

ITEM 0270001

CAMERA ASSEMBLY

DESCRIPTION:

The "Camera Assembly" item shall consist of furnishing and installing an outdoor dome assembly with integral CCTV color camera and motorized lens, receiver/driver (if required), local camera control at the Hartford Traffic Operations Center appropriate interconnect wiring, at the locations shown on the plans. The equipment to be provided shall include any ancillary or incidental items including any code-translators, code-distributors, data converter units, camera controller units, cables, connectors and power supplies required at each video switcher site or camera location to make a complete and fully operating video surveillance system with the approved camera manufacturer.

REFERENCED ITEMS

None

REQUIRED SUBMITTALS

Shop Drawings:

Submit 5 copies of shop drawings for the camera assembly in accordance with these specifications and the contract general requirements.

MATERIALS:

Manufacturer Requirements:

The Contractor shall ensure that all specified camera features, functions and performance requirements are supported by the American Dynamics 1024 video switcher and American Dynamics 2088 keyboard without loss of camera features, functions, performance and response time (except alarm returns). The camera assembly shall be a unit that has been tested and working with the American Dynamics 1024 video switcher at the Hartford Traffic Operations at 525 Main Street , Hartford, CT. The Contractor will not be allowed to submit a camera manufacturer other than the manufacturers listed herein. All camera assemblies shall be manufactured by either Sensomatic - SpeedDome Ultra VII day/night or latest equivalent model or Pelco Spectra III SE Series Model DD53CBW or latest equivalent model or ULTRAK Model KD6BW4NA or latest equivalent model. The catalog cut submittal shall clearly document any camera functions that do not meet the item specifications.

Note: Due to the market changes in the CCTV industry, the Contractor shall contact the Department to verify manufacturer qualifications.

The Camera Dome enclosure shall be manufactured by the camera manufacturer.

1.0 Camera Assembly

1.1 Each camera assembly shall include, but not be limited to, the following equipment:

- Pendant mounted dome camera housing, mountings, pan and tilt unit, and other camera accessories as specified.
- ¼" CCD Integral color television camera with motorized lens.
- Integral receiver/driver installed in the dome housing.
- Local camera controller capabilities (a connector wired in the cabinet for an American Dynamics 2088 Keyboard) located in the traffic controller cabinet or an Auxiliary Video Equipment Cabinet.
- Data Transmission RS-422. Data transmission shall use a dedicated data cable. The selected data transmission protocol shall require prior approval by the Engineer.
- All required wiring and connections to related equipment.

1.2 The dome camera, zoom lens, domed enclosure and control receiver shall be assembled and tested in accordance with these Technical Special Provisions prior to delivery to the job site. All equipment shall be UL listed. These assemblies shall be delivered to the job site as complete units, and installed on poles as shown on the plans and specified herein.

2.0 Camera Assembly Performance Requirements

2.1 The equipment supplied as part of this item, including dome enclosure and internal assembly, shall meet the following performance requirements:

- Minimum ambient temperature range of -49 to +122 degrees F.
- Relative humidity of 0 to 95 percent, non-condensing.
- Minimum protection against 80 mph sustained winds

- 2.2 The operation of CCTV equipment dome type shall not be affected by transient voltages, surges, and sags normally experienced on commercial power lines. CCTV field hardware and related electronic components shall not be adversely affected by wind driven rain, salt in the air or ice buildup.

3.0 Camera Assembly Items

- 3.1 An integral Solid State Digital (DSP6) color camera sensor shall be furnished as part of each camera assembly. The camera shall be capable of auto -sensor/manual selection of black and white and color operational modes through the same camera lens. The camera shall be capable of selecting the color or black and white mode by removing the Infra Red filter based on the ambient light (lux) level setting. The removal of the IR filter shall be repeatable. The automatic mode shall be controlled by a light sensor located within the dome assembly. The automatic sensor control shall have a built in delay for switching the IR filter to prevent "toggle" under false conditions. The sensor shall automatically switch the IR filter when the ambient light level falls below 1.0 lux or 0.5 lux. The camera shall also have backlight compensation control.
- 3.2 The camera shall be capable of automatically reestablishing video and data communications upon the restoration of communications or power to the cameras. The maximum lux level requirements shall be considered using a resulting image on the video monitors at the Hartford Traffic Operations Center. The cameras shall meet or exceed the following requirements:

Note: Due to the market changes in the CCTV industry, the Contractor should contact the Department to verify camera features and performance.

