DEPARTMENTAL INPUT
CONTRACT/PROJECT MEASURE ANALYSIS AND RECOMMENDATION

Rev 1

[X] New contract [ ] OTR [ ] CO [ ] SS [X] BW [ ] Emergency

Previous Contract/Project No. BW9872-MT

[ ] Re-Bid [ ] Other (Access)

LIVING WAGE APPLIES: __YES _x__NO

Requisition/Project No: RQMT1700007

TERM OF CONTRACT: _2_ years with _1_ one-year option-to-renew

Requisition/Project Title:- Traffic Signal System Modernization

Description: Implementation of latest technology (Advanced Traffic Management Systems, traffic controllers, Intelligent Transportation System devices) to improve traffic congestion and mobility in the 10 most congested traffic corridors

User Department(s): DTPW

Issuing Department: ITD Contact Person: Martha Olivia Phone: 305-679-0015

Estimated Cost: $10,975,201 Funding Source: Mixed Funding REVENUE GENERATING: No

ANALYSIS

Commodity/Service No: 55089 SIC:

Trade/Commodity/Service Opportunities

Contract/Project History of Previous Purchases For Previous Three (3) Years
Check Here [ ] if this is a New Contract/Purchase with no Previous History

	EXISTING	2ND YEAR	3RD YEAR
Contractor:	Econolite Control Products, Inc.		
Small Business Enterprise:			
Contract Value:	$240,000		
Comments:			

Continued on another page (s): _____Yes _____No

RECOMMENDATIONS

SBE	Set-Aside	Sub-Contractor Goal	Bid Preference	Selection Factor
		%		
		%		
		%		
		%		

Basis of Recommendation:

Signed: Tiandra Wright Date to SBD: 3/9/2017

Date Returned to PM: _____

Traffic Signal System Modernization
Advance Notice To Waive Competition

Scope of Work

Project Scope of Work

This Scope of Work describes the products and services required to expand the 2070LX Small-Scale Evaluation Program deployed along 36th Street to the remaining eleven congestion management corridors identified by the County.

Task 0 Project Management

The project management activities include:

Project Plan

The Project Plan will document the following elements:

1. Project Scope – this document and any modifications that may be required over the term of the contract
2. Major Deliverables – this document and any modifications that may be required over the term of the contract
3. Risk Assessment – identifies major risk elements and mitigation actions
4. Resource Requirements – includes team organization and responsibilities of stakeholders
5. Project Schedule – Gantt chart periodically updated to reflect project progress

Status Reports

Contractor will host weekly informal project meetings to keep the County informed of project progress and upcoming activities. These meetings are structured as 'status only' and are intended to last not more that approximately fifteen (15) minutes. This time frame ensures regular stakeholder attendance and insists that more in-depth discussion to be taken offline. The agenda for these meetings will form two purposes: to guide the discussion and function as a Status Report. These meetings will be limited to the following discussion points:

- Work performed in the prior week
- Work anticipated in the ensuing week
- Outstanding issues

Meeting Minutes

As dictated by project exigencies, formal project meetings (e.g. Project Kick-off) will be conducted and actions resulting from these meetings will be documented in Meeting Minutes. The need and frequency for these types of meetings will be mitigated by consistently performing the weekly project meetings discussed above.

Procurement Submittals

Contractor will compile and provide product submittals for the following items:

- Controllers
- Detection
- Connected Vehicle Co-Processor
- BlueTOAD
- Centracs Servers

The County will review the submittals and return comments within five (5) business days.

Local Project Facilities

Contractor will establish a local office in Miami-Dade County. The local office will provide work space for project staff as well as warehouse space to receive inventory shipments and perform local testing as required.

Task 1 Controllers

Description of Work

Contractor will supply the Contractor Model 2070LX controller with ASC/3 software. The controllers will be delivered and staged at the Contractor local project facility to be located in Miami-Dade County. The 2070 chassis and 1C module will be tagged as an asset and entered into the Maintenance Management System (MMS) for asset tracking. Contractor will provide the initial configuration and programming for each controller in order to facilitate the deployment of the controller in the field.

Task 2 Cabinets (optional)

Description of Work

Contractor will supply, at the County's request, our standard 332L cabinet. As required, Contractor will supply specialized cabinets, including pull-out racks, on a case-by-case basis.

Contractor will work with the County to define the specific cabinet specification. The cabinets will be delivered and staged at the Contractor's local project facility to be located in Miami-Dade County. The cabinets will be inventoried to validate all components are in place, tagged as an asset and entered into MMS for asset tracking.

