ITEM: 680.82510108 – RADIO/GPS TRANSIT SIGNAL PRIORITY CONTROL SYSTEM
INTERSECTION EQUIPMENT

DESCRIPTION:
Under this item the Contractor shall furnish and install intersection equipment for a Radio/GPS Transit Signal Priority (TSP) control system in accordance with the contract documents, applicable standard sheets, manufacturer’s instructions, NYSDOT representative’s and the Engineer’s requirements.

MATERIALS:
All components furnished, assembled, fabricated or installed shall be in accordance with all details shown in the contract documents or as specified by the Engineer.

System interface software from the Control System manufacturer, shall be provided for the programming of a Multimode Phase Selector Card. No separate payment shall be made to the Contractor for the provision of this software or for the associated programming effort.

The Contractor shall furnish and install a mounting bracket specific to the Radio/GPS Unit in accordance with the details shown on the plans. There shall be no separate payment for this item of work.

The Contractor shall furnish and install auxiliary cabinets at locations designated in the plans to house the Radio/GPS TSP control system equipment inclusive of auxiliary input racks where necessary. Auxiliary cabinets will be paid for under the relevant pay items.

CONSTRUCTION DETAILS:
The contractor shall install the equipment in accordance with the contract documents, standard sheets, manufacturer’s instructions, requirements of the NYSDOT representative and/or the Engineer’s requirements.

Prior to the installation of intersection equipment, by the Contractor’s personnel, all personnel shall have received training from the supplier and/or manufacturer, including but not limited to installation, operations, testing and maintenance of all associated TSP equipment. No intersection equipment shall be installed or accepted without proof of training.

The Multimode Phase Selector Card will be installed directly into the input file of a Model 330 type cabinet or in a separate card rack which may be installed in an auxiliary cabinet, as noted on the plans. The cable between the Radio/GPS Unit and the Multimode Phase Selector Card shall be a multi-conductor cable as recommended by the manufacturer. The cable shall be terminated as recommended by the manufacture.

The Radio/GPS Unit shall be installed on a traffic signal pole via a mounting bracket as shown in the contract documents or as directed by the Engineer.

During installation of the cable, the contractor shall take care not to damage conductors or any part of the cable. Cable grips and hangers shall be furnished and installed at vertical risers. There will be no separate payment for this work.

The cable shall be pulled into conduit by hand and the use of winches or other power actuated pulling equipment will not be permitted. At least 3 feet but not more than 4 feet of slack shall be left for each cable at each pull box or junction box. Splices in the cable shall not be allowed between the equipment terminals. The contractor shall install the equipment in accordance with the contract documents, standard sheets, and manufacturer’s instructions. The contractor shall perform all of the tests necessary to confirm acceptable operation, in the presence of the Engineer.

The Contractor shall program the Radio/GPS Transit Signal Priority Control System by mapping and...
setting the preemption zones per the manufacturer’s recommendations and the NYSDOT Engineers instructions, this shall be completed at each intersection shown in the contract documents or as directed by the Engineer. No separate payment will be made to the contractor for programming the Transit Signal Priority Control System.

1. TESTING REQUIREMENTS

1.1. The Radio/GPS Transit Signal Priority Control System shall be subjected to testing requirements described as follows:

1.1.1 **Wireless System Performance Tests**

The integrator shall perform a wireless spectrum analysis to determine the deployment configuration, site-specific signal levels, potential interference and commissioning of the wireless system from the bus to the traffic signal controller. This testing shall be performed prior to installation and determine the acceptable frequency of the system and locations of the antennas. The radios shall be configured in a point-to-point configuration to provide the communication required for Transit Signal Priority control.

1.1.2 **Site Verification Test**

The Contractor shall conduct an approved site verification test to demonstrate that the intersection is activated by an approaching bus equipped with the vehicle GPS equipment. The site verification test shall include verification of the interfacing of the equipment locally in the cabinet through the communications device test. As part of the remote site verification test, this test will be performed using Contractor furnished test equipment and test software. In the event of failure of the Site Verification Test, the Contractor shall correct the problem and repeat the test. If a unit has been modified as a result of a Site Verification Test failure, a report shall be prepared and delivered to the Engineer prior to repeating the test. The report shall describe the nature of the failure and corrective action taken. If a failure pattern, as described by the Engineer, develops, the Engineer may direct that design and construction modifications be made to all units without additional cost to the State or extension of the contract period. The Site verification test shall include the testing of all components of the TSP Systems and the interconnection between the TSP equipment and the traffic signal controller and software. A test report shall be presented to the engineer for his review and approval.

