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282300 - Video Surveillance

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SECTION 28 2300 - VIDEO SURVEILLANCE (SECURITY CAMERAS)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes a video surveillance system consisting of cameras, digital video recorder, data transmission wiring, and a control station with its associated equipment.
- B. Video surveillance system shall be integrated with monitoring and control system specified in [Section 281643 "Perimeter Security Systems,"] [Section 281600 "Intrusion Detection,"] [Section 281300 "Access Control,"] [Section 284619 "PLC Electronic Detention Monitoring and Control Systems,"] which specifies systems integration.
- C. See Chapter 5, Division 01, Section 017700.1.1.B.1.i Closeout Procedures - Project Record Documents for equipment list requirements for all equipment provided in this section.

1.3 DEFINITIONS

- A. AGC: Automatic gain control.
- B. BNC: Bayonet Neill-Concelman - type of connector.
- C. B/W: Black and white.
- D. CCD: Charge-coupled device.
- E. FTP: File transfer protocol.
- F. IP: Internet protocol.
- G. LAN: Local area network.
- H. MPEG: Moving picture experts group.
- I. NTSC: National Television System Committee.
- J. PC: Personal computer.
- K. PTZ: Pan-tilt-zoom.
- L. RAID: Redundant array of independent disks.
- M. TCP: Transmission control protocol - connects hosts on the Internet.

N. UPS: Uninterruptible power supply.

O. WAN: Wide area network.

1.4 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Video surveillance system shall withstand the effects of earthquake motions determined according to [ASCE/SEI 7] <Insert requirement>.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified **and the unit will be fully operational after the seismic event**."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include dimensions and data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For video surveillance. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Functional Block Diagram: Show single-line interconnections between components for signal transmission and control. Show cable types and sizes.
3. Dimensioned plan and elevations of equipment racks, control panels, and consoles. Show access and workspace requirements.
4. UPS: Sizing calculations.
5. Wiring Diagrams: For power, signal, and control wiring.

C. Equipment List: Include every piece of equipment by model number, manufacturer, serial number, location, and date of original installation. Add pretesting record of each piece of equipment, listing name of person testing, date of test, set points of adjustments, name and description of the view of preset positions, description of alarms, and description of unit output responses to an alarm.

1.6 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For video surveillance, cameras, camera-supporting equipment, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Field quality-control reports.

C. Warranty: Sample of special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For cameras, power supplies, infrared illuminators, monitors, videotape recorders, digital video recorders, video switches, and control-station components to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
1. Lists of spare parts and replacement components recommended to be stored at the site for ready access.

1.8 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NECA 1.
- C. Comply with NFPA 70.
- D. Electronic data exchange between video surveillance system with an access-control system shall comply with SIA TVAC.

1.9 PROJECT CONDITIONS

- A. Environmental Conditions: Capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:
1. Control Station: Rated for continuous operation in ambient temperatures of 60 to 85 deg F (16 to 29 deg C) and a relative humidity of 20 to 80 percent, noncondensing.
 2. Interior, Controlled Environment: System components, except central-station control unit, installed in **[air-conditioned] [temperature-controlled]** interior environments shall be rated for continuous operation in ambient temperatures of **[36 to 122 deg F (2 to 50 deg C)] <Insert temperature range>** dry bulb and 20 to 90 percent relative humidity, noncondensing. Use NEMA 250, Type 1 enclosures.
 3. Interior, Uncontrolled Environment: System components installed in non-**[air-conditioned] [temperature-controlled]** interior environments shall be rated for continuous operation in ambient temperatures of **[0 to 122 deg F (minus 18 to plus 50 deg C)] <Insert temperature range>** dry bulb and 20 to 90 percent relative humidity, noncondensing. Use NEMA 250, **[Type 3R] [Type 4] [Type 12] [Type 12K]** enclosures.
 4. Exterior Environment: System components installed in locations exposed to weather shall be rated for continuous operation in ambient temperatures of **[minus 30 to plus 122 deg F (minus 34 to plus 50 deg C)] <Insert temperature range>** dry bulb and 20 to 90 percent relative humidity, condensing. Rate for continuous operation when exposed to rain as specified in NEMA 250, winds up to 85 mph (137 km/h) **[and snow cover up to 24 inches**

- (610 mm) thick]. Use NEMA 250, [Type 3] [Type 3R] [Type 3S] [Type 4] [Type 4X] enclosures.
5. Hazardous Environment: System components located in areas where fire or explosion hazards may exist because of flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers shall be rated, listed, and installed according to NFPA 70.
 6. Corrosive Environment: System components subject to corrosive fumes, vapors, and wind-driven salt spray in coastal zones. Use NEMA 250, [Type 4X] [Type 6P] enclosures.
 7. Security Environment: Camera housing for use in high-risk areas where surveillance equipment may be subject to physical violence.

1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of cameras, equipment related to camera operation, and control-station equipment that fail in materials or workmanship within specified warranty period.
 1. Warranty Period: [Three] <Insert number> years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SYSTEM REQUIREMENTS

- A. Video-signal format shall comply with NTSC standard, composite interlaced video. Composite video-signal termination shall be 75 ohms.
- B. Surge Protection: Protect components from voltage surges originating external to equipment housing and entering through power, communication, signal, control, or sensing leads. Include surge protection for external wiring of each conductor's entry connection to components.
 1. Minimum Protection for Power Connections 120 V and More: Auxiliary panel suppressors complying with requirements in Section 264313 "Surge Protection for Low-Voltage Electrical Power Circuits."
 2. Minimum Protection for Communication, Signal, Control, and Low-Voltage Power Connections: Comply with requirements in Section 264313 "Surge Protection for Low-Voltage Electrical Power Circuits" as recommended by manufacturer for type of line being protected.
- C. Tamper Protection: Tamper switches on enclosures, control units, pull boxes, junction boxes, cabinets, and other system components shall initiate a tamper-alarm signal when unit is opened or partially disassembled. Control-station, control-unit alarm display shall identify tamper alarms and indicate locations.

