SECTION 28 23 29

IP FIXED VIDEO SURVEILLANCE CAMERAS

(Part of the Work for Section 260001)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the GENERAL REQUIREMENTS AND COVENANTS - DIVISION I, and the SPECIAL PROVISIONS - DIVISIONS IIA and IIB, which are hereby made a part of this Specification Section.

B. Examine all Drawings and all Sections of the Specifications for requirements and provisions affecting the Work of this Section.

1.2 TRADE CONTRACT REQUIREMENTS

A. Work of this Section is part of the Electrical Trade Contract. Refer to Section 26 00 00 "Electrical Trade Contract Requirements" for additional information about this Trade Contract.

1.3 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.4 SUMMARY

A. This section provides specifications for the installation of a fixed IP based video surveillance system and related components.

B. Related Sections

1. Section 08 71 00 Door Hardware
2. Division 21 Fire Suppression
3. Division 26 Electrical
4. Division 27 Communications
5. Division 28 Electronic Safety and Security

1.5 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

B. Video Quality test reports shall be provided for cameras to confirm an optimum high definition video signal.

C. Shop drawings shall reflect requirements associated with Owner provided or existing equipment and materials that will be used as part of this system.

D. Color samples.

E. Battery calculations to show the expected loads and backup duration for camera power supplies and UPS devices for active surveillance equipment.

F. Provide system programming, camera titles, descriptions, camera images and database.

G. Provide camera titles and descriptions prior to system programming.

H. Provide programming/database prior to performance testing.

I. Provide a cross reference between specified camera numbers and programmed camera numbers.

J. Provide final programming, camera images and system documentation on electronic media to Owner.

1.6 DESCRIPTION OF WORK

A. General Requirements

1. Provide labor, materials, tools, equipment, and services for a complete security system as indicated and in accordance with provisions of the contract documents.

2. Although such work is not specifically indicated, provide supplementary or miscellaneous items, and devices incidental to or necessary for a sound, secure and complete installation.

3. System devices and components included shall be compatible.

4. Units of the same type of equipment shall be products of a single manufacturer. Material and equipment shall be new and currently in production. Each major component of equipment shall have the manufacturer's model and serial number in a conspicuous place.

1.7 GENERAL

A. The CCTV System shall provide video surveillance, assessment, and visual alarm monitoring of selected interior and exterior access doors as well as critical areas of the building as specified on the Contract Drawings.

B. The camera shall:

1. Be designed to provide at least two video streams at the resolution specified at up to 30 frames per second (60Hz mode) or 25 frames per second (50Hz mode) using H.264 or Motion JPEG.

2. Be equipped with Day/Night functionality.

3. Be equipped with remote zoom and focus capabilities.

4. Be dome style except for the license plate recognition cameras, which can be bullet or dome style.

5. Operate on an open source; Linux-based platform, and including a built-in web server.

6. Be equipped with a slot for microSD/microSDHC/microSDXC memory card expansion, supporting memory of 64 GB.

7. Be manufactured with a metal vandal resistant body.

8. Be provided with wall, ceiling, building (corner/wall), pendant and pole mounts as indicated on the Contract Drawings Schedules and Typicals.

a. 180 degree, fisheye and fixed dome cameras wall mounted on the exterior of the building shall be surface mounted without the use of a wall mount pendant adaptor unless specifically noted.

i. Wall pendant mounts shall be acceptable at the terrace level as specified in the Contract Documents.

b. Pole mounted cameras shall be mounted with the use of the wall mount and a pole mount adapter.

c. Where installed under building overhangs, exterior cameras shall be flush mounted without the use of a pendant mount.

9. Be recorded on the Network Video Recorder (NVR) and provide full video.

10. Be protected from surges if mounted on the exterior.

11. Shall include a channel license per camera.

12. Shall be compatible with the VMS.

13. Shall provide multi-stream so that recording and viewing can be at different frame rate and compression.

C. The Security Subcontractor shall coordinate space allocation and network IP addresses with the IT department as required.

1.8 SYSTEM DESCRIPTION

A. The camera shall be of manufacturer's official product line, designed for commercial/industrial 24/7/365 use.

B. The camera shall be based upon standard components and proven technology using open and published protocols.

C. The Security Subcontractor shall provide the surveillance system, consisting of camera assemblies, network switches, wiring & cabling, and low voltage camera power supplies.

1. Active surveillance equipment and devices shall be on emergency/UPS/ battery backup power.

D. Camera assemblies include camera, lens, housing, and mount. Provide wiring and low voltage power from the security wall field/rack to the camera locations.

