

SECTION 28 05 00
COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This Section, Common Work Results for Electronic Safety and Security (ESS), applies to all sections of Division 28.
- B. Furnish and install fully functional electronic safety and security cabling system(s), equipment and approved accessories in accordance with the specification section(s), drawing(s), and referenced publications. Capacities and ratings of cable and other items and arrangements for the specified items are shown on each system's required Bill of Materials (BOM) and verified on the approved system drawing(s). If there is a conflict between contract's specification(s) and drawings(s), the contract's specification requirements shall prevail.
- C. The Contractor shall provide a fully functional and operating ESS, programmed, configured, documented, and tested as required herein and the respective Safety and Security System Specification(s). The Contractor shall provide calculations and analysis to support design and engineering decisions as specified in submittals. The Contractor shall provide and pay all labor, materials, and equipment, sales and gross receipts and other taxes. The Contractor shall secure and pay for plan check fees, permits, other fees, and licenses necessary for the execution of work as applicable for the project. Give required notices; the Contractor will comply with codes, ordinances, regulations, and other legal requirements of public authorities, which bear on the performance of work.
- D. The Contractor shall provide an ESS, installed, programmed, configured, documented, and tested. The security system shall include but not limited to: physical access control, intrusion detection, duress alarms, elevator control interface, video assessment and surveillance, video recording and storage, delayed egress, personal protection system, intercommunication system, fire alarm interface, equipment cabinetry, dedicated photo badging system and associated live camera, report printer, photo badge printer, and uninterruptible power supplies (UPS) interface. Operator training shall not be required as part of the Security Contractors scope and shall be provided by the Owner. The Security Contractor shall still be required to provide necessary maintenance and troubleshooting manuals as well as submittals as identified herein. The work shall include the procurement and

installation of electrical wire and cables, the installation and testing of all system components. Inspection, testing, demonstration, and acceptance of equipment, software, materials, installation, documentation, and workmanship, shall be as specified herein. The Contractor shall provide all associated installation support, including the provision of primary electrical input power circuits.

- E. Repair Service Replacement Parts On-site service during the warranty period shall be provided as specified under "Emergency Service". The Contractor shall guarantee all parts and labor for a term of one (1) year, unless dictated otherwise in this specification from the acceptance date of the system as described in Part 5 of this Specification. The Contractor shall be responsible for all equipment, software, shipping, transportation charges, and expenses associated with the service of the system for one (1) year. The Contractor shall provide 24-hour telephone support for the software program at no additional charge to the owner. Software support shall include all software updates that occur during the warranty period.
- F. Section Includes:
 - 1. Description of Work for Electronic Security Systems,
 - 2. Electronic security equipment coordination with relating Divisions,
 - 3. Submittal Requirements for Electronic Security,
 - 4. Miscellaneous Supporting equipment and materials for Electronic Security,
 - 5. Electronic security installation requirements.

1.2 RELATED WORK

- A. Section 01 00 00 - GENERAL REQUIREMENTS. For General Requirements.
- B. Section 07 84 00 - FIRESTOPPING. Requirements for firestopping application and use.
- C. Section 08 11 73 - SLIDING METAL FIRE DOORS. Requirements for door installation.
- D. Section 08 35 13.13 - ACCORDIAN FOLDING DOORS. Requirements for door installation.
- E. Section 08 34 59 - VAULT DOORS AND DAY GATES. Requirements for door and gate installation.
- F. Section 08 51 13 - ALUMINUM WINDOWS. Requirements for window installation.
- G. Section 08 71 00 - DOOR HARDWARE. Requirements for door installation.
- H. Section 10 14 00 - SIGNAGE. Requirements for labeling and signs.

- I. Section 14 21 00 - ELECTRIC TRACTION ELEVATORS. Requirements for elevators.
- J. Section 14 24 00 - HYDRAULIC ELEVATORS. Requirements for elevators.
- K. Section 26 05 11 - REQUIREMENTS FOR ELECTRICAL INSTALLATIONS. Requirements for connection of high voltage.
- L. Section 26 05 21 - LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW). Requirements for power cables.
- M. Section 26 05 33 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS. Requirements for infrastructure.
- N. Section 26 05 41 - UNDERGROUND ELECTRICAL CONSTRUCTION. Requirements for underground installation of wiring.
- O. Section 26 56 00 - EXTERIOR LIGHTING. Requirements for perimeter lighting.
- P. Section 28 05 13 - CONDUCTORS AND CABLES FOR ELECTRONIC SAFETY AND SECURITY. Requirements for conductors and cables.
- Q. Section 28 05 26 - GROUNDING AND BONDING FOR ELECTRONIC SAFETY AND SECURITY. Requirements for grounding of equipment.
- R. Section 28 05 28.33 - CONDUITS AND BOXES FOR ELECTRONIC SAFETY AND SECURITY. Requirements for infrastructure.
- S. Section 28 08 00 - COMMISSIONING OF ELECTRONIC SAFETY AND SECURITY SYSTEMS. Requirements for Commissioning.
- T. Section 28 13 00 - PHYSICAL ACCESS CONTROL SYSTEMS (PACS). For physical access control integration.
- U. Section 28 13 16 - PHYSICAL ACCESS CONTROL SYSTEM AND DATABASE MANAGEMENT. Requirements for control and operation of all security systems.
- V. Section 28 13 53 - SECURITY ACCESS DETECTION. Requirements for screening of personnel and shipments.
- W. Section 28 16 00 - INTRUSION DETECTION SYSTEM (IDS). Requirements for alarm systems.
- X. Section 28 23 00 - VIDEO SURVEILLANCE. Requirements for security camera systems.
- Y. Section 28 26 00 - ELECTRONIC PERSONAL PROTECTION SYSTEM (EPPS). Requirements for emergency and interior communications.
- Z. Section 32 31 13 - CHAIN LINK FENCES AND GATES. Requirements for fences.

1.3 DEFINITIONS

- A. AGC: Automatic Gain Control.
- B. Basket Cable Tray: A fabricated structure consisting of wire mesh bottom and side rails.
- C. BICSI: Building Industry Consulting Service International.
- D. CCD: Charge-coupled device.

- E. Central Station: A PC with software designated as the main controlling PC of the security access system. Where this term is presented with initial capital letters, this definition applies.
- F. Channel Cable Tray: A fabricated structure consisting of a one-piece, ventilated-bottom or solid-bottom channel section.
- G. Controller: An intelligent peripheral control unit that uses a computer for controlling its operation. Where this term is presented with an initial capital letter, this definition applies.
- H. CPU: Central processing unit.
- I. Credential: Data assigned to an entity and used to identify that entity.
- J. DGP: Data Gathering Panel - component of the Physical Access Control System capable to communicate, store and process information received from readers, reader modules, input modules, output modules, and Security Management System.
- K. DTS: Digital Termination Service: A microwave-based, line-of-sight communications provided directly to the end user.
- L. EMI: Electromagnetic interference.
- M. EMT: Electric Metallic Tubing.
- N. ESS: Electronic Security System.
- O. File Server: A PC in a network that stores the programs and data files shared by users.
- P. GFI: Ground fault interrupter.
- Q. IDC: Insulation displacement connector.
- R. Identifier: A credential card, keypad personal identification number or code, biometric characteristic, or other unique identification entered as data into the entry-control database for the purpose of identifying an individual. Where this term is presented with an initial capital letter, this definition applies.
- S. I/O: Input/Output.
- T. Intrusion Zone: A space or area for which an intrusion must be detected and uniquely identified, the sensor or group of sensors assigned to perform the detection, and any interface equipment between sensors and communication link to central-station control unit.
- U. Ladder Cable Tray: A fabricated structure consisting of two longitudinal side rails connected by individual transverse members (rungs).
- V. LAN: Local area network.
- W. LCD: Liquid-crystal display.
- X. LED: Light-emitting diode.

- Y. Location: A Location on the network having a PC-to-Controller communications link, with additional Controllers at the Location connected to the PC-to-Controller link with RS-485 communications loop. Where this term is presented with an initial capital letter, this definition applies.
- Z. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.
- AA. M-JPEG: Motion - Joint Photographic Experts Group.
- BB. MPEG: Moving picture experts group.
- CC. NEC: National Electric Code
- DD. NEMA: National Electrical Manufacturers Association
- EE. NFPA: National Fire Protection Association
- FF. NTSC: National Television System Committee.
- GG. NRTL: Nationally Recognized Testing Laboratory.
- HH. Open Cabling: Passing telecommunications cabling through open space (e.g., between the studs of a wall cavity).
- II. PACS: Physical Access Control System; A system comprised of cards, readers, door controllers, servers and software to control the physical ingress and egress of people within a given space
- JJ. PC: Personal computer. This acronym applies to the Central Station, workstations, and file servers.
- KK. PCI Bus: Peripheral component interconnect; a peripheral bus providing a high-speed data path between the CPU and peripheral devices (such as monitor, disk drive, or network).
- LL. PDF: (Portable Document Format.) The file format used by the Acrobat document exchange system software from Adobe.
- MM. RCDD: Registered Communications Distribution Designer.
- NN. RFI: Radio-frequency interference.
- OO. RIGID: Rigid conduit is galvanized steel tubing, with a tubing wall that is thick enough to allow it to be threaded.
- PP. RS-232: An TIA/EIA standard for asynchronous serial data communications between terminal devices. This standard defines a 25-pin connector and certain signal characteristics for interfacing computer equipment.
- QQ. RS-485: An TIA/EIA standard for multipoint communications.
- RR. Solid-Bottom or Non-ventilated Cable Tray: A fabricated structure consisting of integral or separate longitudinal side rails, and a bottom without ventilation openings.
- SS. SMS: Security Management System - A SMS is software that incorporates multiple security subsystems (e.g., physical access control, intrusion

detection, closed circuit television, intercom) into a single platform and graphical user interface.

TT. TCP/IP: Transport control protocol/Internet protocol incorporated into Microsoft Windows.

UU. Trough or Ventilated Cable Tray: A fabricated structure consisting of integral or separate longitudinal rails and a bottom having openings sufficient for the passage of air and using 75 percent or less of the plan area of the surface to support cables.

VV. UPS: Uninterruptible Power Supply

XX. UTP: Unshielded Twisted Pair

YY. Workstation: A PC with software that is configured for specific limited security system functions.

1.4 QUALITY ASSURANCE

A. Manufacturers Qualifications: The manufacturer shall regularly and presently produce, as one of the manufacturer's principal products, the equipment and material specified for this project, and shall have manufactured the item for at least three years.

B. Product Qualification:

1. Manufacturer's product shall have been in satisfactory operation, on three installations of similar size and type as this project, for approximately three years.
2. The Government reserves the right to require the Contractor to submit a list of installations where the products have been in operation before approval.

C. Contractor Qualification:

1. The Contractor or security sub-contractor shall be a licensed security Contractor with a minimum of five (5) years experience installing and servicing systems of similar scope and complexity. The Contractor shall be an authorized regional representative of the Security Management System's (PACS) manufacturer. The Contractor shall provide four (4) current references from clients with systems of similar scope and complexity which became operational in the past three (3) years. At least three (3) of the references shall be utilizing the same system components, in a similar configuration as the proposed system. The references must include a current point of contact, company or agency name, address, telephone number, complete system description, date of completion, and approximate cost of the project. The owner reserves the option to visit the reference sites, with the site owner's permission and representative, to verify the quality of installation and the references' level of satisfaction with the system. The Contractor shall provide copies of system

manufacturer certification for all technicians. The Contractor shall only utilize factory-trained technicians to install, program, and service the PACS. The Contractor shall only utilize factory-trained technicians to install, terminate and service controller/field panels and reader modules. The technicians shall have a minimum of five (5) continuous years of technical experience in electronic security systems. The Contractor shall have a local service facility. The facility shall be located within [60] <insert number> miles of the project site. The local facility shall include sufficient spare parts inventory to support the service requirements associated with this contract. The facility shall also include appropriate diagnostic equipment to perform diagnostic procedures. The Resident Engineer reserves the option of surveying the company's facility to verify the service inventory and presence of a local service organization.

2. The Contractor shall provide proof project superintendent with BICSI Certified Commercial Installer Level 1, Level 2, or Technician to provide oversight of the project.
3. Cable installer must have on staff a Registered Communication Distribution Designer (RCDD) certified by Building Industry Consulting Service International. The staff member shall provide consistent oversight of the project cabling throughout design, layout, installation, termination and testing.

D. Service Qualifications: There shall be a permanent service organization maintained or trained by the manufacturer which will render satisfactory service to this installation within // four // eight // hours of receipt of notification that service is needed. Submit name and address of service organizations.

1.5 GENERAL ARRANGEMENT OF CONTRACT DOCUMENTS

- A. The Contract Documents supplement to this specification indicates approximate locations of equipment. The installation and/or locations of the equipment and devices shall be governed by the intent of the design; specification and Contract Documents, with due regard to actual site conditions, recommendations, ambient factors affecting the equipment and operations in the vicinity. The Contract Documents are diagrammatic and do not reveal all offsets, bends, elbows, components, materials, and other specific elements that may be required for proper installation. If any departure from the contract documents is deemed necessary, or in the event of conflicts, the Contractor shall submit details of such departures or conflicts in writing to the owner or

owner's representative for his or her comment and/or approval before initiating work.

- B. Anything called for by one of the Contract Documents and not called for by the others shall be of like effect as if required or called by all, except if a provision clearly designed to negate or alter a provision contained in one or more of the other Contract Documents shall have the intended effect. In the event of conflicts among the Contract Documents, the Contract Documents shall take precedence in the following order: the Form of Agreement; the Supplemental General Conditions; the Special Conditions; the Specifications with attachments; and the drawings.

1.6 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. The Government's approval shall be obtained for all equipment and material before delivery to the job site. Delivery, storage or installation of equipment or material which has not had prior approval will not be permitted at the job site.
- C. Submittals for individual systems and equipment assemblies which consist of more than one item or component shall be made for the system or assembly as a whole. Partial submittals will not be considered for approval.
 - 1. Mark the submittals, "SUBMITTED UNDER SECTION_____".
 - 2. Submittals shall be marked to show specification reference including the section and paragraph numbers.
 - 3. Submit each section separately.
- D. The submittals shall include the following:
 - 1. Information that confirms compliance with contract requirements. Include the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, pictures, nameplate data and test reports as required.
 - //2. Submittals are required for all equipment anchors and supports. Submittals shall include weights, dimensions, center of gravity, standard connections, manufacturer's recommendations and behavior problems (e.g., vibration, thermal expansion,) associated with equipment or piping so that the proposed installation can be properly reviewed. //
 - 3. Parts list which shall include those replacement parts recommended by the equipment manufacturer, quantity of parts, current price and availability of each part.

E. Submittals shall be in full compliance of the Contract Documents. All submittals shall be provided in accordance with this section. Submittals lacking the breath or depth these requirements will be considered incomplete and rejected. Submissions are considered multidisciplinary and shall require coordination with applicable divisions to provide a complete and comprehensive submission package. All submittals shall include adequate descriptive literature, catalog cuts, shop drawings and other data necessary for the Government to ascertain that the proposed equipment and materials comply with specification requirements. Catalog cuts submitted for approval shall be legible and clearly identify equipment being submitted. Additional general provisions are as follows:

1. The Contractor shall schedule submittals in order to maintain the project schedule. For coordination drawings refer to Specification Section 01 33 10 - Design Submittal Procedures, which outline basic submittal requirements and coordination. Section 01 33 10 shall be used in conjunction with this section.
2. The Contractor shall identify variations from requirements of Contract Documents and state product and system limitations, which may be detrimental to successful performance of the completed work or system.
3. Each package shall be submitted at one (1) time for each review and include components from applicable disciplines (e.g., electrical work, architectural finishes, door hardware, etc.) which are required to produce an accurate and detailed depiction of the project.
4. Manufacturer's information used for submittal shall have pages with items for approval tagged, items on pages shall be identified, and capacities and performance parameters for review shall be clearly marked through use of an arrow or highlighting. Provide space for Resident Engineer and Contractor review stamps.
5. Technical Data Drawings shall be in the latest version of AutoCAD®, drawn accurately, and in accordance with VA CAD Standards CAD Standard Application Guide, and VA BIM Guide. FREEHAND SKETCHES OR COPIED VERSIONS OF THE CONSTRUCTION DOCUMENTS WILL NOT BE ACCEPTED. The Contractor shall not reproduce Contract Documents or copy standard information as the basis of the Technical Data Drawings. If departures from the technical data drawings are subsequently deemed necessary by the Contractor, details of such departures and the reasons thereof shall be submitted in writing to the Resident Engineer for approval before the initiation of work.

6. Packaging: The Contractor shall organize the submissions according to the following packaging requirements.
- a. Binders: For each manual, provide heavy duty, commercial quality, durable three (3) ring vinyl covered loose leaf binders, sized to receive 8.5 x 11 in paper, and appropriate capacity to accommodate the contents. Provide a clear plastic sleeve on the spine to hold labels describing the contents. Provide pockets in the covers to receive folded sheets.
 - 1) Where two (2) or more binders are necessary to accommodate data; correlate data in each binder into related groupings according to the Project Manual table of contents. Cross-referencing other binders where necessary to provide essential information for communication of proper operation and/or maintenance of the component or system.
 - 2) Identify each binder on the front and spine with printed binder title, Project title or name, and subject matter covered. Indicate the volume number if applicable.
 - b. Dividers: Provide heavy paper dividers with celluloid tabs for each Section. Mark each tab to indicate contents.
 - c. Protective Plastic Jackets: Provide protective transparent plastic jackets designed to enclose diagnostic software for computerized electronic equipment.
 - d. Text Material: Where written material is required as part of the manual use the manufacturer's standard printed material, or if not available, specially prepared data, neatly typewritten on 8.5 inches by 11 inches 20 pound white bond paper.
 - e. Drawings: Where drawings and/or diagrams are required as part of the manual, provide reinforced punched binder tabs on the drawings and bind them with the text.
 - 1) Where oversized drawings are necessary, fold the drawings to the same size as the text pages and use as a foldout.
 - 2) If drawings are too large to be used practically as a foldout, place the drawing, neatly folded, in the front or rear pocket of the binder. Insert a type written page indicating the drawing title, description of contents and drawing location at the appropriate location of the manual.
 - 3) Drawings shall be sized to ensure details and text is of legible size. Text shall be no less than 1/16" tall.
 - f. Manual Content: Submit in accordance with Section 01 00 00, GENERAL REQUIREMENTS.

- 1) Maintenance and Operation Manuals: Submit as required for systems and equipment specified in the technical sections. Furnish four copies, bound in hardback binders, (manufacturer's standard binders) or an approved equivalent. Furnish one complete manual as specified in the technical section but in no case later than prior to performance of systems or equipment test, and furnish the remaining manuals prior to contract completion.
- 2) Inscribe the following identification on the cover: the words "MAINTENANCE AND OPERATION MANUAL," the name and location of the system, equipment, building, name of Contractor, and contract number. Include in the manual the names, addresses, and telephone numbers of each subcontractor installing the system or equipment and the local representatives for the system or equipment.
- 3) The manuals shall include:
 - a) Internal and interconnecting wiring and control diagrams with data to explain detailed operation and control of the equipment.
 - b) A control sequence describing start-up, operation, and shutdown.
 - c) Description of the function of each principal item of equipment.
 - d) Installation and maintenance instructions.
 - e) Safety precautions.
 - f) Diagrams and illustrations.
 - g) Testing methods.
 - h) Performance data.
 - i) Pictorial "exploded" parts list with part numbers. Emphasis shall be placed on the use of special tools and instruments. The list shall indicate sources of supply, recommended spare parts, and name of servicing organization.
 - j) Appendix; list qualified permanent servicing organizations for support of the equipment, including addresses and certified qualifications.
- g. Binder Organization: Organize each manual into separate sections for each piece of related equipment. At a minimum, each manual shall contain a title page, table of contents, copies of Product Data supplemented by drawings and written text, and copies of each warranty, bond, certifications, and service Contract issued. Refer

to Group I through V Technical Data Package Submittal requirements for required section content.

- h. Title Page: Provide a title page as the first sheet of each manual to include the following information; project name and address, subject matter covered by the manual, name and address of the Project, date of the submittal, name, address, and telephone number of the Contractor, and cross references to related systems in other operating and/or maintenance manuals.
- i. Table of Contents: After the title page, include a type written table of contents for each volume, arranged systematically according to the Project Manual format. Provide a list of each product included, identified by product name or other appropriate identifying symbols and indexed to the content of the volume. Where more than one (1) volume is required to hold data for a particular system, provide a comprehensive table of contents for all volumes in each volume of the set.
- j. General Information Section: Provide a general information section immediately following the table of contents, listing each product included in the manual, identified by product name. Under each product, list the name, address, and telephone number of the installer and maintenance Contractor. In addition, list a local source for replacement parts and equipment.
- k. Drawings: Provide specially prepared drawings where necessary to supplement the manufacturers printed data to illustrate the relationship between components of equipment or systems, or provide control or flow diagrams. Coordinate these drawings with information contained in Project Record Drawings to assure correct illustration of the completed installation.
- l. Manufacturer's Data: Where manufacturer's standard printed data is included in the manuals, include only those sheets that are pertinent to the part or product installed. Mark each sheet to identify each part or product included in the installation. Where more than one (1) item in tabular format is included, identify each item, using appropriate references from the Contract Documents. Identify data that is applicable to the installation and delete references to information which is not applicable.
- m. Where manufacturer's standard printed data is not available and the information is necessary for proper operation and maintenance of equipment or systems, or it is necessary to provide additional information to supplement the data included in the manual, prepare written text to provide the necessary information. Organize the

text in a consistent format under a separate heading for different procedures. Where necessary, provide a logical sequence of instruction for each operating or maintenance procedure. Where similar or more than one product is listed on the submittal the Contractor shall differentiate by highlighting the specific product to be utilized.

- n. Calculations: Provide a section for circuit and panel calculations.
 - o. Loading Sheets: Provide a section for DGP Loading Sheets.
 - p. Certifications: Provide section for Contractor's manufacturer certifications.
7. Contractor Review: Review submittals prior to transmittal. Determine and verify field measurements and field construction criteria. Verify manufacturer's catalog numbers and conformance of submittal with requirements of contract documents. Return non-conforming or incomplete submittals with requirements of the work and contract documents. Apply Contractor's stamp with signature certifying the review and verification of products occurred, and the field dimensions, adjacent construction, and coordination of information is in accordance with the requirements of the contract documents.
8. Resubmission: Revise and resubmit submittals as required within 15 calendar days of return of submittal. Make resubmissions under procedures specified for initial submittals. Identify all changes made since previous submittal.
9. Product Data: Within 15 calendar days after execution of the contract, the Contractor shall submit for approval a complete list of all of major products proposed for use. The data shall include name of manufacturer, trade name, model number, the associated contract document section number, paragraph number, and the referenced standards for each listed product.
- F. Group 1 Technical Data Package: Group I Technical Data Package shall be one submittal consisting of the following content and organization. Refer to VA Special Conditions Document for drawing format and content requirements. The data package shall include the following:
- 1. Section I - Drawings:
 - a. General - Drawings shall conform to VA CAD Standards Guide. All text associated with security details shall be 1/8" tall and meet VA text standard for AutoCAD™ drawings.
 - b. Cover Sheet - Cover sheet shall consist of Project Title and Address, Project Number, Area and Vicinity Maps.

- c. General Information Sheets - General Information Sheets shall consist of General Notes, Abbreviations, Symbols, Wire and Cable Schedule, Project Phasing, and Sheet Index.
- d. Floor Plans - Floor plans shall be produced from the Architectural backgrounds issued in the Construction Documents. The contractor shall receive floor plans from the prime A/E to develop these drawing sets. Security devices shall be placed on drawings in scale. All text associated with security details shall be 1/8" tall and meet VA text standard for AutoCAD™ drawings. Floor plans shall identify the following:
 - 1) Security devices by symbol,
 - 2) The associated device point number (derived from the loading sheets),
 - 3) Wire & cable types and counts
 - 4) Conduit sizing and routing
 - 5) Conduit riser systems
 - 6) Device and area detail call outs
- e. Architectural details - Architectural details shall be produced for each device mounting type (door details for EECS and IDS, Intrusion Detection system (motion sensor, vibration, microwave Motion Sensor and Camera mounting,
- f. Riser Diagrams - Contractor shall provide a riser diagram indicating riser architecture and distribution of the SMS throughout the facility (or area in scope).
- g. Block Diagrams - Contractor shall provide a block diagram for the entire system architecture and interconnections with SMS subsystems. Block diagram shall identify SMS subsystem (e.g., electronic entry control, intrusion detection, closed circuit television, intercom, and other associated subsystems) integration; and data transmission and media conversion methodologies.
- h. Interconnection Diagrams - Contractor shall provide interconnection diagram for each sensor, and device component. Interconnection diagram shall identify termination locations, standard wire detail to include termination schedule. Diagram shall also identify interfaces to other systems such as elevator control, fire alarm systems, and security management systems.
- i. Security Details:
 - 1) Panel Assembly Detail - For each panel assembly, a panel assembly details shall be provided identifying individual panel component size and content.

- 2) Panel Details - Provide security panel details identify general arrangement of the security system components, backboard size, wire through size and location, and power circuit requirements.
- 3) Device Mounting Details - Provide mounting detailed drawing for each security device (physical access control system, intrusion detection, video surveillance and assessment, and intercom systems) for each type of wall and ceiling configuration in project. Device details shall include device, mounting detail, wiring and conduit routing.
- 4) Details of connections to power supplies and grounding
- 5) Details of surge protection device installation
- 6) Sensor detection patterns - Each system sensor shall have associated detection patterns.
- 7) Equipment Rack Detail - For each equipment rack, provide a scaled detail of the equipment rack location and rack space utilization. Use of BISCII wire management standards shall be employed to identify wire management methodology. Transitions between equipment racks shall be shown to include use vertical and horizontal latter rack system.
- 8) Security Control Room - The contractor shall provide a layout plan for the Security Control Room. The layout plan shall identify all equipment and details associated with the installation.
- 9) Operator Console - The contractor shall provide a layout plan for the Operator Console. The layout plan shall identify all equipment and details associated with the installation.
Equipment room - the contractor shall provide a layout plan for the equipment room. The layout plan shall identify all equipment and details associated with the installation.
- 10) Equipment Room - Equipment room details shall provide architectural, electrical, mechanical, plumbing, IT/Data and associated equipment and device placements both vertical and horizontally.
- j. Electrical Panel Schedule - Electrical Panel Details shall be provided for all SMS systems electrical power circuits. Panel details shall be provided identifying panel type (Standard, Emergency Power, Emergency/Uninterrupted Power Source, and Uninterrupted Power Source Only), panel location, circuit number, and circuit amperage rating.
- k. Door Schedule - A door schedule shall be developed for each door equipped with electronic security components. At a minimum, the

door schedule shall be coordinated with Division 08 work and include the following information:

- 1) Item Number
 - 2) Door Number (Derived from A/E Drawings)
 - 3) Floor Plan Sheet Number
 - 4) Standard Detail Number
 - 5) Door Description (Derived from Loading Sheets)
 - 6) Data Gathering Panel Input Number
 - 7) Door Position or Monitoring Device Type & Model Number
 - 8) Lock Type, Model Number & Power Input/Draw (standby/active)
 - 9) Card Reader Type & Model Number
 - 10) Shunting Device Type & Model Number
 - 11) Sounder Type & Model Number
 - 12) Manufacturer
 - 13) Misc. devices as required
 - a) Delayed Egress Type & Model Number
 - b) Intercom
 - c) Camera
 - d) Electric Transfer Hinge
 - e) Electric Pass-through device
 - 14) Remarks column indicating special notes or door configurations
2. Camera Schedule - A camera schedule shall be developed for each camera. Contractors shall coordinate with the Resident Engineer to determine camera starting numbers and naming conventions. All drawings shall identify wire and cable standardization methodology. Color coding of all wiring conductors and jackets is required and shall be communicated consistently throughout the drawings package submittal. At a minimum, the camera schedule shall include the following information:
- a. Item Number
 - b. Camera Number
 - c. Naming Conventions
 - d. Description of Camera Coverage
 - e. Camera Location
 - f. Floor Plan Sheet Number
 - g. Camera Type
 - h. Mounting Type
 - i. Standard Detail Reference
 - j. Power Input & Draw
 - k. Power Panel Location
 - l. Remarks Column for Camera

3. Section II - Data Gathering Panel Documentation Package

- a. Contractor shall provide Data Gathering Panel (DGP) input and output documentation packages for review at the Shop Drawing submittal stage and also with the as-built documentation package.
The documentation packages shall be provided in both printed and magnetic form at both review stages.
- b. The Contractor shall provide loading sheet documentation package for the associated DGP, including input and output boards for all field panels associated with the project. Documentation shall be provided in current version Microsoft Excel spreadsheets following the format currently utilized by VA. A separate spreadsheet file shall be generated for each DGP and associated field panels.
- c. The spreadsheet names shall follow a sequence that shall display the spreadsheets in numerical order according to the DGP system number. The spreadsheet shall include the prefix in the file name that uniquely identifies the project site. The spreadsheet shall detail all connected items such as card readers, alarm inputs, and relay output connections. The spreadsheet shall include an individual section (row) for each panel input, output and card reader. The spreadsheet shall automatically calculate the system numbers for card readers, inputs, and outputs based upon data entered in initialization fields.
- d. All entries must be verified against the field devices. Copies of the floor plans shall be forwarded under separate cover.
- e. The DGP spreadsheet shall include an entry section for the following information:
 - 1) DGP number
 - 2) First Reader Number
 - 3) First Monitor Point Number
 - 4) First Relay Number
 - 5) DGP, input or output Location
 - 6) DGP Chain Number
 - 7) DGP Cabinet Tamper Input Number
 - 8) DGP Power Fail Input Number
 - 9) Number of Monitor Points Reserved For Expansion Boards
 - 10) Number of Control Points (Relays) Reserved For Expansion Boards
- f. The DGP, input module and output module spreadsheets shall automatically calculate the following information based upon the associated entries in the above fields:
 - 1) System Numbers for Card Readers
 - 2) System Numbers for Monitor Point Inputs

- 3) System Numbers for Control Points (Relays)
- 4) Next DGP or input module First Monitor Point Number
- 5) Next DGP or output module First Control Point Number
- g. The DGP spreadsheet shall provide the following information for each card reader:
 - 1) DGP Reader Number
 - 2) System Reader Number
 - 3) Cable ID Number
 - 4) Description Field (Room Number)
 - 5) Description Field (Device Type i.e.: In Reader, Out Reader, etc.)
 - 6) Description Field
 - 7) DGP Input Location
 - 8) Date Test
 - 9) Date Passed
 - 10) Cable Type
 - 11) Camera Numbers (of cameras viewing the reader location)
- h. The DGP and input module spreadsheet shall provide the following information for each monitor point (alarm input).
 - 1) DGP Monitor Point Input Number
 - 2) System Monitor Point Number
 - 3) Cable ID Number
 - 4) Description Field (Room Number)
 - 5) Description Field (Device Type i.e.: Door Contact, Motion Detector, etc.)
 - 7) DGP or input module Input Location
 - 8) Date Test
 - 9) Date Passed
 - 10) Cable Type
 - 11) Camera Numbers (of associated alarm event preset call-ups)
- i. The DGP and output module spreadsheet shall provide the following information for each control point (output relay).
 - 1) DGP Control Point (Relay) Number
 - 2) System (Control Point) Number
 - 3) Cable ID Number
 - 4) Description Field (Room Number)
 - 5) Description Field (Device: Lock Control, Local Sounder, etc.)
 - 6) Description Field
 - 7) DGP or OUTPUT MODULE Output Location
 - 8) Date Test
 - 9) Date Passed Cable Type

- 10) Camera Number (of associated alarm event preset call-ups)
- j. The DGP, input module and output module spreadsheet shall include the following information or directions in the header and footer:
 - 1) Header
 - a) DGP Input and Output Worksheet
 - b) Enter Beginning Reader, Input, and Output Starting Numbers and Sheet Will Automatically Calculate the Remaining System Numbers.
 - 2) Footer
 - a) File Name
 - b) Date Printed
 - c) Page Number
4. Section III - Construction Mock-up: In areas with exposed EMT/Conduit Raceways, contractor shall conceal raceway as much as practical and unobtrusively. In addition, historic significance must be considered to determine installation means and methods for approval by the owner.
5. Section IV - Manufacturers' Data: The data package shall include manufacturers' data for all materials and equipment, including sensors, local processors and console equipment provided under this specification.
6. Section V - System Description and Analysis: The data package shall include system descriptions, analysis, and calculations used in sizing equipment required by these specifications. Descriptions and calculations shall show how the equipment will operate as a system to meet the performance requirements of this specification. The data package shall include the following:
 - a. Central processor memory size; communication speed and protocol description; rigid disk system size and configuration; flexible disk system size and configuration; back-up media size and configuration; alarm response time calculations; command response time calculations; start-up operations; expansion capability and method of implementation; sample copy of each report specified; and color photographs representative of typical graphics.
 - b. Software Data: The data package shall consist of descriptions of the operation and capability of the system, and application software as specified.
 - c. Overall System Reliability Calculations: The data package shall include all manufacturers' reliability data and calculations required to show compliance with the specified reliability.

7. Section VI - Certifications & References: All specified manufacturer's certifications shall be included with the data package. Contractor shall provide Project references as outlined in Paragraph 1.4 "Quality Assurance".

G. Group II Technical Data Package

1. The Contractor shall prepare a report of "Current Site Conditions" and submit a report to the Resident Engineer documenting changes to the site, particularly those conditions that affect performance of the system to be installed. The Contractor shall provide specification sheets, or written functional requirements to support the findings, and a cost estimate to correct those site changes or conditions which affect the installation of the system or its performance. The Contractor shall not correct any deficiency without written permission from the COTR.
2. System Configuration and Functionality: The contractor shall provide the results of the meeting with VA to develop system requirements and functionality including but not limited to:
 - a. Baseline configuration
 - b. Access levels
 - c. Schedules (intrusion detection, physical access control, holidays, etc.)
 - d. Badge database
 - e. System monitoring and reporting (unit level and central control)
 - f. Naming conventions and descriptors

H. Group III Technical Data Package

1. Development of Test Procedures: The Contractor will prepare performance test procedures for the system testing. The test procedures shall follow the format of the VA Testing procedures and be customized to the contract requirements. The Contractor will deliver the test procedures to the Resident Engineer for approval at least 60 calendar days prior to the requested test date.

I. Group IV Technical Data Package

1. Performance Verification Test
 - a. Based on the successful completion of the pre-delivery test, the Contractor shall finalize the test procedures and report forms for the performance verification test (PVT) and the endurance test. The PVT shall follow the format, layout and content of the pre-delivery test. The Contractor shall deliver the PVT and endurance test procedures to the Resident Engineer for approval. The Contractor may schedule the PVT after receiving written approval of the test procedures. The Contractor shall deliver the final

PVT and endurance test reports within 14 calendar days from completion of the tests. Refer to Part 3 of this section for System Testing and Acceptance requirements.

2. Training Documentation

- a. New Facilities and Major Renovations: Familiarization training shall be provided for new equipment or systems. Training can include site familiarization training for VA technicians and administrative personnel. Training shall include general information on new system layout including closet locations, turnover of the completed system including all documentation, including manuals, software, key systems, and full system administration rights. Lesson plans and training manuals training shall be oriented to type of training to be provided.
- b. New Unit Control Room:
 - 1) Provide the security personnel with training in the use, operation, and maintenance of the entire control room system (Unit Control and Equipment Rooms). The training documentation must include the operation and maintenance. The first of the training sessions shall take place prior to system turnover and the second immediately after turnover. Coordinate the training sessions with the Owner. Completed classroom sessions will be witnessed and documented by the Architect/Engineer, and approved by the Resident Engineer. Instruction is not to begin until the system is operational as designed.
 - 2) The training documents will cover the operation and the maintenance manuals and the control console operators' manuals and service manuals in detail, stressing all important operational and service diagnostic information necessary for the maintenance and operations personnel to efficiently use and maintain all systems.
 - 3) Provide an illustrated control console operator's manual and service manual. The operator's manual shall be written in laymen's language and printed so as to become a permanent reference document for the operators, describing all control panel switch operations, graphic symbol definitions and all indicating functions and a complete explanation of all software.
 - 4) The service manual shall be written in laymen's language and printed so as to become a permanent reference document for maintenance personnel, describing how to run internal self diagnostic software programs, troubleshoot head end hardware

and field devices with a complete scenario simulation of all possible system malfunctions and the appropriate corrective measures.

- 5) Provide a professional color DVD instructional recording of all the operational procedures described in the operator's manual. All charts used in the training session shall be clearly presented on the video. Any DVD found to be inferior in recording or material content shall be reproduced at no cost until an acceptable DVD is submitted. Provide four copies of the training DVD, one to the architect/engineer and three to the owner.

3. System Configuration and Data Entry:

- a. The contractor is responsible for providing all system configuration and data entry for the SMS and subsystems (e.g., video matrix switch, intercom, digital video recorders, network video recorders). All data entry shall be performed per VA standards & guidelines. The Contractor is responsible for participating in all meetings with the client to compile the information needed for data entry. These meetings shall be established at the beginning of the project and incorporated in to the project schedule as a milestone task. The contractor shall be responsible for all data collection, data entry, and system configuration. The contractor shall collect, enter, & program and/or configure the following components:
 - 1) Physical Access control system components,
 - 2) All intrusion detection system components,
 - 3) Video surveillance, control and recording systems,
 - 4) Intercom systems components,
 - 5) All other security subsystems shown in the contract documents.
- b. The Contractor is responsible for compiling the card access database for the VA employees, including programming reader configurations, access shifts, schedules, exceptions, card classes and card enrollment databases.
- c. Refer to Part 3 for system programming requirements and planning guidelines.

4. Graphics: Based on CAD as-built drawings developed for the construction project, create all map sets showing locations of all alarms and field devices. Graphical maps of all alarm points installed under this contract including perimeter and exterior alarm points shall be delivered with the system. The Contractor shall create and install all graphics needed to make the system

operational. The Contractor shall utilize data from the contract documents, Contractor's field surveys, and all other pertinent information in the Contractor's possession to complete the graphics. The Contractor shall identify and request from the COTR, any additional data needed to provide a complete graphics package. Graphics shall have sufficient level of detail for the system operator to assess the alarm. The Contractor shall supply hard copy, color examples at least 203.2 x 254 mm (8 x 10 in) of each type of graphic to be used for the completed Security system. The graphics examples shall be delivered to the Resident Engineer for review and approval at least 90 calendar days prior to the scheduled date the Contractor requires them.

J. Group V Technical Data Package: Final copies of the manuals shall be delivered to the Resident Engineer as part of the acceptance test. The draft copy used during site testing shall be updated with any changes required 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 sub-contractor installing equipment or systems, as well as the nearest service representatives for each item of equipment for each system. The manuals shall include 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. //Six (6) hard-copies and one (1) soft copy on CD// of each item listed below shall be delivered as a part of final systems acceptance.

1. Functional Design Manual: The functional design manual shall identify the operational requirements for the entire system and explain the theory of operation, design philosophy, and specific functions. A description of hardware and software functions, interfaces, and requirements shall be included for all system operating modes. Manufacturer developed literature may be used; however, shall be produced to match the project requirements.
2. Equipment Manual: A manual describing all equipment furnished including:
 - a. General description and specifications; installation and checkout procedures; equipment electrical schematics and layout drawings; system schematics and layout drawings; alignment and calibration procedures; manufacturer's repair list indicating sources of supply; and interface definition.

3. Software Manual: The software manual shall describe the functions of all software and include all other information necessary to enable proper loading, testing, and operation. The manual shall include:
 - a. Definition of terms and functions; use of system and applications software; procedures for system initialization, start-up, and shutdown; alarm reports; reports generation, database format and data entry requirements; directory of all disk files; and description of all communications protocols including data formats, command characters, and a sample of each type of data transfer.
4. Operator's Manual: The operator's manual shall fully explain all procedures and instructions for the operation of the system, including:
 - a. Computers and peripherals; system start-up and shutdown procedures; use of system, command, and applications software; recovery and restart procedures; graphic alarm presentation; use of report generator and generation of reports; data entry; operator commands' alarm messages, and printing formats; and system access requirements.
5. Maintenance Manual: The maintenance manual shall include descriptions of maintenance for all equipment including inspection, recommend schedules, periodic preventive maintenance, fault diagnosis, and repair or replacement of defective components.
6. Spare Parts & Components Data: At the conclusion of the Contractor's work, the Contractor shall submit to the Resident Engineer a complete list of the manufacturer's recommended spare parts and components required to satisfactorily maintain and service the systems, as well as unit pricing for those parts and components.
7. Operation, Maintenance & Service Manuals: The Contractor shall provide two (2) complete sets of operating and maintenance manuals in the form of an instructional manual for use by the VA Security Guard Force personnel. The manuals shall be organized into suitable sets of manageable size. Where possible, assemble instructions for similar equipment into a single binder. If multiple volumes are required, each volume shall be fully indexed and coordinated.
8. Equipment and Systems Maintenance Manual: The Contractor shall provide the following descriptive information for each piece of equipment, operating system, and electronic system:
 - a. Equipment and/or system function.
 - b. Operating characteristics.
 - c. Limiting conditions.

- d. Performance curves.
 - e. Engineering data and test.
 - f. Complete nomenclature and number of replacement parts.
 - g. Provide operating and maintenance instructions including assembly drawings and diagrams required for maintenance and a list of items recommended to stock as spare parts.
 - h. Provide information detailing essential maintenance procedures including the following: routine operations, trouble shooting guide, disassembly, repair and re-assembly, alignment, adjusting, and checking.
 - i. Provide information on equipment and system operating procedures, including the following; start-up procedures, routine and normal operating instructions, regulation and control procedures, instructions on stopping, shut-down and emergency instructions, required sequences for electric and electronic systems, and special operating instructions.
 - j. Manufacturer equipment and systems maintenance manuals are permissible.
9. Project Redlines: During construction, the Contractor shall maintain an up-to-date set of construction redlines detailing current location and configuration of the project components. The redline documents shall be marked with the words 'Master Redlines' on the cover sheet and be maintained by the Contractor in the project office. The Contractor will provide access to redline documents anytime during the project for review and inspection by the Resident Engineer or authorized Office of Protection Services representative. Master redlines shall be neatly maintained throughout the project and secured under lock and key in the contractor's onsite project office.
- Any project component or assembly that is not installed in strict accordance with the drawings shall be so noted on the drawings. Prior to producing Record Construction Documents, the contractor will submit the Master Redline document to the Resident Engineer for review and approval of all changes or modifications to the documents.
- Each sheet shall have Resident Engineer initials indicating authorization to produce "As Built" documents. Field drawings shall be used for data gathering & field changes. These changes shall be made to the master redline documents daily. Field drawings shall not be considered "master redlines".
10. Record Specifications: The Contractor shall maintain one (1) copy of the Project Specifications, including addenda and modifications issued, for Project Record Documents. The Contractor shall mark the

Specifications to indicate the actual installation where the installation varies substantially from that indicated in the Contract Specifications and modifications issued. (Note related Project Record Drawing information where applicable). The Contractor shall pay particular attention to substitutions, selection of product options, and information on concealed installations that would be difficult to identify or measure and record later. Upon completion of the mark ups, the Contractor shall submit record Specifications to the COTR. As with master relines, Contractor shall maintain record specifications for Resident Engineer review and inspection at anytime.

11. Record Product Data: The Contractor shall maintain one (1) copy of each Product Data submittal for Project Record Document purposes. The Data shall be marked to indicate the actual product installed where the installation varies substantially from that indicated in the Product Data submitted. Significant changes in the product delivered to the site and changes in manufacturer's instructions and recommendations for installation shall be included. Particular attention will be given to information on concealed products and installations that cannot be readily identified or recorded later. Note related Change Orders and mark up of Record Construction Documents, where applicable. Upon completion of mark up, submit a complete set of Record Product Data to the COTR.
12. Miscellaneous Records: The Contractor shall maintain one (1) copy of miscellaneous records for Project Record Document purposes. Refer to other Specifications for miscellaneous record-keeping requirements and submittals concerning various construction activities. Before substantial completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for use and reference. Categories of requirements resulting in miscellaneous records include a minimum of the following:
 - a. Certificates received instead of labels on bulk products.
 - b. Testing and qualification of tradesmen. ("Contractor's Qualifications")
 - c. Documented qualification of installation firms.
 - d. Load and performance testing.
 - e. Inspections and certifications.
 - f. Final inspection and correction procedures.
 - g. Project schedule
13. Record Construction Documents (Record As-Built)

- a. Upon project completion, the contractor shall submit the project master redlines to the Resident Engineer prior to development of Record construction documents. The Resident Engineer shall be given a minimum of a thirty (30) day review period to determine the adequacy of the master redlines. If the master redlines are found suitable by the Resident Engineer, the Resident Engineer will initial and date each sheet and turn redlines over to the contractor for as built development.
- b. The Contractor shall provide the Resident Engineer a complete set of "as-built" drawings and original master redlined marked "as-built" blue-line in the latest version of AutoCAD drawings unlocked on CD or DVD. The as-built drawing shall include security device number, security closet connection location, data gathering panel number, and input or output number as applicable. All corrective notations made by the Contractor shall be legible when submitted to the COTR. If, in the opinion of the COTR, any redlined notation is not legible, it shall be returned to the Contractor for re-submission at no extra cost to the Owner. The Contractor shall organize the Record Drawing sheets into manageable sets bound with durable paper cover sheets with suitable titles, dates, and other identifications printed on the cover. The submitted as built shall be in editable formats and the ownership of the drawings shall be fully relinquished to the owner.
- c. Where feasible, the individual or entity that obtained record data, whether the individual or entity is the installer, sub-contractor, or similar entity, is required to prepare the mark up on Record Drawings. Accurately record the information in a comprehensive drawing technique. Record the data when possible after it has been obtained. For concealed installations, record and check the mark up before concealment. At the time of substantial completion, submit the Record Construction Documents to the COTR. The Contractor shall organize into bound and labeled sets for the COTR's continued usage. Provide device, conduit, and cable lengths on the conduit drawings. Exact in-field conduit placement/routings shall be shown. All conduits shall be illustrated in their entire length from termination in security closets; no arrowed conduit runs shall be shown. Pull box and junction box sizes are to be shown if larger than 100mm (4 inch).