2.2 STANDARD CAMERAS

- A. Manufacturers: Subject to compliance with requirements, [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide [**product indicated on Drawings**] <Insert manufacturer's name; product name or designation> or comparable product by one of the following:
1. ACCESS International Inc.
 2. Bosch Security Systems, Inc.
 3. CBC (AMERICA) Corp.
 4. COP-USA.
 5. Crest Electronics, Inc.
 6. Elbex Ltd.; Elbex America Inc.
 7. ELMO.
 8. EverFocus Electronics Corporation.
 9. GENWAC; a brand of Watec Cameras.
 10. GE Security, Inc.
 11. Hitachi, Ltd.
 12. Honeywell International Inc.; Honeywell Video Systems.
 13. Hunt Electronics USA, Inc.
 14. Ikegami Electronics (USA) Inc.
 15. JVC Americas Corp.; JVC Professional products.
 16. Merit Li-Lin (USA) Corp.
 17. Panasonic Corporation of North America; Panasonic Security Systems.
 18. Pelco.
 19. Pixera Corporation.
 20. Safety Vision.
 21. Samsung Opto-Electronics.
 22. SANYO North America Corporation.
 23. Telpix Electronics, Inc.
 24. Toshiba Corporation; Surveillance products.
 25. Trinus Systems Inc.
 26. Tyco International Limited; Sensormatic products.
 27. VELTEK.
 28. Vicon Industries, Inc.
 29. Videology Imaging Solutions, Inc.
 30. Visiontech.
 31. Watec America Corporation.
 32. <Insert manufacturer's name>.
- C. B/W Camera:
1. Comply with UL 639.
 2. Pickup Device: CCD interline transfer, 252,000 [**512(H) by 492(V)**] <Insert other> pixels.
 3. Horizontal Resolution: 380 lines.
 4. Signal-to-Noise Ratio: Not less than 46 dB.

5. With AGC, manually selectable on or off.
6. Sensitivity: Camera shall provide usable images in low-light conditions, delivering an image at a scene illumination of <Insert light level> lux at f/1.4[, with camera AGC off].
7. Sensitivity: Camera shall deliver 1-V peak-to-peak video signal at the minimum specified light level. Illumination for the test shall be with lamps rated at approximately 2200-K color temperature, and with camera AGC off.
8. Manually selectable modes for backlight compensation or normal lighting.
9. Scanning Synchronization: Determined by external synch over the coaxial cable. Camera shall revert to internally generated synchronization on loss of external synch signal.
10. Motion Detector: Built-in digital.

D. Color Camera:

1. Comply with UL 639.
2. Pickup Device: CCD interline transfer, 380,000 [771(H) by 492(V)] <Insert other> pixels.
3. Horizontal Resolution: 480 lines.
4. Signal-to-Noise Ratio: Not less than 50 dB, with camera AGC off.
5. With AGC, manually selectable on or off.
6. Sensitivity: Camera shall provide usable images in low-light conditions, delivering an image at a scene illumination of <Insert light level> lux at <Insert f-stop of lens>[, with camera AGC off].
7. Sensitivity: Camera shall deliver 1-V peak-to-peak video signal at the minimum specified light level. Illumination for the test shall be with lamps rated at approximately 2200-K color temperature, and with camera AGC off.
8. Manually selectable modes for backlight compensation or normal lighting.
9. Scanning Synchronization: Determined by external synch over the coaxial cable. Camera shall revert to internally generated synchronization on loss of external synch signal.
10. White Balance: Auto-tracing white balance, with manually settable fixed balance option.
11. Motion Detector: Built-in digital.

E. Automatic Color Dome Camera: Assembled and tested as a manufactured unit, containing dome assembly, color camera, motorized pan and tilt, zoom lens, and receiver/driver.

1. Comply with UL 639.
2. Pickup Device: CCD interline transfer, 380,000 [768(H) by 494(V)] <Insert other> pixels.
3. Horizontal Resolution: 480 lines.
4. Signal-to-Noise Ratio: Not less than 50 dB, with camera AGC off.
5. With AGC, manually selectable on or off.
6. Sensitivity: Camera shall provide usable images in low-light conditions, delivering an image at a scene illumination of <Insert light level> lux at <Insert f-stop of lens>[, with camera AGC off].

7. Sensitivity: Camera shall deliver 1-V peak-to-peak video signal at the minimum specified light level. Illumination for the test shall be with lamps rated at approximately 2200-K color temperature, and with camera AGC off.
8. Manually selectable modes for backlight compensation or normal lighting.
9. Pan and Tilt: Direct-drive motor, 360-degree rotation angle, and 180-degree tilt angle. Pan-and-tilt speed shall be controlled by operator. Movement from preset positions shall be not less than 300 degrees per second.
10. Preset Positioning: Eight user-definable scenes, each allowing 16-character titles. Controls shall include the following:
 - a. In "sequence mode," camera shall continuously sequence through preset positions, with dwell time and sequencing under operator control.
 - b. Motion detection shall be available at each camera position.
 - c. Up to four preset positions may be selected to be activated by an alarm. Each of the alarm positions may be programmed to output a response signal.
11. Scanning Synchronization: Determined by external synch over the coaxial cable. Camera shall revert to internally generated synchronization on loss of external synch signal.
12. White Balance: Auto-tracing white balance, with manually settable fixed balance option.
13. Motion Detector: Built-in digital.
14. Dome shall support multiplexed control communications using coaxial cable recommended by manufacturer.