1. Scope of work shall be complete from point of origin (camera) to point of termination (security rack).

E. Coordinate work that must be performed in security head end spaces with the General Contractor, the Electrical Contractor, and the Telecommunications Subcontractor (if applicable).

F. The CCTV cameras shall be connected to the local area network with signals routed to a new network video recorder for recording, storage and video retrieval.

G. The Security Subcontractor shall coordinate space allocation and network IP addresses with the IT department.

H. Camera lenses for fixed cameras shall be varifocal and sized to provide the owner approved field of view. The lens shall be IR corrected and have megapixel resolution.

I. Exterior pole mounted cameras will require independent 120VAC power and shall have video and data signals transmitted over single-mode fiber. The fiber and conduit, including the termination of the fiber in a fiber receiver and transmitter, as well as, the media converter required to convert the transmission from fiber to category cable for connection at the camera and NVR, respectively is required in this scope of work.

J. Surveillance camera audio functions shall not be installed and/or disabled unless specifically requested by Owner.

K. 360 degree cameras shall be multi-lens cameras. Fisheye or equivalent cameras will not be accepted unless specifically specified.

1. 360 degree cameras whose maximum resolutions do not meet the minimum resolution requirements stated on the Contract Documents can use multi-lens cameras with an integrated PTZ camera. The PTZ camera shall provide high definition resolution with an optical zoom that can accommodate the distances that the specified multi-lens camera can provide. The PTZ camera must be integrated with the multi-lens camera and provide auto-tracking and orientation aid.

L. 180 degree cameras shall be multi-lens cameras providing a panoramic view.

1. Exception: 180 degree exterior cameras at site level can utilize fisheye style cameras which meet performance requirements.

1.9 QUALITY ASSURANCE

A. The Security Subcontractor will turn over the new and unused components and devices to the owner at project closeout.

B. Camera 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. Equipment provided shall be backed by a minimum of three years manufacturer warranty.

D. The specified unit shall be manufactured in accordance with ISO 9001 / EN 29001.

1.10 ENVIRONMENTAL SUSTAINABILITY

A. The specified unit shall be manufactured in accordance with ISO 14000.

B. The specified unit shall be compliant with 2002/95/EG RoHS and 2002/96/EG WEEE.

1.11 CERTIFICATES AND STANDARDS

A. The camera shall carry the following EMC approvals:

1. EN55022, EN55024
2. FCC Part 15 - Subpart B
3. VCCI
4. C-tick AS/NZS CISPR22
5. ICES-003

B. The camera shall meet the following product safety standards

1. UL / EN 60950 -1

C. The camera shall meet relevant parts of the following video standards:

1. SMPTE 296M (HDTV 720p)

D. The camera shall meet the following standards

1. MPEG-4: ISO/IEC 14496-10 AVC (H.264)

E. Networking:

1. IEEE 802.3af (Power over Ethernet)
2. IEEE 802.1X (Authentication)
3. IPv4 (RFC 791)
4. IPv6 (RFC 2460)
5. QoS – DiffServ (RFC 2475)

F. Network video:

1. ONVIF Profile S or ONVIF Version 1.01 or higher as defined by the ONVIF organization.

G. Mechanical Environment:

1. IEC 62262 Class IK10 (Impact resistance)
2. EN 62471 (Photobiological Safety)

1.12 HARDWARE

A. The camera shall:

1. Use a high quality IR-sensitive progressive scan sensor.

2. Be equipped with a high quality varifocal lens.
3. Be equipped with a removable IR-cut filter, providing so-called day/night functionality.
4. Provide automated iris functionality with P-Iris control.
5. Provide remote zoom and focus functionality.
6. Be equipped with IR LED functionality with adjustable intensity and angle of illumination.
    a. Exception: 180 degree panoramic cameras at terrace level.
7. Provide pictures down to 0.15 lux in color and down to 0.04 lux in B/W without IR illumination active.
8. Provide pictures down to 0 lux with IR illumination active
9. Support local memory by providing a microSD/microSDHC/microSDXC card slot.

1.13 VIDEO

A. Resolution

1. The camera shall be able to deliver at least two individually configurable full resolution full frame rate video streams over IP networks.
2. The camera shall be able to provide both landscape format (4:3 and 16:9 aspect ratio) as well as corridor format (3:4 and 9:16 aspect ratio).
3. Refer to the Contract Drawings for minimum required camera resolutions specific for each camera.