K. FIPS 201 Compliance Certificates

1. Provide Certificates for all software components and device types utilizing credential verification. Provide certificates for:
 - a. Fingerprint Capture Station
 - b. Card Readers
 - c. Facial Image Capturing Camera
 - d. PIV Middleware
 - e. Template Matcher
 - f. Electromagnetically Opaque Sleeve
 - g. Certificate Management
 - 1) CAK Authentication System
 - 2) PIV Authentication System
 - 3) Certificate Validator
 - 4) Cryptographic Module
 - h. <list devices and software>
 - L. Approvals will be based on complete submission of manuals together with shop drawings.
 - M. After approval and prior to installation, furnish the Resident Engineer with one sample of each of the following:
 1. A 300 mm (12 inch) length of each type and size of wire and cable along with the tag from the coils of reels from which the samples were taken.
 2. Each type of conduit and pathway coupling, bushing and termination fitting.
 3. Conduit hangers, clamps and supports.
 4. Duct sealing compound.
 - N. Completed System Readiness Checklists provided by the Commissioning Agent and completed by the contractor, signed by a qualified technician and dated on the date of completion, in accordance with the requirements of Section 28 08 00 COMMISSIONING OF ELECTRONIC SAFETY AND SECURITY SYSTEMS.
- //O. In addition to the requirement of SUBMITTALS, the VA reserves the right to request the manufacturer to arrange for a VA representative to see typical active systems in operation, when there has been no prior experience with the manufacturer or the type of equipment being submitted.//

1.7 APPLICABLE PUBLICATIONS

- A. The publications listed below (including amendments, addenda, revisions, supplement, and errata) form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American National Standards Institute (ANSI)/ International Code Council (ICC):
- A117.1.....Standard on Accessible and Usable Buildings and Facilities
- C. American National Standards Institute (ANSI)/ Security Industry Association (SIA):
- AC-03.....Access Control: Access Control Guideline Dye Sublimation Printing Practices for PVC Access Control Cards
- CP-01-00.....Control Panel Standard-Features for False Alarm Reduction
- PIR-01-00.....Passive Infrared Motion Detector Standard - Features for Enhancing False Alarm Immunity
- TVAC-01.....CCTV to Access Control Standard - Message Set for System Integration
- D. American National Standards Institute (ANSI)/Electronic Industries Alliance (EIA):
- 330-09.....Electrical Performance Standards for CCTV Cameras
- 375A-76.....Electrical Performance Standards for CCTV Monitors
- E. American National Standards Institute (ANSI):
- ANSI S3.2-99.....Method for measuring the Intelligibility of Speech over Communications Systems
- F. American Society for Testing and Materials (ASTM)
- B1-07.....Standard Specification for Hard-Drawn Copper Wire
- B3-07.....Standard Specification for Soft or Annealed Copper Wire
- B8-04.....Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
- C1238-97 (R03).....Standard Guide for Installation of Walk-Through Metal Detectors
- D2301-04.....Standard Specification for Vinyl Chloride Plastic Pressure Sensitive Electrical Insulating Tape

- G. Architectural Barriers Act (ABA), 1968
- H. Department of Justice: American Disability Act (ADA)
28 CFR Part 36-2010 ADA Standards for Accessible Design
- I. Department of Veterans Affairs:
VHA National CAD Standard Application Guide, 2006
VA BIM Guide, V1.0 10
- J. Federal Communications Commission (FCC):
(47 CFR 15) Part 15 Limitations on the Use of Wireless
Equipment/Systems
- K. Federal Information Processing Standards (FIPS):
FIPS-201-1.....Personal Identity Verification (PIV) of Federal
Employees and Contractors
- L. Federal Specifications (Fed. Spec.):
A-A-59544-08.....Cable and Wire, Electrical (Power, Fixed
Installation)
- M. Government Accountability Office (GAO):
GAO-03-8-02.....Security Responsibilities for Federally Owned
and Leased Facilities
- N. Homeland Security Presidential Directive (HSPD):
HSPD-12.....Policy for a Common Identification Standard for
Federal Employees and Contractors
- O. Institute of Electrical and Electronics Engineers (IEEE):
81-1983.....IEEE Guide for Measuring Earth Resistivity,
Ground Impedance, and Earth Surface Potentials
of a Ground System
802.3af-08.....Power over Ethernet Standard
802.3at-09Power over Ethernet (PoE) Plus Standard
C2-07.....National Electrical Safety Code
C62.41-02.....IEEE Recommended Practice on Surge Voltages in
Low-Voltage AC Power Circuits
C95.1-05.....Standards for Safety Levels with Respect to
Human Exposure in Radio Frequency
Electromagnetic Fields
- P. International Organization for Standardization (ISO):
7810.....Identification cards - Physical characteristics
7811.....Physical Characteristics for Magnetic Stripe
Cards
7816-1.....Identification cards - Integrated circuit(s)
cards with contacts - Part 1: Physical
characteristics

- 7816-2.....Identification cards - Integrated circuit cards
 - Part 2: Cards with contacts -Dimensions and location of the contacts
- 7816-3.....Identification cards - Integrated circuit cards
 - Part 3: Cards with contacts - Electrical interface and transmission protocols
- 7816-4.....Identification cards - Integrated circuit cards
 - Part 11: Personal verification through biometric methods
- 7816-10.....Identification cards - Integrated circuit cards
 - Part 4: Organization, security and commands for interchange
- 14443.....Identification cards - Contactless integrated circuit cards; Contactless Proximity Cards Operating at 13.56 MHz in up to 5 inches distance
- 15693.....Identification cards -- Contactless integrated circuit cards - Vicinity cards; Contactless Vicinity Cards Operating at 13.56 MHz in up to 50 inches distance
- 19794.....Information technology - Biometric data interchange formats
- Q. National Electrical Contractors Association
 - 303-2005.....Installing Closed Circuit Television (CCTV) Systems
- R. National Electrical Manufacturers Association (NEMA):
 - 250-08.....Enclosures for Electrical Equipment (1000 Volts Maximum)
 - TC-3-04.....PVC Fittings for Use with Rigid PVC Conduit and Tubing
 - FB1-07.....Fittings, Cast Metal Boxes and Conduit Bodies for Conduit, Electrical Metallic Tubing and Cable
- S. National Fire Protection Association (NFPA):
 - 70-11..... National Electrical Code (NEC)
 - 731-08.....Standards for the Installation of Electric Premises Security Systems
 - 99-2005.....Health Care Facilities
- T. National Institute of Justice (NIJ)
 - 0601.02-03.....Standards for Walk-Through Metal Detectors for use in Weapons Detection

- 0602.02-03.....Hand-Held Metal Detectors for Use in Concealed
Weapon and Contraband Detection
- U. National Institute of Standards and Technology (NIST):
- IR 6887 V2.1.....Government Smart Card Interoperability
Specification (GSC-IS)
- Special Pub 800-37.....Guide for Applying the Risk Management Framework
to Federal Information Systems
- Special Pub 800-63.....Electronic Authentication Guideline
- Special Pub 800-73-3....Interfaces for Personal Identity Verification (4
Parts)
-Pt. 1- End Point PIV Card Application Namespace,
Data Model & Representation
-Pt. 2- PIV Card Application Card Command
Interface
-Pt. 3- PIV Client Application Programming
Interface
-Pt. 4- The PIV Transitional Interfaces & Data
Model Specification
- Special Pub 800-76-1....Biometric Data Specification for Personal
Identity Verification
- Special Pub 800-78-2....Cryptographic Algorithms and Key Sizes for
Personal Identity Verification
- Special Pub 800-79-1....Guidelines for the Accreditation of Personal
Identity Verification Card Issuers
- Special Pub 800-85B-1...DRAFTPIV Data Model Test Guidelines
- Special Pub 800-85A-2...PIV Card Application and Middleware Interface
Test Guidelines (SP 800-73-3 compliance)
- Special Pub 800-96.....PIV Card Reader Interoperability Guidelines
- Special Pub 800-104A....Scheme for PIV Visual Card Topography
- V. Occupational and Safety Health Administration (OSHA):
- 29 CFR 1910.97.....Nonionizing radiation
- W. Section 508 of the Rehabilitation Act of 1973
- X. Security Industry Association (SIA):
- AG-01Security CAD Symbols Standards
- Y. Underwriters Laboratories, Inc. (UL):
- 1-05.....Flexible Metal Conduit
- 5-04.....Surface Metal Raceway and Fittings
- 6-07.....Rigid Metal Conduit
- 44-05.....Thermoset-Insulated Wires and Cables
- 50-07.....Enclosures for Electrical Equipment
- 83-08.....Thermoplastic-Insulated Wires and Cables

294-99.....	The Standard of Safety for Access Control System Units
305-08.....	Standard for Panic Hardware
360-09.....	Liquid-Tight Flexible Steel Conduit
444-08.....	Safety Communications Cables
464-09.....	Audible Signal Appliances
467-07.....	Electrical Grounding and Bonding Equipment
486A-03.....	Wire Connectors and Soldering Lugs for Use with Copper Conductors
486C-04.....	Splicing Wire Connectors
486D-05.....	Insulated Wire Connector Systems for Underground Use or in Damp or Wet Locations
486E-00.....	Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors
493-07.....	Thermoplastic-Insulated Underground Feeder and Branch Circuit Cable
514A-04.....	Metallic Outlet Boxes
514B-04.....	Fittings for Cable and Conduit
51-05.....	Schedule 40 and 80 Rigid PVC Conduit
609-96.....	Local Burglar Alarm Units and Systems
634-07.....	Standards for Connectors with Burglar-Alarm Systems
636-01.....	Standard for Holdup Alarm Units and Systems
639-97.....	Standard for Intrusion-Detection Units
651-05.....	Schedule 40 and 80 Rigid PVC Conduit
651A-07.....	Type EB and A Rigid PVC Conduit and HDPE Conduit
752-05.....	Standard for Bullet-Resisting Equipment
797-07.....	Electrical Metallic Tubing
827-08.....	Central Station Alarm Services
1037-09.....	Standard for Anti-theft Alarms and Devices
1635-10.....	Digital Alarm Communicator System Units
1076-95.....	Standards for Proprietary Burglar Alarm Units and Systems
1242-06.....	Intermediate Metal Conduit
1479-03.....	Fire Tests of Through-Penetration Fire Stops
1981-03.....	Central Station Automation System
2058-05.....	High Security Electronic Locks
60950.....	Safety of Information Technology Equipment
60950-1.....	Information Technology Equipment - Safety - Part 1: General Requirements
Z.	Uniform Federal Accessibility Standards (UFAS) 1984

AA. United States Department of Commerce:

Special Pub 500-101Care and Handling of Computer Magnetic Storage
Media

1.8 COORDINATION

- A. Coordinate arrangement, mounting, and support of electronic safety and security equipment:
 - 1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
 - 2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
 - 3. To allow right of way for piping and conduit installed at required slope.
 - 4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.
- B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.
- C. Coordinate location of access panels and doors for electronic safety and security items that are behind finished surfaces or otherwise concealed.

1.9 MAINTENANCE & SERVICE

- A. General Requirements
 - 1. The Contractor shall provide all services required and equipment necessary to maintain the entire integrated electronic security system in an operational state as specified for a period of one (1) year after formal written acceptance of the system. The Contractor shall provide all necessary material required for performing scheduled adjustments or other non-scheduled work. Impacts on facility operations shall be minimized when performing scheduled adjustments or other non-scheduled work. See also General Project Requirements.
- B. Description of Work
 - 1. The adjustment and repair of the security system includes all software updates, panel firmware, and the following new items computers equipment, communications transmission equipment and data transmission media (DTM), local processors, security system sensors, physical access control equipment, facility interface, signal transmission equipment, and video equipment.
- C. Personnel
 - 1. Service personnel shall be certified in the maintenance and repair of the selected type of equipment and qualified to accomplish all work

promptly and satisfactorily. The Resident Engineer shall be advised in writing of the name of the designated service representative, and of any change in personnel. The Resident Engineer shall be provided copies of system manufacturer certification for the designated service representative.

D. Schedule of Work

1. The work shall be performed during regular working hours, Monday through Friday, excluding federal holidays.

E. System Inspections

1. These inspections shall include:
 - a. The Contractor shall perform two (2) minor inspections at six (6) month intervals or more if required by the manufacturer, and two (2) major inspections offset equally between the minor inspections to effect quarterly inspection of alternating magnitude.
 - 1) Minor Inspections shall include visual checks and operational tests of all console equipment, peripheral equipment, local processors, sensors, electrical and mechanical controls, and adjustments on printers.
 - 2) Major Inspections shall include all work described for Minor Inspections and the following: clean all system equipment and local processors including interior and exterior surfaces; perform diagnostics on all equipment; operational tests of the CPU, switcher, peripheral equipment, recording devices, monitors, picture quality from each camera; check, walk test, and calibrate each sensor; run all system software diagnostics and correct all problems; and resolve any previous outstanding problems.

F. Emergency Service

1. The owner shall initiate service calls whenever the system is not functioning properly. The Contractor shall provide the Owner with an emergency service center telephone number. The emergency service center shall be staffed 24 hours a day 365 days a year. The Owner shall have sole authority for determining catastrophic and non-catastrophic system failures within parameters stated in General Project Requirements.
 - a. For catastrophic system failures, the Contractor shall provide same day four (4) hour service response with a defect correction time not to exceed eight (8) hours from [notification] [arrival on site]. Catastrophic system failures are defined as any system failure that the Owner determines will place the facility(s) at increased risk.

- b. For non-catastrophic failures, the Contractor within eight (8) hours with a defect correction time not to exceed 24 hours from notification.
- G. Operation
 - 1. Performance of scheduled adjustments and repair shall verify operation of the system as demonstrated by the applicable portions of the performance verification test.
- H. Records & Logs
 - 1. The Contractor shall maintain records and logs of each task and organize cumulative records for each component and for the complete system chronologically. A continuous log shall be submitted for all devices. The log shall contain all initial settings, calibration, repair, and programming data. Complete logs shall be maintained and available for inspection on site, demonstrating planned and systematic adjustments and repairs have been accomplished for the system.
- I. Work Request
 - 1. The Contractor shall separately record each service call request, as received. The record shall include the serial number identifying the component involved, its location, date and time the call was received, specific nature of trouble, names of service personnel assigned to the task, instructions describing the action taken, the amount and nature of the materials used, and the date and time of commencement and completion. The Contractor shall deliver a record of the work performed within five (5) working days after the work was completed.
- J. System Modifications
 - 1. The Contractor shall make any recommendations for system modification in writing to the Resident Engineer. No system modifications, including operating parameters and control settings, shall be made without prior written approval from the Resident Engineer. Any modifications made to the system shall be incorporated into the operation and maintenance manuals and other documentation affected.
- K. Software
 - 1. The Contractor shall provide all software updates when approved by the Owner from the manufacturer during the installation and 12-month warranty period and verify operation of the system. These updates shall be accomplished in a timely manner, fully coordinated with the system operators, and incorporated into the operations and maintenance manuals and software documentation. There shall be at least one (1) 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.

All software changes shall be recorded in a log maintained in the unit control room. An electronic copy of the software update shall be maintained within the log. At a minimum, the contractor shall provide a description of the modification, when the modification occurred, and name and contact information of the individual performing the modification. The log shall be maintained in a white 3 ring binder and the cover marked "SOFTWARE CHANGE LOG".

1.10 MINIMUM REQUIREMENTS

- A. References to industry and trade association standards and codes are minimum installation requirement standards.
- B. Drawings and other specification sections shall govern in those instances where requirements are greater than those specified in the above standards.

1.11 DELIVERY, STORAGE, & HANDLING

- A. Equipment and materials shall be protected during shipment and storage against physical damage, dirt, moisture, cold and rain:
 - 1. During installation, enclosures, equipment, controls, controllers, circuit protective devices, and other like items, shall be protected against entry of foreign matter; and be vacuum cleaned both inside and outside before testing and operating and repainting if required.
 - 2. Damaged equipment shall be, as determined by the Resident Engineer, placed in first class operating condition or be returned to the source of supply for repair or replacement.
 - 3. Painted surfaces shall be protected with factory installed removable heavy craft paper, sheet vinyl or equal.
 - 4. Damaged paint on equipment and materials shall be refinished with the same quality of paint and workmanship as used by the manufacturer so repaired areas are not obvious.
- B. Central Station, Workstations, and Controllers:
 - 1. Store in temperature and humidity controlled environment in original manufacturer's sealed containers. Maintain ambient temperature between 10 to 30 deg C (50 to 85 deg F), and not more than 80 percent relative humidity, non-condensing.
 - 2. Open each container; verify contents against packing list, and file copy of packing list, complete with container identification for inclusion in operation and maintenance data.
 - 3. Mark packing list with designations which have been assigned to materials and equipment for recording in the system labeling schedules generated by cable and asset management system.

4. Save original manufacturer's containers and packing materials and deliver as directed under provisions covering extra materials.

1.12 PROJECT CONDITIONS

- A. Environmental Conditions: System shall be capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:
 1. Interior, Controlled Environment: System components, except central-station control unit, installed in temperature-controlled interior environments shall be rated for continuous operation in ambient conditions of 2 to 50 deg C (36 to 122 deg F) dry bulb and 20 to 90 percent relative humidity, non-condensing. NEMA 250, Type 1 enclosure.
 2. Interior, Uncontrolled Environment: System components installed in non-temperature-controlled interior environments shall be rated for continuous operation in ambient conditions of -18 to 50 deg C (0 to 122 deg F) dry bulb and 20 to 90 percent relative humidity, non-condensing. NEMA 250, Type 4X enclosures.
 3. Exterior Environment: System components installed in locations exposed to weather shall be rated for continuous operation in ambient conditions of -34 to 50 deg C (-30 to 122 deg F) dry bulb and 20 to 90 percent relative humidity, condensing. Rate for continuous operation where exposed to rain as specified in NEMA 250, winds up to 137 km/h (85 mph) and snow cover up to 610 mm (24 in) thick. NEMA 250, Type 4X enclosures.
 4. 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.
 5. Corrosive Environment: For system components subjected to corrosive fumes, vapors, and wind-driven salt spray in coastal zones, provide NEMA 250, Type 4X enclosures.
- B. Security Environment: Use vandal resistant enclosures in high-risk areas where equipment may be subject to damage.
- C. Console: All console equipment shall, unless noted otherwise, be rated for continuous operation under ambient environmental conditions of 15.6 to 29.4 deg C (60 to 85 deg F) and a relative humidity of 20 to 80 percent.

1.13 EQUIPMENT AND MATERIALS

- A. Materials and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items, for which replacement parts shall be available.
- B. When more than one unit of the same class of equipment is required, such units shall be the product of a single manufacturer.
- C. Equipment Assemblies and Components:
 - 1. Components of an assembled unit need not be products of the same manufacturer.
 - 2. Manufacturers of equipment assemblies, which include components made by others, shall assume complete responsibility for the final assembled unit.
 - 3. Components shall be compatible with each other and with the total assembly for the intended service.
 - 4. Constituent parts which are similar shall be the product of a single manufacturer.
- D. Factory wiring shall be identified on the equipment being furnished and on all wiring diagrams.
- E. When Factory Testing Is Specified:
 - 1. The Government shall have the option of witnessing factory tests. The contractor shall notify the VA through the Resident Engineer a minimum of 15 working days prior to the manufacturers making the factory tests.
 - 2. Four copies of certified test reports containing all test data shall be furnished to the Resident Engineer prior to final inspection and not more than 90 days after completion of the tests.
 - 3. When equipment fails to meet factory test and re-inspection is required, the contractor shall be liable for all additional expenses, including expenses of the Government.

1.14 ELECTRICAL POWER

- A. Electrical power of 120 Volts Alternating Current (VAC) shall be indicated on the Division 26 drawings. Additional locations requiring primary power required by the security system shall be shown as part of these contract documents. Primary power for the security system shall be configured to switch to emergency backup sources automatically if interrupted without degradation of any critical system function. Alarms shall not be generated as a result of power switching, however, an indication of power switching on (on-line source) shall be provided to the alarm monitor. The Security Contractor shall provide an interface (dry contact closure) between the PACS and the Uninterruptible Power

Supply (UPS) system so the UPS trouble signals and main power fail appear on the PACS operator terminal as alarms.

- B. Failure of any on-line battery shall be detected and reported as a fault condition. Battery backed-up power supplies shall be provided sized for [8] <insert hours> hours of operation at actual connected load.

Requirements for additional power or locations shall be included with the contract to support equipment and systems offered. The following minimum requirements shall be provided for power sources and equipment.

1. Emergency Generator

- a. Report Printers: Unit Control Room
- b. Video Monitors: Unit Control Room
- c. Intercom Stations
- d. Radio System
- e. Lights: Unit Control Room, Equipment Rooms, & Security Offices
- f. Outlets: Security Outlets dedicated to security equipment racks or security enclosure assemblies.
- g. Security Device Power Supplies (DGP, VASS, Card Access, Lock Power, etc.) powered from the security closets or remotely: various locations
- h. Telephone/Radio Recording Equipment: Unit Control Room.
- i. VASS Camera Power Supplies: Security Closets
- j. VASS Pan/Tilt Units: Various Locations
- k. VASS Outdoor Housing Heaters and Blowers: Various Sites
- l. Intercom Master Control System
- m. Fiber Optic Receivers/Transmitters
- n. Security office Weapons Storage
- o. Outlets that charge handheld radios

2. Uninterruptible Power Supply (UPS) on Emergency Power

- a. The following 120VAC circuits shall be provided by others. The Security Contractor shall coordinate exact locations with the Electrical Contractor:
 - 1) Security System Monitors and Keyboards: Control Room
 - 2) CPU: Control Equipment Room
 - 3) Communications equipment: Control Equipment Room and various sites.
 - 4) VASS Matrix Switcher: Control Equipment Room
 - 5) VASS: Control Equipment Room
 - 6) Digital Video Recorders, encoders & decoders: Control Room
 - 7) All equipment Room racked equipment.
 - 8) Network switches

1.15 TRANSIENT VOLTAGE SUPPRESSION, POWER SURGE SUPPLESION, & GROUNDING

- A. Transient Voltage Surge Suppression: All cables and conductors extending beyond building façade, except fiber optic cables, which serve as communication, control, or signal lines shall be protected against Transient Voltage surges and have Transient Voltage Surge Suppression (TVSS) protection. The TVSS device shall be UL listed in accordance with Standard TIA 497B installed at each end. Lighting and surge suppression shall be a multi-strike variety and include a fault indicator. Protection shall be furnished at the equipment and additional triple solid state surge protectors rated for the application on each wire line circuit shall be installed within 914.4 mm (3 ft) of the building cable entrance. Fuses shall not be used for surge protection. The inputs and outputs shall be tested in both normal mode and common mode to verify there is no interference.
1. 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.
 2. 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.
 3. Maximum series current: 2 AMPS. Provide units manufactured by Advanced Protection Technologies, model # TE/FA 10B or TE/FA 20B.
 4. Operating Temperature and Humidity: -40 to 85 deg C (-40 to 185 deg F), 0 to 95 percent relative humidity.
- B. Grounding and Surge Suppression
1. The Security Contractor shall provide grounding and surge suppression to stabilize the voltage under normal operating conditions. To ensure the operation of over current devices, such as fuses, circuit breakers, and relays, under ground-fault conditions.
 2. Security Contractor shall engineer and provide proper grounding and surge suppression as required by local jurisdiction and prevailing codes and standards referenced in this document.
 3. Principal grounding components and features. Include main grounding buses and grounding and bonding connections to service equipment.
 4. Details of interconnection with other grounding systems. The lightning protection system shall be provided by the Security Contractor.
 5. Locations and sizes of grounding conductors and grounding buses in electrical, data, and communication equipment rooms and closets.
 6. AC power receptacles are not to be used as a ground reference point.
 7. Any cable that is shielded shall require a ground in accordance with the best practices of the trade and manufactures installation instructions.

8. Protection should be provided at both ends of cabling.

1.16 COMPONENT ENCLOSURES

A. Construction of Enclosures

1. Consoles, power supply enclosures, detector control and terminal cabinets, control units, wiring gutters, and other component housings, collectively referred to as enclosures, shall be so formed and assembled as to be sturdy and rigid.
2. Thickness of metal in-cast and sheet metal enclosures of all types shall not be less than those in Tables I and II, UL 611. Sheet steel used in fabrication of enclosures shall be not less than 14 gauge. Consoles shall be 16-gauge.
3. Doors and covers shall be flanged. Enclosures shall not have pre-punched knockouts. Where doors are mounted on hinges with exposed pins, the hinges shall be of the tight pin type or the ends of hinge pins shall be tack welded to prevent removal. Doors having a latch edge length of less than 609.6 mm (24 in) shall be provided with a single construction core. Where the latch edge of a hinged door is more than 609.6 mm (24 in) or more in length, the door shall be provided with a three-point latching device with construction core; or alternatively with two, one located near each end.
4. Any ventilator openings in enclosures and cabinets shall conform to the requirements of UL 611. Unless otherwise indicated, sheet metal enclosures shall be designed for wall mounting with tip holes slotted. Mounting holes shall be in positions that remain accessible when all major operating components are in place and the door is open, but shall be in accessible when the door is closed.
5. Covers of pull and junction boxes provided to facilitate initial installation of the system shall be held in place by tamper proof Torx Center post security screws. Stenciled or painted labels shall be affixed to such boxes indicating they contain no connections. These labels shall not indicate the box is part of the Electronic Security System (ESS).

B. Consoles & Equipment Racks: All consoles and vertical equipment racks shall include a forced air-cooling system to be provided by others.

1. Vertical Equipment Racks:

- a. The forced air blowers shall be installed in the vented top of each cabinet and shall not reduce usable rack space.
- b. The forced air fan shall consist of one fan rated at 105 CFM per rack bay and noise level shall not exceed 55 decibels.

- c. d. Vertical equipment racks are to be provided with full sized clear plastic locking doors and vented top panels as shown on contract drawings.

2. Console racks:

- a. Forced air fans shall be installed in the top rear of each console bay. The forced air fan shall consist of one fan rated at 105 CFM mounted to a 133mm vented blank panel the noise level of each fan shall not exceed 55 decibels. The fans shall be installed so air is pulled from the bottom of the rack or cabinet and exhausted out the top.
- b. Console racks are to be provided with flush mounted hinged rear doors with recessed locking latch on the bottom and middle sections of the consoles. Provide code access to support wiring for devices located on the work surfaces.

C. Tamper Provisions and Tamper Switches:

- 1. Enclosures, cabinets, housings, boxes and fittings or every product description having hinged doors or removable covers and which contain circuits, or the integrated security system and its power supplies shall be provided with cover operated, corrosion-resistant tamper switches.
- 2. Tamper switches shall be arranged to initiate an alarm signal that will report to the monitoring station when the door or cover is moved. Tamper switches shall be mechanically mounted to maximize the defeat time when enclosure covers are opened or removed. It shall take longer than 1 second to depress or defeat the tamper switch after opening or removing the cover. The enclosure and tamper switch shall function together in such a manner as to prohibit direct line of sight to any internal component before the switch activates.
- 3. Tamper switches shall be inaccessible until the switch is activated. Have mounting hardware concealed so the location of the switch cannot be observed from the exterior of the enclosure. Be connected to circuits which are under electrical supervision at all times, irrespective of the protection mode in which the circuit is operating. Be spring-loaded and held in the closed position by the door or cover and be wired so they break the circuit when the door cover is disturbed. Tamper circuits shall be adjustable type screw sets and shall be adjusted by the contractor to eliminate nuisance alarms associated with incorrectly mounted tamper device shall annunciate prior to the enclosure door opening (within 1/4 " tolerance. The tamper device or its components shall not be visible

or accessing with common tools to bypass when the enclosure is in the secured mode.

4. The single gang junction boxes for the portrait alarming and pull boxes with less than 102 square mm will not require tamper switches.
5. All enclosures over 305 square mm shall be hinged with an enclosure lock.
6. Control Enclosures: Maintenance/Safety switches on control enclosures, which must be opened to make routing maintenance adjustments to the system and to service the power supplies, shall be push/pull-set automatic reset type.
7. Provide one (1) enclosure tamper switch for each 609 linear mm of enclosure lock side opening evenly spaced.
8. All security screws shall be Torx-Post Security Screws.
9. The contractor shall provide the owner with two (2) torx-post screwdrivers.

1.17 ELECTRONIC COMPONENTS

- A. All electronic components of the system shall be of the solid-state type, mounted on printed circuit boards conforming to UL 796. Boards shall be plug-in, quick-disconnect type. Circuitry shall not be so densely placed as to impede maintenance. All power-dissipating components shall incorporate safety margins of not less than 25 percent with respect to dissipation ratings, maximum voltages, and current-carrying capacity.

1.18 SUBSTITUTE MATERIALS & EQUIPMENT

- A. Where variations from the contract requirements are requested in accordance with the GENERAL CONDITIONS and Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, the connecting work and related components shall include, but not be limited to additions or changes to branch circuits, circuit protective devices, conduits, wire, feeders, controls, panels and installation methods.
- B. In addition to this Section the Security Contractor shall also reference Section II, Products and associated divisions. The Resident Engineer shall have final authority on the authorization or refusal of substitutions. If there are no proposed substitutions, a statement in writing from the Contractor shall be submitted to the Resident Engineer stating same. In the preparation of a list of substitutions, the following information shall be included, as a minimum:
 1. Identity of the material or devices specified for which there is a proposed substitution.
 2. Description of the segment of the specification where the material or devices are referenced.

3. Identity of the proposed substitute by manufacturer, brand name, catalog or model number and the manufacturer's product name.
 4. A technical statement of all operational characteristic expressing equivalence to items to be substituted and comparison, feature-by-feature, between specification requirements and the material or devices called for in the specification; and Price differential.
- C. Materials Not Listed: Furnish all necessary hardware, software, programming materials, and supporting equipment required to place the specified major subsystems in full operation. Note that some supporting equipment, materials, and hardware may not be described herein. Depending on the manufacturers selected by the COTR, some equipment, materials and hardware may not be contained in either the Contract Documents or these written specifications, but are required by the manufacturer for complete operation according to the intent of the design and these specifications. In such cases, the Resident Engineer shall be given the opportunity to approve the additional equipment, hardware and materials that shall be fully identified in the bid and in the equipment list submittal. The Resident Engineer shall be consulted in the event there is any question about which supporting equipment, materials, or hardware is intended to be included.
- D. Response to Specification: The Contractor shall submit a point-by-point statement of compliance with each paragraph of the security specification. The statement of compliance shall list each paragraph by number and indicate "COMPLY" opposite the number for each paragraph where the Contractor fully complies with the specification. Where the proposed system cannot meet the requirements of the paragraph, and does not offer an equivalent solution, the offers shall indicate "DOES NOT COMPLY" opposite the paragraph number. Where the proposed system does not comply with the paragraph as written, but the bidder feels it will accomplish the intent of the paragraph in a manner different from that described, the offers shall indicate "COMPARABLE". The offers shall include a statement fully describing the "comparable" method of satisfying the requirement. Where a full and concise description is not provided, the offered system shall be considered as not complying with the specification. Any submission that does not include a point-by-point statement of compliance, as described above, shall be disqualified. Submittals for products shall be in precise order with the product section of the specification. Submittals not in proper sequence will be rejected.

1.19 LIKE ITEMS

- A. Where two or more items of equipment performing the same function are required, they shall be exact duplicates produced by one manufacturer. All equipment provided shall be complete, new, and free of any defects.

1.20 WARRANTY

- A. The Contractor shall, as a condition precedent to the final payment, execute a written guarantee (warranty) to the COTR certifying all contract requirements have been completed according to the final specifications. Contract drawings and the warranty of all materials and equipment furnished under this contract are to remain in satisfactory operating condition (ordinary wear and tear, abuse and causes beyond his control for this work accepted) for one (1) year from the date the Contractor received written notification of final acceptance from the COTR. Demonstration and training shall be performed prior to system acceptance. All defects or damages due to faulty materials or workmanship shall be repaired or replaced without delay, to the COTR's satisfaction, and at the Contractor's expense. The Contractor shall provide quarterly inspections during the warranty period. The contractor shall provide written documentation to the COTR on conditions and findings of the system and device(s). In addition, the contractor shall provide written documentation of test results and stating what was done to correct any deficiencies. The first inspection shall occur 90 calendar days after the acceptance date. The last inspection shall occur 30 calendar days prior to the end of the warranty. The warranty period shall be extended until the last inspection and associated corrective actions are complete. When equipment and labor covered by the Contractor's warranty, or by a manufacturer's warranty, have been replaced or restored because of its failure during the warranty period, the warranty period for the replaced or repaired equipment or restored work shall be reinstated for a period equal to the original warranty period, and commencing with the date of completion of the replacement or restoration work. In the event any manufacturer customarily provides a warranty period greater than one (1) year, the Contractor's warranty shall be for the same duration for that component.

1.22 SINGULAR NUMBER

Where any device or part of equipment is referred to in these specifications in the singular number (e.g., "the switch"), this reference shall be deemed to apply to as many such devices as are required to complete the installation as shown on the drawings.

PART 2 - PRODUCTS

2.1 EQUIPMENT AND MATERIALS

- A. All equipment associated within the Security Control Room, Security Console and Security Equipment Room shall be UL 827, UL 1981, and UL 60950 compliant and rated for continuous operation. Environmental conditions (i.e. temperature, humidity, wind, and seismic activity) shall be taken under consideration at each facility and site location prior to installation of the equipment.
- B. All equipment shall operate on a 120 or 240 volts alternating current (VAC); 50 Hz or 60 Hz AC power system unless documented otherwise in subsequent sections listed within this specification. All equipment shall have a back-up source of power that will provide a minimum of [8] <insert hours> hours of run time in the event of a loss of primary power to the facility.
- C. The system shall be designed, installed, and programmed in a manner that will allow for ease of operation, programming, servicing, maintenance, testing, and upgrading of the system.
- D. All equipment and materials for the system will be compatible to ensure correct operation.

2.2 EQUIPMENT ITEMS

- A. The Security Management System shall provide full interface with all components of the security subsystem as follows:
 - 1. Shall allow for communication between the Physical Access Control System and Database Management and all subordinate work and monitoring stations, enrollment centers for badging and biometric devices as part of the PACS, local annunciation centers, the electronic Security Management System (SMS), and all other VA redundant or backup command center or other workstations locations.
 - 2. Shall provide automatic continuous communication with all systems that are monitored by the SMS, and shall automatically annunciate any communication failures or system alarms to the SMS operator providing identification of the system, nature of the alarm, and location of the alarm.
 - 3. Controlling devices shall be utilized to interface the SMS with all field devices.
 - 4. The Security control room and security console will be supported by an uninterrupted power supply (UPS) or dedicated backup generator power circuit.

5. The Security Equipment room, Security Control Room, and Security Operator Console shall house the following equipment i.e. refer to individual master specifications for each security subsystem's specific requirements:
 - a. Security Console Bays and Equipment Racks
 - b. Security Network Server and Workstation
 - c. CCTV Monitoring, Controlling, and Recording Equipment
 - d. PACS Monitoring and Controlling Equipment
 - e. IDS Monitoring and Controlling Equipment
 - f. Security Access Detection Monitoring Equipment
 - g. EPPS Monitoring and Controlling Equipment
 - h. Main Panels for all Security Systems
 - i. Power Supply Units (PSU) for all field devices
 - j. Life safety and power monitoring equipment
 - k. All other building systems deemed necessary by the VA to include, but not limited to, heating, ventilation and air conditioning (HVAC), elevator control, portable radio, fire alarm monitoring, and other potential systems.
 - l. Police two-way radio control consoles/units.
- B. Security Console Bays - shall be EIA 310D compliant and:
 1. Utilize stand-up, sit-down, and vertical equipment racks in any combination to monitor and control the security subsystems.
 2. Shall be wide enough for equipment that requires a minimum 19 inch (47.5 cm) mounting area.
 3. Shall be made of metal, furnished with wire ways, a power strip, a thermostatic controlled bottom or top mounted fan units, a hinge mounted rear door, a hinge mounted front door made of Plexiglas, and a louvered top. When possible, pre-fabricated (standard off-the-shelf) security console equipment shall be used in place of customized designed consoles.
 4. A wire management system shall be designed and installed so that all cables are mounted in a manner that they do not interfere with day-to-day operations, are labeled for quick identification, and so that high voltage power cables do not cause signal interference with low voltage and data carrying cables.
 5. Shall be mounted on lockable casters.
 6. Shall be ergonomically designed so that all devices requiring repetitive interaction with by the operator can be easily accessed, observed, and accomplished.
 7. Controls and displays shall be located so that they are not obscured during normal operation. Control and display units installed with a

- work bench shall be a minimum of 3 in. (7.5 cm) from all edges of the work bench area.
8. All security subsystem controls shall be installed within the same operating console bay of their associated equipment.
 9. Video monitors shall be mounted above all controls within a console bay and positioned in a manner that minimum strain is placed on the operator viewing them at the console.
 10. At least one workbench for every three (3) console bays shall be provided free of control equipment to allow for appropriate operator workspace.
 11. All console devices shall be labeled and marked with a minimum of quarter inch bold print.
 12. All non-security related equipment that is required to be monitored shall be installed in a console bay separate from the security subsystem equipment and clearing be identified as such.
 13. Console bays and related equipment shall be arranged in priority order and sequenced based upon their pre-defined security subsystem operations criticality established by the Contracting Officer.
 14. The following minimum console technical characteristics shall be taken into consideration when designing for and installing the security console and equipment racks:

	Stand-Up	Sit-Down	Vertical Equipment Rack
Workstation Height	No Greater than 84 in. (210 cm)	No greater than 72 in. (150 cm)	No greater than 96 in. (240 cm)
Bench board Slope	21 in. (52.5 cm)	25 in. (62.5 cm)	N/A
Bench board Angle	15 degrees	15 degrees	N/A
Depth of Console	24 in. (60 cm)	24 in. (60 cm)	N/A
Leg and Feet Clearance	6 sq. ft. from center of Console Slope front	6 sq. ft. from center of Console Slope front	6 sq. ft. from center of Console Slope front
Distance Between Console Rows	96 in. (240 cm)	96 in. (240 cm)	96 in. (240 cm)
Distance Between Console and Wall	36 in. (90 cm) from the rear and/or side of console or rack	36 in. (90 cm) from the rear and/or side of console or rack	36 in. (90 cm) from the rear and/or side of console or rack

C. Security Console Configuration:

1. The size shall be defined by the number of console bays required to house and operate the security subsystems, as well as any other factors that may influence the overall design of the space. A small Access Control System and Database Management shall contain no more than four (4) security console bays. A large Access Control System and Database Management shall contain no less than five (5) and no more than eight (8) security console bays.
2. Shall meet the following minimum spacing requirements to ensure that a Access Control System and Database Management is provided to house existing and future security subsystems and other equipment listed in paragraph 2.3.C:
 - a. 500 square feet for a large Access Control System and Database Management.
 - b. 300 square feet for a small Access Control System and Database Management.
 - c. If office, training room and conference space, is a processing area as well as holding cell space is to be located adjacent to the Access Control System and Database Management, these space requirements also need to be considered.
3. Shall be located in an area within, at a minimum, the first level/line of security defense defined by the VA. If the Access Control System and Database Management is to be located outside the first level of security, then the area shall be constructed or retrofit to meet or exceed those requirements outlined in associated VA Master Specifications.
4. Shall not be located within or near an area with little to no blast mitigation standoff space protection, adjacent to an outside wall exposed to vehicle parking and traffic, within a basement or potential flood zone area, in close approximately to major utility areas, or near an exposed air intake(s).
5. Access shall meet UFAS and ADA accessibility requirements.
6. Construction shall be slab to slab and free of windows, with the exception of a service window. All penetrations into the room shall be sealed with fire stopping materials. This material shall apply in accordance with Section 07 84 00, FIRESTOPPING.
7. A service window shall be installed in the wall next to the main entrance of the Access Control System and Database Management or where it best can be monitored and accessed by the security console operator. The window shall meet all requirements set forth in UL 752, to include at a minimum, Class III ballistic level protection. The

windows shall be set in a minimum of four (4) inches (100 mm) solid concrete units to ceiling height with either masonry or gypsum wall board to the underside of the slab above. It shall also contain a service tray constructed in a manner that only objects no larger than 3 inches (7.5 cm) in width may pass through it.

8. The walls making up or surrounding the Access Control System and Database Management shall be made of materials that at a minimum offer Class III ballistic level protection for the security console operator(s).
9. There will be a main power cut-off button/switch located inside the Access Control System and Database Management in the event of an electrical fire or related event occurs.
10. Shall have a fire alarm detection unit that is tied into the main building fire alarm system and have at least two fire extinguishers located within it.
11. Shall utilize a fire suppression system similar to that used by the VA's computer and telecommunications room operating areas.
12. The floor shall be raised a minimum of 4 inches (10 cm) from the concrete floor base. Wire ways shall be utilized under the raised floor for separation of signal and power wires and cables.
13. Access shall be monitored and controlled by the PACS via card reader and fixed camera that utilizes a wide angle lens. A 1 in. (2.5 cm) deadbolt shall be utilized as a mechanical override for the door in the event of electrical failure of the PACS, card reader, or locking mechanism.
14. There shall only be one point of ingress and egress to and from the Security Control Room. The door shall be made of solid core wood or better. If a window is required for the door, then the window shall be ballistic resistant with a Millar covering.
15. A two-way intercom shall be placed at the point of entry into the Security Control Room for access-communication control purposes.
16. A remote push-button door unlocking device shall not be installed for the electronic PACS locking mechanism providing access control into the Security Control Room.
17. All controlling equipment and power supplies that must be wall mounted shall be mounted in a manner that maximizes usability of the Security Control Room wall space. All equipment shall be mounted to three quarter inch fire retardant plywood. The plywood shall be fastened to the wall from slab to slab and fixed to the existing walls supports.

D. Security Control Room Ventilation

1. Shall meet or exceed all requirements laid out in VA Master Specification listed in Division 23, HEATING, VENTILATION, AND AIR CONDITIONING.
2. Controls shall be via a separate air handling system that provides an isolated supply and return system. The Security Control Room shall have a dedicated thermostat control unit and cut-off switch to be able to shut off ventilation to the control room in the event of a chemical, biological, or radiological (CBR) event or other related emergency.
3. There shall be a louver installed in the control room door to assist with ventilation of the room. The louver shall be exactly 12 x 12 inches (30 x 30 cm) and closeable.

E. Security Control Room and Security Console Lighting:

1. The following factors shall be taken into consideration for lighting of the Security Control Room and console area:
 - a. Shadows: To reduce eye strain and fatigue, shadows shall be avoided.
 - b. Glare: The readability of all display panels, labels, and equipment shall not be interfered with or create visibility problems.
2. The following table shall provide guidance on the amount of footcandles required per work area and type of task performed:

Work Area/Type of Task		Footcandles
Main Operating Panels		50
Secondary Display Panels		50
Seated Workstations		100
Reading	Handwriting	100
	Typed Documents	50
	Visual Display Units	10
Logbook Recording		100
Maintenance Area		50
Emergency/Back-up Lighting		10

F. Remote security console access: For facilities that have a remote, secondary back-up control console or workstation shall apply the following requirements:

1. The secondary stations shall the requirements outlined in Sections 2.2.A-G.
2. Installation of an intercom station or telephone line shall be installed and provide direct one touch call-up for communications between the primary Security Control Console and secondary Security Control Console.

3. Secondary stations shall not have priority over a primary Security Control Console.
4. The primary Access Control System and Database Management shall have the ability to shut off power and a signal to a secondary control station in the event the area has been compromised.

G. Wires and Cables:

1. Shall meet or exceed the manufactures recommendation for power and signals.
2. Shall be carried in an enclosed conduit system, utilizing electromagnetic tubing (EMT) to include the equivalent in flexible metal, rigid galvanized steel (RGS) to include the equivalent of liquid tight, polyvinylchloride (PVC) schedule 40 or 80.
3. All conduits will be sized and installed per the NEC. All security system signal and power cables that traverse or originate in a high security office space will contained in either EMT or RGS conduit.
4. All conduit, pull boxes, and junction boxes shall be marked with colored permanent tape or paint that will allow it to be distinguished from all other infrastructure conduit.
5. Conduit fills shall not exceed 50 percent unless otherwise documented.
6. A pull string shall be pulled along and provided with signal and power cables to assist in future installations.
7. At all locations where there is a wall penetration or core drilling is conducted to allow for conduit to be installed, fire stopping materials shall be applied to that area.
8. High voltage and signal cables shall not share the same conduit and shall be kept separate up to the point of connection. High voltage for the security subsystems shall be any cable or sets of cables carrying 30 VDC/VAC or higher.
9. For all equipment that is carrying digital data between the Security Control Room, Security Equipment Room, Security Console, or at a remote monitoring station, it shall not be less that 20 AWG and stranded copper wire for each conductor. The cable or each individual conductor within the cable shall have a shield that provides 100% coverage. Cables with a single overall shield shall have a tinned copper shield drain wire.

2.3 FIBER OPTIC EQUIPMENT

A. 8 Channel Fiber Optic Transcievers (Video&PTZ Control)

1. The field-located and central-located fiber optic transceivers shall utilize wave division multiplexing to transmit and receive video and

data pan-tilt-zoom control signals over two standard 62.5/125 multimode fibers.

2. The units shall be capable of operating over a range of 2 km.
3. The units shall be NTSC color compatible.
4. The units shall support data rates up to 64 Kbps.
5. The units shall be surface or rack mountable.
6. The units shall be UL listed.
7. The units shall meet or exceed the following specifications:
 - a. Video
 - 1) Input/Output: 1 volt pk-pk (75 ohms)
 - 2) Input/Output Channels: 8
 - 3) Bandwidth: 10 Hz - 6.5 MHz per channel
 - 4) Differential Gain: <2%
 - 5) Differential Phase: <0.7°
 - 6) Tilt: <1%
 - 7) Signal to Noise Ratio: 60 dB
 - b. Data (Control)
 - 1) Data Channels: 2
 - 2) Data Format: RS-232, RS-422, 2 wire or 4 wire RS-485 with Tri-State Manchester Bi-Phase and Sensornet
 - 3) Data Rate: DC - 100 kbps (NRZ)
 - 4) Bit Error Rate: < 1 in 10⁹ @ Maximum Optical Loss Budget
 - 5) Operating Mode: Simplex or Full-Duplex
 - 6) Wavelength: 1310/1550 nm, Multimode or Singlemode
 - 7) Optical Emitter: Laser Diode
 - 8) Number of Fibers: 1
 - c. Connectors
 - 1) Optical: ST
 - 2) Power and Data: Terminal Block with Screw Clamps
 - 3) Video: BNC (Gold Plated Center-Pin)
 - d. Electrical and Mechanical
 - 1) Power: 12 VDC @ 500 mA (stand-alone)
 - 3) Current Protection: Automatic Resettable Solid-State Current Limiters
 - e. Environmental
 - 1) MTBF: > 100,000 hours
 - 2) Operating Temp: -40 to 74 deg C (-40 to 165 deg F)
 - 3) Storage Temp: -40 to 85 deg C (-40 to 185 deg F)
 - 4) Relative Humidity: 0% to 95% (non-condensing)

B. Fiber Optic Transmitters: The central-located fiber optic transmitters shall utilize wave division multiplexing to transmit video and signals over standard 62.5/125 multimode fibers.

1. The units shall be capable of operating over a range of 4.8 km.
2. The units shall be NTSC color compatible.
3. The units shall support data rates up to 64 Kbps.
4. The units shall be surface or rack mountable.
5. The units shall be UL listed.
6. The units shall meet or exceed the following specifications:

a. Video

- 1) Input: 1 volt pk-pk (75 ohms)
- 2) Bandwidth: 5Hz - 10 MHz
- 3) Differential Gain: <5%
- 4) Tilt: <1%
- 5) Signal-Noise: 60db
- 6) Wavelength: 850nm
- 7) Number of Fibers: 1
- 8) Operating Temp: -20 to 70 deg C (-4 to 158 deg F)
- 9) Connectors:
 - a) Power: Female plug with screw clamps
 - b) Video: BNC
 - c) Optical: ST
- 10) Power: 12 VDC

C. Fiber Optic Receivers: The field-located fiber optic receivers shall utilize wave division multiplexing to receive video signals over standard 62.5/125 multimode fiber.

1. The units shall be capable of operating over a range of 4.8 km.
2. The units shall be NTSC color compatible.
3. The units shall support data rates up to 64 Kbps.
4. The units shall be surface or rack mountable.
5. The units shall be UL listed.
6. The units shall meet or exceed the following specifications:

a. Video

- 1) Output: 1 volt pk-pk (75 ohms)
- 2) Bandwidth: 5Hz - 10 MHz
- 3) Differential Gain: <5%
- 4) Tilt: <1%
- 5) Signal-Noise: 60dB
- 6) Wavelength: 850nm
- 7) Number of Fibers: 1
- 8) Surface Mount: 106.7 x 88.9 x 25.4 mm (4.2 x 3.5 x 1 in)

- 9) Operating Temp: -20 to 70 deg C (-4 to 158 deg F)
- 10) Connectors:
- 11) Power: Female plug block with screw clamps
- 12) Video: BNC
- 13) Optical: ST
- 14) Power: 12 VAC8 Channel Fiber Optic Transcievers (Video&PTZ Control)

D. Fiber Optic Sub Rack with Power Supply

1. The Card Cage Rack shall provide high-density racking for fiber-optic modules. The unit shall be designed to mount in standard 483 mm (19 in) instrument racks and to accommodate the equivalent of 15 1-inch modules.

a. Specifications

- 1) Card Orientation: Vertical
- 2) Construction: Aluminum
- 3) Current Consumption: 0.99 A
- 4) Humidity: 95.0 % RH
- 5) Input Power: 100-240 VAC, 60/50 Hz
- 6) Mounting: Mounts in standard 483 mm (19 in) rack using four (4) screws (optional wall brackets purchased separately)
- 7) Number of Outputs: 1.0
- 8) Number of Slots 15.0
- 9) Operating Temperature: -40 to +75 deg C (-40.0 to 167.0 deg F)
- 10) Output Voltage: 13.5 V
- 11) Output Current 6.0 A
- 12) Power Dissipation: 28.0 W
- 13) Power Factor: 48.0
- 14) Power Supply: (built-in)
- 15) Rack Units: 3RU
- 16) Redundant Capability: Yes
- 17) Weight: 2.43 kg (5.35 lb)
- 18) Width: 483 mm (19.0 in)

2.4 TRANSIENT VOLTAGE SURGE SUPPRESSION DEVICES (TVSS) AND SURGE SUPPRESSION

A. Transient Voltage Surge Suppression

1. All cables and conductors extending beyond building perimeter, except fiber optic cables, which serve as communication, control, or signal lines shall be protected against Transient Voltage surges and have Transient Voltage surge suppression protection (TVSS) UL listed in accordance with Standard 497B installed at each end. Lighting and surge suppression shall be a multi-strike variety and include a fault

indicator. Protection shall be furnished at the equipment and additional triple solid state surge protectors rated for the application on each wire line circuit shall be installed within 915 mm (36 in) of the building cable entrance. Fuses shall not be used for surge protection. The inputs and outputs shall be tested 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.
- c. Maximum series current: 2 AMPS. Provide units manufactured by Advanced Protection Technologies, model # TE/FA 10B or TE/FA 20B or approved equivalent.
- d. Operating Temperature and Humidity: -40 to + 85 deg C (-40 to 185 deg F), and 0 to 95 percent relative humidity, non-condensing.

B. Physical Access Control Systems

1. Suppressors shall be installed on AC power at the point of service and shall meet the following criteria:
 - a. UL1449 2nd Edition, 2007, listed
 - b. UL1449 S.V.R. of 400 Volts or lower
 - c. Status Indicator Light(s)
 - d. Minimum Surge Current Capacity: 40,000 Amps (8 x 20 µsec)
 - e. Maximum Continuous Current: 15 Amps
 - f. MCOV: 125 VAC
 - g. Service Voltage: 110-120 VAC
2. Suppressors shall be installed on the Low Voltage circuit at both the point of entrance and exit of the building. Suppressors shall meet the following criteria:
 - a. UL 497B
 - b. Minimum Surge Current Capacity: 2,000 Amps per pair
 - c. Maximum Continuous Current: 5 Amps
 - d. MCOV: 33 Volts
 - e. Service Voltage: 24Volts
3. Suppressors shall be installed on the communication circuit between the access controller and card reader at both the entrance and exit of the building. Suppressors shall meet the following criteria:
 - a. Conforms with UL497B standards (where applicable)
 - b. Clamp level for 12 and 24V power: 18VDC / 38VDC
 - c. Clamp level for Data/LED: 6.8VDC

- d. Service Voltage for Power: 12VDC/24VDC
- e. Service Voltage for Data/LED: <5VDC
- f. Clamp level - PoE Access Power: 72V
- g. Clamp level - PoE Access Data: 7.9V
- h. Service Voltage - PoE Access: 48VAC - 54VAC
- i. Service Voltage - PoE Data: <5VDC

C. Intercom Systems

1. Suppressors shall be installed on the AC power at the point of service and shall meet the following criteria:
 - a. UL 1449 Listed
 - b. UL 1449 S.V.R. of 400 Volts or lower
 - c. Diagnostic Indicator Light(s)
 - d. Integrated ground terminating post (where case/chassis ground exists)
 - e. Minimum Surge Current Capacity of 13,000 Amps (8 x 20 μ Sec)
2. Suppressors shall be installed on incoming central office lines and shall meet the following criteria:
 - a. UL 497A Listed
 - b. Multi Stage protection design
 - c. Auto-reset current protection not to exceed 2 Amps per pair
 - d. Minimum Surge Current of 500 Amps per pair (8 x 20 μ Sec)
3. Suppressors shall be installed on all telephone/intercom circuits that enter or leave separate buildings and shall meet the following criteria:
 - a. UL 497A Listed (where applicable)
 - b. UL 497B Listed (horns, strobes, speakers or communication circuits over 300 feet)
 - c. Multi Stage protection design
 - d. Auto-reset over-current protection not to exceed 5 Amps per pair
 - e. Minimum Surge Current of 1000 Amps per pair (8 x 20 μ Sec)

D. Intrusion Detection Systems

1. Suppressors shall be installed on AC at the point of service and shall meet the following criteria:
 - a. UL 1449, 2nd Edition 2007, listed
 - b. UL 1449 S.V.R. of 400 Volts or lower
 - c. Status Indicator Lights
 - d. Center screw for terminating Class II transformers
 - e. Minimum Surge Current Capacity of 32,000 Amps (8 x 20 μ Sec)
2. Suppressors shall be installed on all Telephone Communication Interface circuits and shall meet the following criteria:
 - a. UL 497A Listed

- b. Multi Stage protection design
- c. Surge Current Capacity: 9,000 Amps (8x20 μ Sec)
- d. Clamp Voltage: 130Vrms
- e. Auto reset current protection not to exceed 150 milliAmps
- 3. Suppressors shall be installed on all burglar alarm initiating and signaling loops and addressable circuits which enter or leave separate buildings. The following criteria shall be met:
 - a. UL 497B for data communications or annunciation (powered loops)
 - b. Fail-short/fail-safe mode.
 - c. Surge Current Capacity: 9,000 Amps (8x20 μ Sec)
 - d. Clamp Voltage: 15 Vrms
 - e. Joule Rating: 76 Joules per pair (10x1000 μ Sec)
 - f. Auto-reset current protection not to exceed 150 milliAmps for UL 497A devices.