2.3 SUBMERSIBLE CAMERAS

- A. Manufacturers: Subject to compliance with requirements, [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide **[product indicated on Drawings]** <Insert manufacturer's name; product name or designation> or comparable product by one of the following:
 1. International Space Optics; Rainbow CCTV products.
 2. <Insert manufacturer's name>.
- C. Camera: Color, designed for underwater monitoring and for inspecting pipes and storm drains. Attributes as follows:
 1. Infrared LEDs to provide illumination in zero-light conditions.
 2. 60-foot (18.3-m) factory-installed cable with BNC connector for video and a 2.1-mm jack for 12-V dc power supply.
 3. An adjustable swivel mount and attachment base.
 4. Pickup Device: CCD interline transfer, 290,000 **[500(H) by 580(V)]** <Insert other> pixels.
 5. Horizontal Resolution: 380 lines.
 6. Signal-to-Noise Ratio: Not less than 50 dB.

7. With AGC, from 4 to 39 dB.
8. Sensitivity: Camera shall provide usable images in low-light conditions, delivering an image at a scene illumination of 0.1 lux at f/2.0.
9. Scanning Synchronization: Internal.
10. White Balance: Auto-tracing white balance, for colors ranging from 2800 to 8200 deg K.

2.4 REINFORCED DOME CAMERAS

- A. Manufacturers: Subject to compliance with requirements, [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide [**product indicated on Drawings**] <Insert manufacturer's name; product name or designation> or comparable product by one of the following:
 1. Extreme CCTV Surveillance Systems.
 2. <Insert manufacturer's name>.
- C. Camera: Designed for high-abuse locations, with a weathertight [**semirecessed**] [**surface**] mounting, impact-resistance polycarbonate dome, and heavy-gage, 6061 T6 aluminum body.
 1. Suitable for exterior environment, rated for continuous operation in ambient temperatures of minus 40 to plus 122 deg F (minus 40 to plus 50 deg C) dry bulb and up to 85 percent relative humidity.
 2. Pickup Device: CCD interline transfer, 290,000 [**510(H) by 492(V)**] <Insert other> pixels.
 3. Horizontal Resolution: 350 lines.
 4. Signal-to-Noise Ratio: Not less than 46 dB.
 5. With AGC and automatic backlight compensation.
 6. Sensitivity: Camera shall provide usable images in low-light conditions, delivering an image at a scene illumination of 6 lux at f/2.0.
 7. Scanning Synchronization: Determined by external synch over the coaxial cable. Camera shall revert to internally generated synchronization on loss of external synch signal.
 8. White Balance: Auto-tracing white balance.

2.5 LENSES

- A. Manufacturers: Subject to compliance with requirements, [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide [**product indicated on Drawings**] <Insert manufacturer's name; product name or designation> or comparable product by one of the following:
 1. Bosch Security Systems, Inc.
 2. CBC (AMERICA) Corp.

3. COP-USA.
4. Crest Electronics, Inc.
5. Elbex Ltd.; Elbex America Inc.
6. GENWAC; a brand of Watec Cameras.
7. GE Security, Inc.
8. Hitachi, Ltd.
9. Honeywell International Inc.; Honeywell Video Systems.
10. Hunt Electronics USA, Inc.
11. International Space Optics; Rainbow CCTV products.
12. Panasonic Corporation of North America; Panasonic Security Systems.
13. Pelco.
14. Samsung Opto-Electronics.
15. SANYO North America Corporation.
16. Tamron USA, Inc.; Industrial Optics Division.
17. Telpix Electronics, Inc.
18. Tyco International Limited; Sensormatic products.
19. VELTEK.
20. Vicon Industries, Inc.
21. Videology Imaging Solutions, Inc.
22. Watec America Corporation.
23. <Insert manufacturer's name>.

C. Description: Optical-quality coated lens, designed specifically for video-surveillance applications and matched to specified camera. Provide color-corrected lenses with color cameras.

1. Auto-Iris Lens: Electrically controlled iris with circuit set to maintain a constant video level in varying lighting conditions.
2. Fixed Lens: With calibrated focus ring.
3. Zoom Lens: Motorized, remote-controlled unit, rated as "quiet operating." Features include the following:
 - a. Electrical Leads: Filtered to minimize video signal interference.
 - b. Motor Speed: Variable.
 - c. Lens shall be available with preset positioning capability to recall the position of specific scenes.

2.6 POWER SUPPLIES

A. Low-voltage power supplies matched for voltage and current requirements of cameras and accessories, and of type as recommended by manufacturer of camera[, **infrared illuminator,**] and lens.

