SECTION 28 23 00
VIDEO SURVEILLANCE SYSTEM
Construction Specification

PART 1 GENERAL

1.1   SUMMARY

A.   General: Provide engineering, labor, materials, apparatus, tools, equipment, transportation, temporary construction, and special or occasional services as required to make a complete working video surveillance system installation, as described in this specification.

B.   Section Includes:

1.   VSS Monitoring and Recording System

2.   VSS IP fixed and PTZ cameras, and mounts,

3.   VSS power supplies

4.   Network video recorder servers and software

5.   Interfaces and connections to District security LAN/WAN to allow remote viewing over network

C.   Products Supplied But Not Installed Under This Section:

1.   None

D.   Products Installed But Not Supplied Under This Section:

1.   None

E.   Products Specified But Not Installed Under This Section:

1.   None

F.   Products Furnished and Installed Under Another Section:

1.   120VAC power

2.   Ethernet cable back to IDF/MDF room for IP cameras

3.   Owner provided PoE+ switches in the IDF/MDF for VSS connectivity via security LAN/WAN

4.   Network ports for video storage servers, IP video encoders, and video monitoring workstation connectivity via security LAN/WAN

G.   Related Sections:

1.   Consult other Divisions; determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete and operable system.

2.   Section 28 00 00 Basic Security Requirements: includes general project requirements, submittal formats, warranty, and installation requirements and additional sections for reference.

3.   Section 28 13 00 Access Control & Alarm Monitoring System: includes product information for video integration with the ACAMS.

4.   Section 28 05 13 Security System Cabling: includes product information for wire and cable needed to support the ACAMS.

5.   Section 28 05 53 Security System Labeling: includes label types and formats for security devices.

6.   Section 28 08 00 Security System Commissioning: includes the integrating testing/commissioning requirements for the ACAMS.

7.   Section 27 15 13 Telecommunications Horizontal Cabling: includes product information for cable needed to support Video Surveillance System IP devices.

1.2   DEFINITIONS

A.   The Definitions of Division 1 apply to the 28 00 xx sections.

B.   In addition to those Definitions of Division 1, the following list of terms as used in this specification defined as follows:

1.   "NVR": Network Video Recorder

2.   "VMS": Video Management System

3.   "VSS": Video Surveillance System

4.   "PTZ": Pan-Tilt-Zoom

5.   "NAS": Network Attached Storage

6.   "PoE": Power-over-Ethernet

1.3   SYSTEM DESCRIPTION

A.   Overview

1.   Refer to Division 1 and Section 28 00 00 for general description

2.   The video surveillance system is an extension to the overall security management system that includes access control and alarm monitoring (ACAMS) and mechanical keying.

3.   Provide pathways to connect camera locations to existing primary security infrastructure.

4.   Ensure a fully functioning Video Surveillance System and extension of the existing network-based recording system with capacity to store recorded footage for a minimum of 20 days.

5.   Utilize existing security network for IP video transport to centralized VMS.

B.   Video Surveillance System

1.   The video surveillance system consists of IP-based 1) fixed position 2) multi-sensor, 3) panoramic, and 4) pan-tilt-zoom (PTZ) cameras connected to centralized IP video encoders that encode and stream video over the network.

2. Assess the existing NVR virtual servers to determine additional camera capacity and storage. Notify the Owner if an additional Virtual Machine is required/advised. Provide Network Video Recorder (NVR) server software to allow for incremental growth of up to 64 more network cameras and storage space for at least 20 days for video retention.

3. Provide appropriate number of video licenses with 1-year software support for additional cameras connected to the exacqVision system through the security LAN/WAN, IP video servers, and existing NVRs.

4. Coordinate network connections to video servers, additional video monitoring workstations, and IP cameras with the District's IT department prior to installation. Provide two security network connection for each device.

5. Provide fixed cameras as indicated on the floor plans. Use megapixel cameras at exterior locations viewing large assembly size spaces or interior locations viewing large lobbies. Include environmental housing with heater and blower for cameras located outdoors.

6. Provide fixed multi-sensor megapixel cameras at locations as shown on the project drawings for maximum surveillance. Coordinate site lighting when locating multi-sensor cameras outside.

