

SECTION 28 10 05

ELECTRONIC SECURITY SYSTEMS (ESS)

05/16

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM B32 (2008; R 2014) Standard Specification for Solder Metal

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 802.3 (2018) Ethernet

IEEE C2 (2017; Errata 1-2 2017; INT 1 2017) National Electrical Safety Code

IEEE C62.41.1 (2002; R 2008) Guide on the Surges Environment in Low-Voltage (1000 V and Less) AC Power Circuits

IEEE C62.41.2 (2002) Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ANSI ISO/IEC 7816 (R 2009) Identification Cards - Integrated Circuit Cards

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2020; ERTA 20-1 2020; ERTA 20-2 2020; TIA 20-1; TIA 20-2; TIA 20-3; TIA 20-4) National Electrical Code

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST FIPS 201-2 (2013) Personal Identity Verification (PIV) of Federal Employees and Contractors

OPEN NETWORK VIDEO INTERFACE FORUM (ONVIF)

ONVIF (2017) Core Specification Version 17.06

TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA)

TIA-222 (2018H; Add 1 2019) Structural Standard for Antenna Supporting Structures and Antennas and Small Wind Turbine Support

Structures

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

47 CFR 15 Radio Frequency Devices

UNDERWRITERS LABORATORIES (UL)

UL 294 (2018; Reprint Oct 2018) UL Standard for
Safety Access Control System Units

UL 1076 (2018) UL Standard for Safety Proprietary
Burglar Alarm Units and Systems

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Training Documentation; G
Software Updates; G
Access Control Unit; G

Access Control Devices; G
Cameras; G

Wire and Cable; G

Technical Manuals; G
Camera Lenses; G
Camera Housing and Mounts; G

SD-05 Design Data

CCTV Storage Calculations; G

SD-06 Test Reports

Performance Verification Test; G
Test Procedures and Reports; G
Original Copies of all Test Data; G

SD-07 Certificates

Supplemental Quality Control; G

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals; G

SD-11 Closeout Submittals

As-Built Drawings; G

1.3 SYSTEM DESCRIPTION

1.3.1 General

Configure the system as described and as shown on the Contract Drawings. Include in the system all connectors, adapters, and terminators necessary to interconnect all equipment. Supply all cabling necessary to interconnect the closed circuit television (CCTV) and access control equipment installed and interconnect equipment installed. All camera equipment locations shall be approved by the project personnel and Contracting Officer prior to installation.

1.3.2 System Overall Reliability Requirement

Configure and install the system, including all components and appurtenances, to yield a mean time between failure (MTBF) of at least 10,000 hours, calculated based on the configuration specified.

1.3.3 Power Line Surge Protection

Protect all equipment connected to AC power from surges. Equipment protection shall withstand surge test waveforms described in IEEE C62.41.1 and IEEE C62.41.2. Fuses shall not be used for surge protection.

1.3.4 Video and Sync Signal Transmission Line Surge Protection

All cable, except fiber optic cable, used for sync or video signal transmission shall include protective devices to safeguard the CCTV equipment against surges. The surge suppression device shall not attenuate or reduce the video or sync signal under normal conditions. The surge suppression device shall be capable of dissipating not less than 1500 watts for 1 millisecond, and the response time from zero volts to clamping shall not be greater than 5 nanoseconds. Fuses shall not be used for surge protection.

1.3.5 Control Line Surge Protection

All cables and conductors, except fiber optic cables, which serve as communication, control, or signal lines shall be protected against surges and shall have surge protection installed at each end. Protection shall be furnished at the equipment and additional triple electrode gas surge protectors rated for the application on each wireline circuit shall be installed within (3 feet) of the building cable entrance. Fuses shall not be used for surge protection. Test the inputs and outputs in both normal mode and common mode using the following waveforms:

- a. A 10 microsecond rise time by 1000 microsecond pulse width waveform with a peak voltage of 1500 volts and a peak current of 60 amperes.
- b. An 8 microsecond rise time by 20 microsecond pulse width waveform with

a peak voltage of 1000 volts and a peak current of 500 amperes.

1.3.6 Power Line Conditioners

Furnish a power line conditioner for the CCTV equipment. The power line conditioner shall be of the Faeroes design, with no moving parts and no tap switching, while electrically isolating the secondary from the power line side. The power line conditioner shall be sized for 125 percent of the actual connected kA load. Characteristics of the power line conditioner shall be as follows:

- a. At 85 percent load, the output voltage shall not deviate by more than plus or minus 1 percent of nominal when the input voltage fluctuates between minus 20 percent to plus 10 percent of nominal.
- b. During load changes of zero to full load, the output voltage shall not deviate by more than plus or minus 3 percent of nominal. Full correction of load switching disturbances shall be accomplished within 5 cycles, and 95 percent correction shall be accomplished within 2 cycles of the onset of the disturbance.
- c. Total harmonic distortion shall not exceed 3.5 percent at full load.

1.3.7 Electrical Requirements

Electrically powered IDS equipment shall operate on 120 volt 60 Hz AC sources as shown. Equipment shall be able to tolerate variations in the voltage source of plus or minus 10 percent, and variations in the line frequency of plus or minus 2 percent with no degradation of performance.

1.4 SUBMITTAL OF TECHNICAL DATA

All items of computer software and technical data (including technical data which relates to computer software), which are specifically identified in this specification shall be delivered strictly in accordance with the CONDITIONS OF THE CONTRACT, SUPPLEMENTARY CONDITIONS, Section 01 33 00 SUBMITTAL PROCEDURES, and in accordance with the Contract Data Requirements All data delivered shall be identified by reference to the particular specification paragraph against which it is furnished.