Task 3 Detection

Description of Work

Contractor will supply the Autoscope Encore video detection system or approved next generation video detection system. One TIP (Terra Interface Panel) and one TAP (Terra Access Point) will be provided for each intersection outfitted with Autoscope. The Autoscope equipment will be delivered and staged at the Contractor local project facility to be located in Miami-Dade County. The Autoscope cameras, Terra Interface Panel and Terra Access Point will be tagged as an asset and entered into MMS for asset tracking.

Task 4 Connected Vehicle

Description of Work
Contractor will supply Econolite Connected Vehicle Co-Processors (CVCPs). The CVCPs will be delivered and staged at the Contractor local project facility to be located in Miami-Dade County. The CVCP will be tagged as an asset and entered into MMS for asset tracking.

Task 5 BlueTOAD

Description of Work
Contractor will supply TrafficCast BlueTOAD devices as currently specified on the Florida Approved Products List (APL). The BlueTOAD devices will be delivered and staged at an Contractor facility located in Miami-Dade County.

Contractor will supply the BlueTOAD server with 100 licenses. The BlueTOAD Devices and Server will be tagged as an asset and entered into MMS for asset tracking.

Task 6 Installation

Description of Work

Prior to commencement of the installation work at each intersection, Contractor will have performed a thorough Preventive Maintenance service at that location to verify intersection operation and identify any deficiencies or issues as described in Task 11 Preventive Maintenance. Any deficiencies will be noted and addressed as described in Task 11 prior to installation of the new equipment.

Contractor will provide installation services for the items described below:

Controller Installation

This work shall include the installation of an estimated 300 Connected Vehicle Co-Processors (CVCP) into the new 2070LX chassis and the installation of an estimated 300 new traffic signal controllers in an existing or new controller cabinet. Database conversions, controller configuration, and burn-in are included in other tasks and it is assumed that the controller has been made ready and is approved for installation prior to beginning this work.

This work includes the following tasks:

- Remove the blank plate from the 2070LX chassis and install the CVCP.
- Power on the controller and validate communications to the CVCP through the console monitor port.
- Validate the results of the Bench Test performed in Task 7.
- Intersection will be placed into flash when traffic allows.
- Traffic signal controller wiring will be removed from unit that is to be replaced.
- Traffic signal controller that is to be replaced will be removed and returned to the County.
- New programmed and tested traffic signal controller will be placed into traffic signal controller cabinet.
- New traffic signal controller will be powered on.
- Intersection will be taken out of flash when traffic allows.
- Intersection and traffic signal controller will be observed to ensure proper operation.

This work shall include the installation of an estimated 300 Connected Vehicle Co-Processors (CVCP) into the new 2070LX chassis. This work includes the following tasks:

• Remove the blank plate from the 2070LX chassis and install the CVCP.
• Power on the controller and validate communications to the CVCP through the console monitor port.

Cabinet Installation (optional)
This work shall include the installation of an estimated 300 new traffic signal controller cabinets on existing foundations, poles or pedestals for cabinets provided by Contractor for this project. It is assumed that existing foundation bolt patterns will match the new cabinets. This work includes the following tasks:

• Upon receipt of the cabinet in our local facility, Contractor will inspect the cabinet to ensure it is in compliance with the agreed upon specification (See Task 2) and all required equipment is installed.
• The cabinet test results from the factory will be verified and documented prior to installation.
• Perform bench testing of the controllers and the converted databases in the cabinets as necessary to validate proper and safe on-street operation.
• Traffic Control will be utilized to black out intersection and stop signs will be placed. Police officers, if required, will be provided by the County.
• Field connections for the conductors of signal cable, power cable, interconnect cable, and detector lead-in cable will be labeled and removed from the cabinet that is to be replaced.
• New cabinet will be mounted by attaching to pedestal or pole or by installing on a concrete foundation. Foundation mounted cabinets will be arranged so that control equipment, terminal blocks, or shelves are no closer than 6 inches (150 mm) to the top of the foundation. Pole or pedestal mounted controller cabinets will be installed at a height that allows convenient access to all controller components by service personnel.
• Field connections for the conductors of signal cable, power cable, interconnect cable, and detector lead-in cable will be made in the new traffic signal controller cabinet. All field wiring will be neatly routed to the appropriate terminal blocks.
• Field wiring, except for power, entering the cabinet will be fit with spade terminals to ensure a good connection.
• Incoming power wiring will be fitted with either spade terminals or the bare conductor wire will be connected to terminal points utilizing screw or spring applied clamping surfaces that provide a positive grip.
• After completing field wiring, the conduit entering the cabinet will be sealed in an approved manner with a removable sealing compound (no foam sealants), or a molded plastic or rubber device that is compatible with the cable jacket, the insulation, and the conduit material.
• For foundation mounted cabinets, the joint between the controller cabinet and the foundation will be sealed with a quality, clear silicon caulk.
• New traffic signal controller will be placed into cabinet and cabinet will be powered up. All signals and indications will be flashed out and tested for proper operation.
• Traffic control will be removed
• Intersection will be observed to ensure proper operation.
• Traffic signal cabinets that have been removed will be returned to the County.