1. Enclosure: NEMA 250, [**Type 1**] [**Type 3**] [**Type 4X**] <Insert type>.

2.7 INFRARED ILLUMINATORS

A. Manufacturers: Subject to compliance with requirements, [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

- B. Basis-of-Design Product: Subject to compliance with requirements, provide **[product indicated on Drawings]** <Insert manufacturer's name; product name or designation> or comparable product by one of the following:
1. Honeywell International Inc.; Honeywell Video Systems.
 2. International Space Optics; Rainbow CCTV products.
 3. Merit Li-Lin (USA) Corp.
 4. Visiontech.
 5. Watec America Corporation.
 6. <Insert manufacturer's name>.
- C. Description: Lighting fixtures that emit light only in the infrared spectrum, suitable for use with cameras indicated, for nighttime surveillance, without emitting visible light.
1. Field-Selectable Beam Patterns: Narrow, medium, and wide.
 2. Rated Lamp Life: More than 8000 hours.
 3. Power Supply: **[12-V ac/dc]** **[120-V ac]**.
- D. Area Coverage: Illumination to 150 feet (50 m) in a narrow beam pattern.
- E. Exterior housings shall be suitable for same environmental conditions as the associated camera.

2.8 CAMERA-SUPPORTING EQUIPMENT

- A. Manufacturers: Subject to compliance with requirements, [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide **[product indicated on Drawings]** <Insert manufacturer's name; product name or designation> or comparable product by one of the following:
1. Bosch Security Systems, Inc.
 2. CBC (AMERICA) Corp.
 3. COP-USA.
 4. Crest Electronics, Inc.
 5. Elbex Ltd.; Elbex America Inc.
 6. ELMO.
 7. EverFocus Electronics Corporation.
 8. GENWAC; a brand of Watec Cameras.
 9. GE Security, Inc.
 10. Honeywell International Inc.; Honeywell Video Systems.
 11. Ikegami Electronics (USA) Inc.
 12. Merit Li-Lin (USA) Corp.
 13. Panasonic Corporation of North America; Panasonic Security Systems.
 14. Pelco.
 15. Samsung Opto-Electronics.
 16. SANYO North America Corporation.
 17. Telpix Electronics, Inc.
 18. Tyco International Limited; Sensormatic products.

19. VELTEK.
 20. Vicon Industries, Inc.
 21. Videolarm.
 22. Video Mount Products.
 23. Visiontech.
 24. Wren Associates Limited.
 25. **<Insert manufacturer's name>**.
- C. Minimum Load Rating: Rated for load in excess of the total weight supported times a minimum safety factor of two.
- D. Pan Units: Motorized automatic-scanning units arranged to provide remote-controlled manual and automatic camera panning action, and equipped with matching mounting brackets.
1. Scanning Operation: Silent, smooth, and positive.
 2. Stops: Adjustable without disassembly, to limit the scanning arc.
- E. Pan-and-Tilt Units: Motorized units arranged to provide remote-controlled aiming of cameras with smooth and silent operation, and equipped with matching mounting brackets.
1. Panning Rotation: 0 to 355 degrees, with adjustable stops.
 2. Tilt Movement: 90 degrees, plus or minus 5 degrees, with adjustable stops.
 3. Speed: 12 degrees per second in both horizontal and vertical planes.
 4. Wiring: Factory prewired for camera and zoom lens functions and pan-and-tilt power and control.
 5. Built-in encoders or potentiometers for position feedback[, **and thermostat-controlled heater**].
 6. Pan-and-tilt unit shall be available with preset positioning capability to recall the position of a specific scene.
- F. Mounting Brackets for Fixed Cameras: Type matched to items supported and mounting conditions. Include manual pan-and-tilt adjustment.
- G. Protective Housings for Fixed and Movable Cameras: Steel[**or 6061 T6 aluminum**] enclosures with internal camera mounting and connecting provisions that are matched to camera/lens combination and mounting and installing arrangement of camera to be housed.
1. Tamper switch on access cover sounds an alarm signal when unit is opened or partially disassembled. Central-control unit shall identify tamper alarms and indicate location in alarm display. Tamper switches and central-control unit are specified in Section 281600 "Intrusion Detection."
 2. Camera Viewing Window: [**Polycarbonate**] [**Lexan**] window, aligned with camera lens.
 3. Duplex Receptacle: Internally mounted.
 4. Alignment Provisions: Camera mounting shall provide for field aiming of camera and permit removal and reinstallation of camera lens without disturbing camera alignment.

5. Built-in, thermostat-activated [**heater**] [**and**] [**blower**] units. Units shall be automatically controlled so the environmental limits of the camera equipment are not exceeded.
6. Sun shield shall not interfere with normal airflow around the housing.
7. Mounting bracket and hardware for wall or ceiling mounting of the housing. Bracket shall be of same material as the housing; mounting hardware shall be stainless steel.
8. Finish: Housing and mounting bracket shall be factory finished using manufacturer's standard finishing process suitable for the environment.
9. Enclosure Rating: <Insert **NEMA Type designation**> <Insert **Ingress Protection code designation**>.

2.9 MONITORS

- A. Manufacturers: Subject to compliance with requirements, [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide [**product indicated on Drawings**] <Insert **manufacturer's name; product name or designation**> or comparable product by one of the following:
 1. Bosch Security Systems, Inc.
 2. CBC (AMERICA) Corp.
 3. COP-USA.
 4. Crest Electronics, Inc.
 5. Elbex Ltd.; Elbex America Inc.
 6. ELMO.
 7. EverFocus Electronics Corporation.
 8. GENWAC; a brand of Watec Cameras.
 9. GE Security, Inc.
 10. Hitachi, Ltd.
 11. Honeywell International Inc.; Honeywell Video Systems.
 12. Hunt Electronics USA, Inc.
 13. Ikegami Electronics (USA) Inc.
 14. International Space Optics; Rainbow CCTV products.
 15. JVC Americas Corp.; JVC Professional products.
 16. Merit Li-Lin (USA) Corp.
 17. Panasonic Corporation of North America; Panasonic Security Systems.
 18. Pelco.
 19. Samsung Opto-Electronics.
 20. SANYO North America Corporation.
 21. Tatung Company of America, Inc.
 22. Telpix Electronics, Inc.
 23. Toshiba Corporation; Surveillance products.
 24. Trinus Systems Inc.
 25. Tyco International Limited; Sensormatic products.
 26. VELTEK.
 27. Vicon Industries, Inc.
 28. <Insert **manufacturer's name**>.