1.4.1 Technical Data Package

1.4.1.1 System Drawings

The data package shall include the following:

- a. System block diagram
- b. CCTV equipment installation, interconnection with existing console equipment, block diagrams and wiring diagrams.
- c. Camera wiring and installation drawings.

- d. Pan/tilt mount wiring and installation drawings.
- e. Interconnection with video signal transmission system, block diagrams and wiring diagrams.
- f. Surge protection device installation.

1.4.1.2 Manufacturer's Data

The data package shall include manufacturer's data for all material and equipment provided under this specification.

1.4.1.3 System Description and Analyses

The data package shall include complete system descriptions, analyses and calculations used in sizing the equipment required by these specifications. Descriptions and calculations shall show how the equipment will operate as a system to meet the performance of this specification. The data package shall include the following:

- a. IP video storage size.
- b. Camera call-up response time.
- c. System start up and shutdown operations.
- d. CCTV system programming instructions.
- e. CCTV system operating and maintenance instructions.
- f. Manuals for CCTV equipment.
- g. Data entry forms.

1.4.1.4 Certifications

All specified manufacturer's certifications shall be included with the data package.

1.4.2 Performance Verification Data

Prepare test procedures and reports for the performance verification test. Deliver the performance verification test to the Government for approval. Schedule the tests after receipt of written approval of the test procedures. Provide a report detailing the results of the field test. The final performance verification and test report shall be delivered after completion of the test.

1.4.2.1 Operation and Maintenance Manuals

A draft copy of the operation and maintenance manuals, as specified for the technical manuals, shall be delivered to the Government prior to beginning the performance verification test for use during site testing.

1.4.2.2 Training Documentation

Lesson plans and training manuals for the training phases, including type of training to be provided with a sample training report. and a list of reference material, shall be delivered for approval.

1.4.3 Technical Manuals

Final copies of each of the manufacturer's commercial manuals arranged as specified bound in hardback, loose-leaf binders, shall be delivered to the Government. The draft copy used during site testing shall be updated prior to final delivery of the manuals. Each manual's contents shall be identified on the cover. The manual shall include names, addresses, and telephone numbers of each subcontractor installing equipment and systems, and nearest service representatives for each item of equipment for each system. The manuals shall have a table of contents and tab sheets. Tab sheets shall be placed at the beginning of each chapter or section and at the beginning of each appendix. The final copies delivered after completion of the endurance test shall include all modifications made during installation, checkout, and acceptance.

1.4.3.1 Maintenance Manual

The maintenance manual shall describe maintenance for all equipment including inspection, periodic preventive maintenance, fault diagnosis, and repair or replacement of defective components repair or replacement of defective components.

1.4.3.2 Hardware Manual

A manual shall describe all equipment furnished, including:

- a. General hardware description and specifications.
- b. Installation and checkout procedures.
- c. Equipment electrical schematics and layout drawings.
- d. System schematics and wiring list.
- e. System setup procedures.
- f. Manufacturer's repair parts list indicating sources of supply.
- g. Interface definition.

1.4.3.3 Operator's Manual

The operator's manual shall explain all procedures and instructions for operation of the system including:

- a. Cameras.
- b. Operator commands.
- c. System start-up and shut-down procedures.
- d. Recovery and restart procedures.

1.5 SYSTEM CALCULATIONS AND ANALYSIS

1.5.1 CCTV Storage Calculations

Submit calculations showing the required storage capacity for each video storage device. Each camera shall record 24 hours per day, 7 days per week, at max HD resolution with 15 FPS and H.265 smart compression. Recording shall be stored for a minimum of 90 days. Two video storage devices meeting these requirements shall be provided.

1.6 QUALITY ASSURANCE

1.6.1 Test Procedures and Reports

Test procedures shall explain, in detail, step-by-step actions and expected results demonstrating compliance with the requirements of the specification. Test reports shall be used to document the results of the tests. Reports shall be delivered to the Government within 7 days after completion of each test.

1.7 Environmental Conditions

1.7.1 Field Equipment

The camera and all other field equipment shall be rated for continuous operation under ambient environmental conditions of (14 to 120 degrees F) using no auxiliary heating or cooling equipment. Equipment shall be rated for continuous operation under the ambient environmental temperature, humidity, wind loading, ice loading, and vibration conditions specified or encountered for the installed location.

1.7.2 Existing Conditions

Visit the site and verify that site conditions are in agreement with the design package.

1.8 AS-BUILT DRAWINGS

Maintain a separate set of drawings, elementary diagrams, and wiring diagrams of the system to be used for as-built drawings. Keep this set accurately and neatly up-to-date with all changes and additions. This set is not to be used for installation purposes.

Finish the final drawings submitted with the endurance test report in accordance with Section 01 78 00 CLOSEOUT SUBMITTALS for as-built requirements.

1.9 MAINTENANCE AND SERVICE

1.9.1 Description of Work

The adjustment and repair of the system includes all video equipment and access control equipment.

1.9.2 Personnel

Service personnel shall be qualified to accomplish all work promptly and satisfactorily. The Government shall be advised in writing of the name of the designated service representative, and of any changes in personnel.

1.9.3 Schedule of Work

Perform two inspections at 6 month intervals or less. This work shall be performed during regular working hours, Monday through Friday, excluding legal holidays. These inspections shall include:

- a. Visual checks and operational tests of the cameras, access control equipment, recording devices, electrical and mechanical controls, and a check of the picture quality from each camera.
- b. Run system software and correct all diagnosed problems.
- c. Resolve any previous outstanding problems.

