technologies in conjunction with required sub-systems necessary to enable improved traffic flow and congestion mitigation, as well as provide system monitoring within the Brevard County region. The specific objectives identified as essential to the successful planning, design, and deployment of the Brevard County ATMS project include:

- Improved safety
- Improved air quality mitigation
- Improved congestion mitigation
- Improved emergency response
- Improved regional growth adaptability
- Improved evacuations
- Improved system communications
- Improved cross-jurisdictional traffic flow
- Integration of transportation systems
- Improved regional security
- Improved transportation agency operations
- Reduced Operations and Maintenance (O&M) costs

Project Stakeholder coordination efforts were required to further define the high-level functional requirements. The ConOps has been developed based on these coordination efforts and further documents the functional requirements. The ConOps has lead to the development of the detailed requirements as the project progressed. The project's ConOps has been developed in a method per Appendix R of the Florida's Statewide SEMP.

To view the aforementioned Concept of Operations (ConOps) please see Appendix

4.2.1 Stakeholder Meeting 1:

Stakeholder Meeting 1 was held on January 26th, 2011 specifically for this project. The discrepancy between the need to have already completed this effort prior to this project's solicitation and the current state of the project results in awkward narrative to describe the necessary content.

The focus of the first meeting was to provide project scope and clarification to the group as it related to the current state of the project RFP solicitation. The goal of the meeting was to provide a high level view of the project's various sub-systems, use thereof, and planned functionality of the overall system. A presentation and subsequent open-floor discussion was held to further clarify project intent. An attendee questionnaire was provided for feedback to the District and County for evaluation.

The discussion of preemption was a primary focus of those attending. It was explained that the preemption sub-system was not included in the scope of this project effort but was clearly noted as a desire of the majority of those attending.

4.3 Detailed Requirements

Preliminary Minimum Technical Requirements (MTRs) have been developed based on FDOT District 5 and County-wide functional requirements and have been published with the preliminary version of the project request for proposal (RFP). These requirements may require further development as the project progresses, thus generating a potential for amendments and/or addendums to the project. This potential is not expected to impact the project in any significant fashion. The Requirements Traceability Verification Matrix list the requirements of this project in detail and can be used as a checklist during overall project testing.

4.4 Trade-off Studies, Gap Analyses, or Technology Assessments

Value engineering assessments and "trade-off" studies are used to implement a systematic process to evaluate and analyze the feasibility of tangible alternative approaches to the same design criteria. The evaluation of the requirements provides a basis for defining the objectives of the trade-off study. The required technology for the project will be defined by the MTRs that were developed as mentioned previously.

Brevard County has previously performed various testing and evaluation efforts that have lead to a series of technology choices already deployed throughout the County. Experience with existing technologies deployed throughout the County has resulted in system-wide deployments of those devices that met the County expectations. The resulting system relied on various specific devices in order to maintain interoperability and consistency. The existing system and underlying management system (both hardware and software) limit the ability to integrate alternative technology choices due to interoperability constraints. These constraints limit the trade-off studies needed and none are anticipated at this time.

Gap analyses of the existing and anticipated hardware and software against stakeholder functional requirements have been performed. Functional requirements and comparisons have been identified that will require gap analyses. Such analyses will be performed and documented at the time of installation and product testing. The VDS used for this project are both integral to intersection detection and signal operation and will further enhance the capabilities of data reporting by the County after deployment. The origin-destination and travel time data provided by the VDS technology used in this project required an analysis.

Similar to the trade-off and gap analysis sections above, technology assessments were performed on an as needed basis. As Brevard County's technology requirements were met, assessments of current technologies were required to enhance the system and guarantee reliability. Appropriate assessments were performed on an as needed basis and referenced in this section accordingly; this section will be updated as required during project progression and document development until the system has successfully completed the burn-in period.

4.4.1 Technology assessment of Bluetooth reader technology:

A technology assessment of Bluetooth reader technology was performed to evaluate the potential use of the sub-system for detection and re-identification use. The technology is used to develop travel time information for links along a roadway network. A test bed of this system was deployed to ascertain the viability of the sub-system for deployment County-wide. The test bed was deployed along a stretch of SR 520 in Merritt Island with acceptable results. Cost comparisons to alternative technologies were evaluated and final decision to use this technology was made.

4.5 Technical Reviews

Technical reviews were required to properly accomplish work items that were completed for the Brevard County ATMS project. Brevard County or their representative followed the FDOT design review process for this project. FDOT District 5 and Brevard County, in collaboration with all local agencies involved with this project, participated in the review process. Reviews that were conducted as part of this project included but are not limited to:

- Project Kick-off
- ConOps Review
- System Requirements Review
- Preliminary Design Review
- Hardware Design Review
- Software Design Review
- Requirement Traceability Verification Matrix
- Final Design Review – conducted to provide the final review of the system design
- Test Readiness Review – conducted prior to formal acceptance testing of the system
- Hot Wash-Up Review – conducted immediately after formal acceptance testing to obtain consensus on testing results and resolve major discrepancies
- Operational Readiness Review – conducted prior to full-scale deployment and operation to address all elements that need to be completed

4.6 Risk Identification, Assessment, and Mitigation

Risk assessment and control procedures have been established for the Project. These procedures provided a method for determining the inherent risk in the project and for the evaluation of the effectiveness of risk reduction efforts. The procedures also prepared and implemented plans for mitigating risk.

4.6.1 Risk Identification

Risk items are identified and documented based on an analysis of the functional requirements as they apply to the project's contractual and technical requirements. All project sources are continually reviewed for timely risk identification. The Brevard County Project Manager (PM) validates the identifies risks and makes them part of risk reporting by assigning responsibility to each risk item.

4.6.2 Risk Assessment

Basic project risk assessment consists of identifying individual risks, categorizing the risk, determining the level of risk, and recommending an approach to risk solution.

Low Risk - defines an area in which technical and project metrics are within plan or tolerances.
Medium Risk - defines an area in which one or more major technical or performance metrics are out of tolerance, but are within the maximum established limits for low-impact recovery techniques.
High Risk - defines an area with potential serious failures in accomplishment which requires major milestone re-planning or intensive reallocations of personnel and resources.

The level ranking of identified risks determines the priority and urgency of attention given. Risk items are assigned to key individuals who are responsible for developing and executing individual risk management plans and reporting the status. The mitigation status for identified medium and high risks is reported at status meetings until each risk is resolved.

4.6.3 Mitigation Plans

Effective mitigation plans will be developed by the FDOT District 5 PM or their representative, with the assistance of other key individuals. These individuals initiate mitigation actions, continually monitor the mitigation progress, and perform follow-up activities, as required. Mitigation action plans, procedures, schedules, and responsibility definitions are maintained by the FDOT District 5 PM or their representative.

Mitigation action plans are required for all medium-risk and high-risk items. These plans assign specific actions to specific individuals to achieve detailed and correct analyses of each addressed risk and execute corrective actions. The FDOT District 5 PM or their representative formulates and issues these directive plans and intensely monitors progress against these directives.

4.7 Requirements Traceability Verification Matrix (RTVM)

A Requirements Traceability Verification Matrix (RTVM) was developed upon execution of the design package. Each of the technical requirements are monitored during all phases of the project as well as utilized for specific test points during the testing and acceptance phases of the project.

The Requirements Traceability Verification Matrix was created for use during the testing and acceptance stages. Each requirement has been assigned a unique identifying number and included form of verification (inspection, demonstration, documentation, etc). The RTVM also includes a field for confirming compliance through testing or for noting issues or other notes related to final acceptance of each requirement.

The RTVM developed for this project is attached to this document as Appendix B.

4.8 Creation of Performance Measure Metrics

During the final planning stages, FDOT District 5 or their representative has defined system effectiveness measures that reflect overall stakeholder expectations and the resultant system level of operations and satisfaction. As stated in the FHWA Freeway Management and Operations Handbook:

> *"Performance measurement is a process of assessing progress toward achieving predetermined goals, including information on the efficiency with which resources are transformed into goods and services (outputs), the quality of those outputs (how well they are delivered to clients and the extent to which clients are satisfied) and outcomes (the results of the program activity compared to its intended purposes), and the effectiveness of government operations on terms of their specific contributions to program objectives. Performance measures provide the basis for identifying the location and severity of problems (such as congestion and high accident rates), and for evaluating the effectiveness of the implemented freeway management strategies."*

There are two primary evaluation categories utilized to identify how well a system meets the predefined requirements:

- Measures of Effectiveness (MOEs)
- Measures of Performance (MOPs)

Customers or stakeholders will utilize Measures of Effectiveness (MOEs) to measure satisfaction with products produced as a result of the project or system implemented. Measures of Performance (MOPs) are the engineering performance measures that provide the design requirements needed to satisfy the MOEs. There may be several Technical Performance Measures (TPMs) for each of the MOEs. As the functional system requirements are defined and low-level requirements are allocated to the sub-systems, components and the individual elements of the system, FDOT District 5 or their representative will select or specify the requirements that are testable. Testable requirements are MOPs that can be traced to stakeholder requirements and their MOEs.

4.8.1 Measures of Effectiveness

Measures of Effectiveness will be rated by improved travel times for the public on the corresponding corridors, maintaining corridor flow for improved gas mileage, and information dissemination to the public via Florida 511.

FDOT District 5 or their representative may further define system effectiveness measures that reflect overall stakeholder expectations and satisfactions related to the overall system. These measures will be related to project stakeholder goals and objectives for the project.

4.8.2 Measures of Performance

MOPs are the product design assessments which estimate, through engineering analyses and tests, the values of essential performance parameters of the design elements. They forecast the values to be achieved through the planned technical project effort; measure differences between the achieved values and those allocated to the product element by the Systems Engineering Process; and determine the impact of those differences on system effectiveness. As a result of the Engineering Process Analysis, the following Quantitative Measurement (QM) areas have been defined for the project.

Performance measures will be identified for the following categories:

- Safety measures
  - Overall Safety improvements including less traffic incidents
  - Safer pedestrian conditions
  - Effective traffic management due to more roadway visibility and early incident detection based on real time data.
- Protection of public investment measures
- Interconnected transportation measures (Overall System improvements)
- Travel choice measures based on improved travel times
  - Capacity analysis based on historical and real time traffic counts.
  - Travel Time improvements and intersection wait time
  - Overall corridor travel time improvements
- Overall Accuracy for Data Collection System
- Schedule performance – data relating to the completion of major milestones and individual work products.
- Funding and staffing – data relating to the balance between the work being performed and the personnel resources assigned to the project.
- Product Quality – data relating to the ability of the delivered product to support the user's needs without failure.
- Overall System Health, including uptime/downtime reporting and maintenance costs for system failures

Each stakeholder identifies the controlled course of action required to meet each MOP. Any MOP with medium or high risk is tracked as a risk item, and includes a Risk Management Plan. Continual monitoring tracks progress on these control plans. The MOP values are reported in the project metrics report maintained by the Construction Engineering, and Inspection (CEI).

4.9 System Testing, Integration, and Acceptance Planning

The selected Design/Build Team is required to demonstrate to FDOT District 5 or their representative through testing plans and criteria how each of the selected products, sub-systems and overall ATMS meet the functional requirements as defined for the project. The following documents are inputs to the test planning process:

1. Contract Requirements (Scope of Services (SOS), Technical Special Provisions (TSP), etc.)
2. Requirement Traceability Verification Matrix
3. Project Schedule
4. A test plan outline

Testing shall include, but is not limited, to each of the main components of the ATMS (central hardware and software, local controller hardware and software, network hubs, field cabinets, CCTV cameras, and system sensors). FDOT District 5 or their representative will be responsible for developing final test plans for all testing and subsystem testing required to formally accept the project. Testing of the equipment and system shall include the following hierarchical testing scheme:

- Factory Acceptance Test
- Standalone Test
- Subsystem Test
- System Operational Test
- Burn-In Period

Testing shall provide verification and documentation that all requirements as defined in this document, contract documents, and the requirements defined in the test plan are met by the furnished subsystem components.

4.9.1 Test Approach

The test plans and test procedures together shall provide a two-step description of each test. The test plans shall provide a high-level functional summary of the methods used for verifying each feature of the hardware, software, and firmware being tested. The test procedures shall detail the step-by-step activities associated with each test. The following information shall be included in the test plan:

- An implementation plan and detailed schedule (PERT and GANTT Microsoft Word format);
- Record-keeping procedures and forms;
- Procedures for monitoring, correcting, and retesting variances;
- Procedures for stopping and restarting the testing due to failures;
- Procedures for controlling and documenting all changes made after the start of testing;
- A list of individual tests to be performed, the purpose of each test segment, and the appropriate functional design specification reference describing the feature being tested;
- Test Evaluation/Traceability Matrix;
- Identification of special hardware or software tools or test equipment to be used during the test; and
- Copies of any certified test data to be used in lieu of testing.

4.9.2 Test Schedules

The Design/Build Team will submit the test plans, testing procedures and forms to FDOT District 5 for review at least forty-five (45) calendar days prior to performing the associated tests. FDOT District 5 will review submitted test procedures and forms and shall provide comments or approval to the Design/Build Team within twenty (20) calendar days after receiving the testing documentation.

4.9.3 Test Tools

The Design/Build Team will furnish and maintain all required test equipment necessary to conduct the testing. The test equipment (both hardware and software) will be made ready for FDOT District 5 use at the time it is needed. The Design/Build Team will, if requested by FDOT District 5, postpone any test for up to seven (7) days. Such postponements shall not be grounds for extensions of contract time.

4.9.4 Test Facility

The Design/Build Team shall notify FDOT District 5 of the time, date and place of each test at least fourteen (14) calendar days prior to the date the test is planned. All central system testing will be conducted at designated locations identified by FDOT District 5 and/or Brevard County.

4.9.5 Subsystem Tests

The subsystem tests shall be performed based on the construction project milestones. These tests shall verify all of the requirements defined in the equipment functional requirements, for each subsystem being tested, have been met. These tests shall be performed utilizing the project field equipment and new communications system. The test shall demonstrate full control of the field device(s) from the central management facility with the communications channels as well as the functionalities of local/remote trouble shooting/diagnostics specified in the equipment functional requirements.

During the test, the Design/Build Team will provide qualified personnel to support the diagnosing and repair of system equipment during the operational test as required. The personnel will be available for this support within twenty-four (24) hours of notification of the need for their services.

The Design/Build Team will prepare test plans for the individual Subsystem Tests required for this project. The test plans shall be prepared based on the testing requirements identified in the individual subsystem sections of the final MTRs document. In cases where the test requirements are not identified or described in detail, the Design/Build Team shall prepare detailed plans for approval by the FDOT District 5 prior to testing. The test plan shall include, as a minimum, the following information:

- Date, time, location and estimated duration of test
- Name of designated witnesses
- Description of subsystem to be tested - showing a test of every function of the equipment or system to be tested
- Test equipment list
- Test objectives
- Expected results – A description of the expected operation outputs and test results including a Test Evaluation/Traceability Matrix
- Test sequence details – A step-by-step outline of the test sequence to be followed
- Test result forms – Data forms to be used to record all data and quantitative results obtained during the test
- Connection diagrams wherever applicable
- Software - A copy of all diagnostic software shall be supplied by the Design/Build Team to the County with full documentation

4.9.6 System Acceptance Testing

The Design/Build Team will perform a comprehensive system acceptance test at the central management facility. The Design/Build Team will be responsible for ensuring all ATMS components are operational within the management facility and in strict conformance with the requirements developed for the project.

The Design/Build Team will develop test plans for the integration of the signal controllers, CCTV cameras, system detectors, and communications network with the existing central system.

4.9.7 Final Acceptance Testing

Final Acceptance of the work associated with this project shall be made after satisfactory completion of all tests including the System Operational Test and final inspection of the entire system. The final inspection of the entire system shall be performed by representative(s) of FDOT District 5 and Brevard County in the presence of a representative of the Design/Build Team. All "as-built" documents shall be submitted to the County before the time of Final Acceptance. Notification of final acceptance shall be in writing from FDOT District 5. Following final acceptance, the Design/Build Team shall include a 90-day burn-in period. The burn-in shall be per the requirements outlined in the RFP developed for the project.

5. Project Management and Control

5.1 Organization Structure

5.1.1 Design/Build Team

The Design/Build Team is responsible for the design, installation and testing of all elements of the project. The Design/Build Team will demonstrate good project management practices while working on this project. This shall include:

- Communication with Brevard County, FDOT District 5, and others as necessary;
- Management of time and resources;
- Documentation of design and construction activities, and
- Set up and maintain throughout the design of the project a contract file in accordance with FDOT District 5 procedures.

5.1.2 FDOT District 5

FDOT District 5 provided contract administration, management services, and technical reviews, as necessary, for all work associated with the development and preparation of the contract documents, shop drawings, and construction of the project. FDOT District 5 will provide job specific information and/or functions as outlined in this document.

5.2 Managing the Schedule

The project schedule was developed with coordination between the FDOT District 5 PM or their representative and the Design/Build Team. An initial schedule was developed by FDOT District 5 that has been fine-tuned since the Design/Build Team was selected.

5.2.1 Scheduling Application

A project management software package was utilized by the Design/Build Team and the CEI. The software application was required to support project scheduling, resource allocation in the project planning phase, and schedule and cost tracking during the implementation phase of a project. This software implemented the critical path method for schedule planning and analysis.

5.3 Procurement Management

All procurement adhered to the standards and specifications set forth by the State of Florida, the FDOT and FDOT District 5 Traffic Operations and District 5 Construction office. All procurement also adhered to specific project requirements defined in the RFP.

5.4 Risk Management

Risk identification and assessment materials previously developed under earlier project tasking formed the foundation for project-related design and construction risk management.

FDOT District 5 or their representative built upon the planning risk assessments and developed enhanced risk identification, assessment and mitigation strategies. A new, updated, enhanced risk matrix was developed as a result of new analysis and assessments conducted as part of the design phase of the project. The risk matrix identified all potential risk line items and assigned means and methods of risk avoidance and mitigation where applicable.

Coordination with ongoing projects that potentially conflict with the project were:

- I-95 Six-laning 18 miles from north of Palm Bay Road to SR 519, with a new interchange at an extension of the Pineda Causeway (FM No. 4055068)
- I-95 Six-laning 4.1 miles from Malabar Road to Palm Bay Road (FM No. 4055063)
- US 1 Six-laning 2.6 miles from Park Avenue to Pine Street (FM No. 237592 & 2375762)
- Wickham Road reconstruction and widening from Nasa Boulevard to SR 500 (US 192)
- SR 500 (US 192) 4.2 miles from I-95 SB Ramps to Dairy Road lighting/left turn lane addition and lane rehabilitation (FM No. 416965-1 & 418328-1 & 405506-8-52-01)
- SR 500 (US 192) 1 mile resurfacing from Dairy Road to Babcock Street (FM No. 418328-2)
- SR 520 5.65 miles from Clearlake Road and South Banana River Drive landscape, intersection improvement, and traffic signal improvement (FM No. 427400-1 & 427418-1 & 427654-1 & 414977-1)
- US 1 (SR 5) widening and resurfacing from Peachtree Street to Eyster Boulevard (FM No. 237576-2-52-01 & 237592-1 & 237592-3)
- SR 50 (Cheney Hwy) resurfacing from I-95 to SR 405 (FM No. 424890-1)
- SR 405 resurfacing from SR 50 (Cheney Hwy) to US 1 (SR 5) (FM No. 423350-1-52-01 & 418647-1)
- SR 518 TMS and sidewalk repair from CR 509 (Wickham Road) to SR 5054 (FM No. 428925-1)
- US 1 resurfacing from Aurora Road to SR 500 (US 192)
- CR 507 (Babcock Street) widening near the intersection of SR 500 (US 192)

The Design/Build Team is responsible for coordinating all project activities that interface or physically integrate with the aforementioned projects, and/or other projects in the region to avoid possible conflicts.

5.5 Sub-Design/Build Team Management

The Design/Build Team is responsible for all aspects, output and project interfaces executed by any and/or all of the sub-Design/Build Teams for this project. The Design/Build team managed their sub-design/build members in similar fashion to that expected by the project.

5.6 Engineering Specialty Integration

The design, development, and production of a system required integration across all engineering and programmatic disciplines. This section addresses the integration of specialty engineering disciplines with other disciplines. Attainable supportability characteristics are defined throughout the design process using design trade-off efforts involving all product design and support disciplines.

To achieve the necessary balance of specialty engineering factors within the systems engineering process, System Engineering must define trade-off and decision criteria that adequately address support requirements. Specialty engineers draw upon an extensive background of data extracted from past and current projects to develop standards, guidelines, and checklists to support and evaluate the development of the system. These specialists work to define and document requirements and work with the functional engineering groups to ensure the necessary supportability features are incorporated into the design.

Specialty engineers generally are brought into the design process at a very early stage, but may be employed as-needed to resolve issues. These requirements are then placed into the specifications. These requirements are both quantitative and qualitative. Specialty engineers also review and analyze the evolving design and ensure the incorporation of necessary features such as redundancy, accessibility, etc.

Specialty engineers form a part of the design team. As the system design progresses from requirements interpretation to detailed specifications, the involvement and participation of the engineering specialty areas increases. Specialty engineers verify compliance with all specialty area requirements and review data produced throughout the design process. Deficiencies are documented in action items and followed up to assure resolution. The applicable specialty engineers review all change packages.

5.6.1 Integrated Logistics Support and Maintenance Engineering

This engineering specialty is responsible for determining the total support required for a system to ensure operational readiness and sustainability throughout its life cycle. This specialty provides the following project input:

- Defines support requirements (i.e., the mean time to repair (MTTR))
- Supports considerations that influence requirements and design
- Provides the necessary support package
- Provides operational support at minimum cost

The Brevard County ATMS Master Plan and Conceptual Design and the Brevard County ATMS and TMC Concept of Operations address these criteria with the assistance of the FDOT, jurisdictions within the County of Brevard, and County staff.

5.6.2 Test Engineering

The test engineering specialty provides a systematic approach to verify that all functional requirements have been complied with. The test engineering specialty establishes a philosophy and strategy for qualifying the system, and includes the identification of any special tests and special test equipment that are needed.

5.7 Monthly Project Status Reviews

FDOT District 5 or their representative will conduct periodic meetings as required for the resolution of design and/or construction issues. These meetings may include:

- Action item reviews and resolution
- County or City technical issue resolution
- Permit agency coordination
- Local government agency coordination
- Scoping meetings
- Risk items
- Critical path item status review
- Pre-construction meeting

5.8 Configuration Management

Configuration Management established methodologies and procedures for controlling system change. The approach assisted in planning and implementing changes that were best for the system as a whole, as well as best for the system at a micro level. The objective of Configuration Control Management is to maintain consistency and traceability of the design requirements, physical configuration, and change made to documentation. Electronic Industries Alliance (EIA) Standard 649 states:

> *"Configuration Management, applied over the life cycle of a system, provides visibility and control of its performance, functional and physical attributes. Configuration Management verifies that a system performs as intended, and is identified and documented in sufficient detail to support its projected life cycle…The Configuration Management process facilitates orderly management of system information and system changes for such beneficial purposes as to revise capability; improve performance, reliability, or maintainability; extend life; reduce cost; reduce risk and liability; or correct defects. The relatively minimal cost of implementing Configuration Management is returned many fold in cost avoidance. The lack of Configuration Management, or its ineffectual implementation, can be very expensive and sometimes can have such catastrophic consequences as failure of equipment or loss of life."*

5.8.1 Change Management

A critical component of the overarching Configuration Management approach includes "Change Management". Change Management represents the process of assessing impacts of potential changes to a system. Change Management provides a mechanism for evaluating the comprehensive affects of potential changes to a design or system. The process provides control for changes and minimizes negative impacts to a system as a result of changes. Procedures to be enacted as part of ATMS Project include:

- Immediate identification of all changes
- Documentation of potential change (notes and database)
- Stakeholder review (as required)
- Technical review (as required)
- Impact assessment
- Schedule assessment
- Change review and approval/denial
- Identification of procedures, documentation, and instructions required for incorporating the approved change in the product, as well as its related product configuration information.
- Document changes, including decisions, stakeholder input and technical evaluations

Procedures documented by the FDOT District Construction Office represent the guiding principles and procedures for change management during the life-cycle of the Brevard County ATMS Project.

5.9 Quality Management

The ATMS project adhered to several Quality Management standards, including those set forth by FDOT District 5 and Brevard County. The overarching Quality Management program will be subdivided into two primary stages:

1. Design
2. Construction

5.9.1 Design

The Design/Build Team was responsible for the professional quality, technical accuracy, and coordination of all surveys, design, drawings, specifications, geotechnical, and other services furnished under this project.

The Design/Build Team provided a Design Quality Management Plan (QMP), which describes the Quality Control (QC) procedures to be utilized to verify and review all design drawings, specifications, and other documentation prepared as part of the project. In addition, the QMP will establish a Quality Assurance (QA) program to confirm that the QC procedures were followed.

FDOT District 5 or their representative will oversee the quality management during the design and construction phases of the project.

5.9.2 Construction

FDOT District 5 or their representative will provide final quality management for ultimate delivery of the system. The Construction QC Plan which describes the QC procedures to verify, check, and maintain control of key construction processes and materials.

5.10 Systems Acceptance

Upon completion of the testing, the CEI PM or the County PM or their representative will make a final inspection of the entire system. When all construction, plans, device requirements and the Verification Plan are found complete, the FDOT District 5 PM or their representative may declare this project complete and provide final acceptance in writing as of the date of final inspection.

If during the final inspection, the CEI PM, FDOT District 5 PM or their representative deems any work unsatisfactory or not conforming to the Plans, the Device Requirements, and the Verification Plan, they will notify the Design/Build Team in writing of any deficiencies. The Design/Build Team will correct these conditions within five working days, unless additional time is granted in writing by the CEI PM, or the County PM or their representative. Upon completion of the Design/Build Team's corrections, the CEI PM, or the FDOT District 5 PM or their representative will conduct another final inspection. When the final inspection is approved by the CEI PM, or the FDOT District 5 PM or their representative, the PM will send written notice to the Design/Build Team of the final acceptance of the project.

5.11 Operations and Maintenance, Upgrade and Retirement

An operations and maintenance evaluation of the existing and future system will be assessed once the project reaches near design completion. This sub-section will document the number of devices deployed, expected, and overall operations and maintenance efforts required to sustain the system. The evaluation of the design elements will include the review of system lifetime, overall and device specific, and determine the anticipated retirement/replacement timeframe.

All associated costs for the system will also be reported with the evaluation. These costs will be identified on a per device basis and rolled up into the overall planning budget amount required by the County to maintain the system and all associated costs of other agencies, where applicable; as it is determined through the various agency contracts and inter-local agreements developed as the project develops.

5.12 Lessons Learned

Lessons learned will be documented both during project execution and after final acceptance of the project. The lessons learned is a critical component to both the improvement of future ATMS projects within Brevard County, as well as important in defining critical project phasing events and resolution to design and construction issues related to the project. A “lessons learned” depository will be created at the on-set of the design phase and maintained throughout the life-cycle of the project. Updates to the PSEMP will be reflected at the various stages of submittal that will document the lessons learned. Please see Appendix C for Issue Logs and how they were resolved as part of this project.

Appendix A – FDOT Inspection and As-Built Guidelines

Table of Contents

APPENDICES

FIGURES

List of Acronyms

ANSI. .... American National Standards Institute
APL .... Approved Products List
ASTM .... American Society for Testing and Maintenance
ATMS .... Advanced Traffic Management Systems
BT .... Bench Test
CAD .... Computer Aided Design
CCTV .... Closed Circuit Television
CE&I .... Construction Engineering and Inspection
COTS .... Commercial Off the Shelf
DMS .... Dynamic Message Sign
EIA .... Electronic Industries Alliance
EOC .... Emergency Operations Center
EOTL .... Edge of Travel Lane
FAT .... Factory Testing
FDOT .... Florida Department of Transportation
FDP .... Fiber Distribution Panel
FPP .... Fiber Patch Panel
FSAT .... Final System Testing
GPS .... Global Positioning System
HAR .... Highway Advisory Radio
IP .... Internet Protocol
ITS .... Intelligent Transportation Systems
ITSFM .... ITS Facility Management
ISP .... Inside Plant
MOT .... Maintenance of Traffic
NEC .... National Electrical Code
NEMA .... National Electrical Manufacturers Association
NCR .... Nonconformance Report
OH .... Overhead
OSP .... Outside Plant
OTDR .... Optical Time Domain Reflectometer
PI .... Point of Intersection

PVMS .... Portable Variable Message Sign
RDS .... Radar Detection System
RFI .... Radio Frequency Interference
ROW .... Right of Way
RTMC .... Regional Traffic Management Center
RWIS .... Road Weather Information Systems
SAT .... Stand Alone Testing
SIN .... Site Identification Number
TCC .... Traffic Control Center
TGC .... Telecom General Consultant
TMC .... Traffic Management Center
UL. .... Underwriters Laboratories, Inc.
WGU .... Wire Grounding Units

1. Introduction

The Telecom General Consultant (TGC) to the Florida Department of Transportation (FDOT) has been assigned the task, in coordination with the Districts, to develop a working ITS Facility Management (ITSFM) software application utilizing a commercial-off-the-shelf (COTS) product to allow the Districts to compile information about ITS subsystem assets into a standardized database. This will facilitate identifying requirements to ensure proper planning for future growth, funding availability and assist FDOT with the operational and maintenance management of the installed ITS subsystems.

Facility Management systems are a proven technology to manage complex networks. The statewide ITSFM application will compile ITS asset information into a geo-based graphical and tabular database to document the total ITS subsystem's assets. Each time the system is accessed, it will provide the user with up-to-date and accurate records from a central database.

This technical memorandum provides ITS-specific inspection, quality assurance and quality control, and as-built documentation guidance for construction projects, and it recommends a standardized process for as-built data collection for new installations to ensure consistent and accurate data collection for all pertinent installed components. Timely and accurate data collection during the installation phase of ITS projects is a key element in documenting system assets and cost-effectively populating the ITSFM application.

This technical memorandum is not intended to supersede any existing FDOT practices for Construction Engineering and Inspection (CE&I).

2. Construction Management

Most FDOT projects are focused around heavy construction, with the exception of ITS, which is more technical in nature. FDOT maintains proven construction inspection processes for roadway projects, but the installation of ITS devices or subsystems is relatively new and historically represents only a small percentage of the overall construction preformed by FDOT; therefore, ITS-specific inspection processes have not been developed for statewide use.

The FDOT uses CE&I firms to manage roadway construction, including earthwork and grading operations; drainage and utility work; aggregate base, asphalt, and concrete pavements; installation of roadway signage, striping, and ITS. The services provided by these firms include project administration, daily inspection, project documentation, submittal review, design support, constructability reviews, value engineering, critical path review, materials testing, cost estimating, and claims analysis.

The FDOT and CE&I need ITS-specific inspection guidelines to assist with quality assurance of technical installations and standardized data collection process to ensure the contractor provides accurate as-built documentation. The implementation of a statewide ITSFM application will also require the inspector to collect specific information about installed system components needed to populate the application.

3. ITS Construction and Field Inspection

The Construction Inspector (inspector) is on the front line of construction and must work closely with the contractor's field staff to monitor and verify the contractor installs the ITS subsystem components in accordance with the approved plans and specifications. The inspector must also maintain accurate and timely records of the progressive placement of system components over the life of the project.

ITS projects are comprised of two types of construction: site and longitudinal construction. Site construction typically consists of installing multiple items at a fixed location (site) to form an assembly, such as an ITS field device that may include the installation of the support pole, equipment cabinet, a camera, detector, or other ITS device; fiber optic splices and terminations; electrical service; and a full range of electrical and electronic hardware associated with the site. Longitudinal construction typically consists of installing the electrical and fiber optic conduit system, which includes the conduits, cables, splices, and access points along the roadway between the sites.

Both types of construction are usually implemented parallel to each other and in a logical order or phase using a variety of specialized trades, construction processes, and techniques. This requires the inspector to be knowledgeable in a variety of construction disciples and processes and have the ability to oversee multiple construction activities in several locations simultaneously.

As stated earlier, the inspector's primary responsibility is to monitor and verify the contractor's work is in accordance with the approved plans and specifications and to maintain accurate and timely records of larger assortment of installed system components associated with ITS project. To accomplish this documentation requirement, the inspector must complete several different types of records on a regular basis. The TGC has developed ITS-specific reporting and data collection forms to assist with the reporting and data collection needed for ITS projects.

- Daily Reports,
- Quality Checklist,
- Construction Plan Redlines to document field changes to the approved design, and
- ITSFM Forms documenting information about the installed components not typically provided with the as-built drawings.

The reports, checklist, forms, and the data collection processes are discussed in detail in the following sections of this memorandum.

4. Daily Reports

Daily Reports are used by the CE&I to track daily production and progress on a project, as well as document the conformity of the contractor's work to the approved plans and specifications. The information contained on these reports also provide a historical field diary to document significant project events and changes that can occur on a project that affect the project schedule and budget. FDOT has developed a standardized Daily Report of Construction that captures the following information:

- Weather conditions that impact the project;

- Personnel and equipment logs that allow FDOT to see abrupt changes in project forces;
- Detailed hours of work, including personnel classifications and idle time of equipment that may affect hourly compensation; and
- Location of work activities referenced by project section, station numbers, milepost, road intersections, etc.

In addition to the FDOT Daily Reports, other forms may be needed for the inspector to document project activities based on the specific project scope or contract types such as time and material, unit price or design-build.

Reference Reports:

Form Number	Title
700010-013/Construction (01/03)	FDOT Daily Report of Construction

5. ITS Quality Checklist

ITS construction projects are comprised of many specialized system components requiring the inspector to be knowledgeable in a variety of construction disciples and processes. The quality of construction and system installations has a tremendous impact on the operational effectiveness and the reoccurring maintenance cost associated with ITS subsystems. The TGC has prepared ITS-specific "Quality Checklists" to support the inspector with monitoring the quality of construction. These checklists address the different types of ITS facilities and the different construction methods used to deploy them. The following sections provide a narrative description for the different types of facilities and deployment methods, and include the key elements of inspection and reference to the appropriate FDOT specifications that address these items. Some key benefits derived from the use of ITS Quality Checklists include:

- Identifying the many individual components and stages of ITS facility deployment,
- Providing critical documentation required for overall project acceptance,
- Simplifies and standardizes the CEI's Daily Reporting responsibilities, and
- Helps ensure inspection responsibilities are conducted while each task is being performed.

5.1 ITS Conduit System Access Points

Description:
ITS Conduit System Access Points consist of Splice Vaults and Pull Boxes and are utilized to provide access to the conduit system for the installation, operation and maintenance of fiber optic and electrical cables. Splice vaults are used along the primary or backbone ITS conduit system housing fiber optic cables and pull boxes are used when conduit extends from the backbone conduit system to the ITS field device location. Two types of pull boxes are typically used, electrical and fiber optic. The electrical and fiber optic conduit may be installed in the same trench or conduit bundle, but the access points for the two—electrical and communication—should be separate. Key elements for the inspection of the access point installation include:

- Vault and pullbox placement (i.e., installation offsets and elevation),
- Final lid elevation is flush with finish grade,
- Access point penetrations are sealed and conduits are plugged, and

- Cables are tagged.

Reference ITS Quality Checklist:

Form Number	Title
ITSFM001	Fiber Splice Vaults and Pullboxes

Reference Specification:
FDOT Standard Specifications for Road and Bridge Construction 2004
Section 635 – "Pull and Junction Boxes"
Section 783-3 – "Pull Box and Splice Box"

5.2 ITS Conduit System

Description:
The ITS Conduit System consists of several different types and configurations of conduit and pipes to form the infrastructure that provides the pathway necessary to install, operate and maintain fiber optic and electrical cables between Regional Traffic Management Centers (RTMCs), and the ITS devices. Several construction methods are typically used to install the conduit system including the trench, plow, horizontal bore, directional bore and bridge attachment methods. Key elements for the inspection of the conduit system installation include:

- Conduit placement (i.e., running line offsets and installation depths),
- Conduit field bends do not exceed the maximum bending radius,
- Proper conduit joints and splices, and
- Trench backfill and compaction.

Reference ITS Quality Checklist:

Form Number	Title
ITSFM002	Conduit Placement - Bridge Attachment
ITSFM003	Conduit Placement - Directional Bore
ITSFM004	Conduit Placement - Horizontal Bore
ITSFM005	Conduit Placement - Plow
ITSFM006	Conduit Placement - Trench
ITSFM007	Existing Utility Separation

Reference Specification:
FDOT Standard Specifications for Road and Bridge Construction 2004
Section 630 – "Conduit"

5.3 Designating System and Route Markers

Description:
The Conduit Designating System provides visual notification of the presence of the underground ITS conduit/cable system as well as provides a means for electronically locating the dielectric conduit system. The Designating System consists of several components, including electronic markers, route markers, above-ground and underground tone wire access points, underground tone wires, wire grounding units (WGU), and ground rods. The designating system provides a means to identify, locate, and protect the ITS conduit system. Key elements for the inspection of the designating system installation include:

- Tone wire placement and splicing,
- System grounding, and testing, and
- Route Marker installation and spacing.

Reference ITS Quality Checklist:

Form Number	Title
ITSFM008	Tone Wire Installation
ITSFM009	Route Marker Installation

Reference Specification:
FDOT Standard Specifications for Road and Bridge Construction 2004
Section 783-2 – "Conduit and Locate System"

5.4 ITS Devices

Description:
ITS device placement is critical for effective performance and the delivery of real time data and video to a central location for analysis and dissemination to affected parties for traffic and incident management. Dynamic message signs (DMSs) need to be installed so that messages can be safely and effectively viewed by motorists to allow for proper motorist reaction. Radar Detection Systems (RDS) are positioned along the highway to monitor traffic, but need to be strategically located to minimize background interference that may cause less than optimal RDS operation.

Closed-circuit television (CCTV) cameras are located for optimal views of the highway avoiding trees, buildings and other obstacles that would obscure view. Portable highway advisory radios (HAR) are located along the highway to advice motorists of traffic conditions or broadcast public safety announcements. The device location should be away from any source of radio frequency interference (RFI), and their optimal elevation should be level to, or above, the roadway and not obscured by hills, trees, or other large obstacles to maximize operational range. Portable variable message signs (PVMS) should be located with similar considerations as with the DMS but offer the flexibility in that they can serve a particular area and then quickly be removed and re-deployed to another location.

Key elements for device placement inspection include:

- Monitoring the attachment height and orientation of the device being mounted,
- Proper mounting hardware is utilized,
- Monitoring device assembly and attribute documentation, and
- Monitoring device pre-test before installation.

Reference ITS Quality Checklist:

Form Number	Title
ITSFM010	CCTV Camera Installation
ITSFM011	Dynamic Message Sign Installation
ITSFM012	RDS Unit Installation
ITSFM013	Steel Overhead Sign Installation

Reference Specification:
FDOT Standard Specifications for Road and Bridge Construction 2004
Section 781-1 – "Dynamic Message Sign"
Section 781-2 – "Highway Advisory Radio"
Section 782-1 – "CCTV Camera"
Section 786-1 – "Microwave Vehicle Detection System"
Section 786-2 – "Video Vehicle Detection System"
Section 786-4 – "Acoustic Detection System"
Section 786-5 – "Road Weather Information System"

5.5 Fiber Optic Cable

Description:
Fiber optic cable is used to provide high speed, reliable data and device control communications. Typically, fiber optic communications system should be used in the statewide infrastructure network to provide data and device control communications between RTMCs, Traffic Control Centers (TCCs), Emergency Operations Centers (EOCs), ITS devices, and other identified stakeholder facilities.

The fiber optic communication system consists of fiber optic cable, splices and terminations, and access points. Fiber optic splices provide a continuous optical path for the transmission of optical pulses from one optical fiber length to another. Fiber optic terminations connect the optical fiber housed within a cable to a fiber distribution panel (FDP) and fiber patch panel (FPP), allowing the electronic equipment and devices located throughout the network to be connected to the fiber optic cables. Key elements for the inspection of the fiber optic cable installation include:

- Pre-installation and post installation dB records are received,
- Verify Cable Placing Plan is followed,
- Verify cable is properly handled,
- Documentation of cable sequential numbers,
- Verify all cable placing equipment is calibrated, and
- Verify proper cable coil lengths at designed intermediate vaults.

Reference ITS Quality Checklist:

Form Number	Title
ITSFM014	Fiber Optic Cable Installation
ITSFM015	Fiber Optic Cable Splicing and Termination
ITSFM016	Fiber Optic Cable Testing

Reference Specification:
FDOT Standard Specifications for Road and Bridge Construction 2004
Section 783-1 – "Fiber Optic Cable"

5.6 Primary & Secondary Power

Description:
ITS Electrical Power Systems differ from other ITS elements in several distinct ways. For instance, power is a non-passive component in the system. If not properly installed, it can endanger personnel, and damage ITS equipment. Another differentiator involves the coordination of third-party utility companies to obtain and manage electrical service. As a result, logistics become more complicated when jointly establishing demarcation points for load centers.

The ITS Power System utilizes several components designed to minimize danger to personnel and devices, and efficiently distribute power to ITS devices downstream from the electrical service point. Some of these devices limit the flow of current, such as surge protectors, breakers, and grounding devices, while others transmit and distribute power such as cables, load centers, and transformers. It is imperative that the power components of the ITS are installed properly and conform to designed specifications. Key elements for the inspection of the Power System include:

- Connections of cables to equipment,
- Installation of grounding systems,
- Placement of cables in conduits, and
- Installation of equipment to access boxes.

Reference ITS Quality Checklist:

Form Number	Title
ITSFM017	Back-up Power Installation
ITSFM018	Load Center Installation
ITSFM019	Power Cable and Pullbox Installation
ITSFM020	Surge Protection & Transient Voltage Surge Suppression Installation
ITSFM021	Utility Demarcation Point Installation

Reference Specification:
FDOT Standard Specifications for Road and Bridge Construction 2004
Section 508 – "Electrical Construction for Moveable Bridges"
Section 785-1 "Grounding & Transient Voltage Surge Suppression"

5.7 ITS Support Structure

Description:
ITS Support Structures for devices and subsystems vary to need and applicability. Typically, ITS subsystem components are installed on their own structure, which includes poles of varying materials or sign structures that are either cantilever or overhead truss, and they are usually a structural steel configuration located within the highway right-of-way (ROW). Moreover, some subsystems are trailer mounted and can be quickly deployed to strategic locations to maximize operational effectiveness. Example types are the PHAR and the PVMS.

The process of receiving and transmitting data, resulting in the ability to monitor and alert vehicular or pedestrian traffic, requires a variety of ITS devices ranging from cameras, to DMSs, to wireless antennas. These devices must be readily visible to their target users or their purpose is defeated. That generally requires the devices to be mounted in overhead locations requiring ancillary support structures.

These support structures are installed in locations to maximize the effectiveness of the devices mounted to them. Typically, ITS support structures are installed in close proximity to moving traffic. To guard public safety, it is critical that special attention is focused on monitoring the installation process to ensure its designed structural integrity is met. Key elements for the inspection of the ITS support structure installation includes:

- Drill shaft installation,
- Concrete pre/post placement inspection,
- Pole erection, and
- Anchoring pole to foundation.

Reference ITS Quality Checklist:

Form Number	Title
ITSFM022	Device Pole Installation
ITSFM023	Drilling Foundation Shafts Installation

Reference Specification:
FDOT Standard Specifications for Road and Bridge Construction 2004
Section 641 – "Prestressed Concrete Poles"
Section 649 – "Steel Strain Poles, Steel Mast Arms & Monotube Assemblies"
Section 785-2 – "Pole and Lowering Device"

5.8 Cabinet Inspection

Description:
During the construction phase, it is essential to maintain thorough subsystem cabinet inspection in order to ensure dependable subsystem operation. Depending on the type of subsystem served, the cabinet will likely house sensitive micro-processing equipment, local power distribution panels, fiber optic splices, local control panels, local telephone utility interfaces, solar power interfaces, digital radio devices, and so on. The construction location of the cabinet and the orientation of the cabinet are critical. It is important that the cabinet is installed in its intended location, so it can avoid conflict with anything that may strike it such as mowers, vehicles, and debris thrown from moving vehicles. Likewise, the cabinet should be placed facing its design orientation, allowing a technician to keep an eye on the roadway while accessing the cabinet.

The cabinet itself acts as an environment for the devices or interfaces mounted inside it. In order to protect the electronic devices within, cooling fans and heaters are sometimes added to control the temperature and humidity.

Key elements for cabinet inspection include:
- Monitoring cabinet installation location,
- Documenting cabinet component attributes and position within cabinet, and
- Ensure the functionality of cabinet components.

Reference ITS Quality Checklist:

Form Number	Title
ITSFM024	ITS Field Device Cabinet Installation

Reference Specification:
FDOT Standard Specifications for Road and Bridge Construction 2004
Section 785-3 – "Field Cabinet"
Section 785-4 – "Equipment Shelter"

5.9 Wireless Communications

Description:
Wireless Communications generally consists of a typical configuration of wireless radio and antenna equipment, communications and power interface, lightning protection, grounding, and a cabinet/enclosure to transport information (data, voice, and video) via the backbone and/or distribution communications network between the RTMC and the ITS field devices. Installation of the wireless communications involves correct mounting and grounding of the wireless radios and antennas, accurate alignment of antennas, and proper lightening protection for all related equipment.

Key elements for the inspection of the wireless communications installation include:

- Antenna installation and alignment (i.e., verify height, elevation, azimuth, proper alignment),
- Antenna transmission line installation and connections (i.e., verify proper connections and attachments),
- Proper radio mounting, grounding and connections,
- Proper grounding of antenna and lighting rod,
- Correct ground conductor mounting and grounding,
- Correct ground rod installation and connections,
- Proper mounting and grounding of transmission line surge protection devices, and
- Single point ground system installation and grounding.

Reference ITS Quality Checklist:

Form Number	Title
ITSFM024	Antenna Installation

Reference Specification:
FDOT Standard Specifications for Road and Bridge Construction 2004
Section 620 – Signal Installation Grounding
Section 780 – Intelligent Transportation Systems – General Requirements
Section 785 – Intelligent Transportation Systems Infrastructure

5.10 Equipment Integration and Testing

Description:
Equipment integration and testing is critical in the project acceptance stage of ITS facility deployment. Several stages of testing are necessary to ensure the system devices are operative before, during, and following facility installation. Subsystem testing stages include:

- Factory Testing,
- Bench Testing,
- Standalone Testing, and
- Final System Acceptance Testing.

Factory Testing (FT) of a subsystem such as for a DMS is an operational test that verifies all required subsystem functions and is typically completed and approved before shipment of the device or subsystem to the project.

A Bench Test (BT) is similar to the Factory Test, but it proves that the subsystem is operational. This test may include all components of a particular subsystem or a combination of subsystems, as may be required.

Standalone Testing (ST) is a field site acceptance test of a particular individual subsystem like an RDS but may also include other subsystems that may help demonstrate that the RDS is functioning as required.

Final System Acceptance Testing (FSAT) is performed from the RTMC where all subsystems are reporting data and video. These tests are typically performed utilizing the subsystem vendor software to prove system functionality. Subject to the contract requirements and as a second step to the Systems Test it will be required that all subsystems functions perform acceptably when controlled with the RTMC central software. The central software centralizes the control of the subsystems by eliminating the need to use multiple sets of subsystem vendor software.

Most ITS projects require the contractor to prepare project-specific test plans for approval by FDOT prior to the start of any testing. The CE&I must review and understand the approved test plans prior to witnessing any subsystem test.

Key Elements:

- Approved FT Plan,
- Approved BT Plan,
- Approved ST Plan, and
- Approved FSAT Plan.

Reference Specification:
FDOT Standard Specifications for Road and Bridge Construction 2004
Section 780-5 – "Testing"

6. Quality Assurance & Quality Control (QA/QC)

The Quality Process addresses those requirements critical to the quality of the completed ITS project delivered to FDOT by the contractor. ITS projects are relatively fast paced, utilizing numerous crews with various disciplines in multiple locations. Many challenges arise for the CEI due to these logistical challenges.

In order to maintain quality control, the overall quality process must be driven by the various Daily Reports and procedures available to the CEI, including the Daily Report of Construction, the ITS Quality Checklists, the ITSFM Attribute forms, and the as-built guidelines presented in this memorandum. Although daily documentation is critical to the quality control process, additional procedures are required when the CEI observes an action that does not conform to the project specifications. Nonconforming conditions must eventually be corrected; therefore, it becomes necessary to track each nonconforming condition from its initial identification to its closure.

6.1 Nonconformance Procedure

Nonconformance reporting procedures help manage the quality control process, which is represented below showing inspection and reporting activity stages. Figure 1, the Nonconformance Process, addresses how deficiencies and nonconformances are to be identified, tracked, and eventually rectified and closed out.

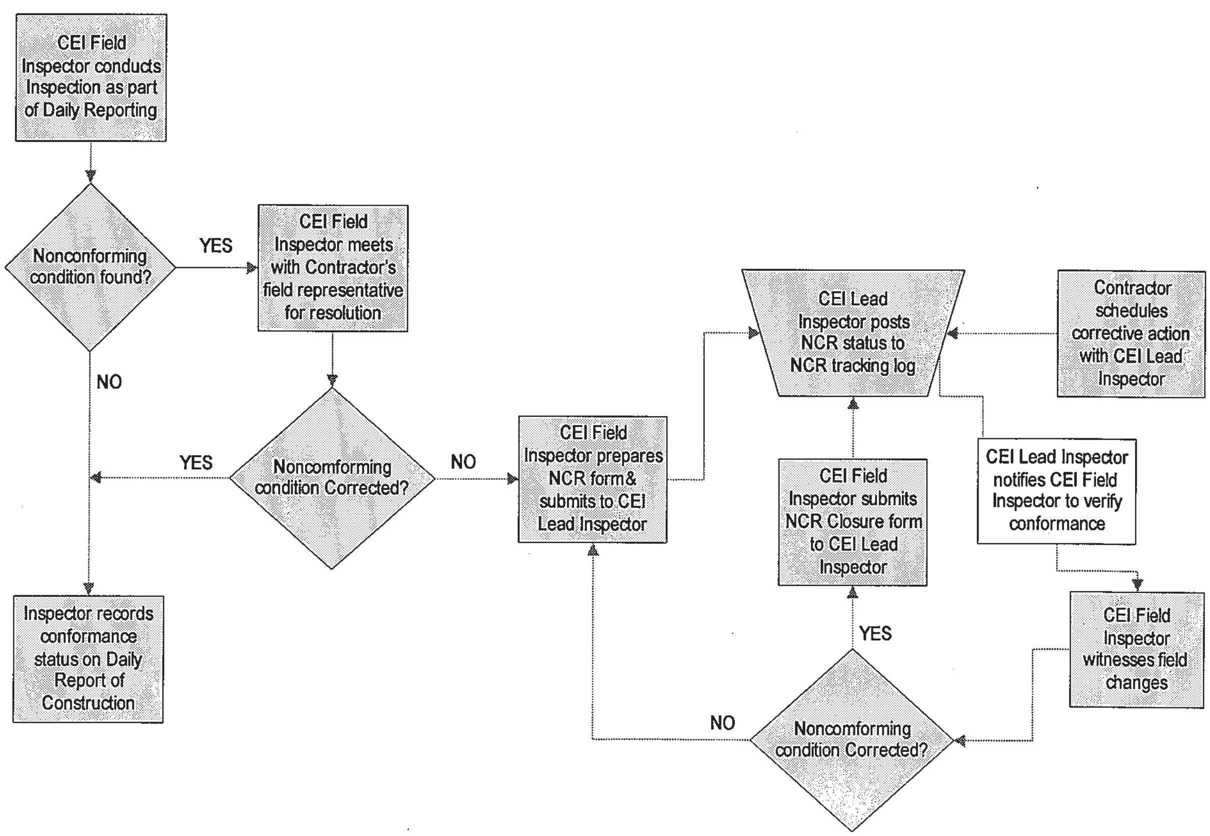


Figure 1 – Nonconformance Process

6.2 Nonconformance Report (NCR)

Following the determination of a nonconforming condition, the CEI field inspector will attempt to resolve the condition with the contractor representative in the field. If the condition cannot be resolved at that level, a Nonconformance Report (NCR) will be generated by the CEI field inspector and submitted to the lead inspector at the CEI field office. The lead inspector will then enter a NCR tracking number on the NCR form, and log all pertinent information onto a NCR tracking log. The NCR will contain the following information:

- NCR Report Number, date, and location;
- Crew foreman name and discipline;
- Description of nonconformance;
- Corrective action proposal (describing how the condition can be remedied);
- Corrective action verification (following rectification of the nonconforming condition); and
- NCR status:—closed: YES or NO.

Reference Reports:

Form Number	Title
ITSFM026	Nonconformance Report (NCR)

6.3 NCR Closure Report

When the contractor is ready to rectify the nonconforming condition, the contractor crew foreman will notify the CEI field office and schedule the work. The CEI lead inspector will determine whether or not a field inspector needs to accompany the crew while the work is being performed, or if an inspector can verify the changes after the work is completed. All changes to underground facilities must be witnessed by a field inspector at the time the work takes place, since the work will be backfilled after completion.

Upon proper completion of the work, an NCR Closure Report is completed by the field inspector and returned to the CEI lead inspector. This provides the verification accounting trail from the field work location back to the CEI field office. It is a necessary component to ensure the NCR Tracking Log is updated properly.

Reference Reports:

Form Number	Title
ITSFM027	NCR Closure Report

6.4 NCR Tracking

In order to ensure nonconformance issues are resolved in a timely manner, it is important that a review process is established and performed on a regular basis. It is inadequate for each inspector to manage this process entirely on their own. In order for the system to work efficiently, the CEI field office must play a part in the process A NCR Tracking Log is an essential tool designed specifically for this purpose. Each CEI inspector may generate several NCRs during the course of a project. The contractor then has the opportunity to remedy these conditions, and the CEI inspector must then verify that the work has been completed. The NCR Tracking Log provides the means to assess the status of each NCR at a glance. Some of the information recorded on the tracking log would include:

- NCR Report Number,

- Location description,
- Description of nonconformance,
- Contractor name,
- Contractor representative,
- CEI Inspector name,
- Date issued,
- Date closed, and
- Description of resolution for closure.

Reference Reports:

Form Number	Title
ITSFM028	NCR Tracking Form

7. As-Built Guidelines

As-built documentation is the final deliverable for all ITS projects and is a key tool used by FDOT to operate and maintain the installed ITS subsystem components. Therefore, it is critical that as-built records of construction be maintained over the life of construction projects to ensure the completeness and accuracy of the deliverable.

As-built record drawings document changes and modifications made to the ITS during construction, compared to what is shown on the approved design plans, and depict the actual type, quantity, and location of assets installed on the project. Producing accurate as-built records provides many benefits, including:

- Provides the Districts with the ability to analyze the impact of future highway improvement projects in relation to existing assets,
- Supports maintenance activities by providing a tool to help physically locate assets in the field, and
- Provides the information needed to population the ITSFM application.

ITS projects typically require the contractor to provide as-built documentation near the end of the project. Although it is the contractor's responsibility to produce accurate as-built drawings, this information cannot merely be accepted at face value without an audit being performed to verify accuracy. The CE&I are responsible to verify the accuracy and quality of the as-built deliverable and to recommend final acceptance. In order to accomplish this, both

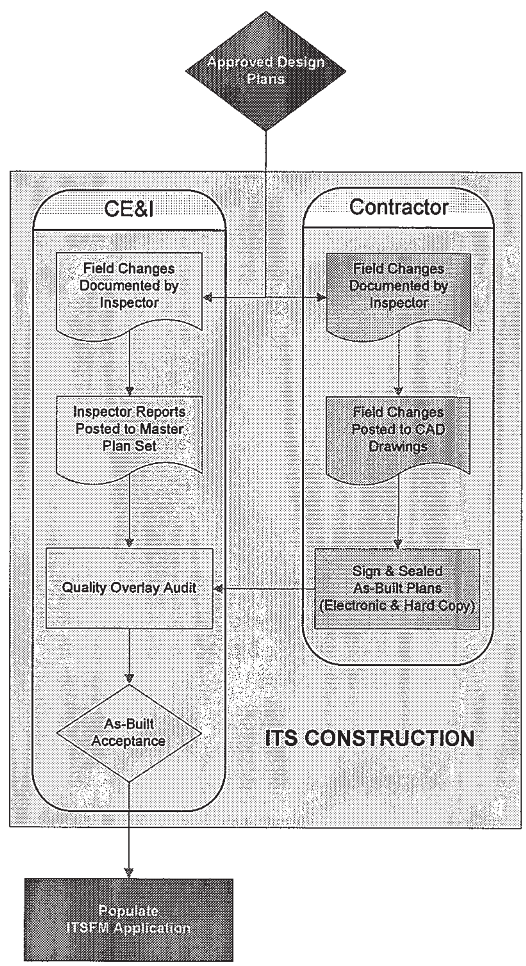


Figure 2 – As-built Process

the contractor and the CE&I must collect as-built information throughout the construction process for comparison.

The recommended as-built process from the approved plans and start of construction to final data population of the ITSFM application is depicted in Figure 2.

A complete and accurate set of as-built records is essential in cost-effectively populating the ITSFM application. Incomplete or poorly documented records will cause a labor-intensive and costly post-construction survey to collect missing information.

Since the as-built data collected by the inspectors are needed to validate the contractor's as-builts, the process used to collect this information is critical. The following sections are intended to provide the CE&I with guidelines to standardize the as-built data collection process and to ensure consistency and completeness of the information.

7.1 As-built Documents

The as-built plans for ITS projects are comprised of several types of drawings, charts, and schematics, including the following:

- Cover page showing the project number, index of sheets, and project location;
- General notes containing specific project information and drawing legend;
- Typical detail drawings describing the method of installation and configurations for all installed components, including:
  - Trench details and conduit configuration,
  - Splice vault and pullbox details,
  - Conduit designating and marking system details,
  - Pole and foundation details, and
  - Cabinet and ITS field device details;
- Plans sheets showing the geographic location, type, and quantity of all installed items;
- Fiber optic schematics showing the fiber cable location, size, type, and length;
- Fiber connectivity, including splicing and termination charts;
- Fiber optic access point details denoting conduit utilization, cable racking and cable sequential numbers at walls, and splice case;
- Electrical wiring diagrams of the power system; and
- Equipment rack details and port assignment charts.

Upon completion of the project, the as-built plans should be provided by the contractor in both paper and electronic formats and must depict the ITS as constructed.

7.2 Documenting Changes

The CE&I monitor the progressive placement of system components and record field changes made during construction. This section describes the process of documenting field changes and the type of information needed.

7.2.1 ITS Subsystem Components

ITS subsystems are comprised of numerous system components or facilities that reside in one of two primary categories, Inside Plant (ISP) and Outside Plant (OSP) facilities.

Outside Plant facilities include assets such as:

- Wireline infrastructure such as fiber optic cables, conduits, splice vaults, and pullboxes;
- Wireless Communications such as virtual wireless paths and antennas;
- Communication Equipment;
- Electrical infrastructure such as conduits, pullboxes, load centers, and service points;
- ITS Field Devices such as CCTV, DMS, detection devices (like induction loops. radar, and video), HAR, and Road Weather Information Systems (RWIS); and
- Support structures such as concrete strain poles and cabinets.

Inside Plant facilities include assets such as:
- Buildings and shelters such as the RTMC and remote shelters;
- Building facilities such as conduit, pullboxes, and fiber optic cables; and
- Equipment support structures such as bays and racks.

These facilities are graphically presented on the as-built plans as linear or point features. Linear features include items such as the conduits and cables that traverse along the roadway, while site features include items such as poles, pad-mounted cabinets, and devices. These features are shown on the plans using the appropriate symbols as defined in the legend of the plan set.

7.2.2 Understanding Changes

The approved design plans provide the contractor with the overall design and configuration of the proposed ITS. The design is based on field surveys, utility research, system calculations, and other engineering processes needed to develop the plans. There are many variables in the field that can affect the designed facility placements including:

- Unidentified conflicts with existing utilities,
- Access limitations for construction equipment,
- Subsurface conditions such as rock formations, and
- Future roadway expansion projects.

Regardless for the reasons field changes occur, it is important to document changes at the time of installation to ensure confidence in the final as-built deliverable. Below are some guidelines for documenting changes.

What constitutes a change from the plans? Typically, a change from plan results from the identification of conflicts during construction, where the relocation or realignment of proposed facilities is required. For example, the plans might show new conduits being placed 30 feet parallel to the edge of the traveled lane, but a previously unknown utility prevents that exact alignment and the contractor must relocated the conduit to 40 feet to complete the installation. This type of deviation or change from the approved plan is common in linear construction.

What is the maximum allowable deviation? Generally, if the linear facility meanders less than five feet from either side of its proposed location, documentation of the deviation may not be required. The relocation of site facilities may require the approval of the FDOT engineer because of clear zone issues, and device offset and spacing requirements. Therefore, the maximum deviation from the design for all facility types should be established by FDOT during the construction kick-off meeting.

Do changes in material type, size and quantity need to be documented? Any change in material, including change in type, size, or quantity should always be documented. This is necessary to ensure that all installed components are recognized. For example, if the plans propose the placement of one conduit in a section, but three are placed, then two spare conduits are now available for future use, but would not be recognized when needed if this change is not documented in the as-builts. Other changes may include the installation of different materials needed to meet the new needs of the relocated facility, such as a taller pole or the change from a pole-mounted cabinet to a base-mounted cabinet.

Why is accuracy important? Accurate documentation of changes in location and/or material is important to ensure confidence in the as-builts. Often times, multiple conduits and other facilities must be placed in close proximity to each other due to confined space issues. If the facility location is physically exposed in the future, and the material exposed differs from what is depicted on the plan, the technician is either in the wrong location (poor as-built location documentation), or the material type was changed from the plan and not documented. As a result, it reduces the technician's overall confidence in the entire asbuilt document, but worse, makes maintenance more costly and less effective.

7.2.3 Field Mark-Ups and Master Record

Each inspector must have at the work site, a copy of the plans specifically for field mark-up so that changes can be documented as the facilities are installed. Since most projects require multiple inspectors, each inspector's field notes must be transferred to a master set of as-built records on a regular basis and stored in the CE&I field office.

It is important to use a standard methodology when collecting as-built information. There should be no question as to the type and location of the facility installation. This will also ensure consistency when transferring the hand-drawn field notes to the master as-built records.

The following methodology is recommended to show changes on the plans:

- Strike-through or X-out the planned facilities that will not be placed.
- Draft the new facilities onto the plans showing the actual placement location.
- Annotate the type and quantity of material.
- Provide two measurements to tie down the new locations:
    - Project station measurement for the linear measurement, and
    - Lateral or offset measurement from the edge of travel lane, fence or other known baseline feature that parallels the linear facility shown on the plans.
- If station measurements are not available, provide a measurement from the nearest milepost, road crossing, culvert, or other known feature that intersects the baseline shown on the plans.

The example shown in Figure 3 below depicts a change in network design affecting both the location and connectivity method for a CCTV camera location. As the example shows, the original design called for the placement of underground duct and fiber, but has been changed to a wireless transmission method involving the placement of antennas and their associated support structures.

The original design connection path and access vaults are X'd-out, and the new virtual wireless path is drawn in along with the required antenna devices. The change is also annotated with the corresponding type describing the new material, as well as measurements tying down their final placement location.

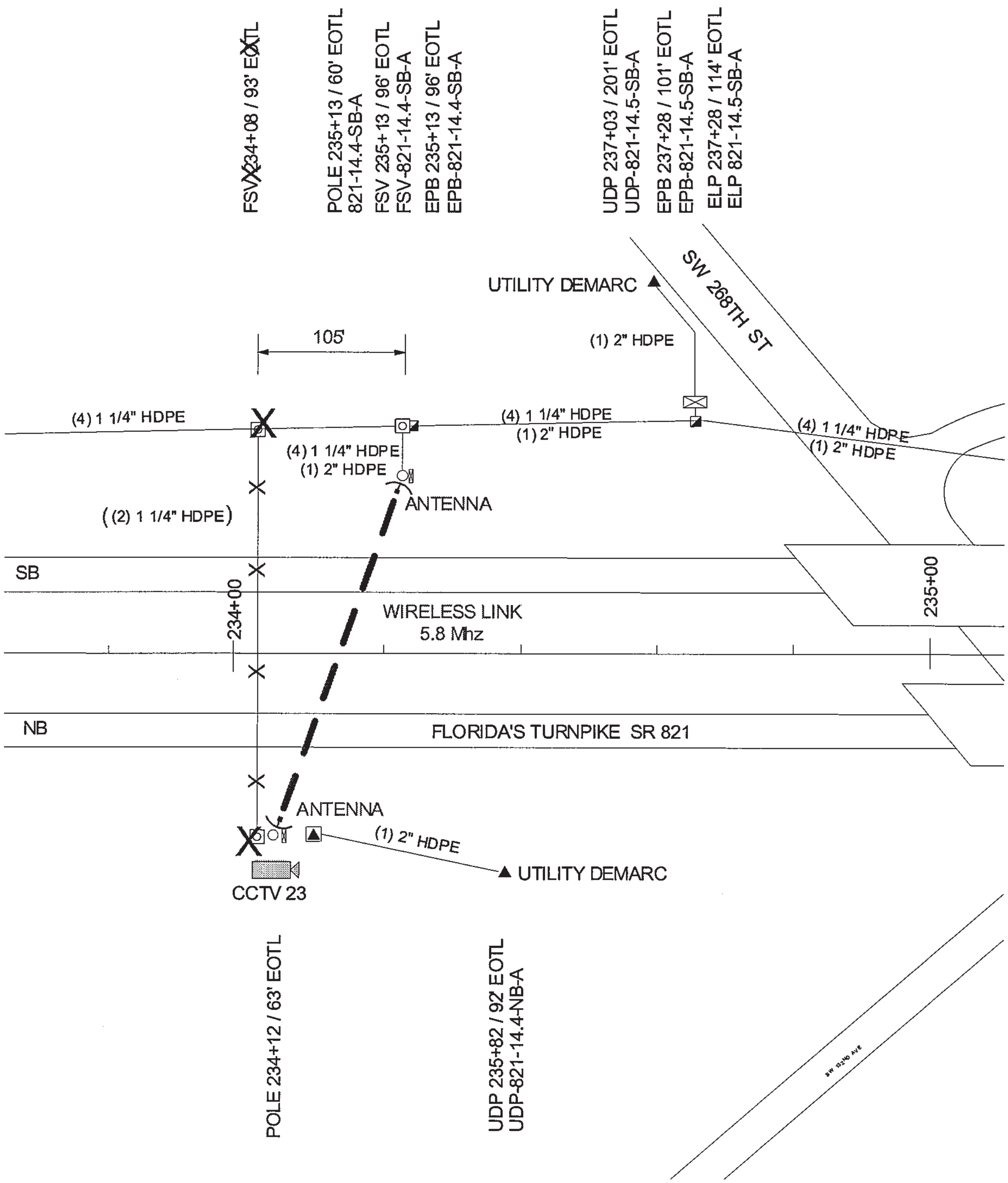


Figure 3 – Field Mark-Up Example

7.2.4 Project Station and Offset Measurements

There are two types of measurements used to identify locations in the plans, project station and offset measurements.

Project station measurements are linear measurements tied to a baseline, typically the roadway centerline, and start and end at the project limits. Project stations provide a unique linear measurement number assigned to features along the project that can be subtracted from each other to provide the distance between the features. Stationed features may include roadway items, such as culverts, drop inlets, bridge head walls, and mileposts. Stationed ITS features should include transition points where the conduit system running line changes direction, conduit access points (splice vaults and pullboxes), ITS field device sites and electrical service points.

Offset measurements denote how far away the feature is from a particular baseline structure, such as the centerline of roadway, edge of travel lane, or right-of-way fence. Offset measurements should be shown at all ITS field device sites, electrical service points, along the conduit including points at the beginning and end of the conduit run, and at all points where the running line changes direction.