Camera

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|---------------------------|---|
| • Color System | NTSC Standard |
| • Image Sensor | ¼" blemish free, interline transfer, CCD color image sensor, B/W selectable by removal of IR filter |
| • Scan | NTSC; 2:1 interlace |
| • Resolution - Color | Minimum 470 TVL horizontal |
| • Resolution - Monochrome | Minimum 500 TVL horizontal |

- Active Picture Element Minimum 758 horizontal x 494 vertical
- Minimum Illumination Color 1.0 lux or less (with AGC on) resulting image
- Minimum Illumination B+W 0.06 lux or less (with AGC on) resulting image

Lens

- Focal Length 3.6 to 80 mm minimum, 23x optical zoom with minimum 8x digital zoom
- Aperture f / 1.6
- Field of View (H) at 48 mm 22 degrees minimum
- Field of View (V) at 48 mm 16 degrees minimum
- Focus Automatic, with user adjustable manual override
- Iris Automatic and manual control, With automatic power-down closure

Features

- Automatic Gain Control On/Off, 0-20 dB average adjustable
- Shutter Control On/Off Control with minimum six selectable positions (manual and/or auto)
- Presets Minimum 64
- Preset speed 1 Second nominal
- Area/Zones/Boundaries Minimum 10
- Blankout/Privacy Zones Minimum 8
- On Screen Text Translucent white or approved other color, min. 16-character alphanumeric titling
- Password Protection User programmable, min 3 characters
- Line Lock On/off control
- White Balance On/Off or Automatic through-the-lens or manually controlled by the operator

- Overexposure Protection The camera shall have built-in circuitry to signal the lens to appropriately adjust the iris opening to prevent any damage to the camera when pointed directly at strong light sources, including the sun.

Electrical

- Signal-to-Noise Ratio 50 dB typical
- Video Output 1 Volt p-p, 75 Ohms impedance, BNC connector
- Power 24 VAC power supplied from the input panel in control cabinet; 25 watts maximum frequency of 50 or 60 Hz
- Surge Protection Manufacturer provided or recommended lightning protection provided for video, power and data lines
- Data Format RS-232, RS-422, or RS-485, Manchester Data and video shall utilize separate cables

Mechanical

- Diameter without enclosure min. 3 inch max. 5 inch
- Height without enclosure min. 6 inch, max. 8.7 inch
- Weight min. 0.5 lbs, max. 6 lbs.

Pan - Tilt Drive

- Pan-Tilt Drive Internal, powered by DC servo motors or AC micro stepping motors or drive system approved by the Engineer
- Pan travel Continuous 360 degrees with sealed slip ring design
- Tilt travel >90 degrees
- Tilt range 90 degrees down from horizontal with automatic flip near vertical vertex
- Speed Manual - minimum 1 to 60 degrees/second
Target - >280 degrees/second

