



Illinois Department of Transportation

2300 South Dirksen Parkway / Springfield, Illinois / 62764

July 27, 2022

SUBJECT FAI Route 270/FAP Route 310 (I-270/IL 255)
Project HSIP-DXAF (431)
Section 60-1, 9SG-1
Madison County
Contact No. 76P66
Item No. 32, August 5, 2022 Letting
Addendum B

NOTICE TO PROSPECTIVE BIDDERS:

Attached is an addendum to the plans or proposal. This addendum involves revised and/or added material.

1. Revised pages i-ii of the Table of Contents
2. Revised pages 36-41 of the Special Provisions.
3. Added pages 74-87 of the Special Provisions

Prime contractors must utilize the enclosed material when preparing their bid and must include any changes to the Schedule of Prices in their bid.

Very truly yours,

A handwritten signature in black ink, appearing to read "Jack A. Elston".

Jack A. Elston, P.E.
Bureau Chief, Design and Environment

MTS

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FAI ROUTE 270/FAP ROUTE 310 (I-270/IL 255)
PROJECT HSIP-DXAF (431)
SECTION 60-1, 9SG-1
MADISON COUNTY
CONTACT NO. 76P66

2

CLOSED CIRCUIT TELEVISION DOME CAMERA, HD 74

Basis of Payment: This work will be paid for at the contract unit price per EACH for REMOVE EXISTING ITS EQUIPMENT.

CAT 5 ETHERNET CABLE

This work shall be in accordance with Sections 873, 1076, and 1088 of the Standard Specifications, except as modified herein.

This work shall consist of furnishing and installing an outdoor rated CAT5E cable in conduits, handholes, and poles.

The cable shall be rated for outdoor use and conform to the following specifications:

- Outdoor CMX rated jacket (climate/oil resistant jacket)
- UV resistant outer jacket material (PVC-UV, UV Stabilized)
- Outer jacket ripcord
- Designed For outdoor above- ground or conduit duct applications
- Cat5E rated to 350MHz (great for 10/100 or even 1000mbps gigabit Ethernet)
- Meets TIA/EIA 568b.2 standard
- Shielded twist pair
- 4 pairs, 8 conductors
- 24AWG, solid core copper
- UL 444 ANSI TIA/EIA-568.2 ISO/IEC 11801
- RoHS compliant
- Water blocking gel

Basis of Payment: This work will be paid for at the contract unit price per FOOT for CAT 5 ETHERNET CABLE.

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FIBER OPTIC ETHERNET DROP AND REPEAT SWITCH

The Contractor shall furnish a fiber optic drop and repeat switch complete with the accessories specified below and install it inside the proposed traffic signal cabinet.

The fiber optic drop and repeat switch shall meet or exceed the following minimum specifications:

Approved Models: Antaira (Aaxeon) Technologies Model LNX-0702C-SFP-T (7-Port (5-port 10/100T + 2 10/100/1000T SFP ports industrial Ethernet switch, wide operating temperature) or approved equal.

CLOSED CIRCUIT TELEVISION DOME CAMERA, HD

Description. This work shall consist of furnishing and installing an integrated Closed-Circuit Television (CCTV) Dome Camera Assembly, camera bracket, and all other items required for installation and operation. This assembly shall contain all components identified in the Materials Section and shall be configured as indicated on the plan sheets.

Materials.

The CCTV camera shall be an outdoor rated dome camera with 1920x1080 HD resolution, 31x optical zoom, laser focus, speed dry, and full VAPIX API support for software integration.

The Contractor shall provide all materials required to install the proposed camera on the proposed camera pole or existing light pole as shown on the plan sheets.

The Contractor shall submit catalog cut sheets to the Department for all items (mounting brackets, hardware, etc.) that will be utilized for review prior to commencing work.

The Department will program the cameras prior to installation.

The camera shall meet or exceed the following specifications:

PART 1 GENERAL

1.01 SYSTEM DESCRIPTION

A. General Requirements

1. The specified unit shall be of manufacturer's official product line, designed for commercial and/or industrial 24/7/365 use.

