ITEM 11680.9130 - PAN/TILT/ZOOM CCTV CAMERA ASSEMBLY
ITEM 11680.9131 - RECEIVER DRIVER UNIT (RDU)

DESCRIPTION:

Under these items the Contractor shall furnish and install Closed Circuit Television (CCTV) equipment at the field locations shown on the plans and in accordance with these Special Provisions. The equipment shall be capable of delivering high-quality full-motion color video during day or night operation with the video transmitted over the fiber network being installed as part of this project as indicated in the plans. The CCTV equipment shall consist of the following elements:

- Pan/tilt/zoom CCTV Camera Assemblies installed at the locations indicted on the plans. Each Pan/tilt/zoom Camera Assembly consists of a solid state color CCTV Camera, zoom lens, camera enclosure, pan/tilt unit and all cabling required to interface the CCTV Camera Assembly with equipment in the field cabinet.
- Receiver Driver Unit (RDU) shall be installed in the field cabinet in accordance with the Table of Equipment Complements contained in the plans. The RDU provides the drive signals to the camera, lens and pan/tilt unit based on commands received from the central and provides status information for transmission to the central.

MATERIALS:

Functional Requirements

The field equipment installed as part of these items shall be fully compatible with the Central Video Equipment described as part of the Central Video Equipment Modification bid item. The video from the CCTV cameras shall be synchronized to provide seamless switching between the cameras such that there is no loss of synchronization on the monitors as various cameras are selected for display at the Joint Traffic Operations Center (JTOC).

The Contractor shall be responsible for installing and testing all equipment necessary to meet the requirements defined below.

Specific Requirements

The system shall meet the following requirements:

a. Seamless switching of the video from the video switcher at the control center.

b. Synchronization to prevent tear or roll when the cameras are sequenced, switched or recorded.

c. Provide the following camera control functions:
   - Pan: left and right
   - Tilt: up and down
   - Zoom: in and out
   - Focus: near and far
   - Iris: auto and manual open and close
d. Provide for each camera a minimum of twelve (12) presets for pan/tilt and zoom. The presets shall be stored in non-volatile memory.

e. Capability to program 2 lines of 24 alphanumeric characters for each camera. The alphanumeric programmed for a specific camera shall be displayed when the video for that camera is displayed.

### Pan/Tilt/Zoom CCTV Camera Assembly

Each CCTV Camera Assembly shall include the following equipment: color CCTV camera, motorized zoom lens, camera enclosure, pan and tilt (P/T) drive unit, mounting hardware, and all interconnecting cabling between the camera assembly and the field cabinet. The camera assembly shall be designed for mounting on top of the CCTV pole as shown in the plans and shall meet all performance requirements when subjected to a 145 kmph wind with a 12 mm ice load on all surfaces. Connections between the equipment shall be through weather proof connectors to provide easy replacement. The equipment shall meet the following requirements:

a. Operating temperature: $-30^\circ C$ to $+50^\circ C$ ambient (camera/lens shall meet these requirements when housed in a pressurized environmental enclosure containing a heater and defroster).

b. Humidity: 0 to 95% non-condensing

c. Weight (total for CCTV Camera Assembly including camera, lens, pan-tilt unit and mounting hardware) shall not exceed 35 kg.

d. Servicing of the equipment constituting the camera assembly shall be available in the continental United States or Canada. In addition, servicing of the lens and CCTV camera shall be available at the same service center.