C. Monochrome:

1. Metal cabinet units designed for continuous operation.
2. Screen Size (Diagonal Dimension): <Insert dimension>.
3. Horizontal Resolution: [600] <Insert resolution> lines, minimum, at center.
4. Minimum Front Panel Devices and Controls: Power switch; power-on indicator; and brightness, horizontal-hold, vertical-hold, and contrast controls.
5. Mounting: Adjustable tilting and training.
6. Mounting: [Single, 14-inch (356-mm)] [Dual, 9-inch (229-mm)], vertical, EIA 19-inch (483-mm) electronic equipment rack or cabinet complying with CEA 310-E.
7. Electrical: 120-V ac, 60 Hz.

D. Color:

1. Metal cabinet units designed for continuous operation.
2. Screen Size (Diagonal Dimension): <Insert dimension>.
3. Horizontal Resolution: [300] <Insert resolution> lines.
4. Minimum Front Panel Devices and Controls: Power switch; power-on indicator; and brightness, contrast, color, and tint controls.
5. Degaussing: Automatic.
6. Mounting: [Single, 14-inch (356-mm)] [Dual, 9-inch (229-mm)], vertical, EIA 19-inch (483-mm) electronic equipment rack or cabinet complying with CEA 310-E.
7. Electrical: 120-V ac, 60 Hz.

2.10 VIDEOTAPE RECORDERS

A. Manufacturers: Subject to compliance with requirements, [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

B. Basis-of-Design Product: Subject to compliance with requirements, provide [product indicated on Drawings] <Insert manufacturer's name; product name or designation> or comparable product by one of the following:

1. Bosch Security Systems, Inc.
2. CBC (AMERICA) Corp.
3. COP-USA.
4. Crest Electronics, Inc.
5. Elbex Ltd.; Elbex America Inc.
6. GE Security, Inc.
7. Honeywell International Inc.; Honeywell Video Systems.
8. Ikegami Electronics (USA) Inc.
9. JVC Americas Corp.; JVC Professional products.
10. Panasonic Corporation of North America; Panasonic Security Systems.
11. Pelco.
12. Samsung Opto-Electronics.
13. SANYO North America Corporation.
14. Toshiba Corporation; Surveillance products.
15. Tyco International Limited; Sensormatic products.

16. VELTEK.
17. Vicon Industries, Inc.
18. Videology Imaging Solutions, Inc.
19. <Insert manufacturer's name>.

C. Description: Industrial, time-lapse type recorder, designed for continuous operation. Tape format is 1/2 inch (13 mm) using industrial-grade, T-120 cassettes.

1. Horizontal Resolution: 400 lines, minimum.
2. Recording Heads: Rotary-scan type.
3. Integral Timer: Permits programming of recording operation for adjustable daily and weekly periods.
4. Time-Lapse Operating Modes: Multiple, covering 24 to 240 hours, minimum.
5. Other Operating Modes:
 - a. Manual play and recording at two- and six-hour speeds.
 - b. Forward and reverse high-speed search.
 - c. Reverse, slow, and single-frame play.
6. Alarm Recording: Operating mode is automatically switched from time-lapse to two- or six-hour recording mode when an externally generated alarm signal is received.
7. Audio Recording: 70 to 7000 Hz. Phono and microphone input; phono output.
8. Time and Date Generator: Records time and date legend in corner of recorded scenes.
9. Tape Counter: Displays tape position.
10. Manual Recording Lock: Key or keypad operated. Prevents unauthorized tampering or control changes during preset operation.
11. Signal-to-Noise Ratio: 45 dB for video output in standard play mode.
12. Mounting: Standard 19-inch (483-mm) rack complying with CEA 310-E, or freestanding desktop.

2.11 DIGITAL VIDEO RECORDERS

A. Manufacturers: Subject to compliance with requirements, [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

B. Basis-of-Design Product: Subject to compliance with requirements, provide [**product indicated on Drawings**] <Insert manufacturer's name; product name or designation> or comparable product by one of the following:

1. ACCESS International Inc.
2. Bosch Security Systems, Inc.
3. CBC (AMERICA) Corp.
4. COP-USA.
5. Crest Electronics, Inc.
6. Dedicated Microcomputers Limited; Dedicated Micros USA.
7. Elbex Ltd.; Elbex America Inc.
8. EverFocus Electronics Corporation .
9. GE Security, Inc.

10. Hitachi, Ltd.
11. Honeywell International Inc.; Honeywell Video Systems.
12. Ikegami Electronics (USA) Inc.
13. JVC Americas Corp.; JVC Professional products.
14. Panasonic Corporation of North America; Panasonic Security Systems.
15. Pelco.
16. Samsung Opto-Electronics.
17. SANYO North America Corporation.
18. Tyco International Limited; Sensormatic products.
19. VELTEK.
20. Vicon Industries, Inc.
21. **<Insert manufacturer's name>**.