7. Provide panoramic cameras at locations as shown on the project. Panoramic cameras home run on low voltage power. Communicate to the servers.

8. Utilize PoE+ switches for camera power and connection to VMS. Fixed cameras home run on low voltage power. Communicate to the servers.

9. Provide PTZ VSS cameras as indicated on the floor plans. Explore environmental housing with heater and blower for cameras located outdoors. PTZ camera power home runs on low voltage cable back to power supplies located in MDF/IDF rooms.

10. Home run and connect exterior weather proof camera video signal and data control cable to video servers. Power cameras locally from VSS power supplies located within 50 feet. Size power supplies accordingly for voltage loss and power demands for outdoor rated enclosures with heater and blower options included.

11. Provide VSS camera power supplies located in the IDF rooms adjacent to ACAMS power supplies

12. Provide day/night cameras in outdoor locations with low light levels.

13. Provide Power-Over-Ethernet extender for IDF to camera distances greater than 270 feet. Refer to Section 280513 Security System Cabling for device information.

C. Custom Device Requirements

1. Provide fiber optic media encoders and decoders for IP camera locations over 1200 feet from an IDF closet. Coordinate fiber optic cable infrastructure and allocation for security functions with ITS and telecommunications engineers.

D. Tamper Monitoring

1. Provide additional monitor input points for monitoring the following:

a. Tamper switches located within each security equipment enclosure and wire way

b. Supervision of power supplies and batteries

1.4   SUBMITTALS

A.   Product Data: Submit product information for components specified herein. Refer to Section 28 00 00 for format and requirements.

B.   Shop Drawings: Submit shop drawings in accordance with Division 1. Refer to Section 28 00 00 for format and additional requirements. Include the following.

　　1.   Device placement on floor plans

　　2.   Point-to-Point- Diagrams: Include wiring, points of connection and interconnecting devices between the following:

　　　　a.   Video surveillance system, monitors, and recording equipment

　　　　b.   Devices connected to the system

　　　　c.   Miscellaneous control relays

　　　　d.   Conductors (identify conductors on the point--to-point- diagrams with the same tag as the installed conductor)

　　3.   Block Diagram/Riser Diagram: Show the video surveillance system components, conduit, wire types, and sizes between them, including cabling interties between termination hardware.

　　4.   Custom mounting details

1.5   WARRANTY

A.   Network Video Recording System

　　1.   Cameras and support devices

　　　　a.   Provide a manufacturer's warranty covering repair or replacement of defective parts for a period of one year from the date of shipment from the factory.

2.1   MANUFACTURERS

A.   Network Video Recording System

　　1.   The video surveillance recording software manufactured by exacqVision Technologies.

　　2.   The system must be compatible with the District's existing exacqVision video surveillance headend.

　　3.   The video storage server hardware must be capable of handling video surveillance system software and network video.

B.   IP Cameras

　　1.   Axis Communications

　　2.   Arecont Vision

　　3.   Or ITS approved equal

C.   Power Supplies/Extenders

1.   Axis

2.   Pelco

3.   Altronix

4.   Or

5.   Or ITS approved equal

2.2   NETWORK VIDEO RECORDERS

A.   Features

1.   Complete Network Video Recorder platform that encompasses recording video, viewing video, reviewing recorded video, and storing video for indefinite periods of time.

2.   Full control of camera selections, sequencing, and viewing modes

3.   The system simultaneously records, displays live video, and plays back video. None of the video operations interfere with each other. Live view and video playback does not interrupt the recording process.

4.   Recorders capture, digitize, and store video. Recorders may record full-time, in response to an alarm, or based on a user-defined schedule. Full-time recording refers to 24 hours per day, 7 days per week, 365 days per year.

5.   Network: Internal Ethernet card for connection to a 100/1000Base-T LAN.

6.   Video Capture: Captures camera signals from fixed cameras, multi-sensor cameras, panoramic cameras, PTZ cameras, low light cameras, and edge video servers. Camera signals may be color, black and white, or both.