2. The specified unit shall be based upon standard components and proven technology using open and published protocols.

3. Related Requirements

- a. 28 05 07.21 PoE Power Sources for Electronic Safety and Security
- b. 28 05 11 Cyber Security Requirements for Electronic Safety and Security
- c. 28 05 19 Storage Appliances for Electronic Safety and Security
- d. 28 05 21 Network Attached Storage for Electronic Safety and Security
- e. 28 05 23 Storage Area Network for Electronic Safety and Security
- f. 28 23 11 Video Management System Analytics
- g. 28 23 13 Video Management System Interfaces

B. Sustainability

1. The specified unit shall be manufactured in accordance with ISO 14001.

2. The specified unit shall be compliant with the EU directives 2011/65/EU (RoHS) and 2012/19/EU (WEEE).
3. The specified unit shall be compliant with the EU regulation 1907/2006 (REACH).
4. The specified unit, including all its components, shall not contain any added PVC.
5. The manufacturer shall have signed and support the UN Global Compact initiative as defined by United Nations.

1.02 CERTIFICATIONS AND STANDARDS

A. General abbreviations and acronyms

1. AGC: Automatic gain control
2. ABR: Average Bit Rate
3. AES: Advanced Encryption Standard
4. API: Application Programming Interface
5. Aspect ratio: A ratio of width to height in images
6. Bit Rate: The number of bits/time unit sent over a network
7. Bonjour: Enables automatic discovery of computers, devices, and services on IP networks.
8. DHCP: Dynamic Host Configuration Protocol
9. DNS: Domain Name System
10. EIS: Electronic Image Stabilization
11. FPS: Frames per Second
12. FTP: File Transfer Protocol
13. SFTP: Secure File Transfer Protocol
14. H.264 (Video Compression Format)
15. H.265 (Video Compression Format)
16. HSMS: Hosted Security Management System (SaaS PACS Application)
17. IEEE 802.1x: Authentication framework for network devices
18. IP: Internet Protocol
19. IR light: Infrared light
20. ISO: International Standards Organization
21. JPEG: Joint Photographic Experts Group (image format)
22. LAN: Local Area Network
23. LED: Light Emitting Diode
24. LPR: License Plate Recognition
25. Lux: A standard unit of illumination measurement
26. MBR: Maximum Bit Rate
27. MPEG: Moving Picture Experts Group
28. Multicast: Communication between a single sender and multiple receivers on a network
29. NTP: Network Time Protocol
30. NTSC: National Television System Committee – a color encoding system based on 60Hz
31. ONVIF: Global standard for the interface of IP-based physical security products
32. PACS: Physical Access Control System
33. PAL: Phase Alternating Line – a color encoding system based on 50Hz

34. PoE: Power over Ethernet (IEEE 802.3af/at) standard for providing power over network cable
35. Progressive scan: An image scanning technology which scans the entire picture
36. PTZ: Pan/Tilt/Zoom
37. QoS: Quality of Service
38. RAID: Redundant Array of Independent Disks
39. RMD: Radar Motion Detection
40. RPC: Remote Procedure Call
41. SaaS: Software as a Service
42. SIP: Session Initiation Protocol
43. SMTP: Simple Mail Transfer Protocol
44. SMPTE: Society of Motion Picture and Television Engineers
45. SNMP: Simple Network Management Protocol
46. SSL: Secure Sockets Layer
47. TCP: Transmission Control Protocol
48. TLS: Transport Layer Security
49. Unicast: Communication between a single sender and single receiver on a network
50. UPnP: Universal Plug and Play
51. UPS: Uninterruptible Power Supply
52. VBR: Variable Bit Rate
53. VMS: Video Management System
54. WDR: Wide dynamic range