1.9.4 Emergency Service

The Government will initiate service calls when a system is not functioning properly. Qualified personnel shall be available to provide service to the complete CCTV or access control system. The Government shall be furnished with a telephone number where the service supervisor can be reached at all times. Service personnel shall be at the site within 24 hours after receiving a request for service. The CCTV and access control systems shall be restored to proper operating condition within 3 calendar days after receiving a request for service.

1.9.5 Operation

Performance of scheduled adjustments and repair shall verify operation of the CCTV or access control system as demonstrated by the applicable portions of the performance verification test.

1.9.6 Records and Logs

Keep records and logs of each task, and organize cumulative records for each major component, and for the complete system chronologically. Maintain a continuous log for all devices containing calibration, repair, and programming data. Keep logs available for inspection on site, demonstrating that planned and systematic adjustments and repairs have been accomplished for each system.

1.9.7 Work Requests

Separately record each service call request, as received. The form shall include the serial number identifying the component involved, its location, date and time the call was received, nature of trouble, names of the service personnel assigned to the task, instructions describing what has to be done, the amount and nature of the materials to be used, the time and date work started, and the time and date of completion. Deliver a record of the work performed within 5 days after work is completed.

1.9.8 System Modifications

Make any recommendations for system modification in writing to the Government. No system modifications, including operating parameters and control settings, will be made without prior approval of the Government.

Incorporate any modifications made to the systems into the operations and maintenance manuals, and other documentation affected.

1.9.9 Software

Submit all software updates to the Government for approval. Upon Government approval, updates shall be accomplished in a timely manner, fully coordinated with the CCTV system operators, operation in the system verified, and incorporated into the operations and maintenance manuals, and software documentation. There shall be at least one scheduled update near the end of the first year's warranty period, at which time the Contractor shall install and validate the latest released version of the manufacturer's software.

1.9.10 Warranty

Provide all required services, material and equipment necessary for the work to maintain the entire CCTV and access control system in an operational state as specified for a period of 1 year after completion of the endurance test. Impacts on facility operations shall be minimized when performing scheduled adjustments or other unscheduled work. For equipment that came with a warranty extended past a year, the contractor shall hand over all warranty information to the government.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

Integrate the installed and operating subsystems into the existing overall ESS system to control access, provide CCTV surveillance, , and perform as an entity, as specified below. Provide electronic equipment that complies with 47 CFR 15 and are suitable for the environment where they will be installed.

Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design, and workmanship, and:

- a. Have been in satisfactory commercial or industrial use for 2 years prior to bid opening, and have been utilized in applications of equipment and materials under similar circumstances and of similar size.
- b. Have been available on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period.
- c. Where two or more items of the same class of equipment are required, provide products of a single manufacturer.
- d. Provide commercial off-the-shelf (COTS) products in which the manufacturer allows a network of qualified distributors to sell, install, integrate, maintain, and repair the hardware and software products that make up the system.

2.1.1 Alternative Qualifications

Products having less than a 2 year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.

2.1.2 Material and Equipment Manufacturing Date

Products manufactured more than one year prior to date of delivery to the site are not acceptable.

2.1.3 Product Safety

System components are to conform to applicable rules and requirements of NFPA 70. Equip system component with instruction stickers including warnings and cautions describing physical activity, and special or important procedures to be followed in operating and servicing system equipment.

2.1.4 Soldering

All soldering shall be done in accordance with standard industry practices.

2.1.5 Maintainability

Provide components that can be maintained using commercially available tools and equipment. Arrange and assemble components to be readily accessible to maintenance personnel without compromising system defeat resistance and with no degradation in tamper protection, structural integrity, EMI or RFI attenuation, or line supervision after maintenance when it is performed in accordance with manufacturer's instructions.

2.1.6 Special Test Equipment

Provide all special test equipment, special hardware, software, tools, and programming or initialization equipment needed to start or maintain any part of the system and its components. Special test equipment is defined as any test equipment not normally used in an electronics maintenance facility.

2.1.7 Interchangeability

Use off-the-shelf components which are physically, electrically, and functionally interchangeable with equivalent components as complete items. Equivalent, replacement components must not require new or other component modification. Do not use custom designed or one-of-a-kind items. Interchangeable components or modules must not require trial and error matching in order to meet integrated system requirements, system accuracy, or restore complete system functionality.

2.2 ACCESS CONTROL SYSTEM (ACS)

Provide an access control system based upon a modular distributed microprocessor architecture complete with access control cards and ready for operation.

- a. The ACS card credentials are required to be Common Access Cards (CAC), and CAC cards are being provided by the Government. Interface system with and provide alarm and other status to the existing overall ESS.

Provide ACS that meets the communications requirements of UL 1076 and UL 294 and has the capability of controlling up to 8 card readers and keypads per card reader controller, 128 alarm inputs, or 128 relay outputs or any components combination.

- b. System is to grant or deny access or exit based upon:

- (1) Keypad identification data

(2) CAC card identification data

- c. Decision to grant or deny access or exit is to be based upon authorization for such data to be input at a specific location for the current time period.
- d. Provide both supervised and non-supervised alarm point monitoring.

2.2.1 Access Control Unit(ACU)

UL 294. Provide micro-processor based ACU with all access and input and output decisions to be made by the individual ACU(s). Provide modular solution which will allow for present security requirements and the capability to expand. Configure all field ACU panels to intercommunicate via RS-422/485 or fiber-optic communication. Equip all field ACU(s) with a tamper contact.