C. Description: Digital, time-lapse type, full-frame and motion recorder, with removable hard drive.

1. Recording Time: 400 hours minimum.
2. Resolution: 720 by 480 lines, minimum.
3. Programming shall be from trackball and push buttons on face of the recorder, settings shall be displayed on any video monitor connected to the recorder. Programming shall include the following:
 - a. Motion analysis graph.
 - b. Password protection.
 - c. Alarm and timer controls.
 - d. Continuous recording option.
 - e. Time-lapse operating modes.
 - f. Search video by time, event, or motion.
4. Programming: SmartMedia card for software updating, image archiving, and image transfer to a PC.
5. Storage: **[80-GB]** **<Insert size>**, removable hard drive. Software shall permit hot-swapping drives.
6. Compression: **[MPEG-2]** **<Insert type>**.
7. Time and Date Generator: Records time (hr:min:sec) and date legend of each frame.
8. Audio Recording: 70 to 7000 Hz. Phono and microphone input; phono output.
9. Mounting: Standard 19-inch (483-mm) rack complying with CEA 310-E, or freestanding desktop.

2.12 NETWORK VIDEO RECORDERS

A. Manufacturers: Subject to compliance with requirements, [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

B. Basis-of-Design Product: Subject to compliance with requirements, provide **[product indicated on Drawings]** **<Insert manufacturer's name; product name or designation>** or comparable product by one of the following:

1. AXCESS International Inc.

2. Bosch Security Systems, Inc.
3. CBC (AMERICA) Corp.
4. COP-USA.
5. Crest Electronics, Inc.
6. Dedicated Microcomputers Limited; Dedicated Micros USA.
7. Elbex Ltd.; Elbex America Inc.
8. EverFocus Electronics Corporation.
9. GE Security, Inc.
10. Hitachi, Ltd.
11. Honeywell International Inc.; Honeywell Video Systems.
12. Ikegami Electronics (USA) Inc.
13. JVC Americas Corp.; JVC Professional products.
14. Panasonic Corporation of North America; Panasonic Security Systems.
15. Pelco.
16. Samsung Opto-Electronics.
17. SANYO North America Corporation.
18. Tyco International Limited; Sensormatic products.
19. VELTEK.
20. Vicon Industries, Inc.
21. **<Insert manufacturer's name>**.

C. External storage or internal 250-1, 500-GB hard disk drive.

1. Video and audio recording over TCP/IP network.
2. Video recording of MPEG-2 and MPEG-4 streams.
3. Video recording up to 48 Mbps for internal storage and up to 100 Mbps for external storage.
4. Duplex Operation: Simultaneous recording and playback.
5. Continuous and alarm-based recording.
6. Full-Featured Search Capabilities: Search based on camera, time, or date.
7. Automatic data replenishment to ensure recording even if network is down.
8. Digital certification by watermarking.
9. Internal RAID storage or non-RAID storage of up to 1500 GB.
10. Capable of adding external RAID storage up to 7000 GB for models with no internal storage.
11. Full integration with LAN, Intranet, or Internet through standard Web browser or video management software.
12. Integrated Web server FTP server functionality.
13. Supports up to 16[, **32**,] or [**64**] **<Insert number>** devices.

2.13 DIGITAL SWITCHERS

A. Manufacturers: Subject to compliance with requirements, [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

B. Basis-of-Design Product: Subject to compliance with requirements, provide [**product indicated on Drawings**] **<Insert manufacturer's name; product name or designation>** or comparable product by one of the following:

1. AXCESS International Inc.

2. Bosch Security Systems, Inc.
 3. CBC (AMERICA) Corp.
 4. Communications Specialties, Inc.
 5. Convision Systems GmbH.
 6. COP-USA.
 7. Crest Electronics, Inc.
 8. Dedicated Microcomputers Limited; Dedicated Micros USA.
 9. Elbex Ltd.; Elbex America Inc.
 10. EverFocus Electronics Corporation.
 11. GE Security, Inc.
 12. Honeywell International Inc.; Honeywell Video Systems.
 13. Hunt Electronics USA, Inc.
 14. Ikegami Electronics (USA) Inc.
 15. JVC Americas Corp.; JVC Professional products.
 16. Merit Li-Lin (USA) Corp.
 17. Panasonic Corporation of North America; Panasonic Security Systems.
 18. Pelco.
 19. Samsung Opto-Electronics.
 20. SANYO North America Corporation.
 21. Telpix Electronics, Inc.
 22. Toshiba Corporation; Surveillance products.
 23. Trinus Systems Inc.
 24. Tyco International Limited; Sensormatic products.
 25. VELTEK.
 26. Vicon Industries, Inc.
 27. **<Insert manufacturer's name>**.
- C. Quad Switch: For displaying images from four cameras on a single monitor. Provide color switcher if one or more cameras or monitors are in color.
1. Controls: Unit-mounted front panel.
 2. Resolution: **[720 by 480]** lines **<Insert resolution>**.
 3. Modes: Auto, manual, and alarm. In manual mode, each channel can also be viewed in single display mode. In the event of an alarm, alarming channel shall automatically switch to full screen. If several alarms are activated, channels in alarm shall be in auto-switching mode.
 4. Channel Loss Alarm: Audible buzzer; occurrence details shall be recorded.
 5. Time: Indicate date and time.
 6. Timing of Auto-Switcher: 1 to 30 seconds, selectable.
 7. Mounting: Standard 19-inch (483-mm) rack complying with CEA 310-E, or freestanding desktop.
- D. Manual Switch Bank: Low-loss, high-isolation, multiple-video switch to allow manual switching of multiple quad switches and cameras to a single output. Switches shall be illuminated.
- E. Sequential Switchers: Automatically sequence outputs of multiple cameras to single monitor and videotape recorder.