4.0 Camera Assembly Dome Enclosure

- 4.1 A dome enclosure supplied and produced by the same manufacturer of the camera assemblies shall be supplied as part of each item. The enclosure shall be rated for outdoor environment use and meet or exceed NEMA 4 rating. The dome enclosure shall meet or exceed IP67 rating. Each camera assembly shall be installed within the dome enclosure. The enclosure shall be pendant mounted and provided with a 1 inch or 1 ½ inch diameter pipe fitting with NPT threads and all hardware required for attachment to the steel truss support and as shown on the plans. The dome enclosure and bubble enclosure shall not exceed 14" high by 13" wide or as approved by the Engineer.
- 4.2 Intentionally left as blank.
- 4.3 The dome environmental enclosure shall be manufactured from high-quality acrylic substrate, cell-cast or an approved equal. The enclosure shall be coated with off-white, beige or gray finish, and outfitted with a sunshield to reflect direct rays from the sun from the control equipment within the housing without adversely affecting the optical qualities of the camera and lens. The sunshield shall have a means for dissipating heat to protect the camera from failing due to excessive sun exposure.
- 4.4 The bubble shall be constructed from high quality, clear, optically graded, thermoformed acrylic or approved equal. The bubbles shall be free of imperfections, scratches and blemishes. Tamper-proof hardware and a safety strap or lanyard shall be provided to attach the bubble assembly to the dome enclosure. A gasket seal shall be provided between the bubble and dome enclosure to prevent water and dust entry. All external connections shall be environmentally sealed. The dome and bubble enclosure shall not exceed 15 inches in height. Sufficient protective packing material shall be provided by the manufacturer to prevent damage to any enclosure surfaces during shipping and handling.
- 4.5 A thermostatically controlled heater/defroster and blower circulation system shall be provided to maintain the temperature in the specified range and ensure clear viewing during cold weather operation. The heater shall turn on at a minimum 40°F and off at a maximum of 59°F (+ or -2°F) to maintain the specified range defined in Section 2.0. The blower shall operate continuously. The blower shall be rated for continuous operation. All heater and blowers shall be mounted to the non-rotating housing of

the dome. The enclosure shall prevent ice formation on the exterior of the enclosure.

- 4.6 The enclosure shall provide easy access to the camera and pan-tilt unit and a quick release option to allow removal of the assembly.
- 4.7 The dome enclosure shall automatically restart camera operation upon restoration of power, video and data communications.
- 4.8 The camera and enclosure shall not experience any adverse operation during power fluctuations within the specified range.

Electrical (dome enclosure)

- Voltage 20 - 36 VAC,; 24VAC nominal
50/60Hz
- Power Consumption Maximum 80 Watts
- Surge Protection Manufacturer-provided or recommended lightning protection provided for video, power and data lines.

5.0 Local Camera Controller

5.1 Means shall be provided to perform all camera control functions locally within the field equipment cabinet for each dome camera. Activation of local camera control shall disable remote camera control. The Contractor shall provide one of the following methods of implementing local camera control:

- A separate connector for camera control shall be provided within the cabinet.
- An AC-powered local camera controller unit that can be plugged into the contractor supplied data cable connector in the field cabinet (traffic controller cabinet or auxiliary video cabinet). A minimum of one (1) camera controller shall be provided to the Engineer in new and working condition for each project irrespective of the number cameras specified for the project.

6.0 Camera Cable Assemblies

- 6.1 The Contractor shall furnish and install all cable and connectors, and make all connections between equipment as required to provide the specified operation. A camera cable assembly shall consist of a camera control cable carrying power for the camera and control lines for the lens and pan-tilt operations, and a video cable that carries the video signal generated by the camera. Specifications of all cable assemblies, including connectors, shall be submitted to the Engineer as part of the shop drawings for review and approval.
- 6.2 The Contractor shall supply and install interconnection wiring between the camera assembly and the equipment installed at the termination point in the traffic controller cabinet or Auxiliary Video cabinet. The interconnect wiring shall be compatible with the camera assembly and the junction box and include a flexible 75 ohm coaxial cable, data communications cable, power cable and required connectors. All wiring shall conform to the camera assembly manufacturer's requirements. All DC logic control conductors shall be shielded from conductors carrying AC power to prevent electrical noise from interfering with control.

