

SECTION 28 2300
VIDEO SURVEILLANCE

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 07 8400 Firestopping

1.02 SUMMARY

- A. This Section includes video surveillance system consisting of cameras, 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 Division 28 Section "Intrusion Detection Access Control" that specifies systems integration.

1.03 DEFINITIONS

- A. AGC: Automatic gain control.
- B. B/W: Black and white.
- C. CCD: Charge-coupled device.
- D. MPEG: Moving picture experts group.
- E. NTSC: National Television System Committee.
- F. UPS: Uninterruptible power supply.

1.04 SUBMITTALS

- A. Product Data: For each type of product indicated, including dimensions and data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: Detail assemblies of standard components that are custom assembled for specific application on this Project.
 - 1. Functional Block Diagram: Show single-line interconnections between components for signal transmission and control. Show cable types and sizes.
 - 2. Dimensioned plan and elevations of equipment racks, control panels, and consoles. Show access and workspace requirements.
 - 3. UPS: Sizing calculations.
 - 4. Wiring Diagrams: Power, signal, and control wiring, and grounding.
- 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.
- D. Manufacturer Seismic Qualification Certification: Submit certification that cameras, camera-supporting equipment, accessories, and components will withstand seismic forces defined in Division 26 Section "Vibration and Seismic Controls for Electrical Systems." Include the following:
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - a. 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."
 - b. 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."
 - 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.
- E. Field quality-control test reports.
- F. 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 Division 01 Section "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.
- G. Warranty: Special warranty specified in this Section.

1.05 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- 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.

1.06 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 interior environments shall be rated for continuous operation in ambient temperatures of 36 to 122 deg F (2 to 50 deg C) dry bulb and 20 to 90 percent relative humidity, noncondensing. NEMA 250, Type 1 enclosures.
 3. Interior, Uncontrolled Environment: System components installed in non-air-conditioned interior environments shall be rated for continuous operation in ambient temperatures of 0 to 122 deg F (minus 18 to plus 50 deg C dry bulb and 20 to 90 percent relative humidity, noncondensing. NEMA 250, Type 3R 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) 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. NEMA 250, Type 3R 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 subjected to corrosive fumes, vapors, and wind-driven salt spray in coastal zones. NEMA 250, Type [4X] [6P] enclosures.
 7. Security Environment: Camera housing for use in high-risk areas where surveillance equipment may be subject to physical violence.

1.07 WARRANTY AND WARRANTY SERVICE

- A. Warranty
1. The completed work as specified herein, including all materials and labor shall be warranted by the Security Contractor for a period of not less than one year from the date of acceptance, to be free from defects in design workmanship and materials. Parts having a manufacturer's warranty in excess of the one (1) year shall be warranted for the duration of the manufacturer's warranty. Further, the Security Contractor shall warrant that the

- completed systems including all components (except those which are NIC) are of sufficient size and capacity to fulfill satisfactorily the requirements of these specifications.
2. The one year warranty period shall begin upon final acceptance of the completed work.
 - a. For purposes of warranty consideration, the date of final acceptance shall be defined as the date on which the system test has been completed, the punch list items have been corrected, and all of the required documentation has been received and approved by the COTR and OPS. A memo of record from the Owner's representative shall formally acknowledge the acceptance of the completed work and the date of acceptance. The warranty will not begin on beneficial use of the system.
 - b. In the event, corrective action on a reported defect has not been taken prior to the warranty expiration date, the warranty period shall be extended at no additional charge until all reported defects have been corrected.
 - c. The contractor shall provide a statement indicating which items are covered by warranties in excess of the base contract requirement
 3. The Security Contractor shall not be responsible for repair or maintenance of any NIC equipment unless these systems or equipment have been specified as being part of this contract. The Security Contractor shall notify the Owner in writing if such equipment requires repairs to operate properly with the systems.
 4. The warranty shall include full preventative maintenance and service on all equipment, components and systems. Preventative maintenance shall include, at a minimum, quarterly inspections and servicing of all equipment to insure continued operation in accordance with manufacturers' specifications as well as the specifications stated herein. Visits shall be scheduled 72 hours in advance with the Smithsonian Institution Office of Protection Services.
 5. A manufacturers' software maintenance agreement shall be included with the one (1) year warranty period and shall include all software updates, revisions and telephone service assistance twenty four (24) hours per day, seven days per week.
- B. Warranty Service
1. In the event that defects in the materials and/or workmanship are identified during the warranty period, the Security Contractor shall provide all labor and materials as may be required for prompt correction of the defect at no additional cost to the Owner. The Security Contractor shall perform the correction of defects such that interruption of the Owner's normal business operations is minimized.
 2. During the warranty period, the Owner shall have the sole authority to determine if the failure is catastrophic or non-catastrophic. Catastrophic system failures are defined as any system failure that places Smithsonian Institution employees, collections or facilities at increased risk. The Security Contractor shall, upon receipt of a request for service from the Owner, have service personnel to the Owner's premises, repair and restore the device or equipment to service as follows:
 - a. Catastrophic failures – Response shall be four (4) hours with a repair time not to exceed eight (8) hours. This response shall be in effect 24 hours per day, 7 days per week.
 - b. Non-catastrophic failure - Response shall be eight (8) hours with a repair time not to exceed twenty-four (24) hours. This response shall be in effect during normal business hours that are defined as 7:30 AM to 5:00 PM Monday through Friday.
 3. All warranty service and repair work shall be performed by personnel who have been manufacturer trained, certified and experienced in the operation and maintenance of the installed system(s).
 - a. Warranty service shall include the replacement of any and all parts and/or components as required to restore normal system operation. In the event that the system parts or components must be removed for repair, it shall be the responsibility of the Security Contractor to furnish and install temporary parts and/or components as required to restore normal system operation until the repaired parts or components can be repaired or re-installed.