B. The specified unit shall carry the following EMC approvals:

1. EN 55032 Class A
2. EN 55035,
3. EN 61000-3-2
4. EN 61000-3-3
5. EN 61000-6-1
6. EN 61000-6-2
7. FCC Part 15 Subpart B Class A
8. ICES-3(A)/NMB-3(A)
9. VCCI Class A
10. RCM AS/NZS CISPR 32 Class A
11. CISPR 35, EAC
12. KC KN32 Class A
13. KC KN35

C. The specified unit shall meet the following product safety standards:

1. IEC/EN/UL 62368-1
2. CAN/CSA C22.2 No. 62368-1
3. IEC/EN/UL 60950-22
4. CAN/CSA-C22.2 No. 60950-22
5. IEC/EN 62471 risk group 2
6. IEC 60825-1 Class 1

D. The specified unit shall meet relevant parts of the following video standards:

1. SMPTE 296M (HDTV 720p)
2. SMPTE 274M (HDTV 1080p)

E. The specified unit shall meet the following standards

1. MPEG-4:
 - a. ISO/IEC 14496-10 Advanced Video Coding (H.264)
 - b. ISO/IEC 23008-5 Advanced Video Coding (H.265)
2. Networking:
 - a. IEEE 802.3bt (Power over Ethernet Plus)
 - b. IEEE 802.1x (EAP-TLS) (Authentication)
 - c. IPv4 (RFC 791)
 - d. IPv6 (RFC 2460)
 - e. QoS – DiffServ (RFC 2475)
3. Mechanical Environment:
 - a. IEC/EN 62262 IK10,
 - b. IEC/EN 60529 IP66,
 - c. NEMA 250
 - d. Type 4X
 - e. NEMA TS 2 (2.2.7–2.2.9)
 - f. IEC 60068-2-1
 - g. IEC 60068-2-2
 - h. IEC 60068-2-6
 - i. IEC 60068-2-14
 - j. IEC 60068-2-27
 - k. IEC 60068-2-78
 - l. ISO 21207 (Method B)
4. Railway environment:
 - a. EN 50121-4
 - b. IEC 62236-4
5. Network:
 - a. NIST SP500-267

1.03 QUALITY ASSURANCE

A. The contractor or security sub-contractor shall be a licensed security Contractor with a minimum of five (5) years' experience installing and servicing systems of similar scope and complexity and evidence that is completed at least three (3) projects of similar design and is currently engaged in the installation and maintenance of systems herein described.

B. All installation, configuration, setup, program and related work shall be performed by electronic technicians thoroughly trained by the manufacturer in the installation and service of the equipment provided.

C. The contractor or designated sub-contractor shall submit credentials of completed manufacturer certification, verified by a third-party organization, as proof of the knowledge.

D. The specified unit shall be manufactured in accordance with ISO9001.

1.04 WARRANTY

A. The manufacturer shall provide a five (5) year limited hardware warranty for product that is free from defects in design, workmanship and materials under substantiated normal use. Defective products under the warranty period will be either repaired or replaced by the manufacturer.

PART 2 PRODUCTS

2.01 GENERAL

A. The product shall be IP-based and comply with established network and video standards.

B. The product shall be powered by the switch utilizing the network cable. Power injectors (midspans) shall be provided by the contractor when required for proper operation.

C. The product shall be fully supported by an open and published API (Application Programmers Interface), which shall provide necessary information for integration of functionality into third-party applications.

2.02 VIDEO SURVEILLANCE SCHEDULE

A. The product or product types listed below describing various resolutions, form-factor and features shall be supplied by a single manufacturer for video surveillance system.

