

TECHNICAL SPECIAL PROVISION

FOR

ITS Automatic Vehicle Identification System  
(AVI):

Financial Project ID:  
435443-2-52-01

ORANGE COUNTY & SEMINOLE COUNTY

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## **T660 ITS Automatic Vehicle Identification System (AVI)**

**T660-1 Description:** Provide a Bluetooth AVI device that is powered by solar or cabinet power supply. The device will communicate via a cellular or ethernet connection with the Florida Department of Transportation (FDOT) servers.

**T660-1.2 Materials:** The device will be Class 1 rated and will operate on either a 120-240 VAC connection using a 12 VDC adapter, a 12 VDC battery, or a Power Over Ethernet connection.

**T660-1.3 Construction Requirements:** The location and type (solar or cabinet power supply) of AVI device will be installed as shown in the contract documents.

**T660-1.4 Operation, Configuration, and Management:** The device network setting will be user configurable. The device will support onboard GPS. The system will collect and report data continuously, 24 hours a day and 7 days a week. The device will collect and archive all detections with a minimum travel time of 30 seconds and a maximum travel time of 1 hour. The system will record multiple hits as a Bluetooth device travels through the area of detection, not a single data entry per Bluetooth device unit. The device will record Received Signal Strength Indicator (RSSI) with each detection as reported by Bluetooth module firmware. The data will upload to the server automatically at least every 60 seconds, and the system will have provisions for not losing data if upload fails. The device will maintain a local cache of data with provisions for a minimum of two weeks worth of data stored in non-volatile, user-replaceable storage. The device will automatically set time each day and have a battery backed real-time clock source. The real-time clock source will have at least 33 KHz main oscillator with +/- 10 ppm worst case accuracy, or 1 second per day without any network time sync. The device will scan all 32 frequency channels as defined by the universal General Inquiry Access Code and divide each into two trains of 16 channels each. The device will take no longer than 3 seconds to sequentially inquire the first and second group of sixteen channels. The device will provide filtering capabilities to reduce the number of MAC addresses recorded for segments, where to the second precision is not needed in order to reduce the data capture space required on both the flash memory and server. The device will degrade all MAC data to eliminate the ability to confidently trace stored data to private devices while maintaining dataset quality.

**T660-1.4.1 Device Detection Range:** The device will detect at a minimum the area depicted in the plans. The device will support replaceable external N-type or RP-SMA omni-directional antennas for Bluetooth signal. The device will be configured as a class 1 Bluetooth device via a web based interface. The device will have a 20 dBm signal strength and 984 foot range.

**T660-1.5 Communications:** The device will use TCP/IP and or UDP/IP communications over 10/100-BaseTX Ethernet network, or GSM network with a data plan. The unit will use Bluetooth Class 1 rated devices.

**T660-1.6 Enclosure and Mounting:** The device will provide 304 stainless steel mounting brackets for the solar panel and pole mount, and an anodized aluminum frame for the solar panel. The fasteners for the solar panel bracket, pole mount bracket, and the solar panel frame will be 304 stainless steel. The device will include pole and solar panel mounting brackets. The solar panel bracket will be attached using 304 stainless steel rivets. The pole mount bracket will be attached using 304 stainless steel bolts. The device will be contained within a NEMA 4X rated enclosure.

**T660-1.7 Solar Panel:** The device will utilize a solar panel as a power source when installed in a wireless configuration unless shown otherwise within the contract documents. The solar panel will be a 10W mono crystalline solar module with a nominal cell operating temperature of 45°C. The solar panel will have an open voltage of 22V, a short current of 0.61A, and a power tolerance of  $\pm 3\%$ . The solar panel will have a maximum power point (MPP) voltage of 17.5V, and a MPP current of 0.57A. The solar panel will have a conversion efficiency of 17.3% and a maximum system voltage of 1000V. The solar panel will be no smaller than 13.75 inches in length, 11 inches in width, and 0.67 inches in depth. The solar panel will weigh no more than 3.78 pounds. The solar panel will withstand a wind bearing of 196.85 feet/second. The solar panel will resist a hail impact of 0.5 pounds from 3.28 feet above the panel.