Detection Installation

This work shall include the installation of an estimated 675 Autoscope Encore video detection cameras and associated supporting equipment on or within existing traffic signal infrastructure

or approved existing street furniture as will be shown on the plans developed in Task 9. This work includes the following tasks:

• It is assumed that existing conduit paths, if required, will be used and no new conduit installed. Existing conduit paths will be investigated to determine proper route from traffic signal cabinet to the new camera location. Please note: if conduits are plugged, full or damaged additional work may be required.
• Video detection cable will be installed from the traffic signal cabinet to the camera mounting location. Cables will be installed utilizing lubricant to prevent damage to existing wiring.
• Cameras will be mounted at the locations determined on the plans developed in Task 9. Any holes drilled for camera mounts or for wire access will be sealed utilizing approved sealant.
• If traffic control is required to mount the video detection cameras it will be done according to the latest MUTCD standards utilizing cones, warning signs and arrow boards.
• Video detection camera wire will be connected to the video detection cameras utilizing manufacturer approved connectors.
• Video detection cabinet equipment will be installed in an approved location within the cabinet. Wire will be routed neatly through the cabinet and terminated on the video detection panel.
• Video detection cameras system will be aimed and detection zones developed according to approved plans.
• Video Detection system operation will be observed to ensure proper operation.

Blue Toad Installation

This work will include the installation of an estimate 30 new BlueTOAD devices and a server on existing traffic signal infrastructure or approved existing street furniture as will be shown on the plans developed in Task 9, Engineering Design. This work includes the following tasks for the BlueTOAD device to be installed in the field:

• Prior to beginning any work at an intersection, Contractor will first verify proper operation of the intersection as appropriate.
• The BlueTOAD device cabinet will be installed at the location determined on the plans developed in Task 9, Engineering Design.
• It is assumed that existing conduit paths, if required, will be used and no new conduit installed. Conduit paths will be investigated to determine proper route from traffic signal cabinet to the BlueTOAD location. If conduits, or risers are plugged, full, damaged, or non-existent, additional work may be required and will be measured and paid separately.
• If traffic control is required to mount the NEMA cabinet it will be done according to Miami-Dade and/or FDOT standards as required by the County.
• The Bluetooth antenna will be mounted and secured utilizing an N-type nut on inside of enclosure.
• Outdoor rated Cat 5 wire will be installed from the BlueTOAD cabinet to the traffic signal controller cabinet. Cat 5 wire will be routed neatly in cabinet and terminated.
• The BlueTOAD device will be turned on and tested for proper local operation.

The following tasks will be performed for installation of the BlueTOAD server.

• Contractor will coordinate with ITD to secure rack space to install the server and assign appropriate IP addresses.
• The servers will be installed in the rack and all network connections made.
• The server will be tested for proper OS operation and network connectivity.

• Contractor will work with TrafficCast to integrate all BlueTOAD field devices and ensure they are available to the server.
• Contractor will test to ensure the BlueTOAD data is available to the designated workstations. The workstations are assumed to be existing workstations at the TMC or other existing workstations with connectivity to the BlueTOAD server.

Task 7 Centracs

Description of Work

The Centracs system that was deployed for the Small-Scale Evaluation Program along 36th /41st is licensed as follows:

• Centracs licensed for up to 15 intersections
• Centracs Local Edition
• Enhanced MOEs
• BlueTOAD interface
• Adaptive module for 14 intersections

Contractor will expand the Centracs installation completed during the Small-Scale Evaluation Project by adding the following enhancements:

• Centracs licenses for up to 500 intersections.
• Centracs MMS (Maintenance Management Module) license for up to 500 locations
• Synchro Interface Module
• Advanced CCTV module integrated with the County's existing Security Center license
• Security Center SDK licenses to allow up to 25 simultaneous Centracs users to monitor and control CCTV cameras
• Adaptive license keys for up to 300 additional intersections

The above enhancements will apply to all intersections under Centracs control.

In order to effectively build off the existing Centracs system deployed for the Small-Scale Evaluation Program toward the enhanced Centracs Implementation for the approximately 300 additional intersections on the remaining eleven congestion management corridors, Contractor will provide documentation, additional servers, configuration services, and enhancements to meet Miami-Dade unique operational requirements. Each of these areas is elaborated upon in the following sections. Contractor will also provide additional training as part of Task 12.