B. The product description will be as follows:

1. High-end outdoor-ready HDTV 1080p PTZ camera with quick-zoom, laser focus, 31x optical zoom, and full VAPIX API support for software integration

2.03 VIDEO SURVEILLANCE CAMERAS

A. High-end outdoor-ready HDTV 1080p PTZ camera with quick-zoom and laser focus

1. The specified product shall meet or exceed the following design specifications:

- a. The camera shall operate on an open source and Linux-based platform, and include a built-in web server.
- b. The camera shall provide a removable IR-cut filter, providing day/night functionality.
- c. The camera shall be equipped with a motorized 31x optical zoom lens with P-Iris, providing a horizontal field of view between 60.6° and 2.0° and a vertical field of view between 36.5° and 1.1°.
- d. The camera shall incorporate functionality for vibrate the dome in order to provide clear images in rainy weather and to simplify dome cleaning.
- e. The camera shall be designed to provide an image up to 20° above the horizon without any loss of image quality.
- f. The camera shall provide local video storage utilizing a SD/SDHC/SDXC memory card expansion.

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- g. The camera shall be manufactured with a repaintable metal (aluminum) casing.
 - h. The camera shall be manufactured with an IP66-, IP67- and NEMA 4X-rated, IK10 casing with a polycarbonate hard coated dome.
 - i. The camera shall incorporate a built-in laser that provides instant and correct focus.
2. The specified product shall meet or exceed the following performance specifications:
- A. Illumination
 - 1. The camera shall meet or exceed the following illumination specifications:
 - a. Color: 0.06 lux at 30 IRE, F1.36
 - b. B/W: 0.001 lux at 30 IRE, F1.36, 0 lux with IR illumination on
 - c. Color: 0.09 lux at 50 IRE, F1.36
 - d. B/W: 0.008 lux at 50 IRE, F1.36, 0 lux with IR illumination on
 - B. Resolution
 - 1. The camera shall be designed to provide video streams in HDTV 1080p (1920x1080) at up to 60 frames per second (60Hz mode) or 50 frames per second (50Hz mode) using H.264 or Motion JPEG.
 - 2. The camera shall support video resolutions including:
 - a. 1920x1080 (HDTV 1080p)
 - b. 1280x720 (HDTV 720p)
 - C. Encoding
 - 1. The camera shall provide independently configured simultaneous H.264 and Motion JPEG streams.
 - 2. The camera shall provide configurable compression levels.
 - 3. The camera shall provide a video streaming indicator.
 - 4. The camera shall support standard baseline profile with motion estimation.
 - 5. The camera shall support motion estimation in H.264/MPEG-4 Part 10/AVC.
 - 6. The camera shall support motion estimation in H.265 (MPEG-H Part 2/HEVC)
 - 7. The camera shall support the following video encoding algorithms:
 - a. Motion JPEG encoding in a selectable range from 1 up to 50/60 frames per second.
 - b. Baseline Profile H.264 encoding with motion estimation in up to 50/60 frames per second.
 - c. Main Profile H.264 and H.265 encoding with motion estimation and context-adaptive binary arithmetic coding (CABAC) in up to 50/60 frames per second.
 - d. High Profile H.264 encoding with motion estimation up to 50/60 frames per second.
 - 8. The camera shall in H.264 and H.265 support combining Variable Bit Rate (VBR), Average Bit Rate (ABR) and Maximum Bit Rate (MBR)
 - 9. The camera shall be able to deliver predictable storage using Average Bit Rate (ABR) bitrate controlling algorithm based on a bitrate budget and selected retention time.
 - a. The camera shall be able to deliver predictable storage using Average Bit Rate (ABR) bitrate controlling algorithm based on a bitrate budget and the selected retention time.
 - 1. The ABR bitrate algorithm, depending on the bitrate budget and the selected retention time, shall adjust the bitrate to meet the bitrate budget over the whole retention time.