Designate one ACU as "Primary", responsible for all ACS-to-ACU communications. All other ACU(s) up to a maximum of 16 are to be designated as "Secondary" and communicate with the "Primary" via an RS-422/485 hardware, or fiber-optic configuration. Provide ACU capable of, but not limited to, the following:

- a. Built-in surge suppression circuitry on plug-in modular circuit boards with surge suppression, configured as an integral component of the system and self-sacrificing in the event of extreme surges or spikes.
- b. Capable of supporting at least 4 ports and be expandable in increments of two ports up to a maximum of 8 ports per ACU.
- c. Each port configured by ACS to support any one of the following peripheral devices:

- (1) Card reader
- (2) Alarm Monitoring Module
- (3) Output Relay Module

Any device combination can be supported on each ACU, up to a total of 8 devices per ACU.

- d. Capability of supporting multiple card reader technologies simultaneously, including:
 - (1) Keypad
 - (2) Card and Keypad

(3) CAC compatible

This capability must be an integral part of the ACU and will not require special external equipment.

- e. Built-in battery back-up of programmed information sustainable for a period of at least 90 days.
- f. Powered by a 12 VDC power source rated at a minimum of 2 amperes with a battery back-up for complete system operation in the event of power failure. Provide battery backup for all ACU(s) to sufficiently power the ACU for 8 hours continuous service.
- g. Electric strikes, other locking devices and ancillary peripherals on a separate power supply with battery back-up for continued operation in the event of power failure as specified in paragraph "Backup Power".
- h. A minimum of a 10,300 event log buffer per ACU to record and hold access and alarm activity information until the ACS is connected and receives the information. Provide a software-configurable warning log buffer filling notification for ACU(s) configured with network switch capabilities.

2.2.2 Access Control Devices

2.2.2.1 Card Readers

Provide weatherproof mountable card readers as indicated for each individual location. Provide contactless type card readers capable of reading CAC cards type of access control cards.

2.2.2.1.1 Contactless Card Readers

Provide contactless card readers that can read credential CAC cards whose characteristics of size and technology meet those defined by ANSI ISO/IEC 7816 in close proximity to the card reader and are in compliance with NIST FIPS 201-2.

Provide readers with "flash" download capability to accommodate card format changes and the capability of reading the card data and transmitting the data, or a portion thereof, to the ESS control panel.

2.2.2.1.2 Card Reader Display

Provide card readers with an LED or other visual indicator display which indicate power ON and OFF and whether user passage requests have been accepted or rejected.

2.2.2.1.3 Card Reader Response Time

The card reader is to respond to passage requests by generating a signal to the local processor.

2.2.2.1.4 Card Reader Power

Power the card reader from the source as shown on the drawings. The card reader must not dissipate more than 5 Watts.

2.2.2.1.5 Card Reader Mounting Method

Provide card readers suitable for weatherproof mounting as required.

2.2.2.2 Access Control Cards

Ensure that installed system is compatible with existing Owner Access Control Cards.

2.3 CLOSED-CIRCUIT TELEVISION (CCTV) SYSTEM

Select system components that conform to the Open Network Video Interface Forum (ONVIF) specification. Provide compatible UL listed CCTV components to provide visual assessment of ESS alarms automatically upon alarm or upon SCC operator selection. Otherwise, the subsystem is to continuously display the coverage area. Display alphanumeric camera location ID on all monitors. Provide the number of alarm monitors as required. The scene from each camera must appear clear, crisp, and stable on the respective monitor during both daytime and nighttime operation. Provide component equipment that minimizes both preventive and corrective maintenance. Provide components from a single manufacturer or justify mixing manufacturer components and demonstrate compatibility in submittal information.

2.3.1 Cameras

2.3.1.1 CCTV Camera

Provide cameras of digital fixed, pan-tilt-zoom (PTZ), or panoramic type as identified on the drawings.

Provide the most recent version of the Spectra Enhanced PTZ, 2MP, 1080p, 30X, environmental pendant camera. Current version model number: S7230L-EW0.

- a. Day-Night Color fixed, PTZ or panoramic cameras are to be used in all outdoor environments. Standard fixed, PTZ, or panoramic cameras are to be used for all indoor applications except when backlighting issues are observed. Use Day-Night cameras or standard cameras with backlighting compensation for backlighting or high contrast applications.
- b. Provide PTZ cameras with a direct drive motor assembly. Belt driven PTZ camera units are not acceptable. Equip PTZ cameras with a slip ring assembly having an optical interface and be rated for continuous duty. PTZ cameras have to be fully integrated units. The pan-tilt mechanism must be an integral part of the camera.
- c. Provide cameras that operate over Power over Ethernet (PoE) IEEE 802.3.
- d. Provide cameras that support FSFP Series transceivers and third-party MSA transceivers.
- e. All cameras must be constructed to provide rigid support for

electrical and optical systems so that unintentional changes in alignment or microphonic effects do not occur during operation, movement, or lens adjustments.

f. Video Frame Rate: up to 60 frames per second (fps)

2.3.1.1.1 Sensitivity

Minimum Illumination: 0.8 lux at 33 ms color mode; 0.1 lux at 33ms in the B&W mode.

2.3.1.1.2 Signal-To-Noise Ratio

Show a signal-to-noise ratio of not less than 50 decibels (dB) at Automatic Gain Control (AGC) "Off", weight "On".