B. Encoding

1. The camera shall:
    a. Support Motion JPEG encoding in a selectable range up to 30 frames per second in each resolution.
    b. Support Baseline Profile H.264 encoding with motion estimation in up to 30 frames per second in each resolution.
    c. Support Main Profile H.264 encoding with motion estimation and context-adaptive binary arithmetic coding (CABAC) in up to 30 frames per second in each resolution.
    d. Be able to provide independently configured simultaneous H.264 and Motion JPEG streams.
    e. Support both Constant Bit Rate (CBR) and Variable Bit Rate (VBR) in H.264.
    f. Provide configurable compression levels.

C. 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)
2. The camera shall support Quality of Service (QoS) to be able to prioritize traffic.

D. Image control

1. The camera shall incorporate Automatic and Manual White Balance
2. The camera shall be equipped with an electronic shutter.
3. The camera shall incorporate automatic and manually defined exposure zones.
4. The camera shall be equipped with Wide Dynamic Range functionality - dynamic contrast.
5. The camera shall support a configurable maximum shutter in the range from 2 seconds to 1/24500 seconds in 50Hz mode
6. The camera shall support a configurable maximum shutter in the range from 2 to 1/29500 seconds in 60Hz mode.
7. The camera shall incorporate Back Light Compensation.
8. The camera shall allow for rotation of the image in steps of 90º.
9. The camera shall support manually defined values for:
    a. Color level
    b. Brightness
    c. Sharpness
    d. Contrast

1.14 AUDIO

A. The camera shall support two-way full duplex audio:

1. Input sources
    a. Built-in microphone
    b. External microphone
    c. External line device
2. Output sources
    a. External line device

1.15 ENCODING

1. The camera shall support:
    a. AAC LC at 8/16 kHz
    b. G.711 PCM at 8 kHz
    c. G.726 ADPCM at 8 kHz

1.16 IR ILLUMINATION

1. The camera shall be equipped with built-in IR LEDs with adjustable angle of illumination and intensity (if applicable)
    a. The IR LEDs shall have a range of up to 30 m (100 ft).
    b. The IR LEDs shall emit light with a wavelength of 850 nm.

1.17 FUNCTIONALITY

A. Web server

1. 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.
2. Optional components downloaded from the camera for specific tasks, e.g. Active

X, shall be signed by an organization providing digital trust services, such as Verisign, Inc.

B. IP addresses

1. The camera shall support both fixed IP addresses and dynamically assigned IP addresses provided by a Dynamic Host Control Protocol (DHCP) server.
2. The camera shall allow for automatic detection of the Camera based on UPnP and Bonjour when using a PC with an operating system supporting this feature.
3. The camera shall provide support for both IPv4 and IPv6.

C. PTZ functionality

1. The camera shall provide non mechanical PTZ functionality (no moving parts).
    a. The camera shall provide at least 100 preset positions.
    b. The camera shall reach selected position within 0.1 second.
    c. The camera shall provide a guard tour functionality which allow the camera to automatically move between selected presets using an individual speed and viewing time for each preset.

D. Event functionality

1. The camera shall be equipped with an integrated event functionality, which can be trigged by:
    a. Video Motion Detection
    b. Schedule
    c. Camera tampering
    d. Embedded third party applications
    e. External input
    f. Audio Detection
    g. Edge storage disruption detection
2. Response to triggers shall include:
    a. Notification, using TCP, SMTP or HTTP
    b. Image upload, using FTP, SMTP or HTTP
    c. Activating external output
    d. Activating embedded illumination/IR LED
    e. Recording to local storage and/or network attached storage
3. The camera shall provide memory for pre & post alarm recordings.
4. Event functions shall be configurable via the web interface.

E. Edge 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 be able to detect and notify Edge storage disruptions
3. Secure digital cards with the highest storage capacity tested from the manufacturer shall be provided for each camera.

F. Protocol support

1. The camera shall incorporate support for at least IP, HTTP, HTTPS, SSL/TLS, TCP, ICMP, SNMPv1/v2c/v3 (MIB-II), RTSP, RTP, UDP, IGMP, RTCP, SMTP, FTP, DHCP, UPnP, ARP, DNS, DynDNS, SOCKS, NTP, CIFS/SMB and Bonjour.
2. The SMTP implementation shall include support for SMTP authentication.

G. 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. To ensure accuracy, the camera shall accept external time synchronization from an NTP (Network Time Protocol) server.
    c. Provide the ability to apply a privacy mask to the image.
    d. Allow for the overlay of a graphical image, such as a logotype, into the image.

H. Security

1. The camera shall:
    a. Support 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.
    b. Support IEEE 802.1X authentication.
    c. Provide support for restricting access to pre-defined IP addresses only, so-called IP address filtering.
    d. Restrict access to the built-in web server by usernames and passwords at three different levels.