1. Switching Time Interval: Continuously adjustable, 5 to 20 seconds minimum, with manual override.
 2. Skip-Sequential-Hold Switch: One for each camera, with LED to indicate active camera.
 3. Camera Identification Legend: Either on-screen message or label at skip-sequential switch.
 4. Alarm Switching: In the event of an alarm, alarming channel shall automatically switch the monitor to full screen.
 5. Mounting: Standard 19-inch (483-mm) rack complying with CEA 310-E.
- F. PTZ Controls: Arranged for multiple-camera control, with switches to select camera to be controlled.
1. Pan-and-Tilt Control: Joystick type.
 2. Zoom Control: Momentary-contact, "in-out" push button.
 3. Automatic-Scan Control: A push button for each camera with pan capability that places camera in automatic-scanning mode.

2.14 IP VIDEO SYSTEMS

- A. Manufacturers: Subject to compliance with requirements, [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide **[product indicated on Drawings]** <Insert manufacturer's name; product name or designation> or comparable product by one of the following:
1. AXCESS International Inc.
 2. Bosch Security Systems, Inc.
 3. CBC (AMERICA) Corp.
 4. COP-USA.
 5. Crest Electronics, Inc.
 6. Dedicated Microcomputers Limited; Dedicated Micros USA.
 7. Elbex Ltd.; Elbex America Inc.
 8. EverFocus Electronics Corporation.
 9. GE Security, Inc.
 10. Hitachi, Ltd.
 11. Honeywell International Inc.; Honeywell Video Systems.
 12. Ikegami Electronics (USA) Inc.
 13. JVC Americas Corp.; JVC Professional products.
 14. Panasonic Corporation of North America; Panasonic Security Systems.
 15. Pelco.
 16. Samsung Opto-Electronics.
 17. SANYO North America Corporation.
 18. Tyco International Limited; Sensormatic products.
 19. VELTEK.
 20. Vicon Industries, Inc.
 21. <Insert manufacturer's name>.
- C. Description:

1. System shall provide high-quality delivery and processing of IP-based video, audio, and control data using standard Ethernet-based networks.
2. System shall have seamless integration of all video surveillance and control functions.
3. Graphical user interface software shall manage all IP-based video matrix switching and camera control functions, two-way audio communication, alarm monitoring and control, and recording and archive/retrieval management. IP system shall also be capable of integrating into larger system environments.
4. System design shall include all necessary compression software for high-performance, dual-stream, MPEG-2/MPEG-4 video. Unit shall provide connections for all video cameras, camera PTZ control data, bidirectional audio, discreet sensor inputs, and control system outputs.
5. All camera signals shall be compressed, encoded, and delivered onto the network for processing and control by the IP video-management software.
6. Camera system units shall be ruggedly built and designed for extreme adverse environments, complying with NEMA Type environmental standards.
7. Encoder/decoder combinations shall place video, audio, and data network stream that can be managed from multiple workstations on the user's LAN or WAN.
8. All system interconnect cables, workstation PCs, PTZ joysticks, and network intermediate devices shall be provided for full performance of specified system.

2.15 VIDEO MOTION SENSORS (INTERIOR)

- A. Manufacturers: Subject to compliance with requirements, [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide **[product indicated on Drawings]** <Insert manufacturer's name; product name or designation> or comparable product by one of the following:
 1. AXCESS International Inc.
 2. ICU Security, Inc.
 3. Tyco International Limited; Sensormatic products.
 4. Visiontech.
 5. <Insert manufacturer's name>.
- C. Device Performance: Detect changes in video signal within a user-defined protected zone. Video inputs shall be composite video as defined in SMPTE 170M. Provide an alarm output for each video input.
 1. Detect movement within protected zone of intruders wearing clothing with a reflectivity that differs from that of background scene by a factor of two. Reject all other changes in video signal.
 2. Modular design that allows for expansion or modification of number of inputs.
 3. Controls:
 - a. Size of detection zones.
 - b. Sensitivity of detection of each protected zone.

4. Mounting: Standard 19-inch (483-mm) rack complying with CEA 310-E.

2.16 CONTROL STATIONS

- A. Manufacturers: Subject to compliance with requirements, [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide **[product indicated on Drawings]** <Insert manufacturer's name; product name or designation> or comparable product by one of the following:
 1. AXCESS International Inc.
 2. Bosch Security Systems, Inc.
 3. CBC (AMERICA) Corp.
 4. COP-USA.
 5. Crest Electronics, Inc.
 6. Elbex Ltd.; Elbex America Inc.
 7. GE Security, Inc.
 8. Honeywell International Inc.; Honeywell Video Systems.
 9. Panasonic Corporation of North America; Panasonic Security Systems.
 10. Pelco.
 11. Samsung Opto-Electronics.
 12. SANYO North America Corporation.
 13. Tyco International Limited; Sensormatic products.
 14. VELTEK.
 15. Vicon Industries, Inc.
 16. <Insert manufacturer's name>.
- C. Description: Heavy-duty, freestanding, modular, metal furniture units arranged to house electronic equipment. Coordinate component arrangement and wiring with components and wiring of other systems.
- D. Equipment Mounting: Standard 19-inch (483-mm) rack complying with CEA 310-E.
- E. Normal System Power Supply: 120 V, 60 Hz, through a locked disconnect device and an isolation transformer in central-station control unit. Central-station control unit shall supply power to all components connected to it unless otherwise indicated.
- F. Power Continuity for Control Station: Batteries in power supplies of central-station control units and individual system components shall maintain continuous system operation during outages of both normal and backup ac system supply.
 1. Batteries: Rechargeable, valve-regulated, recombinant, sealed, lead-acid type with nominal 10-year life expectancy. Capacity adequate to operate portions of system served including audible trouble signal devices for up to four hours and audible and visual alarm devices under alarm conditions for an additional 10 minutes.
 2. Battery Charger: Solid-state, fully automatic, variable-charging-rate type. Charger shall recharge fully discharged battery within 24 hours.