8. Facility Management System Requirements

The ITSFM application will compile statewide ITS information into a geo-based graphical and tabular database to document ITS assets. In order to ensure accuracy and functionality of the data in the final application, it is critical that standardized procedures are utilized on the front end of the data collection process since this data will be used to populate the ITSFM application.

8.1 Positional Features

The ITSFM application provides for importing positional information directly from the electronic as-built drawing files. Positional features are placed in the ITSFM application based on their spatial attributes to provide the user with topology information needed to understand the ITS's geographic configuration. There are two types of positional features found on ITS project, linear and point features.

Linear Features

Linear Features have a start and ending point. The conduits and cable used in the ITS subsystem are linear features that depict the duct or cable alignment as it traverses the roadway and includes both electrical and communication ducts and cables. The splice vaults and pullboxes associated with the conduit system are considered point features because they have a definable location.

Point Features

Point features are items with a definable location and are associated to an individual site such as:

- The RTMC site,
- HUB building sites,
- ITS field device sites,
- Electrical load center sites,

- Utility demarcation sites, and
- Fiber optic access points.

These sites house multiple point features, or system components to form and assemble and can be associated to a single location. Point features should on the as-built plans include the support structure components such as the pole, cabinet. Other items co-located at the site such as the system electronic including the communications equipment and the ITS field device are also point features but, are typically not shown on the as-built plans.

Position features must be placed in the as-built CADD files as positional elements and with unique element attributes defining the specific feature types.

8.2 Abbreviations

The following is a list of abbreviations to be used with the ITSFM application.

APL.......Approved Products List
ATIS......Advanced Traveler Information System
ATMS ...Advanced Traffic Management System
ASPH ....Asphalt
BGN......Begin
BOC ......Back of Curb
BRDG ...Bridge
BSP ....Black Steel Pipe
CAB ......Cabinet
CCTV....Closed-Circuit Television Camera
C/L ....Centerline
CNG......Change
CONC ...Concrete
CRN ......Corner
CMP......Corrugated Metal Pipe
CNTY....County
CRK ......Creek
CULV....Culvert
DEPT.....Department
DIR........Directional
DMS......Dynamic Message Sign
E ....East
EB ....East Bound
ELP ....Electrical Load Center Point
ELTC.....Electric
ENC.......Encased
EOG ......Edge of Gravel
EOP ....Edge of Pavement
EOR.......Edge of Road
EOTL ....Edge of Travel Lane
EPB ....Electric Pull Box
EQUIP...Equipment
EXST.....Existing
FH ....Fire Hydrant
FNC.......Fence
FOC.......Fiber Optic Cable
FPB ....Fiber Pull Box
FSV ....Fiber Splice Vault
GSP ....Galvanized Steel Pipe
GRVL....Gravel
GRVL....Guard Rail
HARB ...Highway Advisory Radio Beacon
HART....Highway Advisory Radio Transmitter
HWL .....Headwall
HDPE....High Density Polyethylene
HWY.....Highway
INT ....Intersection
ITS.........Intelligent Transportation Systems
LN ....Lane
LT..........Left
LGTH....Length
LGT.......Light
MH........Manhole
MKR .....Marker
MAX.....Maximum
MP.........Mile Post
MPNIF ..Mile Post Not In Field
MIN.......Minimum

N............North
NB.........North Bound
NTCIP...National Transportation Communications for ITS Protocol
#.............Number
OH.........Overhead
OHSIG..Overhead Signal
PED.......Pedestal
PET.......Petroleum
PI...........Point of Intersection
PL..........Pole
P/L.........Property Line
PP..........Power Pole
PTU.......Pan& Tilt Unit
PTZ.......Pan & Tilt/Zoom
PVC.......Polyvinyl Chloride
PWR......Power
RWIS.....Road & Weather Information System
RTMC...Regional Traffic Management Center
SB..........South Bound
RAD......Radius
R/R........Rail Road
RCP.......Reinforced Conc. Pipe
REQD....Required
RT.........Right
R/W.......Right of Way
RD.........Road
R/L........Running Line
SWR......Sewer
SIG........Signal
S............South
SB..........South Bound
STA.......Station
STS........Storm Sewer
ST..........Street
TEL.......Telephone
TTS.......Travel Time System
TYP.......Typical
UDP.......Utility Demarcation Point
VDS.......Vehicle Detection System
W...........West
WB........West Bound
W/..........With
WAT.....Water

8.3 Naming Conventions

This section defines the methodology and terminologies used to populate feature information within the ITSFM application across the Districts to provide consistent and meaningful data. Standardization will also provide for data integration (shared) into other database systems used by FDOT. In order for the database to differentiate between individual ITS component, the components must all be assigned unique identifying names or codes based on a standardized naming convention.

The naming conventions outlined in this section provide the user with intuitive information within the name itself and provide value to the user when navigating between the ITSFM application tables and map and the as-built plans or other system documents.

8.3.1 Site Identification Number

The ITSFM application manages ITS subsystem components by associating them to a specific location or site. Therefore, all system components installed at RTMCs, HUB buildings, ITS field device sites, electrical load centers, and utility demarcation points must be assigned a unique Site Identification Number (SIN) to associate the many items installed at a site to a geographic location. The SIN must be present on the as-built plans and attribute forms discuss in section 8.3 to create a common association between the two data documents. Linear facilities such as ducts and cables provide connectivity between equipment sites and do not utilize SINs since they are not tied to one specific location or point within the ITS network.

The SIN is partitioned into four designating sections, providing the reader with meaningful information about the site location including highway route numbers and milepost, proximity to the nearest travel lane and a unique letter designator. The following is an example SIN that depicts a site located on Hwy. 821 at milepost station 56.1 near the northbound travel lane with a unique letter identifier "A".

Hwy		Milepost		Lane		Letter
821	-	56.1	-	NB	-	A

Hwy.: The 1st designator represents the highway number.
Milepost: The 2nd designator represents the milepost station shown to the nearest tenth of a mile.
Lane: The 3rd designator represents the nearest travel lane.
Letter: The 4th designator represents a unique identifier used to differentiate between other sites that are present in the same tenth (0.1) milepost location and the same nearest travel lane. A second site would use the letter "B", the third site the letter "C", and so forth.

8.3.2 ITS Field Device Names

ITS field devices are assigned unique names for which each device is known (i.e., CCTV #1, DMS #5, etc.), both at the RTMC and shown on the as-built plans. These device names are typically comprised of two name components, the device type (CCTV, DMS, etc.) and the next consecutive number from the last number assigned to that type of device. Although this provides unique device names for an individual District, the same device name might be used for a similar device in another District, thereby making it difficult to query device information at the statewide level. Therefore, all field devices must also be assigned and associated a SIN to resolve this issue.

8.3.3 Infrastructure Names

Outside plant infrastructure such as access points, electrical load centers and utility demarcation sites must be assigned a unique name. The naming convention for these types of facilities will use the abbreviation for the facility type (FSV, FPB, ELC, EPB, UDP, etc.) in conjunction with a SIN.

The following is an example infrastructure name that depicts an electrical load center located on Hwy. 821 at milepost station 56.1 near the northbound travel lane with a unique letter identifier "A".

Device Type	Hwy		Milepost		Lane		Letter
ELP	821	-	56.1	-	NB	-	A

Type:	The 1st designator represents the infrastructure type
Hwy.:	The 2nd designator represents the highway number.
Milepost:	The 3rd designator represents the milepost station shown to the nearest tenth of a mile.
Lane:	The 4th designator represents the nearest travel lane.
Letter:	The 5th designator represents a unique identifier used to differentiate between other sites that are present in the same tenth (0.1) milepost location and the same nearest travel lane. A second site would use the letter "B", the third site the letter "C", and so forth.

Since the site identification number provides a unique identifier for any type of field infrastructure, it will be used to name these facilities or features.

Linear features such as ducts and cable do not need to be assigned a unique name.

8.3.4 Equipment Bay & Rack Names

Equipment racks must be assigned unique bay and rack identification numbers. Equipment bays are defined as a row or multiple rows of equipment racks installed inside the RTMC and remote HUB buildings. The naming convention for bays and racks will use the SIN in conjunction with a unique bay and rack identifier. Bays will be assigned a letter (i.e., A, B, C, etc,) to identify the bay and racks will be identified by assigning consecutive numbers to the racks. Racks will be numbered from left to right facing the bay. The following is an example of an equipment rack located at SIN 821-56.1-NB-A, Bay "A", Rack number 001.

SIN		Bay		Rack
821-56.1-NB-A	/	A	/	001

SIN:	The 1st designator represents the Site Identification Number.
Bay:	The 2nd designator represents the unique bay letter.
Rack:	The 3rd designator represents the unique rack number.

Electronic equipment housed in a rack will be associated to the rack name.

8.3.5 Electrical Circuit Names

Electrical circuits distributed to the ITS field devices from a FDOT electrical load center must be assigned unique circuit identification numbers. The naming convention for electrical circuits will use the load center name in conjunction with a unique circuit identifier. Circuits will be assigned a consecutive number (i.e., 1, 2, 3, etc,) to identify individual circuits leaving the load center. Circuits will be numbered from left to right, top to bottom facing the electrical distribution panel. The following is an example of a circuit leaving load center ELP-821-56.1-NB-A, Circuit "1".

Load Center Name		Circuit
ELP-821-56.1-NB-A	/	1

Load Center Name: The 1st designator represents the load center name.
Circuit ID: The 2nd designator represents the unique circuit number.

8.4 Connectivity, Association and Attributes

The final as-built package described in section 6.1 must include plans and schematics that document and map the following:

- The geographic location of point feature components such as poles, cabinets, wireless antennas, etc.;
- The geographic location of linear feature components such as the fiber optic conduit system, the power system and associated access points;
- System electronics located at equipment sites including the connectivity of all subsystem components; and
- Power system wiring diagrams and circuit identification.

The ITSFM application manages connectivity by associating specific components to other components installed at or between equipment sites. Therefore, it is important the as-built package provide unique SINs assigned to all equipment sites so that all system components installed at a location can be associated to the equipment site by the SIN.

The ITSFM application also documents component specific information, referred to as Feature Attributes, which includes information such as equipment type, manufacturer, model number, serial number, etc. The as-built package may not provide the attribute level of information so several ITS-specific attribute forms have been prepared to assist with the collection of needed attribute information. These forms include:

RTMC Equipment Site Attribute Form
This form provides for general and detailed information about the RTMC site, the equipment racks, fiber optic patch panels, communications equipment, wireless radio equipment, and ITS field device controller equipment.

Remote HUB Equipment Site Attribute Form
This form provides for general site information about the HUB site and detail attribute data for the cabinet or building, the equipment racks, fiber optic patch panels, communications equipment, wireless radio equipment, ITS field device controller equipment, and the electrical systems at this site.

ITS Field Device Equipment Site Attribute Form
This form provides for general site information about the ITS field device site and detail attribute data for the cabinet and support structure, the fiber optic patch panel, communications equipment, wireless radio equipment, ITS field device and associated controller equipment, and the electrical systems at this site.

FDOT Power Load Center Site Attribute Form
This form provides for general site information about the FDOT power load center site and detail attribute data for the cabinet and support structure, the serving utility company, the main disconnect, and the distribution circuits at this site.

Utility Service Demarcation Site Attribute Form

This form provides for general site information about the utility service demarcation site and detail attribute data for the service pole, the serving utility company for both power and communications, the power disconnect, and the phone number or static Internet protocol (IP) address for leased communication lines.

If the information required in these forms is not available in the final as-built package, the inspector will be responsible to complete these forms so the attribute information can be populated into the ITSFM application. This is necessary to meet FDOT's operational and maintenance needs from the ITSFM application. The appropriate form(s) should be complete for each equipment site within the project limits and delivered to FDOT with the final as-built package.

8.4.1 Fiber Optic Cable and Equipment Connectivity

The ITSFM application manages the connectivity of communication cables by associating each communication cable end (splice point) to a splice case or patch panel located at each equipment site. The as-built plans must include cable schematics or other documentation needed to show the location and routing of all fiber optic cables and the cable attribute information including the cable size (fiber quantity), cable type (single-mode or multi-mode), cable length, cable coils, as well as the connectivity between all splice and termination points.

Connectivity of the communications equipment is accomplished by associating the fiber patch panel ports to the communication equipment port at each site location. The ITS field device are associated to the device controller equipment that is associated to the communications equipment.

The as-built plans must include equipment rack details showing the location of all electronic equipment installed in the RTMC or hub(s), cable routing and connectivity information for all installed communication cables and electronics, including the cable strand and equipment port assignments.

Figure 4 depicts the association of the RTMC to the ITS equipment sites via the connectivity provided by the fiber optic cables and the typical attribute information for the installed components.

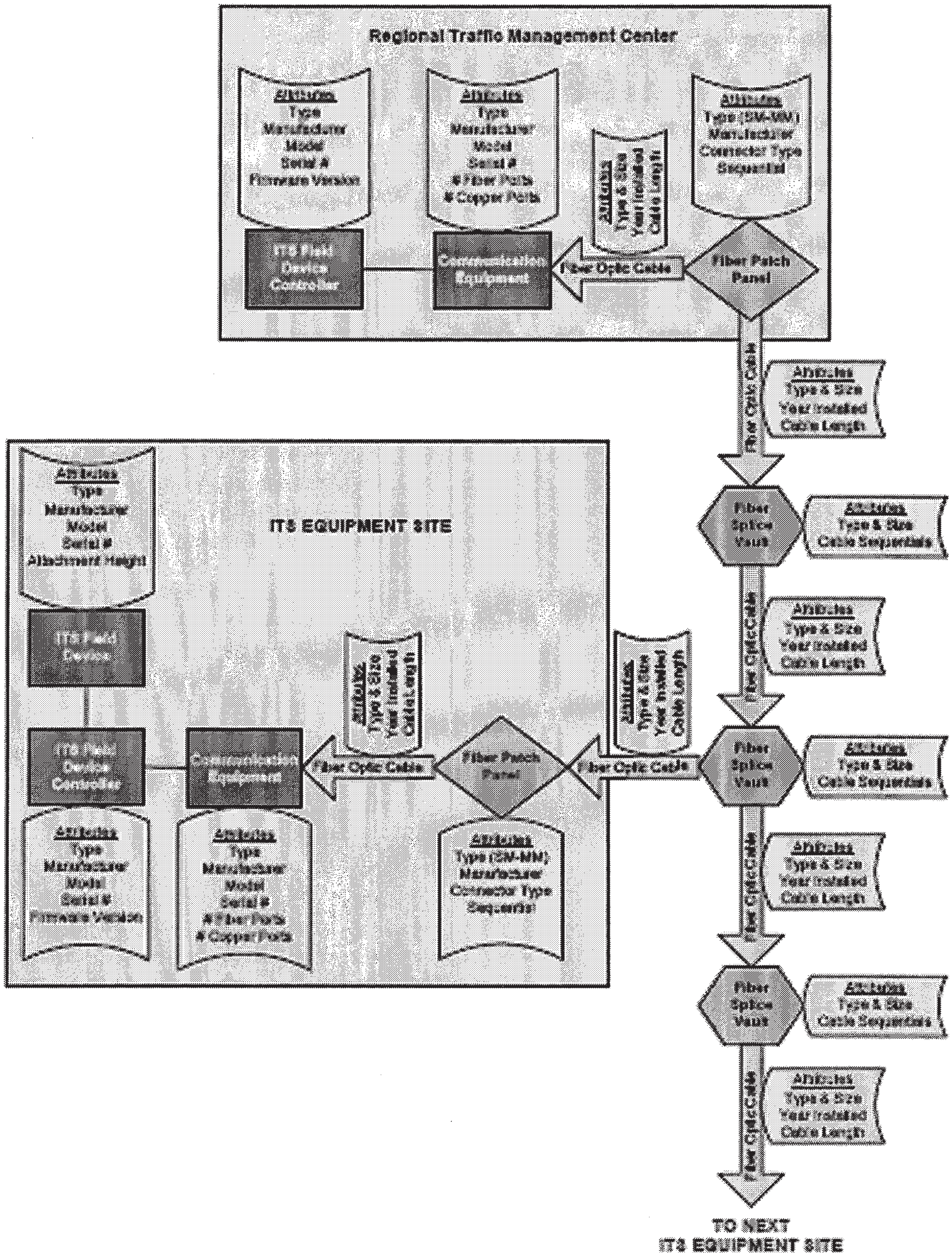


Figure 4 – Wireline Communication System Association and Attributes

Figure 4 – Wireline Communication System Association and Attributes

8.4.2 Electrical Cable Connectivity

The ITSFM application manages the connectivity of the power system by associating the power equipment and cables installed between sites. Electrical cables are managed by associating the electrical cable from the utility service pole (demarcation site) or FDOT load center to the service points located at each ITS field device equipment site. The as-built plans must include wiring schematics or other documentation needed to document the location of the power cables and the associated attribute information including the cable wire gauge, conductor type and sheath type, circuit identification, and voltage.

Figure 5 depicts the association of the power demarcation site to the FDOT load center and then to the ITS equipment sites via the connectivity provided by the power cables and the typical attribute information for the installed components. When a load center is not required, the power demarcation site is directly associated to the ITS equipment site.

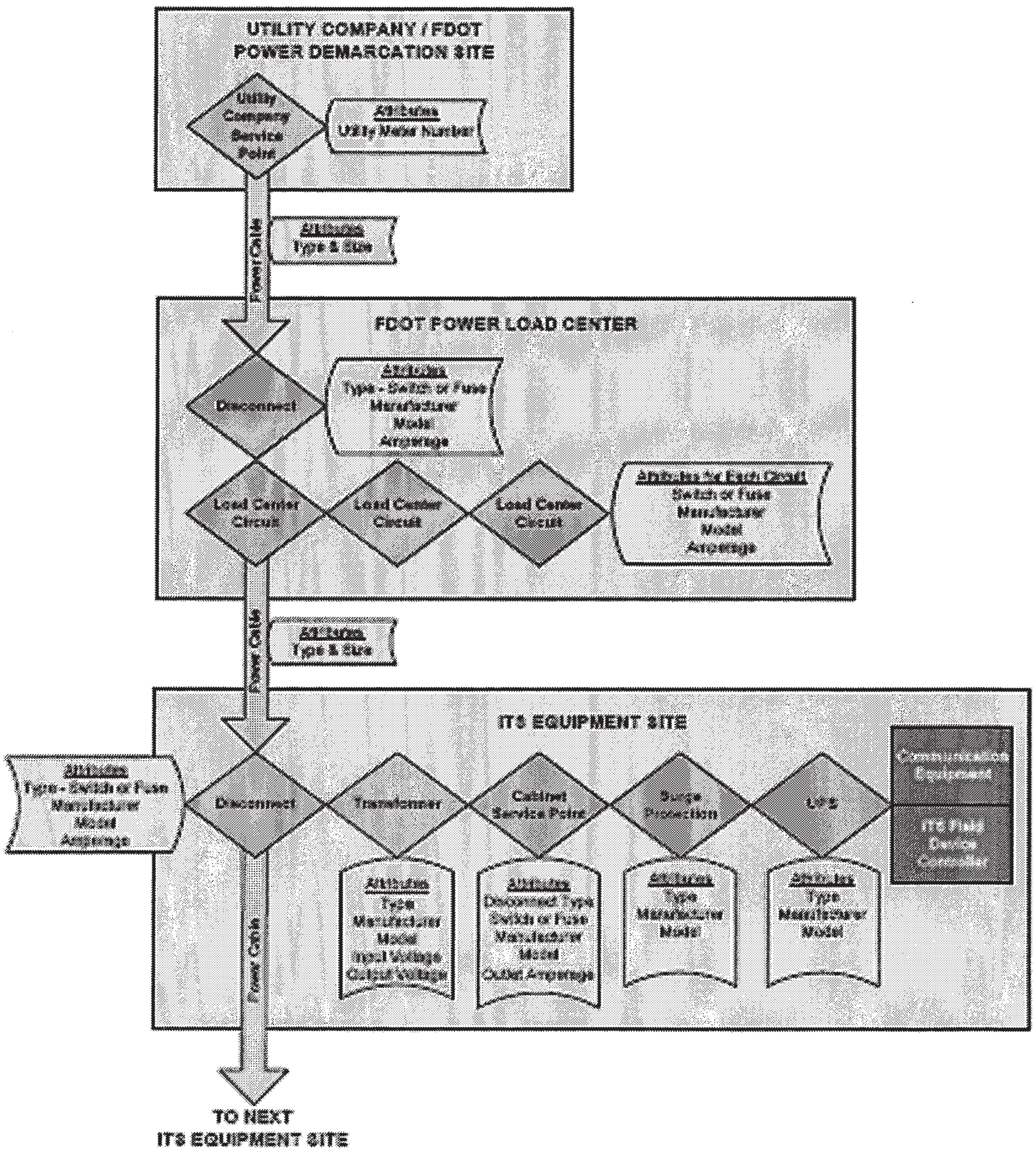


Figure 5 – Power System Association and Attributes

8.4.3 Wireless Communication Connectivity

The ITSFM application manages the connectivity of wireless communications by associating each wireless link to the antenna and radio equipment at each equipment site. The as-built plans must include wireless schematics or other documentation needed to show the location and routing and connectivity of all wireless links and the attribute information including the antenna type and direction, radio equipment type, frequency, and IP address

Figure 6 depicts the association of the wireless radio equipment to the wireless links and the typical attribute information for the installed components.

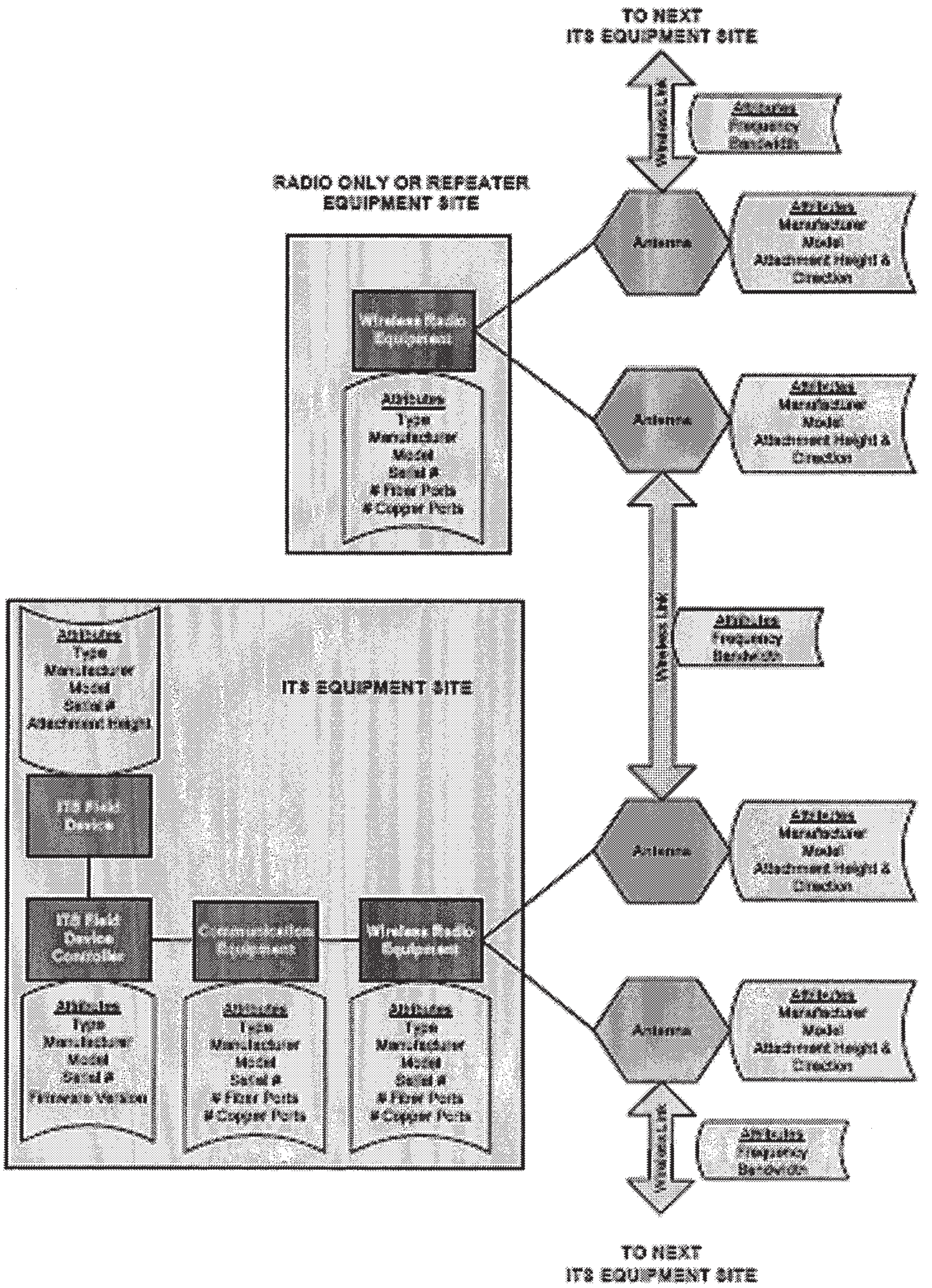


Figure 6 - Wireless Communication System Association and Attributes

Reference Forms:
ITSFM029 – RTMC Equipment Site Attribute Form
ITSFM030 – Remote HUB Equipment Site Attribute Form
ITSFM031 – ITS Field Device Equipment Site Attribute Form
ITSFM032 – FDOT Power Load Center Site Attribute Form
ITSFM033 – Utility Service Demarcation Site Attribute Form
ITSFM034 – Fiber Access Point Detail and Attributes Form

Appendix A – Inspection Daily Report
Index of Forms

Form Number	Title
700010-013 / Construction (01/03)	Daily Report of Construction

The electronic version of the FDOT Daily Report of Construction is password protected and is available for download and use at the following address:

http://formserver.dot.state.fl.us/MiscRepository/forms/70001013.dot

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

DAILY REPORT OF CONSTRUCTION

700-010-15
CONSTRUCTION
01/09

Date:	Contract ID:	Financial Project ID:	Inspector:

High Temp:	AM Conditions:	PM Conditions:
Low Temp:		

Remarks			
General:			
Accidents: ☐No ☐Yes See Accident Report Dated:	Day of Week:	Contract Day:	Total Days:
Visitors:			

Contractor(s) and Personnel										
#	Name	Type	#	Hrs	Type	#	Hrs	Type	#	Hrs
1.	Prime	Supt			Foreman			Skilled		
		Semi skilled			Common			Trainee		
2.	Sub/Utility	Supt			Foreman			Skilled		
		Semi skilled			Common			Trainee		
3.	Sub/Utility	Supt			Foreman			Skilled		
		Semi skilled			Common			Trainee		
4.	Sub/Utility	Supt			Foreman			Skilled		
		Semi skilled			Common			Trainee		

Contractor(s) Equipment (Active or Idle)					
Contr/Sub #	Equipment ID	Description	# Pieces	# Used	Total Hours Used

Date:	Contract ID:

Estimated Work Performed

Contr/ Sub #	Line Item #	Pay Item Code	Location	Time (AM/PM)		Installed	
				Beginning	Ending	Qty.	Units

EFFECTS OF WEATHER ON MAJOR WORK ITEMS (CHECK CONTROLLING ITEMS):

Major and/or Controlling Work Items	No Effect All Day	Affected Less Than 50% of Work Day	Affected More Than 50% Of Work Day	No Work All Day
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐

CONTRACTOR PAST PERFORMANCE

PURSUIT OF THE WORK: ☐ YES ☐ NO

CONFORMANCE WITH CONTRACT DOCUMENTS: ☐ YES ☐ NO

TECHNICIAN'S SIGNATURE AND RATING:	HOURS AT JOB SITE		TOTAL HOURS
	FROM:	TO:	

ENGINEER IN CHARGE (NAME, RANK AND INITIALS):	
	DATE:

DISTRIBUTION: Original - Project Engineer
Copy - Contractor (as requested)

Appendix B – ITS Quality Checklists

Index of Forms

Access Point Placement

Form Number	Title
ITSFM001	Fiber Splice Vaults and Pullboxes

Conduit Placement

Form Number	Title
ITSFM002	Conduit Placement - Bridge Attachment
ITSFM003	Conduit Placement - Directional Bore
ITSFM004	Conduit Placement - Horizontal Bore
ITSFM005	Conduit Placement - Plow
ITSFM006	Conduit Placement – Trench
ITSFM007	Existing Utility Separation

Designating System

Form Number	Title
ITSFM008	Tone Wire Installation
ITSFM009	Route Marker Installation

ITS Device

Form Number	Title
ITSFM010	CCTV Camera Installation
ITSFM011	Dynamic Message Sign Installation
ITSFM012	RDS Unit Installation
ITSFM013	Steel Overhead Sign Installation

Fiber Optic Cable

Form Number	Title
ITSFM014	Fiber Optic Cable Installation
ITSFM015	Fiber Optic Cable Slicing and Termination
ITSFM016	Fiber Optic Cable Testing

Primary & Secondary Power

Form Number	Title
ITSFM017	Backup Power Installation
ITSFM018	Load Center Installation
ITSFM019	Power Cable and Pullbox Installation
ITSFM020	Surge arrestors & Transient Voltage Surge Suppressors Installation
ITSFM021	Utility Demarcation Point Installation

ITS Support Structure

Form Number	Title
ITSFM022	Device Pole Installation
ITSFM023	Drilling Foundation Shafts Installation

Cabinets

Form Number	Title
ITSFM024	ITS Field Device Cabinet Installation

Wireless Communications

Form Number	Title
ITSFM025	Antenna Installation

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

ITS Quality Checklist
Fiber Splice Vaults & Fiber Pullboxes

ITSFM001
06/06

Date:	Contract ID:	Financial Project ID:	Quality Inspector:
Plan Sheet	MP	Sta.	Site ID

CONFORMED	NCR*	N/A	INSPECTION REQUIRED
❑	❑	❑	Verify splice vault and pullbox offsets are in accordance with approved construction Plans.
❑	❑	❑	Verify splice vaults and pullboxes are installed plumb, level, and at proper elevation.
❑	❑	❑	Verify the tone wire or tracer wire is installed and terminated in accordance the Plans and Specifications.
❑	❑	❑	Verify that final lid elevation is flush with finish pavement grade if placed in a street or road. , If placed in a residential lawn, undeveloped or rural areas, verify the final lid elevation is two (2) inches above grade with surface tapered to grade in all directions or as required by governing authority or ROW owner.
❑	❑	❑	Verify that the excavation is 2-feet larger than the splice vault, and that the base is supported by a minimum of 1 foot of coarse, free draining aggregate.
❑	❑	❑	Verify that splice vaults have openings on opposite corners.
❑	❑	❑	Verify that the conduit enters the splice vault endwalls and extended 3" - 6" inside the vault.
❑	❑	❑	Verify installation of conduit duct seals, innerduct cable seals, and spare innerduct plugs.
❑	❑	❑	Verify that all splice vault penetrations are sealed with a non-shrink grout. Verify the space between the conduit and the opening is filled with non-shrink epoxy grout or silicone sealant.
❑	❑	❑	Verify that joints in pre-cast section are sealed with manufacturer's approved sealant material.
❑	❑	❑	If required, verify collar extension units are placed to bring the top to a point near the surface, and that adequate depth is maintained for the required depth of cover.
❑	❑	❑	Verify cable labels are attached to each cable in the splice vault.
❑	❑	❑	Verify that all splice vaults are installed with a locking cover with cover markings as shown on the Plans.
❑	❑	❑	Document all changes from the approved plans and specification to the as-built drawings.

***Complete and Attach a Nonconformance Report for all Nonconforming items noted.**

QUALITY INSPECTOR	DATE	DOC CONTROL NO.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

ITS Quality Checklist
Conduit Placement – Bridge Attachment

ITSFM002
06/06

Date:	Contract ID:	Financial Project ID:	Quality Inspector:
Beg/End Sheet(s)	Beg/End MP	Beg/End Sta.	

CONFORMED	NCR*	N/A	INSPECTION REQUIRED
❑	❑	❑	Verify running line location and offsets are in accordance with approved plans and specifications and carry copy to the field.
❑	❑	❑	Review approved traffic maintenance and protection plan and carry copy to the field.
❑	❑	❑	Monitor traffic control setups and recommend adjustment if necessary.
❑	❑	❑	Verify that attachment to bridge, traffic control, and restoration are in compliance with the plans and specifications and all permits issued by bridge owner or other jurisdictions.
❑	❑	❑	Verify that pipe is attached to the bridge without disrupting road or railroad traffic on or below the bridge unless approved in the permits.
❑	❑	❑	Verify that, if coring of bridge abutments is required, the space between the pipe and the cored hole is filled with non-shrink grout or other approved material indicated on the plans and specifications.
❑	❑	❑	Verify that all nuts on bolts or hanger rods are secure.
❑	❑	❑	Verify that the pipe is extended outside the bridge abutments into the ground with bends as indicated on the plans and specifications.
❑	❑	❑	Verify that expansion devices are installed at the locations indicated on the plans and specifications.
❑	❑	❑	Document all changes from the approved plans and specification to the as-built drawings.

***Complete and Attach a Nonconformance Report for all Nonconforming items noted.**

QUALITY INSPECTOR	DATE	DOC CONTROL NO.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

ITS Quality Checklist
Conduit Placement – Directional Bore

ITSFM003
06/06

Date:	Contract ID:	Financial Project ID:	Quality Inspector:
Beg/End Sheet(s)	Beg/End MP	Beg/End Sta.	

CONFORMED	NCR*	N/A	INSPECTION REQUIRED
❑	❑	❑	Verify running line location and offsets are in accordance with approved plans and specifications.
❑	❑	❑	Review approved traffic maintenance and protection plan and carry copy to the field.
❑	❑	❑	Monitor traffic control setups and recommend adjustment if necessary.
❑	❑	❑	Verify the boring is performed in accordance with plans and specifications, laws, permits, and the requirements of governing authorities and Right-of-Way owner.
❑	❑	❑	Verify bore rigs are grounded.
❑	❑	❑	Verify minimum depth of cover is as shown on the plans and specifications.
❑	❑	❑	Verify casing pipe is installed in the locations and at the minimum depths indicated on the plans and specification.
❑	❑	❑	Verify the Contractor's spill prevention plan for containing and handling drilling fluid that may upwell to the surface. NOTE: The Contractor must request approval of the spill prevention plan from the FDOT engineer prior to any directional boring.
❑	❑	❑	Verify an emergency contact list is maintained and used in the event of a drilling fluid spill. NOTE: The Contractor must notify the FDOT engineer immediately of drilling fluid spills.
❑	❑	❑	Verify casing pipe entry/exit points are no more than 5' of deviation from the staked running line. NOTE: Entry point may be moved only with the approval of the FDOT engineer.
❑	❑	❑	Verify bentonite or other drilling fluids are contained and removed, and the site is restored to its original or improved condition.
❑	❑	❑	Verify innerduct extends a minimum of 15' past the ends of the bore pipe and sealed with manufactured duct plugs. Pipe ends should be sealed and clearly marked with a surface marker or fenced.
❑	❑	❑	Document all changes from the approved plans and specification to the as-built drawings.

***Complete and Attach a Nonconformance Report for all Nonconforming items noted.**

QUALITY INSPECTOR	DATE	DOC CONTROL NO.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

ITS Quality Checklist
Conduit Placement – Horizontal Bore

ITSFM004
06/06

Date:	Contract ID:	Financial Project ID:	Quality Inspector:
Beg/End Sheet(s)	Beg/End MP	Beg/End Sta.	

CONFORMED	NCR*	N/A	INSPECTION REQUIRED
❑	❑	❑	Verify running line location and offsets are in accordance with the approved plans and specifications.
❑	❑	❑	Review approved traffic maintenance and protection plan and carry copy to the field.
❑	❑	❑	Monitor traffic control setups and recommend adjustment if necessary.
❑	❑	❑	Verify the boring is performed in accordance with the plans and specifications, laws, permits, and the requirements of governing authorities and Right-of-way owner.
❑	❑	❑	Verify minimal depth of cover is in accordance with the plans and specifications and the requirements of governing authorities and Right-of-way owner.
❑	❑	❑	Verify existing underground utilities are located and marked prior to boring.
❑	❑	❑	Verify voids outside casings that exceed 1- 1/2" are pressure grouted.
❑	❑	❑	Verify voids from abandoned bores are completely filled.
❑	❑	❑	Verify when connections are not made to adjacent pipe or ducts, ends of pipe or duct are sealed. Manufactured compression plugs or other approved seals should be used in sealing duct and casing pipe ends.
❑	❑	❑	Verify rigid Galvanized Steel Pipe (GSP) ends are threaded with fittings that are hot-dip galvanized both inside and outside including threads, and Black Steel Pipe (BSP) ends are either threaded. Plain pipe ends should be joined by full-circle welding in accordance with ANSI/AWS D1.1-92. PVC Pipe joints should be joined with PVC solvent cement as recommended by the manufacturer and allowed to cure before handling. Joints to be bent, pushed, or pulled should set up for a minimum of 24 hours after joining.
❑	❑	❑	Verify bore pits are placed no less than 15' from the edge of a public road; no less than 5' from the edge of a driveway; no less than 30' from railroad tracks; and conform to the requirements of governing authorities and Right-of-Way owners or as required by the plans and specifications.
❑	❑	❑	Verify bore pits are backfilled and compacted in 8" lifts and comply with the backfill requirements of the plans and specifications.
❑	❑	❑	Document all changes from the approved plans and specification to the as-built drawings.

***Complete and Attach a Nonconformance Report for all Nonconforming items noted.**

QUALITY INSPECTOR	DATE	DOC CONTROL NO.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

ITS Quality Checklist
Conduit Placement – Plow

ITSFM005
06/06

Date:	Contract ID:	Financial Project ID:	Quality Inspector:
Beg/End Sheet(s)	Beg/End MP	Beg/End Sta.	

CONFORMED	NCR*	N/A	INSPECTION REQUIRED
❑	❑	❑	Verify running line location and offsets are in accordance with the approved plans and specifications.
❑	❑	❑	Review approved traffic maintenance and protection plan and carry copy to the field.
❑	❑	❑	Monitor traffic control setups and recommend adjustment if necessary.
❑	❑	❑	Verify pre-rip passes prior to plow operations exceeds the pipe or duct burial depth by 6 inches. Final ripping pass should be in the same direction as pipe or duct plowing.
❑	❑	❑	Prior to plowing, verify the route surface is prepared to eliminate abrupt changes so the pipe or duct alignment and grade should be smooth and uniform.
❑	❑	❑	Verify minimal depth of cover is in accordance with the plans and specifications and the requirements of governing authorities and Right-of-way owner.
❑	❑	❑	Verify pipe or duct material passes through the plow-chute without damaging or overstressing the conduit.
❑	❑	❑	Verify the plow attitude and depth does not change unless the prime mover is moving forward and any changes in attitude should be gradual. All changes in depth should be gradual, not to exceed one (1) foot in (10) feet in length. The plow should not be set at extreme forward rake angles and prime mover should never be backed up with the plow in the ground.
❑	❑	❑	Verify conduit/pipe ends are cut square to provide flush-butting surfaces when spliced and inside edges are free of burrs that could impede the cable installation operations. Ends of ducts should be sealed to keep dirt and debris from entering.
❑	❑	❑	Verify duct jointing is completed as the pipe or duct is installed utilizing manufactured mechanical external couplings compatible with the type of duct being placed and with the method of cable placement to be used. Duct joints should be made secure and capable of allowing compressed air to be used for installing a pull line, and should be capable of withstanding 110psi air pressure as measured by static pressure test.
❑	❑	❑	Verify the buried cable marking tape is installed a minimum of 12-inches below grade directly above the conduit, pipe or duct.
❑	❑	❑	Verify that duct placement is in a free-water environment to prevent the pipe or duct from floating. Dewatering, anchoring, or weighing of the duct should be accomplished without causing damage to the duct.
❑	❑	❑	Document all changes from the approved plans and specification to the as-built drawings.

***Complete and Attach a Nonconformance Report for all Nonconforming items noted.**

QUALITY INSPECTOR	DATE	DOC CONTROL NO.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

ITS Quality Checklist
ITS Conduit Placement – Trench

ITSFM006
06/06

Date:	Contract ID:	Financial Project ID:	Quality Inspector:

Beg/End Sheet(s)	Beg/End MP	Beg/End Sta.

CONFORMED	NCR*	N/A	INSPECTION REQUIRED
❑	❑	❑	Verify running line location and offsets are in accordance with the approved plans and specifications.
❑	❑	❑	Review approved traffic maintenance and protection plan and carry copy to the field.
❑	❑	❑	Monitor traffic control setups and recommend adjustment if necessary.
❑	❑	❑	Verify minimal depth of cover is in accordance with the plans and specifications and the requirements of governing authorities and Right-of-way owner.
❑	❑	❑	Verify conduit is placed in the center of the bottom of the trench with the entire length of conduit, pipe or duct bearing on the trench bottom. The trench bottom should be re-graded if the conduit does not have full bearing to the extent practical. Verify after final placement, conduit rests on the bottom of the trench in a straight line under slight tension during backfilling.
❑	❑	❑	Verify conduit/pipe field bends have a minimum 10-foot radius for steel and PVC conduit. Where a radius less than the allowable field bend are indicated, factory sweeps and bends with a minimum radius of 3 feet should be used. Cold bending of PVC pipe should not be allowed.
❑	❑	❑	Verify conduit/pipe ends are cut square to provide flush-butting surfaces when spliced and inside edges are free of burrs that could impede the cable installation operations. Ends of innerducts should be sealed to keep dirt and debris from entering. Manufactured compression plugs or other approved seals should be used in sealing duct ends.
❑	❑	❑	Verify duct jointing is completed as the duct is installed utilizing manufactured mechanical external couplings compatible with the type of duct being placed Duct joints should be made secure and capable of allowing compressed air to be used for installing a pull line or cable.
❑	❑	❑	Verify the buried cable marking tape is installed a minimum of 12-inches below grade directly above the conduit, pipe or duct.
❑	❑	❑	Verify backfill and compaction is in accordance with the plans and specifications, or jurisdiction authority, whichever is more stringent, on finished areas including road surfaces, road shoulders, parking areas, lawns, and public right-of-ways.
❑	❑	❑	Verify backfill material is composed of earth only and should not contain logs, stumps, frozen debris, wood, grass, roots, broken concrete, stones, trash, organic material, or other debris. Dewatering of trenches should be performed as needed.
❑	❑	❑	Document all changes from the approved plans and specification to the as-built drawings.

***Complete and Attach a Nonconformance Report for all Nonconforming items noted.**

QUALITY INSPECTOR	DATE	DOC CONTROL NO.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

ITS Quality Checklist
Existing Utility Separation

ITSFM007
06/06

Date:	Contract ID:	Financial Project ID:	Quality Inspector:

Beg/End Sheet(s)	Beg/End MP	Beg/End Sta.

CONFORMED	NCR*	N/A	INSPECTION REQUIRED
❑	❑	❑	Verify running line location and offsets are in accordance with approved plans and specifications.
❑	❑	❑	Verify contractor has submitted to the FDOT Engineer documentation that includes the Date, Time, and Verification number showing notification to owners of buried utilities or contact with the local "One-Call" agency.
❑	❑	❑	Verify a minimal separation of 12-inches is maintained between the conduit(s) and the existing utility and the minimum conduit cover is maintained, unless greater separation is required on the plans and specifications or the utility owner.
❑	❑	❑	Verify that in the event a 12-inch separation is not possible, the FDOT Engineer is notified.
❑	❑	❑	Verify mechanical protection is placed surrounding the conduit(s) where minimum separation requirements cannot be achieved.
❑	❑	❑	Verify the buried cable marking tape is installed a minimum of 12-inches below grade directly above the conduit, pipe or duct except at locations where casing pipe or duct is placed by boring.
❑	❑	❑	Document all changes from the approved plans and specification to the as-built drawings.

***Complete and Attach a Nonconformance Report for all Nonconforming items noted.**

QUALITY INSPECTOR	DATE	DOC CONTROL NO.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

ITS Quality Checklist
Tone Wire Placement

ITSFM008
06/06

Date:	Contract ID:	Financial Project ID:	Quality Inspector:

Beg/End Sheet(s)	Beg/End MP	Beg/End Sta.

CONFORMED	NCR*	N/A	INSPECTION REQUIRED
❑	❑	❑	Verify tone wire meets the conductor type, gauge and sheath requirements of the plans and specifications.
❑	❑	❑	Verify that the tone wire is terminated or grounded as specified on the plans and specifications.
❑	❑	❑	Access point splices are not used in direct buried applications.
❑	❑	❑	Access point splices may be mechanically crimped with butt sleeves, corrosion protection applied, and properly taped per the plans and specifications or made in a jelly-filled splice closure.
❑	❑	❑	All direct buried splice should include a jelly-filled splice closure to protect the conductor from corrosion.
❑	❑	❑	The tone wire should include a minimum of (10') foot of slack coiled inside all access points.
❑	❑	❑	Verify tone wire insulation is free from obvious damage.
❑	❑	❑	Verify testing of the tone wire for connectivity.
❑	❑	❑	Document all changes from the approved plans and specification to the as-built drawings.

***Complete and Attach a Nonconformance Report for all Nonconforming items noted.**

QUALITY INSPECTOR	**DATE**	**DOC CONTROL NO.**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

ITS Quality Checklist
Marker Post Placement

ITSFM009
06/06

Date:	Contract ID:	Financial Project ID:	Quality Inspector:
Beg/End Sheet(s)	Beg/End MP	Beg/End Sta.	

CONFORMED	NCR*	N/A	INSPECTION REQUIRED
❑	❑	❑	Marker posts should be placed per the plans and specifications.
❑	❑	❑	Verify that neighboring markers can be seen at each marker site.
❑	❑	❑	Markers should be placed at all access points and in a location that will not interfere with future maintenance.
❑	❑	❑	Verify that marker posts are plumb and marker signs are level and facing the travel lane.
❑	❑	❑	Verify that markers are placed prior to placement of cable.
❑	❑	❑	Verify that compaction is adequate following placement of marker post.
❑	❑	❑	Verify information on signs is correct per the plans and specifications.
❑	❑	❑	Verify the marker post has been installed at a minimum burial depth per the plans and specifications.
❑	❑	❑	Document all changes from the approved plans and specification to the as-built drawings.

***Complete and Attach a Nonconformance Report for all Nonconforming items noted.**

QUALITY INSPECTOR	DATE	DOC CONTROL NO.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

ITS Quality Checklist
CCTV Camera Installation

ITSFM010
06/06

Date:	Contract ID:	Financial Project ID:	Quality Inspector:
Plan Sheet	MP	Sta.	Site ID

CONFORMED	NCR*	N/A	INSPECTION REQUIRED
☐	☐	☐	Review approved camera in the plans and specifications and carry copy to the field.
☐	☐	☐	Review approved camera aerial work submittal and carry to field.
☐	☐	☐	Review approved traffic maintenance and protection plan and carry copy to the field.
☐	☐	☐	Monitor traffic control setups and recommend adjustment if necessary.
☐	☐	☐	Monitor selection and placement of aerial work equipment.
☐	☐	☐	Monitor camera pre-test before installation and if pressurized, check against camera manufacturer specifications.
☐	☐	☐	Verify the approved camera is actually installed. Check against approved plans and specifications.
☐	☐	☐	Verify camera installation on pole includes approved camera mount.
☐	☐	☐	Verify the camera assembly and cable terminations cleanliness and effective terminations.
☐	☐	☐	Verify multi-conductor communication cable and coaxial video cable are properly trained and protected from chafing and were not damaged during installation.
☐	☐	☐	Verify cables are properly routed through designated raceways.
☐	☐	☐	Document all changes from the approved plans and specification to the as-built drawings.

***Complete and Attach a Nonconformance Report for all Nonconforming items noted.**

QUALITY INSPECTOR	DATE	DOC CONTROL NO.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

ITS Quality Checklist
Dynamic Message Sign Installation

ITSFM011
06/06

Date:	Contract ID:	Financial Project ID:	Quality Inspector:
Plan Sheet	MP	Sta.	Site ID

CONFORMED	NCR*	N/A	INSPECTION REQUIRED
❑	❑	❑	Review approved Dynamic Message Sign (DMS) in the plans and specifications and carry copy to the field.
❑	❑	❑	Review approved DMS pick/erection submittal and carry to field.
❑	❑	❑	Review approved traffic maintenance and protection plan and carry copy to the field.
❑	❑	❑	Monitor traffic control setups and recommend adjustment if necessary.
❑	❑	❑	Verify DMS attachment components against approved plans and specifications and carry copy to the field.
❑	❑	❑	Inspect DMS attachment to sign structure truss to verify compliance with approved attachment submittal.
❑	❑	❑	Monitor selection and placement of erection equipment.
❑	❑	❑	Verify proper staging of Highway Patrol (i.e., Troopers, Blue Lights, etc) for effective and safe pacing of traffic and lane or roadway closure as required.
❑	❑	❑	Monitor DMS erection that is integral with the overhead sign structure (OHSS) truss erection to supporting verticals and verify that truss connections are properly torqued to the approved specification.
❑	❑	❑	Measure clearance from highest point on roadway to lowest point of OHSS truss or DMS, whichever is lower, to verify proper clearance between the roadway and lowest point of attachment or truss BEFORE ROADWAY IS OPEN TO TRAFFIC!
❑	❑	❑	Visually inspect DMS and OHSS stability after traffic is open.
❑	❑	❑	Document all changes from the approved plans and specification to the as-built drawings.

***Complete and Attach a Nonconformance Report for all Nonconforming items noted.**

QUALITY INSPECTOR	**DATE**	**DOC CONTROL NO.**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

ITS Quality Checklist
RDS Unit Installation

ITSFM012
06/06

Date:	Contract ID:	Financial Project ID:	Quality Inspector:
Plan Sheet	MP	Sta.	Site ID

CONFORMED	NCR*	N/A	INSPECTION REQUIRED
❑	❑	❑	Review approved radar detection system (RDS) in the plans and specifications and carry copy to the field.
❑	❑	❑	Review approved RDS aerial work submittal and carry to field.
❑	❑	❑	Review approved traffic maintenance and protection plan and carry copy to the field.
❑	❑	❑	Monitor traffic control setups and recommend adjustment if necessary.
❑	❑	❑	Monitor selection and placement of aerial work equipment.
❑	❑	❑	Verify the approved RDS is actually installed. Check against approved plans and specifications.
❑	❑	❑	Monitor RDS installation on RDS pole by approved mounting procedure and manufacturers specifications.
❑	❑	❑	Check RDS unit at proper elevation and inclination above roadway and measure as applicable.
❑	❑	❑	Monitor RDS assembly and cable terminations and ensure cleanliness and effective terminations.
❑	❑	❑	Verify multi-conductor communication cable is properly trained and protected from chafing and not damaged during installation.
❑	❑	❑	Verify cables are properly routed through designated raceways undamaged.
❑	❑	❑	Monitor installation of fused or un-fused quick disconnect on AC power conductors in breakaway base if RDS if so powered.
❑	❑	❑	Document all changes from the approved plans and specification to the as-built drawings.

***Complete and Attach a Nonconformance Report for all Nonconforming items noted.**

QUALITY INSPECTOR	DATE	DOC CONTROL NO.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

ITS Quality Checklist
Steel Overhead Sign Installation

ITSFM013
06/06

Date:	Contract ID:	Financial Project ID:	Quality Inspector:
Plan Sheet	MP	Sta.	Site ID

CONFORMED	NCR*	N/A	INSPECTION REQUIRED
❑	❑	❑	Review approved steel overhead sign structure (OHSS) in the plans and specifications and carry copy to the field.
❑	❑	❑	Review approved OHSS pick/erection submittal and carry to field.
❑	❑	❑	Review approved traffic maintenance and protection plan and carry copy to the field.
❑	❑	❑	Monitor traffic control setups and recommend adjustment if necessary.
❑	❑	❑	Monitor selection and placement of erection equipment.
❑	❑	❑	Verify OHSS components against approved plans and specifications and carry copy to the field.
❑	❑	❑	Witness OHSS component parts assembly before erection and ensure proper.
❑	❑	❑	Verify proper staging of Highway Patrol (i.e., Troopers, Blue Lights, etc) for effective and safe pacing of traffic and lane or roadway closure as required.
❑	❑	❑	Verify the approved OHSS is actually installed. Check against approved plans and specifications.
❑	❑	❑	Monitor right vertical erection and connection to foundation anchor bolts and verify anchor bolt nuts torqued to approved specification.
❑	❑	❑	Monitor left vertical erection and connection to foundation anchor bolts and verify anchor bolt nuts torqued to approve specification.
❑	❑	❑	Monitor OHSS truss erection and connection to supporting verticals and verify that connections are properly torqued to approved specification.
❑	❑	❑	Measure clearance from highest point on roadway to lowest point of OHSS truss or attachment to ensure proper clearance between the roadway and lowest point of attachment or truss BEFORE ROADWAY IS OPEN TO TRAFFIC!
❑	❑	❑	Visually inspect OHSS galvanization is touched up as required and approved.
❑	❑	❑	Document all changes from the approved plans and specification to the as-built drawings.

***Complete and Attach a Nonconformance Report for all Nonconforming items noted.**

QUALITY INSPECTOR	DATE	DOC CONTROL NO.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

ITS Quality Checklist
Fiber Optic Cable Installation

ITSFM014
06/06

Date:	Contract ID:	Financial Project ID:	Quality Inspector:
Beg/End Sheet(s)	Beg/End MP	Beg/End Sta.	

CONFORMED	NCR*	N/A	INSPECTION REQUIRED
☐	☐	☐	Review approved fiber optic cable in the plans and specifications and carry copy to the field.
☐	☐	☐	Review approved traffic maintenance and protection plan and carry copy to the field.
☐	☐	☐	Monitor traffic control setups and recommend adjustment if necessary.
☐	☐	☐	Verify reel number of cable being placed has been documented.
☐	☐	☐	Verify the approved Cable Placing Plan is followed.
☐	☐	☐	Verify the cable is installed in the proper designated duct.
☐	☐	☐	Verify the cable is not subjected to rough treatment or sharp bending that could cause crushing or kinking.
☐	☐	☐	Verify equipment and rigging will ensure that the cable is not bent to less than the minimum bending radius.
☐	☐	☐	Verify all placing equipment is calibrated prior to placing cable.
☐	☐	☐	Verify all personnel involved in cable placing activities have working radio communications.
☐	☐	☐	Verify, for cable being pulled, that pulling winches have (1) Maximum pulling force of ________ pounds, (2) Minimum capstan radius of ________ inches and meet cable manufacturer's specifications.
☐	☐	☐	Verify that all winches are equipped with running line dynamometers, and that the pulling line is equipped with a break-away swivel connector calibrated to 600 pounds tension or per the cable manufacturer's recommendation.
☐	☐	☐	Verify, if pulling becomes too difficult, or air driven stops, exposed conduit is properly repaired and the excavation backfilled as required.
☐	☐	☐	Verify at least _______ feet of cable is coiled in splice vaults and ______ of cable is coiled in pullboxes.
☐	☐	☐	Document all changes from the approved plans and specification to the as-built drawings.

***Complete and Attach a Nonconformance Report for all Nonconforming items noted.**

QUALITY INSPECTOR	DATE	DOC CONTROL NO.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

ITS Quality Checklist
Fiber Optic Cable Splicing & Termination

ITSFM015
06/06

Date:	Contract ID:	Financial Project ID:	Inspector:
Plan Sheet	MP	Sta.	Site ID

CONFORMED	NCR*	N/A	INSPECTION REQUIRED
❑	❑	❑	Review approved traffic maintenance and protection plan and carry copy to the field.
❑	❑	❑	Monitor traffic control setups and recommend adjustment if necessary.
❑	❑	❑	Verify splicing technicians are trained through an approved pre-qualification group.
❑	❑	❑	Verify tools, test equipment, and splicing equipment are clean and in excellent working order.
❑	❑	❑	Verify fusion splicers, high precision cleavers, and mechanical or other industry accepted splicing methods are calibrated and labeled according to manufacturer's specifications.
❑	❑	❑	Verify that fusion splicing equipment is not introduced into any harsh environments or handling.
❑	❑	❑	Verify fusion splices or rotary mechanical splices performed are a maximum of .10 dB per splice, and .10 dB for mass fusion splices as indicated by the splicing machine. .01
❑	❑	❑	Verify splice closure is properly installed per the manufacturer's specifications and mounted on the splice vault wall.
❑	❑	❑	Verify patch panel is properly installed per the manufacturer's specifications and mounted in the cabinet. W I C
❑	❑	❑	Document all changes from the approved plans and specification to the as-built drawings.

***Complete and Attach a Nonconformance Report for all Nonconforming items noted.**

QUALITY INSPECTOR	DATE	DOC CONTROL NO.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

ITS Quality Checklist
Fiber Optic Cable Testing

ITSFM016
06/06

Date:	Contract ID:	Financial Project ID:	Quality Inspector:
Beg/End Sheet(s)	Beg/End MP	Beg/End Sta.	

CONFORMED	NCR*	N/A	INSPECTION REQUIRED
❑	❑	❑	Review approved traffic maintenance and protection plan and carry copy to the field.
❑	❑	❑	Monitor traffic control setups and recommend adjustment if necessary.
❑	❑	❑	Verify all testing crews have calibrated OTDRs, stable laser light sources, power meters and launch cables as needed to properly proof each span.
❑	❑	❑	Verify the OTDR is set up for the appropriate pulse width, range, resolution, and averaging time.
❑	❑	❑	Verify settings remain constant during testing of all fibers.
❑	❑	❑	Verify the technicians are in constant communication between test points.
❑	❑	❑	Verify connectors are kept clean during these tests.
❑	❑	❑	Verify directional span testing is performed once the end to end connectivity on the fibers has been provided.
❑	❑	❑	Measurements should be made after the splice vault lids are closed to check for macro-bending problems.
❑	❑	❑	Verify loss measurements at the required wavelength(s) are recorded using an industry accepted laser source and power meter.
❑	❑	❑	Verify Total Optical Return Loss (TORL) is measured per industry standards.
❑	❑	❑	Verify fiber assignments are consecutive in count.

***Complete and Attach a Nonconformance Report for all Nonconforming items noted.**

QUALITY INSPECTOR	DATE	DOC CONTROL NO.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

ITS Quality Checklist
Backup Power Installation

ITSFM017
06/06

Date:	Contract ID:	Financial Project ID:	Quality Inspector:
Plan Sheet	MP	Sta.	Site ID

CONFORMED	NCR*	N/A	INSPECTION REQUIRED
☐	☐	☐	Verify that the backup power generator (BPG) is set on vibration isolators per the approved plans and specifications and each isolator is bolted to the floor (pad), generator base bolted to isolator.
☐	☐	☐	Verify that the BPG is installed with sufficient number of isolators so that the floor (pad) bearing pressure under each isolator is within the floor (pad) loading specification and that there is an equal number of isolators for equal share of floor weight distribution per the approved plans and specifications.
☐	☐	☐	Verify that the installation of all connections between the BPG and all systems such as fuel lines, electrical connections, and engine exhaust system and air exhaust shroud, should be flexible or per the approved plans and specifications.
☐	☐	☐	Verify that all ITS devices supported by the BPG are electrically connected via an automatic or manual transfer switch as per the approved plans and specifications to ensure that they will continue to operate during a power failure.
☐	☐	☐	Verify that the installation is neat, thermally and structurally tight without sag, neatly finished at all hangers or other penetrations per the approved plans and specifications.
☐	☐	☐	Verify that the BPG is field tested by a start up technician that commissions the electrical and mechanical quality and operation of the BPG.
☐	☐	☐	Verify that the BPG will attain proper voltage, frequency and will accept 100 percent block load within 10 seconds from a cold start after the closing of a single contact.
☐	☐	☐	If an Automatic Transfer Switch is part of the BPG, verify that phase, voltage, ampere rating, number of poles, withstand rating should be as shown on the engineering plan design. The ampere rating should be for 100 percent continuous load current.
☐	☐	☐	Verify that the automatic transfer switch (ATS) is installed in accordance with the approved plans and specifications and is level and anchored to floor or wall.
☐	☐	☐	Verify that the BPG is equipped with a disconnect by means of which the BPG and all protective devices and control apparatus are able to be disconnected entirely from the circuits supplied by the generator as required per NEC.
☐	☐	☐	Document all changes from the approved plans and specification to the as-built drawings.

***Complete and Attach a Nonconformance Report for all Nonconforming items noted.**

QUALITY INSPECTOR	DATE	DOC CONTROL NO.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

ITS Quality Checklist
Load Center Installation

ITSFM018
06/06

Date:	Contract ID:	Financial Project ID:	Quality Inspector:
Plan Sheet	MP	Sta.	Site ID

CONFORMED	NCR*	N/A	INSPECTION REQUIRED
❑	❑	❑	Review approved panel board in the plans and specifications and carry copy to the field.
❑	❑	❑	Review approved traffic maintenance and protection plan and carry copy to the field.
❑	❑	❑	Monitor traffic control setups and recommend adjustment if necessary.
❑	❑	❑	Verify the panel board enclosure cabinet is a NEMA enclosure approved for outdoor use.
❑	❑	❑	Verify the panel board branch or distribution circuit breakers are of the appropriate size per the approved plans and specifications
❑	❑	❑	Verify the current carrying conductors are not installed to close to other conductors or metal enclosure that could cause a short circuit incidence.
❑	❑	❑	Verify all connections were installed using calibrated torque wrench or torque screwdriver per the manufacturer's specifications.
❑	❑	❑	Verify the load center is installed at the appropriate height above finish grade per the approved plans and specifications.
❑	❑	❑	Visually verify that no air gap exist between the switch jaws and the knife-blade with the switch in the OFF (open) position.
❑	❑	❑	Document all changes from the approved plans and specification to the as-built drawings.

***Complete and Attach a Nonconformance Report for all Nonconforming items noted.**

QUALITY INSPECTOR	DATE	DOC CONTROL NO.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

ITS Quality Checklist
Power Cable & Pullboxes Installation

ITSFM019
06/06

Date:	Contract ID:	Financial Project ID:	Quality Inspector:
Beg/End Sheet(s)	Beg/End MP	Beg/End Sta.	

CONFORMED	NCR*	N/A	INSPECTION REQUIRED
❑	❑	❑	Review power system diagrams and schematic in the plans and specifications and carry copy to the field.
❑	❑	❑	Review approved traffic maintenance and protection plan and carry copy to the field.
❑	❑	❑	Monitor traffic control setups and recommend adjustment if necessary.
❑	❑	❑	Verify the total bends in a conduit section do not exceed 270 degrees.
❑	❑	❑	Verify that the pull box has been installed according to the approved plans and specifications
❑	❑	❑	Verify ground rods are installed at ITS poles and pull boxes per the approved plans and specifications.
❑	❑	❑	Verify that the ground conductor at the pull box is bonded to the ground rod using an exothermic weld process.
❑	❑	❑	Verify that each pull boxes have been grounded per FDOT roadway lighting details.
❑	❑	❑	Verify power cables are installed in the appropriate conduit per the approved plans and specifications.
❑	❑	❑	Verify that the power and grounding cables are of the correct type and size per the plans and specifications.
❑	❑	❑	Verify lubricants are used to minimize cable pulling tension.
❑	❑	❑	Verify the cable puller system used has a dynamometer to allow the operator to monitor and maintain desired pulling tensions and speeds for safe and efficient cable installation.
❑	❑	❑	Verify that the manual or hydraulic trailer is equipped with a ball bearing on the reel shaft.
❑	❑	❑	Verify that splices are made with compression sleeves and that proper compression tools are used to ensure a permanent splice of high integrity.
❑	❑	❑	Verify that cables of connectors of dissimilar metals are not joined.
❑	❑	❑	Verify that electrical connectors are tightened to manufacturer's published torque-tightening values.
❑	❑	❑	Verify that proper breaker or fuses have been installed to protect the cables per the approved plans and specifications.
❑	❑	❑	Verify at all pull box and pole bases that ends of conduits are sealed.
❑	❑	❑	Document all changes from the approved plans and specification to the as-built drawings.

***Complete and Attach a Nonconformance Report for all Nonconforming items noted.**

QUALITY INSPECTOR	DATE	DOC CONTROL NO.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

ITS Quality Checklist

Surge Arrestor & Transient Voltage Surge Suppressors Installation

ITSFM020
06/06

Date:	Contract ID:	Financial Project ID:	Quality Inspector:
Beg/End Sheet(s)	Beg/End MP	Beg/End Sta.	

CONFORMED	NCR*	N/A	INSPECTION REQUIRED
❑	❑	❑	Review power system diagrams and schematic to determine what type of surge arrestors or transient voltage surge suppressors (TVSS) are in the plans and specifications and carry copy to the field.
❑	❑	❑	Review approved traffic maintenance and protection plan and carry copy to the field.
❑	❑	❑	Monitor traffic control setups and recommend adjustment if necessary.
❑	❑	❑	Verify all locations where surge arrestors or transient voltage surge suppressors are required per the approved plans and specification. Generally, all metal conductors connected to ITS field equipment must be protected including AC power, signal lines, video lines, telephone lines, microwave communication lines. Fiber optic lines are not conductive and do not require surge arrestor or transient voltage surge protection
❑	❑	❑	Verify the TVSS is specified and installed at ITS equipment connected at the top of the ITS.
❑	❑	❑	Verify the AC power surge arrestor or TVSS conductor leads are connected to all hot legs, neutral or grounding conductor per the approved plans and specifications.
❑	❑	❑	Verify the surge arrester grounding conductor is connected to one of the following; grounded service conductor (white neutral wire), grounding electrode conductor (conductor used to connect to the driven earth ground), or equipment grounding terminal in the service equipment (grounding bus)
❑	❑	❑	Document all changes from the approved plans and specification to the as-built drawings.

***Complete and Attach a Nonconformance Report for all Nonconforming items noted.**

QUALITY INSPECTOR	DATE	DOC CONTROL NO.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

ITS Quality Checklist
Utility Demarcation Point Installation

ITSFM021
06/06

Date:	Contract ID:	Financial Project ID:	Quality Inspector:
Plan Sheet	MP	Sta.	Site ID

CONFORMED	NCR*	N/A	INSPECTION REQUIRED
❑	❑	❑	Review utility demarcation (demarc) point in the plans and specifications and carry copy to the field.
❑	❑	❑	Review approved traffic maintenance and protection plan and carry copy to the field.
❑	❑	❑	Monitor traffic control setups and recommend adjustment if necessary.
❑	❑	❑	Verify contractor has notified owners of buried utilities or contact with the local "One-Call" agency before digging.
❑	❑	❑	Observe vertical drilling by contractor and measure hole depth to verify proper pole seating depth.
❑	❑	❑	Verify the approved pole and associated hardware are actually installed. Check against approved plans and specifications.
❑	❑	❑	Verify cabinet installation complies with the approved plans and specifications.
❑	❑	❑	Verify conduit risers installation for telephone and power are in compliance with approved plans and specifications and all prevailing applicable electrical codes, policies and regulations.
❑	❑	❑	Verify contents of cabinet are in compliance with the approved plans and specifications.
❑	❑	❑	Verify power cable conductor installation for proper size and type.
❑	❑	❑	Verify the meter base installation for proper size and type.
❑	❑	❑	Verify utility separation between power and communication utilities on pole has a minimum of 40" separation.
❑	❑	❑	Document local power utility meter number.
❑	❑	❑	Document all changes from the approved plans and specification to the as-built drawings.

