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**PORTSMOUTH-KITTERY
16189B**

November 17, 2020

SPECIAL PROVISION**SECTION 677 – INTELLIGENT TRANSPORTATION SYSTEMS (ITS) EQUIPMENT****Item 677.31__ – Wireless Communications Equipment****Description**

1.1 This work shall consist of furnishing, installing, relocating, and testing Radio Units (RU) and associated Wireless Communication Equipment at the locations as indicated and in conformity with the lines, grades, dimensions and details shown on the Plans, all in accordance with these Specifications. The work shall also include furnishing, installing, and testing all ancillary items needed to establish a complete, functional wireless communication system including, but not limited to, cabling, mounts, power supplies, power injectors, transient suppression devices as recommended by the manufacturer, antennas, etc.

Materials**2.1 Wireless Communication System.**

2.1.1 The Contractor shall design, construct, and test wireless communications systems (WCS) utilizing RU's that transport data to and from each ITS equipment cabinet to its associated communications network, as described below.

2.1.2 The Maine WCS shall communicate with and be fully integrated into the Maine Turnpike Authority's (MTA) existing communications backhaul system, which includes a digital subscriber line (DSL) drop at the intersection of Route 236 and the on-ramp to I-95/Maine Turnpike southbound, that carries ITS data to the MTA Traffic Management and Communications Center (TMCC) in Portland, ME. MTA intends to upgrade the DSL connection concurrently with this project. The Contractor may contact MTA to determine if any upgrades or equipment replacements will be required to integrate the new ITS equipment into the existing WCS. Any upgrades or equipment replacements necessary to incorporate the new ITS equipment into the existing WCS shall be the responsibility of the Contractor.

2.1.3 The New Hampshire WCS shall upgrade the existing communications system from several existing ITS devices to the existing communications backhaul system that carries ITS data to the NHDOT Transportation Management Center (TMC) in Concord, NH. The

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upgraded WCS shall include the locations identified in the 30% Concept Plans and shall be based on the Contractor's approved Communications Network Plan.

2.1.4 Portions of the Contractor's WCS design that incorporate the use of; Privately owned facilities, State of New Hampshire Agency facilities, State of Maine Agency facilities or other government agencies shall be subject to those agencies' approvals.

2.1.5 All Drawings, manufacturer's specifications, and applicable catalog cuts for all new materials and components for this work shall be submitted in accordance with Section 105.02. The WCS design, associated documents, and catalog cuts for the RUs shall be submitted to the Owners for review and approval prior to any construction activities and/or licensing activities.

2.1.6 The WCS shall be able to return communication system operational status to the TMC.

2.1.7 The WCS shall return communication subsystem and component fault data to the head end subsystem.

2.1.8 The WCS shall be managed and controlled from the New England Compass ATMS located at the Owners' TMC/TMCC.

2.1.9 The Contractor shall identify the locations of all wireless nodes within the WCS. The NHDOT will apply for all required FCC authorizations and licenses on behalf of the Owners. All FCC authorizations shall list the Local Authority/Owner as the owner/operator.

2.1.10 The Contractor shall provide to NHDOT all technical and administrative information parameters required for each FCC/FAA registration and license application.

2.1.11 The WCS communication links shall achieve a minimum "up time" of 99.99%, averaged over a one year period or no more than fifty-three (53) minutes of down-time annually.

2.2 Radio Units.

2.2.1 ITS device RU shall be of the "integrated" type with radio electronics and antennas integrated in a single weatherproof antenna panel enclosure and have the ability to attach an external 2-foot parabolic antenna as required by the communication design requirements.

2.2.2 Parabolic antennae shall be covered with a radome.

2.2.3 The backhaul RU should be a high speed data communication unit operating at FCC Part 101, 18 GHz frequency; however, the RU shall be 100% compatible with the Owners' existing backhaul communications system.

2.2.4 The RU shall be capable of an operating distance of no less than five (5) miles.

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2.2.5 The backhaul RU shall operate at a data transfer rate, measured in megabits per second, of 175 Mbps or greater, or as shown in the Contract Documents, whichever is greater.