2. The ABR algorithm shall have a method to keep the video quality even during busy periods by allowing the current bitrate to be significantly above the configured average bitrate during significant parts of the retention time.
 - b. The camera shall in H.264 and H.265 support flexible retention period for Average Bit Rate (ABR) algorithm up to 1 year.
 - c. When using Average Bit Rate (ABR) the camera shall keep bitrate history up to at least 30 days.
 - d. The camera shall in H.264 and H.265 support reuse of past Average Bit Rate (ABR) history if a stream is disconnected and the camera reconnects with the same basic stream parameters.
 - e. When using Average Bit Rate (ABR), the camera shall in H.264 and H.265 support multiple parallel stream with independent ABR-history.
 - f. The camera shall issue bitrate degradation events when using Average Bit Rate (ABR) if the configuration is predicted to be
 1. unrealistic
 2. not fulfilling basic quality requirements
 3. not fulfilling the bitrate budget.
10. The camera shall support scene adaptive bitrate control with one of the following capabilities to lower bandwidth and storage:
- a. Automatic dynamic Region of Interest to reduce bitrate in unprioritized regions in order to lowering bandwidth and storage requirements.
 - b. Automatic dynamic Group of Pictures to lower bandwidth and storage requirements
 - c. Automatic dynamic Frames per Second to lower bandwidth and storage requirements
 - d. Transmission
 1. The camera shall allow for video to be transported over:
 - a. HTTP (Unicast)
 - b. HTTPS (Unicast)
 - c. RTP (Unicast & Multicast)
 - d. RTP over RTSP (Unicast)
 - e. RTP over RTSP over HTTP (Unicast)
 - f. SRTP (Unicast & Multicast)
 2. The camera shall support Quality of Service (QoS) to be able to prioritize traffic.
 - e. Image
 1. The camera shall incorporate automatic and manual white balance.
 2. The camera shall incorporate an electronic shutter operating in the range of 1/111000 to 1/2s.
 3. The camera shall incorporate capture mode with the following settings:
 - a. HDTV 1080p (1920x1080) with WDR: Up to 50/60 fps (50/60 Hz)
 4. The camera shall incorporate forensic wide dynamic range functionality providing up to 120 dB dynamic range.
 5. The camera shall support manually defined values for:
 - a. Saturation
 - b. Brightness
 - c. Sharpness
 - d. Contrast
 6. The camera shall allow for rotation of the image.

7. The camera shall incorporate a function for Electronic Image Stabilization (EIS) for real-time image stabilization.
8. The camera shall incorporate automatic defog functionality.
- f. IR Illumination
 1. The camera shall be equipped with built-in IR LEDs, with a range of up to 300 m (984 ft) with a wavelength of 850 nm.
 2. The camera shall be equipped with built-in IR LEDs with automatic seamless adapting angle of illumination and intensity.
- g. User Interface
 1. Web server
 - a. The camera shall contain a built-in web server making video and configuration available to multiple clients in a standard operating system and browser environment using HTTP, without the need for additional software.
 - b. Optional components downloaded from the camera for specific tasks shall be signed by an organization providing digital trust services.
 2. Language Specification
 - a. The camera shall provide a function for altering the language of the user interface, and shall include support for at least 10 different languages.
 3. IP addresses
 - a. The camera shall support both fixed IP addresses and dynamically assigned IP addresses provided by a Dynamic Host Control Protocol (DHCP) server.
 - b. The camera shall allow for automatic detection of the camera based on UPnP and Bonjour when using a computer with an operating system supporting this feature.
 - c. The camera shall provide support for both IPv4 and IPv6.
 - d. The camera shall provide support for IPv6 USGv6.
- h. PTZ functionality
 1. The camera shall:
 - a. Provide preset positions functionality.
 - b. Provide On-screen directional indicator (OSDI) functionality.
 - c. Be equipped with accurate pan and tilt functionality with a range of:
 1. Pan: 360°
 2. Tilt +20° to -90°
 - d. Provide pan and tilt speed in a range of:
 1. Pan: 0.05° - 550°/sec
 2. Tilt: 0.05° - 500°/sec
 - e. Provide optical and digital zoom functionality:
 1. Optical zoom: 31x
 2. Digital zoom: 12x
 - f. Provide adjustable zoom speed.
 - g. Provide a guard tour functionality which allows the dome to automatically move between selected presets using an individual speed and viewing time for each preset.
- i. Event conditions
 1. The camera shall be equipped with an integrated event functionality:
 - a. Device status
 1. Above operating temperature
 2. Above or below operating temperature