2.3.1.1.3 Resolution

Provide a minimum of 2 megapixel resolution. The imager must have a minimum of 1920 horizontal x 1080 picture in progressive scan format. Resolution is to be maintained over the specified input voltage and frequency range, and not vary from minimum specification over the specified operating temperature range.

2.3.1.1.4 Synchronization

Provide cameras that have internal and line lock.

2.3.1.1.5 Low Light Level

Provide Day-Night cameras that have a B-W mode that may be automatically engaged on low light level and permit the use of an external infrared illuminator. Electronic removal of the color signal is not acceptable. The camera must have an infrared cut filter capable of being removed automatically upon low light threshold or manually.

2.3.1.2 Camera Lenses

Camera lenses are to be all glass with coated optics. Provide lens mount that is compatible with the cameras selected. Provide lens with the camera that have a maximum f-stop opening of f/1.2 or the maximum available for the focal length specified. The lens is to have an auto-iris mechanism unless otherwise specified. Lenses having auto iris, manual iris, or zoom and focus functions are to be supplied with connectors, wiring, receiver and driver units, and controls as needed to operate the lens functions. Provide lenses with sufficient circle of illumination to cover the image sensor evenly. Lenses are not to be used on a camera with an image format larger than the lens is configured to cover. Provide lens with focal lengths as indicated or specified in the manufacturer's lens selection tables.

2.3.1.3 Camera Housing and Mounts

The camera and lens are to be enclosed in a tamper resistant housing installed on a camera support. Any ancillary housing mounting hardware needed to install the housing at the camera location is to be provided as part of the housing. The camera support must be capable of supporting the

mounted equipment and withstanding wind and ice loads normally encountered at the site.

2.3.1.3.1 Environmentally Sealed Camera Housing

The housing is to provide an environment needed for camera operation and be condensation free; dust and water tight; keep the viewing window free of fog, snow, and ice, and be fully operational in 100 percent condensing humidity. Provide housing equipped with a sunshield. Both the housing and sunshield are to be white. Purge the housing of atmospheric air and pressurized with dry nitrogen, equipped with a fill valve, overpressure valve, and include a humidity indicator visible from the exterior. Housing must not have a leak rate greater than 2 psi at sea level within a 90 day period.

Provide housing equipped with supplementary camera mounting blocks or supports needed to position the camera and lens to maintain the proper optical centerline. All electrical and signal connections required for camera and lens operation are to be supplied. Provide a mounting bracket as part of the housing which allows weight adjustment to center the weight of the assembly.

2.3.1.3.2 Exterior Dome Housing

Provide dome housing capable of being mounted by pendant, pole, ceiling, surface, or corner as shown on the drawings and constructed to be dust and water tight, and fully operational in 100 percent condensing humidity. Purge the housing of atmospheric air and pressurize with dry nitrogen. Provide a fill valve and overpressure valve with a pressure indicator visible from the exterior. The housing is to be equipped with supplementary camera mounting blocks or supports as needed to position the specified camera and lens to maintain the proper optical centerline.

Provide all electrical and signal connections required for camera and lens operation. The housing is to provide the environment needed for camera operation. The lower dome is to be black opaque acrylic with a light attenuation factor of not more than 1 f-stop. Provide housing with:

- a. Integral pan-tilt complete with wiring
- b. Wiring harnesses
- c. Connectors
- d. Receiver-driver
- e. Pan-tilt control system
- f. Pre-position cards
- g. Heavy duty bearings
- h. Hardened steel gears
- i. Permanent lubrication
- j. Motors that are thermally or impedance protected against overload damage.

- k. Any other hardware and equipment as needed to provide a fully functional pan-tilt dome. Provide pan movement of 360 degrees and tilt movement of at least plus or minus 90 degrees. Pan speed must be at least 20 degrees per second and tilt speed be at least 10 degrees per second.

2.3.1.3.3 Pan-Tilt Mount

- a. Provide pan-tilt mount capable of supporting the camera, lens, and housing specified that is weatherproof and sized to accommodate the camera, lens and housing weight plus maximum wind loading encountered at the installation site if the pan-tilt is to be mounted outdoors. Provide pan-tilt with:
 - (1) Heavy duty bearings
 - (2) Hardened steel gears
 - (3) Externally adjustable limit stops for pan and tilt
 - (4) Mechanical, dynamic, or friction brakes
 - (5) Permanent lubrication
 - (6) Motors that are thermally or impedance protected against overload damage.
- b. Provide pan movement of 360 degrees pan rotation, a minimum tilt movement of plus and minus 90 degrees. Manual pan speed must be a minimum of 0 to 80 degrees per second, and a minimum tilt speed of 10 degrees per second. A minimum automatic pan speed of 280 degree per second and tilt speed of 160 degree per second.
- c. The pan-tilt is to be supplied complete with wiring, wiring harnesses, connectors, receiver-driver, pan-tilt control system, pre-position cards, or any other hardware and equipment as needed to provide a fully functional pan-tilt mount to fulfill the site design requirements.

2.3.1.3.4 Explosion Proof Housing

The explosion proof housing must meet the requirements in paragraph "Component Enclosure" for hazardous locations. Configure housing to provide a tamper resistant enclosure and supply with the proper mounting brackets for the specified camera and lens.