Documentation

The following project documentation shall be drafted within 60 days after notice to proceed to guide the expansion program. The draft will be submitted for review and comment and finalized. The documents will include:

Migration Plan

Contractor will prepare a Migration Plan in close coordination with County staff to describe the tasks, steps, milestones, responsibilities, and resources necessary for the installation of the system software, the upgrade of the system controllers to ASC/3 firmware, network deployment, CCTV system considerations, and migration of the new intersections onto the existing database

developed for the Small-Scale Evaluation Program. The plan will also document functionality that may not be available during transition and will be structured so as to minimize and disruption in the street when the controllers are cut-over to Centracs.

Additionally, the migration plan will identify specific issues to facilitate the County's future expansion objectives as well as future technological issues including connected vehicle, trajectory based detection, optimized traffic flow, controller interface hardware, traffic application enhancements, etc.
The purpose of the migration plan is to balance the decisions that must be made to provide immediate mobility enhancements through the expansion project with developmental activities and research being conducted by Econolite, the Federal Highway Administration, SmartCity initiatives, and universities across the country that will fundamentally change the manner in which transportation services are delivered to the public in the near future.

Training Plan

Contractor will prepare a Training Plan for the *Centracs* system, ASC/3 controller software, and the network. As staff have already received significant training, the plan will focus on identifying specific knowledge gaps and tailoring the training objectives to fill these areas as well as targeted training on the new modules that will be added in the expansion. The plan will include a syllabus to guide the topics addressed as well as identify logistical issues such as the appropriate timing for the training, location, number of attendees, IT needs, etc. Formal training will be performed under Task 12.

Test Plan

Contractor will develop a Test Plan that will build off the testing that has already occurred as part of the Small-Scale Evaluation Project. As such, the plan will focus on ensuring the additional intersections are integrated and configured to meet the County's operational requirements as well as targeted testing on the new modules that will be added in the expansion. The plan will include detailed procedures and address logistical issues such as the appropriate timing for the testing, location, number of attendees, IT needs, etc. Formal testing will be performed under Task 13.

User Manual

Centracs software provides for "context sensitive" help to assist users while working within the system. The context sensitive help links users to the appropriate page within the user manual. Additionally, Contractor will provide one electronic copy of the user manual on a client portal site that can be used as a desktop reference.

Additional Servers

Currently, Contractor has installed a HP DL360 Server server in the TMC. This server hosts the Centracs Core, Communications, and SQL. To enhance performance and facilitate the expansion by an estimated 300 intersections, Contractor will procure up to two (2) additional servers similar to the server already installed or current equivalent model. The servers will be configured as follows:

- Existing HP DL360 Server – Centracs Core
- New HP DL380 Server GEN9 – Centracs Device Communications

• New HP DL380 Server GEN 9– Microsoft SQL

Contractor will coordinate with County to secure rack space to install the servers and assign appropriate IP addresses. Upon delivery, Contractor will "rack-and-stack" the servers, reconfigure all software including the operating system, SQL, Centracs Core, and Centracs clients on all machines.

The installation process will include the setup of the servers, verification and configuration of the operating system environment and installation and configuration of the SQL Server database and other third party COTS software required to establish the operating environment. Contractor will also procure up to 25 SDK connections from Genetech to allow Centracs users to view and control video provided by Security Center. It is assumed that Security Center is currently hosted on other existing servers to be provided by the County.

Once the operating environment is established, our engineers will install the appropriate components of the *Centracs* software application on the core and communications servers. We would expect that the existing Centracs installation will only be down for a total of a few hours and the work will be completed after the TMC normal operating hours.

All work on or with the servers will be closely coordinated with the County or other responsible parties to complete installation.

Configuration Services

Once the new servers are installed and the existing operations re-hosted, Contractor will initiate the configuration of an estimated 300 new intersections and build off the existing operational database. To facilitate this configuration, the County will provide the following information:

1. Geographic coordinates for each intersection, if available, including street names, and intersection number.
2. A list of all street names in Miami-Dade County if not already provided
3. Current phase diagrams and timing/coordination databases for each intersection.
4. The network design and IP addressing schema

Following receipt of the above information, Contractor will perform the following configuration tasks:

Intersection Graphics

Contractor will develop intersection graphics for the estimated 300 additional intersections based on the template agreed to during the Small-Scale Evaluation Phase. The input for the graphic development will be the phase diagrams provided by the County. It is assumed that the County GIS aerials or Aerials provided by Microsoft Bing will be made available by the County for the detailed intersection graphic views.

Database Conversion

The existing 170 controller databases, provided by the County, will be manually converted by Contractor from their current format to ASC/3. The end result will be an electronic copy of the database ready to load into each controller.

Bench Test

Contractor will install the converted databases on each controller and back it up to the data key. Each location will be bench tested to validate proper operation prior to installing the controller in the field.