***Complete and Attach a Nonconformance Report for all Nonconforming items noted.**

QUALITY INSPECTOR	DATE	DOC CONTROL NO.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

ITS Quality Checklist
Device Pole Installation

ITSFM022
06/06

Date:	Contract ID:	Financial Project ID:	Quality Inspector:
Plan Sheet	MP	Sta.	Site ID

CONFORMED	NCR*	N/A	INSPECTION REQUIRED
❑	❑	❑	Review support structure pole in the plans and specifications and carry copy to the field.
❑	❑	❑	Review approved pole pick/erection submittal and carry to field.
❑	❑	❑	Review approved traffic maintenance and protection plan and carry copy to the field.
❑	❑	❑	Monitor traffic control setups and recommend adjustment if necessary.
❑	❑	❑	Monitor selection and placement of erection equipment.
❑	❑	❑	Verify the approved pole is actually installed. Check against approved plans and specifications.
❑	❑	❑	Monitor pole erection and anchor bolt nut and washer attachment.
❑	❑	❑	Verify proper torque of pole anchor bolts.
❑	❑	❑	For galvanized poles, visually inspect and insure that pole galvanization is touched up as required and approved.
❑	❑	❑	If equipped, witness approved device (camera) lowering device installation on pole before pole installation.
❑	❑	❑	Document all changes from the approved plans and specification to the as-built drawings.

***Complete and Attach a Nonconformance Report for all Nonconforming items noted.**

QUALITY INSPECTOR	DATE	DOC CONTROL NO.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

ITS Quality Checklist
Drill Shafts Foundation Installation

ITSFM023
06/06

Date:	Contract ID:	Financial Project ID:	Quality Inspector:
Plan Sheet	MP	Sta.	Site ID

CONFORMED	NCR*	N/A	INSPECTION REQUIRED
❑	❑	❑	Review approved drill shaft design in the plans and specifications and carry copy to the field.
❑	❑	❑	Review approved drill shaft work submittal and carry to field.
❑	❑	❑	Review approved traffic maintenance and protection plan and carry copy to the field.
❑	❑	❑	Monitor traffic control setups and recommend adjustment if necessary.
❑	❑	❑	Monitor selection and setup of drill equipment and monitor drilling operation verifying approved shaft dimensions as drilling proceeds.
❑	❑	❑	Verify steel rebar reinforcing schedule against approved plans and specifications.
❑	❑	❑	Verify proper assembly of rebar cage.
❑	❑	❑	Monitor final setting of cage and setting of anchor bolt templates and concrete forms checking dimensions as required.
❑	❑	❑	Inspect concrete pre-placement to verify forms are secure, rebar secure, templates secure, anchor bolts secure, and check all topside dimensions.
❑	❑	❑	When approved concrete arrives, verify delivery against approved concrete mix design and perform plastic concrete tests for air, slump, and concrete temperature and mold acceptance test specimens if required.
❑	❑	❑	Inspect concrete post-placement to verify fresh concrete properly finished, concrete properly cured and protected from hot/cold weather.
❑	❑	❑	Document all changes from the approved plans and specification to the as-built drawings.

***Complete and Attach a Nonconformance Report for all Nonconforming items noted.**

QUALITY INSPECTOR	DATE	DOC CONTROL NO.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

ITS Quality Checklist
ITS Field Device Cabinet Installation

ITSFM024
06/06

Date:	Contract ID:	Financial Project ID:	Quality Inspector:
Plan Sheet	MP	Sta.	Site ID

CONFORMED	NCR*	N/A	INSPECTION REQUIRED
❑	❑	❑	Review approved equipment cabinet in the plans and specifications and carry copy to the field.
❑	❑	❑	Review approved traffic maintenance and protection plan and carry copy to the field.
❑	❑	❑	Monitor traffic control setups and recommend adjustment if necessary.
❑	❑	❑	Verify the approved cabinet type is actually installed. Check against approved plans and specifications.
❑	❑	❑	If equipped, verify that cabinet exhaust fan is functional and thermostat set to predetermined setting. (Use 100 degrees Fahrenheit if not noted.)
❑	❑	❑	If equipped, verify that cabinet heaters are functional and thermostat is set to predetermined setting. (Use 45 degrees Fahrenheit or 10 degrees Fahrenheit above the minimum operating temperature of the devices located in the cabinet if not noted.)
❑	❑	❑	If equipped, verify that cabinet lighting is functional, switched and that approved noise suppression is installed.
❑	❑	❑	Verify the power distribution panel is functional and is protected by approved overcurrent breakers and that main surge protection noise suppression is installed.
❑	❑	❑	Verify ITS field device electronics are installed securely in rack and their power and control cabling terminated safely and securely.
❑	❑	❑	Verify the cabinet door lock function with required keys.
❑	❑	❑	Verify the cabinet air filter is installed and unused.
❑	❑	❑	Document all changes from the approved plans and specification to the as-built drawings.

***Complete and Attach a Nonconformance Report for all Nonconforming items noted.**

QUALITY INSPECTOR	DATE	DOC CONTROL NO.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

ITS Quality Checklist
Antenna Installation

ITSFM025
06/06

Date:	Contract ID:	Financial Project ID:	Quality Inspector:
Plan Sheet	MP	Sta.	Site ID

CONFORMED	NCR*	N/A	INSPECTION REQUIRED
❑	❑	❑	Review approved antenna size and type in the plans and specifications and carry copy to the field.
❑	❑	❑	Review approved drill shaft work submittal and carry to field.
❑	❑	❑	Review approved traffic maintenance and protection plan and carry copy to the field.
			Verify the approved antenna is actually installed. Check against approved plans and specifications.
❑	❑	❑	Verify the antenna height; elevation and azimuth are adjusted as specified.
❑	❑	❑	Verify antenna alignment allows proper operation of the wireless link as specified.
❑	❑	❑	Verify all connectors are the size and type specified and installed properly.
❑	❑	❑	Verify the antenna transmission line is secured to the mounting structure at regular intervals as specified.
❑	❑	❑	Verify the antenna transmission line minimum bending radius is as specified and not violated.
❑	❑	❑	If transmission line jumpers are utilized, verify the maximum jumper length specified is not exceeded.
❑	❑	❑	If transmission line jumpers are utilized, verify the connections to the main transmission line are sealed.
❑	❑	❑	Verify the antenna transmission line is sealed as it attaches to the antenna, equipment cabinet or enclosure containing the radio as specified.
❑	❑	❑	Verify the antenna transmission line is properly connected to the radio as specified.
❑	❑	❑	Verify all installation waste has been removed and discarded properly and the site is restored to its original condition as specified.
❑	❑	❑	Document all changes from the approved plans and specification to the as-built drawings.

***Complete and Attach a Nonconformance Report for all Nonconforming items noted.**

QUALITY INSPECTOR	DATE	DOC CONTROL NO.

Appendix C – QA/QC Forms

Index of Forms

Form Number	Title
ITSFM026	Nonconformance Report (NCR)
ITSFM027	NCR Closure Report
ITSFM028	NCR Tracking Form

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

NONCONFORMANCE REPORT (NCR)

ITSFM026
06/06

Date:	Contract ID:	Financial Project ID:	Quality Inspector:
NCR Report Number:		Location of Nonconformance:	
		Plan Sheet or Stationing:	
DOC Control No.:		Specification Number:	
DESCRIPTION OF NONCONFORMANCE			
Initiator Name:		Contractor Name:	
CORRECTIVE ACTION PROPOSAL			
Scheduled Repair Date:		Inspection Required at Time of Repair? ☐ Yes ☐ No	
Prepared By:	Organization:		Date:
CORRECTIVE ACTION EVALUATION			
Repair as Proposed ☐	Disposition Approved By:		Date:
Resubmit: ☐	Disposition Rejected By:		
Revise as Notes ☐	Organization:		
CORRECTIVE ACTION VERIFICATION			
NCR CLOSED: ☐ Yes ☐ No			
APPROVAL			
Lead Inspector / Construction Manager	**Date**	**Document Control No.**	

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

NCR CLOSURE REPORT

ITSFM027
06/06

Date:	Contract ID:	Financial Project ID:	Quality Inspector:

NC Closure Report Number:	Location of Nonconformance:
Original NCR Number:	Plan Sheet or Stationing:

CORRECTIVE ACTION VERIFICATION

Closure Details: (Description of what was done to close NCR)

CHANGES IN PLAN

(Description of any change in plan resulting form repair)

Was Inspection Performed During Repair? Y❑ N❑	Did any Changes in Plan Occur as a Result of Repair? ❑ Yes ❑ No *If yes, please describe above
NC Closure Report Posted to NCR Tracking Log: ❑ Yes ❑ No	Date:

APPROVAL

Quality Inspector	**Date**	**Document Control No.**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

NCR TRACKING FORM

ITSFM028
06/06

Contract ID:		Financial Project ID:	Document Control Number	Page Number	
NCR #	Priority	Nonconformance Description	Location	Date Open	Date Closed

Appendix D – ITSFM Attribute Forms

Index of Forms

Form Number	Title
ITSFM029	RTMC Equipment Site Attribute Form
ITSFM030	Remote HUB Equipment Site Attribute Form
ITSFM031	ITS Field Device Equipment Site Attribute Form
ITSFM032	FDOT Power Load Center Site Attribute Form
ITSFM033	Utility Service Demarcation Site Attribute Form
ITSFM034	Fiber Optic Access Point Detail and Attribute Form

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

ITS Facility Management System
RTMC Equipment Site Attribute Form

ITSFM029
06/06

Date:	Contract ID:	Financial Project ID:	Inspector:

Site Identification No.	State Plain Coordinate	Latitude/Longitude
Hwy. Milepost Lane Letter - - -	N = E =	N = E =

Equipment Site Infrastructure

General Site Information

RTMC Name: ______________________ Equipment Room Location: ________________________

Address: __________________________

Equipment Racks

Bay # ______________________ Rack # _____________________ Type: ❑ 2-Post ❑ 4-Post Dimension:___(L) x___(W) x___(H)	Bay # ______________________ Rack # _____________________ Type: ❑ 2-Post ❑ 4-Post Dimension:___(L) x___(W) x___(H)	Bay # ______________________ Rack # _____________________ Type: ❑ 2-Post ❑ 4-Post Dimension:___(L) x___(W) x___(H)
Bay # ______________________ Rack # _____________________ Type: ❑ 2-Post ❑ 4-Post Dimension:___(L) x___(W) x___(H)	Bay # ______________________ Rack # _____________________ Type: ❑ 2-Post ❑ 4-Post Dimension:___(L) x___(W) x___(H)	Bay # ______________________ Rack # _____________________ Type: ❑ 2-Post ❑ 4-Post Dimension:___(L) x___(W) x___(H)
Bay # ______________________ Rack # _____________________ Type: ❑ 2-Post ❑ 4-Post Dimension:___(L) x___(W) x___(H)	Bay # ______________________ Rack # _____________________ Type: ❑ 2-Post ❑ 4-Post Dimension:___(L) x___(W) x___(H)	Bay # ______________________ Rack # _____________________ Type: ❑ 2-Post ❑ 4-Post Dimension:___(L) x___(W) x___(H)
Bay # ______________________ Rack # ______________ Type: ❑ 2-Post ❑ 4-Post Dimension:___(L) x___(W) x___(H)	Bay # ______________________ Rack # ______________ Type: ❑ 2-Post ❑ 4-Post Dimension:___(L) x___(W) x___(H)	Bay # ______________________ Rack # ______________ Type: ❑ 2-Post ❑ 4-Post Dimension:___(L) x___(W) x___(H)

Site Identification No. RTMC Equipment Site Attribute Form

Hwy. Milepost Lane Letter

- - -

Wireline Communications Components

Fiber Optic Patch Panel

Panel Type: ❑ Single-Mode ❑ Multi-Mode Bay # ________ Rack # __________

Manufacturer: ______________________ Rack Position: Top ________ Bottom ________

No. of Ports: ______________________ Connector Type: ______________

Cable Sequential: ______________________ Unit of Measure: ❑ Feet ❑ Meter

Panel Type: ❑ Single-Mode ❑ Multi-Mode Bay # ________ Rack # __________

Manufacturer: ______________________ Rack Position: Top ________ Bottom ________

No. of Ports: ______________________ Connector Type: ______________

Cable Sequential: ______________________ Unit of Measure: ❑ Feet ❑ Meter

Leased Line Communication Equipment

Device Type: Data Modem

Manufacturer: ________________

Model: ________________

Serial Number: ________________

Telephone Number: ________________

Static IP Address: ________________

Bay & Rack #: ________________

Rack Position: Top ______ Bottom ______

Ethernet Communication Equipment

Device Type: ❑ Switch ❑ Hub

Input Ports: ❑ Fiber______ ❑ Copper______

Output Ports: ❑ Fiber______ ❑ Copper______

Manufacturer: ________________

Model: ________________

Serial Number: ________________

IP Address: ________________

Bay & Rack #: ________________

Rack Position: Top ______ Bottom ______

Other Communication Equipment

Device Type: ________________

Input Ports: ❑ Fiber______ ❑ Copper______

Output Ports: ❑ Fiber______ ❑ Copper______

Manufacturer: ________________

Model: ________________

Serial Number: ________________

IP Address: ________________

Bay & Rack #: ________________

Rack Position: Top ______ Bottom ______

Other Communication Equipment

Device Type: ________________

Input Ports: ❑ Fiber______ ❑ Copper______

Output Ports: ❑ Fiber______ ❑ Copper______

Manufacturer: ________________

Model: ________________

Serial Number: ________________

IP Address: ________________

Bay & Rack #: ________________

Rack Position: Top ______ Bottom ______

Site Identification No. RTMC Equipment Site Attribute Form

Hwy. Milepost Lane Letter

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Wireless Communications Components

Radio Equipment #1	Associated Antenna
Radio Type: ____________	Antenna Type: ____________
Radio Frequency: ____________	Manufacturer: ____________
Manufacturer: ____________	Model: ____________
Model: ____________	Attachment Height: ____________
Serial Number: ____________	Direction: ❑ N ❑ S ❑ E ❑ W
Output Ports: ❑ Fiber_____ ❑ Copper_____	
IP Address: ____________	
Bay & Rack #: ____________	
Rack Position: Top ______ Bottom ______	

Radio Equipment #2	Associated Antenna
Radio Type: ____________	Antenna Type: ____________
Radio Frequency: ____________	Manufacturer: ____________
Manufacturer: ____________	Model: ____________
Model: ____________	Attachment Height: ____________
Serial Number: ____________	Direction: ❑ N ❑ S ❑ E ❑ W
Output Ports: ❑ Fiber_____ ❑ Copper_____	
IP Address: ____________	
Bay & Rack #: ____________	
Rack Position: Top ______ Bottom ______	

Site Identification No.	RTMC Equipment Site Attribute Form
Hwy. Milepost Lane Letter - - -	

ITS Field Device Components

1st ITS Field Device Controller	3rd ITS Field Device Controller
Device Name: ____________	Device Name: ____________
Device Type: ____________	Device Type: ____________
Manufacturer: ____________	Manufacturer: ____________
Model: ____________	Model: ____________
Serial Number: ____________	Serial Number: ____________
Firmware Version: ____________	Firmware Version: ____________
IP Address: ____________	IP Address: ____________
Bay & Rack #: ____________	Bay & Rack #: ____________
Rack Position: Top _____ Bottom _______	Rack Position: Top _____ Bottom _______
2nd ITS Field Device Controller	**4th ITS Field Device Controller**
Device Name: ____________	Device Name: ____________
Device Type: ____________	Device Type: ____________
Manufacturer: ____________	Manufacturer: ____________
Model: ____________	Model: ____________
Serial Number: ____________	Serial Number: ____________
Firmware Version: ____________	Firmware Version: ____________
IP Address: ____________	IP Address: ____________
Bay & Rack #: ____________	Bay & Rack #: ____________
Rack Position: Top _____ Bottom _______	Rack Position: Top _____ Bottom _______
5th ITS Field Device Controller	**6th ITS Field Device Controller**
Device Name: ____________	Device Name: ____________
Device Type: ____________	Device Type: ____________
Manufacturer: ____________	Manufacturer: ____________
Model: ____________	Model: ____________
Serial Number: ____________	Serial Number: ____________
Firmware Version: ____________	Firmware Version: ____________
IP Address: ____________	IP Address: ____________
Bay & Rack #: ____________	Bay & Rack #: ____________
Rack Position: Top _____ Bottom _______	Rack Position: Top _____ Bottom _______

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

ITS Facility Management System
Remote HUB Equipment Site Attribute Form

ITSFM030
06/06

Date:	Contract ID:	Financial Project ID:	Inspector:

Site Identification No.	State Plain Coordinate	Latitude/Longitude
Hwy. - Milepost - Lane - Letter	N = E =	N = E =

Equipment Site Infrastructure

General Site Information

Equipment Housing: ❑ Cabinet ❑ Building

Located in Clear Zone: ❑ Yes ❑ No

Year of Installation: ________________

Lane Closure Require: ❑ Yes ❑ No

Distance to Travel Lane: ________________

Equipment Cabinet	Equipment Building
Cabinet Type: ________________	Building Type: ________________
Mount: ❑ Pole ❑ Base	Building Dimensions: _____(L) x_____(W) x_____(H)
Filter: ❑ Yes ❑ No	Building Material: ❑ Pre-cast Concrete ❑ Frame
Filter Type: ____________	

Equipment Racks

Bay # ____________ Rack # ____________ Type: ❑ 2-Post ❑ 4-Post Dimension:___(L) x___(W) x___(H)	Bay # ____________ Rack # ____________ Type: ❑ 2-Post ❑ 4-Post Dimension:___(L) x___(W) x___(H)	Bay # ____________ Rack # ____________ Type: ❑ 2-Post ❑ 4-Post Dimension:___(L) x___(W) x___(H)
Bay # ____________ Rack # ____________ Type: ❑ 2-Post ❑ 4-Post Dimension:___(L) x___(W) x___(H)	Bay # ____________ Rack # ____________ Type: ❑ 2-Post ❑ 4-Post Dimension:___(L) x___(W) x___(H)	Bay # ____________ Rack # ____________ Type: ❑ 2-Post ❑ 4-Post Dimension:___(L) x___(W) x___(H)
Bay # ____________ Rack # ____________ Type: ❑ 2-Post ❑ 4-Post Dimension:___(L) x___(W) x___(H)	Bay # ____________ Rack # ____________ Type: ❑ 2-Post ❑ 4-Post Dimension:___(L) x___(W) x___(H)	Bay # ____________ Rack # ____________ Type: ❑ 2-Post ❑ 4-Post Dimension:___(L) x___(W) x___(H)
Bay # ____________ Rack # ____________ Type: ❑ 2-Post ❑ 4-Post Dimension:___(L) x___(W) x___(H)	Bay # ____________ Rack # ____________ Type: ❑ 2-Post ❑ 4-Post Dimension:___(L) x___(W) x___(H)	Bay # ____________ Rack # ____________ Type: ❑ 2-Post ❑ 4-Post Dimension:___(L) x___(W) x___(H)

Site Identification No.

Remote HUB Equipment Site Attribute Form

Hwy. Milepost Lane Letter

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Wireline Communications Components

Fiber Optic Patch Panel

Panel Type: ❑ Single-Mode ❑ Multi-Mode Bay # ________ Rack # __________

Manufacturer: ________________________ Rack Position: Top ________ Bottom ________

No. of Ports: ________________________ Connector Type: ________________

Cable Sequential: ________________________ Unit of Measure: ❑ Feet ❑ Meter

Panel Type: ❑ Single-Mode ❑ Multi-Mode Bay # ________ Rack # __________

Manufacturer: ________________________ Rack Position: Top ________ Bottom ________

No. of Ports: ________________________ Connector Type: ________________

Cable Sequential: ________________________ Unit of Measure: ❑ Feet ❑ Meter

Leased Line Communication Equipment

Device Type: ____Data Modem______

Manufacturer: ___________________

Model: ___________________

Serial Number: ___________________

Telephone Number: ___________________

Static IP Address: ___________________

Bay & Rack #: ___________________

Rack Position: Top _____ Bottom ______

Ethernet Communication Equipment

Device Type: ❑ Switch ❑ Hub

Input Ports: ❑ Fiber_____ ❑ Copper_____

Output Ports: ❑ Fiber_____ ❑ Copper_____

Manufacturer: ___________________

Model: ___________________

Serial Number: ___________________

IP Address: ___________________

Bay & Rack #: ___________________

Rack Position: Top _____ Bottom ______

Other Communication Equipment

Device Type: ___________________

Input Ports: ❑ Fiber_____ ❑ Copper_____

Output Ports: ❑ Fiber_____ ❑ Copper_____

Manufacturer: ___________________

Model: ___________________

Serial Number: ___________________

IP Address: ___________________

Bay & Rack #: ___________________

Rack Position: Top _____ Bottom ______

Other Communication Equipment

Device Type: ___________________

Input Ports: ❑ Fiber_____ ❑ Copper_____

Output Ports: ❑ Fiber_____ ❑ Copper_____

Manufacturer: ___________________

Model: ___________________

Serial Number: ___________________

IP Address: ___________________

Bay & Rack #: ___________________

Rack Position: Top _____ Bottom ______

Site Identification No.	Remote HUB Equipment Site Attribute Form
Hwy. - Milepost - Lane - Letter	

Wireless Communications Components

Radio Equipment #1	Associated Antenna
Radio Type: ______	Antenna Type: ______
Radio Frequency: ______	Manufacturer: ______
Manufacturer: ______	Model: ______
Model: ______	Attachment Height: ______
Serial Number: ______	Direction: ❑ N ❑ S ❑ E ❑ W
Output Ports: ❑ Fiber____ ❑ Copper____	
IP Address: ______	
Bay & Rack #: ______	
Rack Position: Top ______ Bottom ______	

Radio Equipment #2	Associated Antenna
Radio Type: ______	Antenna Type: ______
Radio Frequency: ______	Manufacturer: ______
Manufacturer: ______	Model: ______
Model: ______	Attachment Height: ______
Serial Number: ______	Direction: ❑ N ❑ S ❑ E ❑ W
Output Ports: ❑ Fiber____ ❑ Copper____	
IP Address: ______	
Bay & Rack #: ______	
Rack Position: Top ______ Bottom ______	

Site Identification No.

Remote HUB Equipment Site Attribute Form

Hwy. - Milepost - Lane - Letter

ITS Field Device Components

1st ITS Field Device Controller	3rd ITS Field Device Controller
Device Name: ______	Device Name: ______
Device Type: ______	Device Type: ______
Manufacturer: ______	Manufacturer: ______
Model: ______	Model: ______
Serial Number: ______	Serial Number: ______
Firmware Version: ______	Firmware Version: ______
IP Address: ______	IP Address: ______
Bay & Rack #: ______	Bay & Rack #: ______
Rack Position: Top ______ Bottom ______	Rack Position: Top ______ Bottom ______
2nd ITS Field Device Controller	**4th ITS Field Device Controller**
Device Name: ______	Device Name: ______
Device Type: ______	Device Type: ______
Manufacturer: ______	Manufacturer: ______
Model: ______	Model: ______
Serial Number: ______	Serial Number: ______
Firmware Version: ______	Firmware Version: ______
IP Address: ______	IP Address: ______
Bay & Rack #: ______	Bay & Rack #: ______
Rack Position: Top ______ Bottom ______	Rack Position: Top ______ Bottom ______
5th ITS Field Device Controller	**6th ITS Field Device Controller**
Device Name: ______	Device Name: ______
Device Type: ______	Device Type: ______
Manufacturer: ______	Manufacturer: ______
Model: ______	Model: ______
Serial Number: ______	Serial Number: ______
Firmware Version: ______	Firmware Version: ______
IP Address: ______	IP Address: ______
Bay & Rack #: ______	Bay & Rack #: ______
Rack Position: Top ______ Bottom ______	Rack Position: Top ______ Bottom ______

Site Identification No.

Hwy. Milepost Lane Letter

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Remote HUB Equipment Site Attribute Form

Electrical System Components

General Power Information	Equipment Cabinet/Building (Service Point)
Serving Electric Utility Meter or FDOT Load Center: ______________	Cabinet Disconnect: ❑ Yes ❑ No Type: ❑ Breaker ❑ Fuse Manufacturer: ______________ Model: ______________
Load Center Circuit ID.: ______________	Building Disconnect: ❑ Yes ❑ No Type: ❑ Breaker ❑ Fuse Manufacturer: ______________ Model: ______________

Primary/Secondary Disconnect & Transformer	Surge Protection Device
Disconnect Installed: ❑ Yes ❑ No Type: ❑ Breaker ❑ Fuse Manufacturer: ______________ Model: ______________ Amperage: ______________	AC Transient Device Installed: ❑ Yes ❑ No Manufacturer: ______________ Model/Size: ______________
Transformer Installed: ❑ Yes ❑ No Type: ______________ Manufacturer: ______________ Model: ______________ Input Voltage: ❑ 120/240 ❑ 120/208 ❑ 240/480 Output Voltage: ❑ 120 ❑ 120/240	Data Line Device Installed: ❑ Yes ❑ No Manufacturer: ______________ Model/Size: ______________ Low Voltage Device Installed: ❑ Yes ❑ No Manufacturer: ______________ Model/Size: ______________ Video Line Device Installed: ❑ Yes ❑ No Manufacturer: ______________ Model/Size: ______________ Phone Line Device Installed: ❑ Yes ❑ No Manufacturer: ______________ Model/Size: ______________

Uninterrupted Power System (UPS)		
UPS Installed: ❑ Yes ❑ No Manufacturer: ______________ Model: ______________ Output Wattage: ______________	UPS Installed: ❑ Yes ❑ No Manufacturer: ______________ Model: ______________ Output Wattage: ______________	UPS Installed: ❑ Yes ❑ No Manufacturer: ______________ Model: ______________ Output Wattage: ______________

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

ITS Facility Management System

ITS Field Device Equipment Site Attribute Form

ITSFM031
06/06

Date:	Contract ID:	Financial Project ID:	Inspector:

Site Identification No.	State Plain Coordinate	Latitude/Longitude
Hwy. Milepost Lane Letter - - -	N = E =	N = E =

Equipment Site Infrastructure

General Site Information

Year of Installation: ____________

Distance to Travel Lane: ____________

Located in Clear Zone: ❑ Yes ❑ No

Lane Closure Require: ❑ Yes ❑ No

Equipment Cabinet

Cabinet Type: ____________

Mount: ❑ Pole ❑ Base

Filter: ❑ Yes ❑ No

Filter Type: ____________

Support Structure

Support Structure Type:

❑ Pole ❑ Tower

❑ Cantilever ❑ Overhead

❑ Other ____________

Support Structure Height: ____________

Support Structure Material:

❑ Wood ❑ Concrete ❑ Steel

❑ Other ____________

ITS Field Device Components

1st ITS Field Device

Device Name: ____________

Device Type: ____________

Manufacturer: ____________

Model: ____________

Serial Number: ____________

Attachment Height: ____________

Co-located @ Controller Site: ❑ Yes ❑ No

If No, Controller Site ID: ____________

1st ITS Field Device Controller

Device Name: ____________

Device Type: ____________

Manufacturer: ____________

Model: ____________

Serial Number: ____________

Firmware Version: ____________

IP Address: ____________

2nd ITS Field Device

Device Name: ____________

Device Type: ____________

Manufacturer: ____________

Model: ____________

Serial Number: ____________

Attachment Height: ____________

Co-located @ Controller Site: ❑ Yes ❑ No

If No, Controller Site ID: ____________

2nd ITS Field Device Controller

Device Name: ____________

Device Type: ____________

Manufacturer: ____________

Model: ____________

Serial Number: ____________

Firmware Version: ____________

IP Address: ____________

Site Identification No.

ITS Field Device Equipment Site Attribute Form

Hwy. Milepost Lane Letter

- - -

ITS Field Device Components (Continued)

3rd ITS Field Device	3rd ITS Field Device Controller
Device Name: ______	Device Name: ______
Device Type: ______	Device Type: ______
Manufacturer: ______	Manufacturer: ______
Model: ______	Model: ______
Serial Number: ______	Serial Number: ______
Attachment Height: ______	Firmware Version: ______
Co-located @ Controller Site: ☐ Yes ☐ No	IP Address: ______
If No, Controller Site ID: ______	

4th ITS Field Device	4th ITS Field Device Controller
Device Name: ______	Device Name: ______
Device Type: ______	Device Type: ______
Manufacturer: ______	Manufacturer: ______
Model: ______	Model: ______
Serial Number: ______	Serial Number: ______
Attachment Height: ______	Firmware Version: ______
Co-located @ Controller Site: ☐ Yes ☐ No	IP Address: ______
If No, Controller Site ID: ______	

Wireline Communications Components

Fiber Optic Patch Panel

Panel Type: ☐ Single-Mode ☐ Multi-Mode	Connector Type : ______
No. of Ports: ______	Manufacturer: ______
Cable Sequential: ______	Unit of Measure: ☐ Feet ☐ Meter

Leased Line Communication Equipment	Ethernet Communication Equipment
Device Type: Data Modem	Device Type: ☐ Switch ☐ Hub
Manufacturer: ______	Input Ports: ☐ Fiber______ ☐ Copper______
Model: ______	Output Ports: ☐ Fiber______ ☐ Copper______
Serial Number: ______	Manufacturer: ______
Telephone Number: ______	Model: ______
Static IP Address: ______	Serial Number: ______
	IP Address: ______

Site Identification No.	ITS Field Device Equipment Site Attribute Form
Hwy. - Milepost - Lane - Letter	

Wireline Communications Components (Continued)

Other Communication Equipment	Other Communication Equipment
Device Type: ______	Device Type: ______
Input Ports: ❑ Fiber______ ❑ Copper______	Input Ports: ❑ Fiber______ ❑ Copper______
Output Ports: ❑ Fiber______ ❑ Copper______	Output Ports: ❑ Fiber______ ❑ Copper______
Manufacturer: ______	Manufacturer: ______
Model: ______	Model: ______
Serial Number: ______	Serial Number: ______
IP Address: ______	IP Address: ______

Wireless Communications Components

Radio Equipment #1	Associated Antenna
Radio Type: ______	Antenna Type: ______
Radio Frequency: ______	Manufacturer: ______
Manufacturer: ______	Model: ______
Model: ______	Attachment Height: ______
Serial Number: ______	Direction: ❑ N ❑ S ❑ E ❑ W
Output Ports: ❑ Fiber_____ ❑ Copper_____	
IP Address: ______	
Radio Equipment #2	**Associated Antenna**
Radio Type: ______	Antenna Type: ______
Radio Frequency: ______	Manufacturer: ______
Manufacturer: ______	Model: ______
Model: ______	Attachment Height: ______
Serial Number: ______	Direction: ❑ N ❑ S ❑ E ❑ W
Output Ports: ❑ Fiber_____ ❑ Copper_____	
IP Address: ______	

Site Identification No.

ITS Field Device Equipment Site Attribute Form

Hwy. Milepost Lane Letter

- - -

Electrical System Components

General Power Information

Serving Electric Utility Meter or FDOT Load Center:

____

Load Center Circuit ID.: ________________

Equipment Cabinet (Service Point)

Cabinet Mount Disconnect: ❑ Yes ❑ No

Type: ❑ Breaker ❑ Fuse

Manufacturer: ________________

Model: ________________

Cabinet Mount Power Outlet(s): ❑ Yes ❑ No

Outlet Amperage: ❑ 15 AMP ❑ 20 AMP

Primary/Secondary Disconnect & Transformer

Disconnect Installed: ❑ Yes ❑ No

Type: ❑ Breaker ❑ Fuse

Manufacturer: ________________

Model: ________________

Amperage: ________________

Transformer Installed: ❑ Yes ❑ No

Manufacturer: ________________

Model: ________________

Input Voltage: ❑ 120/240 ❑ 120/208 ❑ 240/480 ❑ 480

Output Voltage: ❑ 120 ❑ 120/240

Surge Protection Device

AC Transient Device Installed: ❑ Yes ❑ No

Manufacturer: ________________

Model/Size: ________________

Data Line Device Installed: ❑ Yes ❑ No

Manufacturer: ________________

Model/Size: ________________

Low Voltage Device Installed: ❑ Yes ❑ No

Manufacturer: ________________

Model/Size: ________________

Video Line Device Installed: ❑ Yes ❑ No

Manufacturer: ________________

Model/Size: ________________

Phone Line Device Installed: ❑ Yes ❑ No

Manufacturer: ________________

Model/Size: ________________

Uninterrupted Power System (UPS)

UPS Installed: ❑ Yes ❑ No

Manufacturer: ________________

Output Wattage: ________________

Model: ________________

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

ITS Facility Management System
FDOT Power Load Center Site Attribute Form

ITSFM032
06/06

Date:	Contract ID:	Financial Project ID:	Inspector:

FDOT Power Load Center

Site Identification No.	State Plain Coordinate	Latitude/Longitude
Hwy. Milepost Lane Letter	N =	N =
- - -	E =	E =

General Site Information	General Power Information
Year of Installation: ____________	Serving Electric Utility Company: ____________
Distance to Travel Lane: ____________	
Located in Clear Zone: ❑ Yes ❑ No	Meter Number: ____________
Lane Closure Require: ❑ Yes ❑ No	

Load Center Cabinet	Main Disconnect
Cabinet Mount: ❑ Pole ❑ Base	Power Disconnect: ❑ Yes ❑ No
Manufacture: ____________	Type: ❑ Breaker ❑ Fuse
Model: ____________	Manufacturer: ____________
Pole Type: ❑ Wood ❑ Concrete ❑ Steel	Model: ____________
Pole Height: ____________	Amperage: ____________

Distribution Circuit #1	Distribution Circuit #2
Circuit ID: ____________	Circuit ID: ____________
Circuit Protection Type: ❑ Breaker ❑ Fuse	Circuit Protection Type: ❑ Breaker ❑ Fuse
Manufacturer: ____________	Manufacturer: ____________
Model: ____________	Model: ____________
Amperage: ____________	Amperage: ____________
Output Voltage: ❑ 120/240 ❑ 120/208 ❑ 240/480 ❑ 480	Output Voltage: ❑ 120/240 ❑ 120/208 ❑ 240/480 ❑ 480

Distribution Circuit #3	Distribution Circuit #4
Circuit ID: ____________	Circuit ID: ____________
Circuit Protection Type: ❑ Breaker ❑ Fuse	Circuit Protection Type: ❑ Breaker ❑ Fuse
Manufacturer: ____________	Manufacturer: ____________
Model: ____________	Model: ____________
Amperage: ____________	Amperage: ____________
Output Voltage: ❑ 120/240 ❑ 120/208 ❑ 240/480 ❑ 480	Output Voltage: ❑ 120/240 ❑ 120/208 ❑ 240/480 ❑ 480

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

ITS Facility Management System
Utility Service Demarcation Site Attribute Form

ITSFM033
06/06

Date:	Contract ID:	Financial Project ID:	Inspector:

Site Identification No.	State Plain Coordinate	Latitude/Longitude
Hwy. - Milepost - Lane - Letter	N = E =	N = E =

Utility Service Demarcation Site (Service Pole)

General Site Information

Year of Installation: ____________________

Located in Clear Zone: ❑ Yes ❑ No

Distance to Travel Lane: ____________________

Lane Closure Require: ❑ Yes ❑ No

Power Service

Service Pole Ownership:

❑ FDOT ❑ Electric Utility Company

Service Pole Material:

❑ Wood ❑ Concrete ❑ Steel

Power Disconnect: ❑ Yes ❑ No

Type: ❑ Breaker ❑ Fuse

Manufacturer: ____________________

Model: ____________________

Amperage: ____________________

Power Company Information

Serving Electric Utility Company:

____

Electric Utility Meter Number:

____

Communication Service

Communication Service: ❑ Yes ❑ No

Service Pole Ownership:

❑ FDOT ❑ Comm. Utility Company

Service Pole Material:

❑ Wood ❑ Concrete ❑ Steel

Telephone Number: ____________________

Static IP Address:Type: ____________________

Communication Company Information

Serving Communication Utility Company:

____

Communication Utility Terminal Number (if applicable):

____

FIBER OPTIC ACCESS POINT DETAIL & ATTRIBUTES FORM

PROJECT & SURVEY INFORMATION

SURVEY DATE: ____________

CONTRACT ID: ____________

FINANCIAL AIDE PROJECT: ____________

INSPECTOR: ____________

ACCESS POINT ATTRIBUTES

SITE IDENTIFICATION NO: ___ - ___ - ___ - ___

ACCESS POINT NAME: ____________

ACCESS POINT DIMENSIONS: ___ (L) X ___ (W) X ___ (H)

STATE PLAIN COORDINATE: N = ____________

E = ____________

LATITUDE/LONGITUDE: N = ____________

E = ____________

YEAR OF INSTALLATION: ____________

DISTANCE FROM TRAVEL LANE: ____________

LOCATED IN CLEAR ZONE: ☐ YES ☐ NO

LANE CLOSURE REQUIRED: ☐ YES ☐ NO

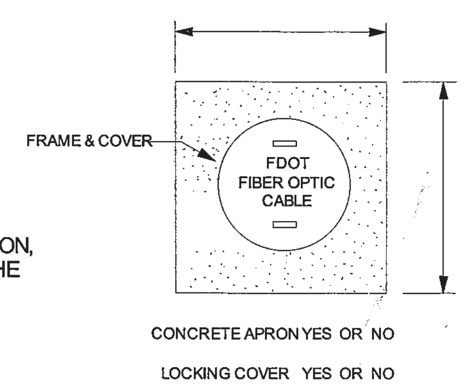
GROUND ROD INSTALLED: ☐ YES ☐ NO

LEGEND

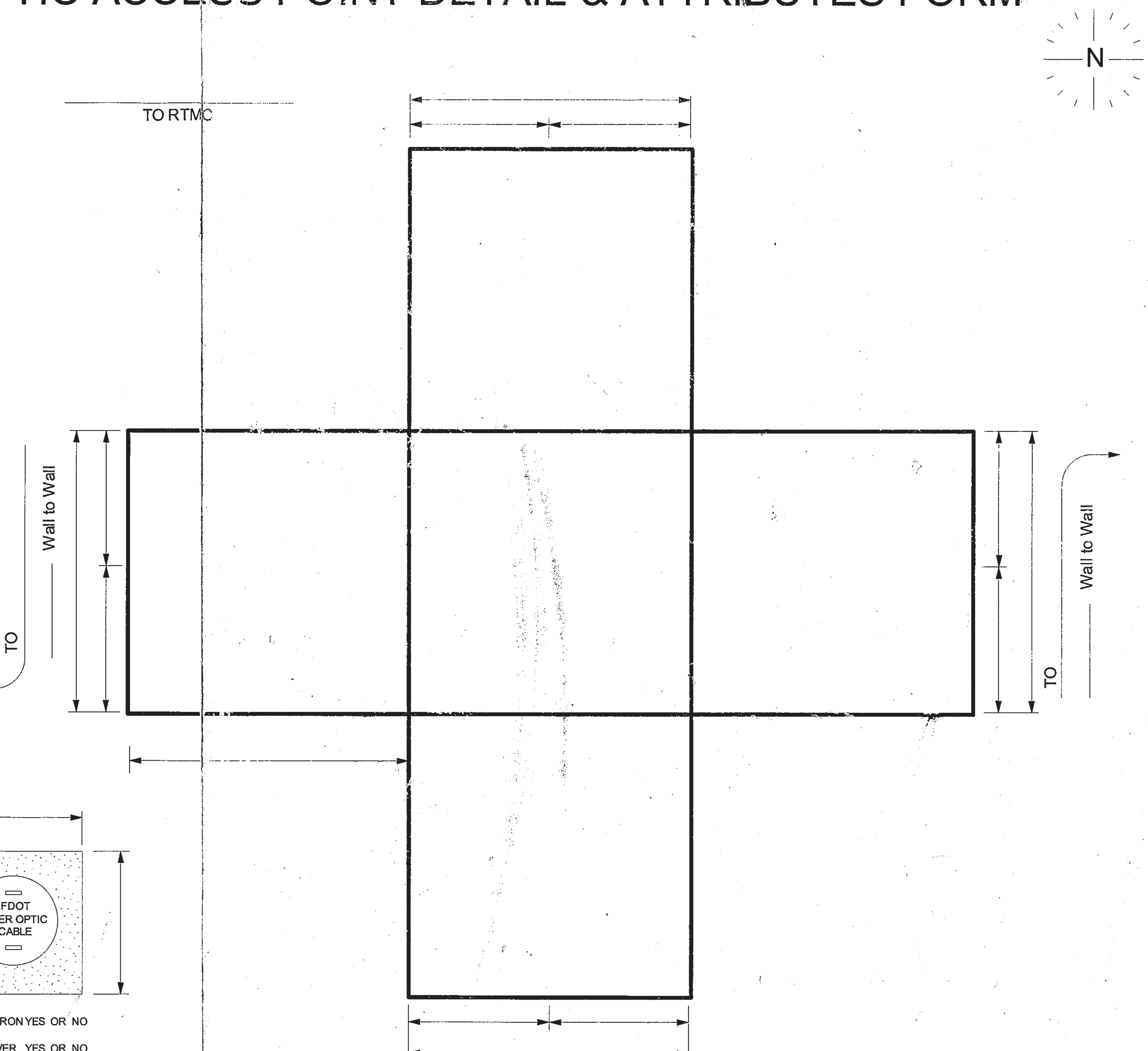
———	FIBER OPTIC CABLE
———	TONE WIRE
SPLICE	FIBER OPTIC SPLICE CLOSURE
V	CABLE PULLING EYE
○	CONDUIT ENTRANCE
(P)	CONDUIT EQUIPPED WITH DUCT PLUG
═══	WALL MOUNT CABLE RACK
SUMP	SUMP HOLE

NOTES

1. THE INSPECTOR SHALL INDICATE THE LOCATION OF CONDUIT(S) PENETRATION, CONDUIT PLUGS, CABLE RACKS, PULL-EYES AND CABLE ROUTING WITHIN THE ACCESS POINT ON THIS DRAWING
2. ALL ACCESS POINT MEASUREMENTS ARE INSIDE DIMENSIONS
3. ALL CABLES SHALL BE ANNOTATED TO SHOW THE CABLE TYPE THE NUMBER OF STRANDS AND CABLE SEQUENCIAL MEASUREMENTS AT THE ACCESS POINT WALLS AND EACH SIDE OF A SPLICE
4. THE TONE WIRE ROUTING AND TERMINATIONS SHALL BE SHOWN ON THIS DRAWING



FRAME & COVER DETAIL



Appendix B – Requirements Traceability Verification Matrix and Attachments

Brevard County
Advanced Traffic Management System (ATMS)

Requirements Traceability Verification Matrix (RTVM)

November 27, 2012
Version 1.2

Prepared for:
Florida Department of Transportation
719 S. Woodland Blvd.
Deland, FL 32720
1-800-780-7102

Document Control Panel	
File Name:	Brevard County RVTM
Version No.:	Version 1.2
Created By:	Krista Small, Atkins
Date of Submission:	October 9, 2012
Comments Received:	October 30, 2012

Revision History Control Panel		
CREATED BY:	Krista Small	July 10, 2012
REVIEWED BY:	Gil Ramirez, Brevard County	August 28, 2012
	Demetrius Lewis, FDOT District 5	August 28, 2012
	Nathan Burda, Miller Electric	October 30, 2012
MODIFIED BY:	Krista Small, Atkins	October 1, 2012
	Krista Small, Atkins	November 27, 2012

Attached Reference Documents

Design/Build Maximum Price Request For Proposal For The Brevard County Advance Traffic Management System (ATMS) Expansion in Brevard County	Attachment 1
BlueTOAD Installed Site Test Procedure	Attachment 2
CCTV Stand Alone Test Procedures	Attachment 3
Fiber Optic Test Procedures	Attachment 4
Sensys Installed Site Test Procedure	Attachment 5
Addendum 6	Attachment 6

Requirement Identification

Requirement Prefix	Definition
S	Overall System Requirement
CB	Cabinet
CD	Conduit
CM	Configuration Management
FD	Field Devices
FN	Fiber Optic Network
MS	Managed Field Ethernet Switch
NM	Network Management
TV	Closed Circuit Television (CCTV)
VD	Vehicle Detection System (VDS)
WS	Work Stations

Verification Method Identification

Verification Method	Definition
Documentation	Verification required documentation is available.
Demonstration	Witnessing system operation in the expected or simulated environment without a need for measurement data.
Inspection	Direct observation of requirements.
Test	Direct measurement of system operation.

Test Case Identification

Test Case	Definition
TC01	Overall System Test Procedures
TC02	VDS Test Procedures
TC03	Communications Test Procedures
TC04	CCTV Test Procedures
C05	Install / Environmental Test Procedures
TC06	Component Test Procedures

The Brevard County ATMS Expansion Project RTVM

Req ID	Parent	Requirement	Source	Section	Verif Method	Test Case	Test Result	Test Notes
CB001	S001	All cable terminations and connecting terminal blocks shall be contained in a weather-proof aluminum enclosure that shall meet the applicable requirements for a NEMA 3R rated cabinet, as specified in FDOT Standard Specifications Section 785, as it relates to the physical requirements of the cabinet, door and lock operations, and weatherproofing.	Attachment 1 of the FDOT RFP E5N82	5.vi	Inspection	TC06	Not Tested	
CB002	CB001	The placement of device cabinets will provide the protection for the maintenance technician from the roadway traffic.	Attachment 1 of the FDOT RFP E5N82	5.vi	Inspection	TC06	Not Tested	
CB003	CB001	A stable, level, and slip resistant concrete pad (tech pad) shall be at all new and existing, affected cabinet locations to allow a technician to stand on comfortably while working on equipment inside the cabinet.	Attachment 1 of the FDOT RFP E5N82	5.vi	Inspection	TC06	Not Tested	
CB004	CB003	The tech pad shall, at a minimum, be reinforced to prevent cracking.	Attachment 1 of the FDOT RFP E5N82	5.vi	Inspection	TC06	Not Tested	
CB005	CB003	The tech pad shall, at a minimum, have a depth of 4 inches, extend 36 inches from the face of each cabinet door, and be 36 inches wide.	Attachment 1 of the FDOT RFP E5N82	5.vi	Inspection	TC06	Not Tested	
CB006	CB003	The tech pad shall be secured and stabilized in such a manner as to prevent shifting and undermining.	Attachment 1 of the FDOT RFP E5N82	5.vi	Inspection	TC06	Not Tested	
CB007	CB001	Cabinets shall have all proper Surge Supression Equipment as called out in FDOT Specification 785.	Attachment 1 of the FDOT RFP E5N82	5.vi	Inspection	TC06	Not Tested	
CB008	CB001	All cables shall enter the cabinet from the bottom of the cabinet.	Attachment 1 of the FDOT RFP E5N82	5.vi	Inspection	TC06	Not Tested	
CB009	S002	As part of the central system improvements, a Type 336S ground mounted cabinet (local hub) shall be installed adjacent to the FDOT DASH III Master hub in the southwest quadrant of SR 528 and I-95 in Cocoa. This local hub shall meet the FDOT Specifications and provide full fiber optic connectivity to the FDOT master hub, I-95 72SM backbone FOC and SR 528 72SM backbone FOC white buffers.	Attachment 1 of the FDOT RFP E5N82	5.vi	Inspection	TC03	Not Tested	
CB010	CB009	The Hub in requirement CB009 shall directly connect to the following: the FDOT router in adjacent master hub, the Traffic Engineering router in Viera, the Traffic Operations router in Merritt Island, the existing Port St. John local hub, SR 50/405 subsystem, and SR 46 subsystem. In addition, a type 336S cabinet shall be required at all locations as described in Table 4 in RFP E5N82.	Attachment 1 of the FDOT RFP E5N82	5.vi	Inspection	TC03	Not Tested	
CB011	CB001	All cabinets within the project limits shall be at minimum TS 2 cabinets and shall replace or upgrade any non TS 2 cabinet to a TS 2 cabinet within the project limits defined by RFP E5N82.	Attachment 1 of the FDOT RFP E5N82	5.vi	Inspection	TC06	Not Tested	

Req ID	Parent	Requirement	Source	Section	Verif Method	Test Case	Test Result	Test Notes
CB012	CB001	If existing TS 2 cabinets do not have sufficient rack space to support the newly installed detection hardware, then additional detection racks shall be installed to provide the necessary connections to accommodate the wireless magnetometer detector units.	Attachment 1 of the FDOT RFP E5N82	5.vi	Inspection	TC06	Not Tested	
CB013	CB001	If a TS 2 cabinet cannot support any additional detection racks, the cabinet shall be upgraded or replaced with with a TS 2 that will provide sufficient space for the additional hardware to be installed.	Attachment 1 of the FDOT RFP E5N82	5.vi	Inspection	TC06	Not Tested	
CD001	S002	Pull box and splice boxes containing fiber optic cable shall not contain power cables for ITS devices or other equipment.	Attachment 1 of the FDOT RFP E5N82	5.v	Inspection	TC03	Not Tested	
CD002	S002	In the event that cabling is supplied to above ground equipment installed on concrete signal strainpoles, the contractor shall furnish and install an external rigid metal conduit. (Per RFC plans, a conduit leading to aerial devices may be less than 2"). All work shall be in accordance with but not limited to FDOT Specifications Section 630 and all applicable specifications.	Attachment 1 of the FDOT RFP E5N82	5.v	Inspection	TC03	Not Tested	
CD003	S002	Underground Fiber Optic conduit shall be HDPE Conduit.	Attachment 1 of the FDOT RFP E5N82	5.v	Inspection	TC03	Not Tested	
CD004	CD003	The HDPE Fiber Optic conduit shall be a minimum of two (2) two-inch (2”) in diameter conduit with a minimum of two (2) conduits installed (one for fiber and one for spare use) for FOC trunkline installation and one (1) conduit for drop cable installation.	Attachment 1 of the FDOT RFP E5N82	5.v	Inspection	TC03	Not Tested	
CD005	CD003	The color designation for the conduit shall be orange and white with the orange conduit used for FOC installation and white for the spare.	Attachment 1 of the FDOT RFP E5N82	5.v	Inspection	TC03	Not Tested	
CD006	CD002	Pull box spacing shall not exceed 500 feet.	Attachment 1 of the FDOT RFP E5N82	5.v	Inspection	TC03	Not Tested	
CD007	CD003	HDPE conduit shall conform to performance requirements of FDOT Standard Specifications Section 783. (The special exception granted from FDOT Tallahassee allowing the use of SDR 13.5 conduit for open trench applications is allowed.)	Attachment 1 of the FDOT RFP E5N82	5.v	Inspection	TC03	Not Tested	
CD008	CD003	Existing spare conduit may be utilized where useable and within the constraints of FDOT standards for cable routing.	Attachment 1 of the FDOT RFP E5N82	5.v	Inspection	TC03	Not Tested	
CD009	CD008	Existing conduit which houses only copper interconnect may be utilized for proposed fiber optic cable routing following the removal of existing copper interconnect. If conduit was utilized, verify copper was removed.	Attachment 1 of the FDOT RFP E5N82	5.v	Inspection	TC03	Not Tested	
CD010	CD008	The removal of copper interconnect and use of existing conduit shall be limited to only existing copper interconnect between and servicing only the signal cabinets within the project limits.	Attachment 1 of the FDOT RFP E5N82	5.v	Inspection	TC03	Not Tested	

Req ID	Parent	Requirement	Source	Section	Verif Method	Test Case	Test Result	Test Notes
CD011	CD008	Where existing conduit is utilized, pull boxes shall be upgraded to FDOT fiber optic pull box standards.	Attachment 1 of the FDOT RFP E5N82	5.v	Inspection	TC03	Not Tested	
CD012	CD003	Bridge Mounted Fiber Optic conduit shall be PVC schedule 80 conduit.	Attachment 1 of the FDOT RFP E5N82	5.v	Inspection	TC03	Not Tested	
CD013	CD002	The conduit shall be a minimum of two (2) two-inch (2”) in diameter conduit with a minimum of two (2) conduits installed (one for fiber and one for spare use) for FOC trunkline installation and one (1) conduit for drop cable installation.	Attachment 1 of the FDOT RFP E5N82	5.v	Inspection	TC03	Not Tested	
CM001	S001	The central system software and supporting hardware (Central Management System or CMS) shall be installed and configured in two locations: System 1 shall be located at The Brevard County Traffic Engineering Center in Viera and System 2 shall be located at The Brevard County Traffic Operations Center on Merritt Island.	Attachment 1 of the FDOT RFP E5N82	5.viii	Inspection	TC03	Not Tested	
CM002	CM001	System 1 shall be located at The Brevard County Traffic Engineering Center in Viera and shall include the following three (3) servers: Server 1 shall include: Sensor Network Archive, Proxy and Statistics (SNAPS) software for the Wireless Magnetometer System Server 2 shall include: Traffic Adaptive Software, Server 3 shall include: Video Management Software (Revised Per Addendum 6, travel time software is not required thus removing the Travel Time Server). (Refer to Attachment 6 to view Addendum 6)	Attachment 1 of the FDOT RFP E5N82	5.viii	Inspection	TC03	Not Tested	
CM003	CM001	System 2 shall be located at The Brevard County Traffic Operations Center on Merritt Island and shall include the following three (3) servers: Server 1 shall include: Backup ATMS.now Software (software provided by Brevard Co.), Server 2 shall include: Backup Traffic Adaptive Software, Server 3 shall include: Backup Video Management Software	Attachment 1 of the FDOT RFP E5N82	5.viii	Inspection	TC03	Not Tested	
CM004	S001	The CMS shall provide management and control of field devices (detectors, etc.) installed as well as performs data processing, analysis, and automated response.	Attachment 1 of the FDOT RFP E5N82	5.viii	Demonstration	TC03	Not Tested	
CM005	CM001	The Central Management System shall include a Device Management server for the Wireless Magnetometer System.	Attachment 1 of the FDOT RFP E5N82	5.viii	Inspection	TC03	Not Tested	
CM006	CM001	The Sensor Network Archive, Proxy, and Statistics (SNAPS) software shall be installed on a server running Fedora 10 operating system with MySQL Database and Apache HTTP server.	Attachment 1 of the FDOT RFP E5N82	5.viii	Inspection	TC03	Not Tested	
CM007	CM006	The SNAPS software shall be capable of providing remote management to all deployed sensors and shall function as the central repository for detection event and device performance data which will be automatically generated from field installed devices	Attachment 1 of the FDOT RFP E5N82	5.viii	Demonstration	TC03	Not Tested	

Req ID	Parent	Requirement	Source	Section	Verif Method	Test Case	Test Result	Test Notes
CM008	CM006	SNAPS shall be fully capable of continuously monitoring the health and performance of all detectors, to include, radio communications status, battery level, and management status for the wireless magnometer VDS system as well as backing up and storing all wireless magnometer VDS device configurations. (Video Detection is not included under the SNAPS server).	Attachment 1 of the FDOT RFP E5N82	5.viii	Demonstration	TC03	Not Tested	
CM009	CM002	The Arterial Travel Time (ATT) software shall be compatible with BlueToad equipment.	Attachment 1 of the FDOT RFP E5N82	5.viii	Inspection	TC03	Not Tested	
CM010	CM009	The Arterial Travel Time (ATT) software shall have the capability to establish travel time data by monitoring and measuring vehicular and pedestrian flows by collecting and matching the Bluetooth MAC addresses.	Attachment 1 of the FDOT RFP E5N82	5.viii	Inspection	TC03	Not Tested	
CM011	CM009	The ATT software must be configurable and scalable to sample data from all integrated receivers for all corridors integrated under this project and shall be capable of archiving all ATT data with the ability to provide a graphing interface and the output of .xls and .csv format files.	Attachment 1 of the FDOT RFP E5N82	5.viii	Demonstration	TC03	Not Tested	
CM012	CM009	The ATT software shall be capable of populating a real time colored coded arterial map from the sampling. This map shall be composed of segments with each segment indicating through color codes the current level of congestion.	Attachment 1 of the FDOT RFP E5N82	5.viii	Demonstration	TC03	Not Tested	
CM013	CM009	Removed	Attachment 1 of the FDOT RFP E5N82	5.viii	Demonstration	TC03	Not Tested	
CM014	CM001	The Traffic Adaptive Control (TAC) software shall be installed on a server running Windows Server 2008 R2 operating system, including 5 CALS.	Attachment 1 of the FDOT RFP E5N82	5.viii	Inspection	TC03	Not Tested	
CM015	CM014	The TAC software shall be capable of providing a fully adaptive real-time traffic control system operation for the traffic signal network using the sensor data generated by the VDS devices and forwarded by traffic controllers.	Attachment 1 of the FDOT RFP E5N82	5.viii	Demonstration	TC03	Not Tested	
CM016	CM014	The traffic adaptive software shall be capable of optimizing phase times to accommodate traffic progression with the ability to link and unlink intersections so adjacent corridors and subsections can be coordinated together.	Attachment 1 of the FDOT RFP E5N82	5.viii	Demonstration	TC03	Not Tested	
CM017	CM014	The TAC software shall have the ability to have modified cycle times on a cycle by cycle basis.	Attachment 1 of the FDOT RFP E5N82	5.viii	Demonstration	TC03	Not Tested	
CM018	CM014	No external control boxes will be accepted as an interface between sensors and controller or central hardware.	Attachment 1 of the FDOT RFP E5N82	5.viii	Inspection	TC06	Not Tested	
CM019	CM014	The traffic adaptive control software shall be capable of integrating software-in-the-loop in conjunction with Synchro SimTraffic to demonstrate and test configurations before implementation on roadway traffic controllers.	Attachment 1 of the FDOT RFP E5N82	5.viii	Demonstration	TC03	Not Tested	

Req ID	Parent	Requirement	Source	Section	Verif Method	Test Case	Test Result	Test Notes
CM020	CM014	A software API shall be provided for integration with existing County traffic controllers.	Attachment 1 of the FDOT RFP E5N82	5.viii	Inspection	TC03	Not Tested	
CM021	CM014	The TAC software must be capable of accomplishing traffic adaptive operations through two major components: The Tactical Element and the Strategic Element as defined in RFP E5N82 Section 5.	Attachment 1 of the FDOT RFP E5N82	5.viii	Demonstration	TC03	Not Tested	
CM022	CM001	The ATMS.now software will be provided by Brevard County and must be installed on a server running the Windows Server 2008 R2 operating system, including 5 CALS.	Attachment 1 of the FDOT RFP E5N82	5.viii	Inspection	TC03	Not Tested	
CM023	CM022	The server that has ATMS.now installed shall serve as a backup Naztec ATMS.now server to mirror the existing Naztec ATMS.now server at Traffic Engineering in Viera.	Attachment 1 of the FDOT RFP E5N82	5.viii	Demonstration	TC03	Not Tested	
CM024	CM001	The contractor shall furnish and install video management software onto two (2) servers with one server functioning as the primary and the other as the backup server to the primary. The Traffic Engineering Center shall house the Primary and Traffic Operations Center shall house the Backup.	Attachment 1 of the FDOT RFP E5N82	5.viii	Inspection	TC03	Not Tested	
CM025	CM024	The video management software shall be capable of providing centralized management, configuration and control of the CCTV system.	Attachment 1 of the FDOT RFP E5N82	5.viii	Demonstration	TC03	Not Tested	
CM026	CM024	Through the video management software, the system administrator shall be able to set different authorization levels for different types of users for various authorization level of live viewing and PTZ of the CCTV system.	Attachment 1 of the FDOT RFP E5N82	5.viii	Demonstration	TC03	Not Tested	
CM027	CM024	The video management software shall be able to support an unlimited number of cameras and monitors.	Attachment 1 of the FDOT RFP E5N82	5.viii	Inspection	TC03	Not Tested	
CM028	CM024	The primary CCTV control software shall be capable of storing all device properties for all installed field CCTVs and serve as the central video distribution point for the client workstations.	Attachment 1 of the FDOT RFP E5N82	5.viii	Inspection	TC03	Not Tested	
CM029	CM024	The central video management software server shall have both an application for configuration of the field devices and an application for viewing multiple simultaneous video streams while handling multiple field alarm inputs.	Attachment 1 of the FDOT RFP E5N82	5.viii	Demonstration	TC03	Not Tested	
CM030	CM024	The video management software shall be fully capable of supporting the County's existing CCTV devices and the newly installed CCTV devices as part of this project	Attachment 1 of the FDOT RFP E5N82	5.viii	Demonstration	TC03	Not Tested	
CM031	CM001	The video management software shall be installed on a server running the Windows Server 2008 R2 operating system, including 5 CALS.	Attachment 1 of the FDOT RFP E5N82	5.viii	Inspection	TC03	Not Tested	
CM032	CM001	Contractor shall configure and install the operating system for each server installed.	Attachment 1 of the FDOT RFP E5N82	5.viii	Inspection	TC03	Not Tested	

Req ID	Parent	Requirement	Source	Section	Verif Method	Test Case	Test Result	Test Notes
CM033	CM001	All servers shall meet or exceed the specifications as called out in the RFP E5N82, section 5.2 Server Hardware Requirements.	Attachment 1 of the FDOT RFP E5N82	5.viii	Inspection	TC03	Not Tested	
FD001	S001	Field device installations shall meet all applicable clear zone requirements.	FDOT Standard Specification	NA	Inspection	TC05	Not Tested	
FD002	FD001	Field device installations shall meet FDOT 2010 Standard Specifications for Road and Bridge Construction (online edition).	FDOT Standard Specification	NA	Inspection	TC05	Not Tested	
FN001	S002	Install a 72-strand, 12-fiber buffer, fiber optic cable (FOC) trunkline for the Brevard County Advance Traffic Management System (ATMS) Expansion of all corridors as listed in Table 3 - FON Required Locations in RFP E5N82.	Attachment 1 of the FDOT RFP E5N82	5.iv	Inspection	TC03	Not Tested	
FN002	S002	Install a 12-strand, 12-fiber buffer, FOC drop cable to each of the signal cabinets found within the limits of the project where drop cables do not exist already	Attachment 1 of the FDOT RFP E5N82	5.iv	Inspection	TC03	Not Tested	
FN003	FN001	Drop cables shall connect fibers 1 through 4 of the blue buffer of the FOC trunkline.	Attachment 1 of the FDOT RFP E5N82	5.iv	Inspection	TC03	Not Tested	
FN004	FN001	Fibers 1 through 4 of the trunkline expressing from the west shall be spliced to fibers 1 through 4 of the drop cable.	Attachment 1 of the FDOT RFP E5N82	5.iv	Inspection	TC03	Not Tested	
FN005	FN001	Fibers 1 through 4 of the trunkline expressing from the east shall be spliced to fibers 7 through 10 of the drop cable.	Attachment 1 of the FDOT RFP E5N82	5.iv	Inspection	TC03	Not Tested	
FN006	FN002	Drop cables shall be terminated in patch panels that shall be installed within existing signal cabinets	Attachment 1 of the FDOT RFP E5N82	5.iv	Inspection	TC06	Not Tested	
FN007	MS001	Existing signal controllers shall be replaced with Ethernet capable controllers of the same make for all existing signal controllers that do not have Ethernet functionality for all signalized intersections found within the project limits.	Attachment 1 of the FDOT RFP E5N82	5.iv	Inspection	TC03	Not Tested	
FN008	MS001	Connection between Ethernet capable controllers and the (Managed Field Ethernet Switches) MFES shall be made.	Attachment 1 of the FDOT RFP E5N82	5.iv	Inspection	TC03	Not Tested	
FN009	MS001	All new ITS sub-systems required by RFP E5N82 for each location shall directly interface with the MFES to be located within the signal cabinet.	Attachment 1 of the FDOT RFP E5N82	5.iv	Inspection	TC03	Not Tested	
FN010	FN001	No standalone sub-system site requiring separate power source, cabinet assembly, or ancillary components typically associated with standalone sub-system ITS sites are permitted unless approved by the County.	Attachment 1 of the FDOT RFP E5N82	5.iv	Inspection	TC06	Not Tested	
FN011	FN001	All trunkline fiber shall be single mode.	Attachment 1 of the FDOT RFP E5N82	5.iv	Inspection	TC03	Not Tested	
FN012	FN002	All drop cable fiber shall be single mode.	Attachment 1 of the FDOT RFP E5N82	5.iv	Inspection	TC03	Not Tested	

Req ID	Parent	Requirement	Source	Section	Verif Method	Test Case	Test Result	Test Notes
FN013	S002	Installation of fiber optic cable shall follow the method established in Concept Plans for Sub-Project 1 (Document 1 of the OTHER DOCUMENTS provided with RFP E5N82).	Attachment 1 of the FDOT RFP E5N82	5.iv	Inspection	TC03	Not Tested	
FN014	CD003	Where fiber optic cable is installed underground, a tone wire shall be continuous from pull box to pull box following the path parallel to the fiber with a maximum 2 foot offset inside conduit.	Attachment 1 of the FDOT RFP E5N82	5.iv	Inspection	TC03	Not Tested	
FN015	FN014	Any splices to the tone wire shall only be done at a pull box, no in-conduit splicing shall be allowed.	Attachment 1 of the FDOT RFP E5N82	5.iv	Inspection	TC03	Not Tested	
FN016	CD011	A ground rod shall be supplied at each splice box for termination of the tone wire.	Attachment 1 of the FDOT RFP E5N82	5.iv	Inspection	TC03	Not Tested	
FN017	CD011	Tone wires shall be terminated to the ground rods via removable ground rod clamp.	Attachment 1 of the FDOT RFP E5N82	5.iv	Inspection	TC03	Not Tested	
FN018	CD008	Where existing conduit is utilized, the tone wire may be installed with the fiber optic cable in same conduit.	Attachment 1 of the FDOT RFP E5N82	5.iv	Inspection	TC03	Not Tested	
FN019	FN021	Only type SC connectors for patch panel connections shall be used unless legacy equipment requires otherwise. However, If a connector type other than the SC must be used, it must be approved by the FDOT ITS Project Manager.	Attachment 1 of the FDOT RFP E5N82	5.iv	Inspection	TC03	Not Tested	
FN020	FN021	Patch cables must be pre-connectorized by the factory with appropriate connector type to connect all ITS equipment.	Attachment 1 of the FDOT RFP E5N82	5.iv	Inspection	TC03	Not Tested	
FN021	S002	A minimum of four (4) fibers in each direction shall be terminated in patch panels within all signal cabinets.	Attachment 1 of the FDOT RFP E5N82	5.iv	Inspection	TC03	Not Tested	
FN022	FN001	Fibers 1-4 of the first buffer will be terminated with the trunk fibers expressing to the west, and fibers 7-10 of the first buffer will be terminated with trunk fibers expressing to the east.	Attachment 1 of the FDOT RFP E5N82	5.iv	Inspection	TC03	Not Tested	
FN023	FN001	Fibers in the last buffer of the trunk cable shall be reserved for regional communications and shall pass through the entire length of the project unspliced except where connecting to existing fiber optic cable or butt splicing of cable is required.	Attachment 1 of the FDOT RFP E5N82	5.iv	Inspection	TC03	Not Tested	
FN024	FN021	Unless preterminated patch panels are used, then contractor shall provide buffer fan-out kits and pigtails that shall match the color of the fiber strand they encase	Attachment 1 of the FDOT RFP E5N82	5.iv	Inspection	TC03	Not Tested	
FN025	S003	All installed fiber and connections shall be tested and signed off on when test is passed in accordance to Attachment 4 of this RTVM: Fiber Optic Test Procedure	Attachment 4:Fiber Optic Test Procedure	All	Documentation	TC03	Not Tested	
MS001	S002	Field-hardened switches shall be industrial-grade Ethernet switches, conforming to FDOT environmental requirements.	Attachment 1 of the FDOT RFP E5N82	5.vii	Inspection	TC03	Not Tested	