B.   Recorders

1.   Use TCP/IP network protocol to communicate with network cameras and other video servers.

2.   Video Information

a.   Store the time, date, and source of the video and be available during playback.

b.   Store for each clip video source, capture date, start time, and stop time. Source identified as either a monitor or a camera.

c.   Store alarm information in the database on the main server when the video is in response to an alarm condition.

3.   Recording Configuration

a.   Use TCP/IP network protocol to communicate to field devices and client workstations.

b.   Captures camera signals from fixed cameras, panoramic, multi-sensor, PTZ cameras, infrared cameras, x-ray cameras, and low light cameras. Camera signals may be color, black and white, or both.

c.   Capable of simultaneously recording each camera at 1080P resolution at 30 frames per second and 1080p or higher resolution at least 12 frames per second.

        d.   Support for multi-megapixel cameras, H.265, H.264, and JPEG compression, and future video analytics.

    4.   Video Storage

        a.   Video stored in clips on the recorder's internal hard drive. As the hard drive becomes full, groom oldest clips to make room for new video.

        b.   Ability to utilize a variety of network storage devices such as external disk arrays, RAID and NAS devices, and external disk drives for exporting, backup, or sharing images.

        c.   Ability to modify video quality per camera with respect to recorder and server configurations, length of time video to be store.

    5.   Video Authentication

        a.   Fingerprint each video clip through a mathematical algorithm during the video capture process. The fingerprint becomes part of the clip and used by the playback software to verify the video has not been altered.

    6.   Alarm recording

        a.   Recording Options

            1)   Alarm condition via activation of an external alarm contact.

            2)   Internal video motion detection

        b.   Recording programmable by camera and by time and date schedule.

        c.   Allow a mix and match of continuous recording and alarm recording, based on camera input and capture card connection.

        d.   Pre and post alarm recording

    7.   Video Motion Detection

        a.   Support cameras capable of detecting activity from camera input and to initiate an alarm condition.

        b.   Video motion detection areas operator selectable for each camera. If the scene changes within the alarm area, an alarm condition is initiated.

    8.   Viewing of both live and archived images, from multiple remote systems.

    9.   Remote event notification

    10.   Unlimited number of clients

    11.   Password protected via user authorization, with profiles assigned by the system administrator, and database tracking of evens.

C.   <u>NVR Software</u>

    1.   Manufacturer:

        a.   exacq Technologies: exacqVision VMS Software. Verify quantity of IP cameras supported with hardware configuration at time of purchase.

      b.   exacqVision Camera **Enterprise** License #EVIP-01

      c.   exacqVision Software Update Subscription #SSA-EVIP-01

2.3   CAMERA SYSTEM

   A.   <u>General</u>

      1.   Type: Color, solid-state CCD with DSP technology, unless otherwise noted

      2.   Power: Power over Ethernet plus POE+ (IEEE 802.3at), Class 2, unless otherwise noted

      3.   Imager: 1/3 inch format or larger, unless otherwise noted

      4.   Sync: Adjustable line lock for synchronizing camera to power line. No auxiliary sync cable required.

      5.   Resolution: 1080p minimum resolution, unless otherwise noted

      6.   Minimum Light Level: 0.1 fc imager illumination at full video, unless otherwise noted

      7.   Lens: Field determine, unless otherwise noted

      8.   Video transmission through IP signal

   B.   <u>Fixed IP Dome Cameras</u>

      1.   Complete prepackaged interior unit containing:

          a.   Superior 1080p resolution, or higher, image sensor quality with progressive scan

          b.   Resolution: 30 frames per second at 1080p

          c.   Video streaming: Simultaneous Motion H.265. H.264, and JPEG

          d.   Auto iris, varifocal lens of 2.8-10mm, remote focus

          e.   Security: IP address filtering and HTTPS encryption

          f.   Power over Ethernet plus POE+ (IEEE 802.3at), Class 2

          g.   Connectors:

              1)   Category 6A, RJ45, 8-position, 8-wire universal module.

                  a)   Refer to Telecommunications/AV standard document for part number

              2)   Terminal block for inputs, output, and RS-485/422

          h.   Dome housing

          i.   Color required to be custom ordered to match surrounding finishes.