2.3.2 Video Analytics (VA)

2.3.2.1 Software

Provide capability range from basic activity detection to the search through databases to pre-empt serious incidents. The VA is to provide graphic identified movement identification, user-selectable monitored areas, compensation for environmental movement, and other features specified when provided as a capability of the NVR. Provide the following features:

2.3.2.1.1 Basic Motion Detection

- a. Adaptive Motion
- b. Abandoned Object
- c. Object Removal
- d. Camera Sabotage
- e. Directional Motion
- f. Object Counting
- g. Loitering Detection
- h. Stopped Vehicle

2.3.2.1.2 Advanced VA

2.3.2.1.2.1 Intruder Identification

This refers to identifying unauthorized humans in specified areas within the field of view.

2.3.2.1.2.2 Environmental Compensation

Recognizing and ignoring wind-blown debris, animals, background traffic, and so on.

2.3.2.1.2.3 Counting

This refers to recognizing a quantity of a particular object moving or activity performed.

2.3.2.1.2.4 Directional Identification

This refers to the ability to ignore objects moving in one direction, while alarming for objects moving in unauthorized directions.

2.3.2.1.2.5 Item Recognition

This refers to activation when specific user-selected items are removed from, placed in, or passed through the field of view.

2.3.2.1.2.6 Subject Tracking

Highlighting and following a specific person or item as it moves about the field of view, or from the field of view of one camera to another.

2.3.2.1.2.7 Multiple Subject Tracking

Highlighting and following multiple persons or items simultaneously as they move about the field of view, or from the field of view of one camera to another.

2.3.2.2 Embedded VA

2.3.2.2.1 Intelligent Video Analysis

- a. Provide camera capable of processing and analyzing video within the camera itself, with no extra hardware required.
- b. The camera is to be capable of detecting and sending alarms for abnormal events.
- c. The camera is to be configurable to analyze up to 10 different scenes for one or more of the following events:
 - (1) Line Crossing
 - (2) Loitering
 - (3) Idle Object
 - (4) Removed Object
 - (5) Conditional Change
 - (6) Trajectory Tracking
 - (7) Filters
- d. The camera is to allow users to set up to 10 separate profiles and switch profiles based on a day, night, or holiday schedules.
- e. The camera is to support scene tours that automatically reposition the camera to each scene for a specified duration.
- f. The camera is to incorporate an Alarm Rule Engine, enabling abnormal events that VA detects to prompt the camera to take one or more actions:
 - (1) Trigger a relay connected to an alarm siren, strobe, or both.
 - (2) Trigger a visual alert to be displayed on the operator's screen.
 - (3) Go to a specified scene (preset position).

2.3.2.2.2 Motion Tracking with PTZ Cameras

- a. The camera is to offer Intelligent Tracking to continuously track an object using pan, tilt, and zoom actions.
- b. The camera is to provide automatic motion tracking using intelligent video analytics.
- c. Provide camera with the ability to follow an object continually when passing behind a privacy mask.
- d. Provide camera with the ability to restart tracking if a target starts moving in the same area where the initial target stopped moving or if the camera detects an object moving along the last known trajectory.
- e. The camera is to allow an operator to select an object to track in the

live image view.

2.3.3 Camera Mounting Structures

Provide camera mounting structures designed specifically for CCTV cameras. The structure is to accommodate appropriate wiring pathways for power and communication as well as proper grounding and surge protection. Design loads for the camera mounting structure must conform to TIA-222 and all applicable addendums of the TIA standard. Allowable pole deflection is determined from the point of the camera mount and must not exceed 0.5 percent of the pole height under adjusted maximum wind load conditions. Adjusted maximum wind load conditions for deflection calculations must be 30 miles per hour (mph) or 35 percent of the basic wind speed as determined by TIA-222, whichever is greater. Confirm compliance to TIA standards by structure manufacturer data or by analysis. Provide additional measures as required to stabilize the camera if placed in an environment that is subject to induced vibrations such as heavy winds or excessive traffic.

2.4 COMMUNICATIONS

Provide all components compatible with and as required to connect to existing Owner ESS.

2.4.1 Wire and Cable

Provide all wire and cable not indicated as Government-furnished equipment. All wire and cable in tunnels, manholes, or other confined spaces shall be low smoke/zero halogen (LSZH). All wire and cable components shall be able to withstand the environment the wire or cable is installed in for a minimum of 20 years.

2.4.2 Digital Data Interconnection Wiring

Interconnecting cables carrying digital data between equipment shall be optical fiber or Category 6 and not less than 23 AWG and shall be stranded copper cable for each conductor. Plenum cables shall be IEEE C2 CL2P certified..

2.4.3 Ethernet Cable

Provide ethernet cable in accordance with TIA-568-C.0, TIA-568-C.2, UL 444, ANSI/NEMA WC 66, ICEA S-90-661 UTP (unshielded twisted pair, 100 ohm as required for PLC or control cabling. Provide low smoke/zero halogen communications rated cabling with four, individually twisted pair, 23 AWG conductors, Category 6 with a blue thermoplastic jacket. Cable shall be imprinted with manufacturer's name or identifier, flammability rating, gauge of conductor, transmission performance rating (category designation) at regular intervals not to exceed 2 feet.

2.5 NETWORK SWITCH

Provide ethernet cable in accordance with TIA-568-C.0, TIA-568-C.2, UL 444, ANSI/NEMA WC 66, ICEA S-90-661 UTP (unshielded twisted pair, 100 ohm as

required for PLC or control cabling. Provide low smoke/zero halogen communications rated cabling with four, individually twisted pair, 23 AWG conductors, Category 6 with a blue thermoplastic jacket. Cable shall be imprinted with manufacturer's name or identifier, flammability rating, gauge of conductor, transmission performance rating (category designation) at regular intervals not to exceed 2 feet.