E. Video Surveillance System

- 1. Protectors shall be installed on coaxial cable systems on points of entry and exit from separate buildings. Suppressors shall be installed at each exterior camera location and include protection for 12 and/or 24 volt power, data signal and motor controls (for Pan, Tilt and Zoom systems). SPDs shall protect all modes herein mentioned and contain all modes in a single unit system. Protection for all systems mentioned above shall be incorporated at the head end equipment. Additionally a minimum 450VA battery back up shall be used to protect the DVR or VCR and monitor. Protectors shall meet the following criteria:
 - a. Head-End Power
 - 1) UL 1778, cUL (Battery Back Up)
 - 2) Minimum Surge Current Capacity: 65,000 Amps (8x20 μ sec)
 - 3) Minimum of two (2) NEMA 5-15R Receptacles (one (1) AC power only, one (1) with UPS)
 - 4) All modes protected (L-N, L-G, N-G)
 - 5) EMI/RFI Filtering
 - 6) Maximum Continuous Current: 12 Amps
 - b. Camera Power
 - 1) Minimum Surge Current Capacity: 1,000 Amps (8X20 μ sec); 240 Amps for IP Video/PoE cameras
 - 2) Screw Terminal Connection
 - 3) All protection modes L-G (all Lines)
 - 4) MCOV <40VAC
 - c. Video And Data

- 1) Surge Current Capacity 1,000 Amps per conductor
- 2) "BNC" Connection (Coax)
- 3) Protection modes: L-G (Data), Center Pin-G, Shield-G (Coax)
- 4) Band Pass 0-2GHz
- 5) Insertion Loss <0.3dB

F. Grounding and Surge Suppression

1. The Security Contractor shall provide grounding and surge suppression to stabilize the voltage under normal operating conditions. This is to ensure the operation of over current devices, such as fuses, circuit breakers, and relays, underground-fault conditions.
2. The Contractor shall engineer, provide, and install proper grounding and surge suppression as required by local jurisdiction and prevailing codes and standards, referenced in this document.
3. Principal grounding components and features shall include: main grounding buses, grounding, and bonding connections to service equipment.
4. The Contractor shall provide detail drawings of interconnection with other grounding systems including lightning protection systems.
5. The Contractor shall provide details of locations and sizes of grounding conductors and grounding buses in electrical, data, and communication equipment rooms and closets.
6. AC power receptacles are not to be used as a ground reference point.
7. Any cable that is shielded shall require a ground in accordance with applicable codes, the best practices of the trade, and all manufactures' installation instructions.

G. 120 VAC Surge Suppression

1. Continuous Current: Unlimited (parallel connection)
2. Max Surge Current: 13,500 Amps
3. Protection Modes: L - N, L - G, N - G
4. Warranty: Ten Year Limited Warranty
5. Dimension: 73.7 x 41.1 x 52.1 mm (2.90 x 1.62 x 2.05 in)
6. Weight: 2.88 g (0.18 lbs)
7. Housing: ABS

2.5 INSTALLATION KIT

A. General:

1. The kit shall be provided that, at a minimum, includes all connectors and terminals, labeling systems, audio spade lugs, barrier strips, punch blocks or wire wrap terminals, heat shrink tubing, cable ties, solder, hangers, clamps, bolts, conduit, cable duct, and/or cable tray, etc., required to accomplish a neat and secure installation. All wires shall terminate in a spade lug and barrier strip, wire wrap

terminal or punch block. Unfinished or unlabeled wire connections shall not be allowed. All unused and partially opened installation kit boxes, coaxial, fiber-optic, and twisted pair cable reels, conduit, cable tray, and/or cable duct bundles, wire rolls, physical installation hardware shall be turned over to the Contracting Officer. The following sections outline the minimum required installation sub-kits to be used:

2. System Grounding:
 - a. The grounding kit shall include all cable and installation hardware required. All head end equipment and power supplies shall be connected to earth ground via internal building wiring, according to the NEC.
 - b. This includes, but is not limited to:
 - 1) Coaxial Cable Shields
 - 2) Control Cable Shields
 - 3) Data Cable Shields
 - 4) Equipment Racks
 - 5) Equipment Cabinets
 - 6) Conduits
 - 7) Cable Duct blocks
 - 8) Cable Trays
 - 9) Power Panels
 - 10) Grounding
 - 11) Connector Panels
3. Coaxial Cable: The coaxial cable kit shall include all coaxial connectors, cable tying straps, heat shrink tabbing, hangers, clamps, etc., required to accomplish a neat and secure installation.
4. Wire and Cable: The wire and cable kit shall include all connectors and terminals, audio spade lugs, barrier straps, punch blocks, wire wrap strips, heat shrink tubing, tie wraps, solder, hangers, clamps, labels etc., required to accomplish a neat and orderly installation.
5. Conduit, Cable Duct, and Cable Tray: The kit shall include all conduit, duct, trays, junction boxes, back boxes, cover plates, feed through nipples, hangers, clamps, other hardware required to accomplish a neat and secure conduit, cable duct, and/or cable tray installation in accordance with the NEC and this document.
6. Equipment Interface: The equipment kit shall include any item or quantity of equipment, cable, mounting hardware and materials needed to interface the systems with the identified sub-system(s) according to the OEM requirements and this document.

7. Labels: The labeling kit shall include any item or quantity of labels, tools, stencils, and materials needed to label each subsystem according to the OEM requirements, as-installed drawings, and this document.
8. Documentation: The documentation kit shall include any item or quantity of items, computer discs, as installed drawings, equipment, maintenance, and operation manuals, and OEM materials needed to provide the system documentation as required by this document and explained herein.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRONIC SAFETY AND SECURITY INSTALLATION

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electronic safety and security equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of Way: Give to piping systems installed at a required slope.
- F. Equipment location shall be as close as practical to locations shown on the drawings.
- G. Inaccessible Equipment:
 1. Where the Government determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, the equipment shall be removed and reinstalled as directed at no additional cost to the Government.
 2. "Conveniently accessible" is defined as being capable of being reached without the use of ladders, or without climbing or crawling under or over obstacles such as, but not limited to, motors, pumps, belt guards, transformers, piping, ductwork, conduit and raceways.

3.2 FIRESTOPPING

- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electronic safety and security installations to restore original fire-resistance rating of assembly. Firestopping materials and

installation requirements are specified in Division 07 Section 07 84 00 "Firestopping."

3.3 COMMISSIONING

- A. Provide commissioning documentation in accordance with the requirements of Section 28 08 00 - COMMISSIONING OF ELECTRONIC SAFETY AND SECURITY SYSTEMS for all inspection, start up, and contractor testing required above and required by the System Readiness Checklist provided by the Commissioning Agent.
- B. Components provided under this section of the specification will be tested as part of a larger system. Refer to section 28 08 00 - COMMISSIONING OF ELECTRONIC SAFETY AND SECURITY SYSTEMS and related sections for contractor responsibilities for system commissioning.

3.4 DEMONSTRATION AND TRAINING

- A. Training shall be provided in accordance with Article, INSTRUCTIONS, of Section 01 00 00, GENERAL REQUIREMENTS.
- B. Training shall be provided for the particular equipment or system as required in each associated specification.
- C. A training schedule shall be developed and submitted by the contractor and approved by the Resident Engineer at least 30 days prior to the planned training.
- D. Provide services of manufacturer's technical representative for <insert hours> hours to instruct VA personnel in operation and maintenance of units.
- E. Submit training plans and instructor qualifications in accordance with the requirements of Section 28 08 00 - COMMISSIONING OF ELECTRONIC SAFETY AND SECURITY SYSTEMS.

3.5 WORK PERFORMANCE

- A. Job site safety and worker safety is the responsibility of the contractor.
- B. For work on existing stations, arrange, phase and perform work to assure electronic safety and security service for other buildings at all times. Refer to Article OPERATIONS AND STORAGE AREAS under Section 01 00 00, GENERAL REQUIREMENTS.
- C. New work shall be installed and connected to existing work neatly and carefully. Disturbed or damaged work shall be replaced or repaired to its prior conditions, as required by Section 01 00 00, GENERAL REQUIREMENTS.
- D. Coordinate location of equipment and conduit with other trades to minimize interferences. See the GENERAL CONDITIONS.

3.6 SYSTEM PROGRAMMING

A. General Programming Requirements

1. This following section shall be used by the contractor to identify the anticipated level of effort (LOE) required setup, program, and configure the Electronic Security System (ESS). The contractor shall be responsible for providing all setup, configuration, and programming to include data entry for the Security Management System (SMS) and subsystems [(e.g., video matrix switch, intercoms, digital video recorders, intrusion devices, including integration of subsystems to the SMS (e.g., camera call up, time synchronization, intercoms)]. System programming for existing or new SMS servers shall not be conducted at the project site.

B. Level of Effort for Programming

1. The Contractor shall perform and complete system programming (including all data entry) at an offsite location using the Contractor's own copy of the SMS software. The Contractor's copy of the SMS software shall be of the Owners current version. Once system programming has been completed, the Contractor shall deliver the data to the Resident Engineer on data entry forms and an approved electronic medium, utilizing data from the contract documents. The completed forms shall be delivered to the Resident Engineer for review and approval at least 90 calendar days prior to the scheduled date the Contractor requires it. The Contractor shall not upload system programming until the Resident Engineer has provided written approval. The Contractor is responsible for backing up the system prior to uploading new programming data. Additional programming requirements are provided as follows:
 - a. Programming for New SMS Server: The contractor shall provide all other system related programming. The contractor will be responsible for uploading personnel information (e.g., ID Cards backgrounds, names, access privileges, personnel photos, access schedules, personnel groupings) along with coordinating with Resident Engineer for device configurations, standards, and groupings. VA shall provide database to support Contractor's data entry tasks. The contractor shall anticipate a weekly coordination meeting and working with Resident Engineer to ensure data uploading is performed without incident of loss of function or data loss.
 - b. Programming for Existing SMS Servers: The contractor shall perform all related system programming except for personnel data as noted. The contractor will not be responsible for uploading

personnel information (e.g., ID Cards backgrounds, names, access privileges, access schedules, personnel groupings). The contractor shall anticipate a weekly coordination meeting and working alongside of Resident Engineer to ensure data uploading is performed without incident of loss of function or data loss.

System programming for SMS servers shall be performed by using the Contractor's own server and software. These servers shall not be connected to existing devices or systems at any time.

2. The Contractor shall identify and request from the Resident Engineer, any additional data needed to provide a complete and operational system as described in the contract documents.
3. Contractor and Resident Engineer coordination on programming requires a high level of coordination to ensure programming is performed in accordance with VA requirements and programming uploads do not disrupt existing systems functionality. The contractor shall anticipate a minimum a weekly coordination meeting. Contractor shall ensure data uploading is performed without incident of loss of function or data loss. The following Level of Effort Chart is provided to communicate the expected level of effort required by contractors on VA ESS projects. Calculations to determine actual levels of effort shall be confirmed by the contractor before project award.

Description of Systems	Description of Tasks						
	Develop System Loading Sheets	Coordination	Initial Set-up Configuration	Graphic Maps	System Programming	Final Checks	Level of Effort (Typical Tasks)

SMS Setup & Configur ation	e.g., program monitorin g stations, programm ing networks, interconn ections between CCTV, intercoms , time synchroni zation	e.g., retrieve IP addresses , naming conventio ns, standard event descripti ons, programm ing templates , coordinat e special system needs	e.g., Load system Operating System and Applicati on software, general system configura tions	e.g., develop naming convent ions, develop file folders , confirm ing accurac y of AutoCAD Floor Plans, convert file into jpeg file	e.g., prog ram moni tori ng stat ions , prog ramm ing netw orks , inte rcon nect ions betw een CCTV , inte rcom s, time sync hron izat ion	e.g., check all system diagno stics (e.g., client s, panels)	Load and set-up 4-6 CDs and configure servers (to configure Loading and Configuring software Administrative account, audit log, Keystrokes, mouse clicks, multi-screen configuration
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Electronic Entry Control Systems	e.g., setup of device, door groups & schedules, REX, Locks, link graphics	e.g., confirming device configurations, naming conventions, event description and narratives	e.g., enter data from loading sheets; configure components, link events, cameras, and graphics		e.g., setup of device, door groups & schedules, REX, Locks, link graphics	e.g., performing testing to confirm correct setup and configuration	e.g., creating a door, door configuration, adding request to exit, door monitors and relays, door timers, door related events (e.g., access, access denied, forced open, held open), linkages, controlled areas, advanced door monitoring, time zones, sequence of operations
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Intru sion Dete ction Syste ms	e.g., enter door groups & schedule s, link devices - REX, lock, & graphics	e.g., confirmi ng device configur ations, naming conventi ons, event descript ion and narrativ es	e.g., enter data from loading sheets; configur e componen ts, link events, cameras, and graphics		e.g., , ente r door grou ps & sche dule s, link devi ces - REX, lock , & grap hics	e.g., walk test, device positi on, and maskin g	e.g., setting up monitoring and control points (e.g., motion sensors, glassbreaks, vibration sensor, strobes, sounders) creating intrusion zones, creating arm/disarm panel, timed sequences, time zones, icon placements on graphic maps, clearance levels, events (e.g., armed, disarmed, zone violation, device alarm activations), LCD reader messages,
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CCTV Systems	e.g., programming call-ups recording	e.g., confirming device configurations, naming conventions	e.g., enter data from loading sheets; camera naming convention, sequence, configure components)		e.g., programming call-ups recording	e.g., confirm area of coverage, call-up per event generated and recording rates	e.g., setting up cameras points, recording ratios (e.g., normal, alarm event) timed recording, linkages, maps placements, call-ups
Intercoms Systems	e.g., programming events & call-ups	e.g., confirming device configurations, naming conventions, event description and narratives	e.g., enter data from loading sheets; configure components, link events, cameras, and graphics		e.g., programming events & call-ups	e.g., confirm operation, SMS event generation and camera call-up	e.g., setup linkages, events for activations, device troubles, land devices on graphic maps
Console Monitoring Components	N/A	per monitor	per monitor	per graphic map	N/A	per monitor	N/A
Note: Programming tasks are supported through the contractor's development of the Technical Data Package Submittals.							

Table 1 Contractor Level of Effort

3.7 TESTING AND ACCEPTANCE

A. Performance Requirements

1. General:

- a. The Contractor shall perform contract field, performance verification, and endurance testing and make adjustments of the completed security system when permitted. The Contractor shall provide all personnel, equipment, instrumentation, and supplies necessary to perform all testing. Written notification of planned testing shall be given to the Resident Engineer at least 60 calendar days prior to the test and after the Contractor has received written approval of the specific test procedures.
 - b. The COTR shall witness all testing and system adjustments during testing. Written permission shall be obtained from the Resident Engineer before proceeding with the next phase of testing. Original copies of all data produced during performance verification and endurance testing shall be turned over to the Resident Engineer at the conclusion of each phase of testing and prior to Resident Engineer approval of the test.
2. Test Procedures and Reports: The test procedures, compliant w/ VA standard test procedures, shall explain in detail, step-by-step actions and expected results demonstrating compliance with the requirements of the specification. The test reports shall be used to document results of the tests. The reports shall be delivered to the Resident Engineer within seven (7) calendar days after completion of each test.

B. Pre-Delivery Testing

1. The purpose of the pre-delivery test is to establish that a system is suitable for installation. As such, pre-delivery test shall be a mock-up of the system as planned in the contract documents. The Contractor shall assemble the Security Test System at the Contractors local project within 50-miles of the project site, and perform tests to demonstrate the performance of the system complies with the contract requirements in accordance with the approved pre-delivery test procedures. The tests shall take place during regular daytime working hours on weekdays. Model numbers of equipment tested shall be identical to those to be delivered to the site. Original copies of all data produced during pre-delivery testing, including results of each test procedure, shall be documented and delivered to the Resident Engineer at the conclusion of pre-delivery testing and prior to Resident Engineer's approval of the test. The test report shall

be arranged so all commands, stimuli, and responses are correlated to allow logical interpretation. For Existing System modifications, the contractor shall provide their own server with loaded applicable software to support PDT.

2. Test Setup: The pre-delivery test setup shall include the following:
 - a. All console equipment.
 - 1) At least one of each type of data transmission media (DTM) and associated equipment to provide a fully integrated PACS.
 - 2) The number of local processors shall equal the amount required by the site design.
 - 3) Enough sensor simulators to provide alarm signal inputs to the system equal to the number of sensors required by the design. The alarm signals shall be manually or software generated.
 - 4) Contractor to prove to owner all systems are appropriately sized and configured as sized.
 - 5) Integration of VASS, intercom systems, other subsystems.
3. During the bidding process the contractor shall submit a request for information to the Owner to determine if a pre-delivery test will be required. If a pre-delivery test is not required, the contractor shall provide a written notification that the Pre-delivery Test is not required in their shop drawings submission.

//C. Intermediate Testing

1. After completion of 30-50 percent of the installation of ESS cabinet(s) and equipment, one local and remote control stations and prior to any further work, this portion of the system must be pretested, inspected, and certified. Each item of installed equipment shall be checked to ensure appropriate FCC listing & UL certification labels are affixed, NFPA, Emergency, Safety, and JCAHCO guidelines are followed, and proper installation practices are followed. The intermediate test shall include a full operational test.//
- D. The inspection and test will be conducted by a factory-certified contractor representative and witnessed by a Government Representative. The results of the inspection will be officially recorded by a designated Government Representative and maintained on file by the Resident Engineer (RE), until completion of the entire project. The results will be compared to the Acceptance Test results.
- E. Contractor's Field Testing (CFT)
1. The Contractor shall calibrate and test all equipment, verify DTM operation, place the integrated system in service, and test the integrated system. Ground rods installed by this Contractor within

the base of camera poles shall be tested as specified in IEEE STD 142. The Contractor shall test all security systems and equipment, and provide written proof of a 100% operational system before a date is established for the system acceptance test. Documentation package for CFT shall include completed (fully annotated details of test details) for each device and system tested, and annotated loading sheets documenting complete testing to Resident Engineer approval. CFT test documentation package shall conform to submittal requirements outlined in this Section. The Contractor's field testing procedures shall be identical to the Resident Engineer's acceptance testing procedures. The Contractor shall provide the Resident Engineer with a written listing of all equipment and software indicating all equipment and components have been tested and passed. The Contractor shall deliver a written report to the Resident Engineer stating the installed complete system has been calibrated, tested, and is ready to begin performance verification testing; describing the results of the functional tests, diagnostics, and calibrations; and the report shall also include a copy of the approved acceptance test procedure. Performance verification testing shall not take place until written notice by contractor is received certifying that a contractors field test was successful.

F. Performance Verification Test (PVT)

1. Test team:

a. After the system has been pretested and the Contractor has submitted the pretest results and certification to the Resident Engineer, then the Contractor shall schedule an acceptance test to date and give the Resident Engineer written, notice as described herein, prior to the date the acceptance test is expected to begin. The system shall be tested in the presence of a Government Representative, an OEM certified representative, representative of the Contractor and other approved by the Resident Engineer. The system shall be tested utilizing the approved test equipment to certify proof of performance, FCC, UL and Emergency Service compliance. The test shall verify that the total system meets all the requirements of this specification. The notification of the acceptance test shall include the expected length (in time) of the test.

2. The Contractor shall demonstrate the completed Physical Access Control System PACS complies with the contract requirements. In addition, the Contractor shall provide written certification that the system is 100% operational prior to establishing a date for starting

PVT. Using approved test procedures, all physical and functional requirements of the project shall be demonstrated and shown. The PVT will be stopped and aborted as soon as 10 technical deficiencies are found requiring correction. The Contractor shall be responsible for all travel and lodging expenses incurred for out-of-town personnel required to be present for resumption of the PVT. If the acceptance test is aborted, the re-test will commence from the beginning with a retest of components previously tested and accepted.

3. The PVT, as specified, shall not begin until receipt of written certification that the Contractors Field Testing was successful. This shall include certification of successful completion of testing as specified in paragraph "Contractor's Field Testing", and upon successful completion of testing at any time when the system fails to perform as specified. Upon termination of testing by the Resident Engineer or Contractor, the Contractor shall commence an assessment period as described for Endurance Testing Phase II.
4. Upon successful completion of the acceptance test, the Contractor shall deliver test reports and other documentation, as specified, to the Resident Engineer prior to commencing the endurance test.
5. Additional Components of the PVT shall include:
 - a. System Inventory
 - 1) All Device equipment
 - 2) All Software
 - 3) All Logon and Passwords
 - 4) All Cabling System Matrices
 - 5) All Cable Testing Documents
 - 6) All System and Cabinet Keys
 - b. Inspection
 - 1) Contractor shall record an inspection punch list noting all system deficiencies. The contractor shall prepare an inspection punch list format for Resident Engineers approval.
 - 2) As a minimum the punch list shall include a listing of punch list items, punch list item location, description of item problem, date noted, date corrected, and details of how item was corrected.
6. Partial PVT - At the discretion of Resident engineer, the Performance Verification Test may be performed in part should a 100% compliant CFT be performed. In the event that a partial PVT will be performed instead of a complete PVT; the partial PVT shall be performed by testing 10% of the system. The contractor shall perform a test of each procedure on select devices or equipment.

G. Endurance Test

1. The Contractor shall demonstrate the specified probability of detection and false alarm rate requirements of the completed system. The endurance test shall be conducted in phases as specified below. The endurance test shall not be started until the Resident Engineer notifies the Contractor, in writing, that the performance verification test is satisfactorily completed, training as specified has been completed, and correction of all outstanding deficiencies has been satisfactorily completed. VA shall operate the system 24 hours per day, including weekends and holidays, during Phase I and Phase III endurance testing. VA will maintain a log of all system deficiencies. The Resident Engineer may terminate testing at any time the system fails to perform as specified. Upon termination of testing, the Contractor shall commence an assessment period as described for Phase II. During the last day of the test, the Contractor shall verify the appropriate operation of the system. Upon successful completion of the endurance test, the Contractor shall deliver test reports and other documentation as specified to the Resident Engineer prior to acceptance of the system.
2. Phase I (Testing): The test shall be conducted 24 hours per day for 15 consecutive calendar days, including holidays, and the system shall operate as specified. The Contractor shall make no repairs during this phase of testing unless authorized in writing by the Resident Engineer. If the system experiences no failures, the Contractor may proceed directly to Phase III testing after receiving written permission from the Resident Engineer.
3. Phase II (Assessment):
 - a. After the conclusion of Phase I, the Contractor shall identify all failures, determine causes of all failures, repair all failures, and deliver a written report to the Resident Engineer. The report shall explain in detail the nature of each failure, corrective action taken, results of tests performed, and recommend the point at which testing should be resumed.
 - b. After delivering the written report, the Contractor shall convene a test review meeting at the job site to present the results and recommendations to the Resident Engineer. The meeting shall not be scheduled earlier than five (5) business days after the Resident Engineer receives the report. As part of this test review meeting, the Contractor shall demonstrate all failures have been corrected by performing appropriate portions of the performance verification test. Based on the Contractor's report

and the test review meeting, the Resident Engineer will provide a written determine of either the restart date or require Phase I be repeated.

4. Phase III (Testing): The test shall be conducted 24 hours per day for 15 consecutive calendar days, including holidays, and the system shall operate as specified. The Contractor shall make no repairs during this phase of testing unless authorized in writing by the COTR.
5. Phase IV (Assessment):
 1. After the conclusion of Phase III, the Contractor shall identify all failures, determine causes of all failures, repair all failures, and deliver a written report to the COTR. The report shall explain in detail the nature of each failure, corrective action taken, results of tests performed, and recommend the point at which testing should be resumed.
 2. After delivering the written report, the Contractor shall convene a test review meeting at the job site to present the results and recommendations to the COTR. The meeting shall not be scheduled earlier than five (5) business days after receipt of the report by the COTR. As a part of this test review meeting, the Contractor shall demonstrate that all failures have been corrected by repeating appropriate portions for the performance verification test. Based on the review meeting the test should not be scheduled earlier than five (5) business days after the Resident Engineer receives the report. As a part of this test review meeting, the Contractor shall demonstrate all failures have been corrected by repeating appropriate portions of the performance verification test. Based on the Contractor's report and the test review meeting, the Resident Engineer will provide a written determine of either the restart date or require Phase III be repeated. After the conclusion of any re-testing which the Resident Engineer may require, the Phase IV assessment shall be repeated as if Phase III had just been completed.

H. Exclusions

1. The Contractor will not be held responsible for failures in system performance resulting from the following:
 - a. An outage of the main power in excess of the capability of any backup power source provided the automatic initiation of all backup sources was accomplished and that automatic shutdown and restart of the PACS performed as specified.

- b. Failure of an Owner furnished equipment or communications link, provided the failure was not due to Contractor furnished equipment, installation, or software.
- c. Failure of existing Owner owned equipment, provided the failure was not due to Contractor furnished equipment, installation, or software.

- - - E N D - - -

SECTION 28 05 11
REQUIREMENTS FOR ELECTRONIC SAFETY AND SECURITY INSTALLATIONS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This Section, Requirements for Electronic Safety and Security Installations, applies to all sections of Division 28.
- B. Furnish and install electronic safety and security cabling, systems, equipment and accessories in accordance with the specifications and drawings. Capacities and ratings of, cable and other items and arrangements for the specified items are shown on drawings.

1.2 MINIMUM REQUIREMENTS

- A. References to industry and trade association standards and codes are minimum installation requirement standards.
- B. Drawings and other specification sections shall govern in those instances where requirements are greater than those specified in the above standards.
- C. In case of conflict between contract documents and the requirements of any code or AHJ, the most stringent requirements of the aforementioned shall govern.

1.3 QUALIFICATIONS (PRODUCTS AND SERVICES)

- A. Manufacturers Qualifications: The manufacturer shall regularly and presently produce, as one of the manufacturer's principal products, the equipment and material specified for this project, and shall have manufactured the item for at least three years. The ESS contractor is responsible for coordinating this when requested by the VA, Architect or Engineer.
- B. Product Qualification:
 - 1. Manufacturer's product shall have been in satisfactory operation, on three installations of similar size and type as this project, for approximately three years.
 - 2. The Government reserves the right to require the Contractor to submit a list of installations where the products have been in operation before approval.
- C. Service Qualifications: There shall be a permanent service organization maintained or trained by the manufacturer which will render satisfactory service to this installation within four hours of receipt of notification that service is needed. Submit name and address of service organizations.

1.4 MANUFACTURED PRODUCTS

- A. Materials and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items, for which replacement parts shall be available.
- B. When more than one unit of the same class of equipment is required, such units shall be the product of a single manufacturer.

C. Equipment Assemblies and Components:

1. Components of an assembled unit need not be products of the same manufacturer.
2. Manufacturers of equipment assemblies, which include components made by others, shall assume complete responsibility for the final assembled unit.
3. Components shall be compatible with each other and with the total assembly for the intended service.
4. Constituent parts which are similar shall be the product of a single manufacturer.

D. Factory wiring shall be identified on the equipment being furnished and on all wiring diagrams.

E. When Factory Testing Is Specified:

1. The Government shall have the option of witnessing factory tests. The contractor shall notify the VA through the Resident Engineer a minimum of 15 working days prior to the manufacturers making the factory tests.
2. Four copies of certified test reports containing all test data shall be furnished to the Resident Engineer prior to final inspection and not more than 90 days after completion of the tests.
3. When equipment fails to meet factory test and re-inspection is required, the contractor shall be liable for all additional expenses, including expenses of the Government.

1.5 EQUIPMENT REQUIREMENTS

- A. Where variations from the contract requirements are requested in accordance with Section 00 72 00, GENERAL CONDITIONS and Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, the connecting work and related components shall include, but not be limited to additions or changes to branch circuits, circuit protective devices, conduits, wire, feeders, controls, panels and installation methods.

1.6 EQUIPMENT PROTECTION

- A. Equipment and materials shall be protected during shipment and storage against physical damage, dirt, moisture, cold and rain:
 1. During installation, enclosures, equipment, controls, controllers, circuit protective devices, and other like items, shall be protected against entry of foreign matter; and be vacuum cleaned both inside and outside before testing and operating and repainting if required.
 2. Damaged equipment shall be, as determined by the Resident Engineer, placed in first class operating condition or be returned to the source of supply for repair or replacement.
 3. Painted surfaces shall be protected with factory installed removable heavy kraft paper, sheet vinyl or equal.
 4. Damaged paint on equipment and materials shall be refinished with the same quality of paint and workmanship as used by the manufacturer so repaired areas are not obvious.

1.7 WORK PERFORMANCE

- A. Job site safety and worker safety is the responsibility of the contractor.
- B. For work on existing stations, arrange, phase and perform work to assure electronic safety and security service for other buildings at all times. Refer to Article OPERATIONS AND STORAGE AREAS under Section 01 00 00, GENERAL REQUIREMENTS.

- C. New work shall be installed and connected to existing work neatly and carefully. Disturbed or damaged work shall be replaced or repaired to its prior conditions, as required by Section 01 00 00, GENERAL REQUIREMENTS.
- D. Coordinate location of equipment and conduit with other trades to minimize interferences. See Section 00 72 00, GENERAL CONDITIONS.

1.8 EQUIPMENT INSTALLATION AND REQUIREMENTS

- A. Equipment location shall be as close as practical to locations shown on the drawings.
- B. Inaccessible Equipment:
 - 1. Where the Government determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, the equipment shall be removed and reinstalled as directed at no additional cost to the Government.
 - 2. "Conveniently accessible" is defined as being capable of being reached without the use of ladders, or without climbing or crawling under or over obstacles such as, but not limited to, motors, pumps, belt guards, transformers, piping, ductwork, conduit and raceways. Equipment installed incorrectly must be rectified by the ESS contractor at no cost to the government.

1.9 EQUIPMENT IDENTIFICATION

- A. Install an identification sign which clearly indicates information required for use and maintenance of equipment.
- B. Nameplates shall be laminated black phenolic resin with a white core with engraved lettering, a minimum of 6 mm (1/4 inch) high. Secure nameplates with screws. Nameplates that are furnished by manufacturer as a standard catalog item, or where other method of identification is herein specified, are exceptions.

1.10 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. The Government's approval shall be obtained for all equipment and material before delivery to the job site. Delivery, storage or installation of equipment or material which has not had prior approval will not be permitted at the job site.
- C. All submittals shall include adequate descriptive literature, catalog cuts, shop drawings and other data necessary for the Government to ascertain that the proposed equipment and materials comply with specification requirements. Catalog cuts submitted for approval shall be legible and clearly identify equipment being submitted by inserting an arrow indicating what part number is being submitted.
- D. Submittals for individual systems and equipment assemblies which consist of more than one item or component shall be made for the system or assembly as a whole. Partial submittals will not be considered for approval.
- E. Mark the submittals, "SUBMITTED UNDER SECTION_____".

-
- F. Submittals shall be marked to show specification reference including the section and paragraph numbers.
- G. Submit each section separately.
- H. The submittals shall include the following:
1. Information that confirms compliance with contract requirements. Include the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, pictures, nameplate data and test reports as required.
- I. Submittals are required for all equipment anchors and supports. Submittals shall include weights, dimensions, center of gravity, standard connections, manufacturer's recommendations and behavior problems (e.g., vibration, thermal expansion,) associated with equipment or piping so that the proposed installation can be properly reviewed.
- J. Elementary and interconnection wiring diagrams for communication and signal systems, control system and equipment assemblies. All terminal points and wiring shall be identified on wiring diagrams.
- K. Parts list which shall include those replacement parts recommended by the equipment manufacturer, quantity of parts, current price and availability of each part.
- L. Manuals: Submit in accordance with Section 01 00 00, GENERAL REQUIREMENTS.
1. Maintenance and Operation Manuals: Submit as required for systems and equipment specified in the technical sections. Furnish four copies, bound in hardback binders, (manufacturer's standard binders) or an approved equivalent. Furnish one complete manual as specified in the technical section but in no case later than prior to performance of systems or equipment test, and furnish the remaining manuals prior to contract completion.
 2. Inscribe the following identification on the cover: the words "MAINTENANCE AND OPERATION MANUAL," the name and location of the system, equipment, building, name of Contractor, and contract number. Include in the manual the names, addresses, and telephone numbers of each subcontractor installing the system or equipment and the local representatives for the system or equipment.
 3. Provide a "Table of Contents" and assemble the manual to conform to the table of contents, with tab sheets placed before instructions covering the subject. The instructions shall be legible and easily read, with large sheets of drawings folded in.
 4. The manuals shall include:
 - a. Internal and interconnecting wiring and control diagrams with data to explain detailed operation and control of the equipment.
 - b. A control sequence describing start-up, operation, and shutdown.
 - c. Description of the function of each principal item of equipment.
 - d. Installation and maintenance instructions.
 - e. Safety precautions.
 - f. Diagrams and illustrations.
 - g. Testing methods.
 - h. Performance data.
 - i. Pictorial "exploded" parts list with part numbers. Emphasis shall be placed on the use of special tools and instruments. The list shall indicate sources of supply, recommended spare parts, and name of servicing organization.
 - j. Appendix; list qualified permanent servicing organizations for support of the equipment, including addresses and certified qualifications.

5. Approvals will be based on complete submission of manuals together with shop drawings.
6. After approval and prior to installation, furnish the Resident Engineer with one sample of each of the following:
 - a. A 300 mm (12 inch) length of each type and size of wire and cable along with the tag from the coils of reels from which the samples were taken.
 - b. Each type of conduit and pathway coupling, bushing and termination fitting.
 - c. Conduit hangers, clamps and supports.
 - d. Duct sealing compound.
- M. In addition to the requirement of SUBMITTALS, the VA reserves the right to request the manufacturer to arrange for a VA representative to see typical active systems in operation, when there has been no prior experience with the manufacturer or the type of equipment being submitted.

1.11 SINGULAR NUMBER

- A. Where any device or part of equipment is referred to in these specifications in the singular number (e.g., "the switch"), this reference shall be deemed to apply to as many such devices as are required to complete the installation as shown on the drawings.

1.12 TRAINING

- A. Training shall be provided in accordance with Article, INSTRUCTIONS, of Section 01 00 00, GENERAL REQUIREMENTS.
- B. Training shall be provided for the particular equipment or system as required in each associated specification.
- C. A training schedule shall be developed and submitted by the Contractor and approved by the Resident Engineer at least 30 days prior to the planned training.

1.13 COORDINATION

- A. Where drawings, plans, details, specification requirements and/or scheduled equipment, cabling and raceway capacities are in conflict and shown to be different between plans and/or between plans, riser diagrams, details and specifications, the most stringent requirement will be included in the Contract. Systems and equipment called for in the specification and/or shown on the drawings shall be provided under this Contract as if it were required by both the drawings and the specifications. However, prior to ordering or installation of any portion of work which appears to be in conflict, such work shall be brought to the Architect's attention for direction as to what is to be provided.

--- E N D ---

SECTION 28 05 11.10
3D BUILDING INFORMATION MODELING

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Common Work Results for HVAC and Steam Generation, Section 23 05 11, Division 25 and other Division 1 Specification Sections, apply to this Section.
- B. LEED™ REQUIREMENTS, Refer to Section 018113 – SUSTAINABLE DESIGN REQUIREMENTS

1.2 OVERVIEW

- A. Building Information Modeling (BIM) is the development and use of a 3-dimensional computer model to represent a virtual model of the facility and the process for constructing the facility. Once the model is developed, it can be used to simulate the construction process and to manage the operations of the facility. The Building Information Model can be created by combining many different 3D models from the designers and contractors into a composite model. From this composite model, views and data appropriate to various users' needs can be extracted and analyzed to generate information, to make decisions and to improve the process of delivering the building.

1.3 OUTCOME

- A. The purpose of BIM is to create a model that may be used for coordination of all trades throughout the construction process, with the final product being an as-built model of the Project which contains all of the major elements of construction that could be used by the Owner for future operation and maintenance of the building.

1.4 REQUIRED DISCLAIMER

- A. All users shall be required to sign a disclaimer as follows:

TERMS OF USE OF 3D COMPUTER MODEL FOR THE SLVHCS REPLACEMENT MEDICAL CENTER PROJECT ("Project")

This 3D Computer Model for the Project is provided by NBBJ (Architect) to user (individually, a "User", or collectively, "Users") at the User's request subject to the terms and conditions stated below (the "Terms of Use"):

The 3D Model is made available to User solely for his convenience and for informational purposes only. The User is not to rely upon the 3D Computer Model and the data and/or information contained therein in preparing any of the coordination documents for the Project. The User acknowledges that the 3D Computer Model is not a part of the Construction or Contract Documents for the Project and that the Architect makes no representations or warranties, express or implied, regarding the 3D Computer Model's, accuracy or completeness or the data and/or information contained therein.

By opening the files provided, the User agrees that these terms apply to the 3D Model in its entirety, together with all of its component parts and data. The User acknowledges that the requirements of these Terms of Use apply to all of User's principals, employees and agents.

The User agrees that the use of the 3D Computer Model is solely at the User's risk and that the User assumes full responsibility and liability in connection with the User's use of the 3D Computer Model and the information and/or data contained therein. The User agrees that the Architect has no responsibility for any deficiencies, inaccuracies, errors and/or omissions contained in the 3D Computer Model or the data and/or information contained therein. The Architect has no responsibility for any deficiencies or defects in the User's documents, work and/or services resulting from the User's use of the 3D Computer Model in lieu of the Construction and/or Contract Documents for the Project.

The User acknowledges and agrees a) that the use of the 3D Computer Model is not a substitute for professional judgment; b) that the use of the 3D Computer Model does not relieve the User from applying the appropriate standard of care and skill relevant to the use of the 3D Computer Model and its contents; c) that the 3D Computer Model is only to be used as a tool to assist the User in connection with the Project; d) that the User is solely responsible for verifying the accuracy of all results created with the use of the 3D Computer Model; and (e) the Architect is not responsible or liable for the means and methods of construction and the User's use of the 3D Computer Model shall in no way give rise to such responsible or liable by the Architect or its consultants.

THE ARCHITECT AND ITS CONSULTANTS SPECIFICALLY DISCLAIM ALL WARRANTIES WHETHER EXPRESSED, IMPLIED OR STATUTORY, INCLUDING, WITHOUT LIMITATION, ALL WARRANTIES OF MERCHANTABILITY, TITLE, FITNESS FOR A PARTICULAR PURPOSE, CONSTRUCTABILITY, NON-INFRINGEMENT, COMPATIBILITY, SECURITY OR ACCURACY AND USERS' USE OF THE 3D COMPUTER MODEL IS AT ITS OWN RISK. USER ASSUMES FULL RESPONSIBILITY AND RISK OF LOSS RESULTING FROM USE OR INABILITY TO USE THE 3D COMPUTER MODEL OR ITS CONTENT.

The User further agrees that the 3D Computer Model contains information that is confidential and proprietary to the Architect, and that the Architect retains the copyright and all other reserved rights in the work product reflected in the 3D Computer Model that was prepared by the Architect or its consultants for the Project. The Architect grants the User a non-exclusive, non-transferable royalty-free license to use the 3D Computer Model for informational purposes only in connection with the Project in strict accordance with these Terms of Use. The User agrees that the 3D Computer Model will be used solely and exclusively for the Project and that it will not use the 3D Computer Model and the data and/or information contained therein, in whole or in part, for any purpose or project other than the Project. The User further agrees that the 3D Computer Model will continue to be kept confidential by the User, and that it shall not be disclosed in any manner, transferred or exchanged to any third parties by the User without the express written consent of the Architect.

Upon completion of the User's involvement with the Project or at any time upon written request of the Architect, the User shall promptly deliver to the Architect the 3D Computer Model and any other material containing or reflecting any information or data in the 3D Computer Model (whether prepared by the Architect, the User or otherwise) and will not retain copies, extracts or other reproductions, tangible or intangible, in whole or in part of the 3D Computer Model. The User's non-disclosure and non-use obligations set forth herein shall survive the return, destruction or deletion of the 3D Computer Model. If the User becomes legally compelled, by subpoena or court order, to disclose the 3D Model, or any information contained therein, the

User shall provide the Architect with prompt notice so that a protective order or other appropriate remedy may be sought by and at the expense of the Architect and/or compliance with the provisions of this Terms of Use may be waived.

User hereby agrees that the Architect shall be entitled to equitable relief, including injunction, in the event of any breach of the Terms of Use, including without limitation its obligations to maintain the confidentiality of the 3D Model, that the granting of such relief will not be opposed and that such relief shall not be the exclusive remedy for such breach. The Architect's failure to insist upon strict adherence to any term of these Terms of Use shall not be considered a waiver thereof or deprive the Architect of the right subsequently to insist upon strict adherence to that term or any other term of this Terms of Use.

The User hereby agrees, to the fullest extent permitted by law, that in no event shall the Architect be liable to User for any damages or losses of any kind including, but not limited to, damages for death or bodily injury to persons, injury to property, and direct, indirect, consequential, special, or incidental damages, resulting from any error, omission, inaccuracy, deficiency or defect in or problem with, the 3D Computer Model or the data and/or information contained therein. Without limiting the foregoing, the User acknowledges that the 3D Computer Model and the data and/or information contained therein may be inaccurate and/or incomplete and that the Architect will have no obligation to update or modify the 3D Computer Model or any of the data and/or information contained in it because the 3D Computer Model was prepared solely for informational purposes and is not part of the Construction or Contract Documents for the Project.

The User agrees that in the event the User, its officers, directors, shareholders, partners, agents, employees, consultants or independent contractors use the 3D Computer Model or the information and/or data contained therein, it shall, to the fullest extent permitted by law, defend, indemnify and hold the Architect and its officers, directors, shareholders, partners, principals, consultants, agents and employees harmless from and against any and all actions, damages, demands, claims, suits, losses, liability, judgments, recoveries, costs and expenses, including, but not limited to, reasonable attorney's fees which any of them may incur in connection with, arising from, resulting from or related to any use of the 3D Computer Model or the data and/or the information contained therein by the User or any third party who receives the 3D Computer Model from the User. Such claims include, without limitation, any claim which may arise due to deletions, omissions or variations of data due to mechanical or technical failure in connection with the transmission of the 3D Computer Model.

The User acknowledges and agrees that it is not in privity of contract with the Architect as of result of these Terms of Use with respect to any claims or causes of action related to or arising out of the Project. The User further agrees to obligate any contractor, consultant or other party who uses the 3D Computer Model to be bound by the terms and conditions contained herein. Any User's use of the 3D Computer Model and the information and/or data contained therein constitutes such User's acceptance of all the terms here specified.

ACCEPTED & AGREED:

Name: _____

Title: _____

Date: _____

1.5 SCOPE OF WORK

A. General Scope Requirements

1. In general, the BIM scope of work for the Project is to create a technically accurate and detailed 3D computer model of the architectural, structural, mechanical, plumbing and electrical systems.
2. The computer model (in plan view) shall extend to five feet beyond the exterior walls of the building. Vertically, the model shall extend from the lowest extent of the foundations up through and including the roof of the top-most floor. To the extent that the scope includes building systems, those systems will be included to the full horizontal and vertical extents of the model including underground utilities and roof mounted items.
3. The level of detail defined in the Specific Scope Requirements is the minimum level of detail required in the model. Greater detail than the minimum should be incorporated into the model where important details are necessary for communicating information about a system.
4. Each Trade Contractor shall provide shop drawings in both 2D and 3D model format.
5. The 3D model shall be located and oriented to the pre-determined world coordinates for the project to allow easy integration into the BIM for the project.
6. The 3D model shall include the project control grid. This grid should be visible when viewing the model in a true view along the X, Y or Z axis.
7. The 3D model shall be layered and constructed in a manner such that all elements of the model can be converted into a 2D dimensioned drawing for use in the field.
8. The 2d shop drawing scale should be 1'-0" = 3/8" unless specified otherwise or as required for full comprehensible and reviewable details.
9. Each drawing should include a key map referencing the location in the building.
10. In addition to the native file format, the Trade Contractor shall provide translation of the 3D model into a .DWG, CIS/2 or other agreed upon file format that can be viewed using NavisWorks Manager.
11. The following changes shall be promptly incorporated into the drawings and model, on a regular basis:
 - a. RFIs, Bulletins and Owner changes
 - b. Changes in the sequence of work
 - c. Field modifications
 - d. Shop drawing review comments
 - e. Changes requested by the Construction Manager
12. All revised 3d model or 2D drawing submittals shall have a written narrative to define changes from previous submittals. Typical drafting techniques such as 'clouds' or 'bubbles' are acceptable means of tracking changes on the 2D drawings. [Layer control shall be used to define changes in the 3D model. All revisions shall be shown in both 2D and 3D formats].
13. The working 3D model will be shared with the Trade Contractors and design team at least once every two weeks. This will be performed by posting the model to the project FTP site or PrologWeb. The Trade Contractor will post the native file format and an agreed upon file format as defined in Item 10 above.
14. Pre-detailing meeting:
 - a. Shall determine the lead trade.
 - b. The order that coordination work will be added to the model.

15. The 3D modeling and layering conventions will be established at a pre-detailing meeting to be attended by:
 - a. Concrete Contractor and detailer
 - b. Steel Fabricator and detailer
 - c. Mechanical Contractors and detailers
 - d. Electrical Contractors and detailers
 - e. Plumbing Contractors and detailers
 - f. Fire protection Contractors and detailers
 - g. Other trades.
16. Each Trade Contractor will submit its 3D modeling software and proposed file format(s) for approval prior to proceeding with detailing. The Trade Contractor will also provide a 3D mock-up of a specific portion of the project, to be agreed upon at a future time, in full detail in order to verify the compatibility of the file formats.
17. Each Trade Contractor shall provide viewer licenses only for its specific 3D software to the following:
 - a. Owner
 - b. Construction Manager
 - c. Architect
 - d. Engineer of Record
18. Each Trade Contractor and detailers shall have the capability to host and attend web meeting using Microsoft Live Meeting software.
19. Each Trade Contractor shall complete the drawings and model in a time frame capable of meeting the Project Schedule.
20. The Trade Contractors are advised that the model shall be shared among all trades and shall be the basis of coordination and fabrication. Costs incurred for post-coordination changes caused by unauthorized deviations from the model shall be borne by the Trade Contractor that initially deviated from the model. This determination is at the sole discretion of the Construction Manager.
21. The base architectural BIM will be created using AutoDesk's Revit Building.
22. The 3D modeling effort is intended to augment and assist in the MEP coordination process. Before first submission shop drawings, the elements shall be first pass coordinated in the 3D model. The model is intended to find conflicts before shop drawings are reviewed and approved.
23. In addition to the requirements set forth in the contract documents, final models shall be submitted reflecting true "as-built" conditions.

B. Plumbing Technical Scope Requirements

1. All plumbing piping will be modeled. All plumbing equipment will be modeled to its overall height, width and depth. Pipes will be modeled to the outside diameter of the pipe or the pipe insulation, whichever is greater. Pipe slope will be incorporated in the model.
2. Pipe fittings and connections will not be modeled. All valves, clean outs and accessories will be modeled.
3. Each Trade Contractor to provide a list of minimum typical clearances for all model components and coordinate necessary clearances within the model. The 3D model is to include clearances for equipment – included as a modeled volume such that clash detection and coordination can be accommodated relating to necessary clearances.
4. Each Trade Contractor shall be prepared to attend weekly coordination meetings to resolve conflicts within the model.

5. The 3D models submitted by the Trade Contractor for overall coordination are required to be checked and coordinated with the structure and the Trade Contractor's own work prior to submittal.
6. The 3D model is to include access areas for equipment – included as a modeled element such that clash detection and coordination can be accommodated relating to access.
7. Coordinated model data is to be distributed weekly and 1 day prior to coordination meetings.
8. Penetrations through building systems shall be identified in the 3D model by means of a modeled sleeve.
9. All items modeled shall have a level of intelligence associated with them, including, at a minimum, material type, size, insulation, etc.
10. All items located within mechanical rooms shall have a level of intelligence associated with them that includes, at a minimum, material type, size, insulation, manufacturer, product numbers, serial numbers, maintenance schedules, operation and maintenance data, etc.

C. Electrical Technical Scope Requirements

1. All electrical equipment including switchgear, transformers and panelboards will be modeled to its overall size. All necessary clearances for electrical equipment will be modeled as a separate volume. All conduit 1-1/2" and larger shall be modeled.
2. All light fixtures will be modeled as an overall volume require for that fixture.
3. Each Trade Contractor shall provide a list of minimum typical clearances for all model components and coordinate necessary clearances within the model. The 3D model is to include clearances for equipment – included as a modeled volume such that clash detection and coordination can be accommodated relating to necessary clearances.
4. Each Trade Contractor shall be prepared to attend weekly coordination meetings to resolve conflicts within the model.
5. The 3D models submitted by the Trade Contractor for overall coordination are required to be checked and coordinated with the structure and the Trade Contractor's own work prior to submittal.
6. The 3D model is to include access areas for equipment – included as a modeled element such that clash detection and coordination can be accommodated relating to access.
7. Coordinated model data is to be distributed weekly and 1 day prior to coordination meetings.
8. Penetrations through building systems shall be identified in the 3D model by means of a modeled sleeve.
9. All panelboards modeled shall have a level of intelligence associated with them that accurately identifies at a minimum the panel schedule.
10. All items located within electrical rooms and closets shall have a level of intelligence associated with them that includes, at a minimum, material type, size, manufacturer, product numbers, serial numbers, maintenance schedules, operation and maintenance data, etc.

D. Fire Protection Technical Scope Requirements

1. All fire protection equipment including pipe, valves, heads, risers and drains will be modeled.
2. Each Trade Contractor to provide a list of minimum typical clearances for all model components and coordinate necessary clearances within the model. The 3D model is to include clearances for equipment – included as a modeled volume such that clash detection and coordination can be accommodated relating to necessary clearances.
3. This Trade Contractor shall be prepared to attend weekly coordination meetings to resolve conflicts within the model.

4. The 3D models submitted by the Trade Contractor for overall coordination are required to be checked and coordinated with the structure and the Trade Contractor's own work prior to submittal.
5. Coordinated model data is to be distributed weekly and 1 day prior to coordination meetings.
6. Penetrations through building systems shall be identified in the 3D model by means of a modeled sleeve.
7. All items modeled shall have a level of intelligence associated with them that accurately identifies at a minimum the material type, rating, model number, etc.