Intersection Properties

The remaining intersections will be geo-located and intersection properties, including intersection name, main street, cross street, IP address, will be configured by Contractor.

Enhancements

Over the course of deploying the Small-Scale Evaluation Project, operational staff and others have identified a few unique features that if they were made available in Centracs would ease the transition from the old legacy system to the new Centracs system.

As some of these new features add additional value to Centracs and our other current and future customers, beyond just the Miami-Dade deployment, Contractor has developed our pricing for these new features, taking into consideration appropriate cost-sharing measures, so that the entirety of the development costs are not solely borne by Miami-Dade County. These enhancements will become part of the standard Centracs offering so that the County can continue to enjoy upgrades to the standard Centracs software through the SMA.

The new features, and intended operational concept are briefly defined in the following sections:

Legacy Reports

The engineering and operations team at the TMC relies on certain reporting features available within the legacy system. This task will define up to five such reports and, to the greatest extent possible, replicate and enhance the reports so as ease the operational transition between the old legacy system to Centracs. Additionally, Contractor will develop an extension to allow the County to develop their own reports as their operational needs change over time.

Synchro Support

Centracs currently supports an older version of Synchro. This feature will bring Centracs up to date with the current released version, or as close as is reasonably possible.

Work Flows

The Engineers in the Miami-Dade TMC are assigned areas to ensure timings are optimized. They have privileges to make any adjustments to the timings they deem to be appropriate and they can do this without supervisory approval.

However, in some cases, such as where an external developer or a new signal is installed, and/or revised and new timings are submitted, these changes must first be approved by a supervisor before they can be downloaded to the controller.

This feature will add functionality to Centracs so that the above operational procedures are replicated. Additionally, the timing changes requiring supervisory approval will be formatted into a meaningful report and sent via email to the supervisor. Once the timings are reviewed, the supervisor can suggest modifications or approve the timings. Then, only after the timings are approved, can the engineer download the timings to the field.

Scratch Pad

The County and/or its transportation partners hires outside consultants to develop and update traffic signal timing plans. This feature will allow approved outside parties to have access to Centracs. The outside parties would work within a "scratch pad" area of Centracs where they could develop, review, and test new traffic signal timing plans and save those timings to the Centracs database.

The Centracs databases would be formatted to run through a model (such as VISSIM or TRANSYT 14) to help determine whether they have made a net positive impact. Centracs, the tool used to develop the timings, and the selected model, would all be tightly integrated such that the controller databases can easily be passed from one system to another. Adjustments and tweaks to optimize the timings in the tool set would be fed back to the timing database(s) for easy incorporation into Centracs. Licenses for third party tools, such as VISSIM, TRANSYT 14, Synchro or others will be provided by the County.

The outside party would not be able to download the timings to the field, but, similar to the Work Flow Approval above, the timings would be submitted to the County for review and approval. Once approved, the timings could be downloaded.

Time-Space Diagram

The time space diagram will be modified to include additional elements including, but not limited to:

- A graphical representation of all timing phases
- Advising the user upon closing the window, the choice of to save, or not to save the changes
- Additional information such as pattern in use, cycle length of pattern, "green band" value, etc.

Video Management System Integration

Centracs is currently tightly integrated with an earlier version of the Video Management System currently used by the County, Security Center from Genetech. This work will update the Centracs integration to match the County's version and allow Centracs users access to monitor and control the CCTV cameras from within Centracs.

Waze Integration

The County has an existing partnership with Waze. Currently, Waze sends the County incident locations. This work will provide the following features:

- **Incident Management:** Waze would provide Centracs access to incident information. Centracs will plot the "incidents" on the Centracs map. A new interface would be developed to allow the County Centracs user to verify, update an incident, or create an entirely new incident.

The verification, update, or new incident would be delivered back to Waze to enhance Waze as an information dissemination channel.
• **Data Share**: Contractor would provide arterial data to Waze. This data would include volume, occupancy and speed where detection is present. Moreover, Contractor can overlay the vehicle data on the arterial with actual phasing information. This overlay allows Contractor to determine significantly more meaningful information such as a corridors actual performance including arrivals on red versus green, split failures, flow rates, approach delay, etc... Additionally, we can easily compare current conditions to historical reference points allowing Waze to focus in on anomalies. We believe this additional level of information, when treated correctly, will dramatically improve the visibility Waze will have into the arterials performance and increase quality. In particular, when coupled with the incident management integration above, the data will lend additional insight into the confidence level of traffic reports on the arterial.
• **Centracs Alerts:** Centracs can be configured to alert on hundreds of different events that can occur in a traffic signal. Most commonly, Centracs can refer to a signal in police flash, versus a conflict flash as an example. Contractor would provide alert data to Waze. Waze would use the information to enhance their data set and broadcast quality.