2.6 CAMERA LICENSES

Each camera shall have a Pelco VideoXpert Professional license plus 3 years of the software upgrade plan.

The camera licenses shall be the most recent version of the VXP-1C-3Y license.

2.7 SPARE PARTS

The contractor shall supply 1 camera and 1 card reader as spare parts. The model number for the spare parts shall be the same as the installed equipment under this contract.

PART 3 EXECUTION

3.1 INSTALLATION

Install all system components, including Government furnished equipment, and appurtenances in accordance with the manufacturer's instructions, IEEE C2 and as shown, and furnish all necessary connectors, terminators, interconnections, services, and adjustments required for a complete and operable system. Raceways shall be furnished and installed as specified. DTM shall not be pulled into conduits or placed in raceways, compartments, outlet boxes, junction boxes, or similar fittings with other building wiring.

3.1.1 Existing Equipment

Connect to and utilize existing equipment, control signal transmission lines, and devices as shown on the drawings. Any equipment and signal lines that are usable in their original configuration without modification may be reused with Government approval.

Make written requests and obtain approval prior to disconnecting any signal lines and equipment that creates equipment outage. Such work can proceed only after receiving Government approval of these requests. If any device fails after work has commenced on that device, signal, or control line, diagnose the failure and perform any necessary corrections to the equipment. The Government is responsible for maintenance and repair of Government equipment. The Contractor will be held responsible for repair costs due to negligence or abuse of Government equipment on their part.

3.1.2 Enclosure Penetrations

Enclosures are to be penetrated from the bottom unless shown otherwise. Penetrations of interior enclosures having transitions of conduit from interior to exterior, and penetrations of exterior enclosures are to be sealed with rubber silicone sealant to preclude the entry of water. Terminate conduit risers in a hot-dipped galvanized metal cable terminator that is filled with a sealant as recommended by the cable manufacturer, and in a manner that does not damage the cable.

3.1.3 Cable and Wire Runs

Perform required cable and wire routings per NFPA 70 , and as specified. Terminate conduits including flexible metal and armored cable in the sensor or device enclosure. Fit ends of conduit with insulated bushings. Exposed conductors at ends of conduits external to sensors and devices are not acceptable.

3.1.4 Soldering

Soldered electrical connections must use composition Sn60, Type AR or S, for general purposes; use composition Sn62 or Sn63, Type AR or S, for special purposes. Flux must conform to ASTM B32 when Type S solder is used for soldering electrical connections.

3.1.5 Cold Galvanizing

All field welds and brazing on factory galvanized boxes, enclosures, and conduits shall be coated with a cold galvanized paint containing at least 95 percent zinc by weight.

3.1.6 Cameras

Install the cameras with the proper focal length lens as indicated for each zone; connect power and signal lines to the camera; set cameras with fixed iris lenses to the proper f-stop to give full video level; aim camera to give field of view as needed to cover the alarm zone; aim fixed mount cameras installed outdoors facing the rising or setting sun sufficiently below the horizon to preclude the camera looking directly at the sun; focus the lens to give a sharp picture over the entire field of view; and synchronize all cameras so the picture does not roll on the monitor when cameras are selected. Dome cameras shall have all preset positions defined and installed.

3.1.7 Camera Housings, Mounts, and Poles

Install the camera housing and mounts as specified by the manufacturer and as shown, provide mounting hardware sized appropriately to secure each camera, housing and mount with maximum wind and ice loading encountered at the site.

3.1.8 Cables in Crossovers

Inform the Contracting Officer two weeks prior to work in the crossovers to ensure project personnel enough time to pump out the crossovers.

3.2 ADJUSTMENT, ALIGNMENT, SYNCHRONIZATION, AND CLEANING

- a. Clean each system component of dust, dirt, grease, or oil incurred during and after installation or accrued subsequent to installation from other project activities subsequent to installation.
- b. Prepare for system activation by manufacturer's recommended procedures for adjustment, alignment, or synchronization.
- c. Prepare each component in accordance with appropriate provisions of component installation, operations, and maintenance manuals.
- d. Remove large vegetation that may sway in the wind and touch fencing.
- e. Adjust sensors so that coverage is maximized without mutual interference.

3.3 SYSTEM STARTUP

Do not apply power to the system until after:

- a. Set up system equipment items and communications in accordance with manufacturer's instructions.
- b. Conduct a system visual inspection to ensure that defective equipment items have not been installed and that there are no loose connections.
- c. Test and verify system wiring as correctly connected.
- d. Verify system grounding and transient protection systems as properly installed.
- e. Verify the correct voltage, phasing, and frequency of the system power supplies.

Satisfaction of the requirements above does not relieve the contractor of responsibility for incorrect installations, defective equipment items, or collateral damage as result of Contractor work or equipment.

3.4 SUPPLEMENTAL QUALITY CONTROL

The following requirements supplement the quality control requirements specified elsewhere in the contract. Provide the services of technical representatives who are thoroughly familiar with all components and installation procedures of the installed IDS; and are approved by the Contracting Officer. These representatives shall be present on the job site during the preparatory and initial phases of quality control to provide technical assistance. These representatives shall also be available on an as needed basis to provide assistance with follow-up phases of quality control. These technical representatives shall participate in the testing and validation of the system and shall submit certification that their respective system portions meet its contractual requirements.

The above requirements supplement the quality control requirements specified elsewhere in the contract.