- G. Annunciation: Indicate change in system condition and switching of system or component to backup power.

2.17 SIGNAL TRANSMISSION COMPONENTS

- A. Cable: Coaxial cable elements have 75-ohm nominal impedance. Comply with requirements in Section 280513 "Conductors and Cables for Electronic Safety and Security."
- B. Video Surveillance Coaxial Cable Connectors: BNC type, 75 ohms. Comply with requirements in Section 280513 "Conductors and Cables for Electronic Safety and Security."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine pathway elements intended for cables. Check raceways and other elements for compliance with space allocations, installation tolerance, hazards to camera installation, and other conditions affecting installation.
- B. Examine roughing-in for LAN, WAN, and IP network before device installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 WIRING

- A. Comply with requirements in Section 260533 "Raceways and Boxes for Electrical Systems."
- B. Wiring Method: Install cables in raceways unless otherwise indicated.
 - 1. Except raceways are not required in accessible indoor ceiling spaces and attics.
 - 2. Except raceways are not required in hollow gypsum board partitions.
 - 3. Conceal raceways and wiring except in unfinished spaces.
- C. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.
- D. Splices, Taps, and Terminations: For power and control wiring, use numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- E. For LAN connection and fiber-optic and copper communication wiring, comply with Section 271300 "Communications Backbone Cabling" and Section 271500 "Communications Horizontal Cabling."

- F. Grounding: Provide independent-signal circuit grounding recommended in writing by manufacturer.

3.3 VIDEO SURVEILLANCE SYSTEM INSTALLATION

- A. Install cameras and infrared illuminators level and plumb.
- B. Install cameras with 84-inch- (2134-mm-) minimum clear space below cameras and their mountings. Change type of mounting to achieve required clearance.
- C. Set pan unit and pan-and-tilt unit stops to suit final camera position and to obtain the field of view required for camera. Connect all controls and alarms, and adjust.
- D. Install power supplies and other auxiliary components at control stations unless otherwise indicated.
- E. Install tamper switches on components indicated to receive tamper switches, arranged to detect unauthorized entry into system-component enclosures and mounted in self-protected, inconspicuous positions.
- F. Avoid ground loops by making ground connections only at the control station.
 - 1. For 12- and 24-V dc cameras, connect the coaxial cable shields only at the monitor end.
- G. Identify system components, wiring, cabling, and terminals according to Section 260553 "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: **[Owner will engage] [Engage]** a qualified testing agency to perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
- C. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- D. Tests and Inspections:
 - 1. Inspection: Verify that units and controls are properly installed, connected, and labeled, and that interconnecting wires and terminals are identified.
 - 2. Pretesting: Align and adjust system and pretest components, wiring, and functions to verify that they comply with specified requirements. Conduct tests at varying lighting levels, including day and night scenes as applicable. Prepare video-surveillance equipment for acceptance and operational testing as follows:

- a. Prepare equipment list described in "Informational Submittals" Article.
 - b. Verify operation of auto-iris lenses.
 - c. Set back-focus of fixed focal length lenses. At focus set to infinity, simulate nighttime lighting conditions by using a dark glass filter of a density that produces a clear image. Adjust until image is in focus with and without the filter.
 - d. Set back-focus of zoom lenses. At focus set to infinity, simulate nighttime lighting conditions by using a dark glass filter of a density that produces a clear image. Additionally, set zoom to full wide angle and aim camera at an object 50 to 75 feet (17 to 23 m) away. Adjust until image is in focus from full wide angle to full telephoto, with the filter in place.
 - e. Set and name all preset positions; consult Owner's personnel.
 - f. Set sensitivity of motion detection.
 - g. Connect and verify responses to alarms.
 - h. Verify operation of control-station equipment.
3. Test Schedule: Schedule tests after pretesting has been successfully completed and system has been in normal functional operation for at least 14 days. Provide a minimum of 10 days' notice of test schedule.
 4. Operational Tests: Perform operational system tests to verify that system complies with Specifications. Include all modes of system operation. Test equipment for proper operation in all functional modes.
- E. Video surveillance system will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

3.5 ADJUSTING

- A. Occupancy Adjustments: When requested within [12] <Insert number> months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to [two] <Insert number> visits to Project during other-than-normal occupancy hours for this purpose. Tasks shall include, but are not limited to, the following:
1. Check cable connections.
 2. Check proper operation of cameras and lenses. Verify operation of auto-iris lenses and adjust back-focus as needed.
 3. Adjust all preset positions; consult Owner's personnel.
 4. Recommend changes to cameras, lenses, and associated equipment to improve Owner's use of video surveillance system.
 5. Provide a written report of adjustments and recommendations.

3.6 CLEANING

- A. Clean installed items using methods and materials recommended in writing by manufacturer.
- B. Clean video-surveillance-system components, including camera-housing windows, lenses, and monitor screens.

3.7 DEMONSTRATION

- A. **[Engage a factory-authorized service representative to train] [Train]** Owner's maintenance personnel to adjust, operate, and maintain video-surveillance equipment.

END OF SECTION 28 2300