7.0 Code-Distributors, Code-Translators, Data Converters.

- 7.1 Any required code-distributors, code-translators or data converters (herein described as data equipment) shall be supplied to successfully permit data transmission between the dome camera assemblies and the American Dynamics 1024 video switchers and American Dynamics 2088 control keyboards. The American Dynamics 1024 video switchers are located at the Hartford traffic Operations Center.
- 7.2 The data equipment is required to translate the AD Manchester code at each of the video switcher sites or at the camera locations depending on approved camera manufacturer to the American Dynamics video switching system.
- 7.3 The data equipment provided as part of these contract items shall support all approved dome camera manufacturer performance, features and functions as originally specified by the manufacturer. There shall be no loss of performance, features or functions (except alarm returns of the approved dome camera manufacturer), unless such exceptions are approved by the Engineer.

- 7.4 The Contractor shall submit the dome camera format to the Engineer for review and approval with the shop drawings.
 - 7.5 The data equipment shall be capable of being configured via internal switches or programmable settings internal to the camera or auxiliary source. The proper switches or program shall be set by the manufacturer to permit the Manchester code commands to control both types of camera assembly. The Contractor shall be responsible for obtaining the proper settings from the camera manufacturer.
 - 7.6 The data equipment shall permit the all of the camera manufacturer's normal pan speed, tilt speed, focus, iris, shutter control, titling, aux. on/off and preshot store/recall and other commands to be converted directly. In addition, all dome camera setup commands and on-screen menus and features as specified herein are accessed with Manchester code commands except alarm returns or other features as approved by the Engineer.
 - 7.7 The data equipment input and output connections shall be made with mating screw terminal connectors or programmed internal to the dome camera as configured by the camera manufacturer. The stand-alone data equipment front panel LEDs shall indicate status of power, receive and transmit status. Internal data equipment shall be configured by the manufacturer or as approved by the Engineer.
 - 7.8 All necessary rack mount kits, cables and connectors shall be supplied to successfully install the data equipment in existing rack space at the switcher sites or as designated by the Engineer.
- 8.0 Spare Equipment
- 8.1 A minimum of one spare camera assembly shall be included for every five (5) camera assemblies provided. For example: If 3 cameras are installed, one (1) spare is provided. If 6 cameras are installed, two (2) spares are provided, etc.
 - 8.2 The spare camera assembly shall be the same manufacturer and model provided for the camera assemblies installed on the poles.
 - 8.3 The spare camera assembly shall include all necessary materials including but not limited to camera, enclosure, code converters, cables, etc. to replace any camera assembly requiring service.

- 8.4 The Contractor is allowed to use the spare camera assembly to replace defective camera assemblies during the equipment operations period. The Contractor shall replace the defective camera assembly at no additional cost to the Department.
- 8.5 The Contractor shall provide to the Department a properly operating spare camera assembly at the end of the equipment operations item.

CONSTRUCTION METHODS:

1.0 Camera Assembly

- 1.1 All assemblies, including camera, lens, pan-tilt unit, enclosures and receiver/drivers, shall be assembled and factory tested prior to delivery to the job site.
- 1.2 The assemblies shall be delivered to the job site as complete units, and installed on new poles or mount as shown on the plans or as directed by the Engineer. Assemblies shall be mounted directly to the lowering device, supporting bracket attached to the steel span pole or mount as indicated on the plans or as Directed by the Engineer. The camera assembly shall be mounted in such a way that all designated areas are available for viewing by operating the pan, tilt and zoom functions.
- 1.3 The Contractor shall design the required mounting adapters and hardware required to attach the camera assembly to the supporting bracket. Pole-mounted adapters shall be electrically bonded to the support bracket and pole. Camera assemblies shall be electrically bonded to the mounting adapter.
- 1.4 The Contractor shall pay particular attention to protection of the camera assembly dome enclosure glass face during installation. It is important that any clear surfaces not be scratched or marred. If any damage is observed by the Engineer, the Contractor will be required to replace the affected equipment at no cost to the State.
- 1.5 The Contractor shall clean all equipment during installation as required by the manufacturer. This is especially important for clear surfaces which must be free of any static electricity that can attract dust. The Contractor shall coat the exterior side of any clear surfaces with a water-resistant chemical, if use of such chemical is approved by the manufacturer.