3. Below operating temperature
4. Within operating temperature
5. Fan
6. IP address
7. Network lost
8. Shock detection
9. Storage failure
10. System ready
- b. Edge storage
 1. Recording ongoing
 2. Storage disruption
- c. I/O
 1. Manual trigger
 2. Virtual inputs
- d. PTZ
 1. Malfunctioning
 2. Movement
 3. Preset position reached
 4. Ready
- e. Scheduled and recurring
- f. Video
 1. Average bitrate degradation
 2. Day-night mode
 3. Live stream open
2. Response to triggers shall include event actions:
 - a. Record video: SD card and network share
 - b. Upload of images and video clips: FTP, SFTP, HTTP, HTTPS, email or network share
 - c. Send notification: email, HTTP, HTTPS, TCP and SNMP trap
 - d. Pre- and post-alarm video or image buffering for recording or upload
 - e. PTZ: PTZ preset, start/stop guard tour
 - f. Overlay text
 - g. Day and night mode
 - h. WDR mode
 - i. IR illumination
3. The camera shall provide memory for pre- and post-alarm recordings.
- j. Storage
 1. The camera shall support continuous and event controlled recording to:
 - a. Local memory added to the cameras SD-card slot
 - b. Network attached storage, located on the local network
 2. The camera shall incorporate encryption functionality for the SD card (AES-XTS-Plain64 256bit).
 3. The camera shall incorporate encryption functionality for the SD card.
 4. The camera shall be able to detect and notify edge storage disruptions.
- k. Protocol
 1. The camera shall incorporate support for at least IPv4, IPv6 USGv6, ICMPv4/ICMPv6, HTTP, HTTPS, HTTP/2, SSL/TLS, QoS Layer 3 DiffServ, FTP, SFTP, CIFS/SMB, SMTP, mDNS (Bonjour), UPnP®, SNMP v1/v2c/v3 (MIB-II), DNS/DNSv6, DDNS, NTP, RTSP, RTP, SRTP, TCP, UDP,

IGMPv1/v2/v3, RTCP, DHCPv4/v6, SOCKS, SSH, LLDP, CDP, MQTT v3.1.1, Syslog, Link-Local address (ZeroConf).

2. The SMTP implementation shall include support for SMTP authentication.

l. Text overlay

1. The camera shall:

- a. Provide embedded on-screen text with support for date & time, and a customer-specific text, camera name, of at least 45 ASCII characters.
- b. Provide the possibility to choose different font sizes for embedded on-screen text, and to use white or black text on at least four different backgrounds.
- c. Provide the ability to manually set up and configure privacy masks to the image.
- d. Allow for the overlay of a graphical image, such as a logotype, into the image.

m. Security

1. The camera shall support the following:

a. Secure web browsing

1. The use of HTTPS and SSL/TLS, providing the ability to upload signed certificates to encrypt and secure authentication and communication of both administration data and video streams.
2. Restrict access to the built-in web server by usernames and passwords at three different levels.

b. Certificate management

1. Provide centralized certificate management, with both pre-installed CA certificates and the ability to upload additional CA certificates. The certificates shall be signed by an organization providing digital trust services.

c. Enhanced security features

1. The use of signed firmware validates the firmware's integrity before accepting to install it.
2. The use of a secure boot process, based on the use of signed firmware, ensures that the camera can boot only with authorized firmware.
3. The use of trusted platform module (TPM) provides a set of cryptographic features suitable for protecting private keys from unauthorized access.
4. TPM is certified according to FIPS 140-2 level 2.

d. Authentication

1. IEEE 802.1x (EAP-TLS) authentication.
2. Restrict access to pre-defined IP addresses, commonly known as IP address filtering.

e. Brute force delay protection

2. Firmware support

- a. The manufacturer must provide firmware with long-term support that only contains corrections for critical bugs, security flaws and performance issues.
- b. The device should maintain high-level cybersecurity without introducing any significant functional changes or affecting any existing integrations.

