

**FLORIDA DEPARTMENT OF TRANSPORTATION
District 7**

July 11, 2013

ADDENDUM NUMBER 3

TO: All Bid Package Holders

**PROJECT NAME: SR93A (I-75) from Manatee/Hillsborough County Line to
Progress/Bloomingdale**

FINANCIAL PROJECT NUMBER: 410909-6-5201

RICT CONTRACT NO.: E7J03

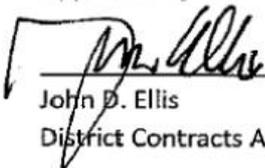
COUNTIES: HILLSBOROUGH

BIDS TO BE RECEIVED: July 18, 2013 @ 2:30 PM

1. The Letting Date has been postponed from 2:30 p.m. on July 16, 2013 until Thursday, July 18, 2013 at 2:30 pm.
2. Correction of Addendum #2 by adding the attachment of Technical Special Provisions for ITS Wireless Communication Device (T-784). See attached Information
3. Revised Bidding Documents may be found on the SPP Website. Amendment files may be found on with the CPP Website or the D7 Website.

**FAILURE TO ACKNOWLEDGE RECEIPT AND ACCEPTANCE OF THIS ADDENDUM WILL
RESULT IN DECLARING YOUR BID AS NON-RESPONSIVE.**

Approved by



John D. Ellis
District Contracts Administrator

TECHNICAL SPECIAL PROVISIONS

FOR

ITS WIRELESS COMMUNICATION DEVICE

FINANCIAL PROJECT ID(s) 410909-6-52-01

The official record of this package is the electronic file signed and sealed under Rule 61G 15-23.003, F.A.C.

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Date: 07-03-2013
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ITS WIRELESS COMMUNICATION DEVICE

T 784-7.1 Description.

Furnish and install six wireless communications radios (Wireless Radios), in the Federal Communications Commission (FCC) licensed frequency band of 4.9 Gigahertz (GHz), for this intelligent transportation systems (ITS) project.

The Wireless Radios shall be configured for point-to-point operations, and capable of point-to-multipoint operations.

Ensure that the radios provide point-to-point connectivity at data transmission rates up to 54 Megabits per second (Mbps) between the remote ITS device installation locations and the Statewide Telecommunications Network microwave tower locations. Use only equipment and components that meet the requirements of these minimum specifications.

The Wireless Radio network architecture is shown in the Plans.

T 784-7.2 Materials.

T 784-7.2.1 General: Ensure that the ITS network administrator will be able to manage each Wireless Radio individually for configuration, performance monitoring, and troubleshooting. Ensure that the radios include capabilities providing dynamic frequency selection, routing, virtual local area networks (VLANs), and simple network management protocol (SNMP).

Ensure that the furnished Wireless Radios are fully compatible with the ITS Ethernet network interface.

Furnish Wireless Radios that are capable of providing 99.999% error-free operation. Wireless Equipment shall include furnish and install weatherhead, mounting assembly, antenna, radio, wireless Ethernet power adapter, power over Ethernet cables, antenna radome covers, and any other incidentals for successful installation of wireless equipment. SPD's shall be installed at the wireless radio and inside the cabinet/microwave shelter (as applicable).

T 784-7.2.2 Network Standards: Ensure that the Wireless Radios comply with all applicable IEEE networking standards, including but not limited to:

1. IEEE 802.1D standard for Media Access Control (MAC) Bridges; used with the Spanning Tree Protocol (STP).
2. IEEE 802.1Q standard for port-based virtual local area networks (VLANs).
3. IEEE 802.1P standard for Quality of Service (QoS).
4. IEEE 802.1w standard for MAC Bridges; used with Rapid Spanning Tree Protocol (RSTP).
5. IEEE 802.11a standard for Wireless Local Area Networks (LANs) MAC and Physical Layer (PHY) specifications: Amendment 1, High-speed Physical Layer in the 5 GHz Band.

T 784-7.2.3 Modulation: Provide Wireless Radios that use Orthogonal Frequency Division Multiplexing (OFDM) with QPSK, QAM16, and QAM64, at a minimum, to enhance performance in Near Line of Sight (NLOS) situations.

T 784-7.2.4 Interfaces: Provide Wireless Radios that include a minimum of one weatherproof 10/100 Base-T Ethernet (RJ45) copper port.

T 784-7.2.5 Management Capability: Ensure that the Wireless Radios support management features including, but not limited to:

1. An STP healing rate that meets or exceeds specifications published in the IEEE 802.1D standard.
2. An RSTP healing rate that meets or exceeds specifications published in the IEEE 802.1w standard.

