

SECTION 687

CLOSED CIRCUIT TELEVISION (CCTV) FIELD EQUIPMENT

DESCRIPTION

687.01.01 GENERAL

- A. This specification shall govern the furnishing and installation of Closed Circuit Television (CCTV) field equipment at designated field locations and equipment cabinets as shown on the plans.
- B. This equipment will be installed by the Contractor at designated sites, and all hardware, software, and assorted components needed for the proper operation of the units shall be supplied.
- C. All materials furnished, assembled, fabricated, and installed under this item shall be new, corrosion-resistant, and in accordance with the specifications.
- D. The equipment design and construction shall utilize the latest techniques with a minimum number of parts, subassemblies, circuits, cards, and modules to maximize standardization and commonality.
 - 1. The equipment shall be designed for ease of maintenance.
 - 2. All component parts shall be readily accessible for inspection and maintenance.
- E. All equipment shall be approved by the FAST Director or designee, prior to installation.

MATERIALS/EQUIPMENT

687.02.01 FUNCTIONAL REQUIREMENTS

- A. The CCTV Field Equipment together with the CCTV central equipment in the Traffic Management Center (TMC) will form a complete CCTV system that shall meet the following requirements.
- B. The minimum Mean Time Between Failures (MTBF) shall be 10 years.
- C. All camera housings shall have an onboard encoder.
 - 1. The unit shall be capable of, at a minimum, H.265, H.264, MPEG4, and MJPEG encoding.
 - 2. The unit shall be capable of broadcasting in both unicast and multicast formats.
 - 3. The unit must be capable of producing multiple broadcast streams.
- D. The video camera positioning system shall provide dual-mode day (color) and night (color) video images with an optical zoom lens and a high-speed positioning system.
 - 1. The lens shall have a focal length of 4.3mm to 129 mm with auto and manual focus.
 - 2. The camera shall provide a minimum of 12x digital zoom.
 - 3. The video camera shall have a minimum of 1080p resolution.
 - 4. The camera shall provide Wide Dynamic Range (WDR), which can be manually enabled/disabled via software.
- E. The camera shall be provided with electronic stabilization.

1. The pan function shall provide 360 degrees of continuous rotation, with a variable speed of at least 90 degrees.
 2. The tilt function shall provide 360 degrees of movement, with a speed of at least 90 degrees per second.
 3. Up to 64 presets shall be available for storing and recalling zoom, pan, and tilt positions.
 4. The positioner shall be capable of a range of 1 to 16 compass points.
 5. All camera functions and pan and tilt functions shall be operable via RS-422, RS-485, and/or Ethernet communications.
 6. Communications protocol command set shall be capable of using, at a minimum, Freeway and Arterial System of Transportation (FAST), the National Transportation Communications for Intelligent Transportation System Protocol (NTCIP), Open Network Video Interface Forum (ONVIF), and COHU.
- F. Additional Features:
1. Minimum of 30x optical zoom lens.
 2. Continuous digital zoom with selectable range from off to at least 12x.
 3. Electronic Image Stabilization.
 4. Auto/Manual Focus.
 5. Selectable shutter speeds from 1/2 second to 1/10,000 second.
 6. Composite video output shall be NTSC format.
 7. Adjustable color balance.
 8. Programmable on-screen character generator.
 9. WDR feature is required.
 10. Camera addressing via Ethernet and/or serial control.
 11. An IP68 camera-certified sealed enclosure.
 12. Continuous rotation capability in either direction.
- G. Additional Camera Specifications:
1. Imager: 1 / 2.8 inch Exmor CMOS.
 2. Image Area: 3.6 mm horizontal by 2.7 mm vertical.
 3. Maximum Lens Aperture: f/1.46 wide-angle to f/4.7 telephoto.
 4. Optical Zoom Speed: Variable speed per manufacturer.
 5. Horizontal Angle of View: Optical: 3.7 degrees to 2.3 degrees.
 6. Minimum Focus Distance: 1200 mm in telephoto, 10 mm in wide angle.
 7. Flash Memory: Update firmware and new features via Serial, Ethernet, or IP communication.
 8. Manual Shutter: From 1 to 1/10,000 selectable shutter speeds per second.
 9. Iris: Manual or auto selectable electronically controlled to provide optimal sensor illumination for constant video output.