n. System integration

1. The camera shall be fully supported by an open and published API (Application Programmers Interface), which shall provide necessary information for integration of functionality into third-party applications.
 2. The camera shall conform to ONVIF profile G as defined by the ONVIF Organization.
 3. The camera shall conform to ONVIF profile S as defined by the ONVIF Organization.
 4. The camera shall conform to ONVIF profile T as defined by the ONVIF Organization.
 5. The camera shall conform to ONVIF profile M as defined by the ONVIF Organization.
- o. Analytics
1. The camera shall provide a platform allowing the upload of third-party applications into the camera.
 2. The camera shall support advanced video analytics capabilities with a built-in hardware-accelerated object detect engine, capable of automatically detecting several simultaneously visible objects from a set of pre-trained object categories (such as vehicles, people and faces).
 3. The camera shall be supplied with preinstalled advanced video analytics capabilities, capable of detecting and classifying humans and vehicles in non-critical indoor and outdoor spaces.
- p. Installation and maintenance
1. The camera shall be supplied with Windows-based management software which allows the assignment of IP addresses, upgrade of firmware and backup of the cameras' configuration.
 2. The camera shall support the use of SNMP-based management tools according to SNMP v1, 2c & 3 / MIB-II.
 3. The camera shall allow updates of the software (firmware) over the network, using FTP or HTTP.
 4. The camera shall store all customer-specific settings in a non-volatile memory that shall not be lost during power cuts or soft reset.
 5. The camera shall accept external time synchronization from an NTP (Network Time Protocol) server.
 6. The camera shall provide a software controlled function for network redundancy when both the SFP module and the RJ45 connector are connected. The SFP connection functions as the primary network link and connection via the fixed RJ45 connector as the fail-over link.
- q. Access log
1. The camera shall provide a log file, containing information about the 250 latest connections and access attempts since the unit's latest restart. The file shall include information about the connecting IP addresses and the time of connecting.
 2. The camera shall provide a connection list of all currently connected viewers. The file shall include information about connecting IP address, time of connecting and the type of stream accessed.
- r. Camera diagnostics
1. The camera shall be equipped with LEDs, capable of providing visible status information. LEDs shall indicate the camera's operational status and provide information about power, communication with receiver, the network status and the camera status.

2. The camera shall be monitored by a Watchdog functionality, which shall automatically re-initiate processes or restart the unit if a malfunction is detected.
 3. The camera shall send a notification when the unit has rebooted and all services are initialized.
- s. Hardware interfaces
1. Network interface
 - a. The camera shall be equipped with one 10BASE-T/100BASE-TX/1000BASE-T Ethernet-port using a RJ45 connector and shall support auto negotiation of network speed and transfer mode (full and half duplex).
 - b. The camera shall be equipped with a SFP slot.
- t. Enclosure
1. The camera shall:
 - a. Be manufactured with an IP66-, IP67, NEMA 4X- and IK10-rated aluminum enclosure.
- u. Power
1. The camera shall provide power over Ethernet IEEE 802.3bt Type 3 Class 6
 - a. Max: 51 W
 - b. Typical: 17 W
 2. The camera shall be connected to a separate midspan and obtain power through a network cable. The midspan shall use 100-240 V AC/50-60 Hz, max 60 W, and provide the camera with a maximum of:
 - a. 51 W when using a 60 W midspan
- v. Environmental
1. The camera shall:
 - a. Operate in a temperature range of -50 °C to 50 °C (-58 °F to 122 °F)
 - b. Operate in a humidity range of 10–100% RH (condensing).

PART 3 EXECUTION

3.01 INSTALLATION

- A. The contractor's or subcontractor's main resources within the project shall carry proper professional certification issued by the manufacturer and verified by a third-party organization to confirm sufficient product and technology knowledge.
- B. The contractor shall carefully follow instructions in documentation provided by the manufacturer to ensure all steps have been taken to provide a reliable, easy-to-operate system.
- C. All equipment shall be tested and configured in accordance with instructions provided by the manufacturer prior to installation.
- D. All firmware found in products shall be the latest and most up-to-date version as specified by the manufacturer, or by the product component provider.
- E. All equipment requiring users to log on using a password shall be configured with user/site-specific password/passwords. No system/product default passwords shall be allowed.