      2.   Manufacturer:

          a.   AXIS P3245-V network interior dome camera

          b.   AXIS P3245-LV network interior dome camera (with IR)

c.   AXIS P9106-V

3.   Or ITS approved equal

4.   Accessories:

   a.   Axis TP3202 - recessed ceiling mount kit (For P3245-V and -LV)

   b.   Axis T94S01P - Conduit Back Box

   c.   Axis T91A05 – Pendant Mounted Camera Holder 1.5" NPS

5.   Or ITS approved equal depending on mounting scenario

6.   Fixed IP Exterior Megapixel Dome Cameras unit containing:

   a.   Superior 1.3 megapixel image sensor, or higher quality with progressive scan

   b.   Resolution: 30 frames per second minimum at 1280x1024

   c.   Video streaming: Simultaneous Motion JPEG, H.264, and H.265

   d.   Auto iris, varifocal lens of 2.8-10mm. remote focus

   e.   Security: IP address filtering and HTTPS encryption

   f.   Power over Ethernet plus POE+ (IEEE 802.3at), Class 2

   g.   Connectors:

      1)   Category 6A, RJ45, 8-position, 8-wire universal module.

         a)   Refer to Telecommunications/AV standard document for part number

      2)   Terminal block for alarm inputs, output, and RS-485/422

   h.   Color required to be custom ordered to match surrounding finishes.

   i.   IR cut filter

   j.   Outdoor IP66 rated housing

7.   Manufacturer:

   a.   AXIS P3245-LVE network exterior dome camera

   b.   AXIS Q3515-LVE network exterior dome camera

   c.   Or Owner Approved Equal

8.   Accessories:

   a.   Axis T91 E61 – Wall Mount

   b.   Axis T94M01D – Pendant Kit

   c.   Axis T94S01P - Conduit Back Box

   d.   Or Owner Approved Equal depending on mounting scenario

C.   IP Multi-Sensor Camera

   1.   Complete dome unit containing:

      a.   Four 2 megapixel cameras for 8 megapixel total

      b.   Flexible positioning of four multidirectional varifocal camera heads

      c.   Video streaming: simultaneous Motion H.265, H.264, and JPEG

      d.   Power over Ethernet plus POE+ (IEEE 802.3at), Class 2

   2.   Color required to be custom ordered to match surrounding finishes.

   3.   Manufacturer:

      a.   Axis P3719-PLE – 360 multidirectional camera

      b.   Axis Q6100-E - 360 multidirectional camera (if combined with Axis Q6135-LE)

      c.   Axis Q6010-E – 360 multidirectional cameras (if combined with Axis Q6075-E)

      d.   Axis P3715-PLVE – 2x2 MP dual sensor multidirectional camera with 360 IR

      e.   Or Owner Approved Equal

   4.   Accessories:

      a.   Axis T94N01L Recessed Mounting Kit

      b.   Axis T91B50 – Telescopic Ceiling Mount

      c.   Axis T94N01D – Pendant Kit

      d.   Axis T91E61 – Wall Mount

      e.   Axis T91D61 – Wall Mount 1.5" NPS

      f.   Axis T91B67 Pole Mount (65-165mm)

      g.   Axis T91B47 Pole Mount (100-410mm)

      h.   Axis T91D62 – Telescopic Parapet Mount

      i.   Axis T91A64– External Corner Bracket

      j.   Axis T94A01C – Attachment Kit

      k.   Or Owner Approved Equal depending on mounting scenario

D.   Panoramic Cameras

   1.   Provide IP Panoramic Camera with appropriate mount(s)

   2.   Complete prepackaged unit containing:

      a.   Video streaming: simultaneous Motion H .265, H.264, and JPEG

       b.   Resolution: 30 frames per second minimum at 1280x1024IR Filter

       c.   Wide Dynamic Range and auto day/night switching between color and B/W

       d.   Color required to be custom ordered to match surrounding finishes. Provide seismic support of unit attached directly to floor decking. T-Bar hangers are acceptable provided they are dedicated to support camera.