Req ID	Parent	Requirement	Source	Section	Verif Method	Test Case	Test Result	Test Notes
MS002	S001	Managed field Ethernet switches (MFES) shall be installed within the signal cabinets at all signalized intersections found within the project limits that are not currently equipped with MEFS.	Attachment 1 of the FDOT RFP E5N82	5.vii	Inspection	TC03	Not Tested	
MS003	MS001	Network switches shall provide at minimum four (4) Gigabit SFP/TX Combo ports and four (4) copper 10/100/1000 TX ports	Attachment 1 of the FDOT RFP E5N82	5.vii	Inspection	TC03	Not Tested	
MS004	MS001	Network switch supported protocols, at minimum, shall include IGMP v1, v2, and v3, sFlow, 802.1x Security features, STP, RSTP, and MSTP, 802.1Q VLAN, Console, Telnet, and Web management, Optical Monitoring (Physical Layer), Link Layer Discovery Protocol	Attachment 1 of the FDOT RFP E5N82	5.vii	Inspection	TC03	Not Tested	
MS005	MS001	Layer 3 field hub routers shall be installed in all field hubs listed in Table 4 - Required Locations for Layer 3 Field Routers	Attachment 1 of the FDOT RFP E5N82	5.vii	Demonstration	TC03	Not Tested	
MS006	MS001	All field hub routers except the unit installed at the City of Melbourne shall provide 24 100/1000BASE-X SFP ports.	Attachment 1 of the FDOT RFP E5N82	5.vii	Inspection	TC03	Not Tested	
MS007	MS001	The City of Melbourne field hub shall provide 24 10/100/1000BASE-T ports and 4 100/1000BASE-X SFP uplink ports.	Attachment 1 of the FDOT RFP E5N82	5.vii	Inspection	TC03	Not Tested	
MS008	MS001	SFP ports shall be populated with sufficient optical transceivers, necessary to connect to adjacent new or existing field hubs and/or core routers.	Attachment 1 of the FDOT RFP E5N82	5.vii	Inspection	TC03	Not Tested	
MS009	MS001	Layer 3 switch capabilities, requirements, and supported protocols of the switches shall include at minimum Chassis: 1 RU with field replaceable fan tray and 1+1 redundant 320 hot swap AC Power Supply, 5-Year Warranty with 5-Year Same Day Support, Stackable with current field routers via minimum 60Gb/s interconnect or 10GB fiber, uplink modules, Operating System: JUNOS or IronWareOS, Packet Switching Capacity: 88 Gb/s, Aggregate Switch Capacity: 264 GB/s, Number of VLANs 4,096, Max IPv4 unicast routes: 16,000 (in hardware), Max IPv4 multicast routes: 8,000 (in hardware), Routing Protocols supported: OSPFv2 with graceful restart, Multicast PIM-SM and PIM-DM, IGMP v2,v3, snooping, VRRP redundancy, sFlow, Port-based, VLAN-based, router-based ACLs Ingress and Egress, ACL entries: 7,000	Attachment 1 of the FDOT RFP E5N82	5.vii	Inspection	TC03	Not Tested	
MS010	MS009	A Layer 3 Core Chassis Router shall be installed at the Traffic Operations Center on Merritt Island in the existing 19" rack in server room. The chassis router shall provide all connections for the Traffic Operations Local Area Network (LAN) via CAT5E cables and gigabit fiber optic connections to all existing systems and new systems. The switch shall meet the requirements called ou in Section 5.vii in RFP E5N82.	Attachment 1 of the FDOT RFP E5N82	5.vii	Demonstration	TC03	Not Tested	
NM001	S002	The contractor shall configure the switches including all tagging, disable all applicable ports, setup all IP addresses, physically connect all devices per plan, and verify all connectivity.	Attachment 1 of the FDOT RFP E5N82	5.ix	Demonstration	TC03	Not Tested	

Req ID	Parent	Requirement	Source	Section	Verif Method	Test Case	Test Result	Test Notes
NM002	S002	The contractor shall demonstrate remote accessing all the new and existing ITS devices to the County.	Attachment 1 of the FDOT RFP E5N82	5.ix	Demonstration	TC03	Not Tested	
NM003	NM001	The contractor shall provide the County with IP addresses, port status, and auto-negotiation speeds, etc. for all switches that cannot be acquired from the remote location.	Attachment 1 of the FDOT RFP E5N82	5.ix	Documentation	TC03	Not Tested	
NM004	NM001	The contractor shall supply verification that database parameters and addressing for new devices were properly entered to allow communications between the central equipment and the new field devices.	Attachment 1 of the FDOT RFP E5N82	5.ix	Documentation	TC03	Not Tested	
S001		The ATMS Expansion Project will build ITS infrastructure and ITS sub-system components along the 10 corridors in Brevard County. This includes upgrading existing signalized intersections to Ethernet functionality, install a fiber optic interconnect throughout the project limits to relay command and control communications to the upgraded signalized intersections through the wide-area network (WAN) of Brevard County to the Brevard County Traffic Management Center (TMC). Upgrades to existing signal intersection detection and installation of CCTV cameras shall be complete to further enhance the overall traffic control system by providing more complete flow rate, volume, and travel time data and remote monitoring capability of the sub-systems through the WAN.	Attachment 1 of the FDOT RFP E5N82	I.	Demonstration	TC01	Not Tested	
S002		The ATMS Expansion project will include new ITS devices that will be integrated into existing communications infrastructure.	Attachment 1 of the FDOT RFP E5N82	I.	Inspection	TC01	Not Tested	
S003		ITS subsystems include a fiber optic network system (FON), a vehicle detection system (VDS), a closed circuit television (CCTV) camera system, and an adaptive signal control system for the traffic corridor.	Attachment 1 of the FDOT RFP E5N82	I.	Inspection	TC01	Not Tested	
TV001	S003	CCTV shall be installed and configured in the required locations as called out in RFP E5N82 Table 1- CCTV Required Locations.	Attachment 1 of the FDOT RFP E5N82	5.ii	Inspection	TC04	Not Tested	
TV002	S003	All CCTV cameras shall be integrated into the Brevard County's Bosch System software.	Attachment 1 of the FDOT RFP E5N82	5.ii	Demonstration	TC04	Not Tested	
TV003	TV001	All CCTV Cameras shall have the capability to provide individual video stream viewing and PTZ through an encoder generated web page.	Attachment 1 of the FDOT RFP E5N82	5.ii	Demonstration	TC04	Not Tested	
TV004	S002	Cameras shall be of an integrated modular IP type, utilizing power and Ethernet connections to the existing traffic controller cabinet and shall be linked with the existing communications system.	Attachment 1 of the FDOT RFP E5N82	5.ii	Inspection	TC04	Not Tested	
TV005	TV001	All cameras must be non-pressurized with minimum 26x optical zoom.	Attachment 1 of the FDOT RFP E5N82	5.ii	Inspection	TC04	Not Tested	
TV006	TV002	Cameras shall be configured with location name in view, along with four (4) approach presets labeled as North, East, South and West to indicate approach direction.	Attachment 1 of the FDOT RFP E5N82	5.ii	Demonstration	TC04	Not Tested	

Req ID	Parent	Requirement	Source	Section	Verif Method	Test Case	Test Result	Test Notes
TV007	TV001	Video encoder shall provide both high and low bandwidth MPEG-4 and M-JPEG outputs simultaneously.	Attachment 1 of the FDOT RFP E5N82	5.ii	Inspection	TC04	Not Tested	
TV008	TV001	All CCTV cameras shall be installed on existing strain pole or mast arm upright support only and shall be designed to capture the greatest level of mainline coverage as available through the installation constraint established above. Mainline coverage shall be defined as the surveillance of mainline (corridor) traffic between edges of pavement of both east and west mainline movements throughout the limits of the project as awarded by this project.	Attachment 1 of the FDOT RFP E5N82	5.ii	Inspection	TC04	Not Tested	
TV011	TV001	The CCTV Cameras shall be NTCIP Compliant.	Attachment 1 of the FDOT RFP E5N82	5.ii	Inspection	TC04	Not Tested	
TV012	S003	The contractor shall provide the County with the following documentation: Camera Manufacturer, Port Server Type (if applicable), ort Server Port number (if Applicable), Port Server IP Address, Video Encoder Manufacturer, Video Encoder IP Address, Encoder Model, All pertinent information as it pertains to VDS	Attachment 1 of the FDOT RFP E5N82	6.iv	Documentation	TC04	Not Tested	
TV013	S003	Each new CCTV shall be tested and signed off on when test is passed in accordance to Attachment 3 of this RTVM: CCTV Stand Alone Test Procedures	Attachment 3:CCTV Stand Alone Test Procedures	All	Documentation	TC04	Not Tested	
VD001	S003	Wireless magnetometer sensor (sensor), repeater, and transceiver technology shall be used for the detection upgrades to the signalized intersections found within the project limits as described in RFP E5N82, Table 2 - VDS Required Locations	Attachment 1 of the FDOT RFP E5N82	5.iii	Inspection	TC02	Not Tested	
VD002	VD001	Detector installation shall be sub-surface, requiring minimal construction/disturbance of existing roadway asphalt.	Attachment 1 of the FDOT RFP E5N82	5.iii	Inspection	TC02	Not Tested	
VD003	VD001	The roadside wireless transceiver shall be mountable to existing support structures such as mast arms or strain poles where available.	Attachment 1 of the FDOT RFP E5N82	5.iii	Inspection	TC02	Not Tested	
VD004	VD001	Pole locations for mounting devices and/or mounting to existing distribution power poles must be cleared through all appropriate permitting agencies.	Attachment 1 of the FDOT RFP E5N82	5.iii	Documentation	TC02	Not Tested	
VD005	VD001	Detector communication for data and configuration shall be accomplished through the wireless transceiver and controller via standard conductor cabling.	Attachment 1 of the FDOT RFP E5N82	5.iii	Demonstration	TC02	Not Tested	
VD006	VD001	Sensors shall be installed between 1 foot and 3 feet in front of the stop bar for all through and left turn approaches to each signalized intersection.	Attachment 1 of the FDOT RFP E5N82	5.iii	Inspection	TC02	Not Tested	
VD007	VD001	At minimum, one wireless access point shall be provided at each signalized intersection.	Attachment 1 of the FDOT RFP E5N82	5.iii	Inspection	TC02	Not Tested	

Req ID	Parent	Requirement	Source	Section	Verif Method	Test Case	Test Result	Test Notes
VD008	VD001	Sensors shall be installed upstream of all mainline (corridors) through movements.	Attachment 1 of the FDOT RFP E5N82	5.iii	Inspection	TC02	Not Tested	
VD009	VD001	The design location of downstream sensors shall capture free-flow movement of traffic and total volume of through movement and shall detect only those movements intended.	Attachment 1 of the FDOT RFP E5N82	5.iii	Inspection	TC02	Not Tested	
VD010	VD001	Installation of the sensors shall be such that turning movement counts can be generated from the data collected from each set of sensors per intersection.	Attachment 1 of the FDOT RFP E5N82	5.iii	Inspection	TC02	Not Tested	
VD011	VD001	The wireless vehicle detection system shall manage data in a compatible format with that of the existing signal coordination/management system software (ATMS.now) and hardware (Naztec signal controllers).	Attachment 1 of the FDOT RFP E5N82	5.iii	Demonstration	TC02	Not Tested	
VD012	S003	Each new VDS (Bluetooth device) shall be tested and signed off on when test is passed in accordance to Attachment 2 of this RTVM: BlueTOAD Installed Site Test Procedure	Attachment 2:BlueTOAD Installed Site Test Procedure	All	Documentation	TC02	Not Tested	
VD013	S003	Each new VDS (Sensys device) shall be tested and signed off on when test is passed in accordance to Attachment 5 of this RTVM: Sensys Installed Site Test Procedure	Attachment 5:BlueTOAD Installed Site Test Procedure	All	Documentation	TC02	Not Tested	
VD014	S002	The Bluetooth Reading Devices shall be deployed at the designated locations shown in Table 4 of Attachment 6.	Attachment 6: Addendum 6	v.	Inspection	TC02	Not Tested	
VD015	CM009	The Bluetooth sensor software must be capable of providing a service to receive, process, match, and filter Bluetooth MAC addresses received from Bluetooth sensorsand the service must generate travel time data from the successive matches sampled along the corridor.	Attachment 6: Addendum 6	v.	Demonstration	TC02	Not Tested	
VD016	S002	The Bluetooth sensors must communicate with with the central system and service via ITS FON utilizing the Ethernet connectivity.	Attachment 6: Addendum 6	v.	Inspection	TC02	Not Tested	
VD017	CM009	The BATT (Bluetooth Arterial Travel Times) system shall be capable of combining the data from multiple pairs of Bluetooth sensors to produce route information for the entire corridor segments where each route must display the first and last sensor with travel time and speed for the designated segment.	Attachment 6: Addendum 6	v.	Demonstration	TC02	Not Tested	
VD018	VD0014	The Bluetooth sensors must be designed to receive power from within the traffic controller cabint, through the NEMA TS2 detection rack.	Attachment 6: Addendum 6	v.	Inspection	TC02	Not Tested	
VD019	CM009	The Bluetooth sensor card rack interface must be no more than one (1) card rack unit wide and be able to provide an Ethernet Port, as a serial to Ethernet port converter will not be accepted.	Attachment 6: Addendum 6	v.	Inspection	TC02	Not Tested	
VD020	S002	The Bluetooth Ethernet/IP controller must be capable of static DHCP IP addressing with support for gateway and domain.	Attachment 6: Addendum 6	v.	Inspection	TC02	Not Tested	

Req ID	Parent	Requirement	Source	Section	Verif Method	Test Case	Test Result	Test Notes
VD021	S002	Bluetooth MAC Sampling shall be done by using a minimum CSR Bluecord4 Class 1 Industrial Specificationembedded radio.	Attachment 6: Addendum 6	v.	Inspection	TC02	Not Tested	
VD022	S002	A coaxial cable shall connect the Bluetooth sensor card to the external antenna (may be either omnidirectional or a unidirectional Yagi-Uda style antenna, as directed by the manufacturer) and can be installed in the same conduit with other cabling as required for other subsystems.	Attachment 6: Addendum 6	v.	Inspection	TC02	Not Tested	
VD023	VD022	The Bluetooth antenna at each location shall not be mounted more than (15) fifteen feet above the roadway.	Attachment 6: Addendum 6	v.	Inspection	TC02	Not Tested	
VD024	S002	The Bluetooth sensors must contain advanced features designed to allow the unit to operate efficieintly in a remote enviroment and capable of sending diagnostic heartbeat information such as voltage and moitoring temperature as well as software stability information.	Attachment 6: Addendum 6	v.	Demonstration	TC02	Not Tested	
VD025	S002	The Bluetooth sensors must be capable of automatically re-booting if a condition is detected that requires such action and in the event of a total system recovery, the Bluetooth sensors shall be designed to automatically re-image the system memory.	Attachment 6: Addendum 6	v.	Demonstration	TC02	Not Tested	
VD026	CM009	The Bluetooth sensors shall have the ability to download software patches and upgrades remotely via the network.	Attachment 6: Addendum 6	v.	Demonstration	TC02	Not Tested	
VD027	CM009	The backend support system for the BATT shall process data collected by Bluetooth sensors and include a secure web-based user interface to enable the County to view, analyze, and configure data outputs. The data shall be available in real time or for post processing and include travel time, flow, speed, and MAC address counts. As well as provide filtering of Pedestrian, Vehicular, smoothing, mean, median, statistical, and 2-stage filter data to provide the most accurate data.	Attachment 6: Addendum 6	v.	Demonstration	TC02	Not Tested	
VD028		Data uploaded from the Bluetooth sensors shall be hosted and stored by the BATT system manufacturer on a dedicated server at the manufacturer's facility (Cybercenter) meeting the requirements in Attachment 6: Addendum 6 page 9.	Attachment 6: Addendum 6	v.	Demonstration	TC02	Not Tested	
VD029	CM009	The BATT system shall include the following: Web-Based Map with device location and information including dynamic color coded links based on average speeds vs. speed limit; pop up on each link displaying the link name, average speed and speed limit; real-time chart displaying the origin, destination, time-stamp, and travel-time and speed; 48 Hour graphs displaying all items called out in Attachment 6: Addendum 6 page 19.	Attachment 6: Addendum 6	v.	Demonstration	TC02	Not Tested	

Req ID	Parent	Requirement	Source	Section	Verif Method	Test Case	Test Result	Test Notes
VD030	VD028	A software plug shall be developed by the Bluetooth manufacturer to allow Brevard County travel time data stored at the BATT manufacturer's Cybercenter to be exported to FL511 website (the FL-ATIS system) and be modified to be in the established format and protcol as specified by FDOT's FL-ATIS software. The manufacturer is responsible for all hardware and the software plug-in.	Attachment 6: Addendum 6	v.	Demonstration	TC02	Not Tested	
VD031	VD028	The Bluetooth maufacturer shall provide all necessary network connectivity from the plug-in production environment to the FL-ATIS Collector server located at the FL-ATIS Tampa Colo Facility.	Attachment 6: Addendum 6	v.	Demonstration	TC02	Not Tested	
WS001	S001	A total of three new video management workstations with video decoding and management software shall be installed with one (1) located at the Brevard County Traffic Operations Center on Merritt Island, one (1) located at the Brevard County Traffic Engineering Center in Viera, and one (1) located at the City of Melbourne Public Works Traffic Engineering Office on Harper Road in Melbourne, FL.	Attachment 1 of the FDOT RFP E5N82	5.viii	Inspection	TC04	Not Tested	
WS002	WS001	The three new video management control and viewing workstations shall operate the Windows 7 Professional, 64-bit English Operating System and meet the hardware requirements as called out in RFP E5N82, section 5.3	Attachment 1 of the FDOT RFP E5N82	5.viii	Inspection	TC04	Not Tested	
WS003	S001	The new video management software client version shall be installed on the six existing Brevard County ATMS workstations as follows; two (2) located at the Traffic Engineering Center in Viera, two (2) located at the Emergency Operations Center in Rockledge, and two (2) located at the Traffic Operations Center on Merritt Island.	Attachment 1 of the FDOT RFP E5N82	5.viii	Inspection	TC04	Not Tested	
WS004	WS003	The video management workstations must be capable of acting as clients to the newly installed video management servers.	Attachment 1 of the FDOT RFP E5N82	5.viii	Inspection	TC04	Not Tested	
WS005	S001	The workstation software must be able to control an unlimited number of cameras and must be fully compatible to control, configure and view CCTVs installed as part of this project as well as the existing CCTV's.	Attachment 1 of the FDOT RFP E5N82	5.viii	Demonstration	TC04	Not Tested	
WS006	S001	Each workstation shall be capable of providing a minimum viewing of six (6) simultaneous MPEG 4 video streams	Attachment 1 of the FDOT RFP E5N82	5.viii	Demonstration	TC04	Not Tested	
WS007	S001	Video control and viewing must meet the requirements as follows: Full screen mode viewing, Multiple user customizable workspaces, Provision for multiple external monitors, Auto scanning of complete network, Remote upload of all CCTV device configurations, Built in site map editor, Background site map graphics in bitmap, Automatic camera activation on alarm, Device COMs for remote camera control (PTZ), Device configuration through a dedicated configuration manager, Device selection tree view, CCTV PTZ through onscreen virtual PTZ controls.	Attachment 1 of the FDOT RFP E5N82	5.viii	Demonstration	TC04	Not Tested	

152 Requirements

Attachment 1

Design/Build Maximum Price Request For Proposal For
The Brevard County Advance Traffic Management System (ATMS) Expansion in Brevard County

Florida Department of Transportation
District 5

DESIGN/BUILD MAXIMUM PRICE REQUEST FOR PROPOSAL

For

The Brevard County Advance Traffic Management System (ATMS) Expansion in Brevard County

Financial Projects Number(s):428597-1-52-01,428919-1-52-01, 428920-1-52-01
Federal Aid Project Number(s): ARRA 641-B
Contract Number: E5N82

Table of Contents

The attachments listed in the table of contents are by this reference hereby incorporated into and made a part of this RFP as though fully set forth herein.

OTHER DOCUMENTS

The following documents are being provided with this RFP. Except as specifically set forth in the body of the RFP, these documents are provided for general information only. They are not being incorporated into and are not being made a part of the RFP, the contract documents or any other document that is connected or related to this project except as otherwise specifically stated therein. Nothing contained in these documents shall be construed as a representation of any field condition or of any state of facts upon which the Design/Build Firm can rely in performing under this contract. All information contained in these documents must be verified by a proper factual investigation and no claims for damages, time, or any other impacts, may be based on these documents:

Document 1: Concept Plans for Sub-Project 1
Document 2: Sketch of Corridor 1 existing infrastructure
Document 3: Geotechnical Data
Document 4: Log and returned mark-ups of utility coordination for design
Document 5: ITS Ecological Constrains Memo
Document 6: Work Program ITS Overlapping Projects
Document 7: Brevard County Signal Controller Inventory

I. Introduction.

The Florida Department of Transportation (Department) has issued this Request for Proposal (RFP) to solicit competitive bids and proposals from Proposers for the design and construction of ITS infrastructure and ITS sub-system components along the following corridors in Brevard County, Florida:

- SR 500 (US 192) from the I-95 Southbound Ramps to ~~Babcock Street~~ Dairy Road
- SR 518 (Eau Galle Blvd/Montreal Ave) from CR 509 (Wickham Road) to Pineapple Ave.
- SR 520 (King Street) from Clearlake Road to Banana River Drive
- SR 5 (US 1) from Peachtree Street to Eyster Blvd.
- SR 5 (US 1) from ~~Aurora Road~~ Lake Washington Road to ~~SR 5054 (Sarno) Road~~ Babcock St
- SR 50 (Cheney Hwy) from I95 to SR 405
- SR 405 (Columbia Blvd) from SR 50 (Cheney Hwy) to SR 5 (US1)
- Palm Bay Road from Minton to Robert J. Conlan Blvd.
- Minton Road from I95 overpass to Emerson Drive NW
- CR 509 (Wickham Road) from SR 5054 (Sarno Road) to SR 500 (US 192)

ITS subsystems shall be defined as a fiber optic network system (FON), a vehicle detection system (VDS), a closed circuit television (CCTV) camera system, and an adaptive signal control system for the traffic corridor. Central control software inclusive of its hardware such as but not limited to servers, computers etc., shall be furnished and installed at the Brevard County Traffic Management Center (TMC) for the functioning purposes of remote control management of the VDS from the Brevard TMC. The overall system being installed shall be considered the Brevard County Advance Traffic Management System (ATMS) Expansion.

The purpose of the project is to upgrade existing signalized intersections to Ethernet functionality and to install a fiber optic interconnect throughout the project limits to relay command and control communications to the upgraded signalized intersections through the wide-area network (WAN) of Brevard County to the Brevard County Traffic Management Center (TMC). Upgrades to existing signal intersection detection and installation of CCTV cameras will further enhance the overall traffic control system by providing more complete flow rate, volume, and travel time data and remote monitoring capability of the sub-systems through the WAN. The traffic signal timing control shall be optimized through real time traffic adaptive operation implementation throughout the signalized intersections within the entire project limits. These upgrades will allow Brevard County to operate and maintain these corridors in a more efficient and cost-effective manner.

The Department has set a total maximum bid price of $7,555,519.00 for this project. The scope of work for the Complete Project consists of three (3) Sub-Projects with Sub-Project 1 having its own maximum bid price as described in the "Description of Work" section of this RFP. Each Design/Build Firm is to develop design approaches with corresponding schedules that maximize the amount of scope in the RFP that can be designed and built without exceeding the maximum price for the Complete Project or Sub-Project 1. Neither the bid price for Sub-Project 1 nor the combined lump sum of all Sub-Projects (Complete Project) shall exceed the total maximum bid prices set within this Request for Proposal. The scope may be modified within the criteria defined in the "Description of Work" section below to meet either maximum bid price. A scope change can be defined as physical items actually altered from the RFP and all scope changes shall be shared with the Design/Build Firms. The competition is on project scope, qualifications, quality, innovation, schedule and costs (not to exceed neither the total maximum price nor the maximum price set for Sub-Project 1). If the total maximum bid price or the maximum bid price set for Sub-Project 1 is exceeded, the Design Build Firm's price proposal shall be found non-responsive and the firm will not be considered for Final Selection.

With the maximum bid price and the use of Options, the Department's goal is to maximize the construction and exhaust the funding for Sub-Project 1 and to construct the remaining work within Sub-Project 2. The scope of Sub-Project 3 is fixed.

For this project, the Department considers the following to be requirements of the project that are not to be changed by the Design/Build Firms:

- Construct within the right-of-way owned by FDOT District 5 and/or Brevard County
- Proposed detection upgrades to signalized intersections compatible with Brevard County existing hardware and management software with no additional conversion hardware or software required to accomplish compatibility.
- Signal Phases are not to be added or deleted.

Any changes to requirements of the RFP by a Design/Build Firm must be approved by the Department prior to the information cut-off date. These changes will be shared with other Design/Build Firms. Innovative concepts will not be shared with other Design/Build Firms. An innovative concept or idea would be Design Build Firms means and methods in constructing the project and not part of approved changes to the RFP.

Description of Work

The criteria defined in Section VI.P and description of work shall be designed following the methodology of the conceptual design plans provided in the "OTHER DOCUMENTS" section of this RFP, "Document 1".

The scope of work for the Complete Project consists of three (3) Sub-Projects. Sub-Project 1 contains Options. All Option work not accomplished in Sub-Project 1 shall be included in Sub-Project 2. Each Sub-Project contains segments of roadways (Corridors) that describe the project limits of the Sub-Projects. Each Sub-Project involves the installation and/or adjustment of the ITS sub-components to include a FON, CCTV camera system, wireless VDS and traffic adaptive signal control for all Corridors as described below. Existing fiber may be utilized within the Corridors except where removal and replacement of existing fiber is specified.

Each Sub-Project for this project including Corridors and maximum bid price and options if applicable is described below. The required locations of the fiber optic cable (FOC), CCTV cameras and VDS to include Traffic Signal Control for each Corridor of each Sub-Project shall be as described in Tables 1 – 3 section VI.P of this RFP.

Sub-Project 1 – (FM 428597-1) has a maximum bid price of $874,558.00 and includes the installation and/or adjustment of the ITS sub-components to include a FON and a CCTV camera system for:

- Corridor 1 (SR 500/US 192) – From I95 South Bound Ramps to Babcock Street
- Corridor 2 (SR 518/Eau Galle Blvd/Montreal Ave) – From CR 509/Wickham Road to Pineapple Ave.

Proposers shall note a sketch of the existing ITS infrastructure known throughout the limits of Corridor 1 in Sub-Project 1is provided as Document 2 for use in evaluation of design and construction of the work described above. Use of existing conduit infrastructure for design and installation of the new 72-strand, 12-fiber buffer, fiber optic cable is encouraged. Proposers shall submit technical and price proposals per the instructions specified in section VII of this RFP.

In the event that the Design/Build Firm's bid for Sub-Project 1 is below the maximum bid amount for

Sub-Project 1, the required installation of wireless VDS's to include implementation of traffic adaptive signal control shall be added to the scope of work for Sub-Project 1 as Options in order to maximize the scope of work accomplished within the maximum bid price. Any Options added to Sub-Project 1 shall not cause the bid price for Sub-Project 1 to exceed the maximum bid price established. Each Option shall be individually added in the order as shown in the table below:

Options	Locations
Option 1	SR 500 (US 192) and I-95 Southbound Ramps
Option 2	SR 500 (US 192) and I-95 Northbound Ramps
Option 3	SR 500 (US 192) and Dike Road
Option 4	SR 500 (US 192) and John Rodes Boulevard
Option 5	SR 500 (US 192) and CR 509 (Wickham Road/Minton Road)
Option 6	SR 500 (US 192) and Meadowland Avenue
Option 7	SR 500 (US 192) and Dayton Boulevard
Option 8	SR 500 (US 192) and Laila Court
Option 9	SR 500 (US 192) and Evans Road
Option 10	SR 500 (US 192) and McClain Drive
Option 11	SR 500 (US 192) and Melbourne Square
Option 12	SR 500 (US 192) and Dairy Road
~~Option 13~~	~~SR 500 (US 192) and Airport Boulevard~~
~~Option 14~~	~~SR 500 (US 192) and South Country Club Road~~
~~Option 15~~	~~SR 500 (US 192) and Babcock Street~~
Option 13	SR 518 (Eau Gallie Blvd) and Croton Rd
Option 14	SR 518 (Eau Gallie Blvd) and Commadore Blvd
Option 15	SR 518 (Eau Gallie Blvd) and SR 5 (US 1)
Option 16	SR 518 (Eau Gallie Blvd) and Highland Ave
Option 17	SR 518 (Eau Gallie Blvd) and Pineapple
Option 18	SR 518 (Montreal Ave) and Highland Ave
Option 19	SR 518 (Montreal Ave) and Pineapple Ave

Specification, guidelines and references that pertain to the American Recovery and Reinvestment Act of 2009 (ARRA) that are contained within this RFP shall only be applicable to the scope of work for Sub-Project 1 (FM 428597-1-52-01).

Sub-Project 2 – (FM 428919-1) includes all remaining Options that are not included in the bid price proposal for Sub-Project 1 and installation and/or adjustment of the ITS sub-components to include a FON, CCTV camera system, wireless VDS and traffic adaptive signal control for:

- Corridor 3 (SR 520) – From Clearlake Road to South Banana River Drive
- Corridor 4 (SR5/US 1) – From Peachtree Street to Eyster Blvd
- Corridor 5 (SR5/US 1) – From ~~Aurora Road~~ Lake Washington Road to ~~SR 5054 (Sarno) Road~~ Babcock St.
- Corridor 6 (SR 50/Cheney Hwy) – From I95 to SR 405
- Corridor 7 (SR 405/Columbia Blvd) – SR 50/Cheney Hwy to SR5/US1

Corridor 3 of Sub-Project 2 involves the installation, replacement and/or adjustment of bridge conduit and FOC at the Merritt Island Causeway between US 1 and Tropical Trail and between Skyes Creek Pkwy and S. Banana Drive. Although, the Design Build Firm shall be required to add a new 72 Strand, 12-buffer FOC at the aforementioned locations, the Design Build Firm shall note that new conduit will be installed on the Merritt Island Causeway between US1 and Tropical Trail as a part of another project. The Design Build Firm shall utilize said conduit and must coordinate with the Department as to the availability of the conduits preparedness for fiber installation. Additionally, the Design Build Firm shall remove and dispose of the existing HDPE conduit attached to the Merritt Island Causeway at said location.

Sub-Project 3 – (FM 428920-1) includes the installation and/or adjustment of the ITS sub-components to include a FON, CCTV camera system, wireless VDS and traffic adaptive signal control for:

- Corridor 8 (Palm Bay Road) – From Minton Road to Robert J. Colin Blvd
- Corridor 9 (Minton Road) – From I95 Overpass to Emerson Drive NW
- Corridor 10 (CR 509/Wickham Road) – From SR 5054/Sarno Road to SR 500/US 192
- Add software and associated hardware to the Brevard County TMC's as described in the "Central Management System" and "Network Equipment" sub-sections of section VI.P of this RFP.

A. Design/Build Responsibility

The Design/Build Firm shall be responsible for survey, geotechnical investigation, design, acquisition of all permits not acquired by the Department, any required modification of permits acquired by the Department, maintenance of traffic, demolition, and construction on or before the date indicated in their proposal. The Design/Build Firm will coordinate all utility relocations.

The Design and Construction Criteria (Section VI) sets forth requirements regarding survey, design, construction, and maintenance of traffic during construction, requirements relative to project management, scheduling, and coordination with other agencies and entities such as state and local government, utilities and environmental permitting agencies, and the public.

The Design/Build Firm shall demonstrate good project management practices while working on this project. These include communication with the Department and others as necessary, management of time and resources, and documentation.

Sections 1201 and 1512 of the American Recovery and Reinvestment Act of 2009 (ARRA) require states to fulfill employment reporting obligations for each ARRA funded project. The Design/Build Firm on each ARRA project shall complete the initial employment report within five calendar days after the Notice to Proceed is issued by the Department. Thereafter, the reporting information will be due on a monthly basis on or before the 10th of each month, until completion of the contract. Design/Build Firms are required to provide the necessary employment information (employees, hours, and payroll wages) for their own workforce as well as the workforce of all subcontractors/subconsultants that are active on their ARRA funded project(s) for the reporting month. FDOT has automated the form which will be used to collect employment information. The prime contractor can access the employment reporting form (also known as FDOT's ARRA Employment Reporting System) from the following website: http://www2.dot.state.fl.us/ARRAEmploymentReporting/
Failure to timely report the required employment information may be cause for rejection of the monthly invoice for contract payment. Please refer to the informational brochure available at the following link, which provides summary information on the employment reporting requirements for ARRA:

http://www.dot.state.fl.us/inspectorgeneral/ARRA/ARRABrochureFinalVersion.pdf
Additional training information on ARRA employment reporting can also be accessed at:
http://www.dot.state.fl.us/inspectorgeneral/ARRA.shtm
One critical reporting component is a requirement for prime Design/Build firms to have a Dun and Bradstreet (DUNS) number. This is a unique nine-digit firm identification number issued by Dun & Bradstreet. It is not the same as a firm's Tax ID Number. Design/Build Firms who don't already have a DUNS number can register for it thru the following website: http://www.dnb.com/us/
Design/Build Firms who do not already have a DUNS number should begin the application process. According to the D&B website, it takes a minimum of 30 business days for a new D&B DUNS Number to be processed.

B. Department Responsibility

The Department will provide contract administration, management services, construction engineering inspection services and quality acceptance reviews of all work associated with the development and preparation of the contract plans and construction of the improvements. The Department will provide job specific information and/or functions as outlined in this document.

II. Schedule of Events.

Below is the current schedule of the remaining events that will take place in the selection process. The Department reserves the right to make changes or alterations to the schedule as the Department determines is in the best interests of the public. Proposers will be notified sufficiently in advance of any changes or alterations in the schedule. Unless otherwise notified in writing by the Department, the dates indicated below for submission of items or for other actions on the part of a Proposer shall constitute absolute deadlines for those activities and failure to fully comply by the time stated shall cause a Proposer to be disqualified.

Date	Event
October 4, 2010	Shortlist meeting
October 11, 2010	Deadline for submission of written questions prior to the pre-proposal meeting
October 12, 2010	Pre-proposal meeting at 1:30 p.m. local time in Cypress A Conference Room, District Office - 719 S. Woodland Blvd., Deland, FL
December 21, 2010	Final deadline for submission of questions/information
November 3, 2010	Technical Proposals due in District Office by 2:00 p.m. local time
November 23, 2010	Revisions to Technical Proposal sections that are affected by question 7 and 16 of the DB Questions and Responses on the website are due in District Office (attention: Chela Wood) by 2:00 p.m. local time. Do not resubmit the entire proposal. Submit only those pages that include any updated changes, and changes made are to be highlighted.
~~December 9, 2010~~ to be determined	Question and Answer Session in the Lake County Conference Room, District Office – 719 S. Woodland Blvd, DeLand, FL. Times will be assigned during the pre-proposal meeting. One hour will be allotted for questions and responses.
~~December 23, 2010~~ to be determined	Price Proposals due in District Office by 2:00 p.m. local time.

~~December 23, 2010~~ to be determined	Public announcing of Technical Scores and opening of Price Proposals at 2:00 p.m. local time in Volusia County Conference Room, District Office - 719 S. Woodland Blvd, Deland, FL
~~January 3, 2011~~ to be determined	Public Meeting of Selection Committee to determine intended Award at 8:15 a.m. in the District Office – 719 S. Woodland Blvd, Deland, FL
~~January 3, 2011~~ to be determined	Posting of the Department's intended decision to Award (will remain posted for 72 hours/days)
~~January 7, 2011~~ to be determined	Anticipated Award Date
~~January 31, 2011~~ to be determined	Anticipated Execution Date
~~February 14, 2011~~ to be determined	Anticipated Notice to Proceed Date (NTP) – Start of Contract Time

III. Threshold Requirements

A. Qualifications

Proposers are required to be pre-qualified in all work types required for the project. The technical qualification requirements of Florida Administrative Code (F.A.C.) Chapter 14-75 and all qualification requirements of F.A.C. Chapter 14-22, based on the applicable category of the project, must be satisfied.

B. Joint Venture Firm

Two or more firms submitting as a Joint Venture must meet the Joint Venture requirements of Section 14-22.007, Florida Administrative Code. Parties to a joint venture must submit a Declaration of Joint Venture and Power of Attorney Form No. 375-020-18, prior to the deadline for receipt of proposals.

If the Proposer is a joint venture, the individual empowered by a properly executed Declaration of Joint Venture and Power of Attorney Form shall execute the proposal. The proposal shall clearly identify who will be responsible for the engineering, quality control, and geotechnical and construction portions of the Work.

C. Price Proposal Guarantee

A bid guaranty in an amount of not less than five percent of the total bid amount shall accompany each Proposer's Price Proposal. The guaranty may, at the discretion of the Proposer, be in the form of a cashier's check, bank money order, bank draft of any national or state bank, certified check, or surety bond, payable to the Department. The surety on any bid bond shall be a company recognized to execute bid bonds for contracts of the State of Florida. The guaranty shall stand for the Proposer's obligation to timely and properly execute the contract and supply all other submittals due therewith. The amount of the guaranty shall be a liquidated sum, which shall be due in full in the event of default, regardless of the actual damages suffered. The bid guaranty of all Proposers' shall be released at such time as the successful Proposer has complied with the condition stated herein, but not prior to that time.

D. Pre-Proposal Meeting

Attendance at the pre-proposal meeting is mandatory and any short listed Proposer who fails to attend will be deemed non-responsive and automatically disqualified from further consideration. All questions of Proposers to be discussed at the pre-proposal meeting must be submitted in writing by the deadline stated in the Schedule of Events. The purpose of this meeting is to provide a forum for all concerned parties to discuss the proposed project, answer questions on the design and construction criteria, CPM schedule, and method of compensation, instructions for submitting proposals, and other relevant issues. In the event that any discussions or questions at the pre-proposal meeting require, in the Department's opinion, official additions, deletions, or clarifications of the Request for Proposal, the Design and Construction Criteria, or any other document, the Department will issue a written summary of questions and answers or an addendum to this Request for Proposals as the Department determines is appropriate. No oral representations or discussions, which take place at the pre-proposal meeting, will be binding on the Department. FHWA will be invited on oversight projects, in order to discuss the project in detail and to clarify any concerns. All necessary Utility Companies will be invited to discuss utility issues with the short listed firms. The Proposers shall direct all questions via email to the Department's Question and Answer website: http://www2.dot.state.fl.us/construction/D5/

During and after the meeting, it is the responsibility of the Project Manager/Contracting Unit to ensure that each Proposer develops their technical proposal with the same information. If a Proposer receives information from the Department relating to the project prior to the information cutoff date, the Department will ensure that all Proposers receive the same information in a timely fashion. The project file will clearly document all communications with any Firm regarding the design and construction criteria by the Contracting Unit or the Project Manager.

E. Question and Answer Session

The Department shall meet with each Proposer, formally, for a Question and Answer session**.** FHWA shall be invited on FA Oversight Projects. The purpose of the Q & A session is for the Technical Review Committee to seek clarification and ask questions, as it relates to the Technical Proposal, of the Proposer. The Question and Answer sessions will occur after the date the Technical Proposals are due, and be part of the Overall Technical Proposal Scoring. The Department will terminate Question and Answer Sessions promptly at the end of the allotted time. The Department may tape record or videotape all or part of the Question and Answer Sessions. Such recordings will become part of the Contract Documents in accordance with the Specifications. The Question and Answer session will not constitute "discussions" or negotiations. Proposers will not be permitted to ask questions of the Department except to ask the meaning of a clarification question posed by the Department. No additional time will be allowed to research answers.

The Department will provide some (not necessarily all) proposed questions to each firm as it relates to their technical proposal approximately 24 hours before the scheduled Question and Answer Session. No supplemental materials, handouts, etc. will be allowed to be presented in the Question and Answer Session.

There will be no limit to the number of staff members that the proposing firms can bring to the Question and Answer Sessions; however, it is highly recommended that the staff members be limited to those with knowledge and decision-making authority of the Question and Answer Session topics, and those who will actually be providing the services.

F. Protest Rights

Any person who is adversely affected by the specifications contained in this Request for Proposal must file a notice of intent to protest in writing within seventy-two hours of the receipt of this Request for Proposals. The formal written protest shall be filed within ten days after the date of the notice of protest if filed. The person filing the Protest must send the notice of intent and the formal written protest to:

Clerk of Agency Proceedings
Department of Transportation
605 Suwannee Street, MS 58, Room 562
Tallahassee, Florida 32399-0458

The formal written protest must state with particularity the facts and law upon which the protest is based and be legible, on 8 ½ x 11-inch white paper and contain the following:

1. Name, address, telephone number, and Department identifying number on the Notice, if known, and name, address and telephone number of a representative, if any; and

2. An explanation of how substantial interest will be affected by the action described in the Request for Proposals; and

3. A statement of when and how the request for Proposals was received; and

4. A statement of all disputed issues of material fact. If there are none, this must be indicated; and

5. A concise statement of the ultimate facts alleged, as well as the rules and statutes, which entitle to relief; and

6. A demand for relief; and

7. Conform to all other requirements set out in Florida Statutes (F.S.), Chapter 120 and F.A.C., Chapter 28-106, including but not limited to Section 120.57, F.S. and Rules 28-106.301, F.A.C., as may be applicable.

A formal hearing will be held if there are disputed issues of material fact. If a formal hearing is held, this matter will be referred to the Division of Administrative Hearings, where witnesses and evidence may be presented and other witnesses may be cross-examined before an administrative law judge. If there are no disputed issues of material fact, an informal hearing will be held, in which case the person filing the protest will have the right to provide the Department with any written documentation or legal arguments which they wish the Department to consider.

Mediation pursuant to Section 120.573, F.S., may be available if agreed to by all parties, and on such terms as may be agreed upon by all parties. The right to administrative hearing is not affected when mediation does not result in a settlement.

Failure to file a protest within the time prescribed in Section 120.57(3), Florida Statutes, shall constitute a waiver of proceedings under Chapter 120, F.S.

G. Non-Responsive Proposals

Proposals found to be non-responsive shall not be considered. Proposals may be rejected if found to be in nonconformance with the requirements and instructions herein contained. A proposal may be found to be non-responsive by reasons, including, but not limited to, failure to utilize or complete prescribed forms, conditional proposals, incomplete proposals, indefinite or ambiguous proposals, failure to meet deadlines and improper and/or undated signatures.

Other conditions which may cause rejection of proposals include evidence of collusion among Proposers, obvious lack of experience or expertise to perform the required work, submission of more than one proposal for the same work from an individual, firm, joint venture, or corporation under the same or a different name (also included for Design/Build projects are those proposals wherein the same Engineer is identified in more than one proposal), failure to perform or meet financial obligations on previous contracts, employment of unauthorized aliens in violation of Section 274A (e) of the Immigration and Nationalization Act, or in the event an individual, firm, partnership, or corporation is on the United States Comptroller General's List of Ineligible Design/Build Firms for Federally Financed or Assisted Projects.

Proposals will also be rejected if not delivered or received on or before the date and time specified as the due date for submission.

If either maximum bid price established is exceeded, the D/B Firm’s price proposal shall be found non-responsive and the firm will not be considered for Final Selection.

H. Waiver of Irregularities

The Department may waive minor informalities or irregularities in proposals received where such is merely a matter of form and not substance, and the correction or waiver of which is not prejudicial to other Proposers. Minor irregularities are defined as those that will not have an adverse effect on the Department's interest and will not affect the price of the Proposals by giving a Proposer an advantage or benefit not enjoyed by other Proposers.

1. Any design submittals that are part of a proposal shall be deemed preliminary only.

2. Preliminary design submittals may vary from the requirements of the Design and Construction Criteria. The Department, at their discretion, may elect to consider those variations in awarding points to the proposal rather than rejecting the entire proposal.

3. In no event will any such elections by the Department be deemed to be a waiving of the Design and Construction Criteria.

4. The Proposer who is selected for the project will be required to fully comply with the Design and Construction Criteria for the price bid, regardless that the proposal may have been based on a variation from the Design and Construction Criteria.

5. Proposers shall identify separately all innovative aspects as such in the Technical Proposal. An innovative aspect does not include revisions to specifications or established Department policies. Innovation should be limited to Design/Build Firm’s means and methods, approach to project, use of new products, new uses for established products, etc.

6. The Proposer shall obtain any necessary permits, and shall pay for all associated fees, and mitigation efforts as needed. The Proposer shall make all attempts to avoid all wetland impacts, if possible. If wetland impacts occur, it will be the responsibility of the Design/Build team to ensure that SJRWMD approves the exclusion of additional impacts from the Senate Bill mitigation program. The Design/Build team can therefore mitigate through bank credits or other alternative methods. If SRJWMD requires monetary donations to the mitigation fund, the D/B team will be required to pay mitigation fees into

the existing FDOT mitigation Escrow account for additional wetland impacts, beyond the permitted acreage. The current fiscal year fee for impacting one acre of wetlands is $103,275. In addition, the Proposer shall obtain any necessary protected species permits, if impacts to protected species or their habitat occur as a result of the proposed design.

7. Those changes to the Design Concept may be considered together with innovative construction techniques, as well as other areas, as the basis for grading the Technical Proposals in the area of innovative measures.

I. Modification or Withdrawal of Proposal

Proposers may modify or withdraw previously submitted proposals at any time prior to the proposal due date. Requests for modification or withdrawal of a submitted proposal shall be in writing and shall be signed in the same manner as the proposal. Upon receipt and acceptance of such a request, the entire proposal will be returned to the Proposer and not considered unless resubmitted by the due date and time. Proposers may also send a change in sealed envelope to be opened at the same time as the proposal provided the change is submitted prior to the proposal due date.

J. Department's Responsibilities

This Request for Proposal does not commit the Department to make studies or designs for the preparation of any proposal, nor to procure or contract for any articles or services. Proposers shall examine the Contract Documents and the site of the proposed work carefully before submitting a proposal for the work contemplated and shall investigate the conditions to be encountered, as to the character, quality, and quantities of work to be performed and materials to be furnished and as to the requirements of all Contract Documents. Written notification of differing site conditions discovered during the design or construction phase of the project will be given to the Department's Project Manager.

The Department does not guarantee the details pertaining to borings, as shown on any documents supplied by the Department, to be more than a general indication of the materials likely to be found adjacent to holes bored at the site of the work, approximately at the locations indicated. Proposers shall examine boring data, where available, and make their own interpretation of the subsoil investigations and other preliminary data, and shall base his bid on his own opinion of the conditions likely to be encountered. The submission of a proposal is prima facie evidence that the Proposer has made an examination as described in this provision.

K. Design/Build Contract

The Department will enter into a Lump Sum contract with the successful Design/Build Firm. In accordance with Section V, the Design/Build Firm will provide a schedule of values to the Department for their approval. The total of the Schedule of Values will be the lump sum contract amount.

The terms and conditions of this contract are fixed price and fixed time. The Design Build Firm's submitted bid (time and cost) is to be a lump sum bid for completing the scope of work detailed in the Request for Proposal.

L. Design-Build Contract-Method of Compensation and Funding: N/A

IV. Disadvantaged Business Enterprise (DBE) Program.

A. DBE Availability Goal Percentage:

The Department of Transportation has an overall eight point one eight percent (8.18%) race-neutral DBE goal. This means that the State's goal is to spend at least 8.18% of the highway dollars with Certified DBE's as prime Design/Build Firms or as subcontractors. Race-neutral means that the Department believes that the 8.18% overall goal can be achieved through the normal competitive procurement process. The Department has reviewed this project and assigned a DBE availability goal shown on the bid blank/contract front page under "% DBE Availability Goal". Although not a contract requirement, the Department believes that this DBE percentage can realistically be achieved on this project based on the number of DBE's associated with the different types of work that will be required.

Under 49 Code of Federal Regulations Part 26, if the 8.18% goal is not achieved, the Department may be required to return to a race-conscious program where goals are imposed on individual contracts. The Department encourages all of our Design/Build Firms to actively pursue obtaining bids and quotes from Certified DBE's.

B. Anticipated DBE Participation Statement:

The Department is reporting to the Federal Highway Administration the planned commitments to use DBE's. This information is being collected through the Anticipated DBE Participation Statement. This statement shall be submitted to the District Contract Compliance Manager/ Resident Compliance Officer who will then submit it electronically to the Equal Opportunity Office. Although these statements WILL NOT become a mandatory part of the contract, they will assist the Department in tracking and reporting planned or estimated DBE utilization.

C. Equal Opportunity Reporting System:

The Design/Build Firm is required to report monthly, through the Department's Equal Opportunity Reporting System on the Internet at, http://www.dot.state.fl.us/equalopportunityoffice/ actual payments, minority status, and the work type of all subcontractors and suppliers. All DBE payments must be reported whether or not the prime initially planned to utilize the company. Each month the prime must report actual payments to all DBE and MBE subcontractors and suppliers. In order for the race neutral DBE Program to be successful, cooperation is imperative.

D. DBE Supportive Services Providers:

The Department has contracted with a consultant, referred to as DBE Supportive Services Provider, to provide managerial and technical assistance to DBE's. This consultant is also required to work with prime Design/Build Firms, who have been awarded contracts, to assist in identifying DBE's that are available to participate on the project. The successful Design/Build Firm should meet with the DBE Supportive Services Provider to discuss the DBE's that are available to work on this project. The current Provider for the State of Florida is serviced by Blackmon Roberts Group and can be reached at (863) 802-1280 in Lakeland or (305) 777-0231 in Coral Gables.

E. DBE Affirmative Action Plan:

A DBE Affirmative Action Plan must be approved and on file with the Equal Opportunity Office prior to award of the contract for each prime Design/Build Firm. Update and resubmit the plan every three years. No Contract will be awarded until the Department approves the plan. The DBE Affirmative Action Plan must be on your company's letterhead, signed by a company official, dated and contain all elements of an effective DBE Affirmative Action Plan. These Plans should be mailed to:

Florida Department of Transportation
Equal Opportunity Office
605 Suwannee Street, MS 65
Tallahassee, FL 32399-0450

Questions concerning the DBE Affirmative Action Plan may be directed to the Equal Opportunity Office by calling (850) 414-4747.

F. Bidders Opportunity List:

The Federal DBE Program requires States to maintain a database of all firms that are participating, or attempting to participate, on DOT-assisted contracts. The list must include all firms that bid on prime contracts or bid or quote subcontracts on DOT-assisted projects, including both DBE's and Non-DBE's.

On the Bidders Opportunity Form if the answers to numbers 2, 3, 4, or 5 are not known, leave them blank and the Department will complete the information. This information should be returned with the bid package or proposal package or submitted to the Equal Opportunity Office within three days of submission. It can be mailed to the Equal Opportunity Office or faxed to (850) 414-4879.

V. PROJECT REQUIREMENTS AND PROVISIONS FOR WORK

A. Governing Regulations:

The services performed by the Design/Build Firm shall be in compliance with all applicable Manuals and Guidelines including the Department, FHWA, AASHTO, and additional requirements specified in this document. Except to the extent inconsistent with the specific provisions in this document, the current edition, including updates, of the following Manuals and Guidelines shall be used in the performance of this work. Current edition is defined as the edition in place and adopted by the Department at the date of advertisement of this contract with the exception of the Standard Specifications for Road and Bridge Construction (Divisions II & III), Special Provisions and Supplemental Specifications, Manual on Uniform Traffic Control Devices (MUTCD), Design Standards and Design Standards Modifications. The Design/Build Firm shall use the edition of the Standard Specifications for Road and Bridge Construction (Divisions II & III), Special Provisions and Supplemental Specifications, Design Standards and Design Standard Modifications that is in effect at the time the bid price proposals are due in the District Office. The Design/Build Firm shall use the 2009 edition of the MUTCD. It shall be the Design/Build Firm's responsibility to acquire and utilize the necessary manuals and guidelines that apply to the work required to complete this project. The services will include preparation of all documents necessary to complete the project as described in Section I of this document.

1. Florida Department of Transportation Roadway Plans Preparation Manuals
   http://www.dot.state.fl.us/rddesign/PPMManual/PPM.shtm

2. Florida Department of Transportation Design Standards
   http://www.dot.state.fl.us/rddesign/DesignStandards/Standards.shtm

3. Florida Department of Transportation Standard Specifications for Road and Bridge Construction (Divisions II & III), Special Provisions and Supplemental Specifications
   http://www.dot.state.fl.us/specificationsoffice/Default.shtm

4. Florida Department of Transportation Surveying Procedure
   http://www2.dot.state.fl.us/proceduraldocuments/procedures/bin/550030101.pdf

5. Florida Department of Transportation EFB User Guide (Electronic Field Book)
http://www.dot.state.fl.us/surveyingandmapping/downloads.shtm

6. Florida Department of Transportation Drainage Manual
http://www.dot.state.fl.us/rddesign/dr/Manualsandhandbooks.shtm

7. Florida Department of Transportation Soils and Foundations Handbook
http://www.dot.state.fl.us/structures/Manuals/SFH.pdf

8. Florida Department of Transportation Structures Manual including Temporary Design Bulletins
http://www.dot.state.fl.us/structures/manlib.shtm

9. Florida Department of Transportation Computer Aided Design and Drafting (CADD) Production Criteria Handbook Roadway Standards
http://www.dot.state.fl.us/ecso/downloads/publications/CriteriaHandBook/

10. Florida Department of Transportation Production Criteria Handbook CADD Structures Standards http://www.dot.state.fl.us/ecso/downloads/publications/CriteriaHandBook/

11. AASHTO – A Policy on Geometric Design of Highways and Streets
https://bookstore.transportation.org/item_details.aspx?ID=110

12. MUTCD - 2009
http://mutcd.fhwa.dot.gov/

13. Safe Mobility For Life Program
http://www2.dot.state.fl.us/proceduraldocuments/procedures/bin/000750001.pdf

14. Traffic Engineering and Operations Making Roads Safer for Older Drivers
http://www.dot.state.fl.us/trafficoperations/Operations/ElderRdUser.shtm

15. American with Disabilities Act
http://www2.dot.state.fl.us/proceduraldocuments/procedures/bin/625020015.pdf

16. Florida Highway Landscape Guide
http://www.dot.state.fl.us/emo/beauty/landscap.pdf

17. Florida Department of Transportation Florida Sampling and Testing Methods
http://www.dot.state.fl.us/statematerialsoffice/administration/resources/library/publications/fstm/disclaimer.shtm

18. Florida Department of Transportation Pavement Coring and Evaluation Procedure
http://www.dot.state.fl.us/statematerialsoffice/administration/resources/library/publications/materialsmanual/documents/v1-section32-clean.pdf

19. Florida Department of Transportation District Design Guidelines
http://www.dot.state.fl.us/rddesign/updates/files/updates.shtm

20. Florida Department of Transportation District Design Memos or Practices Manual (as applicable)
http://www2.dot.state.fl.us/fdotd5erc/SFiles.aspx

21. Florida Department of Transportation Utility Accommodation Manual
http://www.dot.state.fl.us/rddesign/utilities/UAM.shtm

22. AASHTO – Specifications for Highway Bridges
https://bookstore.transportation.org/category_item.aspx?id=BR

23. Florida Department of Transportation Construction Project Administration Manual
http://www.dot.state.fl.us/construction/Manuals/cpam/CPAMManual.shtm

24. Florida Department of Transportation Flexible Pavement Design Manual
http://www.dot.state.fl.us/pavementmanagement/PUBLICATIONS.shtm

25. Florida Department of Transportation Rigid Pavement Design Manual
http://www.dot.state.fl.us/pavementmanagement/PUBLICATIONS.shtm

26. Florida Department of Transportation Pavement Type Section Manual
http://www.dot.state.fl.us/pavementmanagement/PUBLICATIONS.shtm

27. Florida Department of Transportation Right of Way Manual
http://www.dot.state.fl.us/rightofway/Documents.shtm

28. Florida Department of Transportation Intelligent Transportation System Guide Book
http://www.dot.state.fl.us/TrafficOperations/Doc_Library/Doc_Library.shtm

29. Federal Highway Administration Checklist and Guidelines for Review of Geotechnical Reports and Preliminary Plans and Specifications
http://www.fhwa.dot.gov/engineering/geotech/pubs/reviewguide/checklist.cfm

30. Florida Department of Transportation Bicycle Facilities Planning and Design Handbook
http://www2.dot.state.fl.us/proceduraldocuments/procedures/bin/625010050.pdf
http://www.dot.state.fl.us/emo/pubs/pdeman/pt2ch14.pdf

31. Federal Highway Administration Hydraulic Engineering Circular Number 18 (HEC 18).
http://www.fhwa.dot.gov/engineering/hydraulics/library_arc.cfm?pub_number=17

32. Florida Department of Transportation Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways
http://www.dot.state.fl.us/rddesign/FloridaGreenbook/FGB.shtm

33. **Florida Statutes**
http://www.leg.state.fl.us/Statutes/index.cfm?Mode=View%20Statutes&Submenu=1&Tab=statutes&CFID=14677574&CFTOKEN=80981948

34. AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals, 5th Edition, 2009
https://bookstore.transportation.org/item_details.aspx?ID=1319

35. Florida Department of Transportation – Traffic Engineering Manual
http://www.dot.state.fl.us/trafficoperations/Operations/Studies/TEM/TEM.shtm

36. Florida’s Highway Guide Sign Program, Rule Chapter 14-51, F.A.C.
http://www.dot.state.fl.us/trafficoperations/Operations/Studies/TEM/14-51_PartI.shtm

37. FDOT Minimum Specifications for Traffic Control Signal Devices
http://www.dot.state.fl.us/trafficoperations/Traf_Sys/terl/apl4.shtm

38. FDOT Approved Products List
http://www3.dot.state.fl.us/trafficcontrolproducts/

39. FDOT Qualified Products List
http://www.dot.state.fl.us/Specificationsoffice/ProductEvaluation/QPL/Default.shtm

40. FDOT District V Design/Build Shop Drawing submittal process
http://www.dot.state.fl.us/construction/DistrictOffices/d5web/files/sop/ch8/Design-Build%20Shop%20Drawings%20Submittal.pdf

41. FDOT District V Guidelines for Traffic Signal Plan Preparation
http://www2.dot.state.fl.us/fdotd5erc/SFiles.aspx?C=4

42. FDOT District V Guidelines for Signing and Pavement Marking Plans
http://www2.dot.state.fl.us/fdotd5erc/SFiles.aspx?C=4

43. FDOT District V Design Engineer Memorandums
http://www2.dot.state.fl.us/fdotd5erc/SFiles.aspx?C=25

44. FDOT Office of Construction Memorandums
http://www.dot.state.fl.us/construction/memos/Current_Memo/CurrentMemos.shtm

45. AASHTO Roadway Lighting Design Guidelines
https://bookstore.transportation.org/item_details.aspx?ID=320

46. FDOT "Open Roads Policy"
http://www.dot.state.fl.us/trafficoperations/Traf_Incident/pdf/Open_Roads_Policy_FDOT_FHP.pdf

47. FDOT Preparation and Documentation Manual
http://www.dot.state.fl.us/construction/Manuals/finalest/p&d/PrepDocManual.shtm

48. FDOT Driveway Information Guide
http://www.dot.state.fl.us/planning/systems/sm/accman/default.shtm

49. Federal Aviation Authority (FAA), Part 77 Regulations
http://www.access.gpo.gov/nara/cfr/waisidx_04/14cfr77_04.html

B. Innovative Aspects:

All innovative aspects shall be identified separately as such in the Technical Proposal.

An innovative aspect does not include revisions to specifications, standards or established Department policies. Innovation should be limited to Design/Build Firm's means and methods, approach to project, etc.

C. Geotechnical Services:

1. **General Conditions**:

The Design/Build Firm will be responsible for identifying and performing any geotechnical investigation, analysis, and design dictated by the project needs. All geotechnical work necessary shall be performed in accordance with the governing regulations.

The Design/Build Firm shall provide the Department signed and sealed design and construction reports. The reports shall be a record set of all geotechnical information, including relevant support data.

2. **Pile Foundations: N/A**

3. **Drilled Shaft Foundations for Bridges and Major Structures: N/A**

4. **Drilled Shaft Foundations for Miscellaneous Structures: N/A**

The Design/Build Firm shall employ geotechnical and drilled shaft testing consultants with the following minimum qualifications:

- Professional engineers registered in the State of Florida with at least 3 years of post-registration experience in drilled shaft foundation design and construction.

- The drilled shaft installation shall be supervised and certified by the Geotechnical Foundation Design Engineer of Record. These services shall include providing CTQP-qualified Drilled Shaft Inspectors in the numbers necessary to comply with Department specifications for recording drilled shaft construction records. Provide drilled shaft construction logs to FDOT within 24 hours of completing the shaft.

- Use drilled shaft superintendents in responsible charge of drilling operations experienced in drilled shaft installation and testing in the State of Florida. This "responsible charge" experience shall include at least three (3) projects with drilled shaft foundations of similar size.

D. Environmental Permits:

It is anticipated that the proposed project will not require a state Environmental Resource Permit, Section 404 permit, or any protected species permits. It is the Proposer's responsibility to ensure that all wetlands are avoided during construction. A safe-upland line should be provided on construction plans to ensure that the contractor does not perform work or stage equipment within jurisdictional wetlands that are within 25 feet of the construction limits. Should wetland impacts be unavoidable, the following section describes permitting requirements (also described in Section III.H: Waiver of Irregularities).

All efforts should be made to avoid impacts to protected species and their habitat. Should protected species impacts be unavoidable, the Design Build Firm will be responsible for obtaining any necessary protected species permits (including required mitigation). Gopher Tortoise (*Gopherus polyphemus*) burrows have been identified near the project but are currently located outside of the jurisdictional 25 foot buffer limits of conceptual design. The gopher tortoise is listed as a State Threatened species. FDOT will require the chosen Design Build Firm to conduct a species-specific survey that adheres to standardized methods, prior to construction, to ensure no impacts will occur to new tortoise burrows within 25 feet of the project limits. If impacts will occur, a relocation permit from the Florida Fish and Wildlife Conservation Commission will be required, and will be sole responsibility of the Design/Build Team to secure. The Chosen Design/Build team shall coordinate with the District Permit Coordinator prior to consulting any regulatory agency during design.

1. **Storm Water and Surface Water:**

Plans shall be prepared in accordance with Chapter 62-25, Regulation of Storm water Discharge, Florida Administrative Code.

2. **Permits:**

All applicable data shall be prepared in accordance with Chapter 373 and 403, Florida Statutes, Chapters 40 and 62, Florida Administrative Code; Rivers and Harbors Act of 1899, Section 404 of the Clean Water Act, and parts 114 and 115, Title 33, Code of Federal Regulations. In addition to these Federal and State permitting requirements, any dredge and fill permitting required by local agencies shall be prepared in accordance with their specific regulations. Acquisition of all applicable permits will be the responsibility of the Design/Build Firm. Preparation of complete permit packages will be the responsibility of the Design/Build Firm. The Design/Build Firm will obtain permits while acting as an authorized representative for the “Department” for permitting purposes only. If any agency rejects or denies the permit application, it is the Design/Build Firm’s responsibility to make whatever changes necessary to ensure the permit is approved.

The Design/Build Firm will be required to pay all permit fees. Any fines levied by permitting agencies shall be the responsibility of the Design/Build Firm.

The Design/Build Firm shall be responsible for an assessment of all potential gopher tortoise habitat that could be impacted by the project. The habitat will be systematically surveyed according to the current guidelines published by the Florida Fish and Wildlife Conservation Commission (FWC). If gopher tortoise burrows are found, all practicable measures will be employed to avoid impacts. The Design/Build Firm shall be responsible for obtaining an FWC permit for the relocation of gopher tortoises and commensals from burrows which cannot be avoided, and relocation shall be performed at a time as close as practicable to the start of construction activities at the site of the burrows. If new burrows are found after relocation, their occupants will also be relocated. A copy of the permit and any subsequent reports to FWC must be provided to the District Environmental Management Office.

The Design/Build Firm will be required to pay all permit fees including any and all fees associated with the relocation of gopher tortoises. Any fines levied by permitting agencies shall be the responsibility of the Design/Build Firm.

However, notwithstanding anything above to the contrary, upon the Design/Build Firm’s preliminary request for extension of Contract Time, pursuant to 8-7.3, being made directly to the District Construction Engineer, the Department reserves unto the District Construction Engineer, in his sole and absolute discretion, according to the parameters set forth below, the authority to make a determination to grant a non-compensable time extension for any impacts beyond the reasonable control of the Design/Build Firm in securing permits. Furthermore, as to any such impact, no modification provision will be considered by the District Construction Engineer unless the Design/Build Firm clearly establishes that it has continuously from the beginning of the project aggressively, efficiently and effectively pursued the securing of the permits including the utilization of any and all reasonably available means and methods to overcome all impacts. There shall be no right of any kind on behalf of the Design/Build Firm to challenge or otherwise seek review or appeal in any forum of any determination made by the District Construction Engineer under this provision.

3. **Signed and Sealed As-Built Drawings**

The Design/Build Firm shall adhere to all environmental permit conditions related to as-built certification.

E. Railroad Coordination:

The Department will conduct the required contract negotiations and plans review coordination. All required Railroad Reimbursement Agreements will be between Florida East Coast Railway, LLC and (the Department). Copies of the approved Agreements will be made available to the Design/Build Firm. The Design/Build Firm must comply with the terms of these agreements. The Design/Build Firm must make the necessary arrangements with Florida East Coast Railway, LLC prior to encroachments into the railroad rights-of-way.

F. Survey:

The Design/Build Firm shall perform all surveying and mapping services necessary to complete the project. Survey services must also comply with all pertinent Florida Statutes and applicable rules in the Florida Administrative Code. All field survey data will be furnished to the District Surveyor in a Department approved digital format, readily available for input and use in CADD Design files. All surveying and mapping work must be accomplished in accordance with the Department's Surveying Procedure, Topic Nos. 550-030-101; Right-of-Way Mapping Procedure, Topic No. 550-030-015; Aerial Surveying Standards for Transportation Projects Procedure, Topic No. 550-020-002. This work must comply with the Minimum Technical Standards for Professional Surveyors and Mappers, Chapter 61G17, Florida Administrative Code (F.A.C.), pursuant to Section 472.027, Florida Statutes (F.S.) and any special instructions from the Department. This survey also must comply with the Department of Environmental Protection Rule, Chapter 18-5, F.A.C. pursuant to Chapter 177, F.S., and the Department of Environmental Protection.

G. Verification of Existing Conditions:

The Design/Build Firm shall be responsible for verification of existing conditions, including research of all existing Department records and other information.

By execution of the contract, the Design/Build Firm specifically acknowledges and agrees that the Design/Build Firm is contracting and being compensated for performing adequate investigations of existing site conditions sufficient to support the design developed by the Design/Build Firm and that any information is being provided merely to assist the Design/Build Firm in completing adequate site investigations. Notwithstanding any other provision in the contract documents to the contrary, no additional compensation will be paid in the event of any inaccuracies in the preliminary information.

H. Submittals:

1. Plans:

Plans must meet the minimum contents of a particular phase submittal prior to submission for review. The particular phase of each submittal shall be clearly indicated on the cover sheet.

Submittals shall contain the following:

- Plan sheets developed to the specified level of detail (i.e. 90% plans, Final plans, etc.),
- Design documentation including a complete set of calculations, geotechnical reports, pertinent correspondence, etc. in support of the 90% and final component submittals.

The Design/Build Firm shall provide copies of required review documents as listed below.

90% Component Plans

8 sets of 11” X 17” each component set, except ITS plans
5 sets of 11” X 17” ITS plans
7 copies of Final Geotechnical Report
2 copy of Specifications Package
Independent Peer reviewer’s comments and comment responses
2 sets of the adaptive signal control implementation and timings plan draft version
2 sets of 11” x 17” ITS plans and adaptive signal control plan in Adobe Acrobat format (.pdf) on CD’s

Final Component Plans

8 sets of 11” X 17” each component set, except ITS plans
5 sets of 11” X 17” ITS plans
2 sets of final documentation
1 signed and sealed copy of Specifications Package
2 sets of electronic copies of Specifications Package and 11” x 17” plans in Adobe (.pdf) format on CD’s

Construction Set:

1 set of 11”X 17” copies of the signed and sealed plans for the Department to stamp “Released for construction”.
2 sets of 11” x 17” ITS plans in Adobe Acrobat format (.pdf) on CD’s

Final signed and sealed plans will be delivered to the Department’s Project Manager a minimum of 5 working days prior to construction of that component. The Department’s Project Manager will send a copy of a final signed and sealed plans to the appropriate office for review and stamping “Released for Construction”. Only stamped signed and sealed plans are valid and all work that the Design/Build Firm performs in advance of the Department’s release of Plans will be at the Design/Build Firm’s risk.