### A. CCTV Camera

The CCTV camera shall utilize digital signal processing (DSP) techniques and shall meet the following requirements:

a. Format: NTSC 1VPP @ 75 ohms, unbalanced composite

b. Scanning: 2:1 interlace

c. Imager: Interline transfer CCD

d. Horizontal resolution (minimum): 460 TV lines

e. Sensitivity (3200K face plate illumination): 6.5 lux, full video, AGC off

0.3 lux, 80% video, AGC on

f. Signal to Noise ratio (AGC off): 45dB minimum

g. Power consumption (maximum): 8 W

h. Lens mount: C or CS

i. Automatic white balance compensation
j. Back light compensation

k. Electronic shutter speeds: 1/60 to 1/10,000 and auto

l. Automatic gain control (AGC): 0-20 dB

m. Automatic light compensation: Video shall not change more than 2:1 with light level change of 40,000:1 when using the specified zoom lens with auto iris control circuitry

n. Weight (maximum): 1 kg

B. Lens

a. Iris: Auto with manual override

b. Lens mount: C or CS (compatible with camera)

c. Motorized Zoom: 8 to 80 (10:1) for ½” format. Other zoom ranges are subject to approval by the Engineer.

d. Aperture: f1.2

e. Contains neutral density spot filter

f. Weight (maximum): 2 kg

C. Camera Enclosure

The camera enclosure shall meet the following requirements:

a. Sized to enclose the camera and zoom lens.

b. Sealed and pressurized with dry nitrogen to prevent entry of dust and moisture. The enclosure shall use a standard Schrader purge valve and contain a purge relief fitting to prevent over pressurization of the enclosure.

c. Pressure sensor to activate a contact closure when internal pressure drops to below 13.8 kPa (2 psi). The contact closure shall be compatible with the RDU alarm input.

d. Sunshield in front of enclosure to prevent sun glare on the lens.

e. Designed for mounting on Pan/Tilt Unit.

f. Viewing window: The window shall provide a viewing area such that unrestricted camera view are obtained for all camera and lens positions.

g. Cable entry: At the rear or bottom of the enclosure sealed to maintain environmental integrity.

h. Material: With exception of the window, the enclosure shall be painted anodized aluminum. The window shall be 6.35 mm thick plate glass.

i. Built in thermostatically controlled heater/defroster/defogger. The defroster/defogger shall prevent icing and fogging of the viewing window. The heater shall be sized and thermostat set to permit
operation of the camera and zoom lens over the specified environmental conditions. A minimum of 5°C hysteresis shall be provided in the thermostat to prevent continuous cycling of the heater, blower, defroster or defogger. Either snubbers or Metal Oxide Varistors (MOV) of appropriate ratings shall be installed across the switch outputs of all thermostats. The MOVs shall be connected to ground. Fusing for the heater and defroster/defogger shall be in the field cabinet.

j. Power (max) with heater, defroster/defogger on: 120 W

k. Weight (maximum): 4 kg

D. Pan/Tilt Unit

The Pan/Tilt Unit shall be capable of continuous, simultaneous pan and tilt movements and shall meet the following requirements for the required load and environmental conditions:

a. Mechanically compatible with the CCTV camera/enclosure

b. Pan:
   movement: 0-355°
   Speed: 6°/sec minimum (no load)

c. Tilt:
   movement: +15°, -90°
   Speed: 3°/sec minimum (no load)

d. Dynamic breaking in both pan and tilt movements.

e. Limit stops: To limit the range of horizontal and vertical movements. The limit stops shall be externally adjustable for pan and tilt.

f. Adjustable worm gear final drive to prevent drift and backlash.

g. Completely sealed and fabricated out of corrosion resistant material.

h. Electrical connections shall be through a pre-wired feed-through rather than through a wiring harnesses.

i. Power (maximum): 150 W

j. Height (maximum): 290 mm (from bottom of flange to top of camera enclosure mounting platform)

k. Weight (maximum): 30 kg

E. Coaxial Cable

Type RG59 Coaxial cable with a dual shield shall be used to connect the camera to the Video Fiber Optic Transceiver with Bi-Directional Data, housed in the field cabinet.

F. Power and Control Cable
The power and control cable between the CCTV Camera Assembly and the field cabinet shall be in accordance with the CCTV equipment manufacturer’s recommendation. Shop drawings showing the configuration of the harness along with the manufacturer’s recommendation shall be submitted to the Engineer for approval prior to fabrication.