3. A Wireless Radio that supports VLANs and VLAN tagging that meets or exceeds specifications published in the IEEE 802.1Q standard.
4. Support of local and remote setup and management via Telnet or secure Web-based and Graphical User Interface (GUI) and command line interfaces.
5. Support of the Simple Network Management Protocol (SNMP), and capable of sending SNMP traps. Verify that the Wireless Radio can be accessed using a resident EIA-232 (RS-232) management port, a telecommunication network, or the Trivial File Transfer Protocol (TFTP).
6. A Wireless Radio that is equipped with security measures including MAC authentication and 128 bit WEP encryption, at a minimum.
7. Support of the TFTP, the Network Time Protocol (NTP), or the Simple Network Time Protocol (SNTP).
8. Capable of Firmware updates via HTTP or TFTP.
9. Equipped with tools for performing link tests and showing signal strength, and Signal-to-Noise Ratio (SNR) measurements, at a minimum.

T 784-7.2.6 Mechanical Specifications: Provide Wireless Radios that are integrated units. Separate outdoor units (ODUs) and indoor units (IDUs) are not acceptable for design criteria purposes.

Ensure that all wiring complies with NEC requirements and standards. Furnish and identify all equipment and appurtenances by name, model number, serial number, technical support and warranty telephone numbers, and any other pertinent information required to facilitate equipment maintenance.

Ensure that every conductive contact surface or pin is made of noncorrosive, non-rusting, conductive metal.

Ensure that all external screws, nuts, and locking washers are stainless steel.

All parts shall be made of corrosion-resistant materials, such as stainless steel, aluminum, brass, or gold-plated metal.

All antenna radomes/covers shall be UV rated/stabilized plastic or other weatherproof non-conducting materials for Radio Frequency (RF) performance reasons.

T 784-7.2.7 Electrical Specifications: Provide Wireless Radios that have input power supplied by Power over Ethernet (PoE). The PoE supply (injector) must have an input voltage of 110-120 V_{AC}. Ensure that the maximum power consumption does not exceed 20 watts.

Ensure that the transmitter power is adjustable up to 28dBm, and that the bandwidth is selectable in 5, 10, 20, and 40 MHz channels.

Ensure that the receiver sensitivity (receive signal performance) meets or exceeds -74 dBm at 54 Mbps, -91 dBm at 12 Mbps, and -94 dBm at 6 Mbps.

Ensure that the Wireless Radio antennas are integrated with the radios, and configured in the horizontal polarization for point-to-point communications, but capable of vertical polarization if point-to-multipoint operation is desired. The RF gain of the integrated directional antenna shall meet or exceed 19dBi.

T 784-7.2.8 Environmental Specifications: Ensure that the Wireless Radios perform all required functions during and after being subjected to an ambient operating temperature range of -20 degrees (°) to 140° Fahrenheit (F), with a non condensing relative humidity up to at least 95%. Any necessary voltage converters shall function during and after being subjected to an ambient operating temperature range of 15 degrees (°) to 140° Fahrenheit (F), with a non condensing relative humidity up to at least 95%.

Ensure that the Wireless Radio is protected from rain, dust, corrosive elements, and typical conditions found in a roadside environment.

T 784-7.3 Pre-installation and Installation Requirements.

Contractor shall submit Wireless Path and Spectrum Analysis Calculations for all new wireless installations. The calculations shall be submitted to the Engineer.

Mount the Wireless Radios on the steel poles and microwave communications towers as shown in the plans. Ensure that the radios are mounted securely to the structures and fully accessible by field technicians and/or their equipment.

Due to the nature of the equipment and harsh environmental conditions of installation locations, any required voltage converter equipment shall be mounted inside a field site cabinet or microwave communications shelter. The Wireless Radios shall be field serviceable when defective or damaged units must be removed or replaced. The Department shall return units damaged while in service after final acceptance to the manufacturer for warranty repair or replacement.

T 784-7.4 Testing.

T 784-7.4.1 General: Subject the Wireless Radios to field acceptance tests (FATs). Develop and submit a test plan for FATs to the Engineer for consideration and approval. The Engineer reserves the right to witness all FATs.

T 784-7.4.2 Field Testing: Once the Wireless Radios have been installed, conduct local FATs at the field sites according to the submitted and approved test plan. Perform the following:

1. Verify that physical construction has been completed as detailed in the plans.
2. Inspect the quality and tightness of ground and surge protector connections.
3. Verify voltage for all power supplies and related power circuits.
4. Connect devices to the power sources.
5. Verify all connections, including correct installation of communication and power cables.
6. Verify configuration of the Wireless Radio Internet Protocol (IP) addresses, subnet mask, and default gateways.
7. Verify the network connection to the Wireless Radios through ping and telnet sessions from a remote personal computer (PC).
8. Verify the Transmitter RF power and Receive Signal Level (RSL) of the Wireless Radios.

T 784-7.5 Method of Measurement.

T 784-7.5.1 General: The Wireless Radios shall be measured for payment in accordance with the following task.

T 784-7.5.2 Furnish and Install: The Contract lump sum price for each Wireless Radio, furnished and installed, will include furnishing, placement, and testing of all equipment and materials, and for all tools, labor, hardware, operational software package(s) and firmware(s), supplies, support, personnel training, shop drawings, documentation, and incidentals necessary to complete the work.

T 784-7.6 Basis of Payment.

Price and payment will be for full compensation for all work specified in this section, and as shown in the plans.

Payment will be made under:
Lump Sum Bid Price