Contractor reserves the right to either partner directly with Waze on this initiative or potentially join the existing partnership between Waze and the County and define issues such as data storage, delivery, etc. so that all parties have an opportunity to benefit in this initiative commensurate with their contribution.

Controller Security

The County ITD security Team has identified areas of potential security threat at the device, controller, level. Here to date, the transportation standards committees have largely been silent on security in their specified protocols, relying on network security measures to prohibit bad actors from accessing a transportation system. Over the course of this project, Contractor will work to tighten security at the device level. Specific areas of consideration may include, but are not limited to, the following issues:

• Ability to turn controller network services (eg: ftp/http/https/telnet/ssh) on or off individually
• Support for SFTP
• Support for HTTPS
• Support separate login/passwords for each network service

Task 8 Route Based Priority

Description of Work

Typically, both transit and emergency vehicles receive preferential treatment by enabling localized (intersection-by-intersection) detection. This type of control has historically been accomplished by placing infrastructure in the vehicle (a transmitter) and at the intersection (a receiver) on each approach. Upon receipt of the detection notice, a traffic signal controller will either provide the vehicle priority, as is the case for transit vehicles, or preemption, as is the case for emergency vehicles. Miami-Dade County has not deployed any local intersection infrastructure (transmitters or receivers,), but have implemented a small scale and limited version of the center to-center technology discussed herein in the old legacy system.

The goal of both priority and preemption is to give preferential treatment for requesting vehicle on the appropriate intersection movement. However, the methods to accomplish that preference are quite different as described below.

• **Priority:** Signal priority typically implies that the controller delays, or extends, traffic signal phase transitions so that a vehicle arrives at the intersection in the green interval of the desired phase. The request for priority may or may not be granted based on the priority of the request and the current traffic situation at the intersection. The controller does not differentiate between a transit vehicle that is on schedule, behind schedule or ahead of schedule and relies on the driver to enable or disable the in-vehicle transmitter requesting the priority. A priority request will give preference to the requested movement, but with no guarantee of a green light. Finally, preference in signal priority is given with a goal to minimize the disruption to signal operation, particularly in coordination.
• **Preemption:** Signal preemption, as the name suggests, is a more brute force method of giving preference to the requestor. In this case, the current operation is "preempted" and phases can be shortened, extended, or even omitted (with the exception of pedestrian clearances) to provide a green interval on the requested movement. Even in the case of preemption, however, there are no guarantees as the request can be trumped by higher priority and/or conflicting preemption requests, or the vehicle may arrive before the controller can safely cycle to the requested movement. Finally, preemption is typically provided with little or no regard for signal operation, and is nearly always followed by a transition to return to coordination.

In both cases, the optimized traffic patterns and traffic flow are negatively impacted when either vehicle priority or preemption request is served, resulting in additional total vehicle delay and increased stops as well as fuel consumption. To mitigate these negative impacts as well as expand the total foot print to all traffic signals under Centracs control, this Task is structured to satisfy the following objectives:

1. Expand the preemption/priority coverage using centralized strategies without the addition of expensive local intersection hardware.

2. Minimize the impact of preemption and priority through the following strategies:

• Priority will be granted to only those transit vehicles that are running behind schedule as reported by the transit system minimizing the overall impact from the occurrences of unnecessary priority calls. Depending on the capability of the transit system, behind notifications could also be coupled with input from the passenger counters, etc.
• Vehicle priority will be granted for emergency vehicles and/or transit vehicles on a route basis through center-to-center communications, not intersection-by-intersection. The sooner the controller can be informed of a potential priority request; the more time is available to shorten or lengthen phases to serve the vehicle using priority versus preemption.
• Emergency vehicles will receive a preemption when priority cannot satisfy the request.

3. Stakeholders shall experience the following benefits:

• Traffic – Enhanced management or preemption calls
• Transit – Improved on time performance
• Emergency services – Enhanced response times

To accomplish these objectives, this Task is organized into three phases with the ability to modify successive phases based on the outcomes of the prior phase.

The first phase will identify the interfaces with the Miami-Dade County transit and emergency system providers and work directly with those entities in cooperation with County representatives.

The second phase will include any necessary software development and/or unit testing to build out interfaces with the Miami-Dade transit and emergency systems. This phase will enable the required interfaces.

The third phase will be the Implementation Phase and will consist of the deployment and test of the operation in real world conditions with the ultimate goal to rollout the technology to all intersections under Centracs control.