E. Mechanical / Sheetmetal Technical Scope Requirements

1. All ducts and air handling equipment will be modeled. Ducts will be modeled to the outside face dimension. Equipment will be modeled to its overall height, width and depth. All piping associated with the mechanical system will be modeled. Pipes will be modeled to the outside diameter of the pipe or pipe insulation (whichever is greater).
2. Pipe hangers and hanger assemblies and dunnage will be modeled for clash detection and coordination. Fittings and connections will not be modeled. The intent of this model is to show the ductwork and piping, etc. in a true representation of the actual condition at construction completion.
3. Pipe fittings and connections will not be modeled. All valves, clean outs and accessories will be modeled.
4. Each Trade Contractor to provide a list of minimum typical clearances for all model components and coordinate necessary clearances within the model. The 3D model is to include clearances for equipment – included as a modeled volume such that clash detection and coordination can be accommodated relating to necessary clearances.
5. Each Trade Contractor shall be prepared to attend weekly coordination meetings to resolve conflicts within the model.
6. The 3D models submitted by the Trade Contractor for overall coordination are required to be checked and coordinated with the structure and the Trade Contractor's own work prior to submittal.
7. The 3D model is to include access areas for equipment – included as a modeled element such that clash detection and coordination can be accommodated relating to access.
8. Coordinated model data is to be distributed weekly and 1 day prior to coordination meetings.
9. Penetrations through building systems shall be identified in the 3D model by means of a modeled sleeve.
10. All items modeled shall have a level of intelligence associated with them including, at a minimum, the material type, size, insulation, etc.
11. Each Trade Contractor shall include in their base bid BIM/Coordination facilities on site. The Construction Manager shall provide a Coordination Trailer for the Construction Team's use throughout the duration of the project. The HVAC Trade Contractor must provide a CAD workstation capable of running the Trade Contractor's CAD software as well as the following BIM software:
 - a. NavisWorks Manager (current version)
 - b. AutoCAD Revit Architecture Suite (current version)
 - c. AutoCAD Revit MEP Suite (current version)
12. Each Trade Contractor shall turn over the above software complete with Licenses at Final Completion for the Owner's use.

F. Telecommunications Technical Scope Requirements

1. All telecommunications equipment including racks, cabinets, pa speakers, data outlets and patch panels will be modeled to its overall size. All necessary clearances for telecommunication equipment will be modeled as a separate volume. All conduit 1-1/2" and larger shall be modeled.
2. Each Trade Contractor shall provide a list of minimum typical clearances for all model components and coordinate necessary clearances within the model. The 3D model is to include clearances for equipment – included as a modeled volume such that clash detection and coordination can be accommodated relating to necessary clearances.
3. Each Trade Contractor shall be prepared to attend weekly coordination meetings to resolve conflicts within the model.
4. The 3D models submitted by the Trade Contractor for overall coordination are required to be checked and coordinated with the structure and the Trade Contractor's own work prior to submittal.
5. The 3D model is to include access areas for equipment – included as a modeled element such that clash detection and coordination can be accommodated relating to access.
6. Coordinated model data is to be distributed weekly and 1 day prior to coordination meetings.
7. Penetrations through building systems shall be identified in the 3D model by means of a modeled sleeve.
8. All communication outlets on the plans shall have a level of intelligence associated with them that accurately identifies at a minimum the number of patch panels required.
9. All items located within TR rooms shall have a level of intelligence associated with them that includes, at a minimum, material type, size, manufacturer, product numbers, serial numbers, maintenance schedules, operation and maintenance data, etc.

G. Security Technical Scope Requirements

1. All security equipment including racks, patch panels, CCTV cameras, emergency phones and card readers will be modeled to its overall size. All necessary clearances for telecommunication equipment will be modeled as a separate volume. All conduit 1-1/2" and larger shall be modeled.
2. Each Trade Contractor shall provide a list of minimum typical clearances for all model components and coordinate necessary clearances within the model. The 3D model is to include clearances for equipment – included as a modeled volume such that clash detection and coordination can be accommodated relating to necessary clearances.
3. Each Trade Contractor shall be prepared to attend weekly coordination meetings to resolve conflicts within the model.
4. The 3D models submitted by the Trade Contractor for overall coordination are required to be checked and coordinated with the structure and the Trade Contractor's own work prior to submittal.
5. The 3D model is to include access areas for equipment – included as a modeled element such that clash detection and coordination can be accommodated relating to access.
6. Coordinated model data is to be distributed weekly and 1 day prior to coordination meetings.
7. Penetrations through building systems shall be identified in the 3D model by means of a modeled sleeve.
8. All security devices on the plans shall have a level of intelligence associated with them that accurately identifies at a minimum the number of patch panels and number of data gathering panels required.

9. All items located within LVSR rooms shall have a level of intelligence associated with them that includes, at a minimum, material type, size, manufacturer, product numbers, serial numbers, maintenance schedules, operation and maintenance data, etc.

--- END ---

SECTION 28 05 13
CONDUCTORS AND CABLES FOR ELECTRONIC SAFETY AND SECURITY

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies the furnishing, installation, and connection of the conductors and cables for electronic safety and security.

1.2 RELATED WORK

- A. Excavation and backfill for cables that are installed in conduit: Section 31 20 00, EARTH MOVING.
- B. Sealing around penetrations to maintain the integrity of time rated construction: Section 07 84 00, FIRESTOPPING.
- C. General electrical requirements that are common to more than one section in Division 28: Section 28 05 11, REQUIREMENTS FOR ELECTRONIC SAFETY AND SECURITY INSTALLATIONS.
- D. Conduits for cables and wiring: Section 28 05 33, RACEWAYS AND BOXES FOR ELECTRONIC SAFETY AND SECURITY.
- E. Requirements for personnel safety and to provide a low impedance path for possible ground fault currents: Section 28 05 26, GROUNDING AND BONDING FOR ELECTRONIC SAFETY AND SECURITY.

1.3 SUBMITTALS

- A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, furnish the following:
1. Manufacturer's Literature and Data: Showing each cable type and rating.
 2. Certificates: Two weeks prior to final inspection, deliver to the Resident Engineer four copies of the certification that the material is in accordance with the drawings and specifications and has been properly installed.

1.4 APPLICABLE PUBLICATIONS

- A. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are reference in the text by the basic designation only.
- B. American Society of Testing Material (ASTM):
D2301-04.....Standard Specification for Vinyl Chloride Plastic Pressure Sensitive Electrical Insulating Tape

- C. Federal Specifications (Fed. Spec.):
A-A-59544-00 Cable and Wire, Electrical (Power, Fixed Installation)
- D. National Fire Protection Association (NFPA):
70-05..... National Electrical Code (NEC)
- E. Underwriters Laboratories, Inc. (UL):
44-02..... Thermoset-Insulated Wires and Cables
83-03..... Thermoplastic-Insulated Wires and Cables
467-01 Electrical Grounding and Bonding Equipment
486A-01 Wire Connectors and Soldering Lugs for Use with Copper
Conductors
486C-02..... Splicing Wire Connectors
486D-02..... Insulated Wire Connector Systems for Underground Use or in
Damp or Wet Locations
486E-00..... Equipment Wiring Terminals for Use with Aluminum and/or
Copper Conductors
493-01 Thermoplastic-Insulated Underground Feeder and Branch Circuit
Cable
514B-02..... Fittings for Cable and Conduit
1479-03 Fire Tests of Through-Penetration Fire Stops

PART 2 - PRODUCTS

2.1 CONTROL WIRING

- A. Unless otherwise specified in other sections of these specifications, control wiring shall be as specified for power and lighting wiring, except the minimum size shall be not less than No. 14 AWG.
- B. Control wiring shall be large enough so that the voltage drop under inrush conditions does not adversely affect operation of the controls.

2.2 COMMUNICATION AND SIGNAL WIRING

- A. Shall conform to the recommendations of the manufacturers of the communication and signal systems; however, not less than what is shown.
- B. Wiring shown is for typical systems. Provide wiring as required for the systems being furnished.
- C. Multi-conductor cables shall have the conductors color coded.

2.3 WIRE LUBRICATING COMPOUND

- A. Suitable for the wire insulation and conduit it is used with, and shall not harden or become adhesive.
- B. Shall not be used on wire for isolated type electrical power systems.

2.4 FIREPROOFING TAPE

- A. The tape shall consist of a flexible, conformable fabric of organic composition coated one side with flame-retardant elastomer.
- B. The tape shall be self-extinguishing and shall not support combustion. It shall be arc-proof and fireproof.
- C. The tape shall not deteriorate when subjected to water, gases, salt water, sewage, or fungus and be resistant to sunlight and ultraviolet light.
- D. The finished application shall withstand a 200-ampere arc for not less than 30 seconds.
- E. Securing tape: Glass cloth electrical tape not less than 0.18 mm (7 mils) thick, and 19 mm (3/4 inch) wide.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Splice cables and wires only in outlet boxes, junction boxes, or pull boxes.
- B. Seal cable and wire entering a building from underground, between the wire and conduit where the cable exits the conduit, with a non-hardening approved compound.
- C. Wire Pulling:
 - 1. Provide installation equipment that will prevent the cutting or abrasion of insulation during pulling of cables.
 - 2. Use ropes made of nonmetallic material for pulling feeders.
 - 3. Attach pulling lines for feeders by means of either woven basket grips or pulling eyes attached directly to the conductors, as approved by the Resident Engineer.
 - 4. Pull in multiple cables together in a single conduit.

3.2 INSTALLATION IN MANHOLES

- A. Install and support cables in manholes on the steel racks with porcelain or equal insulators. Train the cables around the manhole walls, but do not bend to a radius less than six times the overall cable diameter. Communication and signal cabling shall not be in the same manhole as low voltage, medium voltage and high voltage cabling.

3.3 SPLICE INSTALLATION

- A. Splices and terminations shall be mechanically and electrically secure.
- B. Where the Government determines that unsatisfactory splices or terminations have been installed, remove the devices and install approved devices at no additional cost to the Government.

3.4 CONTROL, COMMUNICATION AND SIGNAL WIRING INSTALLATION

- A. Unless otherwise specified in other sections, install wiring and connect to equipment/devices to perform the required functions as shown and specified.
- B. Except where otherwise required, install a separate power supply circuit for each system so that malfunctions in any system will not affect other systems.
- C. Where separate power supply circuits are not shown, connect the systems to the nearest panelboards of suitable voltages, which are intended to supply such systems and have suitable spare circuit breakers or space for installation.
- D. Install a red warning indicator on the handle of the branch circuit breaker for the power supply circuit for each system to prevent accidental de-energizing of the systems.
- E. System voltages shall be 120 volts or lower where shown on the drawings or as required by the NEC.

3.5 CONTROL, COMMUNICATION AND SIGNAL SYSTEM IDENTIFICATION

- A. Install a permanent wire marker on each wire at each termination.
- B. Identifying numbers and letters on the wire markers shall correspond to those on the wiring diagrams used for installing the systems.
- C. Wire markers shall retain their markings after cleaning.
- D. In each manhole and handhole, install embossed brass tags to identify the system served and function.

3.6 EXISTING WIRING

- A. Unless specifically indicated on the plans, existing wiring shall not be reused for the new installation. Only wiring that conforms to the specifications and applicable codes may be reused. If existing wiring does not meet these requirements, existing wiring may not be reused and new wires shall be installed.

--- E N D ---

SECTION 28 05 26
GROUNDING AND BONDING FOR ELECTRONIC SAFETY AND SECURITY

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies general grounding and bonding requirements of electronic safety and security installations for equipment operations.
- B. "Grounding electrode system" refers to all electrodes required by NEC, as well as including made, supplementary, grounding electrodes.
- C. The terms "connect" and "bond" are used interchangeably in this specification and have the same meaning.

1.2 RELATED WORK

- A. Section 28 05 11, REQUIREMENTS FOR ELECTRONIC SAFETY AND SECURITY INSTALLATIONS: General electrical requirements and items that are common to more than one section of Division 28.
- B. Section 28 05 13, CONDUCTORS AND CABLES FOR ELECTRONIC SAFETY AND SECURITY: Low Voltage power and lighting wiring.
- C. Section 26 41 00, FACILITY LIGHTNING PROTECTION: Requirements for a lightning protection system.

1.3 SUBMITTALS

- A. Submit in accordance with Section 28 05 11, REQUIREMENTS FOR ELECTRONIC SAFETY AND SECURITY INSTALLATIONS.
- B. Shop Drawings:
 - 1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
 - 2. Include the location of system grounding electrode connections and the routing of aboveground and underground grounding electrode conductors.
- C. Test Reports: Provide certified test reports of ground resistance.
- D. Certifications: Two weeks prior to final inspection, submit four copies of the following to the Resident Engineer:
 - 1. Certification that the materials and installation is in accordance with the drawings and specifications.
 - 2. Certification, by the Contractor, that the complete installation has been properly installed and tested.

1.4 APPLICABLE PUBLICATIONS

- A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.
- B. American Society for Testing and Materials (ASTM):
 - B1-2001 Standard Specification for Hard-Drawn Copper Wire
 - B8-2004 Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
- C. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - 81-1983 IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System
- D. National Fire Protection Association (NFPA):
 - 70-2005 National Electrical Code (NEC)
- E. Underwriters Laboratories, Inc. (UL):
 - 44-2005 Thermoset-Insulated Wires and Cables
 - 83-2003 Thermoplastic-Insulated Wires and Cables
 - 467-2004 Grounding and Bonding Equipment
 - 486A-486B-2003 Wire Connectors

PART 2 - PRODUCTS

2.1 GROUNDING AND BONDING CONDUCTORS

- A. Equipment grounding conductors shall be UL 83 insulated stranded copper, except that sizes 6 mm² (10 AWG) and smaller shall be solid copper. Insulation color shall be continuous green for all equipment grounding conductors, except that wire sizes 25 mm² (4 AWG) and larger shall be permitted to be identified per NEC.
- B. Bonding conductors shall be ASTM B8 bare stranded copper, except that sizes 6 mm² (10 AWG) and smaller shall be ASTM B1 solid bare copper wire.
- C. Isolated Power System: Type XHHW-2 insulation with a dielectric constant of 3.5 or less.

2.2 GROUND RODS

- A. Copper clad steel, (5/8 inch) diameter by 3000 mm (10 feet) long, conforming to UL 467.
- B. Quantity of rods shall be as required to obtain the specified ground resistance.

2.3 SPLICES AND TERMINATION COMPONENTS

- A. Components shall meet or exceed UL 467 and be clearly marked with the manufacturer, catalog number, and permitted conductor size(s).

2.4 GROUND CONNECTIONS

- A. Below Grade: Exothermic-welded type connectors.
- B. Above Grade:
 - 1. Bonding Jumpers: compression type connectors, using zinc-plated fasteners and external tooth lockwashers.
 - 2. Ground Busbars: Two-hole compression type lugs using tin-plated copper or copper alloy bolts and nuts.
 - 3. Rack and Cabinet Ground Bars: one-hole compression-type lugs using zinc-plated or copper alloy fasteners.

2.5 EQUIPMENT RACK AND CABINET GROUND BARS

- A. Provide solid copper ground bars designed for mounting on the framework of open or cabinet-enclosed equipment racks with minimum dimensions of 4 mm thick by 19 mm wide (3/8 inch x 3/4 inch).

2.6 GROUND TERMINAL BLOCKS

- A. At any equipment mounting location (e.g. backboards and hinged cover enclosures) where rack-type ground bars cannot be mounted, provide screw lug-type terminal blocks.

2.7 SPLICE CASE GROUND ACCESSORIES

- A. Splice case grounding and bonding accessories shall be supplied by the splice case manufacturer when available. Otherwise, use 16 mm² (6 AWG) insulated ground wire with shield bonding connectors.

PART 3 - EXECUTION

3.1 GENERAL

- A. Ground in accordance with the NEC, as shown on drawings, and as hereinafter specified.
- B. System Grounding:
 - 1. Secondary service neutrals: Ground at the supply side of the secondary disconnecting means and at the related transformers.
 - 2. Separately derived systems (transformers downstream from the service entrance): Ground the secondary neutral.
 - 3. Isolation transformers and isolated power systems shall not be system grounded.
- C. Equipment Grounding: Metallic structures (including ductwork and building steel), enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, and other conductive items in close proximity with electrical circuits shall be bonded and grounded.

3.2 INACCESSIBLE GROUNDING CONNECTIONS

- A. Make grounding connections, which are buried or otherwise normally inaccessible (except connections for which periodic testing access is required) by exothermic weld.

3.3 CORROSION INHIBITORS

- A. When making ground and ground bonding connections, apply a corrosion inhibitor to all contact surfaces. Use corrosion inhibitor appropriate for protecting a connection between the metals used.

3.4 CONDUCTIVE PIPING

- A. Bond all conductive piping systems, interior and exterior, to the building to the grounding electrode system. Bonding connections shall be made as close as practical to the equipment ground bus.
- B. In operating rooms and at intensive care and coronary care type beds, bond the gases and suction piping, at the outlets, directly to the room or patient ground bus.

3.5 WIREWAY GROUNDING

- A. Ground and Bond Metallic Wireway Systems as follows:
 - 1. Bond the metallic structures of wireway to provide 100 percent electrical continuity throughout the wireway system by connecting a 16 mm² (6 AWG) bonding jumper at all intermediate metallic enclosures and across all section junctions.
 - 2. Install insulated 16 mm² (6 AWG) bonding jumpers between the wireway system bonded as required in paragraph 1 above, and the closest building ground at each end and approximately every 16 meters (50 feet).
 - 3. Use insulated 16 mm² (6 AWG) bonding jumpers to ground or bond metallic wireway at each end at all intermediate metallic enclosures and cross all section junctions.
 - 4. Use insulated 16 mm² (6 AWG) bonding jumpers to ground cable tray to column-mounted building ground plates (pads) at each end and approximately every 15 meters.

3.6 GROUND RESISTANCE

- A. Grounding system resistance to ground shall not exceed 5 ohms. Make necessary modifications or additions to the grounding electrode system for compliance without additional cost to the Government. Final tests shall assure that this requirement is met.
- B. Resistance of the grounding electrode system shall be measured using a four-terminal fall-of-potential method as defined in IEEE 81. Ground resistance measurements shall be made before the electrical distribution system is energized and shall be made in normally dry conditions not less than 48 hours after the last rainfall. Resistance measurements of separate grounding electrode systems shall be made before the systems are bonded together below grade. The combined resistance of separate systems may be used to meet the required resistance, but the specified number of electrodes must still be provided.

- C. Services at power company interface points shall comply with the power company ground resistance requirements.
- D. Below-grade connections shall be visually inspected by the Resident Engineer prior to backfilling. The Contractor shall notify the Resident Engineer 24 hours before the connections are ready for inspection.

3.7 GROUND ROD INSTALLATION

- A. Drive each rod vertically in the earth, not less than 3000 mm (10 feet) in depth.
- B. Where permanently concealed ground connections are required, make the connections by the exothermic process to form solid metal joints. Make accessible ground connections with mechanical pressure type ground connectors.
- C. Where rock prevents the driving of vertical ground rods, install angled ground rods or grounding electrodes in horizontal trenches to achieve the specified resistance.

3.8 GROUNDING FOR RF/EMI CONTROL

- A. Install bonding jumpers to bond all conduit, cable trays, sleeves and equipment for low voltage signaling and data communications circuits. Bonding jumpers shall consist of 100 mm (4 inches) wide copper strip or two 6 mm² (10 AWG) copper conductors spaced minimum 100 mm (4 inches) apart. Use 16 mm² (6 AWG) copper where exposed and subject to damage.
- B. Comply with the following when shielded cable is used for data circuits.
 - 1. Shields shall be continuous throughout each circuit.
 - 2. Connect shield drain wires together at each circuit connection point and insulate from ground. Do not ground the shield.
 - 3. Do not connect shields from different circuits together.
 - 4. Shield shall be connected at one end only. Connect shield to signal reference at the origin of the circuit. Consult with equipment manufacturer to determine signal reference.

3.9 GROUND LABELING

- A. All grounding system components shall be labeled with an approved labeling scheme.
- B. Provide approved Warning Label indicating that disconnecting this ground connection shall have detrimental effects of the associated ESS System.

--- E N D ---

SECTION 28 05 33
RACEWAYS AND BOXES FOR ELECTRONIC SAFETY AND SECURITY

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies the furnishing, installation, and connection of conduit, fittings, and boxes to form complete, coordinated, raceway systems. Raceways are required for all electronic safety and security cabling unless shown or specified otherwise.
- B. Definitions: The term conduit, as used in this specification, shall mean any or all of the raceway types specified.

1.2 RELATED WORK

- A. Bedding of conduits: Section 03 20 00, EARTH MOVING.
- B. Mounting board for communication closets: Section 06 10 00, ROUGH CARPENTRY.
- C. Sealing around penetrations to maintain the integrity of fire rated construction: Section 07 84 00, FIRESTOPPING.
- D. Fabrications for the deflection of water away from the building envelope at penetrations: Section 07 60 00, FLASHING AND SHEET METAL.
- E. Sealing around conduit penetrations through the building envelope to prevent moisture migration into the building: Section 07 92 00, JOINT SEALANTS.
- F. Identification and painting of conduit and other devices: Section 09 91 00, PAINTING.
- G. General electrical requirements and items that is common to more than one section of Division 28: Section 28 05 11, REQUIREMENTS FOR ELECTRONIC SAFETY AND SECURITY INSTALLATIONS.
- H. Requirements for personnel safety and to provide a low impedance path for possible ground fault currents: Section 28 05 26, GROUNDING AND BONDING FOR ELECTRONIC SAFETY AND SECURITY.

1.3 SUBMITTALS

- A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, furnish the following:
 - 1. Shop Drawings:
 - a. Size and location of main feeders;
 - b. Size and location of panels and pull boxes
 - c. Layout of required conduit penetrations through structural elements.
 - d. The specific item proposed and its area of application shall be identified on the catalog cuts.

- B. Certification: Prior to final inspection, deliver to the Resident Engineer four copies of the certification that the material is in accordance with the drawings and specifications and has been properly installed.

1.4 APPLICABLE PUBLICATIONS

- A. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.
- B. National Fire Protection Association (NFPA):
70-05.....National Electrical Code (NEC)
- C. Underwriters Laboratories, Inc. (UL):
1-03.....Flexible Metal Conduit
5-01.....Surface Metal Raceway and Fittings
6-03.....Rigid Metal Conduit
50-03.....Enclosures for Electrical Equipment
360-03.....Liquid-Tight Flexible Steel Conduit
467-01.....Grounding and Bonding Equipment
514A-01.....Metallic Outlet Boxes
514B-02.....Fittings for Cable and Conduit
514C-05.....Nonmetallic Outlet Boxes, Flush-Device Boxes and Covers
651-02.....Schedule 40 and 80 Rigid PVC Conduit
651A-03.....Type EB and A Rigid PVC Conduit and HDPE Conduit
797-03.....Electrical Metallic Tubing
1242-00.....Intermediate Metal Conduit
- D. National Electrical Manufacturers Association (NEMA):
TC-3-04.....PVC Fittings for Use with Rigid PVC Conduit and Tubing
FB1-03.....Fittings, Cast Metal Boxes and Conduit Bodies for Conduit, Electrical Metallic Tubing and Cable

PART 2 - PRODUCTS

2.1 MATERIAL

- A. Conduit Size: In accordance with the NEC, but not less than 25 mm (1 inch) unless otherwise shown. Where permitted by the NEC, 13 mm (1/2 inch) flexible conduit may be used for tap connections to recessed lighting fixtures.
- B. Conduit:
1. Rigid galvanized steel: Shall Conform to UL 6, ANSI C80.1.
 2. Rigid aluminum: Shall Conform to UL 6A, ANSI C80.5.
 3. Rigid intermediate steel conduit (IMC): Shall Conform to UL 1242, ANSI C80.6.
 4. Electrical metallic tubing (EMT): Shall Conform to UL 797, ANSI C80.3. Maximum size not to exceed 105 mm (4 inch) and shall be permitted only with cable rated 600 volts or less.
 5. Flexible galvanized steel conduit: Shall Conform to UL 1.
 6. Liquid-tight flexible metal conduit: Shall Conform to UL 360.
 7. Direct burial plastic conduit: Shall conform to UL 651 and UL 651A, heavy wall PVC or high density polyethylene (PE).

8. Surface metal raceway: Shall Conform to UL 5.
9. Non metallic flexible conduit - Innerduct: shall conform to UL 910.

C. Conduit Fittings:

1. Rigid steel and IMC conduit fittings:
 - a. Fittings shall meet the requirements of UL 514B and ANSI/ NEMA FB1.
 - b. Standard threaded couplings, locknuts, bushings, and elbows: Only steel or malleable iron materials are acceptable. Integral retractable type IMC couplings are also acceptable.
 - c. Locknuts: Bonding type with sharp edges for digging into the metal wall of an enclosure.
 - d. Bushings: Metallic insulating type, consisting of an insulating insert molded or locked into the metallic body of the fitting. Bushings made entirely of metal or nonmetallic material are not permitted.
 - e. Erickson (union-type) and set screw type couplings: Approved for use in concrete are permitted for use to complete a conduit run where conduit is installed in concrete. Use set screws of case hardened steel with hex head and cup point to firmly seat in conduit wall for positive ground. Tightening of set screws with pliers is prohibited.
 - f. Sealing fittings: Threaded cast iron type. Use continuous drain type sealing fittings to prevent passage of water vapor. In concealed work, install fittings in flush steel boxes with blank cover plates having the same finishes as that of other electrical plates in the room.
2. Rigid aluminum conduit fittings:
 - a. Standard threaded couplings, locknuts, bushings, and elbows: Malleable iron, steel or aluminum alloy materials; Zinc or cadmium plate iron or steel fittings. Aluminum fittings containing more than 0.4 percent copper are prohibited.
 - b. Locknuts and bushings: As specified for rigid steel and IMC conduit.
 - c. Set screw fittings: Not permitted for use with aluminum conduit.
3. Electrical metallic tubing fittings:
 - a. Fittings shall meet the requirements of UL 514B and ANSI/ NEMA FB1.
 - b. Only steel or malleable iron materials are acceptable.
 - c. Couplings and connectors: Concrete tight and rain tight, with connectors having insulated throats. Use gland and ring compression type couplings and connectors for conduit sizes 50 mm (2 inches) and smaller. Use set screw type couplings with four set screws each for conduit sizes over 50 mm (2 inches). Use set screws of case-hardened steel with hex head and cup point to firmly seat in wall of conduit for positive grounding.
 - d. Indent type connectors or couplings are prohibited.
 - e. Die-cast or pressure-cast zinc-alloy fittings or fittings made of "pot metal" are prohibited.

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4. Flexible steel conduit fittings:
 - a. Conform to UL 514B. Only steel or malleable iron materials are acceptable.
 - b. Clamp type, with insulated throat.
 5. Liquid-tight flexible metal conduit fittings:
 - a. Fittings shall meet the requirements of UL 514B and ANSI/ NEMA FB1.
 - b. Only steel or malleable iron materials are acceptable.
 - c. Fittings must incorporate a threaded grounding cone, a steel or plastic compression ring, and a gland for tightening. Connectors shall have insulated throats.
 6. Direct burial plastic conduit fittings:
 - a. Fittings shall meet the requirements of UL 514C and NEMA TC3.
 - b. As recommended by the conduit manufacturer.
 7. Surface metal raceway fittings: As recommended by the raceway manufacturer.
 8. Expansion and deflection couplings:
 - a. Conform to UL 467 and UL 514B.
 - b. Accommodate, 19 mm (0.75 inch) deflection, expansion, or contraction in any direction, and allow 30 degree angular deflections.
 - c. Include internal flexible metal braid sized to guarantee conduit ground continuity and fault currents in accordance with UL 467, and the NEC code tables for ground conductors.
 - d. Jacket: Flexible, corrosion-resistant, watertight, moisture and heat resistant molded rubber material with stainless steel jacket clamps.
- D. Conduit Supports:
1. Parts and hardware: Zinc-coat or provide equivalent corrosion protection.
 2. Individual Conduit Hangers: Designed for the purpose, having a pre-assembled closure bolt and nut, and provisions for receiving a hanger rod.
 3. Multiple conduit (trapeze) hangers: Not less than 38 mm by 38 mm (1-1/2 by 1-1/2 inch), 12 gage steel, cold formed, lipped channels; with not less than 9 mm (3/8 inch) diameter steel hanger rods.
 4. Solid Masonry and Concrete Anchors: Self-drilling expansion shields, or machine bolt expansion.
- E. Outlet, Junction, and Pull Boxes:
1. UL-50 and UL-514A.
 2. Cast metal where required by the NEC or shown, and equipped with rustproof boxes.
 3. Sheet metal boxes: Galvanized steel, except where otherwise shown.
 4. Flush mounted wall or ceiling boxes shall be installed with raised covers so that front face of raised cover is flush with the wall. Surface mounted wall or ceiling boxes shall be installed with surface style flat or raised covers.
- F. Wireways: Equip with hinged covers, except where removable covers are shown.

- G. Warning Tape: Standard, 4-Mil polyethylene 76 mm (3 inch) wide tape detectable type, red with black letters, and imprinted with "CAUTION BURIED ELECTRONIC SAFETY AND SECURITY CABLE BELOW".

PART 3 - EXECUTION

3.1 PENETRATIONS

- A. Cutting or Holes:
1. Locate holes in advance where they are proposed in the structural sections such as ribs or beams. Obtain the approval of the Resident Engineer prior to drilling through structural sections.
 2. Cut holes through concrete and masonry in new and existing structures with a diamond core drill or concrete saw. Pneumatic hammer, impact electric, hand or manual hammer type drills are not allowed, except where permitted by the Resident Engineer as required by limited working space.
- B. Fire Stop: Where conduits, wireways, and other electronic safety and security raceways pass through fire partitions, fire walls, smoke partitions, or floors, install a fire stop that provides an effective barrier against the spread of fire, smoke and gases as specified in Section 07 84 00, FIRESTOPPING, with rock wool fiber or silicone foam sealant only. Completely fill and seal clearances between raceways and openings with the fire stop material.
- C. Waterproofing: At floor, exterior wall, and roof conduit penetrations, completely seal clearances around the conduit and make watertight as specified in Section 07 92 00, JOINT SEALANTS.

3.2 INSTALLATION, GENERAL

- A. All conduits greater than 2" (conduit) are shown on the plans. Install conduit as follows:
1. In complete runs before pulling in cables or wires.
 2. Flattened, dented, or deformed conduit is not permitted. Remove and replace the damaged conduits with new undamaged material.
 3. Assure conduit installation does not encroach into the ceiling height head room, walkways, or doorways.
 4. Cut square with a hacksaw, ream, remove burrs, and draw up tight.
 5. Mechanically continuous.
 6. Independently support conduit at 8'0" on center. Do not use other supports i.e., (suspended ceilings, suspended ceiling supporting members, lighting fixtures, conduits, mechanical piping, or mechanical ducts).
 7. Support within 300 mm (1 foot) of changes of direction, and within 300 mm (1 foot) of each enclosure to which connected.
 8. Close ends of empty conduit with plugs or caps at the rough-in stage to prevent entry of debris, until wires are pulled in.
 9. Conduit installations under fume and vent hoods are prohibited.
 10. Secure conduits to cabinets, junction boxes, pull boxes and outlet boxes with bonding type locknuts. For rigid and IMC conduit installations, provide a locknut on the inside of the enclosure, made up wrench tight. Do not make conduit connections to junction box covers.
 11. Flashing of penetrations of the roof membrane is specified in Section 07 60 00, FLASHING AND SHEET METAL.

12. Do not use aluminum conduits in wet locations.
13. Unless otherwise indicated on the drawings or specified herein, all conduits shall be installed concealed within finished walls, floors and ceilings.

B. Conduit Bends:

1. Make bends with standard conduit bending machines.
2. Conduit hickey may be used for slight offsets, and for straightening stubbed out conduits.
3. Bending of conduits with a pipe tee or vise is prohibited.

C. Layout and Homeruns:

1. Install conduit with wiring, including homeruns, as shown.
2. Deviations: Must be approved prior to installation. Make only where necessary to avoid interferences. Provide the proposed deviation for approval to architect and engineer and Resident Engineer.

3.3 CONCEALED WORK INSTALLATION

A. In Concrete:

1. Conduit: Rigid steel, IMC or EMT. Do not install EMT in concrete slabs that are in contact with soil, gravel or vapor barriers.
2. Align and run conduit in direct lines.
3. Install conduit through concrete beams only when the following occurs:
 - a. Where shown on the structural drawings.
 - b. As approved by the Resident Engineer prior to construction, and after submittal of drawing showing location, size, and position of each penetration.
4. Installation of conduit in concrete that is less than 75 mm (3 inches) thick is prohibited.
 - a. Conduit outside diameter larger than 1/3 of the slab thickness is prohibited.
 - b. Space between conduits in slabs: Approximately six conduit diameters apart, except one conduit diameter at conduit crossings.
 - c. Install conduits approximately in the center of the slab so that there will be a minimum of 19 mm (3/4 inch) of concrete around the conduits.
5. Make couplings and connections watertight. Use thread compounds that are UL approved conductive type to insure low resistance ground continuity through the conduits. Tightening set screws with pliers is prohibited.

B. Furred or Suspended Ceilings and in Walls:

1. Conduit for conductors 600 volts and below:
 - a. Rigid steel, IMC, rigid aluminum, or EMT. Different type conduits mixed indiscriminately in the same system is prohibited.
2. Align and run conduit parallel or perpendicular to the building lines.
3. Tightening set screws with pliers is prohibited.

3.4 EXPOSED WORK INSTALLATION

- A. Unless otherwise indicated on the drawings, exposed conduit is only permitted in mechanical and electrical rooms.
- B. Electrical Metallic Tubing (EMT)
 - 1. EMT shall be permitted for both exposed and concealed work.
 - 2. EMT shall not be permitted:
 - a. Where subject to physical damage, including mechanical equipment rooms below 10'-0" AFF.
 - b. In corrosive areas.
 - c. In cinder block construction.
 - d. In hazardous (classified) locations.
 - e. Within parking garages.
 - f. Within utility tunnels
 - g. On building roofs
 - h. Outside of building
- C. Conduit for Conductors 600 volts and below:
 - 1. Rigid steel, IMC, rigid aluminum, EMT or innerduct. Different type of conduits mixed indiscriminately in the system is prohibited.
- D. Align and run conduit parallel or perpendicular to the building lines.
- E. Install horizontal runs close to the ceiling or beams and secure with conduit straps.
- F. Support horizontal or vertical runs at not over 2400 mm (eight foot) intervals.
- G. Surface metal raceways: Use only where shown.
- H. Painting:
 - 1. Paint exposed conduit as specified in Section 09 91 00, PAINTING.
 - 2. Paint all conduits containing cables rated over 600 volts safety orange. Refer to Section 09 91 00, PAINTING for preparation, paint type, and exact color. In addition, paint legends, using 50 mm (two inch) high black numerals and letters, showing the cable voltage rating. Provide legends where conduits pass through walls and floors and at maximum 6000 mm (20 foot) intervals in between.

3.5 EXPANSION JOINTS

- A. Conduits 75 mm (3 inches) and larger, that are secured to the building structure on opposite sides of a building expansion joint, require expansion and deflection couplings. Install the couplings in accordance with the manufacturer's recommendations.
- B. Provide conduits smaller than 75 mm (3 inches) with junction boxes on both sides of the expansion joint. Connect conduits to junction boxes with sufficient slack of flexible conduit to produce 125 mm (5 inch) vertical drop midway between the ends. Flexible conduit shall have a copper green ground bonding jumper installed. In lieu of this flexible conduit, expansion and deflection couplings as specified above for 375 mm (15 inches) and larger conduits are acceptable.

- C. Install expansion and deflection couplings where shown.
- D. Seismic Areas: In seismic areas, provide conduits rigidly secured to the building structure on opposite sides of a building expansion joint with junction boxes on both sides of the joint. Connect conduits to junction boxes with 375 mm (15 inches) of slack flexible conduit. Flexible conduit shall have a copper green ground bonding jumper installed.

3.6 CONDUIT SUPPORTS, INSTALLATION

- A. Safe working load shall not exceed 1/4 of proof test load of fastening devices.
- B. Use pipe straps or individual conduit hangers for supporting individual conduits. Maximum distance between supports is 2.5 m (8 foot) on center.
- C. Support multiple conduit runs with trapeze hangers. Use trapeze hangers that are designed to support a load equal to or greater than the sum of the weights of the conduits, wires, hanger itself, and 90 kg (200 pounds). Attach each conduit with U-bolts or other approved fasteners.
- D. Support conduit independently of junction boxes, pull boxes, fixtures, suspended ceiling T-bars, angle supports, and similar items.
- E. Fasteners and Supports in Solid Masonry and Concrete:
 - 1. New Construction: Use steel or malleable iron concrete inserts set in place prior to placing the concrete.
 - 2. Existing Construction:
 - a. Steel expansion anchors not less than 6 mm (1/4 inch) bolt size and not less than 28 mm (1-1/8 inch) embedment.
 - b. Power set fasteners not less than 6 mm (1/4 inch) diameter with depth of penetration not less than 75 mm (3 inches).
 - c. Use vibration and shock resistant anchors and fasteners for attaching to concrete ceilings.
- F. Hollow Masonry: Toggle bolts are permitted.
- G. Bolts supported only by plaster or gypsum wallboard are not acceptable.
- H. Metal Structures: Use machine screw fasteners or other devices specifically designed and approved for the application.
- I. Attachment by wood plugs, rawl plug, plastic, lead or soft metal anchors, or wood blocking and bolts supported only by plaster is prohibited.
- J. Chain, wire, or perforated strap shall not be used to support or fasten conduit.
- K. Spring steel type supports or fasteners are prohibited for all uses except: Horizontal and vertical supports/fasteners within walls.
- L. Vertical Supports: Vertical conduit runs shall have riser clamps and supports in accordance with the NEC and as shown. Provide supports for cable and wire with fittings that include internal wedges and retaining collars.

3.7 BOX INSTALLATION

- A. Boxes for Concealed Conduits:
 - 1. Flush mounted.
 - 2. Provide raised covers for boxes to suit the wall or ceiling, construction and finish.
- B. In addition to boxes shown, install additional boxes where needed to prevent damage to cables and wires during pulling in operations.
- C. Remove only knockouts as required and plug unused openings. Use threaded plugs for cast metal boxes and snap-in metal covers for sheet metal boxes.
- D. Outlet boxes in the same wall mounted back-to-back are prohibited. A minimum 600 mm (24 inch), center-to-center lateral spacing shall be maintained between boxes.)
- E. Stencil or install phenolic nameplates on covers of the boxes identified on riser diagrams; for example "SIG-FA JB No. 1".

3.8 ELECTRONIC SAFETY AND SECURITY CONDUIT AND SLEEVES

- A. Install the electronic safety and security raceway system as shown on drawings.
- B. Minimum conduit size of 19 mm (3/4 inch), but not less than the size shown on the drawings.
- C. All conduit ends shall be equipped with insulated bushings.
- D. All 100 mm (four inch) conduits within buildings shall include pull boxes after every two 90 degree bends. Size boxes per the NEC.
- E. Vertical conduits/sleeves through closets floors shall terminate not less than 75 mm (3 inches) below the floor and not less than 75 mm (3 inches) below the ceiling of the floor below.
- F. Terminate conduit runs to/from a backboard in a closet or interstitial space at the top or bottom of the backboard. Conduits shall enter communication closets next to the wall and be flush with the backboard.
- G. Where drilling is necessary for vertical conduits, locate holes so as not to affect structural sections such as ribs or beams.
- H. All empty conduits located in communications closets or on backboards shall be sealed with a standard non-hardening duct seal compound to prevent the entrance of moisture and gases and to meet fire resistance requirements.
- I. Conduit runs shall contain no more than four quarter turns (90 degree bends) between pull boxes/backboards. Minimum radius of communication conduit bends shall be as follows (special long radius):

Sizes of Conduit Trade Size	Radius of Conduit Bends mm, Inches
3/4	150 (6)
1	230 (9)
1-1/4	350 (14)
1-1/2	430 (17)

Sizes of Conduit Trade Size	Radius of Conduit Bends mm, Inches
2	525 (21)
2-1/2	635 (25)
3	775 (31)
3-1/2	900 (36)
4	1125 (48)

- J. Furnish and install 19 mm (3/4 inch) thick fire retardant plywood specified in on the wall of communication closets where shown on drawings. Mount the plywood with the bottom edge 300 mm (one foot) above the finished floor.
- K. Furnish and pull wire in all empty conduits. (Sleeves through floor are exceptions).

--- E N D ---

- B. The security system will be installed and tested to ensure all components are fully compatible as a system and can be integrated with all associated security subsystems, whether the security system is stand-alone or a part of a complete Information Technology (IT) computer network.
- C. The Contractor or security sub-contractor shall be a licensed security Contractor as required within the state or jurisdiction of where the installation work is being conducted.

1.4 SUBMITTALS

- A. Submit below items in conjunction with Master Specification Sections 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.
- B. Provide certificates of compliance with Section 1.3, Quality Assurance.
- C. Provide a complete and thorough pre-installation and as-built design package in both electronic format and on paper, minimum size 48 x 48 inches (1220 x 1220 millimeters); drawing submittals shall be per the established project schedule.
- D. Pre-installation design and as-built packages shall include, but not be limited to:
 - 1. Index Sheet that shall:
 - a. Define each page of the design package to include facility name, building name, floor, and sheet number.
 - b. Provide a complete list of all security abbreviations and symbols.
 - c. Reference all general notes that are utilized within the design package.
 - d. Specification and scope of work pages for all individual security systems that are applicable to the design package that will:
 - 1) Outline all general and job specific work required within the design package.
 - 2) Provide a detailed device identification table outlining device Identification (ID) and use for all security systems equipment utilized in the design package.
 - 2. Drawing sheets that will be plotted on the individual floor plans or site plans shall:
 - a. Include a title block as defined above.
 - b. Clearly define the drawings scale in both standard and metric measurements.
 - c. Provide device identification and location.
 - d. Address all signal and power conduit runs and sizes that are associated with the design of the electronic security system and other security elements (e.g., barriers, etc.).
 - e. Identify all pull box and conduit locations, sizes, and fill capacities.
 - f. Address all general and drawing specific notes for a particular drawing sheet.
 - 3. A detailed riser drawing for each applicable security subsystem shall:
 - a. Indicate the sequence of operation.
 - b. Relationship of integrated components on one diagram.
 - c. Include the number, size, identification, and maximum lengths of interconnecting wires.

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- d. Wire/cable types shall be defined by a wire and cable schedule. The schedule shall utilize a lettering system that will correspond to the wire/cable it represents (example: A = 18 AWG/1 Pair Twisted, Unshielded). This schedule shall also provide the manufacturer's name and part number for the wire/cable being installed.
 4. A detailed system drawing for each applicable security system shall:
 - a. Clearly identify how all equipment within the system, from main panel to device, shall be laid out and connected.
 - b. Provide full detail of all system components wiring from point-to-point.
 - c. Identify wire types utilized for connection, interconnection with associate security subsystems.
 - d. Show device locations that correspond to the floor plans.
 - e. All general and drawing specific notes shall be included with the system drawings.
 5. A detailed schedule for all of the applicable security subsystems shall be included. All schedules shall provide the following information:
 - a. Device ID.
 - b. Device Location (e.g. site, building, floor, room number, location, and description).
 - c. Mounting type (e.g. flush, wall, surface, etc.).
 - d. Power supply or circuit breaker and power panel number.
 - e. In addition, for the PACS, provide the door ID, door type (e.g. wood or metal), locking mechanism (e.g. strike or electromagnetic lock) and control device (e.g. card reader or biometrics).
 6. Detail and elevation drawings for all devices that define how they were installed and mounted.
- E. Pre-installation design packages shall go through a full review process conducted by the Contractor along with a VA representative to ensure all work has been clearly defined and completed. All reviews shall be conducted in accordance with the project schedule. There shall be four (4) stages to the review process:
1. 35 percent
 2. 65 percent
 3. 90 percent
 4. 100 percent
- F. Provide manufacturer security system product cut-sheets. Submit for approval at least 30 days prior to commencement of formal testing, a Security System Operational Test Plan. Include procedures for operational testing of each component and security subsystem, to include performance of an integrated system test.
- G. Submit manufacture's certification of Underwriters Laboratories, Inc. (UL) listing as specified. Provide all maintenance and operating manuals per Section 01 00 00, GENERAL REQUIREMENTS.

1.5 APPLICABLE PUBLICATIONS

- A. The publications listed below (including amendments, addenda, revisions, supplement, and errata) form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American National Standards Institute (ANSI)/ Security Industry Association (SIA):
AC-01.....Access Control: Wiegand Card Reader Interface Standard
AC-03.....Access Control: Badging Techniques
- C. American National Standards Institute (ANSI)/ International Code Council (ICC):
A117.1Standard on Accessible and Usable Buildings and Facilities
- D. Department of Justice American Disability Act (ADA)
28 CFR Part 36-90ADA Standards for Accessible Design
- E. Government Accountability Office (GAO):
GAO-03-8-02Security Responsibilities for Federally Owned and Leased Facilities
- F. National Electrical Contractors Association
303-2005Installing Closed Circuit Television (CCTV) Systems
- G. National Electrical Manufacturers Association (NEMA):
250-03Enclosures for Electrical Equipment (1000 Volts Maximum)
- H. National Fire Protection Association (NFPA):
70-05.....Article 780-National Electrical Code
- I. Underwriters Laboratories, Inc. (UL):
294-99Standard for Access Control
305-97Standard for Panic Hardware
639-97Standard for Intrusion-Detection Units
752-05Standard for Bullet-Resisting Equipment
827-96Central Station Alarm Services
1076-95Standards for Proprietary Burglar Alarm Units and Systems
1981-03Central Station Automation System
2058-05High Security Electronic Locks
- J. Homeland Security Presidential Directive (HSPD):
HSPD-12Policy for a Common Identification Standard for Federal Employees and Contractors
- K. Federal Information Processing Standards (FIPS):
FIPS-201Personal Identity Verification (PIV) of Federal Employees and Contractors
- L. National Institute of Standards and Technology (NIST):
IR 6887 V2.1.....Government Smart Card Interoperability Specification (GSC-IS)
Special Pub 800-96PIV Card Reader Interoperability Guidelines
- M. Institute of Electrical and Electronics Engineers (IEEE):
C62.41IEEE Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits

- N. International Organization for Standardization (ISO):
 - 7810.....Physical Characteristics of Credit Card Size Document
 - 7811.....Physical Characteristics for Magnetic Stripe Cards
 - 7816-1Physical Characteristics of the Card
 - 7816-2Dimensions and Contact Position of the card
 - 7816-3Electrical Signals and Transmission Protocols
 - 7816-4Inter-Industry Command for Interchange
 - 14443.....RFID cards; Contactless Proximity Cards Operating at 13.56 MHz in up to 5 inches distance
 - 15693.....RFID cards; Contactless Vicinity Cards Operating at 13.56 MHz in up to 50 inches distance
- O. Uniform Federal Accessibility Standards (UFAS) 1984
- P. ADA Standards for Accessible Design 1994

1.6 WARRANTY OF CONSTRUCTION.

- A. Warrant PACS work subject to the Article "Warranty of Construction" of FAR clause 52.246-21.

PART 2 – PRODUCTS

2.1 EQUIPMENT AND MATERIALS

- A. All equipment associated within the PACS shall be UL 294 compliant and rated for continuous operation. Environmental conditions (i.e. temperature, humidity, wind, and seismic activity) shall be taken under consideration at each facility and site location prior to installation of the equipment.
- B. All equipment shall operate on a 120 or 240 volts alternating current (VAC); 50 Hz or 60 Hz AC power system unless documented otherwise in subsequent sections listed within this specification. All equipment shall have a back-up source of power that will provide a minimum of 96 hours of run time in the event of a loss of primary power to the facility.
- C. The system shall be designed, installed, and programmed in a manner that will allow for easy of operation, programming, servicing, maintenance, testing, and upgrading of the system.
- D. All PACS components located in designated "HAZARDOUS ENVIRONMENT" areas where fire or explosion could occur due to the presence of natural gases or vapors, flammable liquids, combustible residue, or ignitable fibers or debris, shall be rated Class II, Division I, Group F, and installed in accordance with NFPA 70, Chapter 5.
- E. All equipment and materials for the system will be compatible to ensure correct operation as outlined in FIPS 201, March 2006 and HSPD-12.

2.2 EQUIPMENT ITEMS

- A. The security system characteristics listed in this section will serve as a guide in selection of equipment and materials for the PACS. If updated or more suitable versions are available then the Contracting Officer will approve the acceptance of prior to an installation.

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- B. PACS equipment shall meet or exceed all requirements listed below.
- C. A PACS shall be comprised of, but not limited to, the following components:
1. Control/Communications Panels
 2. Physical Security Information Management (PSIM)
 3. Card Reader and Credential Cards
 4. Picture ID and Badging Station (To be provided in accordance with the VA PIV enrollment and issuance system.)
 5. Biometrics
 6. Portal Control Devices
 7. Door Status Indicators
 8. Entry Control Device
 9. Power Supplies
 10. Wires and Cables
 11. Request to Exit Device(s)
- D. Physical Security Information Management (PSIM)
1. General
 - a. The PSIM shall use an integrated quality management system certified to ISO 9001:2000 standard. Proof of certification shall be provided by the manufacturer.
 - b. The PSIM manufacturer shall have more than 5 years of extensive experience in the area of Situation Management solutions.
 - c. The PSIM manufacturer shall have completed at least 5 implementations in the last 2 years.
 2. Architecture
 - a. The PSIM shall utilize client/server architecture.
 - b. The PSIM shall provide both thick and web clients.
 - c. The PSIM shall support multi-site, multiple-hierarchy deployments.
 - d. The PSIM shall be scalable to support expanding operations.
 - e. The PSIM shall support any practical number of client workstations.
 - f. The PSIM shall manage all permissions and notifications centrally by the server.
 - g. The PSIM shall be designed and built to allow smooth and easy integrations that will not affect core product functionality and stability.
 - h. The PSIM shall have edge device overload protection.
 - i. The PSIM shall support MS SQL version 2005 or higher.
 - j. The PSIM shall support various redundancy schemes according to implementation considerations.
 - k. The PSIM shall be installed and run over standard TCP/IP LAN/WAN network infrastructure.
 3. System Monitoring
 - a. The PSIM shall have an internal BIT (Built-In-Tests) monitoring watchdog mechanism with GUI to automatically identify and recover from application faults.
 - b. This monitoring service shall be configurable by system administrators to take various actions upon failure, such as sending notifications to technical staff, using e-mail, LAN, and PSIM when a service goes down.
 - c. The PSIM shall provide administrators the ability to define the monitoring time interval and number of alerts before a notification is sent.
 - d. The PSIM shall manage and create/update applicable logs.

4. Graphical User Interface

- a. The PSIM user interface shall support flexible multiple screen setups.
- b. The PSIM shall support the ability to dock/undock multiple views on different monitors and dock all views and manage from a single screen.
- c. The PSIM shall support the ability to define and save a specific layout per workstation.
- d. The PSIM shall enable administrators to define what modules are viewable per user.

