ITEM 680.58870008 - WIRELESS VEHICLE DETECTION SYSTEM CONTACT CLOSURE INTERFACE (APCC)
ITEM 680.58880008 - WIRELESS VEHICLE DETECTION SYSTEM REPEATER – (LONG LIFE)
ITEM 680.58890008 - WIRELESS VEHICLE DETECTION SYSTEM ISOLATOR MODULE (ISO)
ITEM 680.58900008 - WIRELESS VEHICLE DETECTION SYSTEM SERIAL PORT PROTOCOL DIGITAL RADIO (SPP)

DESCRIPTION

Under these items the contractor shall furnish and install a wireless, battery-powered magnetometer vehicle detection system as shown in the contract documents or where directed by the engineer.

The detection system shall provide accurate roadway information as needed to support traffic signal control. The wireless, battery-powered magnetometer vehicle detection system shall consist of one or more of the following:

- Access Point Contact Closure (APCC) Card to interface between a standard 170/2070 controller using contact closure signals.
- Serial Port Protocol Digital Radio (SPP) mounted on the side of the roadway, serving as the communications hub for the installation. Multiple SPPs may be employed per installation.
- Optional wireless repeaters mounted on the side of the roadway, serving to extend the radio range of an APCC.
- Contact Closure Extension cards to support the interface between an APCC and a standard 170/2070 controller using contact closure signals (paid under its respective item)
- Isolation Module for each SPP
- Software to control and configure the sensors, APCCs and repeaters
- Software to store and retrieve detection data

Communications between the sensors and the SPP or repeater and between the repeater and SPP shall be via radio. Detection data shall be relayed from each SPP to a local 170/2070 controller for real-time vehicle presence detection using contact closure signals. As an option, data shall be capable of being relayed from each APCC to a central software system or central server over standard IP (Internet Protocol) networks.

MATERIALS

All SPP components shall be contained within a single housing. The SPP housing shall conform to NEMA Type 4X and IEC IP67 standards. All repeater components shall be contained within a single housing. The repeater housing shall conform to NEMA Type 4X and IEC IP67 standards.

An SPP shall be no larger than 12”H x 8”W x 4”D. A repeater shall be no larger than 5”H x 4”W x 4”D. An SPP and a repeater shall weigh no more than 4 pounds (1.8 kg) each. An SPP shall support at least 48 sensors. A repeater shall support at least 10 sensors.

The SPP/APCC, ISO and the repeater shall operate at temperatures from -37 F to +176 F. The long life repeater shall be battery-powered, have a life expectancy of a minimum of 7 years and the battery shall be field replaceable. An APCC shall be factory-configurable to support at least
two (2) different power options:

- Power shall be supplied via an isolated nominal 48 VDC (36-58 VDC) input, consuming a maximum of 3W and providing 1500 V isolation and 5 kV surge protection
- Power shall be supplied via a non-isolated nominal 12 VDC (10-15 VDC) input, consuming a maximum of 2W

The radio links between each sensor and SPP/APCC or repeater and between each repeater and SPP/APCC shall conform to the following requirements: The physical layer of the radio links between each sensor and SPP/APCC or repeater and between each repeater and SPP/APCC shall conform to published standards. The center frequencies, bandwidths, and transmit power levels of the radio links shall allow operation in an unlicensed frequency band. Frequency channels shall be employed by the sensors, SPP/APCC, and repeaters to avoid interference with other devices operating in the unlicensed band. The frequency channels shall be user-configurable and at least 16 frequency channels shall be supported. The link budget (transmit power plus transmit antenna gain plus receive antenna gain minus receive sensitivity, where receive sensitivity shall assume a 1% packet error rate) for all radio links shall be 93 dB or greater.

An SPP/APCC shall support the relay of sensor detection data through several interfaces as required by the application. Detection data shall be communicated to a standard roadside 170/2070 controller via APCC card capable of being installed in standard contact closure input shelves. As an option, detection data shall be communicated over TCP/IP via an integrated 10Base-T Ethernet interface. As an option, detection data shall be communicated as IP data over GSM-based cellular data services via an integrated GPRS cellular modem. As an option, detection data shall be communicated as IP data over CDMA-based cellular data services via an integrated 1xRTT cellular modem. The APCC shall be capable of simultaneously communicating detection data via the contact closure interface, optional Ethernet interface, and optional cellular data modem interface.

Each Access Point Contact Closure Interface APCC card shall provide detector data as contact closure signals to the 170/2070 controller. An APCC card shall directly plug in to standard 170/2070 input files or NEMA detector racks. Additional Extension Contact Closure cards shall provide up to 256 channels of detection data from a single APCC’s supported sensors, where each channel comprises an optically isolated contact closure relay and, if configured for TS2 operation, an additional contact closure relay to indicate the channel status.
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Each Extension Contact Closure card shall be configurable by providing contact closure signals in either presence or pulse mode with up to 31 seconds of delay timing and 7.5 seconds of extension (carryover) timing. The Extension Contact Closure card front panel shall provide status LEDs to monitor detection channel status, line quality and fault monitor. The Extension Contact Closure card front panel shall provide switches to select and configure presence or pulse mode, delay timing and extension timing. An Extension Contact Closure card shall be powered by the 170/2070 controller backplane via an 11-26 VDC input. An Extension Contact Closure card shall be surge protected to GR-1089 standards. An Extension Contact Closure card shall operate at Temperatures from -37 F to +176 F. An Extension Contact Closure card shall operate in humidity up to 95% (non-condensing).

CONSTRUCTION DETAILS

The maximum distance between a sensor installed in the roadway and an SPP or a repeater with a clear line-of-sight between devices shall be at least 150’ for an access point or repeater installed 24’ above the roadway, at least 100’ for an APCC or repeater installed 5.5 m above the roadway and at least 22.9 m for an APCC or repeater installed 12’ above the roadway. The maximum distance between an APCC and a repeater shall be at least 750’ when both units are installed 18’ above the roadway and with a clear line-of-sight between devices.

The SPP Digital Radio can be wired up to 2000’ from the APCC. Up to 2 SPP’s can be wired to an APCC. Each SPP requires an ISO for proper operation. The ethernet cable shall be provided in the appropriate length as indicated on the plans.

The contractor shall ensure that the wireless battery-powered magnetometer vehicle detection system operates according to specification during all phases and sub-phases of construction. All equipment shall become the property of NYSDOT upon project completion.

METHOD OF MEASUREMENT

The wireless, battery-powered magnetometer vehicle detection system will be measured as the number of units satisfactorily furnished and installed in accordance with the contract documents. Ethernet cable shall be paid for separately.

BASIS OF PAYMENT

The unit price bid for furnishing and installing each item shall include the cost of furnishing all labor, materials, equipment, tools and all necessary tests to satisfactorily complete the work in accordance with the contract documents.