Record Set:

The Design/Build Firm shall furnish to the Department, upon project completion, the following:

- 1 set of 11” X 17” signed and sealed plans
- 5 sets of 11 "X 17” copies of the signed and sealed plans
- 2 sets of final CADD files on CD (This can be added to the Final Project CD)

- 2 sets of 11” x 17” as-built roadway and component plans and 2 sets of the adaptive signal control implementation and timings plan final version in Adobe Acrobat format (.pdf) on CD

The Design/Build Firm's Professional Engineer in responsible charge of the project’s design shall professionally endorse (signed and sealed and certified) the record prints, the special provisions and all reference and support documents. The professional endorsement shall be performed in accordance with the Department Plans Preparation Manual.

The Design Build Firm shall complete the record set as the project is being constructed. The record set becomes the as-builts at the end of the job and signed/sealed changes are by the EOR. The record set shall reflect all changes initiated by the Design/Build Firm or the Department in the form of revisions. The record set shall be submitted on a Final Project CD upon project completion. The CEI shall do a review of the record set prior to final acceptance in order to complete the record set.

The CEI shall certify the final plans as per Section 4.5.7 of Chapter 4 of the Preparation and Documentation Manual (TOPIC No. 700-050-010)

I. Contract Duration:

The Design/Build Firm shall establish the contract duration for the subject project. In no event shall the contract duration exceed 470 calendar days. The official Proposed Contract Time (PCT) will be the one submitted with the Bid Price Proposal. The date on which calendar days will begin to be charged to the project shall be the same date as the Notice to Proceed.

J. Project Schedule:

The Design/Build Firm shall submit a project schedule, in accordance with Subarticle 8-3.2 (Design/Build Division I Specifications), which supports the established contract duration submitted as part of the Technical Proposal. The minimum number of activities shall be those listed in the payout schedule and those listed below:

- Anticipated Award Date
- Design Submittals
- Design Survey
- Design Reviews by the Department and FHWA
- Design Review / Acceptance Milestones
- Materials Quality Tracking
- Geotechnical Investigation
- Start of Construction
- Clearing and Grubbing
- Construction Mobilization
- Environmental Permit Acquisition
- Intelligent Transportation System Design
- Intelligent Transportation System Construction
- Maintenance of Traffic Design
- Maintenance of Traffic Set-Up (per duration)
- Erosion Control

- Additional Construction Milestones as determined by the Design/Build Firm
- Final Completion Date for All Work

The DESIGN BUILD FIRM'S schedule should allow for a fifteen (15) calendar day (excluding Holidays as defined in section 1-3 of the Specifications) review time for the DEPARTMENT'S review of the 90% design submittal.

The review period commences upon the Department's receipt of the valid submittal or re-submittal and terminates upon the transmittal of the submittal back to the Design/Build Firm. The Department's review is not meant to be a complete and detailed review. Submittal of the subsequent Component plans will not be allowed until all previous Component plan review comments have been resolved, responded to by the Design/Build Firm, and accepted by the Department's reviewers.

K. Key Personnel/Staffing:

The Design/Build Firm's work shall be performed and directed by key personnel identified in the technical proposal by the Design/Build Firm. Any changes in the indicated personnel shall be subject to review and approval by the Department's Project Manager. The Design/Build Firm shall have available a professional staff that meets the minimum training and experience set forth in Florida Statute Chapter 455.

L. Meetings and Progress Reporting:

The Design/Build Firm shall anticipate periodic meetings with Department personnel and other agencies as required for resolution of design and/or construction issues. These meetings may include:

- Department technical issue resolution
- Permit agency coordination
- Local government agency coordination
- Scoping Meetings

During design, the Design/Build Firm shall meet with the Department's Project Manager on a regular basis and provide a look ahead of the upcoming activities.

During construction, the Design/Build Firm shall meet with the Department's Project Manager on a weekly basis and provide a one-week look ahead for activities to be performed during the coming week.

The Design/Build Firm shall, on a monthly basis, provide written progress reports that describe the items of concern and the work performed on each task in a Department-approved format.

M. Public Involvement:

1. General:

Public involvement is an important aspect of the project. Public involvement includes communicating to all interested persons, groups, and government organizations information regarding the development of the project. A Public Involvement Consultant (PIC) has been hired by the Department to carry out an exhaustive Public Involvement Campaign and a marketing effort. The Design/Build Firm will continue to be part of the Public Involvement effort but on a limited basis as described below.

2. **Community Awareness:**

The Design/Build Firm will review and comment on a Community Awareness Program provided by the PIC for the project.

3. **Public Meetings:**

The Design/Build Firm shall provide all support necessary for the PIC to hold various public meetings, which may include:

- Kick-off or introductory meeting
- Metropolitan Planning Organization (MPO) Citizens Advisory Committee Meetings
- MPO Transportation Technical Committee Meetings
- MPO Meetings
- Public Information Meetings
- Elected and appointed officials
- Special interest groups (private groups, homeowners associations, environmental groups, minority groups and individuals)

The Design/Build Firm shall include attendance at two meetings per month for the term of the contract to support the public involvement program.

For any of the above type meetings the Design/Build Firm shall provide all technical assistance, data and information necessary for the PIC to produce display boards, printed material, video graphics, computerized graphics, etc., and information necessary for the day-to-day exchange of information with the public, all agencies and elected officials in order to keep them informed as to the progress and impacts that the proposed project will create. This includes workshops, information meetings, and public hearings.

The Design/Build Firm shall, on an as-needed basis, attend the meetings with an appropriate number of his personnel to assist the Department's Project Representative/PIC. The Design/Build Firm shall forward all requests for group meetings to the PIC. The Design/Build Firm shall inform the PIC of any meetings with individuals that occur without prior notice.

4. **Public Workshops, Information Meetings:**

The Design/Build Firm shall provide all the support services listed in No. 3 above.
All legal/display ads announcing workshops, information meetings, and public meetings will be prepared and paid for by the PIC.

The Department will be responsible for the legal/display advertisements for design concept acceptance. The PIC will be responsible for preparing and mailing (includes postage) for all letters announcing workshops and information meetings.

5. **Public Involvement Data:**

The Design/Build Firm is responsible for the following:

- Coordinating with the Public Involvement Consultant.
- Identifying possible permit and review agencies and providing names and contact information for theses agencies to the PIC.
- Providing required expertise (staff members) to assist the PIC on an as-needed basis.
- Preparing color graphic renderings and/or computer generated graphics to depict the proposed improvements for coordination with the Department, local governments, the Urban Design Guidelines Committee, and other agencies.

The collection of public input occurs throughout the life of the project and requires maintaining files, newspaper clippings, letters, and especially direct contacts before, during and after any of the public meetings. Articles such as those mentioned shall be provided to the PIC for their use and records.

In addition to collecting public input data, the Design/Build Firm may be asked by the PIC to prepare responses to any public inquiries as a result of the public involvement process. The Department shall review all responses prior to mailing.

N. Quality Management Plan (QMP):

1. Design:

The Design/Build Firm shall be responsible for the professional quality, technical accuracy and coordination of all surveys, designs, drawings, specifications, geotechnical and other services furnished by the Design/Build Firm under this contract.

The Design/Build Firm shall provide a Design Quality Management Plan, which describes the Quality Control (QC) procedures to be utilized to verify, independently check, and review all design drawings, specifications, and other documentation prepared as a part of the contract. In addition the QMP shall establish a Quality Assurance (QA) program to confirm that the Quality Control procedures are followed. The Design/Build Firm shall describe how the checking and review processes are to be documented to verify that the required procedures were followed. The QMP may be one utilized by the Design/Build Firm, as part of their normal operation or it may be one specifically designed for this project. The Design/Build Firm shall submit a QMP within 15 working days of the written Notice to Proceed. A marked up set of prints from the Quality Control review will be sent in with each review submittal. The responsible Professional Engineers or Professional Surveyor that performed the Quality Control review, as well as the QA manager will sign a statement certifying that the review was conducted.

The Design/Build Firm shall, without additional compensation, correct all errors or deficiencies in the surveys, designs, drawings, specifications and/or other services.

No fabrication, casting, or construction will occur until all related design review and shop drawing review comments are resolved.

2. Construction:

The Design/Build Firm shall be responsible for developing and maintaining a Construction Quality Control Plan in accordance with Section 105 of Standard Specifications which describes their Quality Control procedures to verify, check, and maintain control of key construction processes and materials.

The sampling, testing and reporting of all materials used shall be in compliance with the Sampling, Testing and Reporting Guide (STRG) provided by the Department. The Design/Build Firm will use the Department's database(s) to allow audits of materials used to assure compliance with the STRG. The Department has listed the most commonly used materials and details in the Department's database. When materials being used are not in the Department's database list, the Design/Build Firm shall use appropriate material details from the STRG to report sampling and testing. Refer to the "Access Instruction for LIMS" for more information on how to gain access to the Department's databases: http://www.dot.state.fl.us/statematerialsoffice/quality/programs/qualitycontrol/contractor.shtm

Prepare and submit to the Engineer a Job Guide Schedule (JGS) using the Laboratory Information Management System (LIMS) 21 calendar days prior to commencement of construction. Update the Job Guide Schedule and submit it to the Engineer prior to each monthly progress estimate. The Department may not authorize payment of any progress estimate not accompanied by an up-to-date Job Guide Schedule. Maintain the Job Guide Schedule throughout the project including the quantity placed since the previous submittal, and total to date quantity and any additional materials placed. Do not commence work activities that require testing until the Job Guide Schedule has been reviewed and accepted by the Engineer. At final acceptance, submit a final Job Guide Schedule that includes all materials used on the project in the same format as the monthly reports.

The Department shall maintain its rights to inspect construction activities and request any documentation from the Design/Build Firm to ensure quality products and services are being provided in accordance with the Department's Materials Acceptance Program.

O. Liaison Office:

The Department and the Design/Build Firm will designate a Liaison Office and a Project Manager who shall be the representative of their respective organizations for the project.

For this project an Engineer's Field Office will not be required.

P. Schedule of Values:

The Design/Build Firm will be responsible for invoicing the Department based on current invoicing policy and procedure. Invoicing will be based on the completion or percentage of completion of major, well-defined tasks as defined in the schedule of values. Final payment will be made upon final acceptance by the Department of the Design/Build project. Tracking DBE participation will be required under normal procedures according to the CPAM. The Design/Build Firm must submit the schedule of values to the Department for approval. No invoices shall be submitted prior to Department approval of the schedule of values.

Upon receipt of the invoice, the Department's Project Manager will make judgment on whether or not work of sufficient quality and quantity has been accomplished by comparing the reported percent complete against actual work accomplished.

Q. Computer Automation:

The project shall be developed utilizing computer automation systems in order to facilitate the development of the contract plans. Various software and operating systems were developed to aid in assuring quality and conformance with Department of Transportation policies and procedures. Seed Files, Cell Libraries, User Commands, MDL Applications and related programs developed for roadway design and drafting are available for the MicroStation V8 format in the FDOT CADD Software Suite. However, it is the responsibility of the Design/Build Firm to obtain and utilize current Department releases of all CADD applications.

The Design/Build Firm's role and responsibilities are defined in the Department's CADD Manual. The Design/Build Firm will be required to submit final documents and files which shall include complete CADD design and coordinate geometry files in Intergraph / Micro station format, as described in the above referenced document.

The archived submittal shall also include either a TIMS database file, CADD Index file (generated from RDMENU) or documentation that shall contain the project history, file descriptions of all (and only) project files, reference file cross references, and plotting criteria a (e.g. batch, level symbology, view attributes, and display requirements). A printed directory of the archived submittal shall be included.

R. Construction Engineering and Inspection:

The Department is responsible for providing Construction Engineering and Inspection (CEI) and Quality Assurance Engineering.

The Design/Build Firm is subject to the Department's Independent Assurance (IA) Procedures.

S. Testing:

The Department or its representative will perform verification and resolution testing services in accordance with the latest Specifications. On all Federal Aid Projects, the Department or its representative shall perform verification sampling and testing on site as well as off site locations such as pre-stress plants, batch plants, structural steel and weld, fabrication plants, etc.

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T. Design/Build Firm Value Added:

The Design/Build Firm may provide a Contractor guaranteed/Value Added Project Features, in accordance with Article 5-14 of the Specifications for the following features:

- Any products or features the Design/Build Firm desires.

The Design/Build Firm shall develop the Value Added criteria, measurable standards, and remedial work plans in the Design/Build Firm's technical proposal features proposed by the D/B Firm.

U. Adjoining Construction Projects:

The Design/Build Firm shall be responsible for coordinating construction activities with other construction projects that are impacted by or impact this project. This includes projects under the jurisdiction of local governments, the Department, or other regional and state agencies.

V. Design Issue Escalation:

The Department has established the issue escalation process for design questions and conflict resolution that the Design/Build Firm shall follow unless revised by the Partnering agreement. All issues are to be directed to the Department Project Manager. If the issue cannot be resolved at this level the Department Project Manager shall forward the issue to the next level in the process. The escalation process begins with the District Design Engineer, followed by the Director of Transportation Operations, and finally to the District Secretary. Each level shall have a maximum of three working days to answer, resolve or address the issue. This three day window is a response time and does not infer resolution. Questions may be expressed verbally and followed up in writing. The Department Project Manager will respond in a timely manner but not to exceed three working days. The Design/Build Firm shall provide any available supporting documentation.

The Design/Build Firm shall provide a similar issue escalation process for his organization with personnel of similar levels of responsibility.

The District Secretary will have the final authority on design decisions.

W. Construction Clarification, Conflict Resolution, and Issue Escalation:

In the event that construction problems occur, the resolution of those problems will be processed in one of the following two ways unless revised by a Partnering agreement:

- If the resolution does not change the original intent of the technical proposal/RFP, then the Design/Build Firm Engineer of Record (EOR) will be responsible for developing the design solution to the construction problem and the District Resident Engineer will be responsible for review and response within 10 working days. The District Resident Engineer will either concur with the proposed solution or, if the District Resident Engineer has concerns, the issue will be escalated as described in the process below.

- If the resolution does alter the original intent of the technical proposal/RFP then the EOR will develop the proposed solution, copy in the District Resident Engineer, and send it to the District Construction Office for review and response through the Department Project Manager. The District Construction Office will respond to the proposed solution within ten working days. The District Construction Office will either concur with the proposed solution or, if the District Resident Engineer has concerns, the issue will be escalated as described in the process below. Changes to the original intent of the technical proposal/RFP will require a contract change order and FHWA approval.

- The Department has established the issue escalation process for construction questions and conflict resolution that the Design/Build Firm shall follow unless revised by the Partnering agreement. All issues are to be directed to the Department Project Manager. If the issue cannot be resolved at this level the Department Project Manager shall forward the issue to the next level in the process. The escalation process begins with the District Construction Engineer, followed by the Director of Transportation Operations, and finally to the District Secretary. Each level shall have a maximum of three working days to answer, resolve or address the issue. This three day window is a response time and does not infer resolution. Questions may be expressed verbally and followed up in writing. The Department Project Manager will respond in a timely manner but not to exceed three working days. The Design/Build Firm shall provide any available supporting documentation.

The Design/Build Firm shall provide a similar chain of command for his organization with personnel of similar levels of responsibility.

Should an impasse develop, the Dispute Review Board shall assist in the resolution of disputes and claims arising out of the work on the Contract.

VI. Design and Construction Criteria

A. General:

The Design/Build Firm shall be responsible for: detailed plan checking as outlined in the Plans Preparation Manual (PPM); as described in the RFP; and the Design and Construction criteria package. This includes a checklist of the items listed in the PPM for each completed phase submittal. Roadway submittals may be broken down into ITS, signing & pavement marking, signalization, landscaping and final geometry components. The component design must be in conformity with the Design and Construction Criteria requirements, approved preliminary layout and concept as provided in the Technical Proposal.

Before construction activities can begin for a specific component, signed and sealed design plans and calculations supporting the design for that component must be reviewed by the Department. Component submittals shall be complete submittals along with all the supporting information necessary for review. The work must represent logical work activities and must show impacts on subsequent work on this project. Any modification to the component construction due to subsequent design changes as the result of design development is solely the Design/Build Firm's risk. Upon review by the Department, the plans will be stamped "Released for Construction" and initialed and dated by the reviewer. Any construction initiated by the Design/Build Firm prior to receiving signed and sealed plans stamped "Released for Construction" shall be at the sole risk of the Design/Build Firm.

All design and construction documents shall be prepared using the English system.

B. Geotechnical Services

The Design/Build Firm shall perform a subsurface investigation, analysis and design for all aspects of the project in accordance with Department standards, policies and procedures. Existing subsurface information may be used. Supplemental subsurface investigation and testing will be required to ensure all aspects of the project are covered.

Driven Pile Foundations for Bridges and Major Structures: N/A

Drilled Shaft Foundations for Bridges and Major Structures: N/A

Drilled Shaft Foundation for Miscellaneous Structures:

The Design-Build Firm shall be responsible for the following:

- Evaluating geotechnical conditions and designing the foundations including the drilled shaft diameter and length, and construction methods to be used.
- Completing the subsurface investigation and drilling pilot holes prior to establishing the drilled shaft tip elevations.

- Documenting and providing a report that includes all analysis, and recommendations to the District Geotechnical Engineer. The report should include but not be limited to the following: pilot borings for all drilled shafts, soil parameters used for design shaft length and diameter, shafts tip elevation, and design calculations. This report shall be signed and sealed by a Florida licensed Professional Engineer and shall be submitted to the District Geotechnical Engineer for review and approval at least five working days prior to beginning production shaft construction Additional data or analysis may be required by the Engineer.

- Constructing all drilled shafts to the required tip elevation.

- Verifying level and clean hole bottom conditions and properties of the drilling fluid at the time of concrete placement.

- Documenting and submitting the drilled shaft excavation and concreting logs to the District Geotechnical Engineer within 24 hours of concrete placement. The documentations shall include the drilled shaft installation procedures and sequencing as well as any problems encountered during construction and concrete placement. Allow three working days for the District Geotechnical Engineer to review the data before any further construction on the shafts.

- Repairing all detected defects and conducting post repair integrity testing using 3D tomographic imaging and gamma-gamma density logging. Submitting all results to the District Geotechnical Engineer within five days of test completion.

- Submitting the Foundation Certification Packages.
    - Each Foundation Certification Package shall contain an original signed and sealed letter certifying capacity and integrity of all drilled shafts, and clearly legible copies of all shaft excavation and concreting logs, all CSL reports and electronic data, slurry test data, supplemental testing data and analyses for the foundation unit. The certification shall not be contingent on any future testing or approval by FDOT.
    - Submit two copies of the Foundation Certification Package signed and sealed by the Geotechnical Foundation Design Engineer of Record to FDOT within three weeks of finishing each foundation unit and prior to Verification Testing. A foundation unit is defined as one or more shafts constructed.

C. Utility Coordination

The Design Build Firm shall insure FDOT standards, policies, procedures, and design criteria are followed concerning utility coordination. The FDOT standards, policies, procedures, and design criteria are contained in the current adopted Design Standards, Standard Specifications for Road and Bridge Construction, Rule 14-46.001 (Utility Accommodation Manual), and any Supplemental Specification, Provision, or Agreement attached to this RFP.

The Design/Build Firm may employ more than one individual or utility engineering consultant to provide utility coordination and engineering design expertise. However, the Design/Build Firm shall employ and identify a single dedicated person responsible for managing all utility coordination and design activities. This person shall be contractually referred to as the Utility Coordination Manager and shall be identified in the Design/Build Firm's proposal. The Utility Coordination Manager shall be required to satisfactorily demonstrate to the Department's Project Manager having the following knowledge, skills, and abilities:

1. A minimum of 4 years of experience performing utility coordination in accordance with Department standards, policies, and procedures.
2. Knowledge of the Department plans production process and District utility coordination practices,
3. Knowledge of Department agreements, standards, policies, and procedures.

The Design/Build Firm's Utility Coordination Manager shall be responsible for, but not limited to, the following:

1. Ensuring that Utility Coordination and design is conducted in accordance with the Department's standards, policies, procedures, and design criteria.
2. Assisting the Engineer of Record in identifying all existing utilities and coordinating any new installations.
3. Scheduling utility meetings, keeping and distribution of minutes of all utility meetings, and ensuring expedient follow-up on all unresolved issues.
4. Distributing all plans, conflict matrixes and changes to affected utility owners and making sure this information is properly coordinated.
5. Identifying and coordinating the completion of any Department or utility owner agreement that is required for reimbursement, or accommodation of the utility facilities associated with the Design/Build project.
6. Assisting the Engineer of Record and the contractor with resolving utility conflicts.
7. Handling reimbursable issues inclusive of betterment and salvage determination.
8. Obtaining and maintaining Sunshine State One Call Design to Dig Tickets.
9. QA Review of construction plans prior to construction activities for completeness
10. Acquisition/procurement of any required easements when stated in RFP and as required by design
11. Periodic project updates to the district utility office as needed.

D. Roadway Plans: N/A

E. Geometric: N/A

F. Design Documentation, Computations and Quantities:

The Design/Build Firm shall submit to the Department design notes and computations to document the design conclusions reached during the development of the construction plans.

The design notes and computation sheets shall be fully titled, numbered, dated, indexed, and signed by the designer and the checker. Computer output forms and other oversized sheets shall be folded to a standard size 8½" x 11". The data shall be in a hard-back folder for submittal to the Department. At the project completion, a final set of design notes and computations, signed by the Design/Build Firm, shall be submitted with the record set of plans and tracings.

The design notes and calculations shall include, but not be limited to the following data:

1. Design standards used for the project
2. Documentation of decisions reached resulting from meetings, telephone conversations or site visits

3. Final quantities list

G. Structure Plans: N/A

H. Specifications:

Department Specifications may not be modified or revised. The Design/Build Firm shall also include all Technical Special Provisions, which will apply to the work in the proposal. Technical Special Provisions shall be written only for items not addressed by Department Specifications, and shall not be used as a means of changing Department Specifications.

Before construction activities can begin, the Design/Build Firm shall prepare and submit a signed and sealed Construction Specifications Package for the project, containing all applicable Division II and III Special Provisions and Supplement Specifications from the Specifications Workbook in effect at the time the Bid Price Proposals were due in the District Office. Specification Workbooks are posted on the Department's website at the following URL address:

https://www2.dot.state.fl.us/SpecificationsPackage/Utilities/Membership/login.aspx?ReturnUrl=%2fspecificationspackage%2fDefault.aspx.

The signed and sealed Specifications Package shall also include individually signed and sealed Technical Special Provisions for any and all work not addressed by Department Specifications. Any Technical Special Provisions included in the signed and sealed Construction Specifications Package which had not been included in the proposal phase, may require a contract cost modification as a condition of approval.

The Design/Build Firm must account for a 10 working day (excluding Holidays as defined in section 1-3 of the Specifications) review time in its schedule. Upon review by the Department, the Construction Specifications Package will be stamped "Released for Construction" and initialed and dated by the reviewer.

Any subsequent modifications to the Construction Specifications Package shall be prepared, signed and sealed as a Supplemental Specifications Package, subject to the same process for submittal, review, and, release for construction, as described above, for the original Construction Specifications Package. Construction work affected by Supplemental Specifications Packages shall not begin until stamped "Released for Construction" Supplemental Specification Package is obtained.

I. Shop Drawings:

The Design/Build Firm shall be responsible for the preparation and approval of all Shop Drawings. Shop Drawings shall be submitted to the Department and shall bear the stamp and signature of the Design/Build Firm's Contractor Engineer of Record (EOR) and Specialty Engineer and signed and sealed by the Contractor's EOR or the Specialty Engineer, as appropriate. The Department shall review the Shop Drawing(s) to evaluate compliance with project requirements and provide any findings to the Design/Build Firm. The Department's procedural review of shop drawings is to assure that the Design/Build Firm and the EOR have both accepted and signed the drawing, the drawing has been independently reviewed and is in general conformance with the plans. The Departments review is not meant to be a complete and detailed review. Upon review of the shop drawing, the Department will stamp "Released for Construction" or "Released for Construction as noted" and initialed and dated by the reviewer.

Shop Drawing submittals must be accompanied by sufficient information for adjoining components or areas of work to allow for proper evaluation of the Shop Drawing(s) submitted for review.

J. Sequence of Construction:

The Design/Build Firm shall construct the work in a logical manner and with the following objectives as guides:

1. Maintain or improve, to the maximum extent possible, the quality of existing traffic operations, both in terms of flow rate and safety, throughout the duration of the project.
2. Minimize the number of different Traffic Control Plan (TCP) phases, i.e., number of different diversions and detours for a given traffic movement.
3. Take advantage of newly constructed portions of the permanent facility as soon as possible when it is in the best interest of traffic operations and construction activity.
4. Maintain reasonable direct access to adjacent properties at all times, with the exception in areas of limited access right-of-way where direct access is not permitted.
5. Proper coordination with adjacent construction projects and maintaining agencies.

K. Stormwater Pollution Prevention Plans (SWPPP)

The Design/Build Firm shall prepare an erosion control plan that complies with the Storm Water Pollution Prevention Plan (SWPPP) as required by the National Pollution Discharge Elimination System (NPDES). The Design/Build Firm shall refer to the Plans Preparation Manual for information in regard to the SWPPP and Florida Department of Environmental Protection (FDEP) Rule 62-25 for requirements on the erosion control plan. Detailed limits of the erosion control items will be necessary but may be shown on the roadway plans sheets. This plan shall be submitted along with the Design/Build Firm's Certification at least 15 working days prior to beginning construction activities.

L. Temporary Traffic Control Plan:

1. **Traffic Control Analysis:**

The Design/Build Firm shall design a safe and effective Temporary Traffic Control Plan to move vehicular traffic during all phases of construction. The areas shall include, but are not limited to, construction phasing, utility relocation, drainage structures, signalization, ditches, front slopes, back slopes, drop offs within clear zone, and traffic monitoring sites. Special consideration shall be given to the drainage system when developing the construction phases. Positive drainage must be maintained at all times.
The Temporary Traffic Control Plan shall address how to assist with maintenance of traffic throughout the duration of the contract.

The Temporary Traffic Control Plan shall be prepared by a certified designer who has completed the Department's training course, and in accordance with the Department's Design Standards and the Roadway Plans Preparation Manual.

2. Temporary Traffic Control Plans**:**

The Design/Build Firm shall utilize Index Series 600 of the Department's Design Standards where applicable. Should these standards be inadequate, a detailed Temporary Traffic Control Plan shall be developed.

The Design/Build Firm shall prepare additional Temporary Traffic Control drawings such as plan sheets, cross sections, profiles, drainage structures, retaining wall details, and sheet piling as necessary for proper construction and implementation of the Temporary Traffic Control Plan. The Temporary Traffic Control Drawings for any Release for Construction component set shall depict how traffic will be maintained in conjunction with previous, subsequent, and adjacent Release for Construction component sets.

In the event permanent vehicle detection is disrupted, the contractor shall provide an alternative means of detection to all lanes approaching the intersection, separating each movement which previously had detection. The type of detector shall be approved by the Engineer prior to installation. Equipment shall only detect the intended movement.

3. **Traffic Control Restrictions:**

There will be NO LANE CLOSURES ALLOWED during the times indicated in the table below. A single lane may be closed only during active work periods. All lane closures, including ramp closures, must be reported to the local emergency agencies, the media, the PIC, the ITS Project Manager and the District Public Information Officer, Steve Olson at 386-943-5479 a minimum of seven (7) calendar days in advance. Also the Design/Build Firm shall develop the project to be able to provide for all lanes of traffic to be open in the event of an emergency or if the lane closure causes a driver delay greater than 20 minutes.

Roadway	Description	No Lane Closures	
		From	To
S.R. 500		7:00 AM	9:00 PM
S.R. 518		7:30 AM	7:30 PM
S.R. 520	Four lane section	6:30 AM	10:30 PM
S.R. 520	Six lane section	9:00 AM	7:00 PM
S.R. 5	Peachtree St. to Eyster Blvd.	7:00 AM	7:00 PM
S.R. 5	Aurora Rd. to Sarno Rd.	7:00 AM	8:00 PM
S.R. 50		6:30 AM	8:30 PM
S.R. 405		7:00 AM	7:30 PM
S.R. 9 Ramps		5:00 AM	10:00 PM
Wickham Rd.		7:00 -9:00 am and 4:00 -6:00 pm	
Minton Rd.		7:00 -9:00 am and 4:00 -6:00 pm	
Palm Bay Rd.		7:00 -9:00 am and 4:00 -6:00 pm	

Existing posted speed limits must be maintained during construction unless otherwise approved by the Department.

M. Environmental Services/Permits/Mitigation:

The Design/Build Firm will be responsible for preparing designs and proposing construction methods that are permitable. The Design/Build Firm will be responsible for any required permit fees. All permits required for a particular construction activity will be acquired prior to commencing the particular construction activity. Delays due to incomplete permit packages, agency rejection, agency denials, agency processing time, or any permit violations, except as provided in Section V.D.2, will be the responsibility of the Design/Build Firm, and will not be considered sufficient reason for time extension.

The installation of any "Optional Facility" identified within this RFP is not a requirement of this RFP, nor is the Design/Build Firm responsible for any permitting or commenting agency coordination or other impacts to the permit processes that would be associated with such an "Optional Facility", unless the Design/Build Firm chooses to include the "Optional Facility" in its Proposal.

If contamination is detected the Design/Build Firm will notify the Department and the Department will employ a Contamination Assessment/Remediation (CAR) contractor or similar process to remediate the contamination. The Department will be responsible for contamination in all areas of the Department-owned Right-of-Way.

N. Signing and Pavement Marking Plans: N/A

O. Lighting Plans: N/A

P. Intelligent Transportation System (ITS)

1. General:

The Design/Build Firm shall furnish and install fiber optic cabling (FOC), CCTV camera equipment, and wireless detector equipment conforming to the current FDOT Specifications. The Design Build Firm shall work with the Department and Brevard County ITS personnel to integrate all devices into the Brevard County Traffic Management System. Any new conduit runs, electrical circuitry, electrical panels or other required assemblies or equipment to make the system functional shall be provided by the Design/Build Firm.

The existing ITS facilities, network equipment and communications within the limits of this project defined by this RFP shall remain in operations without interruption for the duration of the project. In the event that interruption of said devices cannot be avoided, then downtime may be allowed on a case-by-case basis but must be approved by the FDOT Project Manager.

2. Location of Existing ITS Equipment:

See "Sketch of corridor of existing infrastructure" included as Document 2 in "Other Documents".

3. Equipment and Components:

The Design/Build Firm shall examine carefully each component and equipment assembly it furnishes to verify that the material, design and construction, markings, and workmanship comply with the requirements of this RFP. Visual inspections shall be performed on all modules and subassemblies to determine any physical defects such as cracking, scaling, poor fastening, incorrect component values, etc. Complete electrical testing shall be performed on each module and subassembly to determine its compliance to the designed function. Housing, chassis, and connection terminals shall be inspected for mechanical sturdiness, and harnessing to sockets shall be electrically tested for proper wiring sequence.

The Design/Build Firm shall conduct QC procedures to assure that equipment units and components are not damaged during shipping and storage. The Design/Build Firm shall develop a quality assurance program and submit it to the Department for review and acceptance within fifteen (15) days after Notice to Proceed (NTP). The Design/Build Firm shall follow the approved quality assurance program for the construction and installation of all field hardware.

4. Design and Engineering Services:

The Design/Build Firm shall secure all permits, make arrangements for all connections, etc., on relevant issues that will be required for designing, installing and operating the ITS system to include power. The Design/Build Firm shall send electronic copies of all the correspondence and minutes, of any project related meetings, to the FDOT's Project Manager.

The design of the new ITS system shall integrate with the existing ITS scheme. The design shall include the necessary infrastructure and components to ensure proper connection of the new ITS sub-systems. This shall include but not be limited to all proposed ITS sub-systems of this project as well as existing sub-systems that remain or are re-deployed as the final ITS of the project.

ITS devices shall be mounted on existing traffic signal structures. The Design Build Firm shall ensure service and communication to the existing traffic signal structures is uninterrupted during the installation of the new ITS devices.

The Design/Build Firm shall provide adaptive signal control analysis for the project throughout the entirety of the project limits awarded by this contract. Analysis and development of timing patterns shall be provided in similar fashion (as applicable) as required by the guidelines established in the Traffic Adaptive System (Attachment 7 of the ATTACHMENTS provided with this RFP). Traffic signal timing shall be required for all intersections in which wireless VDS's are installed.

5. Design and Construction Criteria

i. ITS Governing Rules, Guidelines and Specifications

The work in this section specifies the criteria that the Design/Build Firm shall be responsible for furnishing and installing. All equipment furnished for this project shall meet but are not limited to the following specifications and/or requirements when applicable:

- State of Florida's NTCIP requirements
- Statewide Approved Products List (APL)

All plans and designs are to be prepared in accordance to the FDOT Specifications including but not limited to:

- Section 780 Intelligent Transportation Systems General Requirements
- Section 781 Intelligent Transportation Systems Motorist Information Systems
- Section 782 Intelligent Transportation Systems Video Equipment
- Section 783 Intelligent Transportation Systems Fiber Optic Cable and Interconnect
- Section 784 Intelligent Transportation Systems Network Devices
- Section 785 Intelligent Transportation Systems System Infrastructure
- Section 786 Intelligent Transportation Systems Vehicle Detection and Data Collection

ii. Closed Circuit Television (CCTV) and Digital Video Encoder

The CCTV Cameras shall be NTCIP compliant. All CCTV cameras shall be integrated into the Brevard County's Cameleon software. The proposed CCTV Camera shall have the capability to provide individual video stream viewing and PTZ through an encoder generated web page. Cameras shall be of an integrated modular IP type, utilizing power and Ethernet connections to the existing traffic controller cabinet. All cameras must be non-pressurized with minimum 26x optical zoom. Cameras shall be configured with location name in view, along with four (4) approach presets labeled as North, East, South and West to indicate approach direction. Video encoder shall provide both high and low bandwidth MPEG-4 and M-JPEG outputs simultaneously.

All CCTV cameras shall be installed on existing strain pole or mast arm upright support only and shall be designed to capture the greatest level of mainline coverage as available through the installation constraint established above. Mainline coverage shall be defined as the surveillance of mainline (corridor) traffic between edges of pavement of both east and west mainline movements throughout the limits of the project as awarded by this project.

1. Table 1 – CCTV Required Locations

Corridor	*Intersection*	*Quadrant*
US 192	SR 500 (US 192) and CR 509 (Wickham Road/Minton Road)	SW
US 192	SR 500 (US 192) and Evans Road	NW
US 192	SR 500 (US 192) and Dairy Road	NW
~~US 192~~	~~SR 500 (US 192) and Babcock Street~~	~~SE~~
SR 518	SR 518 (Eau Gallie Blvd) and Croton Rd	NE
SR 518	SR 518 (Eau Gallie Blvd) and Commadore Blvd	SE
SR 518	SR 518 (Eau Gallie Blvd) and SR 5 (US 1)	SE
SR 518	SR 518 (Eau Gallie Blvd) and Pineapple Ave	SE
SR 518	SR 518 (Montreal Ave) and Highland Ave	SW
~~SR 518~~	~~SR 518 (Montreal Ave) and Pineapple Ave~~	~~NE~~
SR 520	SR 520 & Clearlake Rd	NW
SR 520	SR 520 & SR 519 (Fiske Blvd)	NW
SR 520	SR 5 (US1) & SR 520	NW
SR 520	SR 520 (Willard St) & Forrest Ave (existing mast arm mount)	SW
SR 520	SR 520 (King St) & Brevard Ave (existing mast arm mount)	SE
SR 520	SR 520 between King St and Willard St on west end of Humphrey Bridge (new ITS pole)	N/A
SR 520	SR 520 between roadways on east end of Humphrey Bridge (new ITS pole)	N/A
SR 520	SR 520 & SR 3	NW
SR 520	SR 520 & Sykes Creek Pkwy	SE
SR 520	SR 520 & Newfound Harbor Dr	NW
SR 520	SR 520 & S. Banana River/Milford Pt Dr.	NW
US 1	SR 5 (US 1) and Rosa L Jones Blvd	SW
US 1	SR 5 (US 1) and Barton Blvd	NE
US 1	SR 5 (US 1) and Eyster Blvd	SW
US 1	SR 5 (US 1) and Lake Washington	?
US 1	SR 5 (US 1) and Aurora Rd	NE

US 1	SR 5 (US 1) and Sarno Rd	SW
US 1	SR 5 (US 1) and Babcock Street	?
SR 50	SR 50 (Cheney Hwy) and I-95 Southbound Ramps	SE
SR 50	SR 50 (Cheney Hwy) and SR 405 (Columbia Blvd)	NW
SR 405	SR 405 (Columbia Blvd) and Target Entrance	NW
SR 405	SR 405 (Columbia Blvd) and Barna Ave	S
SR 405	SR 405 (Columbia Blvd) and SR 407	SE
SR 405	SR 405 (Columbia Blvd) and Sisson Rd	NW
Palm Bay Road	Palm Bay Rd & Minton Rd	SW
Palm Bay Road	Palm Bay Rd & I-95 Southbound Ramps	SE
Palm Bay Road	Palm Bay Rd & Hollywood Blvd	SE
Palm Bay Road	Palm Bay Rd & Dairy Rd	SE
Palm Bay Road	Palm Bay Rd & Babcock St	SW
Palm Bay Road	Palm Bay Rd & Lipscomb/Clearmont St NE	SE
Palm Bay Road	Palm Bay Rd & Robert J Conlin Blvd	SE
Minton Road	Minton Rd & Norfolk Pkwy	NE
Minton Road	Minton Rd & Emerson Dr NW	SW
Wickham Road	CR 509 (Wickham Rd) & Wright Ave	SW
Wickham Road	CR 509 (Wickham Rd) & Ellis Rd	SE
Wickham Road	CR 509 (Wickham Rd) & Sheridan Rd	NW

iii. Vehicle Detection System (VDS)

Wireless magnetometer sensor (sensor), repeater, and transceiver technology shall be used for the design and installation of the detection upgrades to the signalized intersections found within the project limits as awarded by this project. Detector installation shall be sub-surface, requiring minimal construction/disturbance of existing roadway asphalt. The roadside wireless transceiver shall be mountable to existing support structures such as mast arms or strain poles where available. Proposed pole locations for mounting devices and/or mounting to existing distribution power poles must be cleared through all appropriate permitting agencies. Detector communication for data and configuration shall be accomplished through the wireless transceiver and controller via standard conductor cabling.

Sensors shall be installed between 1 foot and 3 feet in front of the stop bar for all through and left turn approaches to each signalized intersection. At minimum, one wireless access point shall be provided at each signalized intersection. Sensors shall be installed downstream of all mainline (corridors) through movements. The design location of downstream sensors shall intend to capture free-flow movement of traffic and total volume of through movement. Detection zones of all proposed sensors shall detect only those movements intended. The Design/Build Firm shall make every effort to reduce the total number of repeater and transceiver devices required.

Design and installation of the sensors shall be such that turning movement counts can be generated from the data collected from each set of sensors per intersection. Use of data reduction of collected data may be incorporated into design methodology to reduce the number of sensors required at an intersection. The wireless vehicle detection system shall manage data in a compatible format with that of the existing signal coordination/management system software (ATMS.now) and hardware (Naztec signal controllers).

1. Table 2 – VDS Required Locations

Corridor	***Intersection***
US 192	SR 500 (US 192) and I-95 Southbound Ramps
US 192	SR 500 (US 192) and I-95 Southbound Off Ramp Queue Detection
US 192	SR 500 (US 192) and I-95 Northbound Ramps
US 192	SR 500 (US 192) and I-95 Northbound Off Ramp Queue Detection
US 192	SR 500 (US 192) and Dike Road
US 192	SR 500 (US 192) and John Rodes Boulevard
US 192	SR 500 (US 192) and CR 509 (Wickham Road/Minton Road)
US 192	SR 500 (US 192) and Meadowland Avenue
US 192	SR 500 (US 192) and Dayton Boulevard
US 192	SR 500 (US 192) and Laila Court
US 192	SR 500 (US 192) and Evans Road
US 192	SR 500 (US 192) and McClain Drive
US 192	SR 500 (US 192) and Melbourne Square
US 192	SR 500 (US 192) and Dairy Road
~~US 192~~	~~SR 500 (US 192) and Airport Boulevard~~
~~US 192~~	~~SR 500 (US 192) and South Country Club Road~~
~~US 192~~	~~SR 500 (US 192) and Babcock Street~~
SR 518	SR 518 (Eau Gallie Blvd) and Croton Rd
SR 518	SR 518 (Eau Gallie Blvd) and Commadore Blvd
SR 518	SR 518 (Eau Gallie Blvd) and SR 5 (US 1)
SR 518	SR 518 (Eau Gallie Blvd) and Highland Ave
SR 518	SR 518 (Eau Gallie Blvd) and Pineapple Ave
SR 518	SR 518 (Montreal Ave) and Highland Ave
SR 518	SR 518 (Montreal Ave) and Pineapple Ave
SR 520	SR 520 & Clearlake Rd
SR 520	SR 520 & Varr Ave
SR 520	SR 520 & SR 519 (Fiske Blvd)
SR 520	SR 520 & Blake Ave
SR 520	SR 5 (US1) & SR 520
SR 520	SR 520 (Willard St) & Forrest Ave
SR 520	SR 520 (Willard St) & Brevard Ave
SR 520	SR 520 (Willard St) & Delannoy Ave
SR 520	SR 520 (King St) & Forrest Ave
SR 520	SR 520 (King St) & Brevard Ave
SR 520	SR 520 (King St) & Delannoy Ave
SR 520	SR 520 (King St) & Riveredge Blvd

~~SR 520~~	~~SR 520 (Willard St) & Forrest Ave~~
~~SR 520~~	~~SR 520 (Willard St) & Brevard Ave~~
~~SR 520~~	~~SR 520 (Willard St) & Delannoy Ave~~
~~SR 520~~	~~SR 520 (King St) & Forrest Ave~~
~~SR 520~~	~~SR 520 (King St) & Brevard Ave~~
~~SR 520~~	~~SR 520 (King St) & Delannoy Ave~~
~~SR 520~~	~~SR 520 (King St) & Riveredge Blvd~~
SR 520	SR 520 & Tropical Trail
SR 520	SR 520 & SR 3/S. Courtenay Pkwy
SR 520	SR 520 & Big Lots Entrance
SR 520	SR 520 & Plumosa St
SR 520	SR 520 & Merritt Square Mall Entr
SR 520	SR 520 & Sykes Creek Pkwy
SR 520	SR 520 & Kiwannis Island Park Rd
SR 520	SR 520 & Newfound Harbor Dr
SR 520	SR 520 & N. Banana River Dr
SR 520	SR 520 & S. Banana River/Milford Point Dr
SR 520	S. Courtenay Pkwy & Magnolia Ave
SR 520	S. Courtenay Pkwy & Fortenberry Rd
US 1	SR 5 (US 1) and Peachtree St
US 1	SR 5 (US 1) and Rosa L Jones Blvd
US 1	SR 5 (US 1) and Florida Ave
US 1	SR 5 (US 1) and Longwood Ave
US 1	SR 5 (US 1) and Barton Blvd
US 1	SR 5 (US 1) and Rockledge Square Entr
US 1	SR 5 (US 1) and Eyster Blvd
US 1	SR 5 (US 1) and Lake Washington
US 1	SR 5 (US 1) and CR 511 (Aurora Rd)
US 1	SR 5 (US 1) and Sarno Rd
US 1	SR 5 (US 1) and Babcock Street
SR 50	SR 50 (Cheney Hwy) and I-95 Southbound Ramps
SR 50	SR 50 (Cheney Hwy) and SR 405 (Columbia Ave)
SR 405	SR 405 (Columbia Ave) and Windover Trail
SR 405	SR 405 (Columbia Ave) and Target Entrance
SR 405	SR 405 (Columbia Ave) and Barna Ave
SR 405	SR 405 (Columbia Ave) and SR 407
SR 405	SR 405 (Columbia Ave) and Grissom Pkwy
SR 405	SR 405 (Columbia Ave) and Sisson Rd
Palm Bay Road	Palm Bay Rd & Minton Rd
Palm Bay Road	Palm Bay Rd & Athens Dr
Palm Bay Road	Palm Bay Rd & Culver Dr/Norfolk Pkwy

Palm Bay Road	Palm Bay Rd & I-95 SB Ramps
Palm Bay Road	Palm Bay Rd & I-95 NB Ramps
Palm Bay Road	Palm Bay Rd & Hollywood Blvd
Palm Bay Road	Palm Bay Rd & Dairy Rd
Palm Bay Road	Palm Bay Rd & Port Malabar Blvd NE
Palm Bay Road	Palm Bay Rd & Stack Blvd
Palm Bay Road	Palm Bay Rd & Rivera Dr NE
Palm Bay Road	Palm Bay Rd & Babcock St
Palm Bay Road	Palm Bay Rd & Lipscomb/Clearmont St NE
Palm Bay Road	Palm Bay Rd & Troutman Blvd NE
Palm Bay Road	Palm Bay Rd & Robert J Conlin Blvd
Palm Bay Road	Norfolk Pkwy & Shopping Center Dr
Minton Road	Minton Rd & Norfolk Pkwy
Minton Road	Minton Rd & Hield Rd
Minton Road	Minton Rd & Emerson Dr NW
Wickham Road	CR 509 (Wickham Rd) & Fountainhead Blvd
Wickham Road	CR 509 (Wickham Rd) & Wright Ave
Wickham Road	CR 509 (Wickham Rd) & Technology Dr
Wickham Road	CR 509 (Wickham Rd) & Harper Rd
Wickham Road	CR 509 (Wickham Rd) & Ellis Rd
Wickham Road	CR 509 (Wickham Rd) and Greenboro Dr/Idlewylde Cir
Wickham Road	CR 509 (Wickham Rd) & Sheridan Rd

iv. Fiber Optic Network (FON)

The Design/Build Firm shall design and install a FON as stated below:

Design and install a 72-strand, 12-fiber buffer, fiber optic cable (FOC) trunkline for the Brevard County Advance Traffic Management System (ATMS) Expansion of all corridors, where applicable, as listed in Table 3 shown below. Design and install a 12-strand, 12-fiber buffer, FOC drop cable to each of the signal cabinets found within the limits of the project where drop cables do not exist already.

- Drop cables shall connect fibers 1 through 4 of the blue buffer of the FOC trunkline.
- Fibers 1 through 4 of the trunkline expressing from the west shall be spliced to fibers 1 through 4 of the drop cable.
- Fibers 1 through 4 of the trunkline expressing from the east shall be spliced to fibers 7 through 10 of the drop cable.
- Drop cables shall be terminated in patch panels that shall be installed within existing signal cabinets

Existing signal controllers shall be replaced with Ethernet capable controllers of the same make for all existing signal controllers that do not have Ethernet functionality for all signalized intersections found within the project limits awarded by this project.

Connection between Ethernet capable controllers and the MFES shall be made. All new ITS sub-systems required by this RFP for each location shall be designed to directly interface with the MFES to be located within the signal cabinet. No standalone sub-system site requiring separate power source, cabinet assembly, or ancillary components typically associated with standalone sub-system ITS sites are anticipated for this project. All fiber shall be single mode. Installation of fiber optic cable shall follow the method established in Concept Plans for Sub-Project 1 (Document 1 of the OTHER DOCUMENTS provided with this RFP).

1. Table 3 – FON Required Locations

Corridor	*Intersection*	*FOC*	*Type*
US 192	SR 500 (US 192) and Wickham/Minton Rd to SR 500 (US 192) and Dayton Road	72 Strand-6 Buffer	Trunkline
US 192	SR 500 (US 192) and Wickham/Minton Rd	12 Strand-1 Buffer	Drop Cable
US 192	SR 500 (US 192) and Meadowlane Ave	12 Strand-1 Buffer	Drop Cable
US 192	SR 500 (US 192) and Dayton Road	12 Strand-1 Buffer	Drop Cable
US 192	SR 500 (US 192) and Dayton Road to SR 500 (US 192) and Laila Court	72 Strand-6 Buffer	Trunkline
US 192	SR 500 (US 192) and Laila Court	12 Strand-1 Buffer	Drop Cable
US 192	SR 500 (US 192) and Laila Court to SR 500 (US 192) and Dairy Road	72 Strand- 6 Buffer	Trunkline
US 192	SR 500 (US 192) and Evans Road	12 Strand-1 Buffer	Drop Cable
US 192	SR 500 (US 192) and McClain Drive	12 Strand 1 Buffer	Drop Cable
US 192	SR 500 (US 192) and Melbourne Square	12 Strand 1 Buffer	Drop Cable
US 192	SR 500 (US 192) and Dairy Road	12 Strand 1 Buffer	Drop Cable
~~US 192~~	~~SR 500 (US 192) and Dairy Road to SR 500 (US 192) and Babcock Street~~	~~72 Strand-6 Buffer~~	~~Trunkline~~
~~US 192~~	~~SR 500 (US 192) and Airport Blvd~~	~~12 Strand 1 Buffer~~	~~Drop Cable~~
~~US 192~~	~~SR 500 (US 192) and South Country Club Rd~~	~~12 Strand 1 Buffer~~	~~Drop Cable~~
~~US 192~~	~~SR 500 (US 192) and Babcock Street~~	~~12 Strand 6 Buffer~~	~~Drop Cable~~
SR 518	SR 518 (Eau Gallie Blvd) and Wickham Road to SR 518 (Montreal Ave) and Pineapple Ave	72 Strand-6 Buffer	Trunkline
SR 518	SR 518 (Eau Gallie Blvd) and Croton Rd	12 Strand 1 Buffer	Drop Cable
SR 518	SR 518 (Eau Gallie Blvd) and Commadore Blvd	12 Strand 1 Buffer	Drop Cable
SR 518	SR 518 (Eau Gallie Blvd) and SR 5 (US 1)	12 Strand 1 Buffer	Drop Cable
SR 518	SR 518 (Eau Gallie Blvd) and Highland Ave	12 Strand 1 Buffer	Drop Cable
SR 518	SR 518 (Eau Gallie Blvd) and Pineapple Ave	12 Strand	Drop Cable

		1 Buffer	
SR 518	SR 518 (Montreal Ave) and Highland Ave	12 Strand 1 Buffer	Drop Cable
SR 518	SR 518 (Montreal Ave) and Pineapple Ave	12 Strand 1 Buffer	Drop Cable
SR 520	SR 520 and SR 501 (Clearlake Road) to SR 520 and SR 5 (US 1)		Remove Cable
SR 520	SR 520 and SR 501 (Clearlake Road) to SR 520 and SR 5 (US 1)	72 Strand 6 Buffer	Trunkline
SR 520	SR 520 & Varr Ave	12 Strand-1 Buffer	Drop Cable
SR 520	SR 520 & SR 519 (Fiske Blvd)	12 Strand-1 Buffer	Drop Cable
SR 520	SR 520 & Blake Ave	12 Strand-1 Buffer	Drop Cable
SR 520	SR 520 and SR 5 (US 1) to SR 520 and Tropical Trail		Remove Cable
SR 520	SR 520 and SR 5 (US 1) to SR 520 and Tropical Trail	72 Strand 6 Buffer	Trunkline
SR 520	SR 520 (Willard St) and Delannoy Ave	12 Strand 1 Buffer	Drop Cable
SR 520	SR 520 (King St) and Brevard Ave	12 Strand 1 Buffer	Drop Cable
SR 520	SR 520 (King St) and Delannoy Ave	12 Strand 1 Buffer	Drop Cable
SR 520	SR 520 (King St) and Riveredge Blvd	12 Strand 1 Buffer	Drop Cable
SR 520	SR 520 (W. Merritt Island Cswy) and west end of Humphrey Bridge CCTV pole	12 Strand 1 Buffer	Drop Cable
SR 520	SR 520 (W. Merritt Island Cswy) and east end of Humphrey Bridge CCTV pole	12 Strand 1 Buffer	Drop Cable
SR 520	SR 520 and Tropical Trail to SR 520 and Sykes Creek Pkwy		Remove Cable
SR 520	SR 520 and Tropical Trail to SR 520 and South Banana River Drive	72 Strand 6 Buffer	Trunkline
SR 520	SR 520 and Tropical Trail	12 Strand 1 Buffer	Drop Cable
SR 520	SR 520 and SR3 / South Courtenay Pkwy	12 Strand 1 Buffer	Drop Cable
SR 520	SR 520 and Big Lots Entrance	12 Strand 1 Buffer	Drop Cable
SR 520	SR 520 and Plumosa Street	12 Strand 1 Buffer	Drop Cable
SR 520	SR 520 and Merritt Square Mall Entr	12 Strand 1 Buffer	Drop Cable
SR 520	SR 520 and Sykes Creek Pkwy	12 Strand 1 Buffer	Drop Cable
SR 520	SR 520 and Kiwannis Island Park Rd	12 Strand 1 Buffer	Drop Cable
SR 520	SR 520 and Newfound Harbor Dr	12 Strand 1 Buffer	Drop Cable
SR 520	SR 520 & N. Banana River Dr	12 Strand 1 Buffer	Drop Cable

SR 520	SR 520 & S. Banana River Dr	12 Strand 1 Buffer	Drop Cable
US 1	SR 5 (US 1) and ~~CR 511 (Aurora Rd)~~ Lake Washington Rd to SR 5 (US 1) and ~~Sarno Rd~~ Babcock St.	72 Strand 6 Buffer	Trunkline
US 1	SR 5 (US 1) and Lake Washington	12 Strand 1 Buffer	Drop Cable
US 1	SR 5 (US 1) and CR 511 (Aurora Rd)	12 Strand 1 Buffer	Drop Cable
US 1	SR 5 (US 1) and Sarno Rd	12 Strand 1 Buffer	Drop Cable
US 1	SR 5 (US 1) and Babcock St.	12 Strand 1 Buffer	Drop Cable
SR 50	SR 50 (Cheney Hwy) and I-95 Southbound Ramps to SR 50 (Cheney Hwy) and SR 405 (Columbia Blvd)	72 Strand 6 Buffer	Trunkline
SR 50	SR 50 (Cheney Hwy) and I-95 Southbound Ramps	12 Strand 1 Buffer	Drop Cable
SR 50	SR 50 (Cheney Hwy) and SR 405 (Columbia Blvd)	12 Strand 1 Buffer	Drop Cable
SR 405	SR 405 (Columbia Blvd) and SR 50 (Cheney Hwy) to SR 405 (Columbia Blvd) and SR 5 (US 1)		Remove Cable
SR 405	SR 405 (Columbia Blvd) and SR 50 (Cheney Hwy) to SR 405 (Columbia Blvd) and SR 5 (US 1)	72 Strand 6 Buffer	Trunkline
SR 405	SR 405 (Columbia Blvd) and Windover Trail	12 Strand 1 Buffer	Drop Cable
SR 405	SR 405 (Columbia Blvd) and Target Entrance	12 Strand 1 Buffer	Drop Cable
SR 405	SR 405 (Columbia Blvd) and Barna Ave	12 Strand 1 Buffer	Drop Cable
SR 405	SR 405 (Columbia Blvd) and SR 407	12 Strand 1 Buffer	Drop Cable
SR 405	SR 405 (Columbia Blvd) and Grissom Pkwy	12 Strand 1 Buffer	Drop Cable
SR 405	SR 405 (Columbia Blvd) and Sisson Rd	12 Strand 1 Buffer	Drop Cable
Minton Road	Minton Rd and I-95 DASH III Hub to Minton Rd and Emerson Drive NW	72 Strand 6 Buffer	Trunkline
Minton Road	Minton Rd & Norfolk Pkwy	12 Strand 1 Buffer	Drop Cable
Minton Road	Minton Rd & Hield Rd	12 Strand 1 Buffer	Drop Cable
Minton Road	Minton Rd & Emerson Dr NW	12 Strand 1 Buffer	Drop Cable
Minton Road	Minton Rd and Palm Bay Rd		Connection to Palm Bay Rd FOC
Wickham Road	CR 509 (Wickham Rd) and SR 5054 (Sarno Rd to CR 509 (Wickham Rd) and Ellis Rd	72 Strand 6 Buffer	Trunkline
Wickham Road	CR 509 (Wickham Rd) & Fountainhead Blvd	12 Strand 1 Buffer	Drop Cable
Wickham Road	CR 509 (Wickham Rd) & Wright Ave	12 Strand 1 Buffer	Drop Cable
Wickham Road	CR 509 (Wickham Rd) & Technology Dr	12 Strand 1 Buffer	Drop Cable

Wickham Road	CR 509 (Wickham Rd) & Harper Rd	12 Strand 1 Buffer	Drop Cable
Wickham Road	CR 509 (Wickham Rd) & Ellis Rd	12 Strand 1 Buffer	Drop Cable
Wickham Road	CR 509 (Wickham Rd) & Harper Rd – to Harper Rd and City of Melbourne Public Works Traffic Engineering office	12 Strand 1 Buffer	Drop Cable
Wickham Road	CR 509 (Wickham Rd) and Ellis Rd to CR 509 (Wickham Rd) and SR 500 (US 192)	72 Strand 6 Buffer	Trunkline
Wickham Road	CR 509 (Wickham Rd) and Greenboro Dr/Idlewylde Cir	12 Strand 1 Buffer	Drop Cable
Wickham Road	CR 509 (Wickham Rd) & Sheridan Rd	12 Strand 1 Buffer	Drop Cable

2. Tone Wire

Where fiber optic cable is installed underground, a tone wire shall be continuous from pull box to pull box following the path parallel to the fiber with a maximum 2 foot offset inside conduit. Any splices to this wire shall only be done at a pull box, no in-conduit splicing shall be allowed. A ground rod shall be supplied at each splice box for termination of the tone wire. Tone wires shall be terminated to the ground rods via removable ground rod clamp. In the case where existing conduit is utilized, the tone wire may be installed with the fiber optic cable in same conduit.

3. Connector Type and Patch Panel

Use only type SC connectors for patch panel connections unless legacy equipment requires otherwise. If a connector type other than the SC must be used, it must be approved by the FDOT ITS Project Manager. The Design/Build Firm must provide fiber patch cables of sufficient length for all connections and cross connections. Patch cables must be pre-connectorized by the factory with appropriate connector type to connect all ITS equipment.

4. Termination Requirement

A minimum of four (4) fibers in each direction shall be terminated in patch panels within all signal cabinets. Fibers 1-4 of the first buffer will be terminated with the trunk fibers expressing to the west, and fibers 7-10 of the first buffer will be terminated with trunk fibers expressing to the east. Fibers in the last buffer of the trunk cable shall be reserved for regional communications and shall pass through the entire length of the project unspliced except where connecting to existing fiber optic cable or butt splicing of cable is required. Unless preterminated patch panels are used, the Design/Build Firm shall provide buffer fan-out kits and pigtails that shall match the color of the fiber strand they encase.

v. Conduit

1. Above Ground

In the event that cabling is supplied to above ground equipment installed on concrete signal strainpoles, the Design/Build Firm shall furnish and install a minimum 2” external rigid metal conduit. All work shall be in accordance with but not limited to FDOT Specifications Section 630 and all applicable specifications.

2. Under Ground

Fiber Optic conduit shall be HDPE conduit. The conduit shall be a minimum of two (2) two-inch (2") in diameter conduit with a minimum of two (2) conduits installed (one for fiber and one for spare use) for FOC trunkline installation and one (1) conduit for drop cable installation. The color designation for the conduit shall be orange and white with the orange conduit used for FOC installation and white for the spare. Pull box spacing shall not exceed 500 feet.

3. Existing Conduit

Existing spare conduit may be utilized where useable and within the constraints of FDOT standards for cable routing. Existing conduit which houses only copper interconnect may be utilized for proposed fiber optic cable routing following the removal of existing copper interconnect. The removal of copper interconnect and use of existing conduit shall be limited to only existing copper interconnect between and servicing only the signal cabinets within the project limits. Where existing conduit is utilized, pull boxes shall be upgraded to FDOT fiber optic pull box standards.

4. Bridge Conduit

Fiber Optic conduit shall be rigid conduit. The conduit shall be a minimum of two (2) two-inch (2") in diameter conduit with a minimum of two (2) conduits installed (one for fiber and one for spare use) for FOC trunkline installation and one (1) conduit for drop cable installation.

vi. New Cabinets

As part of the central system improvements, a Type 336S ground mounted cabinet (local hub) shall be installed adjacent to the FDOT DASH III Master hub in the southwest quadrant of SR 528 and I-95 in Cocoa. This local hub shall meet the FDOT Specifications and provide full fiber optic connectivity to the FDOT master hub, I-95 72SM backbone FOC and SR 528 72SM backbone FOC white buffers. Specifically, this local hub shall directly connect to the following: the FDOT router in adjacent master hub, the Traffic Engineering router in Viera, the Traffic Operations router in Merritt Island, the existing Port St. John local hub, SR 50/405 subsystem, and SR 46 subsystem. In addition, a type 336S cabinet shall be required at all locations as described in Table 4 below.

The Design/Build Firm shall ensure that all cabinets are at minimum TS 2 cabinets and shall replace or upgrade any non TS 2 cabinet to a TS 2 cabinet within the project limits defined by this RFP. If a TS 2 cabinet does not have sufficient rack space to support the newly installed detection hardware, the Design/Build Firm shall furnish and install additional detection racks to provide the necessary connections to accommodate the wireless magnetometer detector units. If the Design/Build Firms determines that a TS 2 cabinet cannot support any additional detection racks, the Design/Build Firm shall upgrade or replace the TS 2 cabinet with a TS 2 that will provide sufficient space for the additional hardware to be installed.

vii. Network Equipment

Managed field Ethernet switches (MFES) shall be installed within the signal cabinets at all signalized intersections found within the project limits, awarded by this project, that are not currently equipped with MEFS. The MFES shall be field hardened, conforming to FDOT environmental requirements. Network switches shall provide at minimum four (4) Gigabit SFP/TX Combo ports and four (4) copper

10/100/1000 TX ports. Network switch supported protocols, at minimum, shall include:

- IGMP v1, v2, and v3
- sFlow
- 802.1x Security features
- STP, RSTP, and MSTP
- 802.1Q VLAN
- Console, Telnet, and Web management
- Optical Monitoring (Physical Layer)
- Link Layer Discovery Protocol

Layer 3 field hub routers shall be installed in all field hubs listed in Table 4 below. All field hub routers except the unit installed at the City of Melbourne shall provide 24 100/1000BASE-X SFP ports. The City of Melbourne field hub shall provide 24 10/100/1000BASE-T ports and 4 100/1000BASE-X SFP uplink ports. SFP ports shall be populated with sufficient optical transceivers, necessary to connect to adjacent new or existing field hubs and/or core routers. Capabilities, requirements, and supported protocols shall include at minimum:

- Chassis: 1 RU with field replaceable fan tray and 1+1 redundant 320 hot swap AC Power Supply
- 5-Year Warranty with 5-Year Same Day Support
- Stackable with current field routers via minimum 60Gb/s interconnect or 10GB fiber uplink modules
- Operating System: JUNOS or IronWareOS
- Packet Switching Capacity: 88 Gb/s
- Aggregate Switch Capacity: 264 GB/s
- Number of VLANs 4,096
- Max IPv4 unicast routes: 16,000 (in hardware)
- Max IPv4 multicast routes: 8,000 (in hardware)
- Routing Protocols supported: OSPFv2 with graceful restart
- Multicast PIM-SM and PIM-DM
- IGMP v2,v3, snooping
- VRRP redundancy
- sFlow
- Port-based, VLAN-based, router-based ACLs Ingress and Egress
- ACL entries: 7,000

Furnish and install a Layer 3 Core Chassis Router at the Traffic Operations Center on Merritt Island in the existing 19” rack in server room. The chassis router shall be capable of providing all connections for the Traffic Operations Local Area Network (LAN) via CAT5E cables and gigabit fiber optic connections to all existing systems and new systems. The installation of the core chassis system shall not interrupt Traffic Operations LAN and/or Core networking services beyond a maximum period of six (6) consecutive hours. The specifications and protocols below shall be required at minimum:

- Chassis: 4-14 Rack Units – fully redundant power supplies; field replaceable fan trays, redundant routing engine, redundant switch fabric

- Power Supply Voltage: 120 VAC
- 5-Year Warranty with 5-Year Same Day Onsite Support
- Environment Monitoring
- Minimum 20 GbE SFP Fiber Optic Ports with 10-80Km Optics as necessary
- Minimum 48 GbE Copper Ports
- Switch Fabric Capacity: 960 Gb/s
- Forwarding Capacity: 640 Gb/s
- Routing Capacity: 512K IPv4 Routes
- Layer 2 Capacity: 4094 VLANs, 1 million MAC addresses
- Management interfaces: Console, Web, Telnet
- Operating Systems: JUNOS
- DHCP Server, Relay
- Multicast Capacity: 16,000 Multicast Groups
- Routing Capability: OSPFv2, BGPv4
- VRRP redundancy
- Multicast Support: PIM-DM, PIM-SM, BGP-MP
- IEEE Compliance:
  - o 802.3ae 10 GbE
- sFlow
- SSH v2

1. Table 4 –Required Locations for Layer 3 Field Routers

Corridor	***Intersection***	***Quadrant***
SR 518	SR 518 (Eau Gallie Blvd) and SR 5 (US 1)	SW
SR 520	SR 5 (US1) & SR 520	SW
SR 50	SR 50 (Cheney Hwy) and I-95 Southbound Ramps	NW
Wickham Road	SR 500 (US 192) and CR 509 (Wickham Road/Minton Road)	SE
Central System	SR 528 and I-95	SW

viii. Central Management System (CMS)

The central system software and supporting hardware (Central Management System or CMS) shall be installed and configured in two locations as shown below:

- The Central Management System shall be divided into two (2) Systems
  - o System 1 shall be located at The Brevard County Traffic Engineering Center in Viera and shall include the following three (3) servers:
    - ▪ Server 1 shall include:
      - Sensor Network Archive, Proxy and Statistics (SNAPS) software for the Wireless Magnetometer System
    - ▪ Server 2 shall include:
      - Arterial Travel Time Data Software

        - Server 3 shall include:
            - Traffic Adaptive Software
        - Server 4 shall include:
            - Video Management Software
    - System 2 shall be located at The Brevard County Traffic Operations Center on Merritt Island and shall include the following three (3) servers:
        - Server 1 shall include:
            - Backup ATMS.now Software (software provided by Brevard Co.)
        - Server 2 shall include:
            - Backup Traffic Adaptive Software
        - Server 3 shall include:
            - Backup Video Management Software

The Design Build Firm shall be responsible for providing all hardware and software as described within this RFP.

The CMS shall provide management and control of field devices (detectors, etc.) installed as well as performs data processing, analysis, and automated response as described below.
The Central Management System shall include a Device Management and Travel Time software server for the Wireless Magnetometer System.