5. Administration and Security

- a. The PSIM shall enable system administrators to define system users with range of attributes:
 - 1) Picture
 - 2) Icon
 - 3) Contact information
 - 4) Default communication methods
 - 5) Authorization & authentication policies
 - 6) Skills/Education
 - 7) 3rd party IDs
- b. The PSIM shall support advanced authentication policies including password length, special characters, maximum number of failed logins before access is denied, etc.
- c. The PSIM shall enable administrators to terminate or block user sessions and force them to change their password next time they login.
- d. The PSIM shall support MS Active directory, Single-Sign on.
- e. The PSIM shall support advanced authorization policies for every possible functional area of the Control Room application software (maps, sensors, video, incidents, messages, asset management, guard tour, and others).
- f. The PSIM shall support data encryption for communication channels between client workstations and servers.
- g. The PSIM shall support configurable association between users and terminals such that unauthorized users will be restricted to access only from specific terminals.

6. Deployment Support and Training

- a. The PSIM manufacturer shall provide an engineer on-site during system installation, configuration, and operator and coaching.
- b. The PSIM manufacturer shall provide all training directly to the client, including administrator and operator training courses. Reference Section 01 00 00 General Requirements.
- c. The PSIM manufacturer shall provide the client with consulting services to define procedures and business rules based on industry best practices.
- d. The PSIM manufacturer shall provide full technical support for immediate technical assistance.

7. Video Management

- a. The PSIM shall have a built-in virtual video matrix for the display and management of live and recorded video from multiple video vendors.

- b. The PSIM shall support a simultaneous display of multiple video matrices on multiple screens.
- c. The PSIM shall always maintain the last video display matrix and shall return to it upon application restart.
- d. The PSIM shall enable the saving and recalling of multiple matrix favorites, automatically or on-demand.
- e. The PSIM shall define individual video sources according to their supported logical functionality.
- f. The PSIM shall support the ability to automatically display live and recorded video based on predefined rules.
- g. The PSIM shall support multiple opened video views.
- h. The system shall support public announcement (PA) capabilities enabling users to broadcast audio through a group of sensors.
- i. The PSIM shall facilitate automatic loading of cameras from the external ACS system.
- j. The PSIM shall support full screen mode for the complete matrix or of individual cameras.
- k. The PSIM shall support drag & drop functionality of video sources.
- l. The PSIM shall provide the ability to lock individual video slots and the overall display to prevent newly opened streams from replacing previously opened streams.
- m. The PSIM shall support the ability to create and launch virtual tours, automatically or on-demand.
- n. The PSIM shall provide a visual indication reflecting the status of all cameras.
- o. The PSIM shall clearly indicate cameras that open as a result of alarms.
- p. The PSIM shall provide a software PTZ controller for controlling all integrated PTZ enabled cameras. Additionally users shall have the ability to PTZ a camera from the individual video viewer.
- q. The PSIM shall support the capability to assign PTZ cameras preset positions.
- r. The PSIM shall support searching capabilities to enable users to quickly and easily locate any camera connected to the system.
- s. The PSIM shall provide the capability to easily open/close all cameras in a specific geographic or logical zone. Likewise, users can display zone related video favorites.
- t. The PSIM shall provide the capability to control camera operations from the Map (GIS) view.
- u. The PSIM shall support the ability to define which video operation features are to be available via the map.
- v. The PSIM shall provide the capability to easily slave supported cameras to targets, such as those detected by radars, thus giving users the ability to visually track continuously moving targets.
- w. The PSIM shall provide the ability to define a camera's optimal range of view/ Field of view (FOV).
- x. The PSIM shall provide the ability to select a location on a map and automatically bring up video feeds from the cameras which have visibility of the selected point.
- y. The PSIM shall provide the ability to show or hide the FOV on a map for a particular camera or for all cameras on a map.
- z. The PSIM shall provide intelligent video capability – enables users to easily track suspicious moving objects or people in real-time by opening the selected adjacent camera as the object or person moves out of a camera's view.
- aa. The PSIM shall provide a “panoramic” view of an environment by opening all surrounding cameras adjacent to a particular camera in a single click.
- bb. The PSIM shall support the ability to save and export video clips of live and prerecorded video for post event distribution and analysis.
- cc. The PSIM shall support digital zooming of displayed video.

- dd. The PSIM shall support such video playback functionality such as Fast Forward, Rewind, Frame By Frame, Forward Slow Motion, Forward Fast Motion.
- ee. The PSIM shall support the ability to prohibit access and control (according to user roles) of any cameras (e.g. lock PTZ control).
- ff. The PSIM shall provide the ability to easily camera calibrate video cameras.
- gg. The PSIM shall support video analytic technologies.

8. Access Control Management

- a. The PSIM shall support receiving alerts from and controlling all connected Access Control systems under a single user interface regardless of the ACS vendor.
- b. The PSIM shall facilitate automatic loading of readers and inputs from the ACS system.
- c. The PSIM shall provide tools for easily placing ACS readers on the GIS maps and for identifying readers that are not placed.
- d. The PSIM shall provide the capability to prevent duplicate logging and displaying of Access Granted events during busy hours.
- e. The PSIM's Access Control management shall be fully integrated with the system's Rules Engine.
- f. The PSIM shall support queries of access control events for readers and/or users.
- g. The PSIM shall support association between access control events and the users who triggered the event.
- h. The PSIM shall enable access to the associated user's details.
- i. The PSIM shall support the ability to generate customizable access control reports, on demand directly from the Access Control view.
- j. The PSIM shall support filtering capabilities by ACS device, user, or incident.
- k. The PSIM shall support the ability to quickly open video feeds related to a specific ACS point.
- l. The PSIM shall support the ability to easily view pre access event video playback directly from the Access Control view.
- m. The PSIM shall support the ability to query an ACS user or point; showing, for example, the locations of the card swipes.
- n. PSIM shall support the ability to pause the access entries in the Log while retaining all incoming access entries. Once it is un-paused, the system shall return to real-time display.
- o. The PSIM shall provide a Discovery module to probe Access Control Systems and import the badge holders and their associated photos (if available) into the system automatically. The PSIM shall support filter/query capabilities to easily find the relevant badge holders and add them to the system.
- p. The PSIM shall enable users to view user badge ID pictures directly from the Access Control view.
- q. The PSIM shall enable users to easily view user and door access history.
- r. The PSIM shall enable users to easily access map locations of access events.
- s. The PSIM shall provide filtering capabilities for viewing ACS user and sensor history.
- t. The PSIM shall support the ability to receive alarm inputs from the EPPS (Electronic Personal Protection System), including intercoms, emergency phones and panic buttons.

9. Status Display GUI

- a. The PSIM shall provide a comprehensive view for displaying the organization's overall status.
- b. The view shall be clear and precise and shall reflect only the information that is relevant to the user who is logged in.
- c. The view shall include all the relevant incidents sorted in a meaningful way.

- d. The view shall include all the relevant sensors that are not in normal mode.
- e. The view shall include general information bulletins.

10. Incident Management

- a. The PSIM shall have the ability to open incidents both automatically, triggered by sensor alarms or scheduled triggers.
- b. The PSIM shall have the ability to open incidents on-demand via “quick launch” buttons or “on-the-fly” and select the procedures to deploy.
- c. The PSIM shall provide the ability for a user to accept an incident assignment upon acknowledgement.
- d. The PSIM shall have the capability to record/time-stamp all procedural actions taken when managing the incident.
- e. The PSIM shall dynamically update incident handling priority for each user and support incident load balancing as the situation evolves.
- f. The PSIM shall provide the ability to update incident properties, reassign incidents and add scheduled tasks automatically or on demand.
- g. The PSIM shall recommend the most relevant procedures to deploy per incident. This shall be fully customizable by the VA.
- h. The PSIM shall have the ability to escalate incidents that were not handled within a predefined time.
- i. The PSIM shall provide a dedicated screen for managing incidents.
- j. The PSIM shall display the relevant incidents for each user.
- k. The PSIM shall support the ability to define which incidents are viewed by which workstation.
- l. The PSIM shall provide an integrated Incidents Log which contains views of all incidents and that can automatically sort new incidents according to their pre-defined severities and creation time.
- m. The PSIM shall provide the ability to assign a category (or incident type) to incidents, either automatically or on-demand and group incidents in the Incident Log by site, owner, or category.
- n. The PSIM shall enable administrators to define Quick launch default categories per workstation such as safety, security, emergency, etc.
- o. The PSIM shall provide an Incidents Log that enables easy access to all relevant maps and video sources, attachments, and forms for each incident.
- p. The PSIM shall provide the ability to view and edit forms related to incidents and tasks. The forms with the most updated information shall be saved and accessible at any time.
- q. The PSIM shall provide the ability to find incidents that share similar characteristics. Each similar incident’s created time, closure time, related sensors, created by, and deployed procedures shall be displayed.
- r. The PSIM shall display the relevant tasks for each incident.
- s. The PSIM shall display the relevant tasks for each user.
- t. The PSIM shall provide the ability to add, assign, and reassign tasks on-the-fly to a single user or a group of users.
- u. The PSIM shall provide the ability to add attachments when creating tasks on-the-fly.
- v. The PSIM shall provide the ability to add incident comments, in either a predefined form format or free text format, and task comments.
- w. The PSIM shall provide the ability to automatically trigger a set of actions when a task is marked as cancelled, failed, reassigned, etc.
- x. The PSIM shall provide the ability to “hide” closed incidents in the active Incidents Log yet search for closed incidents according to filtered properties.
- y. The PSIM shall provide the ability to create pre-archived incidents, purely for incident reporting purposes, and does not appear in the active Incidents log.
- z. The PSIM shall support the ability to search for active incidents.

- aa. The PSIM shall “pop-up” notifications when an incident is created and escalated.
- bb. The PSIM pop-up incident notification color shall reflect the severity of the incident
- cc. The PSIM shall support text-to-speech or WAV files that will play when there is a new incident, escalation, or incident update.
- dd. The PSIM shall support the ability to filter incident report content and generate reports on-demand or automatically for any incident at any time, in a user-selected format.
- ee. The PSIM shall enable users to easily send report packages containing incident-related content such as forms, video clips, snapshots, related emails, etc.
- ff. The PSIM shall require a comment, upon incident closure, which will be logged and retrievable for post incident debriefing.
- gg. The PSIM shall have a SDK to provide developers with the resources they need to open/update/close incidents and play back video on remote from external sources.

11. GIS Map Visualization

- a. The PSIM shall provide a common operational picture enabling information sharing between different users.
- b. The PSIM shall provide the ability to automatically synchronize all relevant GIS information such as markers, zones, etc. across all relevant workstations.
- c. The PSIM shall provide the flexibility to choose from a range of industry leading GIS visualization platforms.
- d. The PSIM shall be able to interface with ArcIMS/ArcGIS Servers and easily import and view ESRI ArcGIS layers (SID, LYR, MXD, and SHP files).
- e. The PSIM shall provide a way to easily identify, select, and zoom to specific properties of an ESRI layer.
- f. The PSIM shall support multiple GIS 2D and 3D providers simultaneously.
- g. The PSIM shall support multiple map layers.
- h. The PSIM shall have the ability to save a map's layers as a template and automatically or manually display/hide map layers most relevant to an incident.
- i. The PSIM shall support the ability to add dynamic layers that do not affect the defined core layers.
- j. The PSIM shall support multi-level drill-down/up between views.
- k. The PSIM shall support the ability to automatically bring up or 'fly to' map views or locations most relevant to an incident.
- l. The PSIM shall support map searching capabilities.
- m. The PSIM shall support defining and bringing up multiple Map favorites automatically or on demand.
- n. The PSIM shall provide the ability to easily add a single sensor, multiple sensors or sensor groups to the GIS.
- o. The PSIM shall provide the ability to customize sensor icons. The icons representing the sensors shall visually reflect the state of each sensor/sensor group.
- p. The PSIM shall provide the ability to view all entity properties and entity history from the GIS.
- q. The PSIM shall provide the ability to track the movements of all location-based technologies (e.g. GPS, RFID, etc.).The PSIM shall visually display the historical path of the movements.
- r. The PSIM shall provide a GIS interface with a uniform method of interacting with all integrated sensors and systems, no matter the vendor.
- s. The PSIM shall provide users with a map 'toolbox' with the most frequently used map operations for map entity types. The Toolbox operation buttons shall be customizable.
- t. The PSIM shall support the ability to toggle labels that display the name of sensors and assets on the GIS.

- u. The PSIM shall provide the ability to customize the visibility of a GIS map entity per zoom level.
- v. The PSIM shall support the ability to define and easily bring up related cameras for any sensor.
- w. The PSIM shall provide the ability to contact (call or send messages) field responders directly from the GIS.
- x. The PSIM shall provide the ability to assign tasks to field responders directly from the GIS.
- y. The PSIM shall support the ability to add lines to the GIS. The line's properties shall be customizable.
- z. The PSIM shall support the ability to add labels to the GIS. The label's properties shall be customizable.
- aa. The PSIM shall support the ability to easily navigate maps.
- bb. The PSIM shall support the ability to add visual markers to the GIS. The marker's image/icon shall be customizable. The markers shall have the ability to trigger a variety of automatic actions.
- cc. The PSIM shall support the ability to define authorization restrictions for GIS administration such as adding views, icons, layers, etc.
- dd. The PSIM shall provide the ability to click an area on the GIS which will automatically bring up video feed from the camera closest to the selected point.
- ee. The PSIM shall provide the ability to define a camera's optimal range of view/ Field of view (FOV).
- ff. The PSIM shall provide the ability to show or hide the FOV on a map for a particular camera or for all cameras on a map.
- gg. The PSIM shall support the display of Plume Models on the GIS.
- hh. The PSIM shall support the ability to easily take and send snapshots of the GIS map.
- ii. The PSIM shall support the ability to import, view and manage AutoCAD files and their inherent layers and REVIT files and their inherent views and worksets.
- jj. The PSIM shall enable authorized users to open a new incident in the Maps View (automatically and on-demand) and associate the incident with its geographic location.
- kk. The PSIM shall provide a module that enables users to manage information received from external sources such as radar, telemetry or any device that provides geographic locations, such as RFID or GPS devices.

12. Zones

- a. The PSIM shall have the ability to create and manage geographic zones (also known as geo-fences).
- b. The PSIM shall have the ability to relate and/or control entities, incidents, GIS favorites, video favorites and attachments relevant to the zone to perform zone-based response operations.
- c. The PSIM shall provide the ability to define access control rules with automatic actions within a zone.

13. Sensor Management

- a. The PSIM shall have a module dedicated for the management of sensors, including editing and monitoring.
- b. The PSIM shall provide a Discovery module that can probe the connected subsystems and import all sensors without having to define them manually.
- c. The PSIM shall support searching capabilities to enable users to quickly and easily locate any sensor connected to the system.

14. Planning Tool

- a. The PSIM shall provide a user-friendly tool for creating response procedures and policies offline that are then activated and presented automatically or on-demand (during runtime).
- b. The PSIM shall provide a GUI to define the organizational structure including the ability to define job titles, their required and recommended skills, their grouping and their shift assignments.
- c. The PSIM shall provide the ability to define default expiration time per skill.
- d. The PSIM shall enable planners/ administrators to define policies that will ensure that incidents will be handled consistently.
- e. The PSIM shall provide a mechanism to define Incident Types.
- f. The PSIM shall provide a mechanism to define and associate Incident Custom Fields with Incident Types, procedures and Quick Launch buttons.
- g. The PSIM shall enable planners to define and associate specific multiple forms with Incident Types, and procedures.
- h. The PSIM shall provide a mechanism to associate attachments with Incident Types and procedures.
- i. The PSIM shall enable planners to define procedures and associate them with Incident Types and their relevant forms, attachments and reports.
- j. The PSIM shall provide a mechanism to define a repository of relevant reports.
- k. The PSIM shall enable planners to specify escalation policies per incident type.
- l. The PSIM shall enable planners to define planned tasks that will be assigned to users/group of users.
- m. The PSIM shall enable planners to define priority levels for each task.
- n. The PSIM shall enable planners to define scheduling criteria for each task.
- o. The PSIM shall enable planners to define escalation rules for each task.
- p. The PSIM shall enable the activation of different actions according to the task status.
- q. The PSIM shall enable users to define Quick launch buttons.
- r. The PSIM shall enable users to export the entire procedure book.

15. Workflow / Business Process / Event Correlation

- a. The PSIM shall provide a visual environment to design business workflow processes that supports mapping business rules into a set of workflows to provide automatic responses.
- b. The PSIM shall provide the ability to define activation rules based upon a wide array of parameters enabling complete flexibility and customization.
- c. The PSIM shall be capable of identifying potential threats coming from seemingly unrelated activities over a period of time.
- d. The PSIM shall provide an API to extend the workflow, business rules capabilities.

16. Reports

- a. The PSIM shall provide an integrated Reporting Tool that enables generating reports, automatically or on-demand.
- b. The PSIM shall provide a built-in Reporting Tool that requires username and password.
- c. The PSIM's Reporting Tool shall support detailed incident reports which include incident summary, all the tasks that been associated with the incident, sensor related activities, relevant snapshots and maps.
- d. The Reporting Tool shall support flexible definition for periodic reports.
- e. The Reporting Tool shall support system maintenance reports.
- f. The Reporting Tool shall support various customizable statistic reports.

- g. The Reporting Tool shall enable printing and saving in various file formats including Word, Excel, MHT, PDF, etc.
- h. The PSIM shall support automated generation and distribution of reports to users according to incident progress.
- i. The PSIM shall support automated generation and distribution of reports to users according to a pre-defined schedule.
- j. The PSIM shall enable users to add and manage customized reports.

17. Forms

- a. The PSIM shall provide a Form Designer module for designing customizable dynamic HTML-based forms with the ability to associate forms to incident types and then bring them up automatically in real time.
- b. The PSIM shall have the ability to relate forms to specific tasks and to incidents.

18. Training and Simulation

- a. The PSIM shall have simulation capabilities to be used as part of the individual job-training of operators and field responders.
- b. The PSIM shall have special permissions for activating simulations
- c. The PSIM shall enable launching of pre-defined simulation scripts for group-training scenarios.
- d. The PSIM shall support scheduling and automatic execution of training sessions.
- e. The PSIM shall record in the system database all training steps and responses for further analysis and conclusions.

19. Threat Level Management

- a. The system shall provide a visual indication for the current threat level at any time. This shall be displayed on the status display GUI.
- b. The system shall support automatic and manual updates of the threat level.
- c. The system shall support deployment of incident response procedures according to the active threat level, automatically or on-demand.

20. Communications & Messaging

- a. The PSIM shall support built-in communication mechanisms such as email, PSIM communication, and phone calls.
- b. The PSIM shall support a variety of information sharing such as, mass notifications and remote terminals.
- c. The PSIM shall support message tracing capabilities that can be filtered by a number of parameters such as time of creation, message sender/user, driver or message status.
- d. The PSIM shall support phone to phone connection automatically.
- e. The PSIM shall support phone to phone connection on-demand.
- f. The PSIM shall provide electronic phone book with searching capability.
- g. The PSIM shall support SIP protocol, enabling users to make outbound SIP calls from the Phone Dialer or to initiate a SIP call to a user directly from a map.
- h. The PSIM shall support SIP extensions dialing automatically according to a predefined rule.
- i. The PSIM shall provide a mobile solution.
- j. The PSIM shall support Intercom integrated capabilities.
- k. The PSIM shall support emergency telephone integrated capabilities.

21. Asset Management

- a. The PSIM shall have an asset management module for adding assets in order to track the location as well as monitor the condition and environment surrounding an organization's assets. The PSIM shall provide an easy method of searching and locating assets.
- b. The PSIM shall have icons representing assets and their state (when 3rd party devices are connected to an asset) and shall support placing assets on maps.
- c. The PSIM's asset manager shall be integrated with its rule and workflow engines.
- d. The system shall support associating assets with zones and the ability to 'show all assets in zone' and perform operations upon assets from the zone.
- e. The PSIM shall support displaying and managing assets on maps.
- f. The PSIM shall provide built-in asset types as well as enable administrators to create custom asset types.

22. Exception Lists

- a. The PSIM shall support the creation of "exception lists" by system administrators defining the assets for which an incident will be triggered upon detection.
- b. The PSIM shall support creating "Inclusive" or "Exclusive" exception lists for a particular site or globally across an organization.
- c. The PSIM shall trigger rule-based actions when assets contained within an "Inclusive" list or not contained within an "Exclusive" list are detected by the system.
- d. External System Integration
- e. The PSIM shall be designed and built to allow smooth and fast integration with all control room systems, sensors and edge-devices.
- f. The PSIM shall support a customized interface.
- g. The PSIM shall have a mechanism for correlating inputs from external systems.
- h. The PSIM shall have a mechanism that monitors all incoming traffic from sensors and enables setting configurable thresholds of permissible number of reports per timeframe and alerts the operator if the traffic exceeds the policy.
- i. The PSIM shall have a SDK to provide developers with the resources they need to integrate third party sensors, systems, and edge-devices into Situator.
- j. The PSIM shall support gateway administration capabilities directly from a user interface such as stop/start and enable/disable.

23. Product Documentation

- a. The PSIM shall provide built-in help (CHM format) with searchable capability and tree navigation.
- b. The PSIM shall provide a complete product document set.

E. Control and Communication Panels:

- 1. Shall be a central point provided for monitoring, controlling, and programming the PACS.
- 2. Shall provide a means of controlling a minimum of 16 doors per panel.
- 3. Shall be expandable and provide a means of networking multiple panels to provide overall control of all doors on the PACS via a primary panel.
- 4. Shall be system specific addressable, Internet Protocol (IP) addressable, and programmable via a computer.
- 5. Shall be able to be interfaced directly from a computer or via the Internet or Intranet. Access to the panels shall be password protected. All individuals with access to the panels shall have a user specific password.

6. Shall be of the same manufacturer and part number to ensure full compatibility within the system.
7. The operating system for the panel must utilize a single seamlessly integrated relational database for all functionality. This integration shall be provided with one operating environment. The operating environment shall be the fully multi-tasking multi-threading Microsoft Windows 2003/2000/Windows XP Operating System.
8. The panel's web enabled client applications shall be capable of running on independent client operating systems including Windows 2003/2000, Windows XP, Windows NT, Windows 98, Windows 95, Macintosh, UNIX, Linux, and Solaris. The web-enabled applications shall utilize the same common database as the other system modules.
9. The panel programming shall be written so that all system modules (e.g. access control, alarm monitoring, credential management, digital video, visitor management, intrusion detection, asset management, etc.) are developed and built from a unified 32-bit source code set. There absolutely shall not be separate source code bases for the individual modules of the PACS.
10. Shall consist of or have the equivalent of, at a minimum, a General Control Module and an Access Control Module. Both modules shall be programmable via a computer.
11. The General Control Module shall:
 - a. Provide for full distributed processing of access control and alarm monitoring operations.
 - b. Store the following information and function using a high speed, local 32-bit microprocessor:
 - 1) access levels
 - 2) hardware configurations
 - 3) programmed alarm outputs assigned at a administration client workstation
 - c. Process all access granted/denied decisions to provide fast responses to card reader transactions. A fully configured general control module with 64 card readers shall require less than one-half (0.5) seconds to grant access to an authorized cardholder or deny access to an unauthorized cardholder.
 - d. Meet the following minimum requirements:
 - 1) A minimum host communications speed of 115,200 bps.
 - 2) Support direct connect connections.
 - 3) Have remote dial up.
 - 4) Minimum on-board memory of eight (8) MB.
 - 5) Local Area Network (LAN) Support RJ45 (10/100baseT) Ethernet Interface Token Ring four (4) MB connectivity.
 - 6) Minimum memory storage of up to 5,000 cardholders and 100,000 events.
 - 7) Downstream ports for connecting card readers and data gathering panels via RS-485 multi-drop wiring configuration.
 - 8) Support of multiple card technologies.
 - 9) Supervised Communications with PACS system software.
 - 10) Support of up to eight card formats and facility codes.
 - 11) RS-485 Full Duplex, UL 1076 Grade AA communication channel to the system head-end.
 - 12) Integration with all manufacturers' card readers.
 - 13) Biometric Interface Support.
 - 14) 12 VAC or 12 volts direct current (VDC) input power via a UL certified step-down transformer or power supply.
 - 15) Issue Code Support for both Magnetic and Wiegand Card Formats.
 - 16) Individual Shunt Times
 - 17) Up to Nine Digit PIN Codes.
 - 18) Downstream serial RS-232 device support.

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- 19) Status LED's to identify normal component and communication status.
12. The access control module shall:
- a. Control up to 16 doors utilizing input and output relays that are fully programmable via network software.
 - b. Input relays shall meet the following minimum requirements:
 - 1) Provide up to 16 UL 1076 analog unsupervised alarm input zones to monitor and report alarm conditions, power faults, and tampers.
 - 2) Operate independently and in conjunction with output relays, which will send an output signal to a corresponding output device upon alarm input activation. Once an alarm has been received, the input relay shall activate any or all alarm outputs.
 - 3) Contain the following features:
 - a) UL 294 Certified.
 - b) Alarm contact status scanning at up to 120 times per second for each zone.
 - c) A low power Complementary-symmetry/metal-oxide semiconductor (CMOS) microprocessor.
 - d) Filtered data for noise rejection to prevent false alarms.
 - e) Up to 16 supervised inputs.
 - f) 12 VAC or 12 VDC Input Power.
 - g) Two (2) dedicated inputs for tamper and power status.
13. Output relays shall meet the following minimum requirements:
- a. Shall be capable of controlling a corresponding output device upon any input activation or on command from the PACS.
 - b. Shall be capable of responding to:
 - 1) Input alarms.
 - 2) Commands from a System Operator.
 - 3) Time zone control commands for automatic operation.
 - c. Shall be capable of:
 - 1) Pulsing for a predetermined duration. Duration shall be programmable for each relay individually.
 - 2) Responding on command from the System Operator to pulse, command on, command off, or reset to normal state.
 - 3) Operating outputs rated at 5 amps (A) @ 30 VDC.

14. For the SMS network a server and client workstation shall be required and must meet the following minimum technical characteristics:

a. Server:

Processor	Dual Intel Xeon 5600
Free Hard Disk Space	1TB SATA 3.0 Gb/s, 7200 RPM Hard Drive with 32MB Cache
Memory	6 GB
Network Card	100/1000 Base T
Drives	16X CD ROM RW
Operating System	Genuine Windows 7 Professional 64 Bit with XP mode
Backup	16X DVD±RW
Mount	Rack Mount

b. Client Workstation:

Processor	Dual Intel Xeon 5600 Processors
Free Hard Disk Space	1TB SATA 3.0 Gb/s, 7200 RPM Hard Drive with 32MB Cache
Memory	6 GB
Network Card	100/1000
CD-ROM Drive	16X DVD RW and 6X BLU-RAY DISC and 16X CD RW
Monitor/Video Adapter board	24" Widescreen TFT Active Matrix LCD / 1080p with RGB and DVI inputs
Operating Systems	Genuine Windows 7 Professional 64 Bit with XP mode

15. Card Readers and Credential Cards:

- a. Shall be utilized for controlling the locking hardware on a door and allows for reporting back to the main control panel with the time/date the door was accessed, the name of the person accessing the point of entry, and its location.
- b. Will be fully programmable and addressable, locally and remotely, and hardwired to the system.
- c. Shall be individually home run to the main panel.
- d. Shall be installed in a manner that they comply with:
 - 1) The Uniform Federal Accessibility Standards (UFAS)
 - 2) The Americans with Disabilities Act (ADA)
 - 3) The ADA Standards for Accessible Design
- e. Shall support a variety of card readers that must encompass a wide functional range. The PACS may combine any of the card readers described below for installations requiring multiple types of card reader capability (i.e., card only, card and/or PIN, card and/or biometrics, card and/or pin and/or biometrics, supervised inputs, etc.). These card readers shall be available in the approved technology to meet FIPS 201 and is ISO 14443 A or B compliant. The reader output can be Wiegand, RS-22, 485 or TCP/IP.
- f. Are to be housed in an aluminum bezel with a wide lead-in for easy card entry.

- g. Shall contain read head electronics, and a sender to encode digital door control signals.
 - h. LED's shall be utilized to indicate card reader status and access status.
 - i. Shall be able to support a user defined downloadable off-line mode of operation (e.g. locked, unlocked, or facility code), which will go in effect during loss of communication with the main control panel.
 - j. Shall provide audible feedback to indicate access granted/denied decisions. Upon a card swipe, two audible tones or beeps shall indicate access granted and three tones or beeps shall indicate access denied. All keypad buttons shall audible feedback.
 - k. Shall have a minimum of two programmable inputs and two programmable outputs.
 - l. All card readers that utilize keypad controls along with a reader and shall meet the following specifications:
 - 1) Entry control keypads shall use a unique combination of alphanumeric and other symbols as an identifier. Keypads shall contain an integral alphanumeric/special symbols keyboard with symbols arranged in ascending ASCII code ordinal sequence. Communications protocol shall be compatible with the local processor.
 - 2) Shall include a Light Emitting Diode (LED) or other type of visual indicator display and provide visual or visual and audible status indications and user prompts. The display shall indicate power on/off, and whether user passage requests have been accepted or rejected. The design of the keypad display or keypad enclosure shall limit the maximum horizontal and vertical viewing angles of the keypad. The maximum horizontal viewing angle shall be plus and minus five (5) degrees or less off a vertical plane perpendicular to the plane of the face of the keypad display. The maximum vertical viewing angle shall be plus and minus 15 degrees or less off a horizontal plane perpendicular to the plane of the face of the keypad display.
 - 3) Shall respond to passage requests by generating a signal to the local processor. The response time shall be 800 milliseconds or less from the time the last alphanumeric symbol is entered until a response signal is generated.
 - 4) Shall be powered from the source as designed and shall not dissipate more than 150 Watts.
 - 5) Shall be suitable for surface, semi-flush, pedestal, or weatherproof mounting as required.
 - 6) Shall provide a means for users to indicate a duress situation by entering a special code.
16. Card readers shall come in the following formats:
- a. Dual Technology Proximity Reader / Contactless Smart Card Reader
 - 1) Dual technology readers shall support 125MHz proximity cards and 13.56MHz contactless cards.
 - 2) Card readers shall read credential cards whose characteristics of size and technology meet those defined by ISO/IEC 7816, 14443, 15693.
 - 3) The dual technology card reader shall be able to read FIPS 201 access cards.
 - 4) The security contractor shall coordinate the card reader with the access control system prior to ordering and installing the dual technology card readers. Field modifications may not be allowed.

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- 5) The card reader shall be contactless and meet or exceed the following technical characteristics:
- a) Data Output Formats: FIPS 101 low outputs the FASC-N in an assortment of Wiegand bit formats from 40 – 200 bits. FIPS 201 medium outputs a combination FASC-N and HMAC in an assortment of Wiegand bit formats from 32 – 232 bits. All Wiegand formats or the upgradeability from Low to Medium Levels can be field configured with the use of a command card.
 - b) FIPS 201 readers shall be able to read, but not be limited to, DESfire and iCLASS cards. Reader range shall comply with ISO standards 7816, 14443, and 15693, and also take into consideration conditions, are at a minimum 1" to 2" (2.5 – 5 cm).
- b. Contactless Smart Cards and Readers:
- 1) Smart card readers shall read credential cards whose characteristics of size and technology meet those defined by ISO/IEC 7816, 14443, 15693.
 - 2) The readers shall have "flash" download capability to accommodate card format changes.
 - 3) The card reader shall have the capability of reading the card data and transmitting the data to the main monitoring panel.
 - 4) The card reader shall be contactless and meet or exceed the following technical characteristics:
 - a) Data Output Formats: FIPS 201 low outputs the FASC-N in an assortment of Wiegand bit formats from 40 – 200 bits. FIPS 201 medium outputs a combination FASC-N and HMAC in an assortment of Wiegand bit formats from 32 – 232 bits. All Wiegand formats or the upgradeability from Low to Medium Levels can be field configured with the use of a command card.
 - b) FIPS 201 readers shall be able to read, but not be limited to, DESfire and iCLASS cards. Reader range shall comply with ISO standards 7816, 14443, and 15693, and also take into consideration conditions, are at a minimum 1" to 2" (2.5 – 5 cm).
- c. Proximity (PROX) Card Reader:
- 1) Shall be utilized during the transition from the existing technology to the contactless smart card technology as defined in FIPS-201.
 - 2) Shall use active/passive proximity detection and shall not require contact with the proximity credential card for operation.
 - a) Active detection proximity card readers shall provide power to compatible credential cards through magnetic induction and receive and decode a unique identification code number transmitted from the credential card.
 - b) Passive detection proximity card readers shall use a swept-frequency, radio frequency field generator to read the resonant frequencies of tuned circuits laminated into compatible credential cards. The resonant frequencies read shall constitute a unique identification code number.

- 3) Shall read proximity cards in a range from 0 to at least six (6) inches (0 to at least 15 cm) from the reader. The credential card design shall allow for a minimum of 32,000 unique identification codes per facility.
 - 4) Shall be able to read cards from two (2) inches (5cm) to 6 inches (15cm).
 - 5) For exterior parking lots or garages shall be 16 inches (40 cm).
 - 6) The operating frequency shall be determined by the type of access control system being utilized.
 - d. Credential Cards: Shall be in accordance with FIPS 201 and controlled by the PIV enrollment and issuance system.
17. Picture ID and Badging Station:
- a. Shall be FIPS 201 compliant and will be controlled by the PIV enrollment and issuance system.
 - b. Shall provide a form-based interface for the entry of badge holder data and access information. All data, including images, shall be stored on the system server.
 - c. Shall allow image and signature capture for use in badge production, and provides tools for badge design. Both video and digital cameras may be utilized.
 - d. Shall meet the following minimum characteristics:
 - 1) Windows 2000/XP
 - 2) Support for all ID Cards, Reader and Printer Technologies
 - 3) Centralized User Enrollment
 - 4) Password Protected
 - 5) High Speed Photo Capture
 - 6) Signature and/or Biometric Data Capture
 - 7) Digital Certificate Management
 - 8) Report Generator
 - 9) Intelli-Check ID Check Integration or Equivalent
 - 10) Photo Capture via Digital or Video Camera
 - 11) In-line Encoding of Magnetic Stripe and Barcode
 - 12) ZD (PDF-417) Barcode Support
 - 13) Image Compression Control
 - 14) Image FX Gallery
 - 15) Program Badge
 - 16) Chromakey and Ghosting
18. Biometrics:
- a. Shall be FIPS 201 and NIST SP 800-76 compliant.
 - b. Shall utilize hand/palm, fingerprint, retinal, or voice verification and could be utilized as secondary authentication in conjunction with card readers in high security area as defined by the VA. (Note: VA policy requires that the use of biometric measurements is limited to secondary authentication in high or medium security applications).
 - c. Shall be programmable, addressable, and hardwired directly to the main control panel and individually home run to the main control panel.
 - d. Shall be installed in a manner that they comply with:
 - 1) The Uniform Federal Accessibility Standards (UFAS)
 - 2) The Americans with Disabilities Act (ADA)
 - 3) The ADA Standards for Accessible Design

- e. Shall include a means to construct individual templates or profiles based upon measurements taken from the person to be enrolled. This template shall be stored as part of the System Reference Database Files. The stored template shall be used as a comparative base by the personnel identity verification equipment to generate appropriate signals to the associated local processors.
- f. Shall interface with PACS and SMS and provide the employee's name, contact information, and point of access.
- g. Shall allow for surface, flush, or pedestal mounting.
- h. Shall have communications protocol in place that shall allow for communications with the SMS.
- i. Shall determine when multiple attempts were made for verification, and shall automatically prompt the user for additional attempts up to a maximum of three tries. After a third failed attempt the unit shall generate an entry control alarm. This alarm will report to the SMS and the CCTV system. The camera viewpoint for where the alarm was generated shall automatically be called up onto a monitor and be recorded via the recording equipment. An alarm within the SMS shall also be generated recording, at a minimum, the date, time, and attempted point of entry.
- j. Hand/Palm Geometry Verification:
 - 1) Shall utilize unique human hand measurements to identify authorized, enrolled personnel.
 - 2) During the scan process the hand geometry device, which shall allow the user's hand to remain in full view during the scanning process, shall a three (3) dimensional measurement of the user's hand identifying its size and shape.
 - 3) This scan process shall start automatically once the user's hand is positioned. The hand geometry device shall be able to use either left or right hands for enrollment and verification.
 - 4) Shall include an LED or other type of visual indicator display and provide visual or visual and audible status indications and user prompts. The display shall indicate power on/off, and whether user passage requests have been accepted or rejected.
 - 5) Shall only be updated at the unit itself and automatic updates via the SMS shall not be allowed.
 - 6) Any significant change to the user's hand, scars, loss of digit, or any other change that will alter the three dimension view of the hand shall require an update to the unit and SMS.
 - 7) Shall provide an enrollment, recognition, and code/credential verification mode. The enrollment mode shall create a hand template for new personnel and enter the template into the entry control database file created for that person. Template information shall be compatible with the system application software. The operating mode shall be selectable by the system manager/operator from the central processor. When operating in recognition mode, the hand geometry device shall allow passage when the hand scan data from the verification attempt matches a hand geometry template stored in the database files. When operating in code/credential verification mode, the hand geometry device shall allow passage when the hand scan data from the verification attempt matches the hand geometry template associated with the identification code entered into a keypad; or matches the hand geometry template associated with credential card data read by a card reader.

19. Fingerprint Verification:

- a. Shall use a unique human fingerprint pattern to identify authorized, enrolled personnel.
- b. Shall allow the user's hand to remain in full view during the scanning process, shall incorporate positive measures to establish that the hand or fingers being scanned by the device belong to a living human being.
- c. Shall provide an optical or other type of scan of the user's fingers. The fingerprint verification scanner shall automatically initiate the scan process provided the user's fingers are positioned.
- d. LED or other type of visual indicator displays shall provide a visual or visual and audible status indication and enrollee prompts. The display shall indicate power on/off, and whether user passage requests have been accepted or rejected.
- e. Any significant change to the user's finger such as scars, loss of digit, or any other change that will alter the finger print shall require an update to the unit and SMS.
- f. Shall provide an adjustable acceptance tolerance or template match criteria under system manager/operator control.
- g. Shall respond to passage requests by generating signals to the local processor. The verification time shall be 2.0 seconds or less from the moment the finger print analysis scanner initiates the scan process until the fingerprint analysis scanner generates a response signal.
- h. Shall:
 - 1) Provide an enrollment mode, recognition mode, and code/credential verification mode. The enrollment mode shall create a fingerprint template for new personnel and enter the template into the system database file created for that person.
 - 2) Template information shall be compatible with the system application software.
 - 3) The operating mode shall be selectable by the system manager/operator from the central station.
- i. When operating in recognition mode, the fingerprint analysis scanner shall allow passage when the fingerprint data from the verification attempt matches a fingerprint template stored in the database files.
- j. When operating in code/credential verification mode, the fingerprint analysis scanner shall allow passage when the fingerprint data from the verification attempt matches a fingerprint template associated with the identification code. When entered into a keypad or it matches the fingerprint template associated with credential, the card data will then be recognized by the card reader.
- k. Shall store template transactions involving fingerprint scans. The template match scores shall be stored in the matching personnel data file in a format compatible with the system application software, and shall be used for report generation.

20. Portal Control Devices:

- a. Shall be used to assist the PACS.
- b. Such devices shall:
 - 1) Provide a means of monitoring the doors status.
 - 2) Allow for exiting a space via either a push button, request to exit, or panic/crash bar.
 - 3) Provide a means of override to the PACS via a keypad or key bypass.
 - 4) Assist door operations utilizing automatic openers and closures.

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- 5) Provide a secondary means of access to a space via a keypad.
 - c. Shall be connected to and monitored by the main PACS panel.
 - d. Shall be installed in a manner that they comply with:
 - 1) The Uniform Federal Accessibility Standards (UFAS)
 - 2) The Americans with Disabilities Act (ADA)
 - 3) The ADA Standards for Accessible Design
 - e. Shall provide a secondary means of access control within a secure area.
 - f. Keypads: Refer to Section 2.2.F.12 for keypad requirements.
 - g. Push-Button Switches:
 - 1) Shall be momentary contact, back lighted push buttons, and stainless steel switch enclosures for each push button as shown. Buttons are to be utilized for secondary means of releasing a locking mechanism.
 - 2) In an area where a push button is being utilized for remote access of the locking device then no more than two (2) buttons shall operate one door from within one secure space. Buttons will not be wired in series with one other.
 - 3) In an area where locally stationed guards control entry to multiple secure points via remote switches. An interface board shall be designed and constructed for only the amount of buttons it shall house. These buttons shall be flush mounted and clearly labeled for ease of use. All buttons shall be connected to the PACS and SMS system for monitoring purposes.
 - 4) Shall have double-break silver contacts that will make 720 VA at 60 amperes and break 720 VA at 10 amperes.
- F. Door Status Indicators:
- 1. Shall monitor and report door status to the SMS.
 - 2. Door Position Sensor:
 - a. Shall provide an open or closed indication for all doors operated on the PACS and report directly to the SMS.
 - b. Shall also provide alarm input to the Intrusion Detection System for all doors operated by the PACS and all other doors that require monitoring by the intrusion detection system.
 - c. Switches for doors operated by the PACS shall be double pole double throw (DPDT). One side of the switch shall monitor door position and the other side if the switch shall report to the intrusion detection system. For doors with electromagnetic locks a magnetic bonding sensor (MBS) can be used in place of one side of a DPDT switch, in turn allowing for the use of a single pole double throw (SPDT) switch in it place of a DPDT switch.
 - d. Switches for doors not operated by the PACS shall be SPDT and report directly to the IDS.
 - e. Shall be surface or flush mounted and wide gap with the ability to operate at a maximum distance of up to 2" (5 cm).
 - 3. Request-to-Exit (RTE):
 - a. Shall be utilized to de-energize the locking hardware on a door to allow for exiting a secure area.
 - b. Shall be either an infrared sensor or a push button.

- c. Infrared sensors shall meet the following minimum technical characteristics:

Alarm Output	2 Form "C" relay contacts
Indicators	1 activation LED
Power Requirements	12 or 24 VAC, 12 or 24 VDC, 26 mA @ 12 VDC
Relay Latch	Time Adjustable to 60 seconds

G. Entry Control Devices:

1. Shall be hardwired to the PACS main control panel and operated by either a card reader or a biometric device via a relay on the main control panel.
2. Shall be fail-safe in the event of power failure to the PACS system.
3. Shall operate at 24 VCD, with the exception of turnstiles and be powered by a separate power supply dedicated to the door control system. Each power supply shall be rated to operate a minimum of two doors simultaneously without error to the system or overload the power supply unit.
4. Shall have a diode or metal-oxide veristor (MOV) to protect the controller and power supply from reverse current surges or back-check.
5. Power Supplies.

H. Shall be UL rated and able to adequately power two entry control devices on a continuous base without failure.

1. Shall meet the following minimum technical characteristics:

INPUT POWER	110 VAC 60 HZ 2 amp
OUTPUT VOLTAGE	12 VDC Nominal (13.8 VDC) 24 VDC Nominal (27.6 VDC) Filtered and Regulated
BATTERY	Dependant on Output Voltage shall provide up to 14 Ah
OUTPUT CURRENT	10 amp max. @ 13.8 VDC 5 amp max. @ 27.6 VDC
PRIMARY FUSE SIZE	6.3 amp (non-removable)
BATTERY FUSE SIZE	12 amp, 3AG
CHARGING CIRCUIT	Built-in standard

I. Wires and Cables

1. Shall meet or exceed the manufactures recommendations for power and signal.
2. Shall be carried in an enclosed conduit system, utilizing electromagnetic tubing (EMT) to include the equivalent in flexible metal, rigid galvanized steel (RGS) to include the equivalent of liquid tight, polyvinylchloride (PVC) schedule 40 or 80.
3. All conduits will be sized and installed per the NEC. All security system signal and power cables that traverse or originate in a high security office space will contained in either EMT or RGS conduit.
4. All conduit, pull boxes, and junction boxes shall be clearly marked every with colored permanent tape or paint that will allow it to be distinguished from all other conduit and infrastructure.
5. Conduit fills shall not exceed 50 percent unless otherwise documented.
6. A pull rope shall be pulled along with signal and power cables to assist in future work.
7. At all locations where core drilling is conducted to allow for conduit to be installed, then fire stopping shall be applied to that area.

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8. High power and signal cables shall not share the same conduit and shall be kept separate up to the point of connection. High power for the security system shall be defined as any cable or sets of cables carrying 30 VDC/VAC or higher.
 9. Signal Cables:
 - a. Shall meet or exceed all specifications and requirements called out by the manufactures.
 - b. Shall be twisted pairs.
 - c. All cables and conductors, except fiber optic cables, that act as a control, communication, or signal lines shall include surge protection. Surge protection shall be furnished at the equipment end and additional triple electrode gas surge protectors rated for the application on each wire line circuit shall be installed within 3 feet, (1 meter) of the building cable entrance. The inputs and outputs shall be tested in both normal and common mode using the following wave forms:
 - 1) A 10 microsecond rise time by 1000 microsecond pulse width waveform with a peak voltage of 1500 volts and peak current of 60 amperes.
 - 2) An 8 microsecond rise time by 20 microsecond pulse width wave form with a peak voltage of 1000 volts and peak current of 500 amperes.
 10. Power Cables:
 - a. Shall be rated for either 110 or 220 VAC, 50 or 60 Hz, and shall comply with VA Master Spec 26 05 21 Low Voltage Electrical Power Conductors and Cables (600 Volts and Below).
 - b. Shall be sized according and comply with the NEC. High voltage power cables will be a minimum of three conductors, 14 AWG, stranded, and coated with a non-conductive polyvinylchloride (PVC) jacket.
 - c. Low Voltage Power Cables:
 - 1) All cables shall be a minimum of 18 AWG, Stranded and have a polyvinylchloride outer jacket.
 - 2) Specific cable size shall determined using a basic voltage over distance calculation and shall comply with the NEC's requirements for low voltage cables.
 - d. All equipment connected to AC power shall be protected from surges. Equipment protection shall withstand surge test waveforms described in IEEE C62.41. Fuses shall not be used as a means of surge protection.

2.3 INSTALLATION KIT

- A. General: The kit shall be provided that at a minimum includes all connectors and terminals, labeling systems, audio spade lugs, barrier strips, punch blocks or wire wrap terminals, heat shrink tubing, cable ties, solder, hangers, clamps, bolts, conduit, cable duct, and/or cable tray, etc., required to accomplish a neat and secure installation. All wires shall terminate in a spade lug and barrier strip, wire wrap terminal or punch block. Unfinished or unlabeled wire connections shall not be allowed. All unused and partially opened installation kit boxes, coaxial, fiber-optic, and twisted pair cable reels, conduit, cable tray, and/or cable duct bundles, wire rolls, physical installation hardware shall be turned over to the Contracting Officer. The following sections outlined are the minimum required installation sub-kits:

1. System Grounding:

- a. The grounding kit shall include all cable and installation hardware required. All head end equipment and power supplies shall be connected to earth ground via internal building wiring, according to the NEC.
- b. This includes, but is not limited to:

- 1) Coaxial Cable Shields
- 2) Control Cable Shields
- 3) Data Cable Shields
- 4) Equipment Racks
- 5) Equipment Cabinets
- 6) Conduits
- 7) Cable Duct blocks
- 8) Cable Trays
- 9) Power Panels
- 10) Grounding
- 11) Connector Panels

2. Coaxial Cable: The coaxial cable kit shall include all coaxial connectors, cable tying straps, heat shrink tabbing, hangers, clamps, etc., required to accomplish a neat and secure installation.
3. Wire and Cable: The wire and cable kit shall include all connectors and terminals, audio spade lugs, barrier straps, punch blocks, wire wrap strips, heat shrink tubing, tie wraps, solder, hangers, clamps, labels etc., required to accomplish a neat and orderly installation.
4. Conduit, Cable Duct, and Cable Tray: The kit shall include all conduit, duct, trays, junction boxes, back boxes, cover plates, feed through nipples, hangers, clamps, other hardware required to accomplish a neat and secure conduit, cable duct, and/or cable tray installation in accordance with the NEC and this document.
5. Equipment Interface: The equipment kit shall include any item or quantity of equipment, cable, mounting hardware and materials needed to interface the systems with the identified sub-system(s) according to the OEM requirements and this document.
6. Labels: The labeling kit shall include any item or quantity of labels, tools, stencils, and materials needed to label each subsystem according to the OEM requirements, as-installed drawings, and this document.
7. Documentation: The documentation kit shall include any item or quantity of items, computer discs, as installed drawings, equipment, maintenance, and operation manuals, and OEM materials needed to provide the system documentation as required by this document and explained herein.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. System installation shall be in accordance with UL 294, manufacturer and related documents and references, for each type of security subsystem designed, engineered and installed.
- B. Components shall be configured with appropriate “service points” to pinpoint system trouble in less than 30 minutes.
- C. The Contractor shall install all system components including Government furnished equipment, and appurtenances in accordance with the manufacturer's instructions, documentation listed in Sections 1.4 and 1.5 of this document, and shall furnish all necessary connectors, terminators, interconnections, services, and adjustments required for a operable system.
- D. The PACS will be designed, engineered, installed, and tested to ensure all components are fully compatible as a system and can be integrated with all associated security subsystems, whether the system is a stand alone or a network.
- E. For integration purposes, the contractor shall provide full, seamless, integration of all security subsystems with one single GUI. Integration with these security subsystems shall be achieved by the PSIM. Determination for methodology has been determined when the system(s) were designed and engineered. For installation purposes, the PACS shall utilize an output module for integration with other security subsystems. The Contractor will ensure all connections are per the OEM and that any and all software upgrades required to integrate the systems are installed prior to system start-up. For programming purposes refer to the manufacturers requirements for correct system operations. Contractor shall provide all API's required. Ensure computers being utilized for system integration meet or exceed the minimum system requirements outlined on the systems software packages. The PACS shall be integrated with the following associated security subsystems. Contractor shall bear all costs associated with systems set up, integration of all sensors and GIS maps and customized reports. Contractors shall work with VA Security Chief of Operations and obtain sign-off that all security devices have been programmed properly prior to substantial completion.

1. CCTV:

- a. Provide 24 hour coverage of all entry points to the perimeter and agency buildings. As well as all emergency exits utilizing a fixed color camera.
- b. Be able to monitor, control and record cameras on a 24 hours basis.
- c. Be programmed automatically call up a camera when an access point is into an alarm state.
- d. For additional PACS system requirements as they relate to the CCTV, refer to Section 28 23 00, VIDEO SURVEILLANCE.

2. IDS:

- a. Be able monitor door control sensors.
- b. Be able to monitor and control the IDS on a 24 hours basis.
- c. Be programmed to go into an alarm state when an IDS device is put into an alarm state, and notify the operator via an audible alarm.
- d. For additional PACS system requirements as they relate to the IDS, refer to Section 28 16 11, INTRUSION DETECTION SYSTEM.