**T660-2 Software Interface:** The device drivers will communicate with vendor specific protocols in order to relay information from the devices into the SunGuide system. The system will have a probe based protocol that will allow the SunGuide system to efficiently process vendor specific data and diagnose issues with the field device.

**T660-2.1 TCP/IP Interface:** The device will allow SunGuide to establish a TCP/IP connection to the device, in order to allow the system to easily identify connectivity issues with the device and the source of any data from a field device. The device will allow SunGuide to remove the source device identification field from the data provided by the field device.

**T660-2.2 Data Format:** The data will be provided in an XML format. If there are bandwidth restrictions, a simple byte based protocol may be used instead. All messages that the device sends or receives will be fully documented and provided to FDOT. Each message, will be clearly delimited from another message, and any delimiters will be documented.

**T660-2.3 Data Message:** Data messages will be sent immediately upon the MAC address being received by the field Bluetooth device. The MAC address will be unique to the vehicle device and will be easily matched to the same vehicle device

passing a different Bluetooth device. The MAC address data will be one way hashed so that the original data cannot be used to identify an individual person. The one way hash will be consistent across all devices such that the same MAC address is reported in the same manner across all devices. The timestamp will include the time zone information and be formatted in the same way across all field devices. Any additional information provided by the data message will be well documented and include a definition of what data is being reported including the units of measurement or other necessary information needed by the data processing application to interpret and make decisions based on the data.

**T660-2.4 Heartbeat Message:** The device will send a heartbeat message which consists of device status and any problems the device might be experiencing. This message will be sent by the field device on a regular interval regardless of additional data messages being sent.

**T660-2.5 Time Synchronization of Devices:** The device will have a timestamp consistent with other devices and the software interpreting the data. The device will either support a request to set the time on the device or support a process that syncs to a configured NTP server.

**T660-3 Field Unit Verification:** Contractor will contact manufacturer after installation and have manufacturer's support verify the connection to the server has been established by verifying LED indicators. The contractor will verify:

- The Red LED flashes when attempting to connect to server and turns solid once connection is established.
- The Green LED flashes when a Bluetooth MAC address is detected and displays a pulsing pattern when the MAC capture process is running.
- The "Charging Status" LED on the SunSaver and confirm that this LED is green, indicating the solar panel is charging the battery for the solar panel devices.

**T660-4 Method of Measurement:** The quantity to be paid for will be the Contract unit price for each component of an AVI detection system, furnished and installed, and will include furnishing, placement, testing of all materials and equipment, and for all tools, labor, equipment, hardware, operational software packages and firmware, supplies, support, personnel training, shop drawings, warranty documentation, and incidentals necessary to complete the work.

**T660-5 Warranty:** The AVI will include a limited lifetime warranty for all component parts, and a minimum of three years technical support. The Contractor will not purchase the equipment prior to the issuance of Notice to Proceed. The Contractor will assign to the Department the above manufacturer's or other seller's warranties that come with those products, material or supplies. Assignment of such warranties will be effective on the date of Final Acceptance. To the extent that any of such warranties do not extend to subsequent purchasers or owners or such warranties contain a limitation on assignment, the Contractor agrees that the Contractor purchased the products, materials, and supplies, on behalf of the Department with the intent that the Department be the original end user of the product and intended recipient of any warranties. All documents associated with or describing any such warranties will be delivered to the Department along with

the other project final acceptance documents and will be deemed to be a part of the required final acceptance documentation. Contractor will not take any action or fail to act in any way which voids any such warranties. All subcontracts, if any, will contain a similar provision which requires subcontractors to assign any such warranties to the Department.

**T660-6 Basis of Payment:** Price and payment will be full compensation for all work specified in this Technical Special Provision.

Payment will be made under:

Item No. 660-6-122 Vehicle Detection System – AVI, Bluetooth, F&I, Above  
Ground Equipment