2.2.6 The RU shall have an OEM option for over the air encryption that the Contractor shall configure and use.

2.2.7 The RU shall be specified by its manufacturer for continuous duty, non-environmentally controlled, outdoor use.

2.2.8 The RU shall include a power over Ethernet injector (POEI). The POEI shall provide operating power and Ethernet data to the RU. The POEI shall include integral transient voltage surge suppression to protect against transients and surges on the incoming power and data (Ethernet) connections to the POEI, as well as to protect against transients and surges on the outgoing data (Ethernet) connection to the radio. The POEI shall be mounted in the ITS Equipment cabinet(s).

2.2.9 The RU with OEM option of being powered with a second standby POIE shall be supplied with and powered by a standby POIE.

2.2.10 Those components of the RU that are housed inside the ITS Equipment Cabinet shall be field hardened and rated by their manufacturer in accordance with the operating temperature, storage temperature, and relative humidity requirements of the NEMA TS2 Standard. The design shall be inherently temperature compensated to prevent abnormal operation. The circuit design shall include such compensation as is necessary to overcome effects due to temperature in the specified environmental range. Those components of the RU that are mounted in a free-air outdoor environment shall be rated by their manufacturer to operate without degradation over the temperature range -34 degrees F to +122 degrees F.

2.2.11 All proposed wireless equipment shall be of type accepted by the FCC for use in the United States of America.

2.3 The Contractor shall provide the Owners with all documentation associated with the WCS to be built, including, but not limited to, construction plans, equipment acquisition plans, equipment specifications, engineering drawings, maintenance manuals, operational manuals, training and any other documentation necessary for the operation and maintenance of the WCS.

2.4 In the event that existing WCS hardware installed under a previous project or projects(s) must be upgraded in order to handle the additional data transfer rates required for this project, then the Contractor shall be responsible for supplying, installing, and testing the required upgraded equipment up to the demarcation point, established for New Hampshire as the Hobbs Hill Water Tower at Pease and for Maine as the existing DSL drop at Route 236. In such an event, the Contractor shall be fully responsible for ensuring that the upgraded radios still communicate with all ITS devices in the same manner in which they communicated with those devices prior to the upgrade, although the exact path of the communications is at the discretion

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of the Contractor. The Contractor shall also be responsible for ensuring that there is minimal interruption to the existing communication system.

Construction Requirements

3.1 All electrical installations shall comply with the requirements specified herein, local and utility codes, and the National Electrical Code (NEC).

3.2 A preconstruction meeting with the Contractor, equipment subcontractor/vendor, Engineer of Record, the Contract Administrator, and a representative of the Owners shall be arranged not less than 7 days prior to the start of the WCS installations.

3.3 Contractor shall notify the TMC and TMCC no less than 7 days prior to the beginning of equipment and system testing.

3.4 All newly constructed RUs wireless nodes shall be installed and only operated in accordance with FCC authorizations as granted by the FCC.

3.5 Contractor shall make same day notification to the State Project Manager of construction completion for each FCC regulated TU emitting radio frequency energy.

3.6 Contractor shall notify the State Project Manager of any required changes or modifications to RU wireless node that differ from FCC license authorization as previously granted.

3.7 For each location where the RUs are replaced, the Contractor shall also replace the Ethernet switches. Replacement Ethernet switches shall be compatible with the new RUs and with all existing equipment at the cabinets. Ethernet switches shall meet the requirements of Special Provision 677 for ITS Cabinet Components.

3.8 Wireless communication equipment not re-used as required by the Contract Documents shall be salvaged back to the Owners in care of the State Project Manager.

3.9 Radio Units.

3.9.1 The RU shall communicate with and be fully compatible with the portions of the existing WCS not being removed as a result of the project.

3.9.2 The RUs shall be mounted to the proposed ITS devices as indicated in the Contract Documents. RUs shall be mounted at elevations that sufficiently minimize RF scatter caused by motor vehicle traffic and sufficiently minimizes near field RF exposure to pedestrians and motorist.

3.10 Testing. The Contractor shall perform integration testing in accordance with the requirements contained in Special Provision 677.