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3. EPPS:
- a. Be programmed to go into an alarm state when an emergency call box or duress alarm/panic device is activated, and notify the Access Control System and Database Management of an alarm event.
 - b. For additional PACS requirements as they relate to the EPPS, refer to Section 28 26 00, ELECTRONIC PERSONAL PROTECTION SYSTEM.
- F. The Contractor shall visit the site and verify that site conditions are in agreement with the design package. The Contractor shall report all changes to the site or conditions that will affect performance of the system. The Contractor shall not take any corrective action without written permission from the Government.
- G. The Contractor shall visit the site and verify that site conditions are in agreement/compliance with the design package. The Contractor shall report all changes to the site or conditions that will affect performance of the system to the Contracting Officer in the form of a report. The Contractor shall not take any corrective action without written permission received from the Contracting Officer.
- H. Existing Equipment:
- 1. The Contractor shall connect to and utilize existing door equipment, control signal transmission lines, and devices as outlined in the design package. Door equipment and signal lines that are usable in their original configuration without modification may be reused with Contracting Officer approval.
 - 2. The Contractor shall perform a field survey, including testing and inspection of all existing door equipment and signal lines intended to be incorporated into the PACS, and furnish a report to the Contracting Officer as part of the site survey report. For those items considered nonfunctioning, provide (with the report) specification sheets, or written functional requirements to support the findings and the estimated cost to correct the deficiency. As part of the report, the Contractor shall include a schedule for connection to all existing equipment.
 - 3. The Contractor shall make written requests and obtain approval prior to disconnecting any signal lines and equipment, and creating equipment downtime. Such work shall proceed only after receiving Contracting Officer approval of these requests. If any device fails after the Contractor has commenced work on that device, signal or control line, the Contractor shall diagnose the failure and perform any necessary corrections to the equipment.
 - 4. The Contractor shall be held responsible for repair costs due to Contractor negligence, abuse, or improper installation of equipment.
 - 5. The Contracting Officer shall be provided a full list of all equipment that is to be removed or replaced by the Contractor, to include description and serial/manufacturer numbers where possible. The Contractor shall dispose of all equipment that has been removed or replaced based upon approval of the Contracting Officer after reviewing the equipment removal list. In all areas where equipment is removed or replaced the Contractor shall repair those areas to match the current existing conditions.

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- I. Enclosure Penetrations: All enclosure penetrations shall be from the bottom of the enclosure unless the system design requires penetrations from other directions. Penetrations of interior enclosures involving transitions of conduit from interior to exterior, and all penetrations on exterior enclosures shall be sealed with rubber silicone sealant to preclude the entry of water and will comply with VA Master Specification 07 84 00, Firestopping. The conduit riser shall terminate in a hot-dipped galvanized metal cable terminator. The terminator shall be filled with an approved sealant as recommended by the cable manufacturer and in such a manner that the cable is not damaged.
- J. 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.
- K. Control Panels:
1. Connect power and signal lines to the controller.
 2. Program the panel as outlined by the design and per the manufacturer's programming guidelines.
- L. SMS:
1. Coordinate with the VA agency's IT personnel to place the computer on the local LAN or Intranet and provide the security system protection levels required to insure only authorized VA personnel have access to the system.
 2. Program and set-up the SMS to ensure it is in fully operation.
- M. Card Readers:
1. Connect all signal inputs and outputs as shown and specified.
 2. Terminate input signals as required.
 3. Program and address the reader as per the design package.
 4. Readers shall be surface or flushed mounted and all appropriate hardware shall be provided to ensure the unit is installed in an enclosed conduit system.
- N. Biometrics:
1. Connect all signal input and output cables along with all power cables.
 2. Program and ensure the device is in operating order.
- O. Portal Control Devices:
1. Install all signal input and output cables as well as all power cables.
 2. Devices shall be surface or flush mounted as per the design package.
 3. Program all devices and ensure they are working.
- P. Door Status Indicators:
1. Install all signal input and output cables as well as all power cables.
 2. RTE's shall be surface mounted and angled in a manner that they cannot be compromised from the non-secure side of a windowed door, or allow for easy release of the locking device from a distance no greater than 6 feet from the base of the door.
 3. Door position sensors shall be surface or flush mounted and wide gap with the ability to operate at a maximum distance of up to 2" (5 cm).

Q. Entry Control Devices:

1. Install all signal input and power cables.
2. Strikes and bolts shall be mounted within the door frame.
3. Mortise locks shall be mounted within the door and an electric transfer hinge shall be utilized to transfer the wire from within the door frame to the mortise lock inside the door.
4. Electromagnetic locks shall be installed with the mag-lock mounted to the door frame and the metal plate mounted to the door.

R. System Start-Up:

1. The Contractor shall not apply power to the PACS until the following items have been completed:
 - a. PACS equipment items and have been set up in accordance with manufacturer's instructions.
 - b. A visual inspection of the PACS has been conducted to ensure that defective equipment items have not been installed and that there are no loose connections.
 - c. System wiring has been tested and verified as correctly connected as indicated.
 - d. All system grounding and transient protection systems have been verified as installed and connected as indicated.
 - e. Power supplies to be connected to the PACS have been verified as the correct voltage, phasing, and frequency as indicated.
2. Satisfaction of the above requirements shall not relieve the Contractor of responsibility for incorrect installation, defective equipment items, or collateral damage as a result of Contractor work efforts.

S. Supplemental Contractor Quality Control:

1. The Contractor shall provide the services of technical representatives who are familiar with all components and installation procedures of the installed PACS; and are approved by the Contracting Officer.
2. The Contractor will be present on the job site during the preparatory and initial phases of quality control to provide technical assistance.
3. The Contractor shall also be available on an as needed basis to provide assistance with follow-up phases of quality control.
4. The Contractor shall participate in the testing and validation of the system and shall provide certification that the system installed is fully operational as all construction document requirements have been fulfilled.

3.2 TESTING AND TRAINING

- A. All testing and training shall be compliant with the VA General Requirements, Section 01 00 00, GENERAL REQUIREMENTS.

-----END-----

SECTION 28 16 11
INTRUSION DETECTION STSTEM

PART 1 – GENERAL

1.1 DESCRIPTION

- A. The Electronic Security System Contractor (ESSC) shall provide a fully integrated Security System on a dedicated Security System Network. The Intrusion Detection System is a sub system to the Integrated Security System. Provide and install a complete Intrusion Detection System, hereinafter referred to as IDS, as specified in this section.

1.2 RELATED WORK

- A. For firestopping application and use, Section 07 84 00, FIRESTOPPING.
- B. For door and gate installation, Section 08 34 59, VAULT DOORS AND DAY GATES.
- C. For door installation, Section 08 35 13.13, ACCORDING FOLDING DOORS.
- D. For window installation, Section 08 51 13, ALUMINUM WINDOWS.
- E. For door installation, Section 08 71 00, DOOR HARDWARE.
- F. For electrical installation, Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
- G. For power cables, Section 26 05 21, LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW).
- H. For grounding of equipment, Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.
- I. For infrastructure, Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS.
- J. For underground installation of wiring, Section 26 05 41, UNDERGROUND ELECTRICAL CONSTRUCTION.
- K. For infrastructure, Section 26 05 36, CABLE TRAYS FOR ELECTRICAL SYSTEMS.
- L. For access control integration, Section 28 13 11, PHYSICAL ACCESS CONTROL SYSTEMS (PACS).
- M. For security cameras, Section 28 23 00, VIDEO SURVEILLANCE.
- N. For control and operation of all security systems, Section 28 13 16, ACCESS CONTROL SYSTEM AND DATABASE MANAGEMENT.
- O. For emergency and interior communications, Section 28 26 00, ELECTRONIC PERSONAL PROTECTION SYSTEM (EPPS).
- P. For fences, Section 32 31 13, CHAIN LINK FENCES AND GATES.

- Q. For Warranty Construction, Section 00 72 00, GENERAL CONDITIONS.
- R. For General Requirements, Section 01 00 00, GENERAL REQUIREMENTS.

1.3 QUALITY ASSURANCE

- A. The Contractor shall be responsible for providing, installing, and the operation of the IDS as shown. The Contractor shall also provide certification as required.
- B. The security system shall be installed and tested to ensure all components are fully compatible as a system and can be integrated with all associated security subsystems, whether the security system is stand-alone or a part of a complete Information Technology (IT) computer network.
- C. The Contractor or security sub-contractor shall be a licensed security Contractor as required within the state or jurisdiction of where the installation work is being conducted.

1.4 SUBMITTALS

- A. Submit below items in conjunction with Master Specification Sections 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, and Section 02 41 00, DEMOLITION.
- B. Provide certificates of compliance with Section 1.3, Quality Assurance.
- C. Provide a pre-installation and as-built design package in both electronic format and on paper, minimum size 48 x 48 inches (1220 x 1220 millimeters); drawing submittals shall be per the established project schedule.
- D. Pre-installation design and as-built packages shall include, but not be limited to:
 - 1. Index Sheet that shall:
 - a. Define each page of the design package to include facility name, building name, floor, and sheet number.
 - b. Provide a list of all security abbreviations and symbols.
 - c. Reference all general notes that are utilized within the design package.
 - d. Specification and scope of work pages for all security systems that are applicable to the design package that will:
 - 1) Outline all general and job specific work required within the design package.
 - 2) Provide a device identification table outlining device Identification (ID) and use for all security systems equipment utilized in the design package.
 - 2. Drawing sheets that will be plotted on the individual floor plans or site plans shall:
 - a. Include a title block as defined above.
 - b. Define the drawings scale in both standard and metric measurements.
 - c. Provide device identification and location.
 - d. Address all signal and power conduit runs and sizes that are associated with the design of the electronic security system and other security elements (e.g., barriers, etc.).
 - e. Identify all pull box and conduit locations, sizes, and fill capacities.
 - f. Address all general and drawing specific notes for a particular drawing sheet.

3. A riser drawing for each applicable security subsystem shall:
 - a. Indicate the sequence of operation.
 - b. Relationship of integrated components on one diagram.
 4. Include the number, size, identification, and maximum lengths of interconnecting wires.
 - a. Wire/cable types shall be defined by a wire and cable schedule. The schedule shall utilize a lettering system that will correspond to the wire/cable it represents (example: A = 18 AWG/1 Pair Twisted, Unshielded). This schedule shall also provide the manufacturer's name and part number for the wire/cable being installed.
 5. A system drawing for each applicable security system shall:
 - a. Identify how all equipment within the system, from main panel to device, shall be laid out and connected.
 - b. Provide full detail of all system components wiring from point-to-point.
 - c. Identify wire types utilized for connection, interconnection with associate security subsystems.
 - d. Show device locations that correspond to the floor plans.
 - e. All general and drawing specific notes shall be included with the system drawings.
 6. A schedule for all of the applicable security subsystems shall be included. All schedules shall provide the following information:
 - a. Device ID.
 - b. Device Location (e.g. site, building, floor, room number, location, and description).
 - c. Mounting type (e.g. flush, wall, surface, etc.).
 - d. Power supply or circuit breaker and power panel number.
 - e. In addition, for the IDS, provide the sensor ID, sensor type and housing model number.
 7. Detail and elevation drawings for all devices that define how they were installed and mounted.
- E. Pre-installation design packages shall be reviewed by the Contractor along with a VA representative to ensure all work has been clearly defined and completed. All reviews shall be conducted in accordance with the project schedule. There shall be four (4) stages to the review process:
1. 35 percent
 2. 65 percent
 3. 90 percent
 4. 100 percent
- F. Provide manufacturer security system product cut-sheets. Submit for approval at least 30 days prior to commencement of formal testing, a Security System Operational Test Plan. Include procedures for operational testing of each component and security subsystem, to include performance of an integrated system test.
- G. Submit manufacture's certification of Underwriters Laboratories, Inc. (UL) listing as specified. Provide all maintenance and operating manuals per the VA General Requirements, Section 01 00 00, GENERAL REQUIREMENTS.

1.5 APPLICABLE PUBLICATIONS

- A. The publications listed below (including amendments, addenda, revisions, supplement, and errata) form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American National Standards Institute (ANSI)/Security Industry Association (SIA):
 - PIR-01-00Passive Infrared Motion Detector Standard - Features for Enhancing False Alarm Immunity
 - CP-01-00Control Panel Standard-Features for False Alarm Reduction
- C. Department of Justice American Disability Act (ADA)
 - 28 CFR Part 36-90ADA Standards for Accessible Design
- D. National Electrical Manufacturers Association (NEMA):
 - 250-03Enclosures for Electrical Equipment (1000 Volts Maximum)
- E. National Fire Protection Association (NFPA):
 - 70-05National Electrical Code
 - 731-06Standards for the Installation of Electric Premises Security Systems
- F. Underwriters Laboratories, Inc. (UL):
 - 464-03Audible Signal Appliances
 - 609-96Local Burglar Alarm Units and Systems
 - 634-00Standards for Connectors with Burglar-Alarm Systems
 - 639-97Standards for Intrusion Detection Units
 - 1037-99Standard for Anti-theft Alarms and Devices
 - 1635-96Digital Alarm Communicator System Units
- G. Uniform Federal Accessibility Standards (UFAS), 1984

1.6 WARRANTY OF CONSTRUCTION.

- A. Warrant IDS work subject to the Article "Warranty of Construction" of FAR 52.246-21.

PART 2 – PRODUCTS

2.1 EQUIPMENT AND MATERIALS

- A. General
 - 1. All equipment associated within the IDS shall be rated for continuous operation. Environmental conditions (i.e. temperature, humidity, wind, and seismic activity) shall be taken under consideration at each facility and site location prior to installation of the equipment.
 - 2. All equipment shall operate on a 120 or 240 volts alternating current (VAC); 50 Hz or 60 Hz AC power system unless documented otherwise in subsequent sections listed within this specification. All equipment shall have a back-up source of power that will provide a minimum of 96 hours of run time in the event of a loss of primary power to the facility.
 - 3. The system shall be designed, installed, and programmed in a manner that will allow for ease of operation, programming, servicing, maintenance, testing, and upgrading of the system.

4. All IDS components located in designated "HAZARDOUS ENVIRONMENT" areas where fire or explosion could occur due to the presence of natural gases or vapors, flammable liquids, combustible residue, or ignitable fibers or debris, shall be rated Class II, Division I, Group F, and installed in accordance with National Fire Protection Association (NFPA) 70 National Electric Code, Chapter 5.
5. All equipment and materials for the system will be compatible to ensure functional operation in accordance with requirements.

2.2 EQUIPMENT ITEMS

A. General:

1. All requirements listed below are the minimum specifications that need to be met in order to comply with the IDS.
2. All IDS sensors shall conform to UL 639, Intrusion Detection Standard.
3. Ensure that IDS is fully integrated with other security subsystems as required to include, but not limited to, the CCTV, PACS, EPPS, and Access Control System and Database Management. The IDS provided shall not limit the expansion and growth capability to a single manufacturer and shall allow modular expansion with minimal equipment modifications.
4. The IDS shall be a subsystem of the ACS. Inputs and outputs to the IDS are inputs and outputs to the ACS.

B. IDS Components: The IDS shall consist of, but not be limited to, the following components:

1. Control Panel
2. Exterior Detection Devices (Sensors)
3. Interior Detection Devices (Sensors)
4. Power Supply
5. Enclosures

C. Control Panel:

1. The Control panel shall be the main point of programming, monitoring, accessing, securing, and troubleshooting the IDS. Refer to American National Standards Institute (ANSI) CP-01 Control Panel Standard-Features for False Alarm Reduction.
2. The Control Panel shall provide a means of reporting alarms to an Access Control System and Database Management via a computer interface or direct connection to an alarm control monitoring panel.
3. The Control panel shall utilize a Multifunctional Keypad, Input and Output Modules for expansion of alarm zones, interfacing with additional security subsystems, programming, monitoring and controlling the IDS.
4. The Control panel shall meet or exceed the following minimum functional requirements for programming outputs, system response, and user interface:

a. Programming Outputs:

- 1) 2 Amps (A) alarm power at 12 VDC
- 2) 1.4 A auxiliary power at 12 VDC
- 3) Four alarm output patterns
- 4) Programmable bell test
- 5) Programmable bell shut-off timer

b. System Response:

- 1) Selectable point response time
- 2) Cross point capability
- 3) Alarm verification
- 4) Watch mode
- 5) Scheduled events arm, disarm, bypass and un-bypass points, control relays, and control authority levels

c. User Interface:

- 1) Supervises up to eight command points (e.g. Up to 16 unsupervised keypads can be used)
- 2) Provides custom keypad text
- 3) Addresses full function command menu including custom functions
- 4) Allows user authority by defined area and 16-character name
- 5) Provides for 14 custom authority control levels allowing user's authority to change, add, delete pass codes, disarm, bypass points, and start system tests.

5. The Control panel shall meet or exceed the following technical characteristics:

Input Voltage via 110 VAC or 220 VAC Step-down Transformer	16 or 18 VAC
Operating Voltage	12 VDC
Output Voltage	12 VDC @ 2 A max
Direct Hardwire Zones	12 Expandable to 9999 with expansion cards.
Partitions	8
Multifunctional Keypads	16 (2 per partition)
Communications Port	RJ-11

6. A multifunctional keypad may be utilized as a user interface for arming, disarming, monitoring, troubleshooting, and programming the alarm control panel. The ACS shall have the capabilities to arm, disarm, monitor, troubleshoot and program the IDS.

7. Keypads shall have the following features:

- a. Multiple function keypads suitable for remote mounting, no greater than 4000 ft (1333 m), shall be provided from the control panel and have a light emitting diode (LED) readout of alarm and trouble conditions by zone.
- b. An alphanumeric English language display, with keypad programmability, and EE-PROM memory, shall also be provided.
- c. Trouble alarm indicators shall be distinguishable from intrusion alarms.
- d. A minimum of four (4) zones selectable as entry and exit with programmable time delay.
- e. Complete system test activated capability at the keypad.
- f. Capability for opening and closing reports to a remote monitoring location.
- g. Adjustable entry and exit delay times.
- h. Capability for a minimum of two (2) multiple function keypads.
- i. Capability to shunt or bypass selected interior zones while arming perimeter protection and remaining interior zones.
- j. Capability for a minimum of seven assignable pass-codes that are keypad programmable from a suppressed master code.

8. Keypads shall meet or exceed the following technical characteristics:

Connections	4-wire flying lead for data and power
Operating Temperature	0°C to +50°C (+32°F to +122°F)
Display Window	8-point LED
Indicators: Illuminated keys	Armed Status-LED
	Point Status-LED
	Command Mode-LED
	Power-LED
Voltage	Nominal 12 VDC

9. An input module shall be utilized to connect additional detection devices to the control panel. This module will meet or exceed the following technical characteristics:

Operating Voltage	8.5 to 14.5 VDC Nominal
Zone Inputs	Style A (Class B) Supervised
Operating Temperature	32 to 140 degrees F (0 to 40 degrees C)

10. An output module shall be utilized to interface the control panel with other security subsystems. The output module shall meet or exceed the following technical characteristics:

Operating Voltage	8.5 to 14.5 VDC Nominal
Output Relays	"Form C" Dry Relay Contracts
Relay Contact Rating	4A @ 24 VDC
	4A @ 24 VAC
	1A @ 70 VAC
Operating Temperature	32 to 140 degrees F (0 to 40 degrees C)

11. The control panel shall have a communications port that will allow for communications with a computer for programming, monitoring, and troubleshooting purposes. The communications port will be, at a minimum, and RJ-11 or better.
12. The control panel will have a systems success probability of 95% or better, and shall include the following success considerations:
- False Alarm: Shall not exceed one (1) false alarm per 30 days per sensor zone.
 - Nuisance Alarm: Shall not exceed a rate of one (1) alarm per seven (7) days per zone within the first 60 days after installation and acceptance. Sensor adjustments will be made and then shall not exceed one (1) alarm per 30 days.
13. The Control Panel will be able to detect either a line fault or power loss for all supervised data cables.
- Line Fault Detection: Communication links of the IDS shall have an active mode for line fault detection. Fault isolation at the systems level shall have the same geographic resolutions as provided for intrusion detection. The line fault alarm shall be clearly distinguishable from other alarms.
 - Power Loss Detection: Provide the capability to detect when critical components experience temporary or permanent loss of power and annunciate to clearly identify the component experiencing power loss.
14. The Control Panel shall be expandable with the ability to add up to 9999 zones.

D. Interior Detection Devices: (Sensors)

1. The IDS shall consist of interior, exterior, and other detection devices that are capable of:
 - a. Locating intrusions at individually protected asset areas or at an individual portal;
 - b. Locating intrusions within a specific area of coverage;
 - c. Locating failures or tampering of individual sensors or components.
2. Provide and adjust for devices so that coverage is maximized in the space or area it is installed in. For large rooms where multiple devices are required, ensure device coverage is overlapping.
3. Detection sensitivity shall be set up to ensure maximum coverage of the secure area is obtained while at the same time limiting excessive false alarms due to the environment and impact of small animals. All detection devices shall be anti-masking with exception of video motion detection.
4. Dual sensor technology shall be used when possible. Sensor technology shall not be of the same type that is easily defeated by a single method. This will reduce the amount of false alarms.
5. Interior Environmental Conditions: Systems shall be able to operate in environmentally protected interior areas and shall meet operational performance requirements for the following ambient conditions:
 - a. If components are installed in unheated areas they shall be able to operate in temperatures as low as 0 F (-17 C);
 - b. Interior Sensor Environmental Characteristics:

Temperatures	32F to 120 F (0 to 50 C)
Pressure	Sea Level to 15,000 ft. (4573m) above sea level
Humidity	5% - 95%
Fungus	Components of non-fungus nutrient materials
Acoustical Noise	Suitable for high noise environments above 100db

6. **Balanced Magnetic Switches (BMS)**
 - a. BMS switches shall be recessed mounted according to manufacture's instructions. Recessed mounted is the preferred method to reduce tampering or defeating of the system. Switches shall activate when a disturbance in the balanced magnetic field occurs.
 - b. Switches shall have a minimum of two (2) encapsulated reed switches.
 - c. Contractor shall provide each BMS with a current protective device, rated to limit current to 80% of the switch capacity.
 - d. Surface Mounted BMS: For exterior application, components shall be housed in weatherproof enclosures.
 - e. BMS field adjustments in the fixed space between magnet and switch housing shall not be possible. Attempts to adjust or disturb the magnetic field shall cause a tamper alarm.

f. BMS Technical Characteristics:

Maximum current	.25 amperes
Maximum voltage	30 VDC
Maximum power	3.0 W (without internal terminating resistors). 1.0 W (with internal terminating resistors).
Components	Three (3) pre-adjusted reed switches Three (3) pre-adjusted magnets
Output contacts	Transfer type SPDT
Contact rating	0.5 amperes, 28 VDC
Switch mechanism	Internally adjustable ¼ - ½ in. (6-13 mm)
Wiring	Two (2) wires #22 American Wire Gauge (AWG), three (3) or 11 foot attached cable
Activation lifetime	1,000,000 activations
Enclosure	Nonferrous materials
Tamper alarm activation	Cover opened 1/8 in. (3 mm) and inaccessible until actuated

7. Passive Infrared Motion Sensors (PIR): These sensors shall detect an intruder presence by monitoring the level of infrared energy emitted by objects within a protected zone and meet ANSI PIR-01 Passive Infrared Motion Detector Standards Features for Enhancing False Alarm Immunity. An alarm shall be initiated when motion and temperature changes within set patterns are detected as follows.

- a. The detector shall provide multiple detection zones distributed at a variety of angles and distance.
- b. Sensors shall be passive in nature; no transmitted energy shall be required for detection.
- c. Sensors shall be sensitive to infrared energy emitted at wavelengths corresponding to human body and other objects at ambient temperatures.
- d. Sensors shall not alarm in response to general area thermal variations and shall be immune to radio frequency interference.
- e. Sensors shall not be susceptible to changes in temperature due to an air conditioner being turned on or off.
- f. Sensors shall be housed in a tamper-alarmed enclosure.
- g. Sensor detectors shall include motion analyzer processing, adjustable lens, and walk test LED's visible from any angle.
- h. Sensors shall provide some means of indicating an alarm condition during installation and calibration. A means of disabling the indication shall be provided within the sensor enclosure.
- i. Sensor detectors shall include a motion monitoring verification circuit that will signal trouble or alarm if the detector fails to detect motion for an extended period.
- j. PIR Technical Characteristics:

Power	Six (6) – 12 VDC 25 mA continuous current draw 38 mA peaks
Alarm Velocity	Five (5) ft. (1500 mm) at a velocity of 0.1 ft. (30 mm) per second, and one (1) step per second, assuming 6 in. (150 mm) per step. Also, faster than 0.1 foot (30 mm) per second, up to 10 feet (3000 mm) per second
Maximum detection range	35 ft.(10.6 m)

Frequency range- non activation or setup use	26 to 950 MHz using a 50 watt transmitter located 1 ft. from the unit or attached wiring
Infrared detection	3°F (1 1/2°C) different from the background temperature
Detection Pattern	180 degrees for volumetric units, non PIR 360
PIR 360°Detection Pattern	Programmable 60 detection zones including one directly below
Mounting	Ceiling and walls
Ceiling heights	Eight (8) ft. (2.4 m) – 18 ft (5.4 m)
Sensitivity adjustments	Three (3) levels

8. Microwave-Passive Infrared Detector: This sensor shall be designed to detect the motion of a human body within a protected area by means of a combination of microwave sensing technology and passive infrared (MPIR) sensing technology as follows.
- The sensor shall require both technologies to sense intrusion before an alarm may occur.
 - The sensor shall be designed for wall mounting on swivel bracket. A high-security gimbaled bracket shall be provided.
 - The PIR fields of view shall be focused on the pyroelectric element by means of an internal multi-faceted mirror.
 - The sensor shall incorporate a look-down lens system that detects the passing of an intruder directly beneath the sensor.
 - The sensor shall incorporate a microwave supervision system which shall activate the trouble output if the device technology fails.
 - The sensor shall incorporate self-diagnostics which shall monitor the sensor systems and report a trouble to the control panel if any system device fails.
 - The sensor shall have compensation against loss of sensitivity as the ambient temperature nears human body temperature.
 - MPIR Technical Characteristics:

Technology	Microwave and Passive Infrared
Power	Nine (9) – 15 VDC max current consumption 22 mA at 12 VDC
Operating Temperature	32°F (0° C) – 120° F (49° C)
Detection Area	98 ft. (30 m) long by 9.8 ft. (3 m) wide or 69 ft. (21 m) long by 69 ft. (21m) wide
Electronics	Microcontroller based
Alarm Contact	Form-C rated 125 mA, 28 VDC
Tamper Contact	125 mA, 28 VDC
Trouble Contact	Form-B rated 25 mA, 30 VDC
Microwave Operating Frequency	10.525 GHz
Microwave Sensitivity	Adjustable on circuit board
Detection pattern adjustment	Changing of internal lens
Sensing element	Pyro-electric
LED Indicators	PIR, microwave, alarm
Bug and Dust protection	zero-clearance, gasket bug guard
Lens	Interchangeable: standard 60x80 ft. (18x24 m), corner mounting, ultra-wide, pet alley, long range, room and corridor combo, room and ceiling combo, creep zone

9. Ultrasonic Sensors: These sensors shall transmit ultrasonic energy into a protected zone, receiving the direct and reflected energy, and monitoring frequency shift between transmitted and received signals as follows.
- Sensors shall automatically adapt to changing levels of air turbulence and shall consist of a control unit and as many transceivers as required to protect a zone within limitations of the control unit per manufacture's instructions.
 - Ultrasonic system sensors shall provide a means of indicating an alarm condition at the protected zone during installation and calibration. This indication shall be provided with a disabling device within the sensor enclosure.
 - Transceivers shall consist of an adjustable-gain preamplifier, an ultrasonic-to-electrical transducer, and an electrical-to-ultrasonic transducer in a single enclosure. Transducers shall be adjustable in position to allow adequate adjustment and directivity.
 - Each sensor will consist of sensitivity adjustments. Controls shall be inaccessible to operating personnel and sensitivity requirements shall be set approximately at midrange.
 - Sensor elements shall be housed in a tamper-alarmed enclosure.
 - Ultrasonic Sensor Technical Characteristics:

Power output	Peak not to exceed 105 dB at three (3) ft. (900 mm)
Transceiver protection zone	20 ft. (6 m) by 30 ft. (9.2 m) in a zone with an 8 ft. (2440 mm) to 12 ft. (3660 mm) ceiling
Nuisance alarm reduction	Selective filtering
Detection frequency range	Above 24 kHz and below 30 kHz (nominally 26 kHz)
Detection velocity	5 ft. (1500 mm) at a velocity of 0.5 ft. (150 mm) per second to 15 feet (4570 mm) per second, also Higher than 0.5 foot (150 mm) per second, up to eight (8) ft. (2440 mm) per second

10. Photoelectric Sensors: The sensor devices shall be able to detect an intruder presence by sending out a series of infrared or ultraviolet beams. Intrusion is based on disruption of the signal beams as follows.
- Sensors shall consist of a modulating transmitter, focusing lenses, mirrors, demodulating receiver, power supply, and interconnecting lines.
 - Beam transmitters shall be designed to emit light. Beams may be reflected by one (1) or more mirrors before being received and amplified.
 - The photoelectric sensor shall initiate an alarm when the beam is interrupted with monitoring controls set at midrange.
 - Transmitted beams shall be uniquely modulated to prohibit defeat of the IDS system by shining another light source into the receiver.
 - Sensors shall provide a means of local alarm indication on the detector for use at the protected zone during installation and calibration.
 - Sensors shall include an indicator-disabling device within the sensor enclosure.
 - Sensors shall utilize automatic gain control or be provided with sensitivity adjustments to allow for various beam lengths.
 - Sensor controls shall be inaccessible to operating personnel.
 - Sensors that use multiple beams shall be tested by attempting to crawl under and jump through and over beams. Each system sensor shall provide cutoffs of at least 90% to handle a high percentage of light cutoffs prior to initiating an alarm.
 - Sensor components shall be housed in tamper-alarmed enclosure.

k. Photoelectric Sensor Technical Characteristics:

Power requirements	Nine (9)-16 VDC, protected against reverse polarity
Relay output	Normally closed. 18 ohm resistor in series with contacts. 0.5 amperes resistance/24 VDC
Current	Transmitter 15 mA, Receiver 15 mA
LED	Alignment, walk-test alarm, off
Range	Indoor: 130 ft. (39 m) Outdoor: 65 ft. (19.5 m)
Alarm relay contacts	Two (2) amperes at 120 VAC minimum
Enclosure	High impact acrylic
Type	Dual beam
Mounting	Wall, corner, flush
Beam width	Six (6) degrees
Receiver field of view	Six (6) degrees horizontal and vertical
Adjustments	Vertical +10 – 20 degrees Horizontal 30 degrees
Alarm period	Two (2) – three (3) sec
Infrared source	Long-life Gallium Arsenide LED
Infrared sensor	PIN photodiode
Transmitter Frequency	One (1) kHz 10 microsecond pulse width
IR Wavelength	950 nm

11. CCTV Video Motion Detection Sensors: Refer to Section 28 23 00 VIDEO SURVEILLANCE that outlines related video motion detection requirements.
12. Tamper Alarm Switches: The following IDS sensors shall be used to monitor and detect potential tampering of sensors, control panels and enclosures.
 - a. Tamper Switches: All enclosures including cabinets, housings, boxes, raceways, and fittings with hinged doors or removable covers containing circuits and power supplies related to the IDS shall include corrosion-resistant tamper switches.
 - b. Tamper alarms shall be annunciated to be clearly distinguishable from IDS alarms.
 - c. Tamper switches will not be in a viewable from a direct line of sight perspective. The minimum amount of time the tamper switch becomes active and sends a signal after an enclosure is opened or panel removable is attempted, shall be one (1) second.
 - d. Tamper switches will initiate when enclosure doors or covers is removed as little as 1/4 in. (6.35 mm) from the closed position unless otherwise indicated. Tamper switches shall be:
 - 1) Push/pull automatic reset type;
 - 2) Inaccessible until switch is activated;
 - 3) Spring-loaded and held in closed position by door or cover; and
 - 4) Wired to break a circuit when door or cover is removed with each sensor annunciated individually at a central reporting processor.
 - e. Fail-Safe Mode: Shall provide the capability to detect and annunciate diminished functional capabilities and perform self-tests. Fail-safe alarms shall be annunciated to be clearly distinguishable from other types of alarms.

E. Power Supply

1. A power supply shall only be utilized if the control panel is unable to support the load requirements of the IDS system.

2. All power supplies shall be UL rated and able to adequately power two entry control devices on a continuous base without failure.
3. Power supplies shall meet the following minimum technical characteristics:

INPUT POWER	110 VAC 60 HZ 2 amp
OUTPUT VOLTAGE	12 VDC Nominal (13.8 VDC) 24 VDC Nominal (27.6 VDC) Filtered and Regulated
BATTERY	Dependant on Output Voltage shall provide up to 14 Ah, rechargeable
OUTPUT CURRENT	4 amp max. @ 13.8 VDC 3 amp max. @ 27.6 VDC
BATTERY FUSE SIZE	3.5 A @ 250 VAC
CHARGING CIRCUIT	Built-in standard

F. Enclosures:

1. All control panels, input and output modules, and power supplies shall be housed inside a metal enclosure in accordance with National Electrical Manufacturers Association (NEMA) 250 Enclosures for Electrical Equipment.
2. The enclosure shall be UL rated, lockable and alarmed with a tamper alarm switch that is monitored by the control panel.
3. The enclosures will be NEMA 4 rated if exterior mounted.
4. All connections to the enclosure shall meet or exceed the requirements set forth in the NEC.

2.3 INSTALLATION KIT

A. General

1. The kit shall be provided that, at a minimum, includes all connectors and terminals, labeling systems, audio spade lugs, barrier strips, punch blocks or wire wrap terminals, heat shrink tubing, cable ties, solder, hangers, clamps, bolts, conduit, cable duct, and/or cable tray, etc., required to accomplish a neat and secure installation. All wires shall terminate in a spade lug and barrier strip, wire wrap terminal or punch block. Unfinished or unlabeled wire connections shall not be allowed. All unused and partially opened installation kit boxes, coaxial, fiber-optic, and twisted pair cable reels, conduit, cable tray, and/or cable duct bundles, wire rolls, physical installation hardware shall be turned over to the Contracting Officer. The following sections outline the minimum required installation sub-kits to be used:
2. System Grounding
 - a. The grounding kit shall include all cable and installation hardware required. All head end equipment and power supplies shall be connected to earth ground via internal building wiring, according to the NEC.
 - b. This includes, but is not limited to:
 - 1) Coaxial Cable Shields
 - 2) Control Cable Shields
 - 3) Data Cable Shields
 - 4) Equipment Racks

- 5) Equipment Cabinets
 - 6) Conduits
 - 7) Cable Duct blocks
 - 8) Cable Trays
 - 9) Power Panels
 - 10) Grounding
 - 11) Connector Panels
3. Coaxial Cable: The coaxial cable kit shall include all coaxial connectors, cable tying straps, heat shrink tabbing, hangers, clamps, etc., required to accomplish a neat and secure installation.
 4. Wire and Cable: The wire and cable kit shall include all connectors and terminals, audio spade lugs, barrier straps, punch blocks, wire wrap strips, heat shrink tubing, tie wraps, solder, hangers, clamps, labels etc., required to accomplish a neat and orderly installation.
 5. Conduit, Cable Duct, and Cable Tray: The kit shall include all conduit, duct, trays, junction boxes, back boxes, cover plates, feed through nipples, hangers, clamps, other hardware required to accomplish a neat and secure conduit, cable duct, and/or cable tray installation in accordance with the NEC and this document.
 6. Equipment Interface: The equipment kit shall include any item or quantity of equipment, cable, mounting hardware and materials needed to interface the systems with the identified sub-system(s) according to the OEM requirements and this document.
 7. Labels: The labeling kit shall include any item or quantity of labels, tools, stencils, and materials needed to label each subsystem according to the OEM requirements, as-installed drawings, and this document.
 8. Documentation: The documentation kit shall include any item or quantity of items, computer discs, as installed drawings, equipment, maintenance, and operation manuals, and OEM materials needed to correctly provide the system documentation as required by this document and explained herein.

PART 3 – EXECUTION

3.1 INSTALLATION AND INTEGRATION

- A. IDS installation shall be in accordance with Underwriters Laboratories (UL) 639 Standards for Intrusion Detection Units and UL 634 Standards for Connectors with Burglar Alarm Systems, and appropriate manufacture's installation manuals for each type of IDS.
- B. Components shall be configured with appropriate "service points" to pinpoint system trouble in less than 30 minutes.
- C. The Contractor shall install all system components including VA furnished equipment, and appurtenances in accordance with the manufacturer's instructions and shall furnish all necessary connectors, terminators, interconnections, services, and adjustments required for a complete and operable system.
- D. The IDS will be designed, engineered, installed, and tested to ensure all components are fully compatible as a system and be integrated with all associated security subsystems, whether the system is a stand alone or designed as a computer network.

- E. For integration purposes, The contractor shall provide full, seamless, integration of all security subsystems with one single GUI. Integration with these security subsystems shall be achieved by computer programming. Determination for methodology has been determined when the system(s) was designed and engineered. For installation purposes, the IDS shall utilize an output module for integration with other security subsystems. The Contractor will ensure all connections are per the OEM and that any and all software upgrades required to integrate the systems are installed prior to system start-up. Contractor shall work with VA Security Chief of Operations and obtain sign-off that all security devices have been programmed properly prior to substantial completion.
- F. For programming purposes, the Contractor shall refer to the manufacturer's requirements and Contracting Officer instructions for correct system operations. This includes ensuring computers being utilized for system integration meet or exceeds the minimum system requirements outlined in the IDS software packages.
- G. Lightning and power surges to the central alarm reporting and display unit shall be protected at both ends against excessive voltages. This requirement shall apply for circuits that are routed both in underground conduits and overhead runs.
- H. At a minimum, the Contractor shall install primary detection devices, such as three electrode gas-type surge arresters, and secondary protectors to reduce dangerous voltages to levels that will cause no damage. Fuses shall not be permitted as protection devices.
- I. The Contractor shall provide fail-safe gas tube type surge arresters on exposed IDS data circuits. In addition, transient protection shall protect against spikes up to 1000 volts peak voltage with a one-microsecond rise time and 100-microsecond decay time, without causing false alarms. The protective device shall be automatic and self-restoring. Also, circuits shall be designed or selected assuming a maximum of 25 ohms to ground.
- J. Product Delivery, Storage and Handling:
 - 1. Delivery: Deliver materials to the job site in OEM's original unopened containers, clearly labeled with the OEM's name, equipment model and serial identification numbers, and UL logo. The Contracting Officer may inventory the IDS equipment at the time of delivery and reject items that do not conform to this requirement.
 - 2. Storage and Handling: Store and protect equipment in a manner that will preclude damage as directed by the Contracting Officer.
- K. Cleaning and Adjustments:
 - 1. Cleaning: Subsequent to installation, clean each system component of dust, dirt, grease, or oil incurred during installation in accordance to manufacture instructions.
 - 2. Prepare for system activation by following manufacturer's recommended procedures for adjustment, alignment, or synchronization. Prepare each component in accordance with appropriate provisions of the component's installation, operations, and maintenance instructions.
- L. Tamper Switches
 - 1. Install tamper switches to initiate an alarm signal when a panel, box, or component housing door or cover is moved as little as 6.35 mm 1/4 inch from the normally closed position unless otherwise specified.
 - 2. Locate tamper switches within enclosures, cabinets, housings, boxes, raceways, and fittings to prevent direct line of sight to any internal components and to prevent tampering with switch or circuitry.

3. Conceal tamper switch mounting hardware so that the location of the switch within the enclosure cannot be determined from the exterior.

M. Unique IDS Installation Components:

1. BMS Surface Mounted:

- a. Surface mounted BMS housing for the switch element shall have the capability to receive threaded conduit. Housing covers for surface mounted BMS, if made of cast aluminum, shall be secured by stainless steel screws. Magnet housing cover shall not be readily removable and BMS housings shall be protected from unauthorized access by a cover operated, corrosion-resistant tamper device.
- b. Conductors running from a door to alarm circuits shall be contained within a flexible armored cord constructed from corrosion-resistant metal. Each end of the armored cord shall terminate in a junction box or other enclosure. Armored cord ends shall be mechanically secured to the junction boxes by clamps or bushings. Conductors within the armored cord shall be provided with lug terminals at each end. Conductors and the armored cord shall experience no mechanical strain as the door is removed from fully open to closed position. Switch circuits shall initiate an alarm if a short circuit is applied to the door cord.
- c. For exterior application on double gates, both BMS elements must be mounted on the gate. Flexible armored cord constructed from corrosion-resistant metal shall be used to provide electrical connection.

2. BMS Recessed Mounted:

- a. Ball bearing door trips shall be mounted within vault door headers such that when the locking mechanism is secured, the door bolt engages an actuator, mechanically closing the switch.
- b. Door bolt locking mechanisms shall be fully engaged before the ball bearing door trip is activated. Also, circuit jumpers from the door shall be provided.
- c. House sensors in protective mountings and fasten to surface with concealed mounting screws or an epoxy.
- d. Adjust discriminator on the job to precise needs of application. Connect sensors to an electronic control unit by means of wiring or fiber optics cable run in rigid steel conduit or electrical metallic tubing (EMT).

3. Ultrasonic Sensors:

- a. Installation shall ensure that transceiver zones slightly overlap.
- b. Care shall be taken to ensure adequate sensitivity in area abundant in acoustic-absorbing materials such as carpets and drapes.
- c. When the protected zone is broken up by furniture or large objects, it shall not be possible to traverse the zone undetected by moving the blind zones created by the objects.

4. Passive Infrared Detectors: (PIR)

- a. The protective beam shall be focused in a straight line.
- b. Installed beam distance from transmitter to receiver shall not exceed 80% of the manufacturer's maximum recommended rating.
- c. Mirrors may be used to extend the beam or to establish a network of beams. Each mirror used shall not lower the rated maximum system range by more than 50%.

- d. Mirrors and photoelectric sources used in outdoor applications shall have self-heating capability to eliminate condensation and shall be housed in weatherproof enclosures.

3.2 TESTS AND TRAINING

- A. All testing and training shall be compliant with the VA General Requirements, Section 01 00 00, GENERAL REQUIREMENTS.

-----END-----

1.3 QUALITY ASSURANCE

- A. The Contractor shall be responsible for providing, installing, and the operation of the CCTV System as shown. The Contractor shall also provide certification as required.
- B. The security system shall be installed and tested to ensure all components are fully compatible as a system and can be integrated with all associated security subsystems, whether the security system is stand-alone or a part of a complete Information Technology (IT) computer network.
- C. The Contractor or security sub-contractor shall be a licensed security Contractor as required within the state or jurisdiction of where the installation work is being conducted.
- D. All camera installation, configuration, setup, program and related work shall be performed by electronic technicians thoroughly trained by the manufacturer in the installation and service of the equipment provided.
- E. All equipment provided shall be backed by a minimum of one year manufacturer warranty.
- F. The network cameras shall carry the following EMC approvals:
 - 1. EN55022, EN55024
 - 2. FCC Part 15 - Subpart B
 - 3. VCCI
 - 4. C-tick AS/NZS CISPR22
 - 5. ICES-003
- G. The network cameras shall meet the following standards
 - 1. MPEG-4:
 - 2. ISO/IEC 14496-10 AVC (H.264)
 - 3. Networking:
 - a. IEEE 802.3af (Power over Ethernet)
 - b. IPv4 (RFC 791)
 - c. IPv6 (RFC 2460)
 - d. QoS – DiffServ (RFC 2475)
- H. The outdoor located network cameras shall meet the following environmental protection standards:
 - 1. IEC 60529 (IP66)

1.4 SUBMITTALS

- A. Submit below items in conjunction with Master Specification Sections 01 33 23, Shop Drawings, Product Data, and Samples, and Section 02 41 00, Demolition Drawings.
- B. Provide certificates of compliance with Section 1.3, Quality Assurance.
- C. Provide a pre-installation and as-built design package in both electronic format and on paper, minimum size 48 x 48 inches (1220 x 1220 millimeters); drawing submittals shall be per the established project schedule.

D. Pre-installation design and as-built packages shall include, but not be limited to:

1. Index Sheet that shall:
 - a. Define each page of the design package to include facility name, building name, floor, and sheet number.
 - b. Provide a list of all security abbreviations and symbols.
 - c. Reference all general notes that are utilized within the design package.
 - d. Specification and scope of work pages for all security systems that are applicable to the design package that will:
 - 1) Outline all general and job specific work required within the design package.
 - 2) Provide a device identification table outlining device Identification (ID) and use for all security systems equipment utilized in the design package.
2. Drawing sheets that will be plotted on the individual floor plans or site plans shall:
 - a. Include a title block as defined above.
 - b. Define the drawings scale in both standard and metric measurements.
 - c. Provide device identification and location.
 - d. Address all signal and power conduit runs and sizes that are associated with the design of the electronic security system and other security elements (e.g., barriers, etc.).
 - e. Identify all pull box and conduit locations, sizes, and fill capacities.
 - f. Address all general and drawing specific notes for a particular drawing sheet.
3. A riser drawing for each applicable security subsystem shall:
 - a. Indicate the sequence of operation.
 - b. Relationship of integrated components on one diagram.
 - c. Include the number, size, identification, and maximum lengths of interconnecting wires.
 - d. Wire/cable types shall be defined by a wire and cable schedule. The schedule shall utilize a lettering system that will correspond to the wire/cable it represents (example: A = 18 AWG/1 Pair Twisted, Unshielded). This schedule shall also provide the manufacturer's name and part number for the wire/cable being installed.
4. A system drawing for each applicable security system shall:
 - a. Identify how all equipment within the system, from main panel to device, shall be laid out and connected.
 - b. Provide full detail of all system components wiring from point-to-point.
 - c. Identify wire types utilized for connection, interconnection with associate security subsystems.
 - d. Show device locations that correspond to the floor plans.
 - e. All general and drawing specific notes shall be included with the system drawings.
5. A schedule for all of the applicable security subsystems shall be included. All schedules shall provide the following information:
 - a. Device ID.
 - b. Device Location (e.g. site, building, floor, room number, location, and description).
 - c. Mounting type (e.g. flush, wall, surface, etc.).

- d. Power supply or circuit breaker and power panel number.
 - e. In addition, for the CCTV Systems, provide the camera ID, camera type (e.g. fixed or pan/tilt/zoom (P/T/Z), lens type (e.g. for fixed cameras only) and housing model number.
- 6. Detail and elevation drawings for all devices that define how they were installed and mounted.
- E. Pre-installation design packages shall be reviewed by the Contractor along with a VA representative to ensure all work has been clearly defined and completed. All reviews shall be conducted in accordance with the project schedule. There shall be four (4) stages to the review process:
 - 1. 35 percent
 - 2. 65 percent
 - 3. 90 percent
 - 4. 100 percent
- F. Provide manufacturer security system product cut-sheets. Submit for approval at least 30 days prior to commencement of formal testing, a Security System Operational Test Plan. Include procedures for operational testing of each component and security subsystem, to include performance of an integrated system test.
- G. Submit manufacture's certification of Underwriters Laboratories, Inc. (UL) listing as specified. Provide all maintenance and operating manuals per the VA General Requirements, Section 01 00 00, GENERAL REQUIREMENTS.

1.5 APPLICABLE PUBLICATIONS

- A. The publications listed below (including amendments, addenda, revisions, supplement, and errata) form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American National Standards Institute (ANSI)/Electronic Industries Alliance (EIA):
 - 330.....Electrical Performance Standards for CCTV Cameras
 - 375AElectrical Performance Standards for CCTV Monitors
- C. Institute of Electrical and Electronics Engineers (IEEE):
 - C62.41IEEE Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits
 - 802.3af.....Power over Ethernet Standard
- D. National Electrical Contractors Association (NECA):
 - 303-2005Installing Closed Circuit Television (CCTV) Systems
- E. National Fire Protection Association (NFPA):
 - 70-05.....Article 780-National Electrical Code
- F. Federal Information Processing Standard (FIPS):
 - 140-2.....Security Requirements for Cryptographic Modules
- G. Underwriters Laboratories, Inc. (UL):
 - 983-06Standard for Surveillance Camera Units
 - 3044-01Standard for Surveillance Closed Circuit Television Equipment

1.6 WARRANTY OF CONSTRUCTION.

- A. Warrant CCTV System work subject to the Article "Warranty of Construction" of FAR clause 52.246-21.

PART 2 – PRODUCTS

2.1 EQUIPMENT AND MATERIALS

- A. All equipment associated within the CCTV System shall be UL 3004 compliant and rated for continuous operation. Environmental conditions (i.e. temperature, humidity, wind, and seismic activity) shall be taken under consideration at each facility and site location prior to installation of the equipment.
- B. All equipment shall operate on a 37-57 volt, 42.5-57 volt, alternating current (VAC); 24VAC or 120 volt, 60 Hz AC power system unless documented otherwise in subsequent sections listed within this specification. All equipment shall have a back-up source of power that will provide a minimum of 96 hours of run time in the event of a loss of primary power to the facility.
- C. The system shall be designed, installed, and programmed in a manner that will allow for easy of operation, programming, servicing, maintenance, testing, and upgrading of the system.
- D. All equipment and materials for the system will be compatible to ensure correct operation.

2.2 EQUIPMENT ITEMS

- A. CCTV system shall meet following requirements:
- B. All Cameras will be EIA 330 and UL 983 compliant as well as:
 - 1. Will be charge coupled device (CCD) or CMOS cameras and shall conform to National Television System Committee (NTSC) formatting.
 - 2. Fixed cameras shall be color and the primary choice for monitoring following the activities described below and as shown on the Security plans. Pan/Tilt/Zoom (P/T/Z) cameras shall be color and are to be utilized to compliment the fixed cameras and as shown on the Security plans.
 - 3. Shall be powered by power over Ethernet POE plus. POE network switches shall be UL compliant and have a back-up power source to ensure cameras are still operational in the event of loss of primary power to the CCTV System.
 - 4. Shall be rated for continuous operation under the following environmental conditions:
 - a. Ambient temperatures of minus 10 degrees C (14 degrees F) to 55 degrees C (131 degrees F) utilizing equipment that will provide automatic heating and cooling.
 - b. Humidity, wind gusts, ice loading, and seismic conditions specified or encountered for locations where CCTV cameras will be utilized.
 - 5. Will be home run to a monitoring and recording device via a controlling device such as a network server and monitored on a 24 hour basis at a designated Security Command Center aka Access Control System and Database Management location.