1. Software Requirements

a. Sensor Network Archive, Proxy and Statistics (SNAPS)

The Sensor Network Archive, Proxy, and Statistics (SNAPS) software shall be installed on a server running Fedora 10 operating system with MySQL Database and Apache HTTP server. The SNAPS software shall be capable of providing remote management to all deployed sensors and shall function as the central repository for detection event and device performance data which will be automatically generated from field installed devices. SNAPS shall be fully capable of continuously monitoring the health and performance of all detectors, to include, radio communications status, battery level, and management status for the entire VDS system. The SNAPS software shall be capable of backing up and storing all VDS device configurations.

b. Arterial Travel Time (ATT)

The Arterial Travel Time (ATT) software shall be installed on a server running Fedora 10 operating system with MySQL Database and Apache HTTP server. The Arterial Travel Time (ATT) software must have the capability to establish travel time data through the re-identification of magnetic signatures of vehicles captured at upstream and downstream VDS devices. The ATT software must be configurable and scalable to sample data from all mainline VDS sensors of all corridors and shall be capable of archiving all ATT data with the ability to provide a graphing interface and the output of .xls and .csv format files. The ATT software must be capable of populating a real time colored coded arterial map from the magnetic signature sampling. This map shall be composed of segments with each segment indicating through color codes the current level of congestion. Segment labels on the map shall be capable of displaying:

- Median Travel Time (sec)

- 80th percentile Travel Time (sec)
- 90th percentile Travel Time (sec)
- Vehicles in segment (number)
- Length of segment (miles)

In addition to the map display, the ATT software must be capable of providing a real-time XML data feed which will include data such as:

- Segment identification number
- Time interval (seconds)
- Time of day when vehicle enters a segment
- Minimum travel time within the current interval
- 10th percentile through 90th percentile travel time within the current interval
- Maximum travel time within the current interval
- Number of vehicles counted over upstream array in current interval
- Number of vehicles counted over downstream array in current interval
- Number of matches used to generate the aggregate

c. Traffic Adaptive Control (TAC) Software

The Traffic Adaptive Control (TAC) software must be installed on a server running Windows Server 2008 R2 operating system, including 5 CALS. The TAC software must be capable of providing a fully adaptive real-time traffic control system operation for the traffic signal network using the sensor data generated by the VDS devices and forwarded by traffic controllers. The traffic adaptive software must be capable of optimizing phase times to accommodate traffic progression with the ability to link and unlink intersections so adjacent corridors and subsections can be coordinated together. The traffic adaptive control software must also have the ability to modified cycle times on a cycle by cycle basis. No external control boxes will be accepted as an interface between sensors and controller or central hardware. The traffic adaptive control software must be capable of integrating software-in-the-loop in conjunction with Synchro SimTraffic to demonstrate and test configurations before implementation on roadway traffic controllers. A software API must be provided to allow integration with existing County traffic controllers. The TAC software must be capable of accomplishing traffic adaptive operations through two major components:

- The Tactical Element, which is contained within the intersection software, which makes phase time adjustments based upon the level of saturation. This software takes the input from the VDS system providing count and occupancy data to determine split utilization and makes adjustments accordingly. Arriving platoons are monitored, with offset modifications made.

- The Strategic Element which is operated via network at the central system, providing information relevant to insuring traffic progression along a green band. This component operates on central server and commands an intersection to change phase time, offsets, and cycle times in order to create coordinated systems. Critical intersections shall be determined, and adjacent intersections are automatically associated and disassociated based on demand.

d. ATMS.now Software

The ATMS.now software will be provided by Brevard County and must be installed on a server running the Windows Server 2008 R2 operating system, including 5 CALS. Once installed, this server shall server as a backup Naztec ATMS.now server to mirror the existing Naztec ATMS.now server at Traffic Engineering in Viera. The Design Build Firm shall note that Brevard County currently owns the software license for ATMS.now to be installed on the new server.

e. Video Management Software

The Design Build Firm shall furnish and install video management software onto two (2) servers with one server functioning as the primary and the other as the backup server to the primary. The Traffic Engineering Center shall house the Primary and Traffic Operations Center shall house the Backup. The video management software must be capable of providing centralized management, configuration and control of the CCTV system. Through the video management software, the system administrator must be able to set different authorization levels for different types of users for various authorization level of live viewing and PTZ of the CCTV system. The video management software must be able to support an unlimited number of cameras and monitors. The primary CCTV control software shall be capable of storing all device properties for all installed field CCTVs and serve as the central video distribution point for the client workstations. The central video management software server shall have both an application for configuration of the field devices and an application for viewing multiple simultaneous video streams while handling multiple field alarm inputs. The video management software must be fully capable of supporting the County's existing CCTV devices and the newly installed CCTV devices as part of this project. The video management software shall be installed on a server running the Windows Server 2008 R2 operating system, including 5 CALS.

2. Server Hardware Requirements

The Design Build Firm shall be responsible for furnishing and installing all servers required as a part of this RFP and shall also be responsible for configuring and installing the operating system for each server installed. All servers shall meet or exceed the specifications below at minimum:

- Server must integrate into existing ATMS system and utilize current management/monitoring software suite
- Base Unit: 2-4 U Rack Chassis for Up to 6, 3.5-Inch Hard Drives and Intel 56xx Series Processors
- Memory: 12GB Memory (6x2GB), 1333MHz Dual Ranked RDIMMS for 1 Processor, Optimized
- CPU: 2x CPU Intel 56xx Series Processors
- Hard Drive: Multi Select SAS 5x 600 GB 15K RPM Raid 5
- Hard Drive Controller: PERC 6/i SAS RAIS Controller 2x4 Connectors, Internal, PCIe256MB Cache, x6 Chassis

- NIC: Broadcom 5709 Dual Port 1GbE NIC w/TOE iSCSI, PCIe-4
- Server Management: iDRAC6 Hardware/Software to integrate into existing management suite
- CD-ROM or DVD-ROM Drive: DVD+/-RW, SATA, Internal
- Software: OpenManagement Console
- Raid Controller: RAID 5 for H700 or PERC6/i Controllers
- Cable Management: Sliding Ready Rails with Cable Management Arm
- Warranty: 5 YR warranty with 4hr onsite service
- Misc: High Output Power Supply Redundant, 870W
- Misc: Microsoft SQL Server Workgroup, OEM, Includes 5 CALs NFI, with Media

3. Workstation Hardware and Software Requirements

The Design Build Firm shall furnish and install a total of three new video management workstations with video decoding and management software. Said workstations shall be located as follows; one (1) located at the Brevard County Traffic Operations Center on Merritt Island, one (1) located at the Brevard County Traffic Engineering Center in Viera, and one (1) located at the City of Melbourne Public Works Traffic Engineering Office on Harper Road in Melbourne, FL. The Design Build Firm shall install the new video management software client version on the six existing Brevard County ATMS workstations as follows; two (2) located at the Traffic Engineering Center in Viera, two (2) located at the Emergency Operations Center in Rockledge, and two (2) located at the Traffic Operations Center on Merritt Island. The video management workstations must be capable of acting as clients to the newly installed video management servers. Each workstation shall be capable of providing a minimum viewing of six (6) simultaneous MPEG 4 video streams. The workstation software must be able to control an unlimited number of cameras and must be fully compatible to control, configure and view CCTVs installed as part of this project as well as the existing CCTV's. Video control and viewing must meet the requirement below:

- Full screen mode viewing
- Multiple user customizable workspaces
- Provision for multiple external monitors
- Auto scanning of complete network
- Remote upload of all CCTV device configurations
- Built in site map editor
- Background site map graphics in bitmap
- Automatic camera activation on alarm
- Device COMs for remote camera control (PTZ)
- Device configuration through a dedicated configuration manager
- Device selection tree view
- CCTV PTZ through onscreen virtual PTZ controls

The three new video management control and viewing workstations shall operate the Windows 7 Professional, 64-bit English Operating System and meet the following hardware requirements:

- Processor: Quad Core Intel Xeon W3565 3.2 GHz, 8M L3, 4.8GT/s
- Memory: 6 GB, 1333MHz, DDR3 SDRAM, ECC (3 DIMMS)
- Chassis: Mini-Tower Chassis Configuration
- CD-ROM or DVD-ROM Drive: DVD+/-RW, SATA, Internal
- Hard Drive Controller: Integrated Intel chipset SATA 3.0 GB/s controller
- Boot Hard Drive: 320 GB SATA 3.0 GB/s with NCQ and 16MB DataBurst Cache
- Graphics: 1.0GB NVIDIA Quadro FX 3800, Dual Monitor, 2DP and DVI
- Standard Keyboard and Optical Mouse
- Warranty: 5 year Basic Limited Warranty and 5 Year NBD On-Site Service
- Monitor Specification – Minimum two (2) 42" LCD TV
    - Digital Television Certification HDTV 1080p
    - TV Tuner 1x analog/digital combo
    - Video Interface Component, Composite, HDMI
    - HDMI Ports Qty 4 port(s)
    - PC Interface VGA(HD-15)
    - USB Port 1 port(s)
    - HDCP Compatible Yes
    - Diagonal Size 42"-widescreen
    - Technology TFT active matrix
    - Resolution 1920 X 1080
    - Display Format 1080p(FullHD)
    - Image Aspect Ratio 16:9
    - Enhanced Refresh Rate 120Hz
    - Motion Enhancement Technology 120Hz Smooth Motion Technology
    - Color Depth Up to 1.06 billion colors
    - Image Contrast Ratio 4000:1
    - Dynamic Contrast Ratio 20000:1
    - Brightness 450 cd/m2
    - Progressive Scan Progressive scanning (line doubling)
    - Viewing Angle 176 degrees
    - Viewing Angle (Vertical) 176 degrees
    - Pixel Pitch 0.4845 X 0.4845mm
    - Pixel Response Time 5ms
    - Backlight Life 50,000 hours
    - Comb Filter 3D digital
    - HDMI Cables for connection to workstation

ix. Network Integration

The Design/Build Firm shall provide a Logical Topology to the department for concurrence. The logical topology for integration is to include all Layer 2 Ethernet switches within the project limits. The Design/Build Firm shall then setup an Integration Meeting with District 5 ITS and Brevard County representatives allowing minimally 2 week's notice and review time of the logical topology. At the Integration Meeting the Department will provide an IP Scheme, Standard Port Utilization for the Layer 2 devices (including which ports are to be disabled), VLAN Tagging Scheme for all subnets, and information on all Layer 2 and 3 protocols to be run on the switches.

It is the Design/Build Firm's responsibility to setup all tagging, disable all applicable ports, setup all IP addresses, physically connect all devices per plan, and verify all connectivity. Once all field devices are installed, the Design/Build Firm shall give notice to the ITS Project Manger to notify Brevard County to begin configuring the central control management software for the field devices. The Design/Build Firm shall allow 2 weeks for Brevard County to enter the information into the management software. The Design/Build Firm shall troubleshoot with the County's assistance any issues that arise from configuring the central software that directly relates to the newly installed devices.

Once the local devices have been entered into the central control management software the County shall inspect the network for issues from a remote location. The Design/Build Firm shall provide any assistance necessary to provide the County with IP addresses, port status, and auto-negotiation speeds, etc. for all switches that cannot be acquired from the remote location. Inability of the County to access the new ITS devices remotely will constitute failing the inspection should remote access fail due to the malfunction of any new ITS installation or due to the malfunction of existing components resulting from the installation of new components. Failure to remotely access the new ITS devices due to County network infrastructure failure does not dismiss the Design/Build firm from the required testing. Local testing will be performed if such a situation arises. If the inspection is failed the Design/Build Firm shall reconfigure the devices and again work with the County to get the devices into the central management software. After this is complete the switches shall again be inspected. All steps of this process will be repeated until the integration inspection is successfully completed.

6. Testing, Integration and Acceptance:

The Design/Build Firm shall conduct all testing in accordance to the FDOT Specifications.

i. Pre-Installation Test

The following tests shall be conducted prior to the installation of the equipment:

The Design/Build Firm shall perform all Pre-Installation testing in accordance with FDOT Specifications. The Design/Build Firm shall prepare and submit for approval to FDOT, test and demonstration procedures for all pre-installation tests. Notify the Project Manager a minimum of 10 days in advance of the time the test are to be conducted so that the Department can make arrangements for their representative to be present.

ii. Installed Site Test

After due notice to the FDOT Project Manager, the Design/Build Firm shall perform an installed site test on system components in accordance with FDOT Specifications and as stated herein. Whenever any equipment unit fails to pass the component tests, the Design/Build Firm shall correct the deficiencies, either by repair or replacement, at the Design/Build Firm's expense (including freight costs) as required to comply with the testing requirements. Upon notification by the Design/Build Firm that deficiencies have been corrected, the equipment will be retested entirely and not only that part of the failed segment of the test. All installed site testing and any retesting shall be performed in the presence of FDOT personnel.

iii. Network System Integration Test

The Brevard County ITS personnel will integrate the new system components into the Brevard County ATMS after the Design/Build Firm successfully completes stand alone testing. After the County completes central software integration, the Design/Build Firm shall perform the System Acceptance Testing from the Brevard County Traffic Management Center. The Design/Build Firm shall plan for a minimum of two (2) weeks and a maximum of four (4) weeks for complete integration of the central software by Brevard County ITS personnel. Network integration time is to be included in the Design Build Firm's construction schedule.

iv. Central Control Test

The central control and monitoring equipment shall be tested at the Brevard County Traffic Management Center with the exception of the CCTV testing which will be conducted at the BCTMC. Tests will be coordinated with the Brevard County Public Works Engineering and FDOT.

The tests shall include, but not be limited to:

- Verification that all interconnecting cable installations, monitors, network equipment and equipment controllers are in accordance with the specifications.
- Demonstration of full integration of CCTV pan, tilt, zoom control with the control capabilities of FDOT's Sunguide Software.
- Demonstration of full integration of CCTV pan, tilt, zoom control with the control capabilities of Brevard County's Cameleon ITS Software.
- Demonstration of full integration of field equipment monitoring and control with the monitoring and control capabilities of the ATMS.now and Cameleon ITS Software in use at the time of the test.
- Verification that database parameters and addressing for new devices were properly entered to allow communications between the central equipment and the new field devices.

For this test the Design Build Firm shall provide the following information:

- Camera Manufacturer
- Port Server Type (if applicable)
- Port Server Port number (if Applicable)
- Port Server IP Address
- Video Encoder Manufacturer
- Video Encoder IP Address
- Encoder Model
- All pertinent information as it pertains to VDS

v. System Acceptance Test (SAT)

All equipment furnished by the Design/Build Firm shall be subject to monitoring and testing to determine conformance with all applicable requirements and to ensure proper operation of the Brevard County Central System. Documentation that demonstrates component performance and operation in conformance to FDOT Specification and that described in all sections of this document shall be furnished by the Design/Build Firm as part of this project. All equipment required for conducting tests shall be supplied by the Design/Build Firm. No separate payment shall be made for the monitoring, testing, test equipment, and documentation of test results, but shall be included in the amount bid for the project scope.

FDOT reserves the right to examine and test any or all materials furnished by the Design/Build Firm for the project to determine if they meet the Specifications.

If FDOT decides that any material used in the construction of this project is defective or otherwise unsuitable, and the workmanship does not conform to the design or specifications of this contract, the Design/Build Firm shall replace such defective parts and material at no cost to FDOT.

The times and dates of tests shall be approved by the FDOT Project Manager. The Design/Build Firm shall conduct all tests in the presence of the FDOT Project Manager or his/her representative. Testing shall take place only on weekdays, which are official working days of the State, unless the Project Manager allows the test to be conducted and/or continued on weekends and non-working days. The Design/Build Firm shall make a request in writing at least fourteen (14) days prior to the proposed testing, and schedule them only if permission is granted by the FDOT in writing. The Design/Build Firm shall be responsible for the conduct and documentation of the results of these tests that will be countersigned by an FDOT or designated representative at the end of each test. The signature of an FDOT representative implies only proof of presence.

The system acceptance test shall demonstrate that all equipment furnished, adjusted, or modified by the Design/Build Firm has been installed properly and operates as a fully functional ATMS. Prior to initiating the system acceptance test, all in place component tests and the central control test shall have been successfully completed by the Design/Build Firm in the presence of the FDOT Project Manager or designated representative.

The system acceptance test will begin within seven (7) days after the FDOT Project Manager is advised of intent to begin by the Design/Build Firm and shall be contingent upon the FDOT Project Manager providing notice that all work has been completed satisfactorily.

The Brevard County ATMS Expansion shall be activated and left on for sixty (60) consecutive days. During this period, all materials and components of the Brevard County ATMS Expansion shall operate as specified and without any failure.

In the event that any component of the Brevard County ATMS Expansion, provided by Design/Build Firm, malfunctions or operates below the level specified within the FDOT Specifications, the system acceptance test period will be terminated, and the Design/Build Firm shall be required to determine and correct the problems, including repair and replacement of equipment, at no cost to FDOT.

The Design/Build Firm shall respond with a qualified technical representative on site to determine and correct any problems within twenty-four (24) hours, following notification by FDOT. Upon correction of the problems, to the satisfaction of the Department, it shall be at the sole discretion of the Department to determine to either restart the 60-day SAT or to extend the 60-day SAT period by the number of days lost due to failure and repair time.

In the event a malfunction is the result of equipment not installed by the Design Build Firm or others not under the responsibility of the Design/Build Firm (e.g., power service, leased telephone circuits, etc.), the system acceptance test period will be suspended until correction of these problems by others.

vi. System Acceptance

Upon determination from FDOT in writing that the Brevard County ATMS has completed the sixty (60) day system acceptance test period and is in conformance with the requirements of the Plans and the

FDOT Specification, the Brevard County ATMS and all components therein will have achieved Final Acceptance.

7. Repair of Damage to Existing Equipment:

Any damage caused by the Design/Build Firm to any existing roadway features (i.e. drainage structures, bituminous pavement sections, existing sign structures, etc.) shall be repaired to the satisfaction of FDOT's Maintenance Engineer at the expense of the Design/Build Firm. All repair work shall conform to the latest edition of the FDOT Specifications.

Any damage caused by the Design/Build Firm to any existing ITS features (i.e. Fiber Optic cable, etc.), signs, illumination equipment, and electrical service as well as all the hardware and software components of the Transportation Management Center (TMC) system shall be replaced by equal or better components or repaired to the satisfaction of FDOT’s ITS Project Manager at the expense of the Design/Build Firm. All repair work shall conform to the latest edition of the FDOT Specifications.

8. Scope of Warranty Services:

i. Warranty Services for Sub-Project 1 (428597-1) & Sub-Project 2 (428919-1)

1. General Warranty Provision

In addition to any warranties implied by law and to any manufacturers’ or distributors’ warranties assigned to the Department, the Design Build Firm hereby warrants that all CCTV cameras and each of its components shall be free from defects in materials and workmanship for a period of three (3) years following the date of final acceptance.

This warranty shall apply to all CCTV cameras and each of its components and to its assembly as a whole. In the event a defect, malfunction, or other failure not caused by misuse or third party acts not contemplated occurs during the warranty period, the Design Build Firm shall repair the warranted item if repair can be made on site within 48 hours time from receipt of notice of the occurrence. If repair cannot be made within 48 hours time from receipt of notice of the occurrence, the Design Build Firm shall replace the warranted item on site within 72 hours time from receipt of notice of the occurrence. In determining time for repair or replacement, matters unique to the Design Build Firm, such as office location or availability of personnel, shall not be considered. In the event that the Department determines that public health, safety, or welfare requires temporary measures to continue safe functioning of the facility of which the warranted item is a part, the Design/Build Firm shall provide temporary items or take other temporary measures as the Department deems necessary. All repairs, replacements, and temporary measures shall be at the sole cost and expense of the Design/Build Firm, without any charge to the Department.

If the Design Build Firm fails to comply with the Design/Build Firm’s obligations under this warranty, the Design Build Firm shall be liable to the Department for all damages associated with the Design Build Firm’s breach hereof and damages associated with the initial occurrence from the date of the occurrence. Damages shall include, but shall not necessarily be limited to, costs incurred in repairing or replacing warranted items, as well as incidental and consequential damages suffered by the Department.

All costs associated with this warranty shall be included in the Price Proposal.

2. Assignment of other Warranties

The Design Build Firm shall assign to the Department any and all manufacturers' or other sellers' warranties that come with any products, material or supplies which are incorporated into or are consumed in the project in any way. Assignment of such warranties shall be effective on the date of Final Acceptance. To the extent that any such warranties do not extend to subsequent purchasers or owners or such warranties contain a limitation on assignment, the Design Build Firm agrees that the Design Build Firm purchased the products, materials and supplies on behalf of the Department with the intent that the Department be the intended recipient of any warranties. All documents associated with or describing any such warranties shall be delivered to the Department along with the other project final acceptance documents and shall be deemed to be a part of the required final acceptance documentation. The Design Build Firm shall not take any action or fail to act in any way which voids any such warranties. All subcontracts shall contain a similar provision which requires subcontractors to assign any such warranties to the Department.

ii. **Warranty Services for Sub-Project 3 (428920-1)**

1. General Warranty Provision

In addition to any warranties implied by law and to any manufacturers' or distributors' warranties assigned to Brevard County, the Design Build Firm hereby warrants that all CCTV cameras and each of its components shall be free from defects in materials and workmanship for a period of three (3) years following the date of final acceptance. This warranty runs directly to Brevard County as the intended third party beneficiary.

This warranty shall apply to all CCTV cameras and each of its components and to its assembly as a whole. In the event a defect, malfunction, or other failure not caused by misuse or third party acts not contemplated occurs during the warranty period, the Design Build Firm shall repair the warranted item if repair can be made on site within 48 hours time from receipt of notice of the occurrence. If repair cannot be made within 48 hours time from receipt of notice of the occurrence, the Design Build Firm shall replace the warranted item on site within 72 hours time from receipt of notice of the occurrence. In determining time for repair or replacement, matters unique to the Design Build Firm, such as office location or availability of personnel, shall not be considered. Brevard County shall have the sole right to determine defects in the materials and workmanship during the warranty period. In the event that Brevard County determines that public health, safety, or welfare requires temporary measures to continue safe functioning of the facility of which the warranted item is a part, the Design Build Firm shall provide temporary items or take other temporary measures as Brevard County deems necessary. All repairs, replacements, and temporary measures shall be at the sole cost and expense of the Design Build Firm, without any charge to Brevard County.

If the Design Build Firm fails to comply with the Design Build Firm's obligations under this warranty, the Design Build Firm shall be liable to Brevard County for all damages associated with the Design Build Firm's breach hereof and damages associated with the initial occurrence from the date of the occurrence. If the Design Build does not repair or replace the warranted item or fails to provide temporary items or take temporary measure as stated above, Brevard County may do so. Damages shall include, but shall not necessarily be limited to, costs incurred in repairing or replacing warranted items, as well as incidental and consequential damages suffered by Brevard County. Brevard County may make demand of the Design/Build Firm for payment of said damages and payment shall be made promptly.

All costs associated with this warranty shall be included in the Price Proposal.

2. Assignment of other Warranties

The Design Build Firm shall assign to Brevard County any and all manufacturers' or other sellers' warranties that come with any products, material or supplies which are incorporated into or are consumed in the project in any way. Assignment of such warranties shall be effective on the date of Final Acceptance. To the extent that any such warranties do not extend to subsequent purchasers or owners or such warranties contain a limitation on assignment, the Design Build Firm agrees that the Design Build Firm purchased the products, materials and supplies on behalf of Brevard County with the intent that Brevard County be the intended recipient of any warranties. All documents associated with or describing any such warranties shall be delivered to the Department along with the other project final acceptance documents and shall be deemed to be a part of the required final acceptance documentation. The Design Build Firm shall not take any action or fail to act in any way which voids any such warranties. All subcontracts shall contain a similar provision which requires subcontractors to assign any such warranties to Brevard County.

VII. Technical Proposal Requirements.

A. General:

Each Design/Build Firm being considered for this project is required to submit a Technical Proposal. The proposal shall include sufficient information to enable the Department to evaluate the capability of the Design/Build Firm to provide the desired services. The data shall be significant to the project and shall be innovative, when appropriate, and practical. Discussions of past performances on other projects shall be minimized except as they relate to the proposed work.

B. Submittal Requirements:

Four (4) copies of the Technical Proposal shall be hard copies bound with tabs labeled Section 1 through Section 5 with the information, paper size and page limitation requirements as listed below:

The Technical Proposal must also be submitted in .pdf electronic format. The .pdf format must include bookmarks for the various sections and subsections. Seven (7) copies of the CD of the Technical Proposal shall be submitted.

Submit four (4) hard copies and seven (7) CDs of the Technical Proposal to:

Ms. Chela Wood, Professional Services, MS 4-524
Florida Department of Transportation
719 South Woodland Boulevard
DeLand, Florida 32720

Section 1: Written Technical Proposal

- Paper size: 8½" x 11", additional larger charts and graphics placed on 11"X17" paper may be provided if folded neatly to 8½" x 11"
- Maximum allowed pages: 20 (excluding graphics and charts)
- Minimum Font Size: 11
- Minimum Margin Size: 0.75" (excluding graphics and charts)

The written technical proposal shall be presented in the following order and the minimum information to be included is identified below.

Design Approach

The Design/Build Firm shall present a comprehensive approach to developing the design of the project. Specific areas to be addressed shall include but not be limited to:

- Approach to minimizing impacts to Utilities
- Structures Design and geotechnical considerations
- ITS modifications
- Utilization of existing right-of-way
- Innovative aspects relative to the design of the project

Project Management Plan

The Design/Build Firm shall present a comprehensive approach to managing the design and construction of the project. Specific areas to be addressed shall include but not be limited to:

- Project Management: The role of the Design/Build Firm's Project Manager(s) in the design and construction of the project and any specific project management programs shall be described.
- Staffing Plan: Provide a staffing plan for the design and construction of the project, addressing all disciplines and specialty areas, sub-consultants, and sub-contractors. Identify key personnel including their relevant experience and responsibilities. Identify personnel responsible for utility coordination detailing their experience on similar projects. The Department must approve any changes to the Project Management Plan and key personnel. Other items to be included in the discussion of the staffing plan are:

    1. Man-loading requirements (both quality and quantity) for all technical services
    2. Man-loading capabilities of all team firms
    3. Man-loading availability for the project

- Design/Build Firms being considered for this project may have more than one office location. The office assigned responsibility for the work shall be identified in this section of the Technical Proposal. If different elements of the work will be done at different locations, those locations shall be listed.

- Quality Management Plan (QMP): The highlights of the QMP shall be summarized. The minimum information to be included shall be in accordance with Section V.N of this RFP.

- Coordination Plan: The Design/Build Firm will also summarize critical elements and strategies to ensure successful coordination with the following:

    - Department management team and Public Information Personnel
    - Other adjacent Department and local projects
    - Permitting/Environmental agencies
    - Utility owners
    - Local governments
    - Property and Business owners
    - General public

Construction and Maintenance of Traffic Approach

The Design/Build Firm shall present a comprehensive approach for construction of the project. Specific areas to be addressed shall include but not be limited to:

- Maintenance of Traffic: This shall include, but not be limited to geometric design for diversions and/or detours, lane widths, shoulder widths, visual obstructions, reductions in speed limits, minimizing of lane closures, and provision of bicycle and pedestrian accommodations through all MOT phases.

- Utility Relocation Approach: This shall include, but not be limited to, the Design/Build Firm's approach to expedite utility adjustments and relocations that minimize impacts to the traveling public and utility service interruptions.

- Construction Methods: This shall include, but not be limited to, the Design/Build Firm's approach to staging of equipment and materials, structures foundation construction, erection and shoring of critical elements, protection of adjacent structures, and efforts to reduce environmental impacts.

- Protection of Local Business Interests: This shall include, but not be limited to, Design/Build Firm's plan to minimize impacts to local businesses within construction limits, by maximizing driveway access, prevention of screening the visibility of businesses by equipment and/or materials, minimizing dust, noise, and vibration, utilization of Public Information Coordinators and planned activity notification, and process for managing complaints.

- Safety: Include the Design/Build Firm's approach to incorporating safety elements in both the design and construction. This includes such elements as ingress/egress into work zones, rolling road blocks, public safety and worker safety.

- Innovative aspects related to the construction of the project.

Maintenance & Contractor Guaranteed Coverage

The Design/Build Firm shall clearly describe their design and construction strategies to ensure and/or improve the maintainability of the project after completion, including:

- Design and construction methods that minimize periodic and routine maintenance.
- Exceeding minimum material requirements to enhance durability.
- Access to provide adequate inspections and maintenance.
- Response plan to remediate project defects.

In this section, the Design/Build Firm may also present the extent of the Contractor Guaranteed/Value Added coverage above and beyond the minimum time frame and features required by the specifications.

Section 2: Resumes of Key Project Personnel

- Paper size: 8½" x 11"
- Minimum Font: 11
- Maximum number or resumes to be included: 15
- Each Résumé is limited to one (1) page per person.
- The minimum information to be included: education, experience directly relevant to this project and personal references.

Section 3: Proposed Schedule

- Paper size: 8½" x 11" or larger if folded neatly to 8½" x 11"
- Maximum allowed pages: 2
- The minimum information to be included in the summary CPM schedule of anticipated major milestones and their associated phasing as follows:
  - Anticipated Notice to Proceed Date
  - Design Survey
  - Design Reviews by the Department and FHWA
  - Geotechnical Investigations
  - Environmental Permitting
  - Construction Mobilization
  - Start of Construction
  - Construction Milestones
  - Construction Phasing and major MOT shifts
  - Utility Adjustment/Relocations
  - Additional Construction Milestones as determined by the Design/Build Firm
  - Final Completion Date for all Work

Section 4: Design Support Documents:

The Design/Build Firm shall provide design elements, including but not limited to:
- Summary of design standards used for the project
- Documentation of decisions reached resulting from meetings, telephone Conversations or site visits
- Preliminary qualities list

The minimum information to be included shall be in accordance with Section VI.F.

- Paper size: 8½" x 11"
- Design support documents will be printed and presented double-sided
- Maximum allowed pages: No page limit

Section 5: Preliminary Plans

The Design/Build Firm shall provide preliminary plans necessary to convey the intent of the concept.

- Paper size: 11" x 17"
- Maximum allowed pages: 20

The minimum information to be included in the preliminary design requirements is as follows

Roadway

- Project Limits
- Horizontal alignment
- Stationing along Horizontal alignment
- Utility provisions
- Maintenance of traffic provisions
- Preliminary ITS Design

C. Evaluation Criteria:

The Technical Review Committee shall evaluate the written Technical Proposal by each Design/Build team. The Design/Build Firm should not discuss or reveal elements of the price proposal in the written proposals. A technical score for each firm will be based on the following criteria:

Item	Value
1. Design Approach & Proposed Equipment	40
2. Maintenance & Contractor Guaranteed Coverage	25
3. Project Management Plan	15
4. Construction & Maintenance of Traffic Approach	15
5. Contract Duration	5
Maximum Score	**100**

The following is a description of each of the above referenced items:

1. Design Approach and Proposed Equipment (40 points)

Credit will be given for a comprehensive approach to the design aspects of the project, including but not limited to ITS modifications, structures design, and minimizing impacts to utilities. Credit will be given for The Design/Build Firm's approach to the communication section with equipment and parts cut sheet with manufacture specifications data sheets. Incomplete or omission of major components as listed below will be considered as non-responsive. This will be required for each of the proposed major items, at a minimum the fiber optic cable, cabinet enclosures, CCTV, pull boxes, detectors, centralized software and any other devices or parts the Design-Build Firm would be using in this project.

2. Maintenance and Contractor Guaranteed Coverage (25 points)

Credit will be given for:

- Design and construction methods that minimize periodic and routine maintenance
- Exceeding minimum material requirements to enhance durability
- Access to provide adequate inspections and maintenance

- Maintaining functionality of existing ITS facilities

3. Project Management Plan (15 points)

Credit will be given for a comprehensive Project Management Plan (PMP) that addresses Project Management approach, staffing plans, Quality Management Plan and coordination. Credit will also be given for incorporation of effective peer reviews.

4. Construction and Maintenance of Traffic Approach (15 points)

Credit will be given for a comprehensive approach for conducting the construction effort for the project, including but not limited to, Maintenance of Traffic, construction methods, worker and public safety, utility adjustments and relocations.

5. Contract Duration (5 points)

Credit will be given, **at the time of bid opening**, according to the following table.

For the Proposed Contract Time Item, credit will be given, at the time of bid opening, according to the following table. The Proposed Contract Time shown on the bid proposal form shall be the official contract duration.

Proposed Contract Time (Days)	Points Awarded
470 - 445	0
444 - 419	1
418 - 393	2
392 - 367	3
366 - 341	4
340 - or less	5

If the Proposed Contract Time is greater than 470 days, the proposal will be considered non-responsive.

D. Bid Price Proposal

Bid Price Proposals shall be submitted on the Bid Proposal Form attached hereto and shall include one lump sum price for each of the Sub-Projects and one lump sum price for the Complete Project as defined in the "Description of Work" of Section I of this RFP.

For Sub-Project 1 the Proposer shall include one lump sum price for Sub-Project 1 inclusive of the highest Option the Design Build Firm can design and build without exceeding the maximum bid price for Sub-Project 1. The Proposer shall clearly indicate the highest Option Number included within the bid price for Sub-Project 1. All remaining Options that are not included in the bid price for Sub-Project 1 shall be included in the bid price for Sub-Project 2.

For Sub-Project 2 the Proposer shall include one lump sum price for Sub-Project 2, inclusive of all remaining Options not included in the bid price for Sub-Project 1.

For Sub-Project 3 the Proposer shall include on lump sum price for Sub-Project 3. That bid price shall only and exclusively include the scope of work for Sub-Project 3.

The Proposer shall include the total lump sum price of the Complete Project which shall be the combined lump sum of all Sub-Projects inclusive of all Options. The combined lump sum of all Sub-Projects (the Complete Project) shall not exceed the total maximum bid price set for this project. If the Proposer's price proposal for Sub-Project 1 or the Complete Project is greater than the maximum bid prices in this RFP, then the Bid Price Proposal shall be deemed non-responsive.

The lump sum prices shall include all costs for all design, geotechnical surveys, architectural services, engineering services, Design/Build Firms quality plan, construction of that portion of the Project, and all other work necessary to fully and timely complete that portion of the Project in accordance with the Contract Documents, as well as all job site and home office overhead, and profit, it being understood that payment of that amount for that portion of the Project will be full, complete, and final compensation for the work required to complete that portion of the Project.

The Bid Price Proposals shall be hand delivered in a sealed package to the following:

Ms. Chela Wood, Professional Services
Florida Department of Transportation
719 South Woodland Boulevard
DeLand, Florida 32720

The package shall indicate clearly that it is the Price Proposal and shall identify clearly the Proposer's name and project description. The Bid Price Proposal shall be secured and unopened until the date specified for opening of Price Proposals.

E. Final Selection Formula:

The Department will have a public meeting for opening of sealed bids. The Technical Scores will be announced based on the procedure outlined below. The bid opening meeting will be recorded.

At this meeting, the Department will announce the score for each member of the Technical Review Committee for each Proposer and each Proposer's average Technical Score. The Technical Proposals shall all be graded based on the complete project. The complete project is defined as the combined scope of work for all Sub-Projects inclusive of all Options. Following announcement of the technical scores, the sealed bid proposals will be opened.

The Selection Committee shall publicly open the sealed bid proposals and calculate an adjusted score using the following formula:

$$\frac{BPP}{TS} = \text{Adjusted Score}$$

BPP = Bid Price Proposal
TS = Technical Score

The firm selected will be that firm whose adjusted score is lowest.

The Department reserves the right to consider any proposal as non-responsive if any part of the Technical Proposal does not meet established codes and criteria. Also, if the Proposed Contract Time (PCT) is greater than 470 days, the proposal will be considered non-responsive.

F. Final Selection Process:

The Department's Selection Committee will review the evaluation of the Technical Review Committee and the Price Proposal of each Proposer as to the apparent lowest adjusted score and make a final determination of the lowest adjusted score. The Selection Committee has the right to correct any errors in the evaluation and selection process that may have been made. The Department is not obligated to award the contract and the Selection Committee may decide to reject all proposals. If the Selection Committee decides not to reject all proposals, the contract will be awarded to the Proposer determined by the Selection Committee to have the lowest adjusted score.

G. Compensation to Short-Listed Lead Design Firms :N/A

<u>Attachment 2</u>

Blue Toad Installed Site Test Procedure

Florida Department of Transportation
District 5

Brevard Co. ATMS Expansion
Contract # E5N82
FIN # 428597-1-52-01, 428919-1-52-01, 428920-1-52-01
FAP# ARRA 641-B

BlueTOAD Installed Site
Test Procedure

Prepared for:
Florida Department of Transportation

Prepared by:
Miller Electric Company
2251 Rosselle Street
Jacksonville, FL 32201

BlueTOAD INSTALLED SITE TEST PROCEDURE

The purpose of this test is to verify the operation of the installed BlueTOAD vehicle detection devices from the local traffic signal cabinet. In addition to testing the devices the following information shall be verified and recorded.

BlueTOAD Location ___________________ Station # __________________

To ensure proper BlueTOAD communication the following items will be used to conduct the test:

1) Laptop Computer
2) Terminal emulator application (i.e. PuTTY)
3) Serial Cable or USB to serial adapter with cable (DB-9 female)

Step 1

Visually verify all control cabinet equipment and cabling for proper installation. This includes verification that the detector card is properly seated.

Step 2

Connect the serial cable from Laptop to the detector card DB-9 communication port. This connection may be made directly to the computer or if necessary through the USB to serial converter. Apply power to all devices and the Laptop.

Step 3

Upon powering up the device the tester shall launch the terminal emulator application (PuTTY). Configure a new connection using the following parameters, save this connection as BlueTOAD.

Parameter	***Value***
serial line	set to COM port of PC to be used
Speed (baud)	115,200
connection type	serial
data bits	8
stop bits	1
parity	none
flow control	none

Step 4

Confirm the connection between the computer and the serial port on the BlueTOAD device and then using the button on the card “reset” the device. You should see the following BlueTOAD banner.

```
######################################
#  BlueTOAD                          #
#                                    #
#  Build Date: June 27,2011          #
#  Build Time: 14:04:09              #
#  FW Version: 2.0                   #
######################################
Device ID: <1005>
WDT Init: . . . . [ok]
LED Blink Task Init  . . . . [ok]
Please press any key to enter Configuration Mode
```

Did the BlueTOAD banner appear? If yes continue on, if no verify the serial parameters and retry. If the unit does not respond contact the project manager for corrective action.

Blue Toad Banner Appeared ____

Step 5

When prompted hit any key to enter the Configuration Mode.

Welcome to BlueTOAD Configuration Mode

Once in configuration mode type "?" to see a list of Configuration Mode commands.

Available Commands:
Boot
Set IPtype
Set IPaddr
Set mask
Set gateway
Set dns1
Set devid
Showconfig

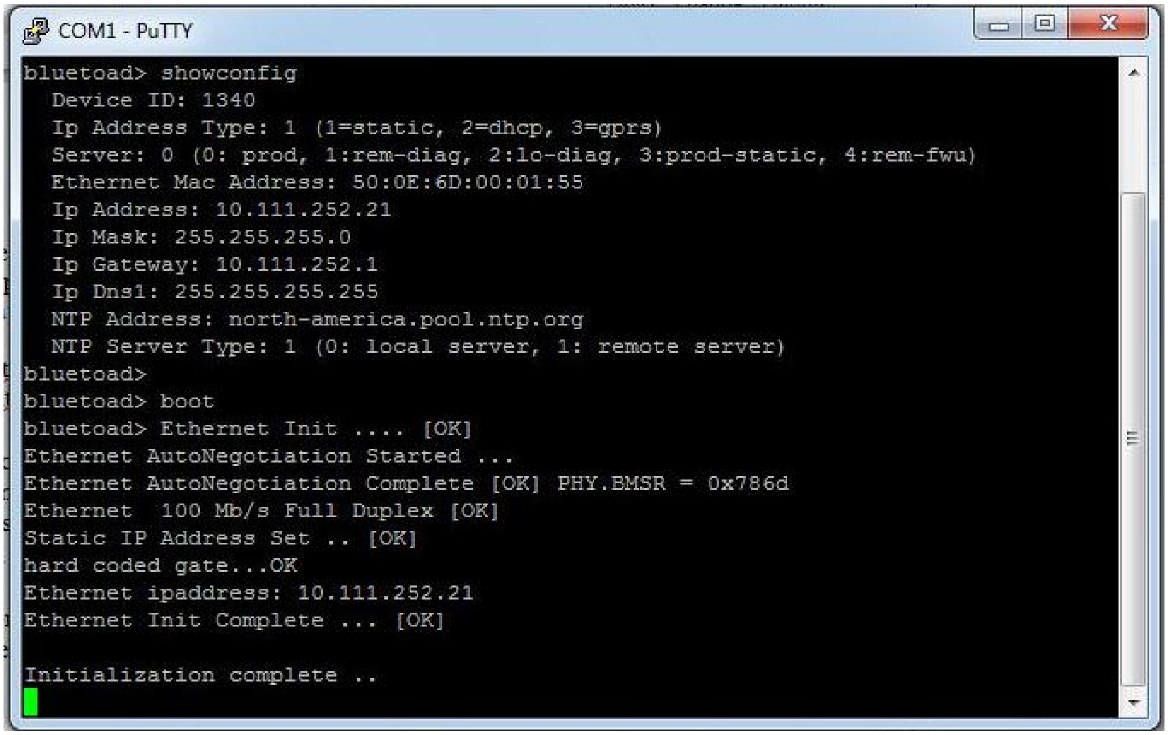
For the purposes of this test we will type "showconfig" in an effort to confirm that all applicable settings are installed on the device and are consistent with the project IP Address list and County provided communication scheme. Once selected you should see the following;

Device ID:
Ethernet MAC address:
IP Address Type:
IP Address:
IP Mask:
IP Gateway:
IP DNS1:

Does this information match the specific site? ____
If yes move on to the next step, if no follow the manufactures instructions on device set up to correct the information. Once the corrected information is installed repeat Step 5 to ensure the set up was saved to the device.

Step 6

The final step in this test is to verify that the device is transmitting data while in the running state. At the prompt type “boot” and the BlueTOAD unit will enter the running state at which time the following information should be displayed.



Did the Initialization complete?____

If yes the test is complete, if no contact the project manager for corrective measure.

BlueTOAD Test Attendees:

Miller Representative	Department/CEI Representative
Signed Date	Signed Date
Print Name	Print Name

Attachment 3

CCTV Stand Alone Test Procedures

Florida Department of Transportation
District 5

Brevard Co. ATMS Expansion
Contract # E5N82
FIN # 428597-1-52-01, 428919-1-52-01, 428920-1-52-01
FAP# ARRA 641-B

CCTV Stand Alone
Test Procedures

Prepared for:
Florida Department of Transportation

Prepared by:
Miller Electric Company
2251 Rosselle Street
Jacksonville, FL 32201

CCTV STAND ALONE TEST PROCEDURE

The purpose of this test is to verify the operation of the installed CCTV devices prior to its connection to the communication infrastructure. In addition to testing the devices the following information shall be verified and recorded.

CCTV Location ____________________ Station #____________________

Manufacturer's Name: Bosch
Product Name: AutoDome
Product Model Number: 500i
Product Serial Number: ____________________

To ensure proper CCTV operation the following items will be used to conduct the test:

1) Manufacturer Supplied Software accessed through web browser
2) Laptop Computer
3) Ethernet Interface Cable

Step 1

Visually verify all control cabinet equipment and cabling for proper installation. This includes verification that all power supply voltages are correct to the devices.

Step 2

Connect the Ethernet cable from Laptop to the Ethernet cable from within the CCTV composite cable. This connection may be made through and Ethernet cable coupling or the Ethernet TVSS unit. Apply power to all devices and the Laptop; establish communication from the laptop to the device.

Step 3

Upon powering up the device the tester should wait for roughly one minute. Once time has passed the tester will log into the unit via the default IP address (192.168.0.1) using either Windows Explorer or Internet Explorer. Upon connection to the device you should see the Bosch screen enabling you to see streaming video or motion jpeg video depending on your laptop software configuration.

Is an image present? ________________ Is the image clear and undistorted? ________________

If the answer to both is yes proceed with the test. If the answer is no repeat the previous steps, if the unit is still not operating properly notify the Project Manager for corrective action.

Step 4

During this test we will verify proper operation of the Zoom functions of the camera. Upon connection to the device use the software to continuously Zoom in to full power then zoom out continuously.

CCTV Assembly Operational	Pass	Fail	Comments
IN Continuous			
OUT Continuous			

Step 5

During this test we will verify proper operation of the Pan and Tilt functions of the camera. Upon connection to the device use the software to continuously Pan left, then right for a complete 360 degree turn. Next use the software to Tilt the camera to the upper and lower limits. When going to the lower limits the camera will perform a “flip” and continue back to the upper limits, this is required for proper operation.

CCTV Assembly Operational	Pass	Fail	Comments
LEFT Continuous			
RIGHT Continuous			
UP Continuous			
DOWN Continuous			

Step 6

During this test we will verify proper operation of the Iris functions of the camera. Upon connection to the device use the software to select and activate the manual Iris functions. Next use the software to open the Iris until the image becomes very bright; second close the iris until the images becomes dark. Prior to exiting the system make sure the iris is rest to function automatically.

Iris Operation	Pass	Fail	Comments
Iris Open (lightens image)			
Iris Close (darkens image)			
Return Iris to Automatic			

Step 7

This step will be used to insert and document the required pre-set viewing locations on the camera. Pre-sets 1 through 5 will be programmed and tested under this step. The following is a list of locations and the order in which they are to be saved to the CCTV memory.

CCTV Pre-set Operational	Yes	No	Comments (Landmark Descriptions)
1) North side of intersection			
2) East side of intersection			
3) South side of intersection			
4) West side of intersection			
5) Traffic Signal Cabinet			
6) Center of Intersection			

All of the aforementioned tests were completed and documented successfully and have been witnessed by the CCTV Device Test Attendees.

CCTV Device Test Attendees:

Miller Representative

Department/CEI Representative

Signed Date

Print Name

Signed Date

Print Name

Attachment 4

Fiber Optic Test Procedure

Intelligent Transportation Systems
201 Reece Way Suite 1431
Casselberry, FL 32707
407.339.6636
Fax 407.339.3822
EC 13003017

Fiber Optic Test Procedures

1.0 Introduction

The fiber test procedures will verify integrity and attenuation of the fiber optic cables installed and spliced on the project in accordance with FDOT Technical Special Provision 783-1.4.

Final testing may begin after the successful installation and splicing of the cable and test plan approval by CEI

2.0 Required Test Equipment

The following equipment is required for this test procedure:
Optical Time Domain Reflectometer (OTDR)
The test unit will be calibrated at the nominal test wavelengths. Calibration should be dated within the last year. The test equipment will be traceable to the National Institute of Standards and Technology (NIST) calibration standard.

2.1 Pre-Installation Testing

Pre-installation, often called reel testing is performed to ensure that the cable has not been damaged in-transit from the manufacturer.

The cable is tested at the 1310nm and 1550 nm wavelengths unidirectional from the inside end which is presented in a protected cage on the side of the reel for this purpose. The technician confirms that all fibers within the cable are of the same length. This testing is to be performed at the discretion of the cable installation contractor or subcontractor.

4.0 Final Acceptance Testing

End- to-End Attenuation testing shall be completed on all terminated fibers within the cable.

783-1.4.2.1 End to End Attenuation Testing: Perform testing on all fibers to ensure that end to end attenuation does not exceed allowable loss (0.4 db/km for 1310nm wavelength, 0.3 db/km for 1550nm wavelength, plus 0.5 db for any connectors and 0.1 db for splices). Repair or replace cable sections exceeding allowable attenuation at no cost to the Department.

783-1.4.2.2 OTDR Tracing: Test all fibers from both cable end points with an optical time domain reflectometer (OTDR) at wavelengths of 1310 and 1550 nm. Test the fibers that are not terminated at the time of installation using a bare fiber adapter. Present the results of the OTDR testing (i.e., traces for each fiber) and a loss table showing details for each splice or termination tested to the Engineer in an approved electronic format. Ensure all OTDR testing complies with the EIA/TIA-55-61 standard.

783-1.4.2.3 Splice Loss Testing: Ensure that the splice loss for a SMF fusion splice does not exceed a maximum bidirectional average of 0.1 decibel per splice. Repair or replace splices that exceed allowable attenuation at no cost to the Department.
783-1.4.2.4 Connector Loss Testing: Ensure that the attenuation in the connector at each termination panel and its associated splice does not exceed 0.5 decibel. Repair or replace connectors exceeding allowable attenuation at no cost to the Department.

The correct index of refraction setting shall be programmed into the test unit based on the cable manufacturer's specifications. The contractor will perform a bi-directional end to end O.T.D.R. test at two (2) optical wavelengths. A 1km launch box will be used to perform all tests. The O.T.D.R. shall have its parameters set up properly. All parameters shall be the same for each cable segment under test. The following are the parameters:

a. Fiber type- single-mode or multi-mode
b. Wavelength- 1310nm, 1550 nm
c. Range and resolution- a function of cable segment length, typically 1.5 times segment length
d. Pulse width- function of cable segment length
e. Refractive index- supplied by cable manufacturer
f. Threshold – limit of event loss, end of fiber segment and reflectance
g. Backscatter coefficient

For Single-mode (9/125 um) fiber, the wavelengths shall be 1310 nm and 1550 nm. The O.T.D.R. traces, a loss table identifying length of span, splices and terminations will be presented along with an electronic copy of the O.T.D.R. traces will be provided for each strand shall be printed and submitted to the Engineer for review. Each O.T.D.R. trace will identify:

a. Cable
b. Buffer color
c. Fiber color
d. Fiber origin point
e. Fiber termination point
f. Operating technicians name

The O.T.D.R. shall have threshold configured to view any anomaly greater than .01 dB. Additionally, any fusion splice identified by the O.T.D.R. as having a bi-directional algebraic sum greater than 0.10 dB shall be broken and re-spliced.

An example of the splice loss computation:

$$\text{Splice Loss (dB)} = \frac{\text{(A to B direction Loss)} + \text{(B to A direction Loss)}}{2}$$

An example follows for an A to B OTDR reading of -0.28 dB and the B to A OTDR reading of 0.38 dB:

$$\text{Splice Loss (dB)} = \frac{\text{(A to B direction Loss)} + \text{(B to A direction Loss)}}{2}$$

$$\text{Splice Loss (dB)} = \frac{(-0.28\ \text{dB}) + (0.38\ \text{dB})}{2}$$

This can be rewritten or simplified to:

$$\text{Splice Loss (dB)} = \frac{0.38\ \text{dB} - 0.28\ \text{dB}}{2}$$

$$\text{Splice Loss (dB)} = \frac{(0.10)}{2}$$

$$\text{Splice Loss (dB)} = 0.05\ \text{dB}$$

Attachment 5

Sensys Installed Site Test Procedure

Florida Department of Transportation
District 5

Brevard Co. ATMS Expansion
Contract # E5N82
FIN # 428597-1-52-01, 428919-1-52-01, 428920-1-52-01
FAP# ARRA 641-B

Sensys Installed Site
Test Procedure

Prepared for:
Florida Department of Transportation

Prepared by:
Miller Electric Company
2251 Rosselle Street
Jacksonville, FL 32201

SENSYS INSTALLED SITE TEST PROCEDURE

The purpose of this test is to verify the operation of the installed Sensys vehicle detection devices from the local traffic signal cabinet. In addition to testing the devices the following information shall be verified and recorded.

Sensys Location ____________________ Station #____________________

To ensure proper Sensys communication the following items will be used to conduct the test:

1) Manufacturer Supplied Software: Traffic DOT2
2) Laptop Computer
3) Ethernet Interface Cable

Step 1

Visually verify all control cabinet equipment and cabling for proper installation. This includes verification that all detector cards are properly seated.

Step 2

Connect the Ethernet cable from Laptop to the access box communication port. This connection may be made directly to the access box or through the Ethernet switch. Apply power to all devices and the Laptop; establish communication from the laptop to the device.

Step 3

Upon powering up the device the tester will log into the unit via the site specific IP address using the Traffic DOT2 software. Upon connection to the device the tester should wait for roughly one minute so that the software can properly poll and display the device information. Once time has passed you should see the DOT2 device verification screen in the map view mode.

Did the site IP allow access into the software? ________________

If the answer is yes proceed with the test. If the answer is no repeat the previous steps, if the unit is still not operating properly notify the Project Manager for corrective action.

Step 4

During this step we will verify proper communication to each of the devices installed at this intersection. Upon connection to the device and verification that you are in the map view screen select the "Table View" button in the upper right hand corner of the screen. Once in table view you should see a complete list of devices and their respective LQI and RSSI values. While the values are not absolute the recommended levels for LQI are between 90 and 100 with the RSSI values recommended between -80 and -50, the lower number the better.

Total number of devices listed? ________________

Are all devices within the recommended range? __________________

Use the space below to note all devices not functioning within the recommended range.

____

____

____

(This test may continue even if devices are outside the recommended range as the value constantly varies for many reasons. Device functionality and performance will be tested and documented in the detection validation test.)

Step 5

During this step we will verify that the information in step 4 corresponds with the layout and requirement of the intersection. At the bottom of the screen in the center position there will be a tab that says “Devices Seen”. This tab is a total of all devices communicating with the Access Point (it does not include the access point). Using the site as-builts count all devices installed (excluding the access point) and verify that installed number of devices matches the “devices seen” and the number from step 4. Provided all numbers match this site is considered operational and has passed the installed site test.

As-Built plan quantity of devices excluding the access point. ____________________
Total number of devices shown on the Devices Seen tab. _______________________
Total number of devices accounted for in step 4. ______________________________

Step 6
During this step we will simply take a screen shot of the table view page as verification and documentation that the information obtained was accurate at the time of test. In the upper right hand corner of the screen you will see a Print Screen button. Select or click on that button and save the file to a folder designated Sensys Installed Site Test Data. Make sure to name the file in accordance with the intersection being tested.

SENSYS Device Test Attendees:

Miller Representative	Department/CEI Representative
Signed Date	Signed Date
Print Name	Print Name

Attachment 6

Addendum 6

Addendum #6
Contract E5N82
Brevard County Advance Traffic Management System
February 10, 2011

The Request for Proposal for the above referenced project is amended as follows:

ATTACHMENTS

Attachment 1: Design/Build Utility Agreement
Attachment 2: Division I Design Build Specifications
Attachment 3: SP0090503ES (Only applies to FM 428597-1-52-01)
Attachment 4: SP0070111ES (Only applies to FM 428597-1-52-01)
Attachment 5: SP0090801ES (Only applies to FM 428597-1-52-01)
Attachment 6: ITS Damage Recovery Specifications
Attachment 7: Traffic Adaptive System
Attachment 8: Permit Exemption Policy Memo
Attachment 9: SP0072800

The attachments listed in the table of contents are by this reference hereby incorporated into and made a part of this RFP as though fully set forth herein.

I. Introduction.

The Florida Department of Transportation (Department) has issued this Request for Proposal (RFP) to solicit competitive bids and proposals from Proposers for the design and construction of ITS infrastructure and ITS sub-system components along the following corridors in Brevard County, Florida:

- SR 500 (US 192) from the I-95 Southbound Ramps to ~~Babcock Street~~ Dairy Road
- SR 518 (Eau Galle Blvd/Montreal Ave) from CR 509 (Wickham Road) to Pineapple Ave.
- SR 520 (King Street) from Clearlake Road to Banana River Drive
- SR 5 (US 1) from Peachtree Street to Eyster Blvd.
- SR 5 (US 1) from ~~Aurora Road~~ Lake Washington Road to ~~SR 5054 (Sarno) Road~~ Babcock St
- SR 50 (Cheney Hwy) from I95 to SR 405
- SR 405 (Columbia Blvd) from SR 50 (Cheney Hwy) to SR 5 (US1)
- Palm Bay Road from Minton to Robert J. Conlan Blvd.
- Minton Road from I95 overpass to Emerson Drive NW
- CR 509 (Wickham Road) from SR 5054 (Sarno Road) to SR 500 (US 192)

Description of Work

Sub-Project 1 – (FM 428597-1) has a maximum bid price of $874,558.00 and includes the installation and/or adjustment of the ITS sub-components to include a FON and a CCTV camera system for:

- Corridor 1 (SR 500/US 192) – From I95 South Bound Ramps to ~~Babcock Street~~ Dairy Road
- Corridor 2 (SR 518/Eau Galle Blvd/Montreal Ave) – From CR 509/Wickham Road to Pineapple Ave.

Proposers shall note a sketch of the existing ITS infrastructure known throughout the limits of Corridor 1 in Sub-Project 1is provided as Document 2 for use in evaluation of design and construction of the work described above. Use of existing conduit and aerial infrastructure for design and installation of the new 72-strand, 12-fiber buffer, fiber optic cable is encouraged. Proposers shall submit technical and price proposals per the instructions specified in section VII of this RFP.

In the event that the Design/Build Firm's bid for Sub-Project 1 is below the maximum bid amount for Sub-Project 1, the required installation of wireless VDS's to include implementation of traffic adaptive signal control shall be added to the scope of work for Sub-Project 1 as Options in order to maximize the scope of work accomplished within the maximum bid price. Any Options added to Sub-Project 1 shall not cause the bid price for Sub-Project 1 to exceed the maximum bid price established. Each Option shall be individually added in the order as shown in the table below:

Options	Locations
Option 1	SR 500 (US 192) and I-95 Southbound Ramps
Option 2	SR 500 (US 192) and I-95 Northbound Ramps
Option 3	SR 500 (US 192) and Dike Road
Option 4	SR 500 (US 192) and John Rodes Boulevard
Option 5	SR 500 (US 192) and CR 509 (Wickham Road/Minton Road)
Option 6	SR 500 (US 192) and Meadowlane~~d~~ Avenue
Option 7	SR 500 (US 192) and Dayton Boulevard
Option 8	SR 500 (US 192) and Laila Court
Option 9	SR 500 (US 192) and Evans/Hollywood Road
Option 10	SR 500 (US 192) and McClain Drive
Option 11	SR 500 (US 192) and Melbourne Square Entr.
Option 12	SR 500 (US 192) and Dairy Road
~~Option 13~~	~~SR 500 (US 192) and Airport Boulevard~~
~~Option 14~~	~~SR 500 (US 192) and South Country Club Road~~
~~Option 15~~	~~SR 500 (US 192) and Babcock Street~~
Option 13	SR 518 (Eau Gallie Blvd) and Croton Rd
Option 14	SR 518 (Eau Gallie Blvd) and Commadore Blvd
Option 15	SR 518 (Eau Gallie Blvd) and SR 5 (US 1)

Option 16	SR 518 (Eau Gallie Blvd) and Highland Ave
Option 17	SR 518 (Eau Gallie Blvd) and Pineapple
Option 18	SR 518 (Montreal Ave) and Highland Ave
Option 19	SR 518 (Montreal Ave) and Pineapple Ave

Specification, guidelines and references that pertain to the American Recovery and Reinvestment Act of 2009 (ARRA) that are contained within this RFP shall only be applicable to the scope of work for Sub-Project 1 (FM 428597-1-52-01).

Sub-Project 2 – (FM 428919-1) includes all remaining Options that are not included in the bid price proposal for Sub-Project 1 and installation and/or adjustment of the ITS sub-components to include a FON, CCTV camera system, wireless VDS and traffic adaptive signal control for:

- Corridor 3 (SR 520) – From Clearlake Road to South Banana River Drive
- Corridor 4 (SR5/US 1) – From Peachtree Street to Eyster Blvd
- Corridor 5 (SR5/US 1) – From ~~Aurora Road~~ Lake Washington Road to ~~SR 5054 (Sarno) Road~~ Babcock St.
- Corridor 6 (SR 50/Cheney Hwy) – From I95 to SR 405
- Corridor 7 (SR 405/Columbia Blvd) – SR 50/Cheney Hwy to SR5/US1

Corridor 3 of Sub-Project 2 involves the installation, replacement and/or adjustment of bridge conduit and FOC at the Merritt Island Causeway between US 1 and Tropical Trail and between Skyes Creek Pkwy and S. Banana Drive. Although, the Design Build Firm shall be required to add a new 72 Strand, 12-fiber buffer FOC at the aforementioned locations, the Design Build Firm shall note that new conduit will be installed on the Merritt Island Causeway between US1 and Tropical Trail as a part of another project. The Design Build Firm shall utilize said conduit and must coordinate with the Department as to the availability of the conduits preparedness for fiber installation. Additionally, the Design Build Firm shall remove and dispose of the existing HDPE conduit attached to the Merritt Island Causeway at said location.

II. Schedule of Events.

Below is the current schedule of the remaining events that will take place in the selection process. The Department reserves the right to make changes or alterations to the schedule as the Department determines is in the best interest of the public. Proposers will be notified sufficiently in advance of any changes or alterations in the schedule. Unless otherwise notified in writing by the Department, the dates indicated below for submission of items or for other actions on the part of a Proposer shall constitute absolute deadlines for those activities and failure to fully comply by the time stated shall cause a Proposer to be disqualified.

Date	Event
October 4, 2010	Shortlist meeting
October 11, 2010	Deadline for submission of written questions prior to the pre-proposal meeting

October 12, 2010	Pre-proposal meeting at 1:30 p.m. local time in Cypress A Conference Room, District Office - 719 S. Woodland Blvd., Deland, FL
December 21, 2010	Final deadline for submission of questions/information
November 3, 2010	Technical Proposals due in District Office by 2:00 p.m. local time. NOTE: This submittal will be considered null and void.
November 23, 2010	Revisions to Technical Proposal sections that are affected by question 7 and 16 of the DB Questions and Responses on the website are due in District Office (attention: Chela Wood) by 2:00 p.m. local time. Do not resubmit the entire proposal. Submit only those pages that include any updated changes, and changes made are to be highlighted. NOTE: This submittal will be considered null and void.
February 16, 2011	Deadline for submission of written questions prior to the pre-proposal meeting
February 17, 2011	Pre-proposal meeting at 10:00 a.m. local time in Cypress A Conference Room, District Office - 719 S. Woodland Blvd., Deland, FL
March 16, 2011	Final deadline for submission of questions/information
March 1, 2011	Technical Proposals due in District Office by 2:00 p.m. local time. This is the only Technical Proposal submittal that will be considered.
~~to be determined~~ March 15, 2011	Question and Answer Session in the ~~Lake~~ Volusia County Conference Room, District Office – 719 S. Woodland Blvd, DeLand, FL. Times will be assigned during the pre-proposal meeting. One hour will be allotted for questions and responses.
~~to be determined~~ March 23, 2011	Price Proposals due in District Office by 2:00 p.m. local time.
~~to be determined~~ March 23, 2011	Public announcing of Technical Scores and opening of Price Proposals at 2:00 p.m. local time in Volusia County Conference Room, District Office - 719 S. Woodland Blvd, Deland, FL
~~to be determined~~ March 28, 2011	Public Meeting of Selection Committee to determine intended Award at 8:15 a.m. in the District Office – 719 S. Woodland Blvd, Deland, FL
~~to be determined~~ March 28, 2011	Posting of the Department's intended decision to Award (will remain posted for 72 hours/days)
~~to be determined~~ April 1, 2011	Anticipated Award Date
~~to be determined~~ April 22, 2011	Anticipated Execution Date
~~to be determined~~ May 6, 2011	Anticipated Notice to Proceed Date (NTP) – Start of Contract Time

E. Question and Answer Session

The Department shall meet with each Proposer, formally, for a Question and Answer session. FHWA shall be invited on FA Oversight Projects. The purpose of the Q & A session is for the Technical Review Committee to seek clarification and ask questions, as it relates to the Technical Proposal, of the Proposer. The Question and Answer sessions will occur after the date the Technical Proposals are due, and be part of the Overall Technical Proposal Scoring. The Department will terminate Question and Answer Sessions promptly at the end of the allotted time. The Department may tape record or videotape all or part of the Question and Answer Sessions. Such recordings will become part of the Contract Documents in accordance with the Specifications. The Question and Answer session will not constitute "discussions" or negotiations. Proposers will not be permitted to ask questions of the Department except to ask the meaning of a clarification question posed by the Department. Within one (1) week of the Q&A session, the Design-Build Firm shall submit to the Department a written clarification letter summarizing the clarifications provided during the Q&A session. No additional time will be allowed to research answers.

The Department will provide some (not necessarily all) proposed questions to each firm as it relates to their technical proposal approximately 24 hours before the scheduled Question and Answer Session. No supplemental materials, handouts, etc. will be allowed to be presented in the Question and Answer Session.

There will be no limit to the number of staff members that the proposing firms can bring to the Question and Answer Sessions; however, it is highly recommended that the staff members be limited to those with knowledge and decision-making authority of the Question and Answer Session topics, and those who will actually be providing the services.