**Receiver Driver Unit (RDU)**

The RDU shall provide all camera and lens control signals and shall contain all power supplies necessary for the control of the camera, lens and pan/tilt unit. The RDU shall meet the following requirements:

a. Control signals compatible with the zoom lens and pan/tilt unit.

b. Addressing capability: Switches shall be provided on each RDU for the setting of the device address in the field. The range of settable addresses shall be from 0 to 999. Each unit shall be assigned a unique address. A unit shall only respond when it is addressed.

c. Supports a minimum of twelve (12) presets stored in non-volatile memory.

d. Data interface to the VCIU or Video Fiber Optic Transceiver with Bi-Directional Data: EIA-232E

e. Data rate: Field selectable from 1200 to 9600bps

f. Alarm inputs: Minimum of 4 inputs provided for transmission to the JTOC with an open circuit shall be considered a logic true and a closed circuit (<1VDC) shall be considered a logic false. The RDU shall contain all required pull ups and filtering to prevent false calls caused by noise.

g. Electric: All power supplies to provide the required receiver and driver voltages shall be contained within the unit

   Voltage 115±20 VAC
   Power (maximum): 40 W.

h. Fuse protection shall be provided for the receiver input power and the power to the camera, enclosure and Pan/Tilt unit.

i. Connectors: Video -BNC
   Data: - DB 25 or screw terminal

j. Mechanical: Suitable for mounting in the cabinet types as designated on the plans.
   Dimensions (maximum): 300 mm (w) x 250 mm (h) x 120 mm (d)

k. Environmental:
   Temperature: -20°C to +70°C
   Humidity: 5 to 95% non-condensing

l. Local control of pan/tilt and zoom functions shall be provided either through momentary toggle switches mounted on the front of the RDU, through a portable test set or by software running on the notebook computer furnished as part of the system support equipment. If the notebook computer is used, a separate serial port with a DB-25 connector for connection to the notebook computer shall be provided on the front of the RDU panel and three copies of the software that will run on the notebook shall be furnished to the Engineer. If a test set is proposed, three test units shall be provided to the Engineer.
CONSTRUCTION DETAILS:

a. The Contractor shall install the specified CCTV field equipment at locations as shown on the plans and as ordered by the Engineer. The pan and tilt unit shall be installed such that the line of site of the camera is in the center line of the desired field of view when the camera is in the mid point of the desired motion between the limit stops. The field of view of each camera and the limit settings of its vertical and horizontal movements will be provided by the Engineer prior to installation. The RDU shall be installed within equipment cabinets furnished and installed under separate contract items.

b. The pan and tilt unit and the pole mounted adapter shall be electrically bonded to the pole. The camera enclosure shall be connected to the pole mounting adapter through a No. 6 AWG braided conductor. The Contractor shall be responsible for installing and connecting all surge protection, cabling, connectors, distribution amplifiers and other equipment necessary to provide a working subsystem. The Contractor shall connect the equipment to the power outlets indicated on the plans.

c. All incidental parts necessary to complete the installation but not specified herein or on the plans shall be provided as necessary to provide a complete and properly operating system.

Warranties and Guarantees

The Contractor shall provide warranties and guarantees to the State of New York Department of Transportation in accordance with Article 104-08 of the Standard Specifications with the additional requirement that all equipment furnished as part of this contract shall be warrantied for a period of 24 months following system acceptance.

Documentation

Manuals

Six (6) advance copies of equipment manuals furnished by the manufacturer shall be submitted to the Engineer for review at least ten days prior to the scheduled start of the first Operational Stand-Alone Test. The Engineer will verify the manufacturer’s equipment manual as part of the test and integration process. The equipment manual incorporating the Engineer’s corrections and comments shall be integrated by the Contractor into the operations and maintenance manual as described in the Special Notes.