   3.   Manufacturer

       a.   Axis P3807-PVE - Panoramic 180 Camera

       b.   Axis M3058-PLVE – Panoramic/Fisheye 360 Camera

   4.   Accessories:

       a.   Axis T94V01C – Dual Camera Mount

       b.   Axis T94V01L – Recessed Ceiling Mount

       c.   Axis T94S02L – Recessed Ceiling Mount

       d.   Axis T94V02D – Pendant Kit

       e.   Axis T94K01D – Pendant Kit

E.   <u>PTZ IP Dome Camera</u>

   1.   Provide IP PTZ camera with appropriate mount(s)

   2.   Complete prepackaged unit containing:

       a.   1/4" high-resolution color CCD camera & motorized zoom auto-iris lens

       b.   High-speed pan and tilt that is stepper motor driven (belt-driven not acceptable).

       c.   Integral receiver/driver

       d.   Color NTSC format

       e.   Integral 30x min optical zoom lens for exterior locations, 18x min optical zoom for interior locations

       f.   Exterior cameras: wide dynamic range and auto day/night switching between color and B/W

       g.   Motion JPEG, H.264, and H.265 video compression

       h.   Integrated heater and blower for exterior locations

       i.   Electronic Image Stabilizer

       j.   Built-in IR

   3.   Color required to be custom ordered to match surrounding finishes. Provide seismic support of unit attached directly to floor decking. T-Bar hangers are acceptable provided they are dedicated to support PTZ.

   4.   Manufacturer:

  a. Axis Q6135-LE

  b. Axis Q6075-E

 5. Accessories:

  a. AXIS T91D62 – Telescopic Parapet Mount

  b. Axis T94A01D – Pendant Kit

  c. Axis T91B57 – Pole Mount 100-410mm

  d. Axis T91G61 – Wall Mount

2.4 IP VIDEO ENCODER (Used in older designs)

 A. General

  1. Video Compression: Motion JPEG, MPEG-4 Part 2 (ISO/IEC 14496-3), Profiles: ASP and SP

  2. Resolution: 4CIF, 2CIFExp, 2CIF, QCI

  3. Frame Rate: Up to 30/25 per channel

  4. Pan/Tilt /Zoom control

  5. Alarm and event management

 B. Standalone Video Server

  1. Channels: 4 to 6

  2. Security: IP address filtering and HTTPS encryption

  3. Manufacturer:

   a. Axis Q7414 4-port encoder

   b. Axis Q7436 6-port encoder

2.5 POWER SUPPLIES/BATTERY CHARGERS/MIDSPANS/PoE Extenders

 A. VSS System Power Supplies

  1. 120 VAC input to 24 VAC output, continuous current, fully supervised power supplies for power to cameras.

  2. Provide a separate fused connection to power supply per camera.

  3. Manufacturer (Interior Camera):

   a. Pelco #MSC-16-10SB UL listed power supply/battery charger for indoor use

   b. Altronix

   c. Or Equal

  4. Manufacturers (Exterior PTZ Camera)

       a.   AXIS #5000-001 24VAC Outdoor power supply

       b.   AXIS T8133 30W Midspan

       c.   AXIS T8134 60W Midspan

       d.   AXIS T8154 60W SFP Midspan

       e.   AXIS T8129-E Outdoor PoE Extender

       f.   Microsemi 9606G/9612G/9624GC POE injector (rack mounted)

       g.   Or ITS approved equal

2.6   VSS LIGHTNING PROTECTORS

A.   Data Line Protectors

    1.   Provide on data lines serving exterior IP cameras.

    2.   Manufacturer:

       a.   Axis T8061 Surge Protector

       b.   NITEK IPPWR1

       c.   Or ITS Approved Equal

B.   Power Line Protectors

    1.   Provide on power lines serving exterior cameras.

    2.   Manufacturer:

       a.   PolyPhaser Corp #IS-SPTV

       b.   NITEK

       c.   Or ITS approved Equal

C.   PTZ Data Line Protectors

    1.   Provide on data lines serving exterior PTZ cameras.

    2.   Manufacturer:

       a.   Axis T8061 Surge Protector

       b.   NITEK IPPWR1

       c.   Or ITS approved Equal

2.7   MEDIA CONVERTER

A.   Provide Fiber-to-Copper Media Converters for locations exceeding 270 feet

B.   Manufacturer

    1.   Comnet CNGE22MC– 4 Port (2 Channel) 10/100/1000 Mbps Ethernet Media Converter

    2.   Comnet C3– 1 RU (1.75") high 19-inch rack-mountable card cage

3. AXIS T8154 60W SFP Midspan (inside NEMA rated enclosure)

4. Or ITS approved equal

3.1 INSTALLATION

A. VSS Cameras

1. Provide outdoor housing and mounts for exterior cameras.

2. Field determine exact placement of cameras to ensure complete coverage.

3. Coordinate location with obstructions such as columns or exceedingly high shelving units to avoid concealment opportunity.