10. Gamma: 0.45 or straight.
 11. AGC: Variable.
 12. Color Balance: Auto, Indoor, Outdoor, ATW, Sodium Vapor, Outdoor Auto.
 13. Signal to Noise Ratio: Greater than 50 dB.
 14. Synchronization: Crystal.
- H. Camera Housing:
1. Each camera housing shall conform to at least IP66 for the body of the housing and IP68 for the camera.
- I. Mechanical Specifications (DSP Camera Assembly):
1. Mounting: Four mounting nuts on the bottom of the base, consistent with the WTI/COHU standard pattern.
- J. Character Generator Specifications:
1. ID characters shall be programmable in size and color.
 2. Camera ID: Up to two lines, each capable of at least 24 characters.
 3. Preset ID: User programmable for each of the 64 preset positions.
 4. Azimuth and Elevation: Position shall be displayed in degrees for AZ and EL position. Position shall be user-selectable.
 5. Internal Temperature Indicator:
 - a. There shall be a visual indication on the video display if the camera's internal temperature is exceeded.
 - b. Message shall be user-enabled/disabled.
 6. Sector Message:
 - a. Up to 16 sectors in 360 degrees shall be able to be defined with up to 24 characters.
 - b. Message shall be programmable via RS-422, RS-485, or Ethernet.
- K. Message Positioning:
1. Messages shall be capable of being positioned at either the top or the bottom of display.
- L. Privacy Zones:
1. Video blanked out for up to eight privacy zones shall be provided.
 2. 1-line and numeric messages shall be displayed.
 3. Message shall be user-enabled/disabled.
 4. Privacy zones shall be programmed via RS-422, RS-485, or Ethernet.
- M. Communication and Camera Addressing Protocol:
1. Control and addressing shall be via RS-422/RS-232, Ethernet, or IP communications.

- a. Additional protocols shall consist of Cohu, ONVIF, and FAST. The National Transportation Communications for ITS Protocol (NTCIP) protocol communications shall be included as an option.
 2. Upon receipt of any given command, the Camera Positioning System shall not take longer than 1.0 second to respond.
 3. All programmable functions shall be stored in non-volatile memory and shall not be lost if a power failure occurs.
 4. System configurations such as video privacy zones, preset text, and sector ID shall be able to be stored in a computer file.
 5. A camera personality shall be able to be cloned or uploaded into a camera in the event that a camera replacement is necessary.
- N. Additional Pan and Tilt Positioning Specifications:
1. The positioning system shall be invertible for mounting to a ceiling.
- O. Tour Specifications:
1. 8-tour sequence shall be able to be defined.
 2. The tour shall be programmed by selecting the preset position by number and then selecting a dwell time.
 - a. The presets shall be able to be used in any order.
 - b. The same preset shall be able to be used more than once as long as the total number of preset positions used does not exceed 32.
 3. The dwell time shall define the length of time paused at each preset position, shall be from 1 second to 60 seconds, and shall be capable of being changed individually for all stops on the tour.
 4. If the appropriate preset ID is programmed, it shall be displayed for each preset position used on the tour.
 5. The tour shall stop upon receipt of a pan command.
 6. All programmable functions shall be stored in non-volatile memory.
- P. Power Requirements:
1. Operating Voltage: Model dependent, using any of the following: 120 VAC Nominal, 60 Hz ± 3 Hz, IEEE 802.3BT, or POE++ and in accordance with NEMA TS-2, Section 2.1.2, "Traffic Control System."
 2. The line variation specifications shall be tested to meet these specifications by an outside agency other than the camera manufacturer. The tests shall be provided upon request.
 3. Primary Input Power Interruption: Comply with NEMA TS-2, Section 2.1.4, "Power Interruption."
 4. Transients Power Service:
 - a. The CCTV field equipment shall comply with NEMA TS-2, Section 2.1.6, "Transients, Power Service" and/or Comité International Spécial des Perturbations Radioélectriques (CISPR) (aka International Special Committee on Radio Interference) 24 levels.