6. Each function and activity shall be addressed within the system by a unique twenty (20) character user defined name. The use of codes or mnemonics identifying the CCTV action shall not be accepted.
7. Shall come with built-in video motion detection that shall automatically monitor and process information from each camera. The camera motion detection shall detect motion within the camera's field of view and provide automatic visual, remote alarms, and motion-artifacts as a result of detected motion as follows:
 - a. Motion-detection settings shall include adjustable object size and velocity, as well as a selectable detection area of 132 twelve (12) x eleven (11) grid.
 - b. Sensors shall accept video signals from CCTV cameras and when synchronizing is required, it shall be in composite synchronization.
 - c. Sensor processors shall detect motion by digitizing multiple pixels within each video scene and by comparing the gray scale of the pixels to a previously stored reference. The number of pixels digitized depends on the application. The designer of the system shall consider cost effectiveness as a factor since digitizing a large number of pixels could increase cost dramatically with little additional actual detection capability for a specific application.
 - d. An alarm shall be initiated when the comparison varies by six (6) percent or more.
8. Appropriate signage shall be designed, provided, and posted that notifies people that an area is under camera surveillance. Coordinate signage standards with Architect.
9. Dummy or fake cameras will not be utilized at any time.
10. Shall be programmed to digitally flip from color to black and white at dusk and vise versa at dawn.
11. Will be fitted with Auto-Iris or DC Iris or P-Iris lenses to ensure the image is maintained in low light.
12. Lightning protection shall be IEEE C62.41 compliant and provided for all cameras. Either surge protectors or a lightning grid may be utilized. Ensure all lightning protection equipment is compliant with Article 780 of the National Electrical Code (NEC). The use of Fuses and Circuit Breakers as a means of lightning protection shall not be allowed.
13. Network Camera, Indoor Fixed Dome, SVGA Type I
 - a. The camera shall be manufactured with a vandal-resistant metal casing and metal encapsulated electronics and shall operate in temperatures between 0°C to +50°C (32°F to +122°F).
 - b. The camera shall be equipped with a progressive scan sensor, varifocal lens and shall provide images down to 0.9 lux.
 - c. The camera shall be equipped with a 10BASE-T/100BASE-TX Ethernet-port, and shall include support for Power over Ethernet according to IEEE 802.3af.
 - d. The camera shall provide simultaneous Motion JPEG and H.264 video streams and shall support at least two video streams of resolutions up to 800x600 pixels in 30 frames per second. The H.264 implementation shall include both unicast and multicast functionality and support Constant Bit Rate (CBR) as well as Variable Bit Rate (VBR).
 - e. The camera shall be able to trigger its embedded event functionality based on camera tampering alarm or detection of video motion. Possible response to a triggered event shall include remote notification, incl. image upload. The camera shall be equipped with at least 25MB of memory for local storage of images.
 - f. The camera shall feature overlay text ability, that includes date and time synchronized using an NTP server. Furthermore, it shall have the ability to apply a graphical image as an overlay and a privacy mask in the video stream.
 - g. The camera shall support both static IP addresses and addresses from a DHCP-server, and shall support both IPv4 and IPv6. The camera shall incorporate support for Quality of Service (QoS).

- h. For secure access to the camera as well as provided content, the camera shall support HTTPS and SSL/TLS. The camera shall also support IP address filtering and include at least three different levels of password security.
 - i. The camera shall contain a built-in web server making video and configuration available in a standard browser environment using HTTP and shall also be fully supported by an open and published API (Application Programmers Interface) providing necessary information for integration of functionality into third party applications.
 - j. The camera shall:
 - 1) Be manufactured with a vandal-resistant metal casing and metal encapsulated electronics.
 - 2) Operate between 0°C to +50°C (32°F to +122°F)
 - 3) Be equipped with a 10BASE-T/100BASE-TX Ethernet interface
 - 4) Be equipped with a progressive scan sensor, varifocal lens and provide images down to 0.9 lux
 - 5) Provide at least 2 streams of resolutions up to 800x600 pixels at 30 frames per second per stream
 - 6) Support simultaneous individually configured Motion JPEG and H.264 video streams
 - 7) Support both unicast and multicast H.264 with support for both Constant and Variable Bit Rate
 - 8) Support Power over Ethernet according to IEEE 802.3af
 - 9) Accept static IP addresses as well as addresses provided by a DHCP
 - 10) Support both IPv4 and IPv6 based addresses
 - 11) Provide text overlay that includes date/time support synchronized with an NTP server and the ability to apply a graphical image as an overlay into the video image
 - 12) Provide multiple user password levels and support for HTTPS and SSL/TLS Include embedded event functionality, which may be triggered by:
 - a) Camera tampering alarm
 - b) Video motion detection
 - 13) Event actions supported by the camera shall include:
 - a) Remote notification, including image upload
 - 14) Be equipped with a built-in web server
 - 15) Be supported by an open and published API
14. Network Camera, Indoor Fixed Dome, 720p, Type 2
- a. The camera shall be manufactured with a vandal-resistant metal casing and metal encapsulated electronics and shall operate in temperatures between 0°C to +50°C (32°F to +122°F).
 - b. The camera shall be equipped with a progressive scan sensor, varifocal lens and shall provide images down to 0.9 lux.
 - c. The camera shall be equipped with a 10BASE-T/100BASE-TX Ethernet-port, and shall include support for Power over Ethernet according to IEEE 802.3af.
 - d. The camera shall provide simultaneous Motion JPEG and H.264 video streams and shall support at least two video streams of resolutions up to 800x600 pixels in 30 frames per second. The H.264 implementation shall include both unicast and multicast functionality and support Constant Bit Rate (CBR) as well as Variable Bit Rate (VBR).

- e. The camera shall provide simultaneous Motion JPEG and H.264 video streams and shall support video streams of HDTV 720p (1280x720) resolution in 30 frames per second.
- f. The camera shall be able to trigger its embedded event functionality based on camera tampering alarm or detection of video motion. Possible response to a triggered event shall include remote notification, incl. image upload. The camera shall be equipped with at least 25MB of memory for local storage of images.
- g. The camera shall feature overlay text ability, that includes date and time synchronized using an NTP server. Furthermore, it shall have the ability to apply a graphical image as an overlay and a privacy mask in the video stream.
- h. The camera shall support both static IP addresses and addresses from a DHCP-server, and shall support both IPv4 and IPv6. The camera shall incorporate support for Quality of Service (QoS).
- i. For secure access to the camera as well as provided content, the camera shall support HTTPS and SSL/TLS. The camera shall also support IP address filtering and include at least three different levels of password security.
- j. The camera shall contain a built-in web server making video and configuration available in a standard browser environment using HTTP and shall also be fully supported by an open and published API (Application Programmers Interface) providing necessary information for integration of functionality into third party applications.
- k. The camera shall:
 - 1) Be manufactured with a vandal-resistant metal casing and metal encapsulated electronics.
 - 2) Operate between 0°C to +50°C (32°F to +122°F)
 - 3) Be equipped with a 10BASE-T/100BASE-TX Ethernet interface
 - 4) Be equipped with a progressive scan sensor, varifocal lens and provide images down to 0.9 lux
 - 5) Provide at least 2 streams of resolutions up to 800x600 pixels at 30 frames per second per stream
 - 6) Support simultaneous individually configured Motion JPEG and H.264 video streams
 - 7) Support both unicast and multicast H.264 with support for both Constant and Variable Bit Rate
 - 8) Support Power over Ethernet according to IEEE 802.3af
 - 9) Accept static IP addresses as well as addresses provided by a DHCP
 - 10) Support both IPv4 and IPv6 based addresses
 - 11) Provide text overlay that includes date/time support synchronized with an NTP server and the ability to apply a graphical image as an overlay into the video image
 - 12) Provide multiple user password levels and support for HTTPS and SSL/TLS Include embedded event functionality, which may be triggered by:
 - a) Camera tampering alarm
 - b) Video motion detection
 - 13) Event actions supported by the camera shall include:
 - a) Remote notification, including image upload
 - 14) Be equipped with a built-in web server
 - 15) Be supported by an open and published API

15. Network Camera, Indoor Fixed, 1080p, Type 3

- a. The camera shall be manufactured with a vandal-resistant metal casing and metal encapsulated electronics.
- b. The camera shall be equipped with a progressive scan megapixel sensor, a varifocal lens with automated iris functionality and remote zoom and focus capabilities, Wide Dynamic Range, so called Day/Night functionality and shall provide images down to 0.5 lux in day mode and 0.08 lux in night mode.
- c. The camera shall be equipped with a 10BASE-T/100BASE-TX Ethernet-port, and shall include support for Power over Ethernet according to IEEE 802.3af.
- d. The camera shall provide individually configured simultaneous Motion JPEG and H.264 video streams, and shall support video of HDTV 1080p (1920x1080) resolution in 30 frames per second.
- e. The H.264 implementation shall include both unicast and multicast functionality and support Constant Bit Rate (CBR) as well as Variable Bit Rate (VBR).
- f. The camera shall be equipped with one digital (alarm) input and one digital output, and shall also be able to trigger its embedded event functionality based on camera tampering alarm, detection of video motion or audio, or when the local storage is full. Possible response to a triggered event shall include remote notification, incl. image upload, and activation of output and recording to local storage. The camera shall be equipped with a video buffer for saving pre- and post-alarm images and shall have a SD/SDHC card slot to support local storage of video.
- g. The camera shall feature overlay text ability, that includes date and time synchronized using an NTP server. Furthermore, it shall have the ability to apply a graphical image as an overlay and a privacy mask in the video stream.
- h. The camera shall support both static IP addresses and addresses from a DHCP-server, and shall support both IPv4 and IPv6. The camera shall incorporate support for Quality of Service (QoS).
- i. For secure access to the camera as well as provided content, the camera shall support HTTPS, SSL/TLS and IEEE802.1X authentication. The camera shall also support IP address filtering and include at least three different levels of password security.
- j. The camera shall contain a built-in web server making video and configuration available in a standard browser environment using HTTP and shall also be fully supported by an open and published API (Application Programmers Interface) providing necessary information for integration of functionality into third party applications.
- k. The camera shall:
 - 1) Be manufactured with a vandal-resistant metal casing and metal encapsulated electronics.
 - 2) Be equipped with a 10BASE-T/100BASE-TX Ethernet interface
 - 3) Be equipped with a progressive scan megapixel sensor, support WDR and shall provide images down to 0.5 lux in day mode and 0.08 lux in night mode
 - 4) Be equipped with so called Day/Night functionality and a varifocal lens with automated iris functionality supporting remote zoom and focus
 - 5) Provide at least two video streams at full frame rate (30 fps) in HDTV 720p (1280x720) resolution using H.264
 - 6) Provide video at 30 frames per second in HDTV 1080p (1920x1080) resolution using H.264
 - 7) Support simultaneous individually configured Motion JPEG and H.264 video streams
 - 8) Support both unicast and multicast H.264 with support for both Constant and Variable Bit Rate
 - 9) Support Power over Ethernet according to IEEE 802.3af

- 10) Provide 1 channel of full duplex audio and be equipped with a built-in microphone, Line/Mic In and Line Out [AXIS P3346 and P3346-V only]
- 11) Accept static IP addresses as well as addresses provided by a DHCP
- 12) Support both IPv4 and IPv6 based addresses
- 13) Provide text overlay that includes date/time support synchronized with an NTP server and the ability to apply a graphical image as an overlay into the video image
- 14) Include pixel counter functionality, providing a tool to calculate the size of objects in number of pixels
- 15) Provide multiple user password levels, support for HTTPS and SSL/TLS and incorporate IEEE 802.1X authentication
- 16) Be equipped with one digital (alarm) input and one digital output
- 17) Include embedded event functionality, which may be triggered by:
 - a) Alarm input
 - b) Camera tampering alarm
 - c) Video motion detection
 - d) Audio detection
 - e) Local storage full
- 18) Event actions supported by the camera shall include:
 - a) Remote notification, including video upload
 - b) Activation of output
 - c) Recording to local storage
- 19) Be equipped with a built-in web server
- 20) Be supported by an open and published API

16. Network Camera, Outdoor Fixes, SVGA, Type 4

- a. The camera shall be manufactured with an outdoor ready IP66-rated casing and shall operate between -20 to +50°C (-4 to +122°F), also when powered using Power over Ethernet.
- b. The camera shall be equipped with a progressive scan sensor, a CS-mounted replaceable varifocal lens with automated iris functionality and shall provide images down to 0.6 lux.
- c. The camera shall be equipped with a 10BASE-T/100BASE-TX Ethernet-port, and shall include support for Power over Ethernet according to IEEE 802.3af.
- d. The camera shall provide simultaneous Motion JPEG and H.264 video streams and shall support at least two individually configured video streams of resolutions up to 800x600 pixels in 30 frames per second. The H.264 implementation shall include both unicast and multicast functionality and support Constant Bit Rate (CBR) as well as Variable Bit Rate (VBR).
- e. The camera shall be able to trigger its embedded event functionality based on camera tampering alarm or detection of video motion. Possible response to a triggered event shall include remote notification, incl. video upload. The camera shall be equipped with at least 25MB of memory for local storage of images.
- f. The camera shall feature overlay text ability, that includes date and time synchronized using an NTP server. Furthermore, it shall have the ability to apply a graphical image as an overlay and a privacy mask in the video stream.
- g. The camera shall support both static IP addresses and addresses from a DHCP-server, and shall support both IPv4 and IPv6. The camera shall incorporate support for Quality of Service (QoS).

- h. For secure access to the camera as well as provided content, the camera shall support HTTPS and SSL/TLS. The camera shall also support IP address filtering and include at least three different levels of password security.
 - i. The camera shall contain a built-in web server making video and configuration available in a standard browser environment using HTTP and shall also be fully supported by an open and published API (Application Programmers Interface) providing necessary information for integration of functionality into third party applications.
 - j. The camera shall:
 - 1) Be IP66-rated and operate between -20 to +50°C (-4 to +122°F), also when powered using Power over Ethernet
 - 2) Be equipped with a 10BASE-T/100BASE-TX Ethernet interface
 - 3) Be equipped with a progressive scan sensor, replaceable varifocal lens with automated iris and provide images down to 0.6 lux
 - 4) Provide at least 2 streams of resolutions up to 800x600 pixels at 30 frames per second per stream
 - 5) Support simultaneous individually configured Motion JPEG and H.264 video streams
 - 6) Support both unicast and multicast H.264 with support for both Constant and Variable Bit Rate
 - 7) Support Power over Ethernet according to IEEE 802.3af
 - 8) Accept static IP addresses as well as addresses provided by a DHCP
 - 9) Support both IPv4 and IPv6 based addresses
 - 10) Provide text overlay that includes date/time support synchronized with an NTP server and the ability to apply a graphical image as an overlay into the video image
 - 11) Provide multiple user password levels and support for HTTPS and SSL/TLS Include embedded event functionality, which may be triggered by:
 - a) Camera tampering alarm
 - b) Video motion detection
 - 12) Event actions supported by the camera shall include:
 - a) Remote notification, including video upload
 - 13) Be equipped with a built-in web server
 - 14) Be supported by an open and published API
17. Network Camera, Outdoor Fixes, 720p, Type 5
- a. The camera shall be manufactured with an outdoor ready IP66-rated casing and shall operate between -20 to +50°C (-4 to +122°F), also when powered using Power over Ethernet.
 - b. The camera shall be equipped with a progressive scan sensor, a CS-mounted replaceable varifocal lens with automated iris functionality and shall provide images down to 0.6 lux.
 - c. The camera shall be equipped with a 10BASE-T/100BASE-TX Ethernet-port, and shall include support for Power over Ethernet according to IEEE 802.3af.
 - d. The camera shall provide simultaneous Motion JPEG and H.264 video streams and shall support at least two individually configured video streams of resolutions up to 800x600 pixels in 30 frames per second. The H.264 implementation shall include both unicast and multicast functionality and support Constant Bit Rate (CBR) as well as Variable Bit Rate (VBR).

- e. The camera shall provide simultaneous Motion JPEG and H.264 video streams and shall support video of HDTV 720p (1280x720) resolution in 30 frames per second.
- f. The camera shall be able to trigger its embedded event functionality based on camera tampering alarm or detection of video motion. Possible response to a triggered event shall include remote notification, incl. video upload. The camera shall be equipped with at least 25MB of memory for local storage of images.
- g. The camera shall feature overlay text ability, that includes date and time synchronized using an NTP server. Furthermore, it shall have the ability to apply a graphical image as an overlay and a privacy mask in the video stream.
- h. The camera shall support both static IP addresses and addresses from a DHCP-server, and shall support both IPv4 and IPv6. The camera shall incorporate support for Quality of Service (QoS).
- i. For secure access to the camera as well as provided content, the camera shall support HTTPS and SSL/TLS. The camera shall also support IP address filtering and include at least three different levels of password security.
- j. The camera shall contain a built-in web server making video and configuration available in a standard browser environment using HTTP and shall also be fully supported by an open and published API (Application Programmers Interface) providing necessary information for integration of functionality into third party applications.
- k. The camera shall:
 - 1) Be IP66-rated and operate between -20 to +50°C (-4 to +122°F), also when powered using Power over Ethernet
 - 2) Be equipped with a 10BASE-T/100BASE-TX Ethernet interface
 - 3) Be equipped with a progressive scan sensor, replaceable varifocal lens with automated iris and provide images down to 0.6 lux
 - 4) Provide at least 2 streams of resolutions up to 800x600 pixels at 30 frames per second per stream
 - 5) Provide video of HDTV 720p (1280x720) resolution at 30 frames per second [AXIS M1114-E only]
 - 6) Support simultaneous individually configured Motion JPEG and H.264 video streams
 - 7) Support both unicast and multicast H.264 with support for both Constant and Variable Bit Rate
 - 8) Support Power over Ethernet according to IEEE 802.3af
 - 9) Accept static IP addresses as well as addresses provided by a DHCP
 - 10) Support both IPv4 and IPv6 based addresses
 - 11) Provide text overlay that includes date/time support synchronized with an NTP server and the ability to apply a graphical image as an overlay into the video image
 - 12) Provide multiple user password levels and support for HTTPS and SSL/TLS
Include embedded event functionality, which may be triggered by:
 - a) Camera tampering alarm
 - b) Video motion detection
 - 13) Event actions supported by the camera shall include:
 - a) Remote notification, including video upload
 - 14) Be equipped with a built-in web server
 - 15) Be supported by an open and published API

18. Network Camera, Outdoor Fixed, 1080p, Type 6

- a. The camera shall be manufactured with a metal casing and be equipped with a progressive scan megapixel sensor, a varifocal lens with automated iris functionality, Wide Dynamic Range, so called Day/Night functionality and shall provide images down to 0.6 lux in day mode and 0.08 lux in night mode.
- b. The camera shall be equipped with a 10BASE-T/100BASE-TX Ethernet-port, and shall include support for Power over Ethernet according to IEEE 802.3af.
- c. The camera shall provide individually configured simultaneous Motion JPEG and H.264 video streams, and shall support video of HDTV 1080p (1920x1080) resolution in 30 frames per second.
- d. The H.264 implementation shall include both unicast and multicast functionality and support Constant Bit Rate (CBR) as well as Variable Bit Rate (VBR).
- e. The camera shall be fitted with a built-in microphone, Line In and Line Out, provide full duplex audio, and shall support AAC, G.711 or G.726 compression.
- f. The camera shall be equipped with one digital (alarm) input and one digital output, and shall also be able to trigger its embedded event functionality based on camera tampering alarm, detection of video motion or audio, or when the local storage is full. Possible response to a triggered event shall include remote notification, incl. image upload, and activation of output and recording to local storage. The camera shall be equipped with a video buffer for saving pre- and post-alarm images and shall have a SD/SDHC card slot to support local storage of video.
- g. The camera shall feature overlay text ability, that includes date and time synchronized using an NTP server. Furthermore, it shall have the ability to apply a graphical image as an overlay and a privacy mask in the video stream.
- h. The camera shall be equipped with an ability to perform back focus adjustment remotely from the web interface and shall include a customizable pixel counter functionality, identifying the size of objects in number of pixels.
- i. The camera shall support both static IP addresses and addresses from a DHCP-server, and shall support both IPv4 and IPv6. The camera shall incorporate support for Quality of Service (QoS).
- j. For secure access to the camera as well as provided content, the camera shall support HTTPS, SSL/TLS and IEEE802.1X authentication. The camera shall also support IP address filtering and include at least three different levels of password security.
- k. The camera shall contain a built-in web server making video and configuration available in a standard browser environment using HTTP and shall also be fully supported by an open and published API (Application Programmers Interface) providing necessary information for integration of functionality into third party applications.
- l. The camera shall:
 - 1) Be manufactured with a metal casing
 - 2) Be equipped with a 10BASE-T/100BASE-TX Ethernet interface
 - 3) Be equipped with a progressive scan megapixel sensor, support WDR and shall provide images down to 0.6 lux in day mode and 0.08 lux in night mode
 - 4) Be equipped with so called Day/Night functionality and a varifocal lens with automated iris functionality
 - 5) Support remote back focus adjustment
 - 6) Provide at least 2 streams of resolutions up to 800x600 pixels at 30 frames per second per stream
 - 7) Provide at least 2 video streams at 30 frames per second in HDTV 720p (1280x720) resolution using H.264.

- 8) Provide video at 30 frames per second in HDTV 1080p (1920x1080) resolution using H.264.
 - 9) Support simultaneous individually configured Motion JPEG and H.264 video streams
 - 10) Support both unicast and multicast H.264 with support for both Constant and Variable Bit Rate
 - 11) Support Power over Ethernet according to IEEE 802.3af
 - 12) Provide 1 channel of full duplex audio and be equipped with a built-in microphone, Line/Mic In and Line Out
 - 13) Accept static IP addresses as well as addresses provided by a DHCP
 - 14) Support both IPv4 and IPv6 based addresses
 - 15) Provide text overlay that includes date/time support synchronized with an NTP server and the ability to apply a graphical image as an overlay into the video image
 - 16) Include pixel counter functionality, providing a tool to calculate the size of objects in number of pixels
 - 17) Provide multiple user password levels, support for HTTPS and SSL/TLS and incorporate IEEE 802.1X authentication
 - 18) Be equipped with one digital (alarm) input and one digital output
 - 19) Include embedded event functionality, which may be triggered by:
 - a) Alarm input
 - b) Camera tampering alarm
 - c) Video motion detection
 - d) Audio detection
 - e) Local storage full
 - 20) Event actions supported by the camera shall include:
 - a) Remote notification, including image upload
 - b) Activation of output
 - c) Recording to local storage
- m. Be equipped with a built-in web server
- n. Be supported by an open and published API

19. Network Camera, Outdoor Pan Tilt 200M D1, Type 7

- a. The camera shall be manufactured with an all-metal body, support operation between -20°C to +50°C (-4°F to +122°F) and be both IP66 and NEMA 4X certified.
- b. The camera shall be equipped with a CCD-sensor, 12x optical zoom, so called Day/Night functionality and shall provide images down to 1 lux in day mode and 0.3 lux in night mode.
- c. The camera shall provide accurate high-speed pan-tilt functionality with 360° pan range and a 180° tilt range, provide 100°/sec pan and tilt speed, be equipped with Auto-flip and incorporate at least 100 presets.
- d. The camera shall be equipped with a 10BASE-T/100BASE-TX Ethernet-port, and shall include support for Power over Ethernet according to IEEE 802.3af.
- e. The camera shall provide simultaneous Motion JPEG and H.264 video streams and shall support at least three individually configured video streams of resolutions up to 704x480 (60Hz) / 704x576 (50Hz) pixels in full frame rate (30/25fps). The H.264 implementation shall include both unicast and multicast functionality and support Constant Bit Rate (CBR) as well as Variable Bit Rate (VBR).

- f. The camera shall be able to trigger its embedded event functionality based on detection of video motion, PTZ position, when the local storage is full, camera temperature or in the case of fan malfunctions. Possible response to a triggered event shall include remote notification, incl. video upload, preset call-up and recording to local storage. The camera shall be equipped with a video buffer for saving pre- and post-alarm images and shall have a SD/SDHC card slot to support local storage of video.
- g. The camera shall feature overlay text ability, that includes date and time synchronized using an NTP server. Furthermore, it shall have the ability to apply a graphical image as an overlay in the video stream.
- h. The camera shall support both static IP addresses and addresses from a DHCP-server, and shall support both IPv4 and IPv6. The camera shall incorporate support for Quality of Service (QoS).
- i. For secure access to the camera as well as provided content, the camera shall support HTTPS, SSL/TLS and IEEE802.1X authentication. The camera shall also support IP address filtering and include at least three different levels of password security.
- j. The camera shall contain a built-in web server making video and configuration available in a standard browser environment using HTTP and shall also be fully supported by an open and published API (Application Programmers Interface) providing necessary information for integration of functionality into third party applications.
- k. The camera shall conform to the network video standard as defined by the ONVIF organization.
- l. The camera shall:
 - 1) Be manufactured with an all-metal body
 - 2) Be both IP66 and NEMA 4X-rated
 - 3) Start-up and operate between -20°C to +50°C (-4°F to +122°F)
 - 4) Be equipped with a 10BASE-T/100BASE-TX Ethernet interface
 - 5) Be equipped with a CCD-sensor and provide images down to 1 lux in day mode and 0.3 lux in night mode
 - 6) Be equipped with 12x optical zoom and so called Day/Night functionality
 - 7) Provide at least 3 streams of resolutions up to 704x480 (60Hz) / 704x576 (50Hz) pixels at 30/25 frames per second per stream
 - 8) Support simultaneous individually configured Motion JPEG and H.264 video streams
 - 9) Support both unicast and multicast H.264 with support for both Constant and Variable Bit Rate
 - 10) Support Power over Ethernet according to IEEE 802.3af
 - 11) Accept static IP addresses as well as addresses provided by a DHCP
 - 12) Support both IPv4 and IPv6 based addresses
 - 13) Provide accurate high-speed pan-tilt functionality with 360° pan range and a 180° tilt range
 - 14) Provide 100°/sec pan and tilt speed
 - 15) Be equipped with Auto-flip and incorporate at least 100 presets
 - 16) Provide text overlay that includes date/time support synchronized with an NTP server and the ability to apply a graphical image as an overlay into the video image
 - 17) Provide multiple user password levels, support for HTTPS and SSL/TLS and incorporate IEEE 802.1X authentication
 - 18) Be equipped with an SD/SDHC memory card slot
 - 19) Include embedded event functionality, which may be triggered by:
 - a) Video motion detection

- b) PTZ position
- c) Camera temperature outside of operative range
- d) Fan malfunction
- e) Local storage full

20) Event actions supported by the camera shall include:

- a) Remote notification, including video upload
- b) Preset call-up
- c) Recording to local storage

21) Be equipped with a built-in web server

22) Be supported by an open and published API

23) Be conformant to the network video standard as defined by the ONVIF organization.

20. Network Camera, Outdoor Pan Tilt 200M 720p, Type 8

- a. The camera shall be manufactured with an all-metal body, be equipped with a progressive scan sensor, 29x optical zoom, so called Day/Night functionality and shall provide images down to 0.5 lux in day mode and 0.01 lux in night mode.
- b. The camera shall provide accurate high-speed pan-tilt functionality with 360° pan range and a 180° tilt range, provide pan and tilt speed between 0.2° - 300°/sec, be equipped with Auto-flip and incorporate at least 100 presets.
- c. The camera shall be equipped with a 10BASE-T/100BASE-TX Ethernet-port, and shall include support for High Power over Ethernet according to IEEE 802.3at.
- d. The camera shall provide simultaneous Motion JPEG and H.264 video streams and shall support at least three individually configured video streams of resolutions up to 720x480 (60Hz) / 720x576 (50Hz) pixels in full frame rate (30/25fps). The H.264 implementation shall include both unicast and multicast functionality and support Constant Bit Rate (CBR) as well as Variable Bit Rate (VBR).
- e. The camera shall be fitted with Line In and Line Out, provide full duplex audio, and shall support AAC, G.711 or G.726 compression.
- f. The camera shall be equipped with four I/O-ports, configurable for in- or output functionality, and shall also be able to trigger its embedded event functionality based on detection of video motion or audio, PTZ position, when the local storage is full or in the case of fan malfunctions. Possible response to a triggered event shall include remote notification, incl. video upload, and activation of output, preset call-up and recording to local storage. The camera shall be equipped with at least 96 MB of memory and hold a SD/SDHC card slot for expanding the memory.
- g. The camera shall feature overlay text ability, that includes date and time synchronized using an NTP server. Furthermore, it shall have the ability to apply a graphical image as an overlay and at least 4 individually configurable and dynamically adjusted privacy masks in the video stream.
- h. The camera shall support both static IP addresses and addresses from a DHCP-server, and shall support both IPv4 and IPv6. The camera shall incorporate support for Quality of Service (QoS).
- i. For secure access to the camera as well as provided content, the camera shall support HTTPS, SSL/TLS and IEEE802.1X authentication. The camera shall also support IP address filtering and include at least three different levels of password security.

- j. The camera shall contain a built-in web server making video and configuration available in a standard browser environment using HTTP and shall also be fully supported by an open and published API (Application Programmers Interface) providing necessary information for integration of functionality into third party applications.
- k. The camera shall:
 - 1) Be manufactured with an all-metal body
 - 2) Be equipped with a 10BASE-T/100BASE-TX Ethernet interface
 - 3) Be equipped with a progressive scan sensor and provide images down to 0.5 lux in day mode and 0.01 lux in night mode
 - 4) Be equipped with 29x optical zoom and so called Day/Night functionality
 - 5) Provide at least 3 streams of resolutions up to 720x480 (60Hz) / 720x576 (50Hz) pixels at 30/25 frames per second per stream
 - 6) Support simultaneous individually configured Motion JPEG and H.264 video streams
 - 7) Support both unicast and multicast H.264 with support for both Constant and Variable Bit Rate
 - 8) Support Power over Ethernet according to IEEE 802.3at
 - 9) Provide 1 channel of full duplex audio and be equipped with a Line/Mic In and Line Out
 - 10) Accept static IP addresses as well as addresses provided by a DHCP
 - 11) Support both IPv4 and IPv6 based addresses
 - 12) Provide accurate high-speed pan-tilt functionality with 360° pan range and a 180° tilt range
 - 13) Provide pan and tilt speed between 0.2° - 300°/sec
 - 14) Be equipped with Auto-flip and incorporate at least 100 presets
 - 15) Provide text overlay that includes date/time support synchronized with an NTP server and the ability to apply a graphical image as an overlay into the video image
 - 16) Provide multiple user password levels, support for HTTPS and SSL/TLS and incorporate IEEE 802.1X authentication
 - 17) Be equipped with four I/O ports, configurable as in- or output
 - 18) Be equipped with an SD/SDHC memory card slot for memory expansion
 - 19) Include embedded event functionality, which may be triggered by:
 - a) Alarm input
 - b) Video motion detection
 - c) Audio detection
 - d) PTZ position
 - e) Local storage full
- l. Event actions supported by the camera shall include:
 - 1) Remote notification, including video upload
 - 2) Activation of output
 - 3) Preset call-up
 - 4) Recording to local storage
- m. Be equipped with a built-in web server
- n. Be supported by an open and published API

21. Network Camera, Fixed Dome, SVG4, Type 9

- a. The camera shall be manufactured with an outdoor ready, IP66 and NEMA 4X-rated vandal-resistant metal casing, metal encapsulated electronics and shall operate between -40 to +55°C (-40 to +131°F), also when powered using Power over Ethernet.
- b. The camera shall be equipped with a progressive scan sensor, varifocal DC-iris lens with remote zoom and focus capabilities, Wide Dynamic Range, so called Day/Night functionality and shall provide images down to 0.3 lux in day mode and 0.05 lux in night mode.
- c. The camera shall be equipped with a 10BASE-T/100BASE-TX Ethernet-port, and shall include support for Power over Ethernet according to IEEE 802.3af.
- d. The camera shall provide simultaneous Motion JPEG and H.264 video streams and shall support at least two individually configured video streams of resolutions up to 800x600 pixels in 30 frames per second. The H.264 implementation shall include both unicast and multicast functionality and support Constant Bit Rate (CBR) as well as Variable Bit Rate (VBR).
- e. The camera shall be equipped with one digital (alarm) input and one digital output, and shall also be able to trigger its embedded event functionality based on camera tampering alarm, detection of video motion or audio, or when the local storage is full. Possible response to a triggered event shall include remote notification, incl. video upload, and activation of output and recording to local storage. The camera shall be equipped with at least 48MB of memory and hold a SD/SDHC card slot for expanding the memory.
- f. The camera shall feature overlay text ability, that includes date and time synchronized using an NTP server. Furthermore, it shall have the ability to apply a graphical image as an overlay and a privacy mask in the video stream.
- g. The camera shall support both static IP addresses and addresses from a DHCP-server, and shall support both IPv4 and IPv6. The camera shall incorporate support for Quality of Service (QoS).
- h. For secure access to the camera as well as provided content, the camera shall support HTTPS, SSL/TLS and IEEE802.1X authentication. The camera shall also support IP address filtering and include at least three different levels of password security.
- i. The camera shall contain a built-in web server making video and configuration available in a standard browser environment using HTTP and shall also be fully supported by an open and published API (Application Programmers Interface) providing necessary information for integration of functionality into third party applications.
- j. The camera shall:
 - 1) Be manufactured with a vandal-resistant metal casing and metal encapsulated electronics.
 - 2) Be IP66 and NEMA 4X-rated and operate between -40 to +55°C (-40 to +131°F), also when powered using Power over Ethernet
 - 3) Be equipped with a 10BASE-T/100BASE-TX Ethernet interface
 - 4) Be equipped with a progressive scan sensor, support WDR and shall provide images down to 0.3 lux in day mode and 0.05 lux in night mode
 - 5) Be equipped with so called Day/Night functionality and a varifocal DC-iris lens supporting remote zoom and focus
 - 6) Provide at least 2 streams of resolutions up to 800x600 pixels at 30 frames per second per stream
 - 7) Support simultaneous individually configured Motion JPEG and H.264 video streams

- 8) Support both unicast and multicast H.264 with support for both Constant and Variable Bit Rate
- 9) Support Power over Ethernet according to IEEE 802.3af
- 10) Accept static IP addresses as well as addresses provided by a DHCP
- 11) Support both IPv4 and IPv6 based addresses
- 12) Provide text overlay that includes date/time support synchronized with an NTP server and the ability to apply a graphical image as an overlay into the video image
- 13) Provide multiple user password levels, support for HTTPS and SSL/TLS and incorporate IEEE 802.1X authentication
- 14) Be equipped with one digital (alarm) input and one digital output
- 15) Include embedded event functionality, which may be triggered by:
 - a) Alarm input
 - b) Camera tampering alarm
 - c) Video motion detection
 - d) Audio detection
 - e) Local storage full
- 16) Event actions supported by the camera shall include:
 - a) Remote notification, including video upload
 - b) Activation of output
 - c) Recording to local storage
- 17) Be equipped with a built-in web server
- 18) Be supported by an open and published API

22. Network Camera, Fixed Dome 720p, Outdoor Ready, Type 10

- a. The camera shall be manufactured with an outdoor ready, IP66 and NEMA 4X-rated vandal-resistant metal casing, metal encapsulated electronics and shall operate between -40 to +55°C (-40 to +131°F), also when powered using Power over Ethernet.
- b. The camera shall be equipped with a progressive scan megapixel sensor, varifocal DC-iris lens with remote zoom and focus capabilities, Wide Dynamic Range, so called Day/Night functionality and shall provide images down to 0.4 lux in day mode and 0.06 lux in night mode.
- c. The camera shall be equipped with a 10BASE-T/100BASE-TX Ethernet-port, and shall include support for Power over Ethernet according to IEEE 802.3af.
- d. The camera shall provide simultaneous Motion JPEG and H.264 video streams and shall support at least two individually configured video streams of HDTV 720p (1280x720) resolutions in full frame rate (30 fps) using H.264. The H.264 implementation shall include both unicast and multicast functionality and support Constant Bit Rate (CBR) as well as Variable Bit Rate (VBR).
- e. The camera shall be fitted with Line In and Line Out, provide full duplex audio, and shall support AAC, G.711 or G.726 compression.
- f. The camera shall be equipped with one digital (alarm) input and one digital output, and shall also be able to trigger its embedded event functionality based on camera tampering alarm, detection of video motion or audio, or when the local storage is full. Possible response to a triggered event shall include remote notification, incl. video upload, and activation of output and recording to local storage. The camera shall be equipped with at least 48MB of memory and hold a SD/SDHC card slot for expanding the memory.

- g. The camera shall feature overlay text ability, that includes date and time synchronized using an NTP server. Furthermore, it shall have the ability to apply a graphical image as an overlay and a privacy mask in the video stream.
- h. The camera shall support both static IP addresses and addresses from a DHCP-server, and shall support both IPv4 and IPv6. The camera shall incorporate support for Quality of Service (QoS).
- i. For secure access to the camera as well as provided content, the camera shall support HTTPS, SSL/TLS and IEEE802.1X authentication. The camera shall also support IP address filtering and include at least three different levels of password security.
- j. The camera shall contain a built-in web server making video and configuration available in a standard browser environment using HTTP and shall also be fully supported by an open and published API (Application Programmers Interface) providing necessary information for integration of functionality into third party applications.
- k. The camera shall:
 - 1) Be manufactured with a vandal-resistant metal casing and metal encapsulated electronics.
 - 2) Be IP66 and NEMA 4X-rated and operate between -40 to +55°C (-40 to +131°F), also when powered using Power over Ethernet
 - 3) Be equipped with a 10BASE-T/100BASE-TX Ethernet interface
 - 4) Be equipped with a progressive scan megapixel sensor, support WDR and shall provide images down to 0.4 lux in day mode and 0.06 lux in night mode
 - 5) Be equipped with so called Day/Night functionality and a varifocal DC-iris lens supporting remote zoom and focus
 - 6) Provide at least two video streams at full frame rate (30 fps) in HDTV 720p (1280x720) resolution using H.264
 - 7) Support simultaneous individually configured Motion JPEG and H.264 video streams
 - 8) Support both unicast and multicast H.264 with support for both Constant and Variable Bit Rate
 - 9) Support Power over Ethernet according to IEEE 802.3af
 - 10) Provide 1 channel of full duplex audio and be equipped with Line/Mic In and Line Out
 - 11) Accept static IP addresses as well as addresses provided by a DHCP
 - 12) Support both IPv4 and IPv6 based addresses
 - 13) Provide text overlay that includes date/time support synchronized with an NTP server and the ability to apply a graphical image as an overlay into the video image
 - 14) Provide multiple user password levels, support for HTTPS and SSL/TLS and incorporate IEEE 802.1X authentication
 - 15) Be equipped with one digital (alarm) input and one digital output
 - 16) Include embedded event functionality, which may be triggered by:
 - a) alarm input
 - b) camera tampering alarm
 - c) video motion detection
 - d) audio detection
 - e) local storage full
 - 17) Event actions supported by the camera shall include:
 - a) remote notification, including video upload
 - b) activation of output

c) recording to local storage

18) Be equipped with a built-in web server

19) Be supported by an open and published API

23. Network Camera, Fixed Dome, 1080p, Outdoor Ready, Type II

- a. The camera shall be manufactured with an outdoor ready, IP66 and NEMA 4X-rated vandal-resistant metal casing, metal encapsulated electronics and shall operate between -40 to +55°C (-40 to +131°F), also when powered using Power over Ethernet.
- b. The camera shall be equipped with a progressive scan megapixel sensor, a varifocal lens with automated iris functionality and remote zoom and focus capabilities, Wide Dynamic Range, so called Day/Night functionality and shall provide images down to 0.5 lux in day mode and 0.08 lux in night mode.
- c. The camera shall be equipped with a 10BASE-T/100BASE-TX Ethernet-port, and shall include support for Power over Ethernet according to IEEE 802.3af.
- d. The camera shall provide individually configured simultaneous Motion JPEG and H.264 video streams, and shall support video of HDTV 1080p (1920x1080) resolution in 30 frames per second.
- e. The H.264 implementation shall include both unicast and multicast functionality and support Constant Bit Rate (CBR) as well as Variable Bit Rate (VBR).
- f. The camera shall be fitted with Line In and Line Out, provide full duplex audio, and shall support AAC, G.711 or G.726 compression.
- g. The camera shall be equipped with one digital (alarm) input and one digital output, and shall also be able to trigger its embedded event functionality based on camera tampering alarm, detection of video motion or audio, or when the local storage is full. Possible response to a triggered event shall include remote notification, incl. image upload, and activation of output and recording to local storage. The camera shall be equipped with a video buffer for saving pre- and post-alarm images and shall have a SD/SDHC card slot to support local storage of video.
- h. The camera shall feature overlay text ability, that includes date and time synchronized using an NTP server. Furthermore, it shall have the ability to apply a graphical image as an overlay and a privacy mask in the video stream.
- i. The camera shall support both static IP addresses and addresses from a DHCP-server, and shall support both IPv4 and IPv6. The camera shall incorporate support for Quality of Service (QoS).
- j. For secure access to the camera as well as provided content, the camera shall support HTTPS, SSL/TLS and IEEE802.1X authentication. The camera shall also support IP address filtering and include at least three different levels of password security.
- k. The camera shall contain a built-in web server making video and configuration available in a standard browser environment using HTTP and shall also be fully supported by an open and published API (Application Programmers Interface) providing necessary information for integration of functionality into third party applications.
- l. The camera shall:
 - 1) Be manufactured with a vandal-resistant metal casing and metal encapsulated electronics.
 - 2) Be IP66 and NEMA 4X-rated and operate between -40 to +55°C (-40 to +131°F), also when powered using Power over Ethernet
 - 3) Be equipped with a 10BASE-T/100BASE-TX Ethernet interface
 - 4) Be equipped with a progressive scan megapixel sensor, support WDR and shall provide images down to 0.5 lux in day mode and 0.08 lux in night mode

- 5) Be equipped with so called Day/Night functionality and a varifocal lens with automated iris functionality supporting remote zoom and focus
- 6) Provide at least two video streams at full frame rate (30 fps) in HDTV 720p (1280x720) resolution using H.264
- 7) Provide video at 30 frames per second in HDTV 1080p (1920x1080) resolution using H.264
- 8) Support simultaneous individually configured Motion JPEG and H.264 video streams
- 9) Support both unicast and multicast H.264 with support for both Constant and Variable Bit Rate
- 10) Support Power over Ethernet according to IEEE 802.3af
- 11) Provide 1 channel of full duplex audio and be equipped with Line/Mic In and Line Out
- 12) Accept static IP addresses as well as addresses provided by a DHCP
- 13) Support both IPv4 and IPv6 based addresses
- 14) Provide text overlay that includes date/time support synchronized with an NTP server and the ability to apply a graphical image as an overlay into the video image
- 15) Include pixel counter functionality, providing a tool to calculate the size of objects in number of pixels
- 16) Provide multiple user password levels, support for HTTPS and SSL/TLS and incorporate IEEE 802.1X authentication
- 17) Be equipped with one digital (alarm) input and one digital output
- 18) Include embedded event functionality, which may be triggered by:
 - a) alarm input
 - b) camera tampering alarm
 - c) video motion detection
 - d) audio detection
 - e) local storage full
- 19) Event actions supported by the camera shall include:
 - a) remote notification, including video upload
 - b) activation of output
 - c) recording to local storage
- 20) Be equipped with a built-in web server
- 21) Be supported by an open and published API

D. Camera Mounts

1. Ceiling Mounts:

- a. This enclosure and mount shall be installed in a finished or suspended ceiling.
- b. The enclosure and mount shall be fastened to the finished ceiling, and shall not depend on the ceiling tile grid for complete support.
- c. Suspended ceiling mounts shall be low profile, and shall be suitable for replacement of 2 foot by 2 foot (610mm x 610mm) ceiling tiles.

2. Wall Mounts:

- a. The enclosure shall be installed in manner that it matches the existing décor and placed at a height that it will be unobtrusive, unable to cause personal harm, and prevents tampering and vandalism.

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- b. The mount shall contain a manual pan/tilt head that will provide 360 degrees of horizontal and vertical positioning from a horizontal position, and has a locking bar or screw to maintain its fixed position once it has been adjusted.
 - 3. Interior Domes
 - a. The interior dome shall be a pendant mount, pole mount, ceiling mount, surface mount, or corner mounted equipment.
 - b. The lower portion of the dome that provides camera viewing shall be made of black opaque acrylic and shall have a light attenuation factor of no more than 1 f-stop.
 - c. The housing shall be equipped with integral pan/tilt capabilities complete with wiring, wiring harness, connectors, receiver/driver, pan/tilt control system, pre-position cards, or any other hardware and equipment as needed to fully provide a fully functional pan/tilt dome.
 - 4. Exterior Domes
 - a. The exterior dome shall meet all requirements outlined in the interior dome paragraph above.
 - b. The housing shall be constructed to be dust and water tight, and fully operational in 100 percent condensing humidity.
 - 5. Exterior Wall Mounts
 - a. Shall have an adjustable head for mounting the camera.
 - b. Shall be constructed of aluminum, stainless steel, or steel with a corrosion-resistant finish.
 - c. The head shall be adjustable for not less than plus and minus 90 degrees of pan, and not less than plus and minus 45 degrees of tilt. If the bracket is to be used in conjunction with a pan/tilt, the bracket shall be supplied without the adjustable mounting head, and shall have a bolt-hole pattern to match the pan/tilt base.
 - d. Shall be installed at a height that allows for maximum coverage of the area being monitored.
 - E. Network Switch
 - 1. 48 10/100/1000 PoE+
 - 2. Four Gigabit Ethernet (GbE) SFP or two 10GbE SFP+
 - 3. PoE+ with 30W power on all ports in 1 rack unit (RU) form factor
 - 4. Dual redundant, modular power supplies and fans, 1100W
 - 5. Media Access Control Security (MACsec) hardware-based encryption
 - 6. IPv4 and IPv6 routing, Multicast routing, advanced quality of service (QoS), and security features in hardware
 - 7. EnergyWise for operational cost optimization by measuring actual power consumption of the PoE devices, reporting and reducing energy consumption across the network
 - 8. 1.75H x 17.5W x 19.5D

F. Encryptor Technical Characteristics:

Cryptography	Standard - Triple DES 168-bit (ANSI 9.52) Rijndael - AES (128, 192, 256)
Performance	Throughput (end-to-end) @ 100 Mbps line speed: >188 Mbps full duplex (large frames) >200 kfps full duplex (small frames) Latency (end-to-end) @ 100 Mbps
Key Management	Automatic KEK/DEK Exchange Using Signed Diffie-Hellman Unit Authentication Using X.509 Certificates
Physical Interfaces	10BaseT or 10/100BaseT Ethernet (Host and Network Ports) 10BaseT Ethernet Management Port Back and Front-Panel Serial Control Port
Device Management	THALES Element Manager, Front Panel Viewer, and Certificate Manager 10Base T (RJ-45) or 9- pin Serial Control Port SNMP Network Monitoring
Security Features	Tamper Proof Cryptographic Envelope Tamper Evident Chassis Hardware Random Number Generator
Management	Channel Encrypted Using Same Algorithm as Data Traffic
Security Certifications	FIPS 140-2 Level 3 CAPS Baseline and Enhanced Grades Common Criteria EAL4 and EAL5 (under evaluation)
Regulatory	EN60950, FCC, UL, CE, EN 50082-1, and EN 55022

G. Wires and Cables

1. Shall meet or exceed the manufactures recommendation for power and signal.
2. Will be carried in an enclosed conduit system, utilizing electromagnetic tubing (EMT) to include the equivalent in flexible metal, rigid galvanized steel (RGS) to include the equivalent of liquid tight, polyvinylchloride (PVC) schedule 40 or 80.
3. All conduits will be sized and installed per the NEC. All security system signal and power cables that traverse or originate in a high security office space will contained in either EMT or RGS conduit.
4. All conduit, pull boxes, and junction boxes shall be clearly marked with colored permanent tape or paint that will allow it to be distinguished from all other conduit and infrastructure.
5. Conduit fills shall not exceed ~~50~~ 40 percent unless otherwise documented.
6. A pull string shall be pulled along and provided with signal and power cables to assist in future installations.
7. At all locations where there is a wall penetration or core drilling is conducted to allow for conduit to be installed, fire stopping materials shall be applied to that area.
8. High voltage and signal cables shall not share the same conduit and shall be kept separate up to the point of connection. High voltage for the security system shall be defined as any cable or sets of cables carrying 30 VDC/VAC or higher.
9. For all equipment that is carrying digital data between the Access Control System and Database Management or at a remote monitoring station, shall not be less that 20 AWG and stranded copper wire for each conductor. The cable or each individual conductor within the cable shall have a shield that provides 100% coverage. Cables with a single overall shield shall have a tinned copper shield drain wire.