F. A proper installation shall meet NEC (National Electrical Code – US only) per the guidelines of that year’s revision. When properly installed equipment meets Low Voltage, Class 2 classification of the NEC.

Environmental Enclosure/Housing

The environmental enclosure shall be designed to physically protect the integrated camera from the outdoor environment and moisture via a sealed enclosure. If the option exists in the standard product line of the manufacturer, the assembly shall be supplied with an integral sun shield. The enclosure shall be fully water and weather resistant with a NEMA 4 rating or better.

The camera dome shall be constructed of distortion free acrylic or equivalent material that must not degrade from environmental conditions. The environmental housing shall include a camera-mounting bracket. In addition, the environmental housing shall include a heater, blower, and power surge protector.

The enclosure shall be equipped with a heater controlled by a thermostat. The heater shall turn on when the temperature within the enclosure falls below 40°F (4.4°C). The heater shall turn off when the temperature exceeds 60°F (15.6°C). The heater will minimize internal fogging of the dome faceplate when the assembly is operated in cold weather.

In addition, a fan shall be provided as part of the enclosure. The fan will provide airflow to ensure effective heating and to minimize condensation.

The enclosure shall be equipped with a hermetically sealed, weatherproof connector, located near the top for external interface with power, video, and control feeds.

CCTV Dome Camera Mounting Supports

The Contractor shall furnish and install a Pole Mount Bracket with integral IDC wire termination inside the bracket for camera installation on CCTV camera poles and light poles and stainless steel banding as required.

Mounting supports shall be configured as shown on the camera support detail plans and as approved by the Engineer. Mount shall be of aluminum construction with enamel or polyester powder coat finish. Braces, supports, and hardware shall be stainless steel. Wind load rating shall be designed for sustained gusts up to 90 mph (145 km/hr), with a 30% gust factor. Load rating shall be designed to support up to 75 lb (334 N). For roof or structural post/light pole mounting, mount shall have the ability to swivel inward for servicing. The mounting flange shall use standard 1-1/2 inch (38.1 mm) NPT pipe thread.

Connecting Cables

The Contractor shall furnish and install outdoor rated, shielded CAT 5E cable at the locations shown on the plan sheets. The cable shall be terminated using the terminal block inside the camera bracket and the IDC connector and pre-formed IP66 rated RJ-45 connector on the camera end and a shielded RJ-45 connector in the cabinet. The Contractor shall test the cable prior after termination.

Cable will be paid for separately under the pay item CAT 5 ETHERNET CABLE.

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Construction Requirements.

General

The Contractor shall prepare a shop drawing detailing the complete CCTV Dome Camera Assembly and installation of all components to be supplied for approval of the Engineer. Particular emphasis shall be given to the cabling and the interconnection of all of the components.

The Contractor shall install the CCTV dome camera assembly at the locations indicated in the Plans. The CCTV Dome Camera Assembly shall be mounted on a pole, wall, or other structure.

Testing

The Contractor shall test each installed CCTV Dome Camera Assembly. The test shall be conducted from the field cabinet using the standard communication protocol and a laptop computer. The Contractor shall verify that the camera can be fully exercised and moved through the entire limits of Pan, Tilt, Zoom, Focus and Iris adjustments, using both the manual control and presets. The Contractor shall maintain a log of all testing and the results. A representative of the Contractor and a representative of the Engineer shall sign the log as witnessing the results. Records of all tests shall be submitted to the Engineer prior to accepting the installation.

Method of Measurement. The closed circuit television dome camera bid item will be measured for payment by the actual number of CCTV dome camera assemblies furnished, installed, tested, and accepted.

Basis of Payment. Payment will be made at the contract unit price for each CLOSED CIRCUIT TELEVISION DOME CAMERA, HD.