VI. Design and Construction Criteria

P. Intelligent Transportation System (ITS)

5. Design and Construction Criteria

ii. Closed Circuit Television (CCTV) and Digital Video Encoder

1. Table 1 – CCTV Required Locations

Corridor	*Intersection*	*Quadrant*
US 192	SR 500 (US 192) and CR 509 (Wickham Road/Minton Road)	SW
US 192	SR 500 (US 192) and Evans/Hollywood Road	NW
US 192	SR 500 (US 192) and Dairy Road	NW
~~US 192~~	~~SR 500 (US 192) and Babcock Street~~	~~SE~~
SR 518	SR 518 (Eau Gallie Blvd) and Croton Rd	NE
SR 518	SR 518 (Eau Gallie Blvd) and Commadore Blvd	SE
SR 518	SR 518 (Eau Gallie Blvd) and SR 5 (US 1)	SE
SR 518	SR 518 (Eau Gallie Blvd) and Pineapple Ave	SE

SR 518	SR 518 (Montreal Ave) and Highland Ave	SW
SR 518	SR 518 (Montreal Ave) and Pineapple Ave	NE
SR 520	SR 520 & Clearlake Rd	NW
SR 520	SR 520 & SR 519 (Fiske Blvd)	NW
SR 520	SR 5 (US1) & SR 520	NW
SR 520	SR 520 (Willard St) & Forrest Ave (existing mast arm mount)	SW
SR 520	SR 520 (King St) & Brevard Ave (existing mast arm mount)	SE
SR 520	SR 520 between King St and Willard St on west end of Humphrey Bridge (new ITS pole)	N/A
SR 520	SR 520 between roadways on east end of Humphrey Bridge (new ITS pole)	N/A
SR 520	SR 520 & SR 3	NW
SR 520	SR 520 & Sykes Creek Pkwy	SE
SR 520	SR 520 & Newfound Harbor Dr	NW
SR 520	SR 520 & S. Banana River/Milford Pt Dr.	NW
US 1	SR 5 (US 1) and Rosa L Jones Blvd	SW
US 1	SR 5 (US 1) and Barton Blvd	NE
US 1	SR 5 (US 1) and Eyster Blvd	SW
US 1	SR 5 (US 1) and Lake Washington	SW
US 1	SR 5 (US 1) and Aurora Rd	NE
US 1	SR 5 (US 1) and Sarno Rd	SW
US 1	SR 5 (US 1) and Babcock Street	S
SR 50	SR 50 (Cheney Hwy) and I-95 Southbound Ramps	SE
SR 50	SR 50 (Cheney Hwy) and SR 405 (Columbia Blvd)	NW
SR 405	SR 405 (Columbia Blvd) and Target Entrance	NW
SR 405	SR 405 (Columbia Blvd) and Barna Ave	S
SR 405	SR 405 (Columbia Blvd) and SR 407	SE
SR 405	SR 405 (Columbia Blvd) and Sisson Rd	NW
Palm Bay Road	Palm Bay Rd & Minton Rd	SW

Palm Bay Road	Palm Bay Rd & I-95 Southbound Ramps	SE
Palm Bay Road	Palm Bay Rd & Hollywood Blvd	SE
Palm Bay Road	Palm Bay Rd & Dairy Rd	SE
Palm Bay Road	Palm Bay Rd & Babcock St	SW
Palm Bay Road	Palm Bay Rd & Lipscomb/Clearmont St NE	SE
Palm Bay Road	Palm Bay Rd & Robert J Conlin Blvd	SE
Minton Road	Minton Rd & Norfolk Pkwy	NE
Minton Road	Minton Rd & Emerson Dr NW	SW
Wickham Road	CR 509 (Wickham Rd) & Wright Ave	SW
Wickham Road	CR 509 (Wickham Rd) & Ellis Rd	SE
Wickham Road	CR 509 (Wickham Rd) & Sheridan Rd	NW

VI. Design and Construction Criteria

P. Intelligent Transportation System (ITS)

5. Design and Construction Criteria

iii. Vehicle Detection System (VDS)

1. Table 2 – VDS Required Locations

Corridor	*Intersection*
US 192	SR 500 (US 192) and I-95 Southbound Ramps
US 192	SR 500 (US 192) and I-95 Southbound Off Ramp Queue Detection
US 192	SR 500 (US 192) and I-95 Northbound Ramps
US 192	SR 500 (US 192) and I-95 Northbound Off Ramp Queue Detection
US 192	SR 500 (US 192) and Dike Road
US 192	SR 500 (US 192) and John Rodes Boulevard
US 192	SR 500 (US 192) and CR 509 (Wickham Road/Minton Road)
US 192	SR 500 (US 192) and Meadowland Avenue

US 192	SR 500 (US 192) and Dayton Boulevard
US 192	SR 500 (US 192) and Laila Court
US 192	SR 500 (US 192) and Evans/Hollywood Road
US 192	SR 500 (US 192) and McClain Drive
US 192	SR 500 (US 192) and Melbourne Square
US 192	SR 500 (US 192) and Dairy Road
~~US 192~~	~~SR 500 (US 192) and Airport Boulevard~~
~~US 192~~	~~SR 500 (US 192) and South Country Club Road~~
~~US 192~~	~~SR 500 (US 192) and Babcock Street~~
SR 518	SR 518 (Eau Gallie Blvd) and Croton Rd
SR 518	SR 518 (Eau Gallie Blvd) and Commadore Blvd
SR 518	SR 518 (Eau Gallie Blvd) and SR 5 (US 1)
SR 518	SR 518 (Eau Gallie Blvd) and Highland Ave
SR 518	SR 518 (Eau Gallie Blvd) and Pineapple Ave
SR 518	SR 518 (Montreal Ave) and Highland Ave
SR 518	SR 518 (Montreal Ave) and Pineapple Ave
SR 520	SR 520 & Clearlake Rd
SR 520	SR 520 & Varr Ave
SR 520	SR 520 & SR 519 (Fiske Blvd)
SR 520	SR 520 & Blake Ave
SR 520	SR 5 (US1) & SR 520
SR 520	SR 520 (Willard St) & Forrest Ave
SR 520	SR 520 (Willard St) & Brevard Ave
SR 520	SR 520 (Willard St) & Delannoy Ave
SR 520	SR 520 (King St) & Forrest Ave
SR 520	SR 520 (King St) & Brevard Ave
SR 520	SR 520 (King St) & Delannoy Ave
SR 520	SR 520 (King St) & Riveredge Blvd

SR 520	SR 520 & Tropical Trail
SR 520	SR 520 & SR 3/S. Courtenay Pkwy
SR 520	SR 520 & Big Lots Entrance
SR 520	SR 520 & Plumosa St
SR 520	SR 520 & Merritt Square Mall Entr
SR 520	SR 520 & Sykes Creek Pkwy
SR 520	SR 520 & Kiwannis Island Park Rd
SR 520	SR 520 & Newfound Harbor Dr
SR 520	SR 520 & N. Banana River Dr
SR 520	SR 520 & S. Banana River/Milford Point Dr
SR 520	S. Courtenay Pkwy & Magnolia Ave
SR 520	S. Courtenay Pkwy & Fortenberry Rd
US 1	SR 5 (US 1) and Peachtree St
US 1	SR 5 (US 1) and Rosa L Jones Blvd
US 1	SR 5 (US 1) and Florida Ave
US 1	SR 5 (US 1) and Longwood Ave
US 1	SR 5 (US 1) and Barton Blvd
US 1	SR 5 (US 1) and Rockledge Square Entr
US 1	SR 5 (US 1) and Eyster Blvd
US 1	SR 5 (US 1) and Lake Washington
US 1	SR 5 (US 1) and CR 511 (Aurora Rd)
US 1	SR 5 (US 1) and Sarno Rd
US 1	SR 5 (US 1) and Babcock Street
SR 50	SR 50 (Cheney Hwy) and I-95 Southbound Ramps
SR 50	SR 50 (Cheney Hwy) and SR 405 (Columbia Ave)
SR 405	SR 405 (Columbia Ave) and Windover Trail
SR 405	SR 405 (Columbia Ave) and Target Entrance
SR 405	SR 405 (Columbia Ave) and Barna Ave

SR 405	SR 405 (Columbia Ave) and SR 407
SR 405	SR 405 (Columbia Ave) and Grissom Pkwy
SR 405	SR 405 (Columbia Ave) and Sisson Rd
Palm Bay Road	Palm Bay Rd & Minton Rd
Palm Bay Road	Palm Bay Rd & Athens Dr
Palm Bay Road	Palm Bay Rd & Culver Dr/Norfolk Pkwy
Palm Bay Road	Palm Bay Rd & I-95 SB Ramps
Palm Bay Road	Palm Bay Rd & I-95 NB Ramps
Palm Bay Road	Palm Bay Rd & Hollywood Blvd
Palm Bay Road	Palm Bay Rd & Dairy Rd
Palm Bay Road	Palm Bay Rd & Port Malabar Blvd NE
Palm Bay Road	Palm Bay Rd & Stack Blvd
Palm Bay Road	Palm Bay Rd & Rivera Dr NE
Palm Bay Road	Palm Bay Rd & Babcock St
Palm Bay Road	Palm Bay Rd & Lipscomb/Clearmont St NE
Palm Bay Road	Palm Bay Rd & Troutman Blvd NE
Palm Bay Road	Palm Bay Rd & Robert J Conlin Blvd
Palm Bay Road	Norfolk Pkwy & Shopping Center Dr
Minton Road	Minton Rd & Norfolk Pkwy
Minton Road	Minton Rd & Hield Rd
Minton Road	Minton Rd & Emerson Dr NW
Wickham Road	CR 509 (Wickham Rd) & Fountainhead Blvd
Wickham Road	CR 509 (Wickham Rd) & Wright Ave
Wickham Road	CR 509 (Wickham Rd) & Technology Dr
Wickham Road	CR 509 (Wickham Rd) & Harper Rd
Wickham Road	CR 509 (Wickham Rd) & Ellis Rd
Wickham Road	CR 509 (Wickham Rd) and Greenboro Dr/Idlewylde Cir
Wickham Road	CR 509 (Wickham Rd) & Sheridan Rd

VI. Design and Construction Criteria

P. Intelligent Transportation System (ITS)

5. Design and Construction Criteria

iv. Fiber Optic Network (FON)

1. Table 3 – FON Required Locations

Corridor	*Intersection*	*FOC*	*Type*
US 192	SR 500 (US 192) and Wickham/Minton Rd to SR 500 (US 192) and Dayton Road	72 Strand-6 Buffer	Trunkline
US 192	SR 500 (US 192) and Wickham/Minton Rd	12 Strand- 1 Buffer	Drop Cable
US 192	SR 500 (US 192) and Meadowlane Ave	12 Strand- 1 Buffer	Drop Cable
US 192	SR 500 (US 192) and Dayton Road	12 Strand- 1 Buffer	Drop Cable
US 192	SR 500 (US 192) and Dayton Road to SR 500 (US 192) and Laila Court	72 Strand-6 Buffer	Trunkline
US 192	SR 500 (US 192) and Laila Court	12 Strand- 1 Buffer	Drop Cable
US 192	SR 500 (US 192) and Laila Court to SR 500 (US 192) and Dairy Road	72 Strand- 6 Buffer	Trunkline
US 192	SR 500 (US 192) and Evans Road	12 Strand- 1 Buffer	Drop Cable
US 192	SR 500 (US 192) and McClain Drive	12 Strand 1 Buffer	Drop Cable
US 192	SR 500 (US 192) and Melbourne Square	12 Strand 1 Buffer	Drop Cable
US 192	SR 500 (US 192) and Dairy Road	12 Strand	Drop Cable

		1 Buffer	
~~US 192~~	~~SR 500 (US 192) and Dairy Road to SR 500 (US 192) and Babcock Street~~	~~72 Strand-6 Buffer~~	~~Trunkline~~
~~US 192~~	~~SR 500 (US 192) and Airport Blvd~~	~~12 Strand~~ ~~1 Buffer~~	~~Drop Cable~~
~~US 192~~	~~SR 500 (US 192) and South Country Club Rd~~	~~12 Strand~~ ~~1 Buffer~~	~~Drop Cable~~
~~US 192~~	~~SR 500 (US 192) and Babcock Street~~	~~12 Strand~~ ~~6 Buffer~~	~~Drop Cable~~
SR 518	SR 518 (Eau Gallie Blvd) and Wickham Road to SR 518 (Montreal Ave) and Pineapple Ave	72 Strand- 6 Buffer	Trunkline
SR 518	SR 518 (Eau Gallie Blvd) and Croton Rd	12 Strand 1 Buffer	Drop Cable
SR 518	SR 518 (Eau Gallie Blvd) and Commadore Blvd	12 Strand 1 Buffer	Drop Cable
SR 518	SR 518 (Eau Gallie Blvd) and SR 5 (US 1)	12 Strand 1 Buffer	Drop Cable
SR 518	SR 518 (Eau Gallie Blvd) and Highland Ave	12 Strand 1 Buffer	Drop Cable
SR 518	SR 518 (Eau Gallie Blvd) and Pineapple Ave	12 Strand 1 Buffer	Drop Cable
SR 518	SR 518 (Montreal Ave) and Highland Ave	12 Strand 1 Buffer	Drop Cable
SR 518	SR 518 (Montreal Ave) and Pineapple Ave	12 Strand 1 Buffer	Drop Cable
SR 520	SR 520 and SR 501 (Clearlake Road) to SR 520 and SR 5 (US 1)		Remove Cable
SR 520	SR 520 and SR 501 (Clearlake Road) to SR 520 and SR 5 (US 1)	72 Strand 6 Buffer	Trunkline

SR 520	SR 520 & Varr Ave	12 Strand-1 Buffer	Drop Cable
SR 520	SR 520 & SR 519 (Fiske Blvd)	12 Strand-1 Buffer	Drop Cable
SR 520	SR 520 & Blake Ave	12 Strand-1 Buffer	Drop Cable
SR 520	SR 520 and SR 5 (US 1) to SR 520 and Tropical Trail		Remove Cable
SR 520	SR 520 and SR 5 (US 1) to SR 520 and Tropical Trail	72 Strand 6 Buffer	Trunkline
SR 520	SR 520 (Willard St) and Delannoy Ave	12 Strand 1 Buffer	Drop Cable
SR 520	SR 520 (King St) and Brevard Ave	12 Strand 1 Buffer	Drop Cable
SR 520	SR 520 (King St) and Delannoy Ave	12 Strand 1 Buffer	Drop Cable
SR 520	SR 520 (King St) and Riveredge Blvd	12 Strand 1 Buffer	Drop Cable
SR 520	SR 520 (W. Merritt Island Cswy) and west end of Humphrey Bridge CCTV pole	12 Strand 1 Buffer	Drop Cable
SR 520	SR 520 (W. Merritt Island Cswy) and east end of Humphrey Bridge CCTV pole	12 Strand 1 Buffer	Drop Cable
SR 520	SR 520 and Tropical Trail to SR 520 and Sykes Creek Pkwy		Remove Cable
SR 520	SR 520 and Tropical Trail to SR 520 and South Banana River Drive	72 Strand 6 Buffer	Trunkline
SR 520	SR 520 and Tropical Trail	12 Strand 1 Buffer	Drop Cable
SR 520	SR 520 and SR3 / South Courtenay Pkwy	12 Strand 1 Buffer	Drop Cable

SR 520	SR 520 and Big Lots Entrance	12 Strand 1 Buffer	Drop Cable
SR 520	SR 520 and Plumosa Street	12 Strand 1 Buffer	Drop Cable
SR 520	SR 520 and Merritt Square Mall Entr	12 Strand 1 Buffer	Drop Cable
SR 520	SR 520 and Sykes Creek Pkwy	12 Strand 1 Buffer	Drop Cable
SR 520	SR 520 and Kiwannis Island Park Rd	12 Strand 1 Buffer	Drop Cable
SR 520	SR 520 and Newfound Harbor Dr	12 Strand 1 Buffer	Drop Cable
SR 520	SR 520 & N. Banana River Dr	12 Strand 1 Buffer	Drop Cable
SR 520	SR 520 & S. Banana River Dr	12 Strand 1 Buffer	Drop Cable
US 1	SR 5 (US 1) and ~~CR 511 (Aurora Rd)~~ Lake Washington Rd to SR 5 (US 1) and ~~Sarno Rd~~ Babcock St.	72 Strand 6 Buffer	Trunkline
US 1	SR 5 (US 1) and Lake Washington	12 Strand 1 Buffer	Drop Cable
US 1	SR 5 (US 1) and CR 511 (Aurora Rd)	12 Strand 1 Buffer	Drop Cable
US 1	SR 5 (US 1) and Sarno Rd	12 Strand 1 Buffer	Drop Cable
US 1	SR 5 (US 1) and Babcock St.	12 Strand 1 Buffer	Drop Cable
SR 50	SR 50 (Cheney Hwy) and I-95 Southbound Ramps to SR 50 (Cheney Hwy) and SR 405 (Columbia Blvd)	72 Strand 6 Buffer	Trunkline

SR 50	SR 50 (Cheney Hwy) and I-95 Southbound Ramps	12 Strand 1 Buffer	Drop Cable
SR 50	SR 50 (Cheney Hwy) and SR 405 (Columbia Blvd)	12 Strand 1 Buffer	Drop Cable
SR 405	SR 405 (Columbia Blvd) and SR 50 (Cheney Hwy) to SR 405 (Columbia Blvd) and SR 5 (US 1)		Remove Cable
SR 405	SR 405 (Columbia Blvd) and SR 50 (Cheney Hwy) to SR 405 (Columbia Blvd) and SR 5 (US 1)	72 Strand 6 Buffer	Trunkline
SR 405	SR 405 (Columbia Blvd) and Windover Trail	12 Strand 1 Buffer	Drop Cable
SR 405	SR 405 (Columbia Blvd) and Target Entrance	12 Strand 1 Buffer	Drop Cable
SR 405	SR 405 (Columbia Blvd) and Barna Ave	12 Strand 1 Buffer	Drop Cable
SR 405	SR 405 (Columbia Blvd) and SR 407	12 Strand 1 Buffer	Drop Cable
SR 405	SR 405 (Columbia Blvd) and Grissom Pkwy	12 Strand 1 Buffer	Drop Cable
SR 405	SR 405 (Columbia Blvd) and Sisson Rd	12 Strand 1 Buffer	Drop Cable
Minton Road	Minton Rd and I-95 DASH III Hub to Minton Rd and Emerson Drive NW	72 Strand 6 Buffer	Trunkline
Minton Road	Minton Rd & Norfolk Pkwy	12 Strand 1 Buffer	Drop Cable
Minton Road	Minton Rd & Hield Rd	12 Strand 1 Buffer	Drop Cable
Minton Road	Minton Rd & Emerson Dr NW	12 Strand 1 Buffer	Drop Cable
Minton Road	Minton Rd and Palm Bay Rd		Connection to Palm

			Bay Rd FOC
Wickham Road	CR 509 (Wickham Rd) and SR 5054 (Sarno Rd to CR 509 (Wickham Rd) and Ellis Rd	72 Strand 6 Buffer	Trunkline
Wickham Road	CR 509 (Wickham Rd) & Fountainhead Blvd	12 Strand 1 Buffer	Drop Cable
Wickham Road	CR 509 (Wickham Rd) & Wright Ave	12 Strand 1 Buffer	Drop Cable
Wickham Road	CR 509 (Wickham Rd) & Technology Dr	12 Strand 1 Buffer	Drop Cable
Wickham Road	CR 509 (Wickham Rd) & Harper Rd	12 Strand 1 Buffer	Drop Cable
Wickham Road	CR 509 (Wickham Rd) & Ellis Rd	12 Strand 1 Buffer	Drop Cable
Wickham Road	CR 509 (Wickham Rd) & Harper Rd – to Harper Rd and City of Melbourne Public Works Traffic Engineering office	12 Strand 1 Buffer	Drop Cable
Wickham Road	CR 509 (Wickham Rd) and Ellis Rd to CR 509 (Wickham Rd) and SR 500 (US 192)	72 Strand 6 Buffer	Trunkline
Wickham Road	CR 509 (Wickham Rd) and Greenboro Dr/Idlewylde Cir	12 Strand 1 Buffer	Drop Cable
Wickham Road	CR 509 (Wickham Rd) & Sheridan Rd	12 Strand 1 Buffer	Drop Cable

VI. Design and Construction Criteria

P. Intelligent Transportation System (ITS)

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v. Arterial Travel Time (ATT)

~~The Arterial Travel Time (ATT) software shall be installed on a server running Fedora 10 operating system with MySQL Database and Apache HTTP server. The Arterial Travel Time (ATT) software must have the capability to establish travel time data through the re-identification of magnetic signatures of vehicles captured at upstream and downstream VDS devices. The ATT software must be configurable and scalable to sample data from all~~

~~mainline VDS sensors of all corridors and shall be capable of archiving all ATT data with the ability to provide a graphing interface and the output of .xls and .csv format files. The ATT software must be capable of populating a real-time colored coded arterial map from the magnetic signature sampling. This map shall be composed of segments with each segment indicating through color codes the current level of congestion. Segment labels on the map shall be capable of displaying:~~

- ~~Median Travel Time (sec)~~
- ~~80th percentile Travel Time (sec)~~
- ~~90th percentile Travel Time (sec)~~
- ~~Vehicles in segment (number)~~
- ~~Length of segment (miles)~~

~~In addition to the map display, the ATT software must be capable of providing a real-time XML data feed which will include data such as:~~

- ~~Segment identification number~~
- ~~Time interval (seconds)~~
- ~~Time of day when vehicle enters a segment~~
- ~~Minimum travel time within the current interval~~
- ~~10th percentile through 90th percentile travel time within the current interval~~
- ~~Maximum travel time within the current interval~~
- ~~Number of vehicles counted over upstream array in current interval~~
- ~~Number of vehicles counted over downstream array in current interval~~
- ~~Number of matches used to generate the aggregate~~

v. Arterial Travel Time Sensors

The Design Build firm shall be responsible for designing and building a Bluetooth Arterial Travel Time (BATT) system. The BATT system shall be defined as all hardware (Bluetooth reading devices, etc.), software (service, website access, back end support system, etc.) and any other components necessary to provide accurate real-time speed and travel time data of the deployment corridors and must meet the minimum requirements as described in the RFP.

The Bluetooth Reading Devices (Sensors) shall be deployed at the designated locations shown in Table 4 below, and must be capable of sampling data such as the Machine Address Code (MAC)of portable devices for the purpose of producing Travel Time data. The BATT system software must be capable of providing a service to receive, process, match, and filter the Bluetooth MACs received from the Bluetooth sensors and the service must generate travel time data from the successive matches sampled along the corridor. .. The Bluetooth sensors must communicate with the central system and service via the ITS FON utilizing Ethernet connectivity. The BATT system must also be capable of combining the data from multiple pairs of Bluetooth sensors to produce route information for entire corridors or segments. Each route must display the first and last sensor with travel time and speed for the designated segment.

The Bluetooth sensors must be designed to receive powerfrom within the traffic controller cabinet, through the NEMA TS 2 detection rack. The Bluetooth sensor card rack interface must be no more than one (1) card rack unit wide. A coaxial cable will be utilized to connect the Bluetooth sensor card to the external antenna. The coaxial cable may be installed in the same conduit with other cabling as required for other subsystems of this project. The external antenna may be either an omnidirectional or a unidirectional Yagi-Uda style antenna as directed by the manufacturer and mounted no higher than fifteen (15) feet above roadway. The detector card must provide an Ethernet port, as a serial to Ethernet converter will not be accepted. The Ethernet/IP controller must be capable of static and DHCP IP addressing, with support for gateway and domain. To sample the Bluetooth MAC, a minimum CSR Bluecore4 Class 1 Industrial Specification embedded radio is required, no USB dongle types will be accepted. The Bluetooth sensors must contain advanced features designed to allow the unit to operate efficiently in a remote environment and must be capable of sending diagnostic heartbeat information such as voltage and temperature monitoring as well as software stability information. The Bluetooth sensors must be capable of automatically rebooting if a condition is detected that requires such action and in the event of a total system recovery, the Bluetooth sensors must be designed to automatically re-image the system memory.

In addition, the Bluetooth sensors must have the ability to download software patches and upgrades remotely via the network without the need to physically visit the unit.

The backend support system shall exist to process the data collected by the Bluetooth sensors. Such support shall also include a secure web-based user interface to enable the County to view, analyze, and configure data outputs. The data must be available for viewing in real time or as post processed. Data processing information shall include travel time, flow, speed, and MAC address counts. The data processing shall also provide filtering of the following as needed to deliver the most accurate information:

- Pedestrian
- Vehicular
- Smoothing
- Mean, Median, statistical
- 2-stage filter

Data uploaded from the Bluetooth sensors shall be hosted and stored by the BATT system manufacturer on a dedicated server in a state-of-the-art mission critical environment facility (Cybercenter) for hosting. The Cybercenter shall meet the following requirements at a minimum:

- SAS 70 Type II Internal Control Standards
- Physical Security including biometric scanners for access, indoor and outdoor 24/7 surveillance, security desk check-in
- HVAC and fire suppression – N+1 Redundant chilling/heating system and redundant, multi-zoned fire suppression systems.
- Power redundancy in the form of battery backup UPS sufficient to power the center until N+1 diesel generators can power up
- Public network connectivity – linked to tier one OC-192 IP network or better

The BATT System shall include the following, as a complete turnkey operations and maintenance package for the County:

- Web-based Map with device location and information including:
    - Dynamic Color coded links based on average speeds versus speed limit
    - Pop up on each link displaying link name, average speed & speed limit
- Real-time chart displaying origin, destination, time stamp, travel-time & speed
- 48 hour graphs displaying the following:

    - Travel-Time or Average Speed in 15 minute increments with the following options being displayed on the same graph:
        - # of matches on a bar graph
        - Raw data matches being displayed as tick marks
- 12 month rolling data storage
- Historical reports showing matched pairs, travel times and speeds based on user defined dates and times
- Historical report showing number of unique MAC detects by unit based on user defined dates and times
- XML and CSV Feed on all reports
- Ability for the provider to run a query of a specific MAC address for diagnostic purposes
- Web-based GUI for Operations and Maintenance
- Software Bug Fixes
- Software Performance Improvements
- Firmware Updates
- 24 x 7 Monitoring for each device
- Email/Text Alerting
- 48 Hour Depot return on Hardware

Software Interface to FL-ATIS System:

The Design/Build firm shall be responsible for coordinating with the Department, County, and bluetooth manufacturer to develop a software plug-in to allow the Brevard County travel time data stored at the Cybercenter to be exported to the FL511 website (FL-ATIS) system. The Bluetooth manufacturer shall be responsible for developing the software plug-in. The Design/Build firm shall be responsible for funding the development of the software plug-in as a part of this project.

The software plug-in must translate the manufacturer-provided travel time data from the established format and protocol into the format and protocol specified by FDOT's FL-ATIS software.

The manufacturer shall be responsible for all hardware and software for the plug-in. The manufacturer must also provide all necessary network connectivity from the plug-in production environment to the FL-ATIS Collector server located at the FL-ATIS Tampa Colo facility.

Any software agreements or licensing of the FL-ATIS system will be the responsibility of Brevard County and not the manufacturer of the Bluetooth travel-time system. Any costs associated with licensing of the FL -ATIS system will the responsibility of Brevard County.

1. Table 4 – Travel Time Sensor Locations

Corridor	***Intersection***
US 192	SR 500 (US 192) and I-95 Southbound Ramps
US 192	SR 500 (US 192) and John Rodes Boulevard
US 192	SR 500 (US 192) and CR 509 (Wickham Road/Minton Road)
US 192	SR 500 (US 192) and Dayton Boulevard

US 192	SR 500 (US 192) and Evans Road/Holiday Boulevard
US 192	SR 500 (US 192) and Shoppes of West Melbourne/Melbourne Square
US 192	SR 500 (US 192) and Dairy Road
SR 518	SR 518 (Eau Gallie Blvd) and Wickham Road
SR 518	SR 518 (Eau Gallie Blvd) and Croton Rd
SR 518	SR 518 (Eau Gallie Blvd) and Commadore Blvd
SR 518	SR 518 (Eau Gallie Blvd) and SR 5 (US 1)
SR 518	SR 518 (Eau Gallie Blvd) and Pineapple Ave
SR 518	SR 518 (Montreal Ave) and Pineapple Ave
SR 520	SR 520 and Clearlake Rd
SR 520	SR 520 and SR 519 (Fiske Blvd)
SR 520	SR 520 and SR 5 (US 1)
SR 520	SR 520 (King St) and Delannoy Ave
SR 520	SR 520 (Willard St) and Delannoy Ave
SR 520	SR 520 and Tropical Trail
SR 520	SR 520 and Sykes Creek Pkwy
SR 520	SR 520 and S. Banana River Drive/Milford Point
US 1	SR 5 (US 1) and Rosa L Jones Blvd
US 1	SR 5 (US 1) and Florida Ave
US 1	SR 5 (US 1) and Barton Blvd
US 1	SR 5 (US 1) and Eyster Blvd
US 1	SR 5 (US 1) and Lake Washington Rd
US 1	SR 5 (US 1) and CR 511 (Aurora Rd)
US 1	SR 5 (US 1) and Sarno Rd
US 1	SR 5 (US 1) and Babcock St
SR 50	SR 50 (Cheney Hwy) and I-95 Southbound Ramps
SR 50	SR 50 (Cheney Hwy) and SR 405 (Columbia Ave)

SR 405	SR 405 (Columbia Ave) and Target Entrance
SR 405	SR 405 (Columbia Ave) and Barna Ave
SR 405	SR 405 (Columbia Ave) and SR 407
SR 405	SR 405 (Columbia Ave) and Sisson Rd
SR 405	SR 405 (Columbia Ave) and SR 5 (US 1)
Palm Bay Road	Palm Bay Rd and Minton Rd
Palm Bay Road	Palm Bay Rd and I-95 SB Ramps
Palm Bay Road	Palm Bay Rd and Hollywood Blvd
Palm Bay Road	Palm Bay Rd and Dairy Rd
Palm Bay Road	Palm Bay Rd and Babcock St
Palm Bay Road	Palm Bay Rd and Lipscomb/Clearmont St NE
Palm Bay Road	Palm Bay Rd and Robert J Conlin Blvd
Minton Road	Minton Rd and Norfolk Pkwy
Minton Road	Minton Rd and Emerson Dr NW
Wickham Road	Wickham Rd and Sarno Rd
Wickham Road	Wickham Rd and Wright Ave
Wickham Road	Wickham Rd and Ellis Rd
Wickham Road	Wickham Rd and Sheridan Rd

VI. Design and Construction Criteria

P. Intelligent Transportation System (ITS)

5. Design and Construction Criteria

viii. Central Management System (CMS)

The central system software and supporting hardware (Central Management System or CMS) shall be installed and configured in two locations as shown below:

- The Central Management System shall be divided into two (2) Systems
  - System 1 shall be located at The Brevard County Traffic Engineering Center in Viera and shall include the following three (3) servers:
    - Server 1 shall include:
      - Sensor Network Archive, Proxy and Statistics (SNAPS) software for the

Wireless Magnetometer System

- ~~Server 2 shall include:~~
  - ~~Arterial Travel Time Data Software~~
- Server 2 shall include:
  - Traffic Adaptive Software
- Server 3 shall include:
  - Video Management Software

- System 2 shall be located at The Brevard County Traffic Operations Center on Merritt Island and shall include the following three (3) servers:
  - Server 1 shall include:
    - Backup ATMS.now Software (software provided by Brevard Co.)
  - Server 2 shall include:
    - Backup Traffic Adaptive Software
  - Server 3 shall include:
    - Backup Video Management Software

The Design Build Firm shall be responsible for providing all hardware and software as described within this RFP.

The CMS shall provide management and control of field devices (detectors, etc.) installed as well as performs data processing, analysis, and automated response as described below.
The Central Management System shall include a Device Management and Travel Time software server for the Wireless Magnetometer System.

VI. Design and Construction Criteria

P. Intelligent Transportation System (ITS)

5. Design and Construction Criteria

vii. Network Equipment

Furnish and install a Services Gateway / Firewall at the Traffic Operations Center on Merritt Island in the existing 19" rack in server room. The Services Gateway shall provide the primary security functions between the County ITS network, the FDOT regional network and Brighthouse Internet connection. This device shall provide any necessary switching, routing, and security functionality through, at minimum, these fixed I/O ports: 16 X 10/100/1000BASE-T and 2 SFP ports for Gigabit Ethernet fiber optic connections. The Services Gateway shall provide for secure remote connectivity through IPSec VPN with minimum 10 Dynamic Clients.
Additional capabilities, requirements, and supported security methods shall include as a minimum:

- 1 GB DRAM, 1GB Flash RAM
- JUNOS operating system
- Firewall performance – 1.5 Gbps
- VPN performance – 250 Mbps
- Maximum concurrent sessions – 128K
- Firewall features
  - Network Atttack Detection
  - DoS and DdoS protection
  - TCP reassembly for fragmented packet protection
  - Brute force attack mitigation
  - SYN cookie protection
  - Zone-based IP spoofing
  - Malformed packet protection

    - URL Filtering
    - Deep Packet Inspection
- Intrusion Prevention System
    - Stateful protocol signatures
    - Attack detection and response mechanisms
    - Worm protection
    - Trojan protection
    - Spyware/adware/keylogger protection
    - Protection agatinst attack proliferation from infected systems
    - Reconnaissance protection
    - Compound attack protection
    - Attacker and target audit trail and reporting
- Unified Access Control (UAC) system utilizing 802.1x port control in remote network devices
- Multicast Routing, PIM and IGMP
- OSPF Routing
- NAT and PAT

The Services Gateway shall include a 5-year subscription for enterprise security including Antivirus, Web filtering, Antispam, and Intrusion Detection and Prevention(IDP).

Please respond upon receipt, and direct any questions to Michelle Sloan at (386) 943-5528, or at michelle.sloan@dot.state.fl.us

Posted: February 10, 2011 @ 2:30 pm

By: Michelle Sloan

Failure to file a protest within the time prescribed in section 120.57(3), Florida Statutes, or failure to post the bond or other security required by law within the time allowed for filing a bond shall constitute a waiver of proceedings under chapter 120, Florida Statutes.

Appendix C- Lessons Learned Logs

In regards to the Countywide network integration, the issue with Sensys has been dynamic to say the least.

1. Plan Development;

In our case FR Aleman designed the detection system from the technical specifications available to them at the time of development. After the 90% plans were approved construction began, Sensys along with their east coast supplier Temple started the "kitting" process at Miller Electrics field office. During the process, Sensys engineers commented that in their opinion, they had issues with the amount of repeaters that were located at some of the intersections as well as the height at which the EOR was to have them attached. When the CEI confronted Miller Electric and FR Aleman in regards to Sensys comments, they responded the detection system was designed based off the criteria listed on Sensys website and Miller Electric said at that time, they would not add any additional equipment due to that fact. The County, Department and CEI were notified by Sensys and a meeting was set up to discuss the design issue. Sensys was represented by Eric Deason and Randy Adams. At this meeting Sensys was challenged by FR Aleman and Sensys admitted to modifying their design specifications without notifying FR Aleman during the design phase. Sensys said point blank FR Aleman's design should work but couldn’t guarantee it would work 100% due to design criteria changes such as attachment height of repeaters and access points, as well as requiring tandem detection zones, total distance between repeaters and cone of detection. Sensys at this point said they would work with Miller/FR Aleman however they did not offer additional product needed free of charge. They did commit to additional technical support if needed. As time went by and it became evident additional equipment was necessary, Sensys agreed to foot the bill and provide whatever was needed in order for the project to be completed. This also included additional personnel on a daily basis for troubleshooting and support.

Future Plan of Action;

Contractor;

Coordinate with manufacturer prior to plan development. Be sure to work with the manufactures engineering, design and technical staff during all phases of plan development. Conduct a thorough field review of obstructions, employ use of a spectrum analyzer if needed. Consider all existing infrastructure and will the proposed equipment work homogenously with the existing equipment and if not, develop a contingency plan. Furthermore, before plans are released for review to the Department, conduct a thorough QC with the manufacturer.

Department;

Since the Department cannot for the most part dictate the means and methods of the contractor. Require and hold responsible in the Request for Proposal that no additional time or money will be granted due to poor or improper planning that shall cause the contractor to run over schedule or incur extra costs due to the above paragraph.

2. Sole Source

One issue with the RFP was the Department sole sourcing Sensys Networks as the main detection to work in conjunction with the County's existing infrastructure. The RFP uses the term "wireless magnetometer" The fact is Sensys is the only wireless magnetometer product available for deployment on a scope as the Countywide ATMS. After conducting a thorough search of the internet, reviewing industry technical journals and consulting with industry ITS System Network Engineers, only Sensys Networks has a proven wireless magnetometer traffic detection system capable of meeting the intent of the RFP available for use in North America. In Europe, Sensys partnered with Golden River Traffic. Together, their research teams developed the wireless magnetometer at Berkeley University in Southern California. After further research with the US Patent office, Sensys has filed since June 27, 2005 at least six patents. Please go to link below to see current patent list. In regards to the other listed companies, none has successfully produced a product capable of being deployed to meet the requirements of the RFP. Feel free to pass this along and conduct a QC verifying this information.

US Patents;

http://www.google.com/patents/US5491475

Golden River, United Kingdom. (Partnering with Sensys Networks)

http://www.jctconsultancy.co.uk/Symposium/Symposium2011/PapersForDownload/Reducing%20life%20time%20costs%20for%20SCOOT%20and%20MOVA%20via%20smart%20vehicle%20detection%20Graham%20Muspratt%20Clearview%20Traffic.pdf

Pros and Cons of latest detector technologies;

http://tti.tamu.edu/conferences/tsc10/program/presentations/traffic-ops-1/chodkiewicz.pdf

Future Plan of Action;

Department;

Do not hold the contractor to one single type of technology. A good example would be; "The detection system shall consist of wireless magnetometers or another proven technology capable of working in conjunction with a traffic adaptive system". This gives the contractor a choice and doesn't hold the Department liable if for some unknown reason one particular technology doesn't operate as intended. It also pushes the responsibility of product selection to the contractor who will argue their product at the technical Q & A before a selection committee.

3. More Detailed Infrastructure Requirements in the TSP and RFP

Department;

Basic requirements such as type of conduit (size and thickness), color of conduit, minimum electrical service wire type and thickness are basics that we all take for granted. For the first time that we are aware of, Miller Electric protested District 5's requirement that HDPE SDR-11 be used as a minimum requirement for all underground and trench. Miller Electric even submitted for HDPE SDR-11 but showed up on the jobsite with SDR 13, a thinner wall conduit. Specification A630 required HDPE SDR-11 but Miller protested to FDOT in Tallahassee and won the protest.

Future Plan of Action;

All we need to do is make a requirement in the RFP and/or TSP in the future. As of today, 2/18/2013 Miller Electric is refusing to install standard route markers along the entire newly installed fiber optic system (Spec 783-2). The RFP was written to encourage the contractor to use existing conduit if applicable. A resourceful contractor can save thousands of dollars with this requirement. However, this requirement doesn't excuse the contractor from installing route markers along the entire new fiber optic run. By adding this requirement to the TSP and/or RFP in the future will make this a non issue and no room for interpretation.

4. Interference and/or Grounding Issues at Cabinets;

The contractor has spent about six (6) months troubleshooting an issue between the existing Econolite video detection system and the newly installed Sensys wireless detection system. Soon after the Sensys system was integrated at various location, mainly Palm Bay Road and US 1 in Rockledge, the video detection began dropping out. When technicians were dispatched to troubleshoot, the short term fix was to pull out the cat5e from the Sensys CC card and the Econolite video detection would come back on line. Miller Electric, The County, Sensys Networks, Temple, Econolite all sent engineers, technicians and others to troubleshoot to determine whether it was a power or RF issue. Shielded cat5e cable with a ground was installed, the access boxes were grounded, shorter jumpers were installed, Ferrite choke attenuators were installed, new grounding was installed. Finally, a new POE was installed. As of today 2/18/13, it appears the issue has been resolved.

Future Plan of Action;

Contractor;

Follow the contract plans. A POE was required but not utilized (see attachment and CEI advisement to follow the plans or resubmit a revision) Miller Electric did not feel a POE was necessary however according to the County, it is. Saving pennies can sometimes cost thousands of dollars.

5. Specification 786 Testing Procedures;

After much thought and debate, we can conclude the 786 Specification for validation testing is not applicable in its current requirements for stop bar detection when it comes to detecting occupancy. Nathan Burda and Gil Ramirez had spoke with Marshall Cheek of Trafficware and the consensus is the Spec may not have been written to address the detection working with traffic adaptive software. The 786 Spec was used as a Technical Special Provision since 2003 then incorporated into the FDOT 2007 Specifications. Early on, ITS in Florida was primarily located on limited access roadways with some notable exceptions (Seminole County, Duval, Dade County). Along with FDOT traffic count stations, RTMS (EIS), Wavetronix and TransCore counters, providing detection of 95% for volume, 90% for occupancy, and 90% for speed for all lanes was realistic and attainable. Technology has changed and perhaps the Specification may need to be modified to reflect these changes. That being said and with the success of Sensys working in conjunction with TrafficWares Synchro Green traffic adaptive software, Brevard County Traffic Engineering came up with an alternative testing where data can be pulled from ATMS.now and graphed for easy reference. As long as the detectors can be seen, they can be tweeked or the software can be tweeked to over or under compensate for a detector that is acting up. The graphs show each detector by serial number (or detector number) and color code. I have observed this method of detector interpretation and believe this type of"validation" is more applicable to the technology that it is being tested by.

Future Plan of Action;

Contractor;

Incorporate testing plans that are applicable with governmental agencies and offer as a service to contractors for future use. This will save hundreds of hours of time and money trying to perform a test that is not applicable to the intent that the detection is to be used.

Department;

Revisit the 786 Specification and modify it to conform with today's ever changing technology. Differentiate between limited access use and urban arterial use.

Respectfully,

Keith B. DeLuca
Senior ITS Analyst

Brevard County Advance Traffic Management System (ATMS) Expansion Technical Special Provisions for the Development and Implementation of the Traffic Adaptive System

General
The purpose of this document is to identify the special provisions to be followed by the Contractor to develop and implement the Traffic Adaptive System (TAS) as required by the project. The specific adaptive system to be implemented is the SynchroGreen Adaptive Traffic Control System. SynchroGreen consists of a Tactical Element located in the intersection controller software and a Strategic Element which is networked to the intersection controllers via an ATMS.now module. This document assumes the Contractor will furnish and install all hardware, software and firmware required to properly operate SynchroGreen within the system architecture (hardware and software) of the County's existing Intelligent Transportation System (ITS).

The Contractor shall develop and implement a TAS subsystem for the corridors described within the RFP for Project 428597-1-52-01 (Brevard County ATMS Expansion). This subsystem, which covers a variety of roadways county-wide, shall be developed and implemented as specified in the following provisions.

1. Within one month after the award of the contract and before the installation of system detectors, subject to approval of the Project Manager, the Contractor shall select a traffic engineer to implement an adaptive traffic signal system for the following signalized intersections:

Corridor	***Intersection***
US 192	SR 500 (US 192) and I-95 Southbound Ramps
US 192	SR 500 (US 192) and I-95 Southbound Off Ramp Queue Detection
US 192	SR 500 (US 192) and I-95 Northbound Ramps
US 192	SR 500 (US 192) and I-95 Northbound Off Ramp Queue Detection
US 192	SR 500 (US 192) and Dike Road
US 192	SR 500 (US 192) and John Rodes Boulevard
US 192	SR 500 (US 192) and CR 509 (Wickham Road/Minton Road)
US 192	SR 500 (US 192) and Meadowland Avenue
US 192	SR 500 (US 192) and Dayton Boulevard
US 192	SR 500 (US 192) and Laila Court
US 192	SR 500 (US 192) and Evans Road
US 192	SR 500 (US 192) and McClain Drive
US 192	SR 500 (US 192) and Melbourne Square
US 192	SR 500 (US 192) and Dairy Road
US 192	SR 500 (US 192) and Airport Boulevard
US 192	SR 500 (US 192) and South Country Club Road
US 192	SR 500 (US 192) and Babcock Street
SR 518	SR 518 (Eau Gallie Blvd) and Croton Rd
SR 518	SR 518 (Eau Gallie Blvd) and Commadore Blvd
SR 518	SR 518 (Eau Gallie Blvd) and SR 5 (US 1)
SR 518	SR 518 (Eau Gallie Blvd) and Highland Ave
SR 518	SR 518 (Eau Gallie Blvd) and Pineapple Ave

SR 518	SR 518 (Montreal Ave) and Highland Ave
SR 518	SR 518 (Montreal Ave) and Pineapple Ave
SR 520	SR 520 & Clearlake Rd
SR 520	SR 520 & Varr Ave
SR 520	SR 520 & SR 519 (Fiske Blvd)
SR 520	SR 520 & Blake Ave
SR 520	SR 5 (US1) & SR 520
SR 520	SR 520 (Willard St) & Forrest Ave
SR 520	SR 520 (Willard St) & Brevard Ave
SR 520	SR 520 (Willard St) & Delannoy Ave
SR 520	SR 520 (King St) & Forrest Ave
SR 520	SR 520 (King St) & Brevard Ave
SR 520	SR 520 (King St) & Delannoy Ave
SR 520	SR 520 (King St) & Riveredge Blvd
SR 520	SR 520 (Willard St) & Forrest Ave
SR 520	SR 520 (Willard St) & Brevard Ave
SR 520	SR 520 (Willard St) & Delannoy Ave
SR 520	SR 520 (King St) & Forrest Ave
SR 520	SR 520 (King St) & Brevard Ave
SR 520	SR 520 (King St) & Delannoy Ave
SR 520	SR 520 (King St) & Riveredge Blvd
SR 520	SR 520 & Tropical Trail
SR 520	SR 520 & SR 3/S. Courtenay Pkwy
SR 520	SR 520 & Big Lots Entrance
SR 520	SR 520 & Plumosa St
SR 520	SR 520 & Merritt Square Mall Entr
SR 520	SR 520 & Sykes Creek Pkwy
SR 520	SR 520 & Kiwannis Island Park Rd
SR 520	SR 520 & Newfound Harbor Dr
SR 520	SR 520 & N. Banana River Dr
SR 520	SR 520 & S. Banana River/Milford Point Dr
SR 520	S. Courtenay Pkwy & Magnolia Ave
SR 520	S. Courtenay Pkwy & Fortenberry Rd
US 1	SR 5 (US 1) and Peachtree St
US 1	SR 5 (US 1) and Rosa L Jones Blvd
US 1	SR 5 (US 1) and Florida Ave
US 1	SR 5 (US 1) and Longwood Ave
US 1	SR 5 (US 1) and Barton Blvd
US 1	SR 5 (US 1) and Rockledge Square Entr
US 1	SR 5 (US 1) and Eyster Blvd
US 1	SR 5 (US 1) and CR 511 (Aurora Rd)
US 1	SR 5 (US 1) and Sarno Rd

SR 50	SR 50 (Cheney Hwy) and I-95 Southbound Ramps
SR 50	SR 50 (Cheney Hwy) and SR 405 (Columbia Ave)
SR 405	SR 405 (Columbia Ave) and Windover Trail
SR 405	SR 405 (Columbia Ave) and Target Entrance
SR 405	SR 405 (Columbia Ave) and Barna Ave
SR 405	SR 405 (Columbia Ave) and SR 407
SR 405	SR 405 (Columbia Ave) and Grissom Pkwy
SR 405	SR 405 (Columbia Ave) and Sisson Rd
Palm Bay Road	Palm Bay Rd & Minton Rd
Palm Bay Road	Palm Bay Rd & Athens Dr
Palm Bay Road	Palm Bay Rd & Culver Dr/Norfolk Pkwy
Palm Bay Road	Palm Bay Rd & I-95 SB Ramps
Palm Bay Road	Palm Bay Rd & I-95 NB Ramps
Palm Bay Road	Palm Bay Rd & Hollywood Blvd
Palm Bay Road	Palm Bay Rd & Dairy Rd
Palm Bay Road	Palm Bay Rd & Port Malabar Blvd NE
Palm Bay Road	Palm Bay Rd & Stack Blvd
Palm Bay Road	Palm Bay Rd & Rivera Dr NE
Palm Bay Road	Palm Bay Rd & Babcock St
Palm Bay Road	Palm Bay Rd & Lipscomb/Clearmont St NE
Palm Bay Road	Palm Bay Rd & Troutman Blvd NE
Palm Bay Road	Palm Bay Rd & Robert J Conlin Blvd
Palm Bay Road	Norfolk Pkwy & Shopping Center Dr
Minton Road	Minton Rd & Norfolk Pkwy
Minton Road	Minton Rd & Hield Rd
Minton Road	Minton Rd & Emerson Dr NW
Wickham Road	CR 509 (Wickham Rd) & Fountainhead Blvd
Wickham Road	CR 509 (Wickham Rd) & Wright Ave
Wickham Road	CR 509 (Wickham Rd) & Technology Dr
Wickham Road	CR 509 (Wickham Rd) & Harper Rd
Wickham Road	CR 509 (Wickham Rd) & Ellis Rd
Wickham Road	CR 509 (Wickham Rd) and Greenboro Dr/Idlewylde Cir
Wickham Road	CR 509 (Wickham Rd) & Sheridan Rd

2. The Contractor’s Traffic Engineer shall respond to emergency calls regarding timing issues within four hours during normal weekday working hours (8:00 am – 5:00 pm, Monday through Friday) until the final acceptance of the traffic adaptive system. During the final system implementation phase, the Contractor’s Traffic Engineer shall be on-call for a 24-hour period, and shall respond within four (4) hours for emergency timing changes.

3. The firm that performs this work must be prequalified by the Florida Department of Transportation in Group 6.3, Section 1, Traffic Systems Analysis and Design. The Traffic Engineer that carries out this work for the Contractor shall be a registered

professional engineer in the State of Florida. All individuals that perform work on any signal cabinet equipment shall be certified by the International Municipal Signal Association (IMSA) as either Level 2 or Level 3 Traffic Signal Technician or Traffic Signal Electrician.

The work includes the following tasks:

Detection System Calibration

The detection system calibration process will involve both operational verification and validation of accurate results. The Contractor's Traffic Engineer shall perform the following detection testing needed for establishing traffic adaptive system operation:

1. Verify detector topography and function

   The Contractor's Traffic Engineer shall review all available detector information, including the design plans for location, type, and function of each detector in the network. Following installation, the Contractor's Traffic Engineer shall poll each detector for ~~volume and~~ occupancy reports identifying proper collection of the newly installed detectors to ensure data availability and detector responsiveness. The collected data shall be either a 5 minute or 15 minute increment of detector ~~volume and~~ occupancy to depict proper detector operation; as-built record documentation of proper device installation shall be provided.

~~2. Validation of detector accuracy~~

   ~~The Contractor's Traffic Engineer shall conduct 24-hour automatic traffic recording (ATR) counts for system detector verification of proper operation and / or perform necessary calibration after the completion of systemwide detection installation. The ATR counts shall be abbreviated 2-day counts (including occupancy) at the locations where system detectors are installed. The ATR counts shall record traffic volumes and occupancy in both directions, at 15-minute intervals from each lane for the entire 24-hour period. The abbreviated 2-day ATR counts shall be compared against system detector data collected via County ATMS central system. The system sensor data and ATR report timeframes shall match. The abbreviated 2-day counts shall be graphed against system detector counts and occupancy, along with differences between the two per time of day. The collected count and occupancy data with comparisons shall be submitted to the Project Manager for a two week review period and approval. All County requirements for calibration of the system devices shall be addressed prior to approval.~~

~~3.~~2. Initiate detector polling

   Once detector operation has been calibrated, the Contractor's Traffic Engineer shall configure the ATMS.now software to collect traffic volume and occupancy data to be used in the adaptive system operation.

Field Data Collection

The Contractor's Traffic Engineer shall collect the following data needed for establishing traffic adaptive system operation:

1. Intersection controller databases

   Utilizing Naztec's ATMS.now software operating on a County workstation, the Contractor's Traffic Engineer shall upload existing intersection databases.

2. Travel time runs

The Contractor’s Traffic Engineer shall conduct multiple floating car evaluation runs per each direction of all project corridors that record travel times, delays and number of stops for all significant coordinated periods during weekdays ~~and weekends~~ to benchmark the existing traffic conditions. The routes of floating car runs shall be determined by the Contractor’s Traffic Engineer and the Project Manager Manager. The Tru-Traffic TS/PP Diagram Generator software shall be used in the floating car evaluation runs.

3. Field reviews

The Contractor’s Traffic Engineer shall conduct appropriate field reviews to document the physical features of each intersection including an intersection sketch that illustrates lane configuration, lane storage, movement phases, signal head types, cabinet location, and pedestrian signal heads and push button locations. The field review shall also document vehicle and pedestrian clearance distances, speed limits, median and lane widths, left turn phasing, and any turn restrictions. Pedestrian push buttons shall be verified for proper operation. Photographs shall also be taken of each approach.

4. Observations

The Contractor’s Traffic Engineer shall spend appropriate time in the field making detailed observations of the traffic flows and the operation of the signals at each intersection.

5. Saturation Flow Rate studies

The Project Manager and the Contractor’s Traffic Engineer shall determine if saturation flow rate studies should be conducted. If studies are conducted, the Contractor’s Traffic Engineer shall propose study locations and obtain approval from the Project Manager. The Contractor’s Traffic Engineer shall perform the saturation flow rate studies.

Software-in-the-Loop Simulation (SILS) Model Development

The Contractor’s Traffic Engineer shall perform the following tasks in order to develop the SILS in support of the adaptive system operation:

1. Develop base model in Synchro

The Contractor’s Traffic Engineer shall code all necessary data in order to develop the proper system topography in the base line Synchro model. The base line Synchro model will be used as the preprocessor for SILS. This will generally include: system layout, roadway and intersection geometrics, speed limits, detection topography and functionality, free ring phasing sequence and phase numbering. The SILS system background image shall be constructed on a geo-reference based map for eventual countywide arterial system inclusion. The County will provide the base map as was generated from the Wickham Road ITS Phase I project.

2. Run SILS of existing conditions

The Contractor’s Traffic Engineer shall perform SILS on existing conditions over multiple time periods to establish an “existing conditions” baseline. The baseline will be used to compare the adaptive system performance once implemented.

3. Detector configuration analysis

The Contractor’s Traffic Engineer shall conduct analysis on the designed detector configuration to establish a benchmark. Additional modeling with modified detector configurations may be conducted and compared to the benchmark analysis to determine if any detector modifications should be made prior to final installation of the detection system.

4. Recommendations
Based on the detector configuration analysis, the Contractor's Traffic Engineer shall provide recommendations to the Project Manager for modifying the designed detector configuration.

Adaptive System Preparation
The Contractor's Traffic Engineer shall perform the following tasks in order to prepare the adaptive system for operation:

1. Modify basic signal timing
The Contractor's Traffic Engineer shall select basic signal timing parameters, including minimum initial, yellow change, all-red clearance, vehicle extension, walk time, and flashing don't walk time, for each traffic signal phase at each intersection based on data collected in the field and the guidelines provided in Section 3.6 of the FDOT Traffic Engineering Manual. The Contractor's Traffic Engineer shall submit the proposed basic signal timing parameters to the Project Manager with a one week period for review and approval.

2. Install SynchroGreen Adaptive Module and Local Controller Firmware
The Contractor's Traffic Engineer shall work with the Contractor to install the SynchroGreen adaptive module and local controller firmware.

3. Develop adaptive system settings
The Contractor's Traffic Engineer shall select and code all traffic adaptive system settings in SynchroGreen.

~~4. Pre-Implementation performance evaluation~~
~~The Contractor's Traffic Engineer shall test the developed adaptive system settings via "virtual adaptive operation" using SILS. This will attempt to replicate what would occur (in a simulation environment) when SynchroGreen has been enabled. Results of the virtual testing will be used to modify SynchroGreen settings. Various time periods shall be analyzed, including typical weekday and weekend peak, midday, and offpeak periods as well as unique conditions of interest to the Project Manager such as but certainly not limited to a I-95 closure resulting in Wickham Road operating as a diversion route, or evacuation of the barrier islands on SR 520. The Contractor's Traffic Engineer shall coordinate with the Project Manager for specific conditions of interest and shall assume a minimum of 9 simulations to be run per corridor.~~

~~5. Pre-implementation memorandum~~
~~The Contractor's Traffic Engineer, based on the performance evaluation above, shall submit a memo to the Project Manager summarizing operational and performance characteristics of the proposed traffic adaptive system at least four weeks prior to implementation of the system. The Project Manager shall approve the memo prior to system implementation.~~

Implementation, Observation and Fine-Tuning
The Contractor's Traffic Engineer shall perform the following tasks in order to implement the adaptive system operation:

1. Database programming
   Utilizing Naztec's ATMS.now software operating on a County workstation, the Contractor's Traffic Engineer shall download the changes for final local signal timings.

2. Adaptive programming
   Utilizing Naztec's ATMS.now software operating on a County workstation, the Contractor's Traffic Engineer shall program all traffic adaptive system settings using ATMS.now and download to the local controllers.

3. Initiate adaptive control
   The Contractor's Traffic Engineer shall initiate the traffic adaptive system, utilizing ATMS.now on a County workstation, one intersection at a time.

4. Observation
   The Contractor's Traffic Engineer shall observe the signals and controllers to ensure proper operations. The Contractor's Traffic Engineer shall then make proper adjustments to the central software configuration for the purpose of optimizing traffic adaptive system operation. The Contractor's Traffic Engineer shall keep a log of all system parameter adjustments made to the system. This log shall contain a timestamp of date and time on all adjustments made and a clear description of the adjustments made.

5. Fine-tuning
   In addition to observing adaptive software and controller interaction, the Contractor's Traffic Engineer shall conduct travel time runs along the corridor during the implementation period and make adjustments to system operating parameters as required. The Contractor's Traffic Engineer shall supply a report of the performed travel time runs specifying justifications for the required adjustments or lack thereof.

6. Final adjustments
   The Contractor's Traffic Engineer shall meet with the Project Manager to conduct field observations of the final signal operations. The Contractor's Traffic Engineer shall make proper adjustments to the system operating parameters per comments from the Project Manager.

Performance Evaluation
After implementation and fine-tuning of the traffic adaptive system is complete, the Contractor's Traffic Engineer shall evaluate the performance of the traffic adaptive system relative to the existing operation. The evaluation shall include the following performance measures:

~~1. Intersection Measures of Effectiveness (MOEs)~~
   ~~Utilizing SILS, the Contractor's Traffic Engineer shall tabulate average delay by movement and intersection for both existing and implemented traffic operations.~~

~~2.~~1. Corridor MOEs
   Upon the final acceptance of the traffic adaptive operation by the Project Manager, the Contractor's Traffic Engineer shall conduct multiple floating car evaluation runs per each direction of all project corridors including major side street contributors to the corridor traffic, during the time periods the "before" study was conducted to record travel times, delays and number of stops of the traffic operations with the implemented \ timing plans.

~~3. Network MOEs~~
~~The Contractor's Traffic Engineer shall tabulate total delay, travel time, stops, and fuel consumption for both existing and implemented traffic operations.~~

~~4.~~2. Benefit/Cost Analysis
The Contractor's Traffic Engineer shall then conduct a benefit-cost analysis to document the benefits of implementing adaptive system operation. This analysis must compare the "before" and "after" of the total travel time and fuel consumption to arrive at a benefit-cost ratio.

Documentation

The Contractor's Traffic Engineer shall prepare a single report to document the development and implementation of this traffic adaptive system. The report shall cover the following items as a minimum:

- Introduction
- Detection Calibration
  - Detection topography and function
  - Detector verification results
  - Detector validation results
- Data Collection
  - Controller databases
  - Pre-implementation travel time runs
  - Field reviews
  - Observations
  - Saturation Flow Rate studies
- ~~SILS Development~~
  - ~~Base Synchro model~~
  - ~~Detection configuration analysis~~
  - ~~Detection recommendations~~
- Adaptive System Preparation
  - Basic signal timing parameters
  - Adaptive system settings
- Implementation
  - Database programming
  - Adaptive programming
  - Initiation of adaptive control
  - Summary of observations and fine-tuning
  - Final adjustments
- Performance Evaluation
  - ~~Intersection MOEs~~
  - Corridor MOEs
  - ~~Network MOEs~~
  - Benefit-Cost Analysis

The Contractor's Traffic Engineer shall submit the report to the Project Manager for review and approval. The County shall be allowed a minimum of ~~15~~ 1 business day~~s~~ to perform its review. The Contractor's Traffic Engineer shall provide written responses to the County's comments and revise the report accordingly.

"Quality Service Since 1928"
www.mecojax.com

MILLER ELECTRIC COMPANY

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Parsons Brinckerhoff
100 E. Pine Street, Suite 500
Orlando, FL 32801

February 5, 2013

Brevard County ATMS, Contract E5N82
FIN: 428597, 428919, 428920-1-52-01

RE: Notice of Intent to Claim for delays encountered by Sensys Networks

Mr. Johnson

Provided that the previously submitted and discussed modifications to the specification are approved in writing by the Department on or before February 6th, 2013 Miller Electric Company is willing to rescind the current notice of intent to claim for delays encountered as a result of the sole sourced Sensys Networks equipment and their inability to meet the required specifications. This agreement to rescind the current notice of intent shall not limit our ability to claim in the future for compensation should further issues or delays arise as a result of Sensys Networks equipment.

Sincerely,

Nathan Burda
Project Manager

WORK ORDER

Supplemental Agreement No.*NA________________ Work Order No.**________________________

Fin Proj. ID 428597, 428919 & 428920 Contract No. E5N82 Date 2/6/2013

F.A.P. No. ARRA 641 B,ITS5 018,ITS5 019 Road No. Various

Contractor Miller Electric

DESCRIPTION OF WORK:
See Attachment

REASON:
See Attachment

Revised Plan Sheet Nos. NA

Granted time due to delays to controlling items of work shown on approved work schedule: 0 days

TOTAL COST OF WORK: $0.00 Premium Cost[1]: $0.00

Amount to be paid from Lump Sum Contingency S.A. or Pay Item shown above: $0.00

Work described results from a Design Error or Omission: ☐Yes ☒No

*N/A when funding by contingency pay item
**Number Work Orders on a Contingency Pay item sequentially beginning with 01, 02, 03, etc.
For each subsequent Contingency Supplemental Agreement (CSA) restart the numbering of the Work Orders on that CSA sequentially beginning with 01, 02, 03, etc.

☒ Costs negotiated; work sheets documenting negotiated costs and basis for costs attached.
OR
☐ Costs based on actual costs plus mark-ups as shown in above referenced Contingency Supplemental Agreement; work sheets itemizing costs attached.

If, prior to execution of this Work Order, the Department has not issued a Notice to Proceed to the Contractor for the work outlined herein, execution of this document by the Department shall serve as the Notice to Proceed.

The Department and the Contractor agree that the contract time adjustment and sum agreed to in this document constitute a full and complete settlement of the matters set forth herein, including all direct and indirect costs for equipment, manpower, materials, overhead, profit, and delay relating to the issues set forth in this document

________________________ Printed Name: ______________________________
Contractor Signature Title: ______________________________
Date: ______________________________

________________________ Printed Name: ______________________________
FDOT or CCEI Title: ______________________________
Date: ______________________________

Approved: ___________________________ _____
FHWA Date

FHWA Participation[2] 0 Days/ $0.00
Non-Participation __________________

[1] Premium Cost is defined as additional cost which would not have been incurred if the work described herein had been included in the original contract
[2] Attach reasons justifying FHWA participation

WORK ORDER

Supplemental Agreement No.*NA Work Order No.**________________________
Fin Proj. ID 428597, 428919 & 428920 Contract No. E5N82 Date 2/6/2013
F.A.P. No. ARRA 641 B,ITS5 018,ITS5 019 Road No. Various
Contractor Miller Electric

DESCRIPTION OF WORK (continued):

The purpose of this Work Order is to formally document the resolution and clarification of the following issues:

1. Validation of Vehicle Detection Systems
2. Impacts by “other” Projects

The resolution of the issues based on the following clarifications and agreements:

1. Response to RFI #16 questions requesting clarification on validation testing and system implementation issues. Refer to the attached RFI document.
2. Clarification of Brevard County Technical Special Provision (TSP) for Development and Implementation of the Traffic Adaptive System, as discussed in the February 5, 2013 teleconference and as documented in the attached TSP dated.
3. Contractor’s agreement to rescind their Notice of Intent to Claim, dated December 20, 2012, for issues associated with Sensys equipment, as noted in Miller Electric’s letter dated February 5, 2013.
4. Contractor’s agreement to rescind their Notice of Intent to Claim, dated July 18, 2012, for issues associated with Impacts by Other Projects, as stated in Miller Electric’s letter dated __________________,
5. Contractor agrees to submit the benefit to cost report on or before May 3, 2013 allowing FDOT and Brevard County to review and accept the report before May 7, 2013.
6. The Contractor agrees to submit a summary/explanation, including any associated reports, documents and software tools developed, for the time and effort put forth by TrafficWare in an effort to deploy the models and simulations.

“By signing of this Work Order Agreement the Contractor hereby agrees that any and all requests, claims, causes of action, issues, demands, disputes, matters or controversies of any kind or nature, including for time and compensation, known and unknown, on this contract through February 6, 2013 are hereby waived and that Work Order Agreement represents full and complete settlement of any and all issues by the contractor.”

WORK ORDER

Supplemental Agreement No.*NA Work Order No.**
Fin Proj. ID 428597, 428919 & 428920 Contract No. E5N82 Date 2/6/2013
F.A.P. No. ARRA 641 B,ITS5 018,ITS5 019 Road No. Various
Contractor Miller Electric

REASON (continued):

- There were issues discovered with the verification testing methods for the wireless detection devices. The Contractor originally conducted validation testing on the wireless detection devices utilizing ITS Standard Specification 786, which is based on comparing vehicle counts between the wireless devices and observations. However, upon review of the method, it was discovered that if a vehicles stops over the wireless detection devices and then creeps ahead, the wireless detectors log multiple counts. The multiple counts cause validation test failures because they do not match the true counts. Based on Brevard County's (ultimate maintaining agency) recent completion of a similar project, it was determined that validation by comparing true counts to wireless detection counts was unrealistic and not the proper type of test for the application the product is being used (i.e. urban area - stop bar detection). It was determined that a more appropriate way of validation testing is to validate by determining vehicle occupancy, since the Adaptive Traffic Management System (ATMS) software utilizes occupancy rates and not traffic counts. Validation testing will be accomplished by using the ATMS.NOW software and servers to poll the devices to determine if they are operating and providing the required information to the traffic management system.
- Based on Brevard County's (Maintaining Agency) recent experience it was determined that the lengthy system integration process can be mitigated by streamlining the processes outlined in the Brevard ATMS development and implementation specification. The revised processes will mitigate issues related to the wireless detection devices' implementation and validation.
- Clarification and resolution of the above issues will expedite the ATMS installation, integration and validation processes and provide for a window of opportunity to conduct the required implementation/testing without being impacted by other Agencies and FDOT projects throughout the ten corridors. Currently there are several resurfacing projects that are impacting and or can impact the completion and final acceptance of the Project. By agreeing to the alternative integration method, there is an opportunity to complete the entire Project within the current allowable contract time of May 7, 2013.

January 30, 2013

Mr. Nathan Burda
Miller Electric Company
2251 Rosselle Street
Jacksonville, FL 32204

Re: **RFI #16**

Advanced Traffic Management System (ATMS) Expansions

Financial Project No(s).	: 428597-1-52-01, 428919-1-52-01, 428920-1-52-01
Federal Job No's.	: ARRA 641-B, ITS5-018-A, ITS5-019-A
Contract No.	: E5N82
State Road No.	: Various
County	: Brevard

Dear Mr. Burda:

This letter is in response to RFI #16 requesting information regarding clarification of TSP 6.5 through 6.8 and clarification of validation testing requirements. We have reviewed the RFI and offer the following response:

VDS requirement in Specification Section 786: Request that the overall accuracy requirement for validation testing be reduced from 90% to 75%.

Response: Any revisions in the Verification Test Plan shall be submitted to the Department for review and approval. As noted in the response to Pre-Bid Q&A #24, Specification 786 is to be used as a guide. The DB Team is responsible to develop the appropriate details in all the test plans.

Modifications to the Specification

1. Remaining items on 6.5 include part d and e that deal with simulation. These are time consuming tasks that are not necessary to complete the project. We propose discounting the simulation portion of the project and that we move to the deployment phase under Section 6.6.

   Response: The Department and County will consider removing this requirement. However, since this was an original requirement at bid time does Miller Electric propose a credit?

   We propose removing Section 6.7 and 6.8 (Performance Evaluation). These sections are unnecessary to complete installation of the adaptive system and requires time, resources and several weeks of review from the County.

   Response: The request is denied. However, as discussed in the 1/30/2013 progress meeting, there are opportunities to expedite the process. Please include the performance evaluation process in your test plan for review.

2. Additional Resources
   a. Based on resources used on the Phase II project, additional personnel will be required to complete the project within the allotted timeframe (January-April 2013).
   b. Due to the constrained project schedule and accelerated deployment, this project requires resources that are not typical of other SynchroGreen deployments.
   c. Trafficware requires additional contract workers to be onsite during deployment and fine tune Synchro Green settings. Contract workers will allow corridor deployments to overlap.
   d. Trafficware will train and manage all contract workers.
   e. Contract workers will invoice Miller Electric separately.

Response: Any additional resources required to meet the contract requirements within the allowable contract time shall be at the cost of the Contractor.

3. Contingency
   a. Trafficware will verify all detection in the field after the adaptive system has been activated.
   b. Detection that is found to be faulty will be fixed or replaced by the contractor immediately.

   Response - No comment.

<u>VDS Questions</u>

1. In the event that a single device fails during the validation testing can the single device be retested on a stand-alone basis or will the entire intersection need to be retested?

   Response: Replace failed device and continue observation. If after failed device is replaced and observation is successful, finish validation and move forward with Synchro Green Deployment. Retesting the entire intersection again does not provide valuable data. Once validation testing has verified that the magnetometers are reporting accurately and the wireless communication is stable retesting is superfluous and demands resources both generating data and reviewing data that are better spent focusing on the failing infrastructure. SNAPS alert reporting engine provides the means to ensure that essential personnel are notified if any field devices fail, or begin to suffer from signal interference.

2. In the event that a single device fails during the system acceptance testing will the testing be stopped for the time in which the repair is made and restarted at that point or will the 30 day time frame be restarted?

   Response: The test shall be stopped at that point until the faulty device is replaced then after the new device is configured and commissioned, time picks up where it left off.

3. In the instance where other ongoing projects have required removal of the VDS system devices from a specific amount of the corridor or intersection, when available, will Miller Electric Co be permitted to move forward with testing of all available devices? The removed devices would be re-installed, tested and incorporated into the system as they become available.

   Response: Each corridor is its own subsystem working within the Brevard County ATMS master system. Miller Electric shall be permitted to move forward with testing all available devices, however acceptance of a particular corridor shall be achieved by meeting the intent of the RFP. Each corridor needs to operate as its own subsystem from beginning to end, coordinate traffic efficiently, homogenously work with all existing equipment as well as all newly installed equipment and communicate flawlessly to its dedicated TMC per the RFP.

4. Will the Department be willing to accept alternate vehicle detection technologies to supplement the failed VDS devices?

   Response: The Department will consider any proposed alternatives by the DB Team.

Please find the above responses to RFI #16 for your records. Please note the above questions and response will require submission of various test plans for review and approval by the Department.

Please contact me if you need any additional information.

Sincerely
Parsons Brinckerhoff, Inc.

Barry J Johnson

Barry Johnson
Project Administrator

cc: Hector Matos - FDOT
Demetrius Lewis – FDOT
Gil Ramirez – Brevard County

Brevard County Advance Traffic Management System (ATMS) Expansion Technical Special Provisions for the Development and Implementation of the Traffic Adaptive System

(Rev. 2/6/2013)

General

The purpose of this document is to identify the special provisions to be followed by the Contractor to develop and implement the Traffic Adaptive System (TAS) as required by the project. The specific adaptive system to be implemented is the SynchroGreen Adaptive Traffic Control System. SynchroGreen consists of a Tactical Element located in the intersection controller software and a Strategic Element which is networked to the intersection controllers via an ATMS.now module. This document assumes the Contractor will furnish and install all hardware, software and firmware required to properly operate SynchroGreen within the system architecture (hardware and software) of the County's existing Intelligent Transportation System (ITS).