- b. It shall be the responsibility of the Security Contractor to maintain an inventory of spare parts or to arrange for manufacturers' parts support as required to insure correction of all critical component failures or malfunctions within twenty-four (24) hours of the Owner's request for service. Critical parts shall be defined as those, which govern or affect the normal operation of more than one (1) field device (card reader, electric lock, door position switch, etc.). The Security Contractor shall provide a list of recommended spare parts with his bid proposal.
- c. The Security Contractor's warranty obligation shall include correction of any software defects, which may be identified during the warranty period. Any failure of the software to perform as specified by the software manufacturer at the time of final acceptance shall be defined as a software error.
- d. In the event that the Security Contractor determines and successfully demonstrates to the Owner that service or repairs are required as a result of misuse, abuse or abnormal wear and tear, the Security Contractor shall be compensated for such service or repairs at the Security Contractor's hourly rates. Similarly, such compensation to the Security Contractor shall apply in the event that repairs are required for devices and equipment not provided by the Security Contractor but incorporated in the completed systems.
- e. Immediately following the completion of the warranty repair or service call, the Security Contractor's service personnel shall submit a written report to the Owner which details the service work performed, the cause of the trouble and any outstanding work which is required to restore complete and normal operation. Owner personnel must sign off on all repair or service calls to verify completion of work.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.02 SYSTEM REQUIREMENTS

- A. Video signal format shall comply with the NTSC standard composite video, interlaced. 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 entry connection to components.
 - 1. Minimum Protection for Power Connections 120 V and More: Auxiliary panel suppressors complying with requirements in Division 26 Section "Transient-Voltage Suppression for Low-Voltage Electrical Power Circuits."
 - 2. Minimum Protection for Communication, Signal, Control, and Low-Voltage Power Connections: Comply with requirements in Division 26 Section "Transient-Voltage Suppression 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.

2.03 NETWORK CAMERAS

- A. Manufacturers:
 - 1. Pelco
 - 2. Avigilon
- B. Color Camera
 - 1. Camera

- a. Refer to SPectrum Health Physical Security Team for Models.
- 2. Video
 - a. Camera models must meet these requirements:
 - b. Video compression: H.264.
 - c. Frame rate H.264: 30 fps in all resolutions
 - d. Frame rate Motion JPEG: 30 fps in all resolutions
- 3. Network
 - a. Security: Video data must be encrypted when traveling over a public network. Password protection, IP address filtering, digest authentication, user access log, IEEE 802.1X* network access control, HTTPS* encryption
 - b. Supported protocols: IPv4/v6, HTTP, HTTPS*, QoS Layer 3 DiffServ, FTP, SMTP, Bonjour, UPnP, SNMPv1/v2c/v3(MIB-II), DNS, DynDNS, NTP, RTSP, RTP, TCP, UDP, IGMP, RTCP, ICMP, DHCP, ARP, SOCKS
- 4. System integration
 - a. Intelligent video: Video motion detection, active tampering alarm, audio detection
 - b. Alarm triggers: Intelligent video, external input
 - c. Alarm events: File upload via FTP, HTTP and email, Notification via email, HTTP and TCP, External output activation, Video recording to local storage
 - d. Video buffer: 48 MB pre- and post alarm
- 5. General
 - a. Casing: Must be in tamper resistant housing.
 - b. Power: Power over Ethernet IEEE 802.3af.
 - c. Connectors: RJ-45 10BASE-T/100BASE-TX PoE Terminal block for 1 alarm input and 1 output 3.5 mm mic/line in, 3.5 mm line out

2.04 LENSES

- A. Available Manufacturers:
 - 1. Reference Spectrum Health Physical Security Team.
- B. Description: Optical-quality coated optics, 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 Lenses: With calibrated focus ring.
 - 3. Zoom Lenses: Motorized, remote-controlled units, 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.