The manuals shall, as a minimum, include the following:

a. Complete and accurate schematic diagrams

b. Complete installation and operation procedures

c. Complete performance specifications (functional, electrical, mechanical and environmental) of the unit.

d. Complete list of replaceable parts including names of vendors for parts not identified by universal part numbers such as JEDEC, RETMA or EIA.

e. Complete schematic diagrams.
f. Complete maintenance and troubleshooting procedures

Testing

The field video equipment shall not be installed until completion of the CCTV Staging Test. In addition to the testing requirements defined in the Special Notes, the following testing shall be performed:

Operational Stand-Alone Test

At each field site the contractor shall demonstrate local control of all camera and pan-tilt unit functions. The video input into the Video Fiber Optic Transmitter with Bi-directional data shall be monitored to verify operability of each of the control functions. The Contractor shall provide a video monitor on which the video will be displayed. This test shall not be performed until all of the CCTV Field Equipment specified on the plans have been installed for the site under test.

CCTV Equipment Group Site Verification Test

A site verification test shall be performed for each of the field sites containing CCTV Equipment Groups after successful completion of the Operational Stand-Alone Test. The test shall consist of the following two parts:

- Control capability shall be demonstrated for each of the cameras from the hub to which the camera reports. The video shall also be monitored at this hub.
- Control and switching capability shall be demonstrated for each of the cameras from the JTOC. The video shall also be monitored at the JTOC.

METHOD OF MEASUREMENT:

Pan/Tilt/Zoom CCTV Camera Assembly will be measured for payment as the number of assemblies installed, made fully operational and tested.

Receiver Driver Unit will be measured for payment as the number of units, installed, made fully operational and tested.

BASIS OF PAYMENT:

The unit price bid for each Pan/Tilt/Zoom CCTV Camera Assembly shall include the cost of furnishing all labor, materials, and tools and equipment necessary to complete the work. All miscellaneous hardware required for the installation of the unit, including but not limited to the coaxial, and control and power cabling between the field cabinet and the Pan/Tilt/Zoom CCTV Camera Assembly, mounting hardware, connectors, and weather heads, shall be included in this price. Payment for all documentation, testing, and test equipment used for testing of the Pan/Tilt/Zoom CCTV Camera Assembly shall be included in this item.
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The unit price bid for each Receiver Driver Unit shall include the cost of furnishing all labor, materials, cables and tools and equipment necessary to complete the work. All miscellaneous hardware required for the installation of the unit into the field cabinet shall be included under this item. Payment for all documentation, testing, and test equipment used for testing of the Receiver Driver Unit shall be included in this item. Included in this cost shall be the three (3) test units or software, if required, for the simulation of the RDU commands.

Progress payment will be made as follows:

Forty percent of the bid price for each Pan/Tilt/Zoom CCTV Camera Assembly will be paid when the Pan/Tilt/Zoom CCTV Camera Assembly is installed and having passed the Operational Stand-Alone Test.

Twenty five percent of the bid price for each Pan/Tilt/Zoom CCTV Camera Assembly shall be paid upon successful completion of the CCTV Equipment Group Site Verification Test.

Twenty five percent of the bid price for each Pan/Tilt/Zoom CCTV Camera Assembly shall be paid upon successful completion of the CCTV Subsystem Integration Test described in the Special Notes.

Ten percent of the bid price for each Pan/Tilt/Zoom CCTV Camera Assembly shall be paid upon System Acceptance.

Forty percent of the bid price for each Receiver Driver Unit will be paid when the Receiver Driver Unit is installed and having passed the Operational Stand-Alone Test.

Twenty five percent of the bid price for each Receiver Driver Unit shall be paid upon successful completion of the CCTV Equipment Group Site Verification Test.

Twenty five percent of the bid price for each item shall be paid upon successful completion of the CCTV Subsystem Integration Test described in the Special Notes.

Ten percent shall be paid upon System Acceptance.