Task 9 Engineering Design

Description of Work

To support the overall goals and objectives of the project, Contractor will provide the following engineering design services:

• Prepare design documentation sufficient to allow for the efficient installation of the controllers, detection, connected vehicle, and BlueTOAD devices. The work will include development of base plans as possible, field surveys, and design drawings.
• Provide network support services to ensure the deployed technology and network function seamlessly.
• Perform an analysis of each corridor to assess the appropriate deployment of adaptive technology
• Perform detection survey for adaptive deployment
• Provide planning services to assess 'future-proof' opportunities that may guide the design services such that advances in near term technological enhancements in transportation are appropriately addressed.

Task 10 Operations Support

Description of Work

Contractor will place a full-time Traffic Systems Operations Engineer in the TMC for a one year period, commencing with the start of the project, to assist the County in transitioning the ATMS, controllers, detection and communications from the old legacy system to Centracs. The Operations Engineer will be assigned to the County to perform the following day-to-day duties:

• Provide formal and ad-hoc training for all project technologies
• Document potential issues and identify root cause
• Resolve issues and track to completion
• Customize and configure Centracs and other technologies to meet the County's operational objectives
• Provide local testing of new databases and validate operations in the field
• Perform testing and configuration services for all deployed technologies
• Provide timing expertise and optimize adaptive settings

The Operations Engineer will have a broad background in all of the technologies deployed in this project and be capable of immediately resolving most issues. He/She will work closely with the Contractor's quality assurance and testing teams as necessary and participate in the project as a technical expert.

This Task will be for a one-year term with an expected outcome that the knowledge and expertise of the Operations Engineer will be transferred to staff designated by the County. To measure the success of this knowledge transfer, the Operations Engineer will develop testing exercises. The designated County staff will be asked to take and pass these exercises to provide assurance to the County that their staff has been competently and effectively trained.

Task 11 Preventive Maintenance

Description of Work

Contractor will perform Preventive Maintenance for the estimated 300 traffic signal locations. The work shall include the following activities, but not limited to:

• **Display Equipment Inspection**
• Visually inspect signal and pedestrian displays and verify all indications are operational, note condition and alignment of all heads, note any deficiencies

• **Detector Verification**
• Verify proper operation of vehicle detectors, note any faults and reset
• Inspect condition of all loops and lead-ins; note sealant failures by street approach, lane and phase
• Verify proper operation of pedestrian pushbuttons on all approaches, note failures or other issues
• Check push button lamps, audio operation and direction, if applicable

• **Intersection Infrastructure Inspection**
• Check condition of pull-boxes; note size and number of any broken or missing lids, crushed boxes and buried boxes
• Perform ground-level visual inspection of metal poles for damage, rust, cracked welds, grounding & foundation damage
• Perform ground-level visual inspection of hand hole covers on steel poles; secure if necessary and note if missing
• Perform ground-level visual inspection of conduit risers; note any repairs needed

• **Cabinet Inspection**
• Inspect foundation and exterior for damage and vandalism
• Check door gaskets, anchor bolts, base extension bolts; reseal base if water is present
• Check for signal plans; verify signal heads are per plan; note any discrepancies
• Check/test interior cabinet lamps, fan and thermostat; replace any that are not working properly and note replacements
• Check physical condition of meter/service disconnect, line filter and surge arrestor
• Ensure all load switches and flashers have a tight and secure fit into the socket
• Check for and note any burned, pitted, corroded or discolored contacts and terminals
• Visually inspect condition of all relays and note if burned or full of ants; replace if necessary
• Ensure all terminal connections and harnesses have a tight and secure fit; check for frayed writing and note if any are found

• Visually check condition of all loading resistors

• **Cabinet Maintenance**
• Clean and vacuum cabinet; place insect, slug, and rodent control in cabinet, as needed
• Replace filter and, if needed, filter frame
• Lubricate hinges, lock, and lock cover on cabinet
• Remove graffiti, posters, stickers, etc., without damaging the surface of the cabinet

• **Power and Grounding Service**
• Measure and record service voltage
• Check ground resistance and bonding connections and conductors; record ground reading
• Note if control equipment is plugged into GFI

• **Controller Service**
• Verify date and time on isolated controllers, if any; note and correct any discrepancies
• Check operation of display and backlight on controller; note any issues

• **Conflict Monitor Service**
• Replace conflict monitor with a certified unit provided by the County and record conflict monitor identification in notes

Preventive Maintenance records will be provided to the County, noting all issues detected and the recommended disposition. The dispositions will be annotated as follows:

• Contractor repaired the recorded issue (examples may include minor repairs or other previously agreed upon issues that can be accomplished while the technician is onsite), or
• The defective or damaged equipment must be repaired or replaced. In this case, the County may choose to self-perform the work, hire the work out to other contractors, or contract directly with Contractor for the additional work. This work, as necessary, must be executed in a timely manner so as not to delay the project schedule.