2.05 POWER SUPPLIES

- A. Power Supplies: Low-voltage power supplies matched for voltage and current requirements of cameras and accessories, type as recommended by camera[, infrared illuminator,] and lens manufacturer.
 - 1. Enclosure: NEMA 250, Type 1.

2.06 CAMERA-SUPPORTING EQUIPMENT

- A. As recommended by the following manufacturers:
 - 1. Pelco
 - 2. Avigilon
- B. Minimum Load Rating: Rated for load in excess of the total weight supported times a minimum safety factor of two.
- C. Mounting Brackets for Fixed Cameras: Type matched to items supported and mounting conditions. Include manual pan-and-tilt adjustment.

- D. 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 Division 28 Section "Intrusion Detection."
 2. Camera Viewing Window: 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. With sun shield that does 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: IEC 60529, IP 52.

2.07 NETWORK VIDEO RECORDS

- A. Manufacturers:
1. Pelco Endura.
 2. Avigilon Control Center.
- B. Storage and Frame Rate:
1. Provide 30 days of storage.
 2. Normal Recording rate: 8 fps at full resolution.
 3. Alarm Call-Up Recording Rate: 15 frames per second.

2.08 SIGNAL TRANSMISSION COMPONENTS

- A. Shall comply with SHH Technology and Information Systems' Division 27 Standards for Low Voltage Cabling.

2.09 FIBER OPTIC TRANSMITTERS

- A. Fiber optic transmitters shall be provided as shown on the CCTV block diagram and shall provide for transmission of video or video/data signals over the fiber optic cable specified.
- B. Fiber optic transmitters shall be provided at a minimum for all exterior and exterior wall mounted cameras.
- C. Fiber Optic Video Transmitters
1. Fiber optic transmitters shall be provided as shown on the CCTV block diagram and shall provide for transmission of one way video signals over the fiber optic cable specified.
 2. Fiber optic transmitters shall be fiber to POE type at the perimeter fence and vehicle entry gates.
- D. Fiber Optic Video and Data Transmitters
1. Fiber optic transmitters shall be provided as shown on the CCTV block diagram and shall provide for transmission of one way video and two way data signals over the fiber optic cable specified.
 2. Fiber optic transmitters shall be fiber to POE type at the perimeter fence and vehicle entry gates.
- E. Fiber Optic Transmitter Card Cage
1. Fiber optic transmitter card cage shall be provided as shown on the CCTV block diagram and shall provide for the compact installation of the fiber optic transmitters in the equipment rack.

PART 3 EXECUTION

3.01 WIRING

- A. Wiring Method: Install cables in raceways except in accessible indoor ceiling spaces, in attics, in hollow gypsum-board partitions, and as otherwise indicated. Conceal raceways and wiring except in unfinished spaces.
 - 1. If new pathways are required that were not provided by the EC, all sections of this specification apply for conduit sizing, fire stopping, and other specific requirements outlined in these specifications.
- B. Wiring Method: Install cables concealed in accessible ceilings, walls, and floors where possible.
- 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 and UL 486B.
- E. Grounding: Provide independent-signal circuit grounding recommended in writing by manufacturer.

3.02 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 at only 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 Division 26 Section "Identification of Electrical Systems."

3.03 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation and supervise pretesting, testing, and adjusting of video surveillance equipment.
- B. Inspection: Verify that units and controls are properly installed, connected, and labeled, and that interconnecting wires and terminals are identified.
- C. 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:
 - 1. Prepare equipment list described in Part 1 "Submittals" Article.
 - 2. Verify operation of auto-iris lenses.
 - 3. 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.

4. 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.
 5. Set and name all preset positions; consult Owner's personnel.
 6. Set sensitivity of motion detection.
 7. Connect and verify responses to alarms.
 8. Verify operation of control-station equipment.
- D. 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.
- E. 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.
- F. Remove and replace malfunctioning items and retest as specified above.
- G. Record test results for each piece of equipment.
- H. Retest: Correct deficiencies identified by tests and observations and retest until specified requirements are met.

3.04 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions and to optimize performance of the installed equipment. 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' utilization of video surveillance system.
 5. Provide a written report of adjustments and recommendations.

3.05 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.

3.06 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain video surveillance equipment.
1. Train Owner's maintenance personnel on procedures and schedules for troubleshooting, servicing, and maintaining equipment.
 2. Demonstrate methods of determining optimum alignment and adjustment of components and settings for system controls.
 3. Review equipment list and data in maintenance manuals. Refer to Division 01 Section "Operation and Maintenance Data"
 4. Conduct a minimum of [six] <Insert number> hours' training as specified in instructions to Owner's employees in Division 01 Section "Demonstration and Training"

END OF SECTION 28 2300