The Contractor shall develop and implement a TAS subsystem for the corridors described within the RFP for Project 428597-1-52-01 (Brevard County ATMS Expansion). This subsystem, which covers a variety of roadways county-wide, shall be developed and implemented as specified in the following provisions.

1. Within one month after the award of the contract and before the installation of system detectors, subject to approval of the Project Manager, the Contractor shall select a traffic engineer to implement an adaptive traffic signal system for the following signalized intersections:

Corridor	*Intersection*
US 192	SR 500 (US 192) and I-95 Southbound Ramps
US 192	SR 500 (US 192) and I-95 Southbound Off Ramp Queue Detection
US 192	SR 500 (US 192) and I-95 Northbound Ramps
US 192	SR 500 (US 192) and I-95 Northbound Off Ramp Queue Detection
US 192	SR 500 (US 192) and Dike Road
US 192	SR 500 (US 192) and John Rodes Boulevard
US 192	SR 500 (US 192) and CR 509 (Wickham Road/Minton Road)
US 192	SR 500 (US 192) and Meadowland Avenue
US 192	SR 500 (US 192) and Dayton Boulevard
US 192	SR 500 (US 192) and Laila Court
US 192	SR 500 (US 192) and Evans Road
US 192	SR 500 (US 192) and McClain Drive
US 192	SR 500 (US 192) and Melbourne Square
US 192	SR 500 (US 192) and Dairy Road
US 192	SR 500 (US 192) and Airport Boulevard
US 192	SR 500 (US 192) and South Country Club Road
US 192	SR 500 (US 192) and Babcock Street
SR 518	SR 518 (Eau Gallie Blvd) and Croton Rd
SR 518	SR 518 (Eau Gallie Blvd) and Commadore Blvd
SR 518	SR 518 (Eau Gallie Blvd) and SR 5 (US 1)
SR 518	SR 518 (Eau Gallie Blvd) and Highland Ave
SR 518	SR 518 (Eau Gallie Blvd) and Pineapple Ave

SR 518	SR 518 (Montreal Ave) and Highland Ave
SR 518	SR 518 (Montreal Ave) and Pineapple Ave
SR 520	SR 520 & Clearlake Rd
SR 520	SR 520 & Varr Ave
SR 520	SR 520 & SR 519 (Fiske Blvd)
SR 520	SR 520 & Blake Ave
SR 520	SR 5 (US1) & SR 520
SR 520	SR 520 (Willard St) & Forrest Ave
SR 520	SR 520 (Willard St) & Brevard Ave
SR 520	SR 520 (Willard St) & Delannoy Ave
SR 520	SR 520 (King St) & Forrest Ave
SR 520	SR 520 (King St) & Brevard Ave
SR 520	SR 520 (King St) & Delannoy Ave
SR 520	SR 520 (King St) & Riveredge Blvd
SR 520	SR 520 (Willard St) & Forrest Ave
SR 520	SR 520 (Willard St) & Brevard Ave
SR 520	SR 520 (Willard St) & Delannoy Ave
SR 520	SR 520 (King St) & Forrest Ave
SR 520	SR 520 (King St) & Brevard Ave
SR 520	SR 520 (King St) & Delannoy Ave
SR 520	SR 520 (King St) & Riveredge Blvd
SR 520	SR 520 & Tropical Trail
SR 520	SR 520 & SR 3/S. Courtenay Pkwy
SR 520	SR 520 & Big Lots Entrance
SR 520	SR 520 & Plumosa St
SR 520	SR 520 & Merritt Square Mall Entr
SR 520	SR 520 & Sykes Creek Pkwy
SR 520	SR 520 & Kiwannis Island Park Rd
SR 520	SR 520 & Newfound Harbor Dr
SR 520	SR 520 & N. Banana River Dr
SR 520	SR 520 & S. Banana River/Milford Point Dr
SR 520	S. Courtenay Pkwy & Magnolia Ave
SR 520	S. Courtenay Pkwy & Fortenberry Rd
US 1	SR 5 (US 1) and Peachtree St
US 1	SR 5 (US 1) and Rosa L Jones Blvd
US 1	SR 5 (US 1) and Florida Ave
US 1	SR 5 (US 1) and Longwood Ave
US 1	SR 5 (US 1) and Barton Blvd
US 1	SR 5 (US 1) and Rockledge Square Entr
US 1	SR 5 (US 1) and Eyster Blvd
US 1	SR 5 (US 1) and CR 511 (Aurora Rd)
US 1	SR 5 (US 1) and Sarno Rd

SR 50	SR 50 (Cheney Hwy) and I-95 Southbound Ramps
SR 50	SR 50 (Cheney Hwy) and SR 405 (Columbia Ave)
SR 405	SR 405 (Columbia Ave) and Windover Trail
SR 405	SR 405 (Columbia Ave) and Target Entrance
SR 405	SR 405 (Columbia Ave) and Barna Ave
SR 405	SR 405 (Columbia Ave) and SR 407
SR 405	SR 405 (Columbia Ave) and Grissom Pkwy
SR 405	SR 405 (Columbia Ave) and Sisson Rd
Palm Bay Road	Palm Bay Rd & Minton Rd
Palm Bay Road	Palm Bay Rd & Athens Dr
Palm Bay Road	Palm Bay Rd & Culver Dr/Norfolk Pkwy
Palm Bay Road	Palm Bay Rd & I-95 SB Ramps
Palm Bay Road	Palm Bay Rd & I-95 NB Ramps
Palm Bay Road	Palm Bay Rd & Hollywood Blvd
Palm Bay Road	Palm Bay Rd & Dairy Rd
Palm Bay Road	Palm Bay Rd & Port Malabar Blvd NE
Palm Bay Road	Palm Bay Rd & Stack Blvd
Palm Bay Road	Palm Bay Rd & Rivera Dr NE
Palm Bay Road	Palm Bay Rd & Babcock St
Palm Bay Road	Palm Bay Rd & Lipscomb/Clearmont St NE
Palm Bay Road	Palm Bay Rd & Troutman Blvd NE
Palm Bay Road	Palm Bay Rd & Robert J Conlin Blvd
Palm Bay Road	Norfolk Pkwy & Shopping Center Dr
Minton Road	Minton Rd & Norfolk Pkwy
Minton Road	Minton Rd & Hield Rd
Minton Road	Minton Rd & Emerson Dr NW
Wickham Road	CR 509 (Wickham Rd) & Fountainhead Blvd
Wickham Road	CR 509 (Wickham Rd) & Wright Ave
Wickham Road	CR 509 (Wickham Rd) & Technology Dr
Wickham Road	CR 509 (Wickham Rd) & Harper Rd
Wickham Road	CR 509 (Wickham Rd) & Ellis Rd
Wickham Road	CR 509 (Wickham Rd) and Greenboro Dr/Idlewylde Cir
Wickham Road	CR 509 (Wickham Rd) & Sheridan Rd

2. The Contractor's Traffic Engineer shall respond to emergency calls regarding timing issues within four hours during normal weekday working hours (8:00 am – 5:00 pm, Monday through Friday) until the final acceptance of the traffic adaptive system. During the final system implementation phase, the Contractor's Traffic Engineer shall be on-call for a 24-hour period, and shall respond within four (4) hours for emergency timing changes.

3. The firm that performs this work must be prequalified by the Florida Department of Transportation in Group 6.3, Section 1, Traffic Systems Analysis and Design. The Traffic Engineer that carries out this work for the Contractor shall be a registered

professional engineer in the State of Florida. All individuals that perform work on any signal cabinet equipment shall be certified by the International Municipal Signal Association (IMSA) as either Level 2 or Level 3 Traffic Signal Technician or Traffic Signal Electrician.

The work includes the following tasks:

Detection System Calibration
The detection system calibration process will involve both operational verification and validation of accurate results. The Contractor's Traffic Engineer shall perform the following detection testing needed for establishing traffic adaptive system operation:

1. Verify detector topography and function
   The Contractor's Traffic Engineer shall review all available detector information, including the design plans for location, type, and function of each detector in the network. Following installation, the Contractor's Traffic Engineer shall poll each detector for ~~volume and~~ occupancy reports identifying proper collection of the newly installed detectors to ensure data availability and detector responsiveness. The collected data shall be either a 5 minute or 15 minute increment of detector ~~volume and~~ occupancy to depict proper detector operation; as-built record documentation of proper device installation shall be provided.

~~2. Validation of detector accuracy~~
~~The Contractor's Traffic Engineer shall conduct 24-hour automatic traffic recording (ATR) counts for system detector verification of proper operation and / or perform necessary calibration after the completion of systemwide detection installation. The ATR counts shall be abbreviated 2-day counts (including occupancy) at the locations where system detectors are installed. The ATR counts shall record traffic volumes and occupancy in both directions, at 15-minute intervals from each lane for the entire 24-hour period. The abbreviated 2-day ATR counts shall be compared against system detector data collected via County ATMS central system. The system sensor data and ATR report timeframes shall match. The abbreviated 2-day counts shall be graphed against system detector counts and occupancy, along with differences between the two per time of day. The collected count and occupancy data with comparisons shall be submitted to the Project Manager for a two week review period and approval. All County requirements for calibration of the system devices shall be addressed prior to approval.~~

~~3.~~2. Initiate detector polling
   Once detector operation has been calibrated, the Contractor's Traffic Engineer shall configure the ATMS.now software to collect traffic volume and occupancy data to be used in the adaptive system operation.

Field Data Collection
The Contractor's Traffic Engineer shall collect the following data needed for establishing traffic adaptive system operation:

1. Intersection controller databases
   Utilizing Naztec's ATMS.now software operating on a County workstation, the Contractor's Traffic Engineer shall upload existing intersection databases.

2. Travel time runs

The Contractor's Traffic Engineer shall conduct multiple floating car evaluation runs per each direction of all project corridors that record travel times, delays and number of stops for all significant coordinated periods during weekdays ~~and weekends~~ to benchmark the existing traffic conditions. The routes of floating car runs shall be determined by the Contractor's Traffic Engineer and the Project Manager Manager. The Tru-Traffic TS/PP Diagram Generator software shall be used in the floating car evaluation runs.

3. Field reviews

The Contractor's Traffic Engineer shall conduct appropriate field reviews to document the physical features of each intersection including an intersection sketch that illustrates lane configuration, lane storage, movement phases, signal head types, cabinet location, and pedestrian signal heads and push button locations. The field review shall also document vehicle and pedestrian clearance distances, speed limits, median and lane widths, left turn phasing, and any turn restrictions. Pedestrian push buttons shall be verified for proper operation. Photographs shall also be taken of each approach.

4. Observations

The Contractor's Traffic Engineer shall spend appropriate time in the field making detailed observations of the traffic flows and the operation of the signals at each intersection.

5. Saturation Flow Rate studies

The Project Manager and the Contractor's Traffic Engineer shall determine if saturation flow rate studies should be conducted. If studies are conducted, the Contractor's Traffic Engineer shall propose study locations and obtain approval from the Project Manager. The Contractor's Traffic Engineer shall perform the saturation flow rate studies.

Software-in-the-Loop Simulation (SILS) Model Development

The Contractor's Traffic Engineer shall perform the following tasks in order to develop the SILS in support of the adaptive system operation:

1. Develop base model in Synchro

The Contractor's Traffic Engineer shall code all necessary data in order to develop the proper system topography in the base line Synchro model. The base line Synchro model will be used as the preprocessor for SILS. This will generally include: system layout, roadway and intersection geometrics, speed limits, detection topography and functionality, free ring phasing sequence and phase numbering. The SILS system background image shall be constructed on a geo-reference based map for eventual countywide arterial system inclusion. The County will provide the base map as was generated from the Wickham Road ITS Phase I project.

2. Run SILS of existing conditions

The Contractor's Traffic Engineer shall perform SILS on existing conditions over multiple time periods to establish an "existing conditions" baseline. The baseline will be used to compare the adaptive system performance once implemented.

3. Detector configuration analysis

The Contractor's Traffic Engineer shall conduct analysis on the designed detector configuration to establish a benchmark. Additional modeling with modified detector configurations may be conducted and compared to the benchmark analysis to determine if any detector modifications should be made prior to final installation of the detection system.

4. Recommendations
   Based on the detector configuration analysis, the Contractor's Traffic Engineer shall provide recommendations to the Project Manager for modifying the designed detector configuration.

Adaptive System Preparation
The Contractor's Traffic Engineer shall perform the following tasks in order to prepare the adaptive system for operation:

1. Modify basic signal timing
   The Contractor's Traffic Engineer shall select basic signal timing parameters, including minimum initial, yellow change, all-red clearance, vehicle extension, walk time, and flashing don't walk time, for each traffic signal phase at each intersection based on data collected in the field and the guidelines provided in Section 3.6 of the FDOT Traffic Engineering Manual. The Contractor's Traffic Engineer shall submit the proposed basic signal timing parameters to the Project Manager with a one week period for review and approval.

2. Install SynchroGreen Adaptive Module and Local Controller Firmware
   The Contractor's Traffic Engineer shall work with the Contractor to install the SynchroGreen adaptive module and local controller firmware.

3. Develop adaptive system settings
   The Contractor's Traffic Engineer shall select and code all traffic adaptive system settings in SynchroGreen.

~~4. Pre-Implementation performance evaluation~~
~~The Contractor's Traffic Engineer shall test the developed adaptive system settings via "virtual adaptive operation" using SILS. This will attempt to replicate what would occur (in a simulation environment) when SynchroGreen has been enabled. Results of the virtual testing will be used to modify SynchroGreen settings. Various time periods shall be analyzed, including typical weekday and weekend peak, midday, and offpeak periods as well as unique conditions of interest to the Project Manager such as but certainly not limited to a I-95 closure resulting in Wickham Road operating as a diversion route, or evacuation of the barrier islands on SR 520. The Contractor's Traffic Engineer shall coordinate with the Project Manager for specific conditions of interest and shall assume a minimum of 9 simulations to be run per corridor.~~

~~5. Pre-implementation memorandum~~
~~The Contractor's Traffic Engineer, based on the performance evaluation above, shall submit a memo to the Project Manager summarizing operational and performance characteristics of the proposed traffic adaptive system at least four weeks prior to implementation of the system. The Project Manager shall approve the memo prior to system implementation.~~

Implementation, Observation and Fine-Tuning
The Contractor's Traffic Engineer shall perform the following tasks in order to implement the adaptive system operation:

1. Database programming
   Utilizing Naztec's ATMS.now software operating on a County workstation, the Contractor's Traffic Engineer shall download the changes for final local signal timings.

2. Adaptive programming
   Utilizing Naztec's ATMS.now software operating on a County workstation, the Contractor's Traffic Engineer shall program all traffic adaptive system settings using ATMS.now and download to the local controllers.

3. Initiate adaptive control
   The Contractor's Traffic Engineer shall initiate the traffic adaptive system, utilizing ATMS.now on a County workstation, one intersection at a time.

4. Observation
   The Contractor's Traffic Engineer shall observe the signals and controllers to ensure proper operations. The Contractor's Traffic Engineer shall then make proper adjustments to the central software configuration for the purpose of optimizing traffic adaptive system operation. The Contractor's Traffic Engineer shall keep a log of all system parameter adjustments made to the system. This log shall contain a timestamp of date and time on all adjustments made and a clear description of the adjustments made.

5. Fine-tuning
   In addition to observing adaptive software and controller interaction, the Contractor's Traffic Engineer shall conduct travel time runs along the corridor during the implementation period and make adjustments to system operating parameters as required. The Contractor's Traffic Engineer shall supply a report of the performed travel time runs specifying justifications for the required adjustments or lack thereof.

6. Final adjustments
   The Contractor's Traffic Engineer shall meet with the Project Manager to conduct field observations of the final signal operations. The Contractor's Traffic Engineer shall make proper adjustments to the system operating parameters per comments from the Project Manager.

Performance Evaluation
After implementation and fine-tuning of the traffic adaptive system is complete, the Contractor's Traffic Engineer shall evaluate the performance of the traffic adaptive system relative to the existing operation. The evaluation shall include the following performance measures:

~~1. Intersection Measures of Effectiveness (MOEs)~~
~~Utilizing SILS, the Contractor's Traffic Engineer shall tabulate average delay by movement and intersection for both existing and implemented traffic operations.~~

~~2.~~1. Corridor MOEs
Upon the final acceptance of the traffic adaptive operation by the Project Manager, the Contractor's Traffic Engineer shall conduct multiple floating car evaluation runs per each direction of all project corridors including major side street contributors to the corridor traffic, during the time periods the "before" study was conducted to record travel times, delays and number of stops of the traffic operations with the implemented \ timing plans.

~~3. Network MOEs~~
~~The Contractor's Traffic Engineer shall tabulate total delay, travel time, stops, and fuel consumption for both existing and implemented traffic operations.~~

~~4.~~2. Benefit/Cost Analysis
The Contractor's Traffic Engineer shall then conduct a benefit-cost analysis to document the benefits of implementing adaptive system operation. This analysis must compare the "before" and "after" of the total travel time and fuel consumption to arrive at a benefit-cost ratio.

Documentation

The Contractor's Traffic Engineer shall prepare a single report to document the development and implementation of this traffic adaptive system. The report shall cover the following items as a minimum:

- Introduction
- Detection Calibration
  - Detection topography and function
  - Detector verification results
  - Detector validation results
- Data Collection
  - Controller databases
  - Pre-implementation travel time runs
  - Field reviews
  - Observations
  - Saturation Flow Rate studies
- ~~SILS Development~~
  - ~~Base Synchro model~~
  - ~~Detection configuration analysis~~
  - ~~Detection recommendations~~
- Adaptive System Preparation
  - Basic signal timing parameters
  - Adaptive system settings
- Implementation
  - Database programming
  - Adaptive programming
  - Initiation of adaptive control
  - Summary of observations and fine-tuning
  - Final adjustments
- Performance Evaluation
  - ~~Intersection MOEs~~
  - Corridor MOEs
  - ~~Network MOEs~~
  - Benefit-Cost Analysis

The Contractor's Traffic Engineer shall submit the report to the Project Manager for review and approval. The County shall be allowed a minimum of ~~15~~ 1 business days to perform its review. The Contractor's Traffic Engineer shall provide written responses to the County's comments and revise the report accordingly.

Appendix D – Concept of Operations

Brevard County
Advanced Traffic Management System (ATMS)

Concept of Operations

October 9, 2012
Version 1.2

Prepared for:
Florida Department of Transportation
719 S. Woodland Blvd.
Deland, FL 32720
1-800-780-7102

DOCUMENT CONTROL PANEL		
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Version Number:	v.1.2	
	Name	**Date**
Created By:	Krista Small, Atkins	March 13, 2012
Reviewed By:	Gilberto Ramirez, Brevard County	April 17, 2012
	City of Melbourne	April 19, 2012
	Demetrius Lewis, FDOT District 5	August 21, 2012
	Gilberto Ramirez, Brevard County	August 27, 2012
Modified By:	Krista Small, Atkins	May 29, 2012
	Krista Small, Atkins	October 1, 2012
Completed By:		

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List of Figures

List of Acronyms

ATMS .... Advanced Traffic Management System
CCTV .... Closed-circuit Television
ConOps .... Concept of Operations
DMS .... Dynamic Message Sign
EIA .... Electronic Industries Alliance
EOC .... Emergency Operations Center
FDOT .... Florida Department of Transportation
FHP .... Florida Highway Patrol
FON .... Fiber Optic Network
GIS .... Geographic Information System
GUI .... Graphical User Interface
I-95 .... Interstate 95
IRD .... Incident Recognition Devices
ITS .... Intelligent Transportation Systems
LAN .... Local Area Network
NITSA .... National ITS Architecture
RTMC .... Regional Traffic Management Center
SITSA .... Statewide Intelligent Transportation System Architecture
TIM .... Traffic Incident Management
TMC .... Traffic Management Center
VDS .... Vehicle Detection System
WMS .... Weather Monitoring Stations

1. Overview

1.1 Identification

- ➢ Project Name: Brevard County ATMS
- ➢ Financial Project Identification(s) (ID):
  - 428957-1-52-01
  - 428919-1-52-01
  - 428920-1-52-01
- ➢ Federal Aid Project Number: ARRA 641-B

1.2 Document Overview

This document will serve as the Concept of Operations for the Advanced Traffic Management System (ATMS) Expansion Project for Brevard County. A Concept of Operations document includes the proposed environment of the system and the system utilization by stakeholders and associated agencies. It specifically describes the advanced traffic management system and components that will be deployed in Brevard County to support the needs of the agencies and the public.

The document is organized as follows:

Section 1 – Overview
Section 2 - Referenced Documentation
Section 3 - Current System Situation
Section 4 - Justification and Nature of the Changes
Section 5 - Concepts for the Proposed System
Section 6 – Operational Scenarios
Section 7 – Summary of Impacts
Section 8 – Analysis of the Proposed System
Section 9 – Notes
Section 10 – Glossary

The development and management of the Brevard County ATMS Concept of Operations is based on a number of guidelines and builds upon planning, reports, and documentation developed prior to the development of this Concept of Operations, including:

- State and Federal Guidelines
- Project Planning Reports
- FDOT ITS Strategic Plan
- Brevard County ITS Strategic Plan
- Preliminary Systems Engineering Management Plan (PSEMP)

The development of this Concept of Operations and other project management materials for the Brevard County ATMS project were developed in accordance with guidelines and information presented at the Florida Department of Transportation's (FDOT) SEMP website, which can be found at the following link:

http://www.dot.state.fl.us/trafficoperations/ITS/Projects_Deploy/SEMP.shtm

The development of this Concept of Operations document was prepared as required by State guidelines and systems engineering processes as defined in

- Deliverable 1-10: Technical Memorandum, Florida's Statewide Systems Engineering Management Plan, Version 2, March 7, 2005.
- Technical Memorandum: Writing a Project Systems Engineering Management Plan (Version 4, September 29, 2006).

1.3 System Overview

The Brevard County ATMS project is a collaborative effort between FDOT District 5, The Brevard County Transportation Planning Organization, The City of Melbourne, The City of Titusville, The City of Palm Bay, and Brevard County. This project consists of the design and construction of ITS infrastructure and ITS sub-system components along the following corridors in Brevard County, Florida:

- SR 500 (US 192) from the I-95 Southbound Ramps to Dairy Road
- SR 518 (Eau Galle Blvd/Montreal Ave) from CR 509 (Wickham Road) to Pineapple Ave.
- SR 520 (King Street) from Clearlake Road to Banana River Drive
- SR 5 (US 1) from Peachtree Street to Eyster Blvd.
- SR 5 (US 1) from Lake Washington Road to Babcock Street
- SR 50 (Cheney Hwy) from I-95 to SR 405
- SR 405 (Columbia Blvd) from SR 50 (Cheney Hwy) to SR 5 (US1)
- Palm Bay Road from Minton Road to Robert J. Conlan Blvd.
- Minton Road from I-95 overpass to Emerson Drive NW
- CR 509 (Wickham Road) from SR 5054 (Sarno Road) to SR 500 (US 192)

ITS sub-systems for the project are defined as: a fiber optic network system (FON), a vehicle detection system (VDS), a closed circuit television (CCTV) camera system, a travel-time data collection system, and an adaptive signal control system for the traffic corridors. These systems are inclusive of central control software, local software, and hardware (such as but not limited to controllers, servers, computers and switches). Central command operations will be temporarily housed and performed at the joint Brevard County Traffic Management Centers (TMCs). Once the ITS network is extended sufficiently close to the municipal facilities of the Cities of Titusville, Melbourne, and Palm Bay, terminals will be installed allowing the Cities monitoring capabilities over the entirety of the ATMS components and management of components within their jurisdiction. The Figure 1-1 outlines the system overview of the proposed and existing Brevard County ATMS system as part of the ITS Strategic Planning Map.

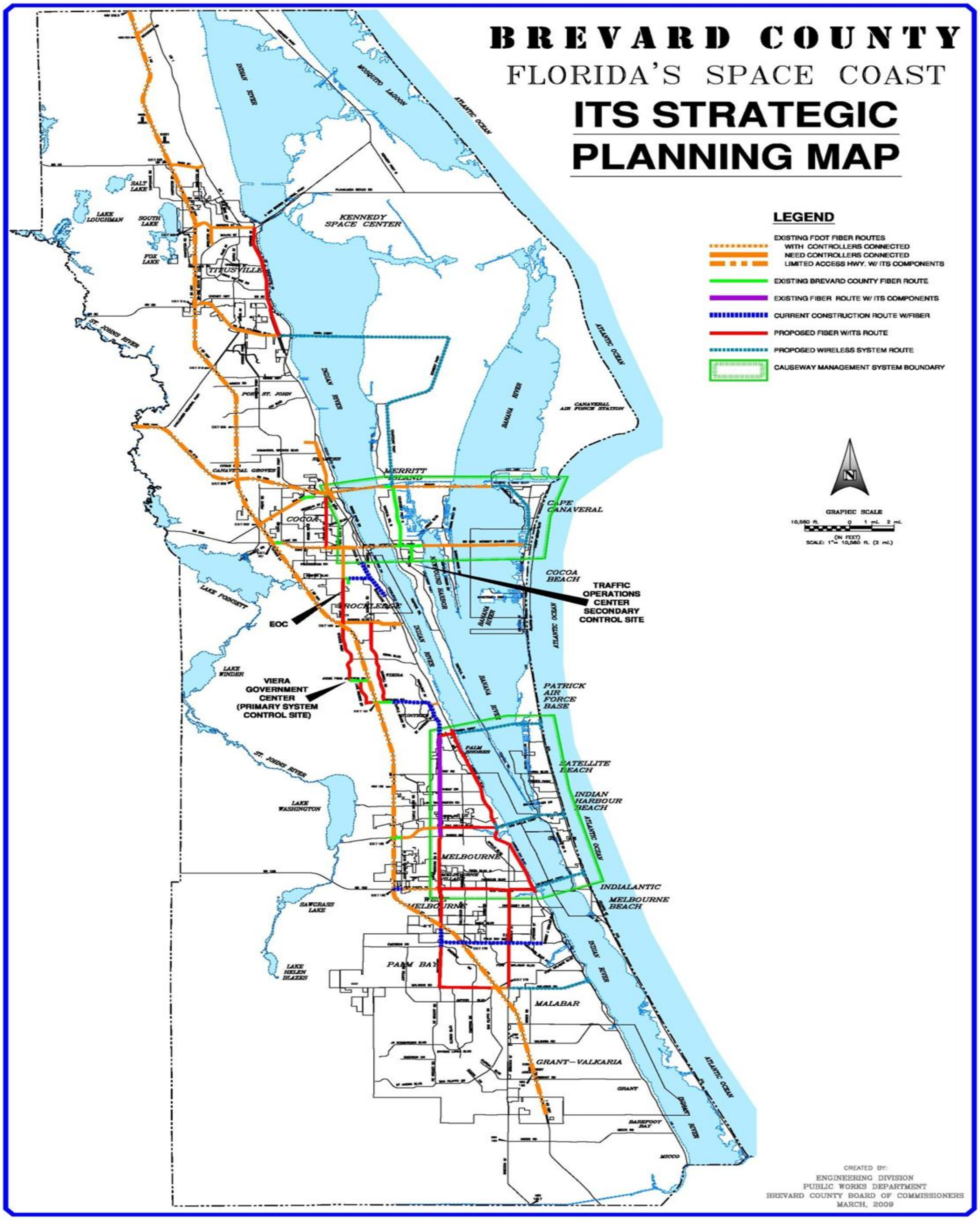

Figure 1-1 – System Overview of the Brevard County ATMS System

The goal of this project is to develop a full deployment of ITS field devices in Brevard County on the corridors listed above that will improve safety, air quality mitigation, congestion mitigation, emergency response time, regional growth adaptability, evacuations, system communications, cross-jurisdictional traffic flow, regional security, transportation operations, and reduce Operations and Maintenance costs.

The purpose of this project is to improve transportation efficiency, promote safety, increase traffic flow, reduce emissions, and improve traveler information in the Brevard County region by providing additional ITS devices, expanding the FON network to connect agencies within Brevard County, and provide the agencies visibility of what is happening on the roadways.

The following outlines the roles and responsibilities for the system:

- ***Project Sponsors***- Agencies involved in funding the project and building the project goals, objectives, and requirements for Brevard County. The Sponsors include the following:
    - Florida Department of Transportation, District Five
    - Brevard County's Transportation Planning Organization (TPO)
    - Brevard County Department of Public Works

- ***User Agencies*** – Agencies that will utilize the ITS equipment installed under this project for traffic monitoring, traffic incident management, performance measures and data collection, and roadway improvement. The User Agencies include the following:
    - Florida Department of Transportation, District Five
    - Brevard County
    - Brevard County's Transportation Planning Organization (TPO)
    - Brevard County Department of Public Works
    - Brevard County Emergency Operations Center
    - City of Titusville
    - City of Melbourne Traffic Engineering
    - City of Palm Bay

- ***Maintenance and Support Agencies*** – Agencies that will be responsible for maintaining the ITS equipment designed and installed under this project. The ITS equipment includes all field devices as well as the networking and control equipment. The Maintenance and Support Agencies are as follows:
    - Florida Department of Transportation, District Five
    - Brevard County Department of Public Works
    - City of Titusville
    - City of Melbourne Traffic Engineering
    - City of Palm Bay

- ***Operating Centers*** – Joint Brevard County Traffic Management Centers (TMCs) that will perform central command operations utilizing central software, local software, and hardware that will control the ITS devices implemented as part of this project. The Operating Centers associated with this project are as follows:
    - Florida Department of Transportation, District Five (View Only)
    - Brevard County Department of Public Works
    - Brevard County Emergency Operations Center

- o City of Titusville
- o City of Melbourne Traffic Engineering
- o City of Palm Bay

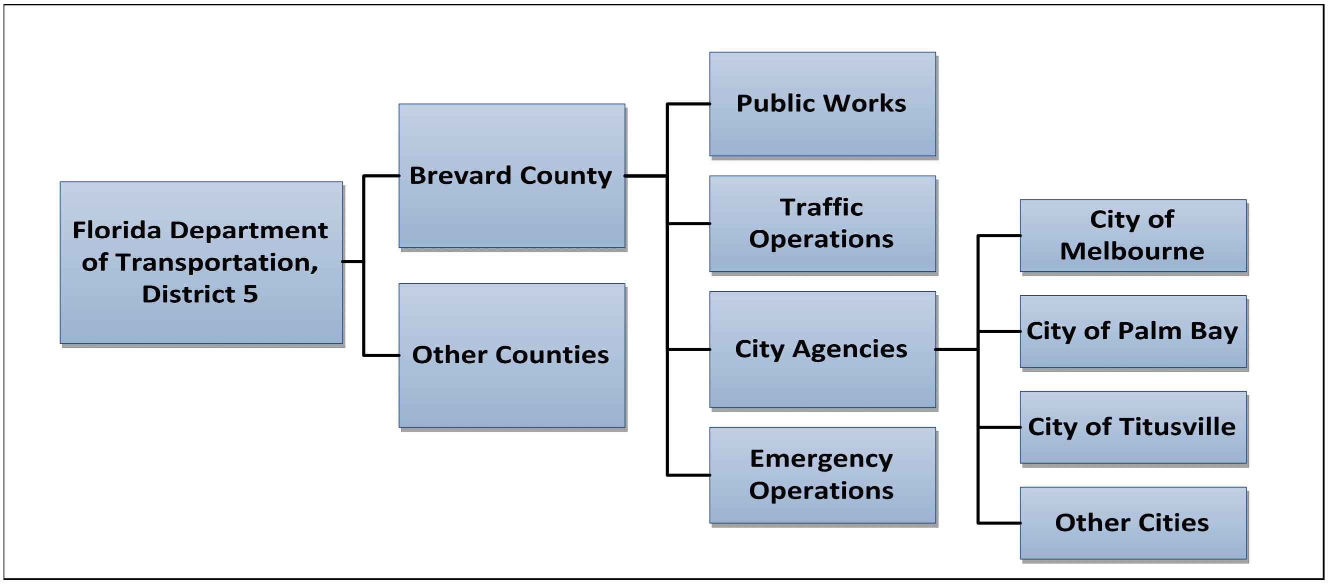

Figure 1-2 – Overview of Brevard County and Relevant Agencies

1.3.1 Agency Contact Information

- Florida Department of Transportation, District Five
  719 S. Woodland Blvd.
  DeLand, FL 32720-6800
  Phone: 1-800-780-7102

- Brevard County Department of Public Works
  2725 Judge Fran Jamieson Way, A211
  Viera, Florida 32940-6605
  Phone: (321) 617-7202

- Brevard County Traffic Operations
  580 Manor Drive
  Merritt Island, Florida 32952
  Phone: (321) 455-1440

- Brevard County Emergency Operations Center
  1746 Cedar Street
  Rockledge, Florida 32955
  Phone: (321) 637-6670

- City of Melbourne Traffic Operations
  2901 Harper Road
  Melbourne, Florida 32904

Phone: (321) 674-5807

2. Referenced Documentation

The following documents, of the exact issue shown, form a part of this document to the extent specified herein. In the event of a conflict between the contents of the documents referenced herein and the contents of this document, this document shall be considered the superseding document. Additionally, noted documents will be developed in support of, or in conjunction with, the preparation and definitions of this Concept of Operations.

DOCUMENT	DATE	CONTACT
Statewide Intelligent Transportation System Architecture (SITSA) update project	February 20, 2006; Version 2	Florida Department of Transportation Intelligent Transportation Systems Office 605 Suwannee Street, M.S. 90 Tallahassee, Florida 32399-0450 (850)-410-5600
Brevard County ITS Strategic Plan	July 28, 2008 Version 4	Brevard County Public Works Engineering 2725 Judge Fran Jamieson Way Building A211 Viera, Florida 32940-6605 (321)-633-2077
Brevard County Traffic Signal Maintenance and Compensation Agreement	August 27, 2002	Florida Department of Transportation 719 S. Woodland Blvd. Deland, FL 32720 1-800-780-7102
City of Melbourne, City of Palm Bay, and City of Titusville Traffic Signal Maintenance and Compensation Agreement	September 13, 2002	Florida Department of Transportation 719 S. Woodland Blvd. Deland, FL 32720 1-800-780-7102
Off System Maintenance Agreement	September 2010	Florida Department of Transportation 719 S. Woodland Blvd. Deland, FL 32720 1-800-780-7102
Brevard County ATMS Preliminary Systems Engineering Management Plan	July 25, 2011	Brevard County Public Works Engineering 2725 Judge Fran Jamieson Way Building A211 Viera, Florida 32940-6605 (321)-633-2077
Brevard County ATMS Operations and Maintenance	April 14, 2011	Brevard County Public Works Engineering 2725 Judge Fran Jamieson Way Building A211 Viera, Florida 32940-6605 (321)-633-2077
City of Melbourne, City of Palm Bay, and City of Titusville Interlocal Agreement for ITS Maintenance	June, 2012	Brevard County Public Works Engineering 2725 Judge Fran Jamieson Way Building A211 Viera, Florida 32940-6605 (321)-633-2077
Brevard County Fiber Sharing Agreement	July, 2012	Brevard County Public Works Engineering 2725 Judge Fran Jamieson Way Building A211 Viera, Florida 32940-6605 (321)-633-2077

2.1 Local Agreements

In addition to the applicable documents identified above, local agreements in place that may have some bearing on the project are defined below:

- Traffic Signal Maintenance and Compensation Agreements

  The "Traffic Signal Maintenance and Compensation Agreements" established between FDOT District 5 and other agencies is the governing document outlining the roles and responsibilities of each entity as it pertains to signalized intersections. This agreement includes all definitions of responsibilities as they pertain to all, "…traffic signals, traffic signal systems (central computer, cameras, message signs, and communications interconnect), school zone traffic control devices, intersection flashing beacons, illuminated street name signs, and the payment of electricity and electrical charges incurred in connection with operation of such traffic signals and signal systems…" Due to the evolving nature of ITS and the interchangeability of ATMS's and signal operation, responsible roles for the maintenance of this project are loosely defined. As a result, the definitions of the "Off System Maintenance Agreement" developed to further clarify the line of system definitions and responsible roles of each agency.

- Off System Maintenance Agreement

  The "Off System Maintenance Agreement" between FDOT District 5 and Brevard County is the governing maintenance agreement document between the two agencies for non-state roads identified as part of the project. These corridors are specifically identified as Wickham Road, Minton Road, and Palm Bay Road. This agreement establishes various responsibilities and conditions required of and by these agencies per, during, and post construction of the project.

- *Fiber sharing agreement with FDOT District 5*

  A fiber sharing agreement defining roles and responsibilities between FDOT District 5 and Brevard County for sharing, accessing, and utilizing fiber owned by each agency as well as the process and requirements for installing fiber on each agency's right of way.

- *Interlocal agreement between Brevard County and Cities within the County*

  Brevard County has developed the ITS Interlocal Agreement document between the various cities within the county in conjunction with the development of this project's RFP. The intent of this document is to define all roles and responsibilities of each agency (city or county) as they pertain to this project's and future ITS related county-city cross-jurisdictional boundary efforts. This document defines ITS related elements as opposed to signal operational elements with the intent to clearly define the boundaries of the two systems. Federally funded technical support and equipment will be provided to the regional ITS network outside of the standard signal operations and maintenance agreements. This support will focus solely on the continued operations and maintenance of the Brevard County ITS fiber optic network. The ITS Interlocal

Agreement developed by Brevard County in conjunction with all cities within the County establishes the newest rules to be adhered to by each agency.

3. Current System Situation

3.1 Background, Objectives, and Scope

Brevard County currently has an existing ITS infrastructure consisting of various ITS sub-system components that connect via fiber optic network or wirelessly along Brevard County roadways. These roadways include but are not limited to SR 3, US 1, Wickham Rd, Barton Blvd, and US 192. Brevard County's ITS infrastructure also includes limited access to FDOT, District 5 owned ITS systems on I-95, US 1, SR 407, SR 528, and SR 520.

Brevard ITS subsystems are defined as a wireless and fiber optic network system (FON), a vehicle detection system (VDS), a closed circuit television (CCTV) camera system, dynamic message signs (VMS), Roadway Weather Stations (RWS), a travel-time data collection system, and an adaptive signal control system for the traffic corridor. The overall system consisting of the existing ITS infrastructure and the future ITS infrastructure defined in this document should be considered the Brevard County Advance Traffic Management System (ATMS).

Brevard County ITS devices are accessed and controlled remotely by Brevard County Public Works Engineering Office, the Brevard Traffic Operations Center, and the Brevard County Emergency Operations Center. The Brevard County ITS devices are also accessible from the Florida Department of Transportation, District Five Regional Traffic Management Center (RTMC) but not controllable.

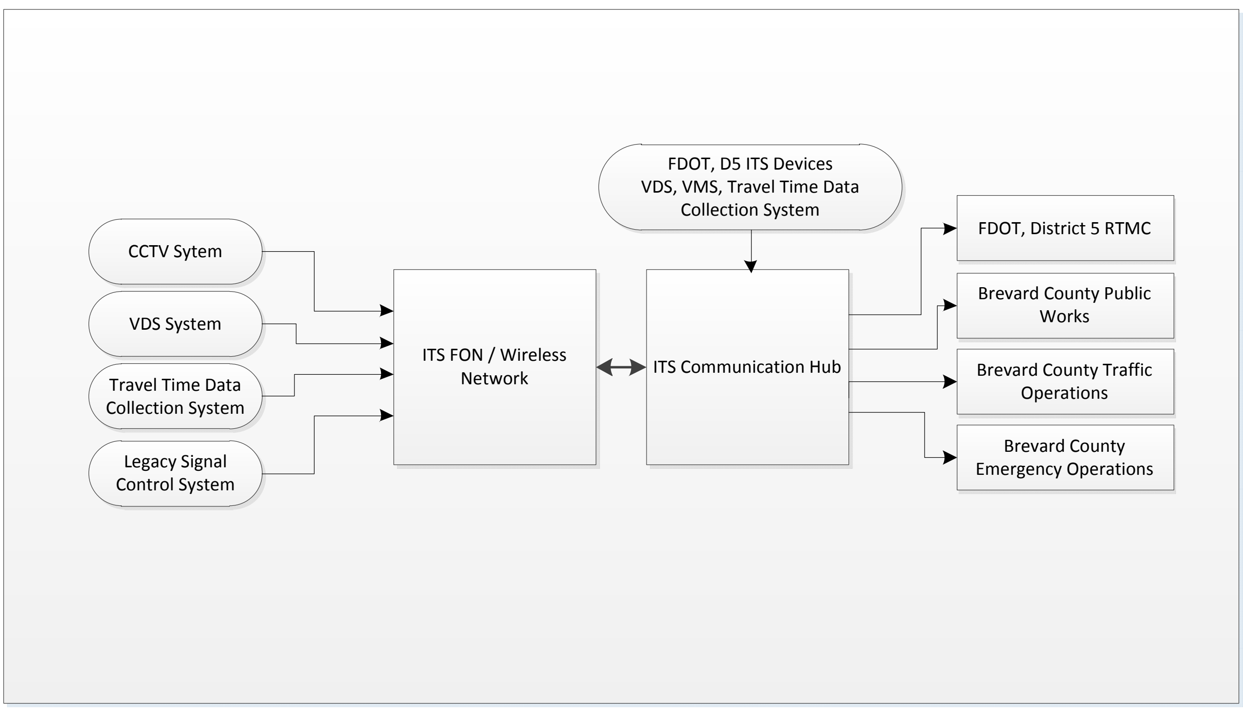

Figure 3-1 – Block Diagram of Current ATMS System

3.2 Operational Constraints of Existing Situation

Currently, local agencies such as the City of Titusville, the City of Palm Bay, and the City of Melbourne, do not have connectivity to Brevard County's ITS devices.

Brevard County does not have a Traffic Management Center that will manage and monitor traffic conditions on the roadways at this time. Without a centralized facility, the agencies will need to closely coordinate efforts for traffic monitoring and system maintenance and determine a standard operating procedure describing how the ITS devices will be used.

The existing fiber optic backbone on SR 520 requires redesign in certain locations where the fiber was pulled into ITS cabinets and spliced within the cabinet. This configuration is not conducive to maintaining the health of the fiber optic network. In order to improve the fiber optic network configuration, the backbone should be relocated to a manhole or pull box near the cabinet with fiber optic drop cable re-spliced inside the manhole or pull box. This work will be completed during the County Wide Project.

3.3 User Profiles

The Brevard Advanced Traffic Management System will have four different user types. The user types and profiles are as follows-

ITS Operator- This user will access and control the ITS devices to monitor and maintain traffic. The ITS operator will be able to pan, tilt, and zoom the cameras, post messages to the variable message signs (for future projects), ensure the traffic signal control system is working properly, and gather data collected by the vehicle detection system. The operator will also verify the overall health of the system and dispatch maintenance crews to fix any ITS devices that are not functioning properly. The Operator will also assist Emergency Response Teams to decrease emergency response times and manage the traffic while an incident is occurring.

ITS Device Maintenance Personnel- This user will be responsible for maintaining the ITS field devices and ensure the device downtime is minimal. This user would access the ITS devices routinely and verify each device system wide is operational and fully functional. The ITS Device Maintenance Personnel will generally be the County's Traffic Systems Technician(s), however, the City's Traffic Sign/Signal Technician(s) and any other personnel agreed upon by the Cities and County may perform maintenance as well.

ITS Network Support Personnel- This user will access the ITS network and ensure the network is operational and fully functional. This user will also be responsible for implementing any necessary network updates or device integration. This user will also verify the fiber optic network is stable and free from any fiber cuts or damages.

Traffic Operation Engineers and personnel- Traffic operation engineers will be able to analyze and utilize the ITS data to make decisions on future roadway and safety projects. The analyzed ITS data can be used to make roadway improvement decisions on areas that are congested regularly or may have re-occurring incidents.

Public- The Public will directly benefit from the Brevard ATMS system by utilizing traveler information disseminated from the system to avoid congested areas and make travel route decisions. The public will be informed via Florida 511 (FDOT's Real Time Traveler Information System) of incidents, construction, weather hazards or other useful information such as road closures, etc. that will improve their commute and travel times.

3.4 Support Environment

The Brevard County ATMS ITS devices will be supported and maintained. The County is primarily responsible for maintaining the ITS devices. The City of Titusville, the City of Palm Bay, and the City of Melbourne currently hold an Interlocal Agreement for ITS Maintenance with Brevard County that allows the Cities to access the County's ATMS server and adjust traffic signaling within their jurisdiction if necessary. For normal business operations, the City must provide a request in writing to adjust any ITS devices installed by the County. In emergency situations, the Cities may be required to provide maintenance on ITS Devices within their jurisdiction upon County approval. Brevard County maintains all other ITS devices that are not FDOT owned within Brevard County unless otherwise specified in an executed Interlocal Agreement.

4. Justification and Nature of the Changes

4.1 Justification for Changes

Intelligent Transportation Systems are an integral part of providing innovative services to motorists in the Brevard region. The region (FDOT District Five, Brevard County, and the Cities of Titusville, Palm Bay, and Melbourne) has agreed that traffic operations will be monitored and controlled in a shared environment. The deployment of a regional ATMS using ITS will improve transportation efficiency, promote safety, increase traffic flow, reduce emissions, and improve traveler information across jurisdictional boundaries within Brevard County.

4.2 Description of the Desired Changes

The communications network for the Brevard ATMS will utilize new underground fiber optic cable. This fiber optic network will have sufficient excess capacity to provide connectivity for many government facilities and agencies throughout the county. The backbone ATMS network will consist of a 1-Gigabit per second (Gbps) Ethernet communications network, which is expandable to 10 Gbps for future scalability. The expansion of the fiber optic network will provide the agencies with connectivity to the ITS devices.

This project will also include ITS device installation such as CCTV, DMS, VDS, travel time data collection and adaptive signal control systems. The ITS devices will installed and integrated on the corridors listed within this document and integrated into the existing ITS network and infrastructure.

4.3 Change Priorities

The highest priority of the change is the expansion of the communications network for the Brevard ATMS. This will provide multiple agencies with access and control to the existing ITS devices and the new ITS devices that will be installed under this project. The next highest priority is the device installation and integration that will increase the County's roadway visibility.

4.4 Changes Considered but Not Included

Designing, building, and integrating a centralized traffic management center for Brevard County was considered but not included in this project. In the future, Brevard County will centralize operations into a Traffic Management Center that will be constructed near the Viera Government Center.

Installing Variable Message Signs was also considered but not included in the design. Considerations may be made in the future to install VMS to disseminate traveler information to motorists.

4.5 Assumptions and Constraints

The equipment and software chosen for this project will be compatible with the components that already exist for Brevard County to provide a homogeneous system that facilitates the operation and maintenance of all ITS devices.

It is assumed that providing network connectivity to the ATMS from additional locations or stakeholders in Brevard County will require a network connection at those sites, but will not require significant expenditures for hardware and software.

Upon completion of the Brevard ATMS expansion, many traffic signals and ITS devices will be connected to the regional ATMS and will be operated by multiple agencies. This project will not have the funding to build a traffic monitoring center in Brevard County and operations and maintenance responsibilities will be divided amongst agencies within Brevard as mentioned previously in this document.

5. Concepts for the Proposed System

This section describes the anticipated operation of the Brevard ATMS Expansion Project.

5.1 Background, Objectives, and Scope

The proposed Brevard ATMS Expansion project will expand the ITS infrastructure within the county providing visibility and data collection for more roadways and provide more connectivity to additional agencies within Brevard County. The purpose of this project is to expand Brevard County's ITS infrastructure, upgrade existing signalized intersections with Ethernet functionality, and to install a fiber optic interconnect throughout the project limits to relay command and control communications to the upgraded signalized intersections through the wide-area networks (WANs) of District 5 and Brevard County. This project consists of the design and construction of ITS infrastructure and ITS sub-system components along the following corridors in Brevard County, Florida:

- SR 500 (US 192) from the I-95 Southbound Ramps to Dairy Road
- SR 518 (Eau Galle Blvd/Montreal Ave) from CR 509 (Wickham Road) to Pineapple Ave.
- SR 520 (King Street) from Clearlake Road to Banana River Drive
- SR 5 (US 1) from Peachtree Street to Eyster Blvd.
- SR 5 (US 1) from Lake Washington Road to Babcock Street
- SR 50 (Cheney Hwy) from I95 to SR 405
- SR 405 (Columbia Blvd) from SR 50 (Cheney Hwy) to SR 5 (US1)
- Palm Bay Road from Minton Road to Robert J. Conlan Blvd.
- Minton Road from I95 overpass to Emerson Drive NW
- CR 509 (Wickham Road) from SR 5054 (Sarno Road) to SR 500 (US 192)

Upgrades to existing signal intersection detection and installation of CCTV cameras will further upgrade the overall management system of this corridor by allowing remote access and control of the sub-systems through the WANs. The adaptive signal control, timing plans analysis, and development for the traffic management of the signalized intersections throughout the project limits shall be generated and refined through adaptive signal timing operations. These upgrades will allow Brevard County to operate and maintain the corridor in a more efficient and cost-effective manner. These upgrades will also provide ITS device connectivity to the City of Titusville, City of Palm Bay, and the City of Melbourne.

Upon completion of the Brevard ATMS project, the ITS devices will be accessible and controlled from the Brevard County Public Works Engineering Office, the Brevard Traffic Operations Center, the Brevard County Emergency Operations Center, as well as the Cities of Titusville, Palm Bay, and Melbourne. The Brevard County ITS devices will be accessible from the Florida Department of Transportation, District Five Regional Traffic Management Center (RTMC) but not controlled.

5.2 Operations Policies and Constraints

Brevard County will not have a centralized facility that will manage and monitor traffic conditions on the roadways. Without a centralized facility, the agencies will need to closely coordinate efforts for traffic monitoring and system maintenance and determine a standard operating procedure describing how the ITS devices will be used.

Upon completion of the System wide ATMS Project, the Cities will have connectivity to the County's ITS devices. The County will provide maintenance for County owned ITS Devices for normal operations. The County will not make any changes to the ITS infrastructure or enter into any City owned cabinets without receiving the City's Engineer advanced consent in writing.

The Cities will continue to maintain all non-ITS devices and in case of an emergency may be required to maintain the County's ITS devices. If a timing signal adjustment or a permanent change to the timing or offset of the City's ITS network is required, the City is required to notify the County in writing to ensure coordinated operation of the overall network. Any adjustments to the ITS Infrastructure must be coordinated and approved by the County.

5.3 Description of the Proposed System

ATMS field devices throughout Brevard County will provide traffic surveillance and control capabilities. The exact locations and quantities of each of these devices will be determined by stakeholder involvement and budget availability. The field devices will connect either wirelessly or via fiber optic network and provide roadway visibility to Brevard County and associated agencies.

5.3.1 Traffic Signals

Traffic signal hardware on regionally significant corridors will be connected to the Brevard ATMS and will be upgraded to be compatible with the signal management software. The traffic signal upgrade will consist of the replacement of the traffic signal controller. The traffic signals will be interconnected using fiber optic communications along the corridor. Signal detectors will consist of a combination of either inductive loops, video detectors and wireless magnetometers.

All users of the system will be able to observe the operation of a traffic signal; however, only the owning agency will have the authority to modify the traffic signal operation. In the future, each agency may choose to grant control authority to qualified regional operators.

5.3.2 Closed-circuit Television Cameras

Closed-circuit television (CCTV) cameras will be deployed throughout the network to provide video traffic surveillance from the joint Brevard traffic management centers and the FDOT, District 5 RTMC. The CCTV cameras can pan, tilt, and zoom (PTZ) to allow system users to observe traffic patterns, locate and respond to incidents, adjust traffic signal timings, and verify the operation of other ITS devices. While the CCTV cameras will not provide entire coverage of the roadway network, they will provide coverage of major intersections, large stretches of major corridors, and areas known to be prone to congestion or other problems.

All system users will be able to observe any CCTV camera on the network. All traffic operations agencies will be able to control any CCTV camera; however, the joint TMC operators and the owning agency will have priority for controlling the cameras. The higher priority user can take over PTZ control at any time, however, the lower priority user will still be able to view the video from the camera. Users can be assigned priorities as well that will dictate the permissions and control capabilities of the user.

5.3.3 Dynamic Message Signs

Future projects may use the ATMS as the foundation to allow the deployment of Dynamic message signs (DMS) along arterials. These signs will provide information on the status of the interstates and corridors so travelers can make informed decisions before committing to entering the roadway. These signs can also be used to provide travel information and alerts (America's Missing: Broadcast Emergency Response [AMBER], Silver, etc.) to the public. FDOT currently owns and controls DMS on I-95 in Brevard County. Brevard County may consider a separate project in the future, to deploy arterial DMS along the Brevard corridors. Future projects may install additional DMS to provide information for tourists, events, parking, launches, and evacuation, particularly near the beaches and the coast. The development of an information dissemination master plan for the County may be necessary to ensure that the devices are procured and deployed in an efficient and beneficial manner.

5.3.4 Vehicle Detection Stations

Vehicle detection systems (VDS) will collect vehicle speed data along corridors throughout the network. Falling speeds in an area may alert the operator of a traffic problem in the area. The operator can then use the surveillance systems to look for a possible cause. This is typically done by using a color-coded map display in the TMC and RTMC that identifies different speed conditions by color. Detector information will be automatically distributed to the Florida 511 Real Time Traveler Information System for dissemination to the public.

5.3.5 Adaptive Signal Control

As part of this project, intersections within the project limits will be upgraded to use an adaptive signal control system which collects traffic and pedestrian data from vehicle detection devices on a 24 hours a day, 7 days a week basis and utilizes it real-time to configure the timing of the intersection. The real-time system takes in the full view and needs of each intersection individually then makes adjustments to optimize traffic in all directions during normal traffic conditions and congested traffic conditions.

5.3.6 Roadway Weather Stations

There may be a need to integrate Roadway Weather Stations (RWS) on local area bridges and overpasses to detect high wind speeds during poor weather conditions. Roadway Weather Stations can help agencies detect unsafe wind conditions during dangerous storms, especially hurricanes and make evacuation decisions as well as bridge and causeway closures if necessary.

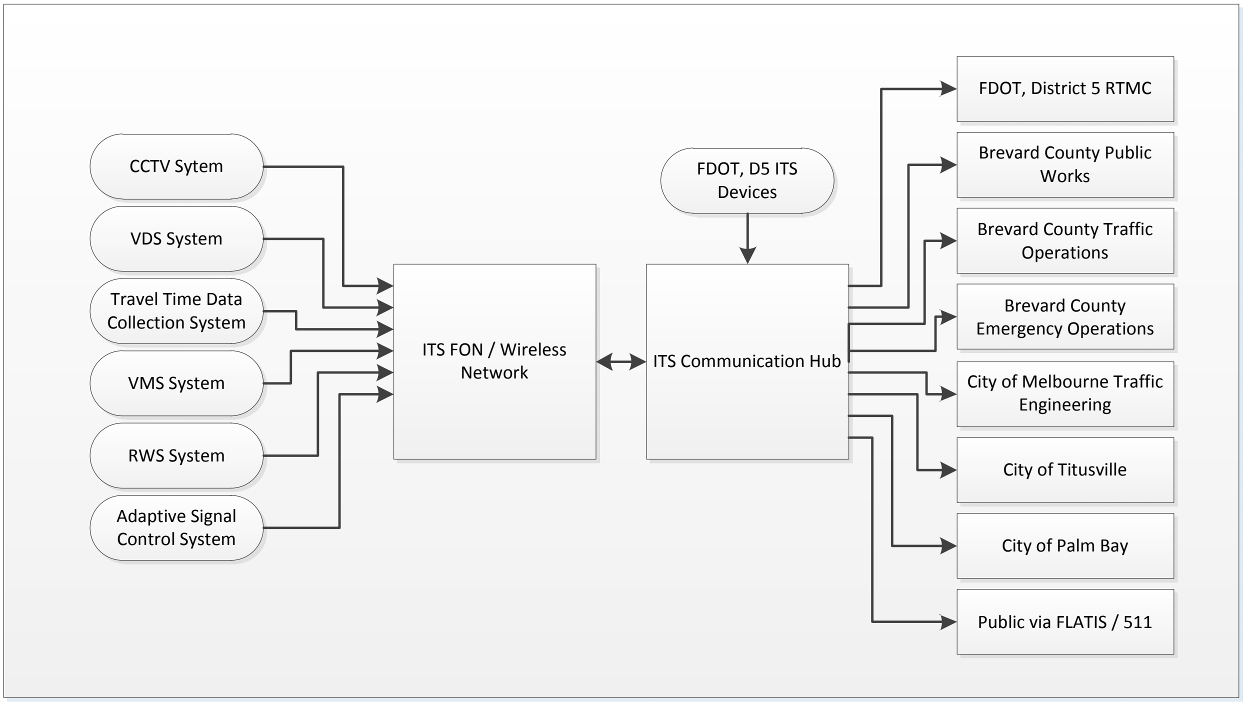

Figure 5-1 – Block Diagram of the Proposed System

5.4 Modes of Operation

The Brevard joint TMCs will not be regularly staffed, but will be available for Brevard County employees to use during the course of their daily activities. Other Brevard agencies, and authorized employees of the city/county will be provided access to the regional ATMS from multiple locations throughout the county, with the appropriate network connectivity and login credentials.

All agencies connected to the ATMS will have access to view data from any agency; however, control of the ATMS components will only be available to the owner of that component. An exception to this rule will be the ability for any agency to control a CCTV camera; however, the owning agency has priority when multiple users attempt to control the same camera. Florida Department of Transportation, District 5 has full authority over FDOT owned devices primarily located on I-95, SR 407, SR 520, SR 528, and US 1. FDOT operates and maintains these devices 24 hours a day, 7 days a week at the Regional Traffic Management Center located in Orlando, Florida. The FDOT owned and operated ITS devices can be viewed by Brevard County and the associated agencies but not controlled.

Brevard County will develop further guidelines to determine which agencies and operators will be authorized to perform particular functions on the system. Table 5-1 identifies the authority and control responsibilities for each agency.

Agency/Department	Signals	CCTV	Vehicle Detection	Adaptive	RWS
Brevard County Traffic Operations	Observe any. Control County Signals	View and operate any camera. Priority rights for County devices.	View any. Can operate County owned devices.	View any. Can operate County owned devices.	View any. Can operate County owned devices.
Brevard County Public Works	Observe any. Control City Signals	View and operate any camera. Priority rights for County devices.	View any. Can operate County owned devices.	View any. Can operate County owned devices	View any. Can operate County owned devices
Brevard County Emergency Operations	Observe any. Control City Signals	View and operate any camera. Priority rights for County devices.	View any. Can operate County owned devices	View any. Can operate County owned devices	View any. Can operate County owned devices.
FDOT, District 5 RTMC	N/A	View any camera. .	View any.	N/A	N/A
City of Titusville	Observe any. Control City Signals	View and operate any camera. Priority rights for city devices.	View any. Can operate City owned devices.	View any. Can operate City owned devices.	View any. Can operate City owned devices.
City of Palm Bay	Observe any. Control City Signals	View and operate any camera. Priority rights for City devices.	View any. Can operate City owned devices.	View any. Can operate City owned devices.	View any. Can operate City owned devices.
City of Melbourne	Observe any. Control City Maintained Signals	View and operate any camera. Priority rights for City devices.	View any. Can operate City maintained devices.	View any. Can operate City maintained devices.	View any. Can operate City maintained devices.

Table 5-1: Agency ITS Device Privileges

5.5 User Involvement and Interaction

Primary operations of the Brevard County ATMS will take place from the Brevard County Traffic Operations Facilities. The Cities of Titusville, Palm Bay, and Melbourne will have connectivity to the ITS devices within their jurisdiction. FDOT, District 5 RTMC operators will use the Sunguide software to monitor and operate the components of the system that are owned by FDOT.

If signal-timing modifications are deemed necessary, staff will communicate those needs to the agency responsible for the specific traffic signals; all signal modifications will be performed by the owning agency or their authorized agents.

Future efforts will develop regional timing plans and agencies roles and responsibilities for operating ITS devices within their jurisdiction that are acceptable to all agencies. Once these plans are developed and approved, authority will be granted to qualified personnel to invoke these plans in response to incidents, accidents, evacuations, or other emergencies.

Currently, the Cities of Melbourne, Palm Bay, and Titusville hold an Interlocal Agreement for ITS Maintenance with Brevard County. This Agreement defines the roles and responsibilities of the agencies and coordination efforts for maintaining signals and the County's ITS Device.

5.6 Support Environment

Brevard County will have in-house and contract personnel available to provide the support and maintenance required for the joint TMCs and ITS field devices deployed during this project. The traffic signal maintenance and operations will remain the responsibility of the agency owning the signal, or as covered by other agreements between agencies.

5.7 Future Agency Connectivity

The agencies listed below are involved in traffic management, incident management, or emergency operations in Brevard County. Access to the ATMS and field devices will allow faster, more efficient and coordinated responses to incidents and emergencies. Depending on each agency's individual needs, various levels of access and control for field devices can be provided in the future. It is envisioned that this and future projects will allow the following agencies to remotely access the system.

Brevard County

- Brevard County Department of Public Works
- Space Coast Area Transit
- Brevard County Emergency Operations Center
- Brevard County Road and Bridge Division
- Brevard County IT Division
- Brevard County Operations and Maintenance (O&M) Division
- Brevard County 911 – Public Safety Communications
- Brevard County Fire and Rescue
- Brevard Sherriff's Department
- Brevard County/ Mobility
- Brevard County's Transportation Planning Organization (TPO)

Other Organizations

- City of Cape Canaveral
- City of Cocoa
- City of Cocoa Beach
- City of Indian Harbour Beach
- City of Rockledge
- City of Satellite Beach
- City of West Melbourne
- Town of Grant-Valkaria
- Town of Indialantic
- Town of Malabar
- Town of Melbourne Beach
- Town of Melbourne Village
- Town of Palm Shores
- Florida Highway Patrol (FHP)
- Melbourne International Airport

- The Cape Canaveral Port Authority
- Patrick Air Force Base
- Cape Canaveral Air Force Station
- Kennedy Space Center

6. Operational Scenarios

Once the Brevard ATMS Expansion Project is complete and integrated into the existing Brevard ATMS system, there will be a number of operational scenarios that involve utilizing the ATMS system. The following is a brief description of certain scenarios and how they may be handled utilizing the Brevard ATMS System.

Normal Operations: During normal operations, traffic will be free flow and there will be no congestion present. All camera show free-flowing traffic images, the vehicle detection system will not detect any congestion or slower speeds, and the adaptive timing signal system will maintain its current signaling configuration. There will be no actions required by the operator.

Peak Congestion Operations: During peak congestion operations, traffic will be slow and congestion will be present. Camera images will show congested areas on highly traveled intersections, the vehicle detection system will detect higher traffic volume and low speeds, thus initiating the adaptive timing signal system to reconfigure the intersection's signaling based on the direction of travel with higher volume. The operator will be required to view camera images and ensure traffic is flowing consistently and there are no incidents present. If there is an incident present or an obstruction of traffic, for example a disabled vehicle, the operator will need to dispatch the proper personnel.

Incident and Event Operations: During normal or peak congestion operations, an incident can occur and cause major delays on roadways. If an incident occurs, traffic will be slow and congestion will be present. Camera images will show congested areas at the incident site and areas surrounding the incident. The vehicle detection system will detect higher traffic volumes, thus initiating the adaptive signal control system to reconfigure the intersection's signaling based on the direction of travel with higher volume. The operator will need to dispatch the proper emergency services personnel if they are not already on the scene. The operator will be required to view camera images and potentially take over signal control if there is an intersection blocked. There may also be instances where the operator will need to work with FDOT, District 5 RTMC operators under incident conditions, Amber/Silver Alerts, hurricane evacuations, as well as coordinating route plans for major events.

Maintenance Operations: The operator should verify each device at the beginning of every shift to ensure connectivity and optimal uptime. If a device is polled and is not working properly, the operator should contact the proper maintenance personnel and dispatch them to the site for repair. The maintenance worker should contact the operator when the repairs have been made to ensure the device is online and fully functional.

7. Summary of Impacts

Throughout the construction of this project, there will be impacts to the current traffic situation due to possible lane closures and slower traffic conditions. However, once this system is in place, the motorist will have an improved and more efficient means for traveling the Brevard County system.

As the system is brought online, normal traffic operations may be slightly impacted until operators and Traffic Operations personnel fully understand how to use the system. Once this training is complete and each agency fully understands their roles and responsibilities for operations and maintenance, the system should reduce the time spent on signal timing and configuration as well as provide optimal visibility to Brevard roadways thus, improving incident response times.

8. Analysis of the Proposed System

ITS systems are a beneficial and integral part of providing innovative services to transportation customers. Brevard County plans to deploy a region-wide ATMS in accordance with national and statewide ITS architectures and standards and to operate it from the joint TMCs. Brevard County will operate traffic signal systems using innovative software and the FDOT District Five will use the SunGuide® software for operation of the I-95, SR 520, and SR 528 corridors. The RTMC will provide a location for FDOT District Five and Brevard County to work together to improve the overall regional traffic operations. This project provides for the deployment of the expansion of the overall ATMS within Brevard County and the development of interlocal agency plan for operating and maintaining the ITS devices within the joint TMCs.

The stakeholders in the region are confident that the regional ATMS will result in improved transportation efficiency and safety; increased traffic flow; reduced emissions; and improved real-time traveler information. The Brevard ATMS expansion will also increase visibility countywide and provide traveler information to the Florida ATIS system and Florida 511 Real Time Traveler Information System.

9. Notes

Not every agency will be brought on-line during the initial deployment due to the availability of funding and the costs associated with extending the communications network to remote facilities. Additional projects will be required to add all interested agencies to the ATMS network.

Brevard County should consider deploying DMS or other information dissemination technology on heavily congested corridors and roadways, as well as causeways for evacuation purposes. Deploying such technology would disseminate real-time traveler information, important messages such as Amber and Silver Alerts, construction alerts, road closures, detours, and evacuation routes. Dissemination can also help motorist plan for traffic congestion during events, etc. The public would greatly benefit from the installation of information dissemination sub-systems county-wide.

10. Glossary

Backbone – The pieces of network connections that bring devices and systems together at various locations typically identified with the main branch of a communications subsystem.

Closed-circuit Television (CCTV) Site – A single roadway location, selected by the Engineer, containing a camera assembly; a pole with or without a camera-lowering device; and any other equipment required for a fully functioning CCTV site.

Communications – For the purposes of this project, communications includes conduit, fiber optic cable, multiplexers, fiber optic transceivers, and other ancillary communications components.

Field Device – Any component in the field used as part of the advanced traffic management system.

Gigabit Ethernet® – A transmission technology used in local area networks (LAN) based on the Ethernet frame format and protocol that provides a data rate of 1 billion bits per second (one gigabit). Many enterprise networks use Gigabit Ethernet, defined by the Institute of Electrical and Electronics Engineers 802.3 standard, as their transmission backbone. Optical fiber is the primary carrier of Gigabit Ethernet, with very short distances possible on copper media. Existing Ethernet LANs with 10 and 100-megabit cards can feed into a Gigabit Ethernet backbone.

Nonintrusive Vehicle Detector – A noninvasive detection system installed aboveground on the roadside (i.e., side fire-mounted). The detection system uses a certified Federal Communications Commission non-site licensed, low-power microwave radar beam (i.e., digital wave radar) to measure vehicle presence, volume, occupancy, and speed. This system transmits data in serial format using the Electronic Industries Alliance (EIA) standard EIA-232 communications port, which is an internet protocol interface.

Variable Message Sign (VMS) – A variable message sign system on which a message can be created for display after installation of the sign in the field. The sign can have predefined messages in its library of stored messages. This message sign shall give the operator the capacity to create or modify messages on a situation-by-situation basis.