- b. The surge specifications shall be tested to meet these specifications by an outside agency other than the camera manufacturer.
 - c. The tests shall be provided upon request.
5. Power consumption shall not exceed a total of 60 W.
- Q. Environmental Specifications:
1. Ambient Temperature Limits (Operating): -40 °F to 165 °F, NEMA TS-2, Section 2.1.5.1.
 2. Ambient Temperature Limits (Storage): -50 °F to 185 °F, NEMA TS-2, Section 2.1.5.1.
 3. The environmental specifications of the camera shall be tested to meet these specifications by an outside agency other than the camera manufacturer. The tests shall be provided upon request.
 4. Humidity: Up to 100% relative humidity in accordance with the IP 67 rating.
 5. Other: Withstand exposure to sand, dust, fungus, and salt atmospheres.
 6. Shock: Up to 10 g's, 10 ms, in any axis under non-operating conditions, in accordance with NEMA TS-2, paragraphs 2.1.10, 2.2.4, and 2.2.9.
 7. Vibration: Immunity to shock shall be tested according to NEMA TS-2, paragraphs 2.1.10 and 2.2.4 using a 10g amplitude, 10 ms duration shock pulse in each of three mutually perpendicular axes.
 8. Wind Loading: 150 mph wind load survivability, operability to 70 mph.
- R. Mounting Configurations: The Camera Positioning System shall include at least five possible mounting configurations: wall mount, pole mount, parapet mount, corner mount, and pedestal mount versions.
- S. Main Interface Connector: The main interface connector on a 120 VAC model shall be equivalent to an Amphenol 206036-3 with back shell 206070-1 and mating connector equivalent to an Amphenol 206037-11 with clamp 206070-1. On a PoE camera model, the standard shall call for a CAT6 or higher-rated cable.

687.02.02 WARRANTY

- A. The camera shall include a three year warranty that includes parts and labor.
- B. The three year period shall begin at the time of acceptance of the project.

CONSTRUCTION

687.03.01 CABLE HARNESS

- A. The cable(s) used for CCTV control, video, and/or 120 VAC power shall be installed as an integrated unit.
- B. An approved camera manufacturer wiring harness shall be used.
- C. The wiring shall be installed from the CCTV unit to the Ethernet switch.
 1. The Contractor shall be responsible for determining the length needed, and order the correct size accordingly.
 2. Connectors at both ends of the cable are required.

687.03.02 DOCUMENTATION

- A. Complete documentation of the system, as it is built, shall be provided by the Contractor.
 - 1. A minimum of two copies of descriptive manuals and brochures for each type of electronic equipment and apparatus proposed for this project shall be supplied.
 - 2. These documents shall contain sufficient technical data for complete evaluation. The quality, function, and capability of each deliverable item shall be described.
 - 3. Manuals or brochures shall be originals or copies equal to originals.

687.03.03 OPERATIONAL TESTING

- A. Upon completion of the system integration testing, the CCTV field equipment shall be required to complete a 30-day period of acceptable operation.
 - 1. The system operational test shall fully and successfully demonstrate all system functions using live data and controlling all system activities.
 - 2. Failure in any hardware item during the test period, with the exception of expendable items such as fuses and minor equipment as determined by the FAST Director or designee, prior to installation, shall necessitate restarting the 30-day test period for its full 30-day duration upon repair.
 - 3. Any failure of system software, discovery of a software deficiency that causes a system malfunction, or discovery of software operation that is not in compliance with the specifications shall cause the 30-day test to be restarted in its entirety after correction of the software problem.
 - 4. No intermittent hardware, software, communication, or control operation; malfunction not related to a specific hardware; or software malfunction shall be permitted to persist during the test period. Diagnostic testing that does not result in changes to system hardware or software shall result only in the loss of acceptable test time.

METHOD OF MEASUREMENT

687.04.01 MEASUREMENT

- A. The quantity of CCTV field equipment shall be measured per each.

BASIS OF PAYMENT

687.05.01 PAYMENT

- A. The accepted quantity of CCTV field equipment will be paid at the Contract unit price bid per each which shall be full compensation for the video camera, zoom lens, pan/tilt drive, camera housing, pole mount, receiver/driver, surge protection devices, and all cables, connections and hardware, measured as provided under **Subsection 687.04.01, "Measurement,"** complete including warranty, installation, and testing of the equipment as specified and shown on the drawings.
- B. Pre-assembly of CCTV equipment and components shall be considered incidental to CCTV field equipment.
- C. Payment will be made under:

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687

PAY ITEM

PAY UNIT

CCTV Field Equipment..... Each