1.1.3 **Systems Acceptance Test**

The satisfaction of this test completion shall be the basis for system acceptance and shall, at a minimum, exercise all functional operations of each unit of the field equipment including the communication with buses on the route. The test shall also include a thirty (30) day period of normal operations with no failure.

The Contractor shall complete any site specific tests in as few consecutive days as possible. No separate payment will be made to the contractor for the performance of the testing requirements as outlined above. All testing procedures shall be performed to the satisfaction of the project’s Systems Integrator and/or the NYSDOT and acceptance shall be coordinated via the Engineer.

2. TRAINING REQUIREMENTS

2.1. At least ten (10) business days prior to the testing of any system elements, the Contractor
shall submit for review and Engineer’s approval, a Training Plan covering equipment installation, maintenance, and system operation. The training shall be appropriate for varied personnel backgrounds encompassing equipment installation, maintenance, engineering, operations, management and system administration. The Contractor shall address all comments to the Training Plan and resubmit for approval where necessary. Training can be scheduled only after the Engineer’s approval of the Training Plan and the receipt of any training manuals and documentation.

3. DOCUMENTATION

3.1. In addition to any other documentation requirements previously stated, the Contractor shall provide the following:

- All manufacturers’ documentation for equipment to be supplied under this item. This documentation shall include all operations, maintenance, software support, and protocol descriptions available from the manufacturer each system component. In addition, all documentation specifically requested in individual item specifications shall be delivered.
- Written documentation of the correct hardware (dipswitch settings, etc.) and software adjustable configurations for all equipment used under this item.
- A site specific graphical depiction of all cable assemblies (“pin-outs”) and the actual interconnection of all system components.

4. WARRANTY

4.1. All equipment shall be covered by a full manufactures warranty for a period of two (2) years from the date of the final acceptance.

5. MAINTENANCE

5.1. The Contractor shall not be required to undertake maintenance of an existing intersection prior to the installation of the Transit Signal Priority (TSP) Equipment, except when the intersection has been upgraded as part of the same contract, in either instance, if a fault is identified, the contractor is to inform the Engineer.

5.2. If within four (4) hours of completion of the TSP Equipment installation a malfunction occurs, the Contractor shall respond within two (2) hours to correct the malfunction. If it is determined that the condition was not a result of the Contractor’s work, the malfunction shall be reported to the Engineer. No separate payment will be made for this work.

5.3. The Contractor shall be responsible for any damages at the intersection caused by this installation of Radio/GPS TSP Control System equipment. The Contractor shall repair any damages to the intersection to the satisfaction of the engineer at no additional cost to this contract and at the Contractor’s own expense. Within thirty days (30) of the Radio/GPS TSP Control System installation, the Engineer shall bring to the attention of the Contractor any damages requiring repair by the Contractor.

METHOD OF MEASUREMENT:
The measurement for payment shall be the number of fully tested installations operating in accordance with the contract documents, manufacturer’s instructions, requirements of the NYSDOT representative’s and all the Engineer’s requirements.
The testing and client training associated with this item shall be apportioned to the number of TSP installations indicated in the contract plans and the Contractor shall receive no additional payment for these tasks.

**BASIS OF PAYMENT:**

The unit price bid for each **Radio/GPS TSP Control System – Intersection Equipment** shall include the cost of furnishing all labor, training, materials, tools and equipment necessary to complete the work. The cost of all miscellaneous hardware, cabling and connectors, mounting hardware, training, documentation, and testing.

Progress payments will be made as follows:

- 50% upon the bid price of each item will be paid upon satisfactory completion of Milestone 3, On-Site Stand Alone Tests
- 20% upon will be paid upon satisfactory completion of Milestone 4, System Interface Test
- 20% upon will be paid upon satisfactory completion of Milestone 5, System Performance Tests
- 10% upon will be paid upon satisfactory completion of Milestone 6, 90-Day Operational Test, as described in the ITS Special Provisions part of the contract and within the plans/proposal.