- 1.6 All programming for all camera assemblies shall be conducted by an Integrator that is certified by the camera manufacturer. The Contractor shall submit certified integrator qualifications, including contact names and previous experience, to the Engineer as part of the catalog cut submittal.
- 1.7 The Integrator shall program each camera to fully utilize the capabilities of all programmable features to the satisfaction of the Engineer, including night time and other varying light conditions. The Integrator shall be responsible for coordinating the integration dates and times with the Engineer. The Integrator shall demonstrate to the Engineer that all programming features are included as specified.
- 1.8 The Contractor shall complete all camera programming at least two working days after the successful establishment of video and data communications between the camera site and the Hartford traffic Operations Center. The Contractor/Integrator shall contact the Traffic Operations Engineer to coordinate the completion of all programmable features. Upon completion of the program features, the Contractor/Integrator shall record the program settings for each camera assembly and submit two copies to the Engineer for review and approval.

2.0 Local Camera Controller Installation

- 2.1 If a shelf-mounted local camera controller is used, the Contractor shall install the controller in the traffic cabinet and furnish and install all necessary cables to interface the camera controller with the junction box, video camera output signal and power source.
- 2.2 If a manufacturer's keyboard is used for local camera control, the Contractor shall be responsible for purchasing a keyboard that is utilized for programming and configuring camera operation. Use of the keyboards provided as part of this contract item will not be allowed.
- 2.3 The Contractor is responsible for the purchase and supply of a video monitor and any other equipment required for on-site programming and configuration.

3.0 Camera Cable Assembly Installation

- 3.1 The Contractor shall supply and install all required interface cables between the camera assembly, junction box, local camera controller and the power source. All cables shall be routed between the camera assembly via the inside of the camera pole or in a conduit. A ground wire shall be provided between the camera assembly and the traffic controller cabinet.
- 3.2 Wiring shall run continuous from source to destination. No splices will be allowed. Coaxial cables shall be installed without damaging the connectors, insulation or jacket. The coaxial cables shall not be kinked or bent tighter than the manufacturer's recommended bending radius. Sufficient slack cable shall be provided for equipment movement. All cabling shall be secured with tie-wraps and protected from physical damage. All interconnecting wiring and connectors shall meet all necessary standards with regard to voltage, current and environmental ratings. All electrical cable shall meet the requirements of the National Electrical Code.

4.0 Camera Assembly Tests

- 4.1 The Contractor shall be responsible for the provision of all testing and documentation required to obtain approval and acceptance of the production, installation and operation of these materials, equipment and the overall system. The Contractor shall test each camera assembly as shown on the plans as described herein or as directed by the Engineer.
- 4.2 The Contractor shall test all cables for continuity, short circuits or grounds. Tests on cables with connectors attached (connectorized) shall be performed after installation. The Contractor shall perform system integration testing to ensure that the video interface and camera interconnect wiring functions properly and complies with all relevant standards when used in operation with all other devices installed under this contract or the procurement contract.
 - Verification of installation of specified cables and connections between camera assembly and the traffic controller cabinet.
 - Local operation of all CCTV equipment, exercising the pan, tilt, zoom, focus, iris opening, shutter control, power on/off and all other functions described herein this specification while observing the video picture on a portable monitor.
 - Demonstration of camera sensitivity at low light levels to meet the specified requirements.

- Demonstration of pan/tilt speed and extent of movement to meet the specified requirements.
- Verify that video output from the camera is a 1-volt peak-to-peak, composite NTSC signal.
- Preset test to ensure camera consistently goes to the proper preset position.