4. Field determine fixed camera lens size to ensure complete coverage. Refer to plans for lens selection starting point.

5. Route watertight flex from junction box to camera housing from below on exterior cameras.

6. Provide 25 foot cable loop at PTZ location for relocating unit if required post installation

7. Provide 12 foot cable loop at interior camera locations installed in accessible ceiling location for future Owner relocation of unit if required post installation

8. Coordinate Network Data Drop with Telecom contractor for each IP Camera.

9. Coordinate camera IP address with District IT staff.

10. Coordinate programming of IP cameras into existing video surveillance head end with District and Districts contracted AMAG programmer.

B. Exterior Site Cameras

1. Installation requirements under paragraph A, VSS Cameras still apply.

2. Provide NEMA 4 enclosure located in close proximity to the camera(s) with 120VAC power when necessary.

    a. Install near base of pole for pole-mounted locations.

    b. Install in nearby accessible ceiling below for roof mount cameras.

    c. Install on surface of parapet wall

3. Route camera cable to NEMA box and terminate.

4. Provide waterproofing material and required gaskets in order to maintain roofing system warranty. Verify installation does not void roofing warranty.

5. Provide lightning protection on cameras located on roof tops and parapets.

6. Manufacturer

    a. Cooper B-Line

C. VSS Power supplies

1. Do not combine with Access Control & Alarm Monitoring System power supplies.

2. Locate power according to security drawings.

D. Surge Protection

1. Provide surge protection for video, power, and control cable on exterior cameras.

2. Provide protective device at the camera and encoder/recorder device.

E. Network Recording System

1. Rack mount NVRs next to existing units on dedicated security rack.

2. Coordinate equipment rack location with District IT department.

F. IP Video Encoder

1. Rack mounted.

2. Coordinate Network Data Drop with Telecom contractor.

3. Coordinate IP address with District IT staff by providing camera's MAC Address.

G. Pathways

1. Provide conduit and back boxes to devices located on walls and inaccessible ceilings.

2. Route device conduit back to security equipment hub.

3. Provide back boxes for all devices installed in ceiling and support brackets that span T-Bar grid.

4. Route cable on dedicated J-hanger and/or ladder rack runs attached to structure above. Do not attach cable to ceiling grid hangers.

5. Coordinate fiber optic cable requirements with telecommunications.

6. Coordinate joint trenching with telecommunications and/or electrical for site pathways.

H. Cabling Infrastructure

1. All Category cabling is to be terminated on <u>female</u> RJ45 jacks (Refer to Telecommunication/AV District Standard Document for part number).

2. Each camera location is to have a minimum of **two (2)** category 6A cables per Telecommunications/AV/Classroom Technology standard document

3.2 PROGRAMMING AND TRAINING

A. Prior to the completion of construction schedule a meeting with the Owner, Engineer, and Owner's VMS programmer to determine the programming criteria. Discuss the following:

1. Provide new License Key from Exacq with new EVIP-01 Enterprise license(s) inclusive of existing cameras. Server that receives the new licenses will be determined by the owner.

2. Camera naming

3. PTZ Presets, Multisensor positioning

4. Schedules and recording parameters including quality and frame rate (including video motion detection)

5. ACAMS alarm and event integration requirements for workstation pop-ups and recording (if applicable)

B. Document the results of the meeting and perform necessary adjustments to achieve the Owner's requests.

C. Setup and program the cameras such that no additional programming required. Programming at the head end performed by Owner's VMS programmer.

D. Use the camera naming convention agreed upon in the programming meeting when programming point names into the system.

3.3 TESTING

A. Commission the video surveillance system in accordance with Section 28 08 00.

END OF SECTION