Task 12 Training

Description of Work

As set forth in the Project Schedule, Contractor will prepare a training plan as part of Task 7, that outlines the content, sequence, and duration of each segment of each training session so that County staff are capable and prepared to use the *Centracs* system and all proposed technologies. The training will be performed in consideration of the training that has already occurred as part of the Small-Scale Evaluation Project and focus on advanced topics and/or areas that may require additional focus. Refresher training or training for new employees shall also be made available as required. After County approval of the plan, Contractor will schedule each of the training courses.

Sample Advanced Training content for Centracs is provided below as an example and for informational purposes. This content will be adjusted to best meet the County's needs.

• Introduction and Overview - This session will review the System Hardware, System Software, Centracs capabilities and features, and a brief tour of the Traffic Management System

Workspace. The discussion will also include: How to log-on to Windows for both remote connections and local workstations, launching the Client application, logging on to Centracs, accessing system graphics, and an explanation of the workspace components.
• Windows Security - This session will provide a general overview of the Windows security system as well as creating and removing user accounts. Each attendee will have the opportunity to add or remove a user account to/from the system.
• Windows Event Logs - This session will cover both the System and Application Event Logs within Windows. Specific items appearing within the logs will be discussed and their relationship to system performance will be reviewed.
• Database Backups - This session will review how the system backs-up the SQL Databases and the required operator actions.
• Software Installation Procedures - This session will review the procedures used to install the Centracs ATMS software on a target computer. Additionally, general setup requirements for each "type" of computer will be reviewed.
• The Centracs Server Suite - This session will review the function of each component comprising the server software suite, and will cover the Administration menu items associated with the Client application. Adding and deleting users to/from the *Centracs* system and assigning user privileges will also be reviewed.
• Centracs System Configuration and Troubleshooting - This session will review the system hardware and cabling. General functions of each piece of equipment will be covered and the potential impact of equipment faults will be discussed. The Local Area Network (LAN) and TCP/IP portion of the session will review the basic setup and configuration of the LAN. General network troubleshooting tools and procedures will be reviewed as well.

Task 13: Testing

Description of Work

Final Acceptance

Once all of the controllers are brought on-line, and training has been completed, the Final Acceptance Test will be conducted in accordance with the Test Plan. This initial phase of testing recognizes that testing was also completed for the Small-Scale Evaluation Project and will build from that test forward to include a step-by-step walk through of every procedure documented in the Test Plan and will focus on the operational status of the devices on the system.

This phase of testing ensures that the Standard *Centracs* Test Procedures and the specific additional functional and performance requirements of Miami-Dade County are observed and proven to successfully function. If during this phase, an item is marked as "failed" Contractor and County staff will agree to a course of action, which may delay the start of the 90-day Trial Period.

90-Day Trial Period

Upon successful completion of the Final Acceptance Test, the 90-day Trial Period will commence. During the Trial Period, various issues may arise. Typically, many of these are of a minor or trivial nature, while, although they will be addressed, do not constitute a system failure and do not warrant a restart of the Trial Period.

Therefore, Contractor proposes the following priority mechanism be utilized to organize and account for the types of issues that may be encountered during the Trial Period. The issues would be handled as follows:

Priority One

Priority One applies if the problem could:

- Prevent the accomplishment of an operational or mission essential function, OR
- Causes loss of data or data corruption, OR
- Jeopardize safety or security

Upon notification by the County to Contractor of a Priority One event, the Trial Period will pause. If not resolved within 24 hours after the problem is first reported to Contractor, the Trial Period restarts from zero days after resolution. Otherwise, the Trial Period continues without interruption.

Priority Two

Priority Two applies if the problem could:

- Adversely affect (but not prevent) the accomplishment of an operational or mission essential function, and no Workaround is available, OR
- Adversely affect technical or cost risks to the life cycle support of the System, and no workaround is available.
- Priority Two problems include aborts, but not loss of data or data corruption.

Upon notification by the County to Contractor of a Priority Two event, the Trial Period will pause. If not resolved within 72 hours after the problem is first reported to Contractor, the Trial Period will be suspended until resolution, after which the day count will resume. Otherwise, the Trial Period continues without interruption.

Priority Three

Priority Three applies if the problem could:

- Adversely affect (but not prevent) the accomplishment of an operational or mission essential function, but a Workaround is available, OR
- Adversely affect technical or cost risks to the life cycle support of the system, but a workaround is available.
- Priority Three problems do not include aborts or loss of data.

If not resolved by the end of the Trial Period, the Trial Period continues until resolution.

Priority Four

Priority Four applies if the problem could:

- Any problem related to the System which does not fall within Priority One, Two or Three

Priority Four issues should be resolved within the next two new releases and will not prevent the successful completion of the Trial Period.

Upon successful completion of the Trial Period, the County will grant "System Acceptance" and the warranty period will begin