4.3 Whenever any unit of equipment fails to pass the assembly tests, the Contractor shall correct the deficiencies, either by repair or replacement, at his expense (including freight costs) as required to comply with the testing requirements. Upon notification by the Contractor that the deficiencies have been corrected, the equipment shall be re-tested. All camera assembly testing and any re-testing shall be performed in the presence of the Engineer or his designated representative. The Contractor shall provide all test results to the Engineer in writing seven working days after the completion of each individual camera assembly test.

5.0 Factory Tests

- 5.1 All camera equipment furnished by the Contractor shall be tested and subjected to a nominal 72-hour burn-in period at the factory. The factory tests shall be in accordance with the manufacturer's standard procedures and quality assurance program.
- 5.2 The Contractor shall provide the Engineer with a copy of the manufacturer's test procedures and quality assurance procedures for information. If the Engineer determines that these procedures are not adequate, the Engineer may require that the Contractor conduct additional tests prior to installation. The Contractor shall provide documentation certifying and showing that each item supplied has passed factory inspection, burn-in and testing.

6.0 Central Control Tests

- 6.1 The central control tests shall demonstrate that all equipment furnished by the Contractor has been installed properly and operates as a fully functional CCTV surveillance system using the existing Hartford Traffic Operations video camera control system. Prior to initiating the central control tests, all camera assembly tests specified in (a) herein shall have been successfully conducted by the Contractor in the presence of the Engineer or his designated representative.
- 6.2 In the event that any Contractor-provided component of the CCTV surveillance system malfunctions or operates below the level specified, the Contractor shall be required to determine and correct the problems, including repair or replacement of equipment, at no cost to the City. The Contractor shall respond with a qualified technical representative on site to determine and correct any problems within 24 hours following notification by the Engineer. The central control tests shall resume upon correction of the problem. In the event a malfunction is the result of equipment not installed by the Contractor (e.g., power service, etc.), the central control tests will be suspended until these problems are corrected by others.

7.0 Daytime Tests

- 7.1 All central control and monitoring equipment shall be tested from the Hartford Traffic Operations Center facility during daytime hours. The Contractor shall contact the Traffic Operations Engineer to arrange and coordinate the testing procedure. The tests shall include, but not be limited to the following:
- Operation of all newly installed camera assemblies from the central controller, exercising the pan, tilt, zoom, focus, presets, iris opening and all other functions and features described herein this specification while observing the video picture on the local monitor.
 - Display of each camera on a designated video monitor to verify proper operation and picture quality from each camera.
- 7.2 The Contractor shall correct any operational problems encountered with the video camera system during this test.

8.0 Nighttime Tests

8.1 A second central control test shall be performed during the hours of darkness to verify proper operation of the auto iris lenses, shutter control and the absence of video signal noise. This test shall be conducted in the presence of the Engineer or his designated representative at the Hartford Traffic Operations Center. The test shall include the following as a minimum:

- Operation of all newly installed camera assemblies from the central controller, exercising the pan, tilt, zoom, focus, presets, iris opening and shutter control functions while observing the video picture on the local monitor.
- Display of each camera on a designated video monitor to observe both the brightest and darkest scenes available from each camera location.

8.2 The Contractor shall correct any operational problems encountered with the video camera system during this test.

9.0 Additional Tests

9.1 The Contractor shall be responsible for the all the equipment during a 30 Day Camera Operational Test.

METHOD OF MEASUREMENT:

The work to be measured for payment under this item shall be the number of Camera Assemblies of the type specified, installed, completed, tested and accepted.

BASIS OF PAYMENT:

This work shall be paid for at the contract unit price for each "Camera Assembly" of the type specified, which price shall include all equipment including camera, lens, code distributors-translators-converters, dome pan-tilt mechanism, enclosures, receiver/drivers, local camera controller, power supply, interconnect wiring, mountings, cabling and connectors, testing, and all labor, materials, tools, equipment, transportation, storage and other incidentals necessary to complete the work.

<u>PAY ITEM</u>	<u>DESCRIPTION</u>	<u>PAY UNIT</u>
0270001	Camera Assembly	EA