3.5 Training

3.5.1 General

Conduct training courses for designated personnel in the maintenance and operation of the CCTV system as specified. The training shall be oriented to the specific system being installed under this contract. Training manuals shall be delivered for each trainee with two additional manuals delivered for archiving at the project site. The manuals shall include an agenda, defined objectives for each lesson, and a detailed description of the subject matter for each lesson. The Contractor is responsible for furnishing all audio-visual equipment and all other training materials and supplies. Where the Contractor presents portions of the course through the use of audio-visual material, copies of the audio-visual materials shall be delivered to the Government, either as a part of the printed training manuals or on the same media as that used during the training sessions.

3.5.2 Operator's Training

The course shall be taught at the project site during or after the Contractor's field testing. A maximum of 6 personnel will attend the course. No part of the training given during this course will be counted toward completion of the performance verification test. The course shall consist of hands-on training, instruction on the specific hardware configuration of the installed system, and specific instructions for operating the installed system. The course shall demonstrate system start up, system operation, system shutdown, system recovery after a failure, the specific hardware configuration, and operation of the system and its software. The students should have no unanswered questions regarding operation of the installed CCTV system. Prepare and insert additional training material in the training manuals when the need for additional material becomes apparent during instruction. The course shall include:

- a. General hardware, installed system architecture and configuration.
- b. Functional operation of the installed system and software.
- c. Operator commands.
- d. System interfaces.
- e. System report functions.
- f. Fault diagnostics and correction.
- g. General system maintenance.
- h. Replacement of failed components and integration of replacement components into the operating system.

3.5.3 Maintenance Personnel Training

The system maintenance course is to be taught at the project site after endurance test completion for a period of five training days. A maximum of five personnel, designated by the Government, will attend the course. The training includes:

- a. Physical layout of each piece of hardware.
- b. Troubleshooting and diagnostics procedures.
- c. Component repair and replacement procedures.
- d. Maintenance procedures and schedules to include system testing after repair.
- e. Calibration procedures. Upon course completion, the students are to be proficient in system maintenance.
- f. Review of site-specific drawing package, device location, communication, topology, and flow.

3.6 SITE TESTING

3.6.1 General

Provide all personnel, equipment, instrumentation, and supplies necessary to perform all site testing. The Government will witness all performance verification and endurance testing. Written permission shall be obtained from the Government before proceeding with the next phase of testing. Original copies of all test data produced during performance verification and endurance testing shall be turned over to the Government at the conclusion of each phase of testing prior to Government approval of the test.

3.6.2 Contractor's Field Testing

Calibrate and test all equipment, verify DTM operation, place the integrated system in service, and test the integrated system. Test installed ground rods as specified in IEEE 142. Deliver a report describing all results of functional tests, diagnostics, and calibrations including written certification to the Government that the installed complete system has been calibrated, tested, and is ready to begin performance verification testing. The report shall also include a copy of the approved performance verification test procedure. Note any objects in the field of view that might produce highlights that could cause camera blinding. Note any objects in the field of view or anomalies in the terrain which may cause blind spots. Note if a camera cannot be aimed to cover the zone and exclude the rising or setting sun from the picture. Note night assessment capabilities and whether lights or vehicle headlights cause blooming or picture degradation. If any of the above conditions or other conditions exist that cause picture degradation or interfere with the camera field of view, inform the Contracting Officer. The field testing shall, as a minimum, include:

- a. Verification that the video transmission system and any signal or control cabling have been installed, tested, and approved as specified.
- b. When the system includes remote control/monitoring stations or remote switch panels, verification that the remote devices are functional,

communicate with the security center, and perform all functions as specified.

- c. Verification that the equipment is fully functional and that the software has been programmed as needed for the site configuration.
- d. Verification that equipment software is functioning correctly. All software functions shall be exercised.
- e. Verification that the IP storage unit is functioning correctly.
- f. Operation of all electrical and mechanical switcher controls and verification that the control performs the designed function.
- g. Verification that all video sources and video outputs provide a full bandwidth signal that complies with specifications at all video inputs.
- h. Verification that all video signals are terminated properly.
- i. Verification that all cameras are aimed and focused properly. Conduct a walk test of the area covered by each camera to verify the field of view.
- j. Verification that cameras facing the direction of rising or setting sun are aimed sufficiently below the horizon so that the camera does not view the sun directly.
- k. If vehicles are used in proximity of the assessment areas, verification of night assessment capabilities and determination if headlights cause blooming or picture degradation.
- l. Verification that all cameras are synchronized and that the picture does not roll when cameras are switched.
- m. When pan/tilt mounts are used in the system, verification that the limit stops have been set correctly. Verification of all controls for pan/tilt or zoom mechanisms are operative and that the controls perform the desired function. If preposition controls are used, verification that all home positions have been set correctly, and have been tested for auto home function and correct home position.
- n. When dome camera mounts are used in the system, verify that all preset positions are correct and that the dome also operates correctly in a manual control mode.

3.6.3 Performance Verification Test

Demonstrate that the completed CCTV system complies with the contract requirements. Using approved test procedures, all physical and functional requirements of the project shall be demonstrated and shown. The performance verification test, as specified, shall not be started until receipt by the Contractor of written permission from the Government, based on the Contractor's written report. This shall include certification of successful completion of Contractor Field Testing as specified in paragraph "Contractor's Field Testing," and upon successful completion of training as specified. The Government may terminate testing at any time when the

system fails to perform as specified. Upon termination of testing by the Government or by the Contractor, commence an assessment period as described for Endurance Testing Phase II. Upon successful completion of the performance verification test, deliver test reports and other documentation as specified to the Government prior to commencing the endurance test.

-- End of Section --