I. API support

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 S or ONVIF Version 1.01 or higher as defined by the ONVIF organization, and shall be upgradable.

J. Embedded applications

1. The camera shall provide a platform allowing the upload of third party applications into the camera.
2. The camera vendor shall provide a compatibility tool for the application vendor to verify the stability and performance impact of their uploaded application.

K. Installation and Maintenance

1. The camera shall:
    a. Be supplied with Windows-based management software which allows the assignment of IP addresses, upgrade of firmware and backup of the Cameras' configuration.
    b. Support the use of SNMP-based management tools according to SNMP v1, 2c & 3 / MIB-II.
    c. Allow updates of the software (firmware) over the network, using FTP or HTTP.

d. Provide the ability to apply a rectangle of customer-defined number of pixels to the image, which can be used as a pixel counter identifying the size of objects in number of pixels.

2. Customer-specific settings shall be stored in a non-volatile memory and shall not be lost during power cuts or soft reset.

L. User logs

1. The camera shall:

a. 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.

b. Provide a connection list of currently connected viewers. The file shall include information about connecting IP address, time of connecting and the type of stream accessed.

1.18 CAMERA DIAGNOSTICS

A. The camera shall:

1. 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. Be monitored by a Watchdog functionality, which shall automatically re-initiate processes or restart the unit if a malfunction is detected.

1.19 INTERFACES

A. Network interface

1. The camera shall be equipped with one 100BASE-TX Fast Ethernet-port, using a standard RJ-45 socket and shall support auto negotiation of network speed (100 MBit/s and 10 MBit/s) and transfer mode (full and half duplex).

B. Audio

1. The camera shall be equipped with one 3.5 mm jack for line/mic input and one 3.5 mm jack for line output.

C. Inputs/Outputs

1. The camera shall be equipped with one digital (alarm) input and one digital output, accessible via a removable terminal block. This input shall be configurable to respond to normally open (NO) or normally closed (NC) dry contacts.

1.20 ENCLOSURE

A. The camera enclosure shall include the following:

1. Manufactured with a metal vandal resistant body providing encapsulated electronics

2. Vandal resistant casing with clear transparent cover

3. Impact resistance according to IK10

B. The camera enclosure shall provide the ability to adjust the camera modules angle with 360° (pan), 170° (tilt) and 340° (rotation) while maintaining an image that is not interfered by the camera housing.

1.21 POWER REQUIREMENTS

A. Power over Ethernet according to IEEE 802.3af - Class 3.

1. With IR illumination off, max 5.9 W

2. With IR illumination on, max 12.1 W

1.22 ENVIRONMENTAL

A. The camera shall:

1. Operate in a temperature range of 0°C to +50°C (32°F to +122°F).

2. Operate in a humidity range of 10–85% RH (non-condensing).

1.23 NETWORK SWITCH

A. Provide a fully configured rack mounted Managed 10/100/1000Mbps Layer 3 Switch.

1. Coordinate with Owner / Owner network representative on video surveillance subnet assignment.

2. Switch port count shall allow for 10% growth.

1.24 COLORS

A. Camera mounts will be white for interior and building exterior applications.

B. Camera mounts for pole mounted cameras shall be custom painted to match the light poles.

1. Repainting will follow manufacturer instructions.

1.25 QUALITY ASSURANCE

A. Installer Qualifications: Minimum 2 years experience installing similar equipment.

B. Units of the same type of equipment will be products of a single manufacturer. Material and equipment will be new and currently in production. Each major component of equipment will have the manufacturer's model and serial number in a conspicuous place.

C. Installation, configuration, setup, programming and related work shall be performed by technicians thoroughly trained by the manufacturer in the installation and service of the equipment.

1.26 WARRANTY

A. Manufacturer’s Warranty: Submit manufacturer’s standard warranty.

1.27 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer’s labeled packages. Store and handle in accordance with manufacturer’s requirements, in a facility with environmental conditions within recommended limits.

1.28 PROJECT CONDITIONS

A. Inspect locations where installation work will be performed and verify that conditions found are in accordance with the Contract Drawings and are acceptable for installation work. Report discrepancies in writing to the Engineer requesting clarification.

B. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Interior IP Fixed Dome Camera

1. Axis P33 Series

2. Samsung SNV Series

3. Avigilon H4

4. Or Approved Equal

B. Exterior IP Fixed Dome Camera

1. Axis P33 Series
2. Samsung SNV Series
3. Avigilon H4
4. Or Approved Equal

C. Interior/ Exterior IP Fixed 360 Degree Multi-Lens Dome Camera

1. Avigilon H4
2. Pelco Optera
3. Hanwha PNV Series
4. Or Approved Equal

D. Interior/ Exterior IP Fixed 180 Degree Multi-Lens Dome Camera

1. Axis Q Series
2. Arecont Vision
3. Hanwha PNM Series
4. Or Approved Equal

E. Interior/ Exterior IP Fixed Fisheye Camera

1. Avigilon H4
2. Axis M Series
3. Hanwha XNF Series
4. Or Approved Equal

F. Secure Digital Cards

1. SanDisk
2. Panasonic
3. Samsung
4. Or Approved Equal

G. Surge Suppression

1. Ditek
2. Nitek
3. Tripp Lite
4. Or Approved Equal

PART 3 - EXECUTION

3.1 CONFIGURATION

A. Cameras

1. Provide day/night cameras in exterior locations
2. Lenses shall be field tested with Owner present to verify clear, crisp images and desired field of view a) Substitute camera lenses as necessary to obtain required field of view at no additional cost b) Provide spot filters for exterior lenses as required to reduce picture washout caused by sunlight

3. The security integrator shall coordinate network and IP address requirements with Owner to identify the Media Access Control (MAC) address (Layer 2) of each provided camera, the location to be installed, and the port configuration needed for communication.

4. Make necessary adjustments to camera lenses to obtain clear, crisp images and desired field of view to the Owners satisfaction.

   a. Substitute camera lenses as necessary to obtain required field of view at no additional cost.

B. Adjust cameras to produce high-definition images with no blooming, streaking or noticeable lag.

C. Provide in-line PoE injectors, as required, when non-PoE network switches are used or when manufacturer specified power is not available to the camera.

D. Camera power shall comply with the specified power requirements.

3.2 POWER REQUIREMENTS

A. Provide uninterruptible power supplies for active surveillance equipment

B. Rack mounted components, including active network communication hardware, shall be on an Uninterruptible Power Supply (UPS) system.

C. Camera power supplies shall be on an Auxiliary Power Supply (APS), system as required, with a battery backup.

1. The Auxiliary power supply shall be provided with a power distribution panel with each camera individually fused or protected with an over-current protector.

D. Power supplies shall provide:

1. 120 VAC input and output voltage as required

2. UL Listed

3. Power fail contacts to monitor the status of the input power

4. Key lockable wall mount metal enclosure with tamper switch

5. Independently fused outputs

3.3 INSTALLATION

A. The Security Subcontractor shall carefully follow instructions in documentation provided by the manufacturer to ensure steps have been taken to provide a reliable, easy-to-operate system.

B. Equipment shall be tested and configured in accordance with instructions provided by the manufacturer prior to installation.

C. Firmware found in products shall be the latest and most up-to-date provided by the manufacturer, or of a version as specified by the provider of the Video Management System (VMS) or Network Video Recorder (NVR).

D. 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.

E. 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.

F. Surveillance system devices and components shall be compatible.

G. Camera Housings and Mounts

1. Cameras shall include housings and mounts as indicated in the Drawings.

2. Wiring to cameras shall pass from the back-box through the mount and into the housing. Exposed wiring or conduit shall not be acceptable.

3. Provide sun shields for camera housings in outdoor locations exposed directly to sunlight.

4. Provide surge protection for power and copper video cables for exterior cameras at the camera and at the point of termination (security rack).

5. Field verify the exact camera location, position, and mounting prior to installation.

6. Roof mounted cameras shall use roof deck brackets.

7. Provide the smallest available housing for each camera application.

   a. Integrated miniature dome cameras are preferred

H. Provide labeling suitable to Owner for major equipment components. Coordinate with Owner on numbering scheme to match existing. Major equipment components include:

1. Video monitors, IP camera Patch Panels, PoE Switches (or mid-span units), and fiber mux units (if required).

I. Coordinate with Telecommunication Subcontractor for network and patch panel provisions for security connections.

J. Coordinate with Owner for system programming and database requirements.

1. Provide programming, setup, camera and device titling and data entry

2. Camera and device title and descriptions shall be consistent for components

K. Install Point-to-Point wiring with appropriate terminal connections for every wire and component termination so that connections are mechanically and electrically secure.

L. Install field wiring in continuous lengths, without splices.

M. Verify upon job completion that wiring and terminations are clearly labeled to identify the wire and terminal.

N. Testing of the surveillance system includes checkout of installed cameras back to the Security head end equipment to confirm proper operation of camera assemblies. Security integrator shall provide necessary test equipment to fully demonstrate proper performance of field devices. Copies of test results shall be included in the project completion submittals given to the Owner.

3.4 PROTECTION

A. Protect installed system from damage during construction.

END OF SECTION