10. All cables and conductors, except fiber optic cables, that act as a control, communication, or signal lines shall include surge protection. Surge protection shall be furnished at the equipment end and additional triple electrode gas surge protectors rated for the application on each wire line circuit shall be installed within three (3) ft. (one (1) m.) of the building cable entrance. The inputs and outputs shall be tested in both normal and common mode using the following wave forms:
- A 10 microsecond rise time by 1000 microsecond pulse width waveform with a peak voltage of 1500 volts and peak current of 60 amperes.
 - An 8 microsecond rise time by 20 microsecond pulse width wave form with a peak voltage of 1000 volts and peak current of 500 amperes.
11. The surge suppression device shall not attenuate or reduce the video or sync signal under normal conditions. Fuses and relays shall not be used as a means of surge protection.
12. Coaxial Cables
- All video signal cables for the CCTV System, with exception to the PoE cameras, shall be a coaxial cable and have a characteristic impedance of 75 ohms plus or minus 3 ohms.
 - For runs up to 750 feet use of an RG-59/U is required. The RG-59/U shall be shielded which provides a minimum of 95 percent coverage, with a stranded copper center conductor of a minimum 23 AWG, polyethylene insulation, and black non-conductive polyvinylchloride (PVC) jacket.
 - For runs between 750 feet and 1250 feet, RG-6/U is required. RG-6/U shall be shielded which provides a minimum of 95 percent coverage, with a stranded copper center conductor of a minimum 18 AWG, polyethylene insulation, and black non-conductive polyvinylchloride (PVC) jacket.
 - For runs of 1250 to 2750 feet, RG-11/U is required. RG-11/U shall be shielded which provides a minimum of 95 percent coverage, with a stranded copper center conductor of a minimum 14 AWG, polyethylene insulation, and black non-conductive polyvinylchloride (PVC) jacket.
 - All runs greater than 2750 feet will be substituted with a fiber optic cable. If using fiber optics as a signal carrier then the following equipment will be utilized:
 - Multimode fiber optic cable a minimum size of 62 microns
 - Video transmitter, installed at the camera that utilizes 12 VDC or 24 VAC for power.
 - Video receiver, installed at the switcher.

f. RG-59/U Technical Characteristics

AWG	22
Stranding	7x29
Conductor Diameter	.031 in.
Conductor Material	BCC
Insulation Material	Gas-injected FHDPE
Insulation Diameter	.145 in.
Outer Shield Type	Braid/Braid
Outer Jacket Material	PVC
Overall Nominal Diameter	.242 in.
UL Temperature Rating	75°C
Nom. Characteristic Impedance	75 Ohms
Nom. Inductance	0.094 µH/ft
Nom. Capacitance	Conductor to Shield 17.0 pF/ft
Nom. Velocity of Propagation	80 %

Nom. Delay	1.3 ns/ft
Nom. Conductor DC Resistance @ 20°C	12.2 Ohms/1000 ft
Nom. Outer Shield DC Resistance @ 20°C	2.4 Ohms/1000 ft
Max. Operating Voltage	UL 300 V RMS

g. RG-6/U Technical Characteristics:

AWG	18
Stranding	7x27
Conductor Diameter	.040 in.
Conductor Material	BC
Insulation Material	Gas-injected FHDPE
Insulation Diameter	.180 in.
Outer Shield Material	Trade Name Duofoil
Outer Shield Type	Tape/Braid
Outer Shield %Coverage	100 %
Outer Jacket Material	PVC
Overall Nominal Diameter	.274 in.
Nom. Characteristic Impedance	75 Ohms
Nom. Inductance	0.106 μ H/ft
Nom. Capacitance	Conductor to Shield 16.2 pF/ft
Nom. Velocity of Propagation	82 %
Nom. Delay	1.24 ns/ft
Nom. Conductor DC Resistance	6.4 Ohms/1000 ft
Nominal Outer Shield DC Resistance @ 20°C	2.8 Ohms/1000 ft
Max. Operating Voltage	UL 300 V RMS

h. RG-11/U Technical Characteristics:

AWG	15
Stranding	19x27
Conductor Diameter	.064 in.
Conductor Material	BC
Insulation Material	Gas-injected FHDPE
Insulation Diameter	.312 in.
Inner Shield Type	Braid
Inner Shield Material	BC - Bare Copper
Inner Shield %Coverage	95 %
Inner Jacket Material	PE – Polyethylene
Inner Jacket Diameter	.391 in.
Outer Shield Type	Braid
Outer Shield Material	BC - Bare Copper
Outer Shield %Coverage	95 %
Outer Jacket Material	Trade Name Belflex
Outer Jacket Material	PVC Blend
Overall Nominal Diameter	.520 in.
Operating Temperature Range	-35°C To +75°C
Non-UL Temperature Rating	75°C
Nom. Characteristic Impedance	75 Ohms
Nom. Inductance	0.097 μ H/ft
Nom. Capacitance	Conductor to Shield 17.3 pF/ft
Nom. Velocity of Propagation	78 %
Nom. Delay	1.30 ns/ft

Nom. Conductor DC Resistance	3.1 Ohms/1000 ft
Nom. Inner Shield DC Resistance	1.8 Ohms/1000 ft
Nom. Outer Shield DC Resistance	1.4 Ohms/1000 ft
Max. Operating Voltage Non-UL	300 V RMS

H. Signal Cables:

- Signal wiring for PoE cameras depends on the distance the camera is being installed from either a hub or the server.
- If the camera is up to 295 ft from a hub or the server, then use a shielded UTP category 5e (CAT-5e) cable with standard RJ-45 connector at each end. The cable must comply with the Power over Ethernet, IEEE802.3at Standard.
- CAT-5e Technical Characteristics:

Number of Pairs	4
Total Number of Conductors	8
AWG	24
Stranding	Solid
Conductor Material	BC - Bare Copper
Insulation Material	PO – Polyolefin
Overall Nominal Diameter	.230 in.
IEC Specification	11801 Category 5
TIA/EIA Specification	568-B.2 Category 5e
Max. Capacitance Unbalance	(pF/100 m) 150 pF/100 m
Nom. Velocity of Propagation	70 %
Max. Delay	(ns/100 m) 538 @ 100MHz
Max. Delay Skew	(ns/100m) 45 ns/100 m
Max. Conductor DC Resistance	9.38 Ohms/100
Max. DCR Unbalance@ 20°C	3 %
Max. Operating Voltage	UL 300 V RMS

I. Video Wall System

- Provided a complete video wall system complete with displays, display support infrastructure, media wall switcher, digital switcher and interconnect cables.

a. Displays:

- Video wall display shall have HD inputs – HDME and DVI as well as standard video inputs. Shall also have picture by picture (PBP) and picture in picture (PIP) capabilities, all metal chassis, VESA standard hole patterns, multi language, fan on-off control, auto pixel shift, control panel lock (panel or IR).

SCREEN SIZE	50"
BEZEL WIDTH	12.8 mm
NATIVE RESOLUTION	1290 X 1080 @ 60HZ
CONTRAST RATIO	4000:1
ASPECT RATIO	16:9
RS232 IN / OUT	1 / 1
DVI-D IN / HDMI IN	1 / 2
VGA IN (15 pin D-Sub)	1
BNC Video In / Out	2 / 2
S-Video In / Out	1 / 1
Component In	1
Audio In	3 (L & R)
Dimensions	49" W x 28" H x 5.36"D

J. Monitor Wall Frame System

1. The contractor shall supply a modular monitor wall frame support system capable of supporting the specified monitors.
2. The system shall be comprised of exterior frames and interior supports fabricated from lightweight, high-strength extruded "T-slotted" aluminum with black anodized finish.
3. The system shall also feature the necessary pivot and/or tilt mounts required to support and/or adjust the specified monitors.
4. Monitor Wall Frame
 - a. The system's exterior frame and internal support frames shall deliver a Rockwell hardness rating of approximately E-88.
 - b. All system extrusions shall conform to DIN 17 615 specifications.
 - c. Of a pre-engineered modular construction, i.e.: constructed from a series of independent sectional compartments.
 - d. Available from a pre-defined set of manufacturers model numbers.
 - e. Free from alterations to the design either prior to or following installation, will be accomplished without the need for either welding or carpentry work.
 - f. Exterior frames and internal supports shall be constructed of anodized aluminum.
5. Self-Supporting Skeleton Framework
 - a. The self-supporting skeleton framework shall:
 - 1) Consist of exterior frames (1-1/2" x 3") and interior supports (1-1/2" x 1-1/2") constructed of black anodized 6105-T5 extruded aluminum.
 - 2) Have a minimum Yield strength of 35,000 lbs./sq. in.
 - 3) Have a minimum Tensile strength of 38,000 lbs./sq. in.
 - 4) Have a Twist per foot not to exceed 0.25 degrees and a total Twist over 20 feet not to exceed 1.5 degrees.
 - 5) Have a Flatness of 0.004 per inch of width.
 - 6) Have a Straightness of 0.0125" per foot of length, not to exceed 0.120" over 20 feet of length.
 - 7) All exterior frames and interior supports shall feature a smooth black anodized finish.
 - 8) Provide 34" 10 outlet electrical assembly.
 - 9) Provide 69" tem outlet electrical assembly.
 - 10) Provide wire ducts for integral wire management.
 - 11) Provide panel fillers where there are no displays.
 - 12) Provide all hardware needed for monitor wall assembly and monitor mounts.

K. Multi-format video matrix switcher up to 16 In x 16 Out

1. The matrix switcher shall accept DVI, RGB or YPbPr on every input with conversion to DVI, if necessary, for DVI output.
2. The matrix switcher shall be HDCP compliant, allowing support for HDMI™ signals.
3. The matrix switcher shall utilize user-swappable, two-channel modular input and output cards.
4. Each of the switcher's input and output cards shall include four LEDs, visible to the user, indicating power, ready, signal present channel A and signal present channel B.
5. The matrix switcher shall be capable of system configurations up to 16x16.
6. The matrix switcher shall utilize a user-swappable power supply.
7. The matrix switcher's output channels shall each support resolutions up to 1600x1200 pixels, 1920x1200 pixels and 1080p.

8. The matrix switcher's input channels shall each support resolutions up to 1600x1200 pixels, 1920x1200 pixels and 1080p.
 9. The matrix switcher shall offer optional Dual-Link DVI functionality
 10. The matrix switcher shall include the ability to choose the EDID with the lowest resolution from a group of monitors when a single source is routed to multiple monitors with differing resolutions, independent of any particular connection scheme.
 11. The matrix switcher shall provide Input Cable Equalization with Auto, Manual Adjustment and off settings.
 12. The matrix switcher shall provide up to 500mA of pin power on every output simultaneously.
 13. The matrix switcher shall be operable using an embedded web-based graphical user interface and command set via telnet, Gigabit Ethernet, and RS-232 serial communication. The command set shall be available for third-party controller programming and customization.
 14. The matrix switcher shall have the ability to connect to Gigabit Ethernet and serial networks simultaneously.
 15. The matrix switcher shall have the ability to accept commands over Ethernet and serial networks contemporaneously.
 16. The matrix switcher shall store up to 100 EDID files.
 17. The matrix switcher shall store up to 100 presets.
 18. The matrix switcher shall provide the ability to import and export EDID and preset files from/to a PC.
 19. The matrix switcher shall provide a Graphical User Interface (GUI) depicting the switching matrix.
 20. The matrix switcher shall provide the ability to adjust the input timing of an RGB or YPbPr signal via serial commands or GUI.
 21. The matrix switcher shall include a front panel control set capable of selecting presets and configuring crosspoints.
 22. The matrix switcher front panel shall include four indicator LEDs for Ethernet/Serial Link, activity via one or both of those links, thermal alarm, and power supply fault.
 23. The matrix switcher shall include a removable, replaceable, washable air filter.
 24. The Matrix Switcher shall be RGB Spectrum Linx 1700 Switcher or equal.
- L. Multi-Input, Real Time Video/Data Wall Processor for 1x2, 1x3, 1x4, 1x5, 1x6, 2x2, 2x3, 2x4 Screen Arrays.
1. The wall processor shall have a scalable embedded system architecture allowing for a variety of user defined input and output combinations.
 2. The wall processor shall display a combination of up to twelve (12) sources simultaneously, made up of a choice of computer/graphic inputs and/or video inputs.
 3. The wall processor shall support field upgrades for additional input and output modules.
 4. The wall processor shall provide for a choice of four (4) DVI outputs (to support 1x2, 1x3, 1x4 screen array configuration) or eight (8) DVI outputs (1x2, 1x3, 1x4, 1x5, 1x6, 2x2, 2x3, 2x4 screen array configuration). Output connector shall be DVI-I.
 5. The wall processor shall have a choice of three (3) dual input modules (2 inputs per module) which support the following input signal types:
 - a. Non-interlaced and interlaced, analog RGB/YUV/HDTV via DB-15 connector and DVI. Both inputs shall support standard CVT resolutions up to 1920x1200p/60, HD 720p/1080i/1080p, plus timing support for 2048x1080p/60, automatic or manual cable equalization; up to 164 feet or 50 meters and connection via DVI-I connector.
 - b. YUV component, S-Video, composite NTSC/PAL via BNC connector.
 - c. 3G/HD-SDI, maximum rate of 1.485GHz to 3GHz, input formats of 1280x720p, 1920x180i, 1920x1080p, connection via BNC, cable equalization (Beldon 1694A) up to 120m (3GHz) and 200m (1.485GHz)

6. The wall processor shall display each window in real-time, i.e., up to 80 fps without any dropped frames from the input source. Full frame rate capability should be maintained for all windows simultaneously, including high definition video and graphics.
7. The wall processor's output channels shall each support resolutions up to 1920x1200 pixels.
8. The wall processor's output channels shall each support HD resolutions up to 1920x1080 and 2048x1080 pixels.
9. The wall processor's output channels shall supply 5 VDC DVI Pin Power at up to 500mA per output.
10. The wall processor shall provide the ability to display all twelve (12) windows on a single screen.
11. The wall processor shall provide the ability to overlay, stretch, and overlap windows across screens.
12. The wall processor shall provide the ability to independently position each window anywhere on the screen array and scaled to any size.
13. The wall processor shall provide zoom, pan, image freeze, and crop capabilities for each and every window.
14. The wall processor shall provide independent labeling and border capability for each window. Borders shall have adjustable thickness (in 1 to 100 pixels) and have user selectable colors.
15. The wall processor shall provide independent, adjustable color, brightness, contrast and sharpness controls for each window.
16. The wall processor shall provide automatic synchronization to the connected input signals with the input timing automatically detected for each input source and the ability to optimize, interactively adjust, and save these timing parameters for each individual input signal.
17. The wall processor shall be operable using an embedded web-based graphical user interface and command set via telnet, Ethernet and RS-232 serial communication. The command set should be available for third-party controller programming and customization.
18. The wall processor shall provide the ability to select display windows independently and interactively assign each window's depth priority.
19. The wall processor shall provide a graphical user interface depicting a graphical representation of the wall display configuration with "drag and drop" window positioning and sizing.
20. The wall processor shall provide the ability to overlay and overlap display windows.
21. The wall processor shall provide the ability to move display windows instantly or smoothly over a programmed time period.
22. The wall processor shall provide up to 50 user programmable display configuration presets.
23. The wall processor shall provide a mullion compensation function that compensates, independently, for any image displacement arising from the horizontal and vertical mullions of multiple display screens.
24. The wall processor shall provide horizontal and vertical image overlap of up to 512 pixels to support external edge blending.
25. The wall processor shall offer an optional on-screen-digital clock that can be displayed in the foreground anywhere on the wall array, in either 12 or 24-hour format.
26. The wall processor shall offer an optional on-screen cursor capable of repositioning, resizing (horizontally and/or vertically) and enabling full screen mode of any window.
27. The wall processor shall offer optional dual-level password control for Administrator and User level access restrictions.
28. The wall processor shall expand the functionality of the on-screen cursor with an optional "On-Wall" KVM (Keyboard and Mouse) control of displayed Microsoft Windows (2000 and XP) and Linux computers using a single control computer, keyboard and mouse.

29. The wall processor shall offer downloadable logos and graphics for display as a foreground image. These shall be loadable in the JPEG format via Ethernet and/or a flash memory card. Multiple logos/graphics can be downloaded for display selection. Background graphics shall be cacheable in up to three (3) buffers for quick recall.
30. The wall processor shall provide the ability to display high-resolution still background images in the JPEG format, up to the aggregate resolution of the output screen array.
31. The wall processor shall be packaged in a rugged enclosure allowing for operation in harsh environments, including removable filters, and hot swappable, redundant power supplies.
32. The wall processor shall operate using a self-contained, embedded operating system.
33. The wall processor shall provide the ability to monitor internal temperature and display this information both on the processor's front panel LCD display and on the system's graphical user interface.
34. The wall processor shall not include a hard disk drive therefore reducing the risk of data storage failure or compromise from external sources.
35. The wall processor shall consume less than 400 watts of electrical power.
36. The wall processor shall produce a heat load of less than 1365 BTU per hour.
37. The wall processor system shall be packaged in a stand-alone chassis not to exceed 5.25" / 13.3 cm / 3RU (height), 19.0"/48.3 cm (width), 22.0"/55.9 cm (depth).

M. Network Video Recorder System

1. A complete IP Video Solution consists of some or all of the following six components:

- a. IP Cameras
- b. Network Video Recorders (NVRs)
- c. External Storage
- d. Physical Security Information Management System that integrates to External Systems (e.g., Access Control, Video Analytics, etc)
- e. Video and Event SDK / API (for development of new integrations)
- f. Failover / Redundancy Solution

The Network Video Recorder shall be a software-based, open platform solution that functions as an appliance server and operates on hardened and embedded Linux[®] operating system. It shall be available as a bundled server solution.

2. Manufacturer Qualifications

- a. The Network Video Recorder shall be developed and manufactured by a reputable Fortune 100 company with more than 20 years of manufacturing experience in the security industry.

3. Contractor/Integrator Qualifications

- a. The Contractor shall be a factory authorized and certified installer of the security equipment supplied in this project and shall have been regularly engaged in the installation of the type of security equipment, hardware, and software specified herein for a period of not less than 10 years. The contractor shall be factory trained on the Network Video Recorder and products they propose and shall submit with their proposal a certificate from the manufacturer indicating their satisfactory completion of training for the Network Video Recorder proposed. Proposals submitted without this certificate shall be considered non-responsive and shall not be accepted.

4. Licensing

- a. Licensing shall be required for the Network Video Recorder. The licensing shall include:

- 1) Series (Model).
- 2) Number of online cameras.

N. Warranty

1. Manufacturer shall provide standard 3 year warranty on all bundled NVR server hardware.
2. Manufacturer shall provide standard 3 year warranty on all hard disks included in NVR bundled servers.
3. Manufacturer or Manufacturer's partner shall provide next-day on site replacement / repair support for hardware issues relating to bundled NVR server hardware.
4. Manufacturer shall provide software upgrades for 12 months included in the purchase price of the bundled NVR server.
5. Additional years of software upgrades (SSAs) shall be available for purchase separately.

	Bundled Server: VideoEdge NVR v4.01 R710 400 Mbit/s capacity. Includes initial 16 IP camera licenses 1TB boot drive + 50TB video storage
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6. **Provide a camera expansion license requirement for each camera for 5 years.**

O. Description

1. The Network Video Recorder shall be a software-based, open platform solution that functions as an appliance server and operates on a hardened and embedded Linux® operating system. It shall be available as a bundled server solution. The unit must operate in server-client architecture as a network appliance and simultaneously support viewing, recording, and playback of video.

The Network Video Recorder shall provide required functionality in the following areas:

- a. System Performance
- b. Initial Installation / Configuration
- c. Video Recording, Live Viewing & Playback
- d. Audio Recording, Live Viewing & Playback
- e. Video Search & Export
- f. Event or Alarm Generation / Management
- g. External Storage
- h. Supported IP Cameras & Peripheral Devices
- i. Web Client
- j. Maintenance / Software Upgrades
- k. Integrations
- l. IT Requirements / Networking
- m. SDK

P. System Performance

1. While operators are actively using the system and accessing the live and recorded video/audio, a single NVR bundled server shall support any combination of supported IP cameras or encoders that meet both of the following criteria:
 - a. Maximum aggregate throughput of 400Mbit/s on recorded video streams
 - 1) Supports 64 cameras at H.264 resolution, H.264 encoding, 30 FPS, with medium scene activity and motion detection on all streams
 - b. Maximum of 128 cameras connected to a single server.
2. Maximum aggregate throughput of 400Mbit/s shall be supported both when writing to internal server hard disks and to external storage over iSCSi or Fiber connections. Manufacturer shall provide, on request, documented test results demonstrating this performance.
3. While recording up to 400Mbit/s the Network Video Recorder shall simultaneously support delivery of up to 64 concurrent video streams to connected clients with no impact to recording or alerts.
4. The Network Video Recorder bundled server shall support up to 10 TB of video storage without the use of external storage.
5. The Network Video Recorder shall allow the completion of motion searches on any camera without reducing the aggregate recorded throughput or impacting recording or event management.
6. The Network Video Recorder shall support the completion of a motion search over 1 week of recorded video of a scene containing an average level of motion throughout, regardless of codec or resolution of the recorded video, within 2 minutes.
7. The Network Video Recorder shall synchronize audio and video streams and maintain synchronization to within ½ a second.

Q. Initial Installation/Configuration

1. The Network Video Recorder shall allow for auto-discovery of all supported IP cameras or encoders on the network
2. The Network Video Recorder shall support RAID 5 storage configurations
3. The Network Video Recorder's operating system and application must be installed on a dedicated hard drive, separate from the hard drives used for video recording, to dramatically reduce the risk of system failure.

R. Video Recording/Live Viewing/Playback

1. The Network Video Recorder shall be able to stream live video to connected clients.
2. The Network Video Recorder shall be able to stream recorded video (instant playback) to connected clients.
3. The Network Video Recorder shall be able to support streaming recorded video content at the following rates:
 - a. Fast Forward x4
 - b. Fast Forward x3
 - c. Fast Forward x2
 - d. Clock Speed (x1)
 - e. Frame Forwards
 - f. Frame Backwards

- g. Clock Speed Rewind (x1)
 - h. Fast Rewind x2
 - i. Fast Rewind x3
 - j. Fast Rewind x4
- 4. The Network Video Recorder software shall support recording video in the following formats:
 - a. Motion JPEG (MJPEG) video codec
 - b. MPEG-4 video codec
 - c. H.264 video codec
- 5. The Network Video Recorder software shall allow the user to create and edit video recording schedules for each connected camera in sixty minute increments. Recording schedules shall be configurable by day-of-week or hour-of-day.
 - 1) The Network Video Recorder software shall allow camera-by-camera configuration of the following recording modes:
 - a) No Recording,
 - b) Continuous Recording,
 - c) Alert-Based Recording
 - d) Continuous with Alert-based Recording
 - 2) The Network Video Recorder software shall support the configuration of the following video parameters for each available stream on connected cameras or encoders:
 - a) Codec
 - b) Frame Rate
 - c) Resolution
 - d) Quality

S. Audio Recording/Live Listening/Playback

- 1. The Network Video Recorder shall support recording and re-broadcasting of audio inputs connected to the audio channel on supported IP cameras and encoders.
- 2. The Network Video Recorder shall be able to stream live audio to connected clients
- 3. The Network Video Recorder shall be able to stream recorded audio to connected clients
- 4. The Network Video Recorder software shall support recording audio in the following formats:
 - a. AAC audio codec
 - b. G.711 audio codec
 - c. G.726 audio codec

T. Video Search and Export

- 1. The Network Video Recorder shall support the configuration of both Date / Time and Motion searches via the NVR Web Client.
- 2. The Network Video Recorder shall support the configuration of both Date / Time and Motion searches via connected Security Management Client applications.
- 3. To enable fast motion-based video searches over days, weeks or months of video, the Network Video Recorder shall support integrated motion-detection video analytics on supported cameras.

4. The integrated motion-detection video analytics shall support the configuration of the following rules:
 - a. Motion-detection anywhere in scene
 - b. Motion-detection within user-defined region-of-interest
 - c. Motion-detection outside of user-defined region-of-interest
5. Integrated motion-detection video analytics shall have the ability to capture and store in an industry standard database, motion activity events on every frame of video from every camera.
6. Integrated motion-detection video analytics shall have the ability to be enabled / disabled on each connected camera.
7. The Network Video Recorder shall support integrated motion-detection video analytics on MJPEG or MPEG-4 video streams.
8. Integrated motion-detection video analytics shall be supported on H.264 cameras that can also produce an MJPEG stream.
9. The Network Video Recorder shall allow the user to export clips of video from one or multiple connected cameras.
10. The Network Video Recorder shall provide the user the ability to export video clips in their native format (ISO) which can be played using the client player application.
11. The SMS shall support exporting "tamper-protected" video clips using check-sum authentication.

U. Event or Alarm Management

1. The Network Video Recorder shall allow for the following alarm recording settings:
 - a. Codec
 - b. Maximum Video Frame Rate (FPS)
 - c. Resolution
 - d. Quality
 - e. Pre-Alarm Duration – (Selectable from 30 to 300 seconds)
 - f. Post-Alarm Duration – (Selectable from 30 to 300 seconds)
2. The Network Video Recorder software shall support the generation of the following alarm events:
 - a. Motion Detection
 - b. Dry Contact
 - c. Video Lost
 - d. Video Restored
 - e. Unit Status Changed – Normal or Reboot
 - f. Unit Protection Status Changed – None, Monitor or Failover
 - g. Unit Storage Status Changed – Normal, Degraded, Backup or Missing
 - h. Camera Status Notification – Add, Remove, Video Loss or Normal
3. The Network Video Recorder shall support the configuration of Motion Detection alarms with multiple independent regions-of-interest on each camera.

V. External Storage

1. The Network Video Recorder software shall support both iSCSI and Fiber connected external storage units.
2. Each Network Video Recorder server shall support up to 104 TB of connected external storage in addition to its own internal storage.

3. Each Network Video Recorder shall support the configuration of up to 8 storage sections.
4. The latest list of supported external storage devices shall be available on the manufacturer's web site.

W. Supported IP Cameras and Peripheral Devices

1. The Network Video Recorder shall interoperate with cameras of a range of types from a variety of manufacturers.
2. The Network Video Recorder shall support dual-streaming from IP cameras or encoders that support this functionality.
3. The Network Video Recorder shall include driver support for IP fixed cameras.
4. The Network Video Recorder shall include driver support for IP pan-tilt-zoom cameras.
5. The Network Video Recorder shall include driver support for IP MegaPixel cameras.
6. The Network Video Recorder shall include driver support for analog cameras using IP encoders.
7. Supported cameras shall be easily interchangeable between different models without the need to register each individual MAC address.
8. The contractor shall provide the proper API (s) to enable this Network Video Recorder to operate seamlessly with the cameras provided elsewhere in this specification.
9. The latest list of supported devices must be available on the manufacturer's web site.

X. Maintenance/Software Upgrades

1. Firmware updates (REFLASH) to the Network Video Recorder firmware shall be supported from any fast and reliable connection, whether it is executed over the LAN, WAN or internet.

Y. IT Requirements/Networking

1. The Network Video Recorder shall operate as a read-only platform that prevents the installation of any third party software and restricts any file-level access to provide for a stronger level of virus protection and ensure a higher up-time operation in a commercial/industrial environment.
2. The Network Video Recorder software shall not accept any keyboard or mouse input at the physical server, and will utilize true server-client architecture to provide a "lights-out" operation.
3. The Network Video Recorder software shall provide no file-level access to all users and administrators of the system.
4. The Network Video Recorder software shall not be susceptible to the regular security patching that is typical on other standard distribution operating systems. This shall reduce the administration overhead for each Network Video Recorder as well as limit the exposure to security risks.
5. The Network Video Recorder system shall integrate into standard TCP/IP network environments.
6. The Network Video Recorder software shall support a static IP address setting from the local IT administrator for both of the client and camera network interface cards (NICs).
7. The Network Video Recorder software shall support receiving its IP address information from an existing dynamic host configuration protocol (DHCP) server for the user's network (LAN1). In addition, it shall include the option of being the DHCP server for smaller environments where a DHCP server may not be available.
8. The Network Video Recorder shall utilize UDP protocol for LAN transmission of video streams, ensuring minimal latency in video display at connected clients.
9. In a WAN environment the Network Video Recorder shall be able to supply all audio and video streams through a single administrator defined port (default 554), simplifying routing of video through most standard firewalls and VPNs.

10. The Network Video Recorder shall auto-detect whether a connected client is on a Local-Area or Wide Area Network and automatically, seamlessly switch streaming protocols.
11. In the event of a denial-of-service attack (DoS), the web server of the Network Video Recorder shall shutdown and temporarily prevents any client access, but it shall continue to manage and record video until the administrator can secure the network and restart the server.
12. The Network Video Recorder software shall minimize bandwidth and eliminate video interruptions due to network packet collisions by supporting multiple networks. The client network (LAN1) shall be used for outbound video transmission to client applications and two-way communication via the web client for administration and configuration. The private camera network (LAN2) shall be used for transmission of video and events from supported IP cameras and encoders to the Network Video Recorder and for communication of configuration and other settings from Network Video Recorder to each individual IP camera and encoder. The optional storage network (LAN3) shall be used for communication between the Network Video Recorder and supported External iSCSI storage
13. The Network Video Recorder software shall support automatic and seamless bridging of multiple networks to enable both IT and security managers to collectively integrate the server into existing networks. In this way the high bandwidth video network can be managed separately and IP video equipment isolated from core networks which may be subject to strict bandwidth and security controls. This provides for a more secure architecture, bandwidth control and higher performance.
14. The Network Video Recorder software shall support at least three network time protocol (NTP) servers for date and time synchronization. In addition, it shall include the option of being the NTP server for environments where connectivity to a public NTP server is restricted.

Z. Redundancy and Failover

1. The Network Video Recorder software shall be designed to provide both redundancy and high availability as standard built-in features.
2. The Network Video Recorder software shall include configuration support for up to two levels of automatic storage fail-over. In the event that the designated primary storage encounters a problem, the system shall automatically switch to a designated level one storage device to provide continuous recording. In the event that a problem occurs with level one storage device, the system shall automatically switch to an alternative designated level two storage device. The optional storage fail-over drives must be setup on the Network Video Recorder.
3. The Network Video Recorder software shall include server-based fail-over support for 1-to-1 or many-to-1 (N+1) configurations.
4. When a Network Video Recorder is setup to be a standby fail-over server, it shall be setup to monitor one or more active Network Video Recorders. When a failure is detected, the standby fail-over server shall automatically take control over all cameras and provide the same user and access rights as the failed server. The standby fail-over server shall have its own storage resources, be on the same network segments, and licensed to support the Network Video Recorder with the largest number of camera slots.

AA. Security

1. The Network Video Recorder shall be designed to provide a very secure environment.
2. The Network Video Recorder shall be designed to provide multiple levels of access and management.

3. The Network Video Recorder software shall support 3 different levels of permissions for each individual camera. Each group of users shall have their own unique combination of permission settings:
 - a. Guard – (Basic Access)
 - b. Supervisor – (Users have same rights as Guard, plus modify camera settings)
 - c. Administrator – (Users have full rights to camera and system settings)
4. The Network Video Recorder software shall support custom password groups for the IP cameras and encoders. Most camera devices have a default administrator or root username and password. For added security, the password for the highest level user account can be modified on the camera device. Therefore, a custom password group for each unique password shall be easily be generated on the Network Video Recorder and utilized for the applicable devices.
5. The Network Video Recorder software shall support a read-only audit trail for the administrators of the server to track any changes to the settings and configurations:
 - a. System Reboot
 - b. Change to Storage Configuration
 - c. Change to System Time
 - d. Firmware Upgrade
 - e. Modification to Users
 - f. Modification to Groups
6. The activity log shall include, but not necessarily be limited to, the following information which the administrators shall have the ability to save as or print the entire audit file remotely from a web browser:
 - a. Date / Time – (Date and Time the action was performed)
 - b. Category – (Type of action that occurred (see above))
 - c. Details – (Description of the action)
 - d. User – (Login name of the user who performed the action)
 - e. Client Machine – (The IP Address and MAC Address of the remote machine from which the action was performed)

BB. Web Client

1. The Network Video Recorder shall provide a web interface for the configuration of date / time searches across one or many connected cameras.
2. The Network Video Recorder software shall support remote administration and configuration via a standard web browser.
 - a. Internet Explorer – (Windows Clients)
3. The Network Video Recorder software shall support a one, two, four or eight live camera views per monitor and with the ability to view full screen using the web client (browser) with appropriate drivers. The latest list of supported browsers for specified video codecs shall be available on the manufacturer's web site.
4. The Network Video Recorder software shall support direct access to both standard and advanced camera settings from within the web client. The software must provide a standard interface that allows authorized users to easily change settings that are most common to all devices.
 - a. Camera Name

-
- b. Unique ID
 - c. Password Group
 - d. Maximum Video Fetch Frames-Per Second
 - e. Maximum Video Recording Frames-Per-Second
 - f. Image Resolution
 - 5. For device specific advanced settings, a separate pop-up window should display the available API supported options. The latest list of supported devices shall be available on the manufacturer's web site.
- CC. Thick Client
- 1. The Network Video Recorder manufacturer shall offer optional Network Video Recorder THICK CLIENT management software that is developed on the Microsoft .NET framework.
- DD. Player
- 1. The Network Video Recorder manufacturer shall offer a free player software (vactor Player) that is developed on the Microsoft .NET framework to provide standard DVR-like controls for playback of recorded ISO images or video that is exported from the Network Video Recording to a local drive
- EE. Application Program Interface (API)
- 1. The Network Video Recorder software shall easily integrate with other business-critical systems and third party applications using its Application Programmers Interface (API). The manufacturer of the unit shall also offer a Software Developers Kit (SDK) to select third party manufacturers, in addition to sample modular programs with their source codes in C#, allowing programmers to develop their own software to control the unit's functions.
 - 2. The Network Video Recorder software shall utilize standard server-client architecture for access and management of the server and its resources.
 - 3. The Network Video Recorder software shall support both standard HTTP as well as HTTPS communication between the clients and server. The open SSL 128-bit encryption will provide a higher level of security.
 - 4. The system must also have the ability to host multiple remote users, archive data, and search for data, all while recording multiple video streams.
- FF. Configuration Backup
- 1. The Network Video Recorder software shall support the administrator's ability to save a Configuration Backup from any local and remote server. This file must contain all of the current setting and configuration information for the server:
 - a. Users, Groups
 - b. Camera Access Configuration
 - c. Server Settings
 - d. DHCP Leases
 - e. NTP Settings
 - f. Camera Information
 - 2. A configuration backup may be used to recover a system in the event of the following:
 - 3. A change was made that needs to be undone.
 - 4. The bootable hard drive needs to be replaced.

6. TOWER BUNDLED SERVER MECHANICAL SPECIFICATIONS

Unit Dimensions (HxWxD) 44 cm (17.3 inch) High; 21.8 cm (8.6 inch) Wide; 52.1 cm (20.5 inch) Deep
 Unit Weight 23.5 kg (51.8 lb) Maximum configuration

7. TOWER BUNDLED SERVER ELECTRICAL POWER REQUIREMENTS

Input Single 375W PSU
 Voltage 100-240 VAC, 50/60 Hz, 5.8A-2.9A
 Heat Dissipation 1683 BTU/hr maximum

8. TOWER BUNDLED SERVER ENVIRONMENTAL CONDITIONS

Operating Temperature..... 10° to 35° C (50° to 95° F)
 Storage Temperature -40° to 65° C (-40° to 149° F)
 Operating Relative Humidity 20% to 80% non-condensing
 Storage Relative Humidity 20% to 85% non-condensing
 Operating Vibration 0.26 G at 5–500 Hz for 15 min
 Storage Vibration 1.54Grms at 10Hz to 250Hz for 15 min
 Operating Shock One shock pulse in the positive z axis (one pulse on each side of the system) of 31 G for 2.6 ms in the operational orientation
 Storage Shock..... Six consecutively executed shock pulses in the positive and negative x, y, and z axes (one pulse on each side of the system) of 71 G for up to 2 ms
 Operating Altitude 0 to 3,048m (0 to 10,000 ft)
 Storage Altitude..... 0 to 10,600m (0 to 35,000 ft)

II. Examination

1. Submission of a proposal confirms that the contract documents and site conditions are accepted without qualifications unless exceptions are specifically noted.
2. The site shall be visited on a regular basis to appraise ongoing progress of other trades and contractors, make allowances for all ongoing work, and coordinate the requirements of this contract in a timely manner.
3. The Network Video Recorder must be inspected before installation, and shall be free of any cosmetic defects or damage.

JJ. Preparation

1. Prior to installation, the Network Video Recorder shall be configured and tested in accordance with the manufacturer's instructions.

KK. Installation

1. The Network Video Recorder must be installed, programmed, and tested in accordance with the manufacturer's instructions.
2. In order to ensure a complete, functional Network Video Recorder, for bidding purposes, where information is not available from the Owner upon request, the worst-case condition shall be assumed.
3. Interfaces shall be coordinated with the Owner's representative, where appropriate.
4. All necessary back boxes, racks, connectors, supports, conduit, cable, and wire must be furnished and installed to provide a complete and reliable Network Video Recorder installation. Exact location of all boxes, conduit, and wiring runs shall be presented to the Owner for approval in advance of any installation.

5. All conduit, cable, and wire shall be installed parallel and square with building lines, including raised floor areas. Conduit fill shall not exceed forty percent (40%). All wires shall be gathered and tied up to create an orderly installation.

LL. Testing and Certification

1. The Contractor shall demonstrate the functionality of the Network Video Recorder upon completion of installation, documenting the result of all tests and providing these results to the Owner. The Network Video Recorder shall be tested in accordance with the following:
2. The Contractor shall conduct a complete inspection and test of all installed Network Video Recorder equipment. This includes testing and verifying operation with connected equipment.
3. The Contractor shall provide staff to test all devices and all operational features of the system for witness by the Owner's representative and the Authority Having jurisdiction. All testing must be witnessed by the Owner's representative, prior to acceptance.
4. The testing and certification shall take place as follows:
 - a. The Network Video Recorder shall be tested in conjunction with the manufacturer's representative.
 - b. All deficiencies noted in the above test shall be corrected.
 - c. Test results shall be submitted to the consultant or Owner's representative.
 - d. The test and correction of any deficiencies shall be witnessed by the owner's representative, and note.
 - e. The Owner's representative shall accept the system.
 - f. The system test shall be witnessed by the Authority Having Jurisdiction. Any deficiencies noted during the testing must be corrected.
 - g. A letter of certification shall be provided to indicate that the tests have been performed, and all devices are operational.

MM. Training

1. The Contractor shall provide a competent trainer who has extensive experience on the installed systems and in delivering training to provide the instruction. As an alternative, the Contractor may propose the use of factory training personnel and coordinate the number of personnel to be trained.

NN. Maintenance

1. Preventative Maintenance Agreement during Warranty: As a separate price item, the Contractor shall provide preventative maintenance during the warranty period. Maintenance shall include, but no be limited to:
 - a. Labor and materials, at no additional cost, to repair Network Video Recorder Digital Servers.
 - b. Labor and materials, at no additional cost, to provide test and adjustments to the Network Video Recorder Servers.
 - c. Regular inspections.

2. Preventative Maintenance Agreement: As a separate price item, the Contractor shall provide a complete Maintenance Agreement for a period of 12 months after the conclusion of the warranty period. The Maintenance Agreement shall include, but not be limited to:
 - a. Labor and materials, at no additional cost, to repair Network Video Recorder Servers.
 - b. Labor and materials, at no additional cost, to provide test and adjustments to the Network Video Recorder Servers.
 - c. Regular inspections.

Operating Shock	One shock pulse in the positive z axis (one pulse on each side of the system) of 31 G for 2.6 ms in the operational orientation
Storage Shock	Six consecutively executed shock pulses in the positive and negative x, y and z axes (one pulse on each side of the system) of 71 G for up to 2 ms
Operating Altitude	0 to 3,048m (0 to 10,000 ft)
Storage Altitude	0 to 10,600m (0 to 35,000 ft)

OO. Examination

1. Submission of a proposal confirms that the contract documents and site conditions are accepted without qualifications unless exceptions are specifically noted.
2. The site shall be visited on a regular basis to appraise ongoing progress of other trades and contractors. Make allowances for all ongoing work, and coordinate the requirements of this contract in a timely manner.
3. The Network Video Recorder must be inspected before installation, and shall be free of any cosmetic defects or damage.

PP. Preparation

1. Prior to installation, the Network Video Recorder shall be configured and tested in accordance with the manufacturer's instructions.

QQ. Installation

1. The Network Video Recorder must be installed, programmed and tested in accordance with the manufacturer's instructions.
 - a. In order to ensure a complete, functional Network Video Recorder, for bidding purposes, where information is not available from the Owner upon request, the worst-case condition shall be assumed.
 - b. Interfaces shall be coordinated with the Owner's Representative, where appropriate.
 - c. All necessary back boxes, racks, connectors, supports, conduit, and wire must be furnished and installed to provide a complete and reliable Network Video Recorder installation. Exact location of all boxes, conduit and wiring runs shall be presented to the Owner for approval in advance of any installation.
 - d. All conduit, cable, and wire shall be installed parallel and square with the building lines, including raised floor areas. Conduit fill shall not exceed forty percent (40%). All wires shall be gathered and tied up to create an orderly installation.

RR. Testing and Certification

1. The Contractor shall demonstrate the functionality of the Network Video Recorder upon completion of installation, documenting the result of all tests and providing these results to the Owner, The Network Video Recorder shall be stested in accordance with the following:

2.3 INSTALLATION KIT

A. General:

1. The kit shall be provided that, at a minimum, includes all connectors and terminals, labeling systems, audio spade lugs, barrier strips, punch blocks or wire wrap terminals, heat shrink tubing, cable ties, solder, hangers, clamps, bolts, conduit, cable duct, and/or cable tray, etc., required to accomplish a neat and secure installation. All wires shall terminate in a spade lug and barrier strip, wire wrap terminal or punch block. Unfinished or unlabeled wire connections shall not be allowed. All unused and partially opened installation kit boxes, coaxial, fiber-optic, and twisted pair cable reels, conduit, cable tray, and/or cable duct bundles, wire rolls, physical installation hardware shall be turned over to the Contracting Officer. The following sections outline the minimum required installation sub-kits to be used:
2. System Grounding:
 - a. The grounding kit shall include all cable and installation hardware required. All head end equipment and power supplies shall be connected to earth ground via internal building wiring, according to the NEC.
 - b. This includes, but is not limited to:
 - 1) Coaxial Cable Shields
 - 2) Control Cable Shields
 - 3) Data Cable Shields
 - 4) Equipment Racks
 - 5) Equipment Cabinets
 - 6) Conduits
 - 7) Cable Duct blocks
 - 8) Cable Trays
 - 9) Power Panels
 - 10) Grounding
 - 11) Connector Panels
3. Coaxial Cable: The coaxial cable kit shall include all coaxial connectors, cable tying straps, heat shrink tabbing, hangers, clamps, etc., required to accomplish a neat and secure installation.
4. Wire and Cable: The wire and cable kit shall include all connectors and terminals, audio spade lugs, barrier straps, punch blocks, wire wrap strips, heat shrink tubing, tie wraps, solder, hangers, clamps, labels etc., required to accomplish a neat and orderly installation.
5. Conduit, Cable Duct, and Cable Tray: The kit shall include all conduit, duct, trays, junction boxes, back boxes, cover plates, feed through nipples, hangers, clamps, other hardware required to accomplish a neat and secure conduit, cable duct, and/or cable tray installation in accordance with the NEC and this document.

6. Equipment Interface: The equipment kit shall include any item or quantity of equipment, cable, mounting hardware and materials needed to interface the systems with the identified sub-system(s) according to the OEM requirements and this document.
7. Labels: The labeling kit shall include any item or quantity of labels, tools, stencils, and materials needed to correctly label each subsystem according to the OEM requirements, as-installed drawings, and this document.
8. Documentation: The documentation kit shall include any item or quantity of items, computer discs, as installed drawings, equipment, maintenance, and operation manuals, and OEM materials needed to correctly provide the system documentation as required by this document and explained herein.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. System installation shall be in accordance with NECA 303, manufacturer and related documents and references, for each type of security subsystem designed, engineered and installed.
- B. Components shall be configured with appropriate “service points” to pinpoint system trouble in less than 30 minutes.
- C. The Contractor shall install all system components including Government furnished equipment, and appurtenances in accordance with the manufacturer's instructions, documentation listed in Sections 1.4 and 1.5 of this document, and shall furnish all necessary connectors, terminators, interconnections, services, and adjustments required for a complete and operable system.
- D. The CCTV System will be designed, engineered, installed, and tested to ensure all components are fully compatible as a system and can be integrated with all associated security subsystems, whether the system is a stand alone or a complete network.
- E. For integration purposes, the CCTV System shall be integrated where appropriate with the following associated security subsystems:
 1. PACS:
 - a. Provide 24 hour coverage of all entry points to the perimeter and agency buildings. As well as all emergency exits utilizing a fixed color camera.
 - b. Record cameras on a 24 hours basis or as programmed by Contractor and VA.
 - c. Be programmed go into an alarm state when an emergency exit is opened, and notify the Access Control System and Database Management of an alarm event.
 - d. For additional CCTV System requirements as they relate to the PACS, refer to Section 28 13 11, PHYSICAL ACCESS CONTROL SYSTEMS.
 2. IDS:
 - a. Provide a recorded alarm event via a color camera that is connected to the IDS system by either direct hardwire or a security system computer network.
 - b. Record cameras on a 24 hours basis.
 - c. Be programmed to go into an alarm state when an IDS device is put into an alarm state, and notify the Security Command Center Duty Officer.
 - d. For additional CCTV System requirements as they relate to the IDS, refer to Master Specification 28 16 11.

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3. Security Access Detection:
 - a. Provide full coverage of all vehicle and lobby entrance screening areas utilizing a fixed color camera.
 - b. Record cameras on a 24 hours basis.
 - c. The CCTV System should have facial recognition software to assist in identifying individuals for current and future purposes.
 - d. For additional CCTV System requirements as they relate to the Security Access Detection, refer to Master Specification 28 13 53.
 - e. The ESSC is responsible for terminating Security Access Detection cabling inputs / outputs within the PACS system and full integration of these security subsystems.
 4. EPPS:
 - a. Provide a recorded alarm event via a color camera that is connected to the EPPS system by either direct hardwire or a security system computer network.
 - b. Record cameras on a 24 hours basis.
 - c. Be programmed to go into an alarm state when an emergency call box or duress alarm/panic device is activated, and notify the Access Control System and Database Management of an alarm event.
 - d. For additional CCTV System requirements as they relate to the EPPS, refer to Master Specification 28 26 00.
 - F. Integration with these security subsystems shall be achieved by computer programming or the direct hardwiring of the systems.
 - G. For programming purposes refer to the manufacturers requirements for correct system operations. Ensure computers being utilized for system integration meet or exceed the minimum system requirements outlined on the systems software packages.
 - H. Contractor shall program all the components of the Video Surveillance System into the PSIM. Contractor shall schedule adequate time to work with the VA Security Chief of Operations and obtain sign-off prior to completion. Components shall have proper input and output mapping to the PSIM as well as call-up sequencing and coordination with nearest PTZ cameras.
 - I. A complete CCTV System shall be comprised of, but not limited to, the following components:
 1. Cameras
 2. Lenses
 3. Video Display Equipment
 4. Camera Housings and Mounts
 5. Controlling Equipment
 6. Recording Devices
 7. Wiring and Cables
 - J. The Contractor shall visit the site and verify that site conditions are in agreement/compliance with the design package. The Contractor shall report all changes to the site or conditions that will affect performance of the system to the Contracting Officer in the form of a report. The Contractor shall not take any corrective action without written permission received from the Contracting Officer.

K. Existing Equipment

1. The Contractor shall connect to and utilize existing video equipment, video and control signal transmission lines, and devices as outlined in the design package. Video equipment and signal lines that are usable in their original configuration without modification may be reused with Contracting Officer approval.
2. The Contractor shall perform a field survey, including testing and inspection of all existing video equipment and signal lines intended to be incorporated into the CCTV System, and furnish a report to the Contracting Officer as part of the site survey report. For those items considered nonfunctioning, provide (with the report) specification sheets, or written functional requirements to support the findings and the estimated cost to correct the deficiency. As part of the report, the Contractor shall include a schedule for connection to all existing equipment.
3. The Contractor shall make written requests and obtain approval prior to disconnecting any signal lines and equipment, and creating equipment downtime. Such work shall proceed only after receiving Contracting Officer approval of these requests. If any device fails after the Contractor has commenced work on that device, signal or control line, the Contractor shall diagnose the failure and perform any necessary corrections to the equipment.
4. The Contractor shall be held responsible for repair costs due to Contractor negligence, abuse, or incorrect installation of equipment.
5. The Contracting Officer shall be provided a full list of all equipment that is to be removed or replaced by the Contractor, to include description and serial/manufacturer numbers where possible. The Contractor shall dispose of all equipment that has been removed or replaced based upon approval of the Contracting Officer after reviewing the equipment removal list. In all areas where equipment is removed or replaced the Contractor shall repair those areas to match the current existing conditions.

- L. Enclosure Penetrations: All enclosure penetrations shall be from the bottom of the enclosure unless the system design requires penetrations from other directions. Penetrations of interior enclosures involving transitions of conduit from interior to exterior, and all penetrations on exterior enclosures shall be sealed with rubber silicone sealant to preclude the entry of water and will comply with VA Master Specification 07 84 00, Firestopping. The conduit riser shall terminate in a hot-dipped galvanized metal cable terminator. The terminator shall be filled with an approved sealant as recommended by the cable manufacturer and in such a manner that the cable is not damaged.

- M. 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.

- N. Interconnection of Console Video Equipment: The Contractor shall connect signal paths between video equipment as specified by the OEM. Cables shall be as short as practicable for each signal path without causing strain at the connectors. Rack mounted equipment on slide mounts shall have cables of sufficient length to allow full extension of the slide rails from the rack.

O. Cameras:

1. Connect power and signal lines to the camera.
2. Coordinate with the VA, architect, engineer and CM to set up each camera. At the completion of set up, obtain written sign off of acceptance that the camera view has been set up and approved by the VA. Camera set up includes:
3. Aim camera to give field of view as needed to cover the alarm zone.

4. Aim fixed mounted cameras installed outdoors facing the rising or setting sun sufficiently below the horizon to preclude the camera looking directly at the sun.
5. Focus the lens to give a sharp picture (to include checking for day and night focus and image quality) 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.

P. Monitors:

1. Install the monitors as shown and specified in design and construction documents.
2. Connect all signal inputs and outputs as shown and specified.
3. Terminate video input signals as required.
4. Connect the monitor to AC power.
5. Coordinate with the VA, architect, engineer and CM to set up each monitor. At the completion of set up, obtain written sign off of acceptance that the monitor views have been set up and approved by the VA. Monitor set up includes:
 6. Set up alarm view pop up window.
 7. Set up matrix of views on monitor.
 8. Set up the touring views per cameras on appropriate monitor.

Q. Video Recording Equipment:

1. Install the video recording equipment as shown in the design and construction documents, and as specified by the OEM.
2. Connect video signal inputs and outputs as shown and specified.
3. Connect alarm signal inputs and outputs as shown and specified.
4. Connect video recording equipment to AC power.

R. Video Signal Equipment:

1. Install the video signal equipment as shown in the design and construction documents, and as specified by the OEM.
2. Connect video or signal inputs and outputs as shown and specified.
3. Terminate video inputs as required.
4. Connect alarm signal inputs and outputs as required.
5. Connect control signal inputs and outputs as required.
6. Connect electrically powered equipment to AC power.

S. Camera Housings, Mounts, and Poles:

1. Install the camera housings 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.
2. Provide a foundation for each camera pole as specified and shown.
3. Provide a ground rod for each camera pole and connect the camera pole to the ground rod as specified in Division 26 of the VA Master Specification and the VA Electrical Manual 730.
4. Provide electrical and signal transmission cabling to the mount location via a hardened carrier system from the Access Control System and Database Management to the device.
5. Connect signal lines and AC power to the housing interfaces.
6. Connect pole wiring harness to camera.

T. System Start-Up

1. The Contractor shall not apply power to the CCTV System until the following items have been completed:
 - a. CCTV System equipment items and have been set up in accordance with manufacturer's instructions.
 - b. A visual inspection of the CCTV System has been conducted to ensure that defective equipment items have not been installed and that there are no loose connections.
 - c. System wiring has been tested and verified as correctly connected as indicated.
 - d. All system grounding and transient protection systems have been verified as installed and connected as indicated.
 - e. Power supplies to be connected to the CCTV System have been verified as the correct voltage, phasing, and frequency as indicated.
2. Satisfaction of the above requirements shall not relieve the Contractor of responsibility for incorrect installation, defective equipment items, or collateral damage as a result of Contractor work efforts.

U. Supplemental Contractor Quality Control

1. The Contractor shall provide the services of technical representatives from the equipment manufacturer(s) that are trained with all components and installation procedures of the installed CCTV System; and are approved by the Contracting Officer.
2. The Contractor will be present on the job site during the preparatory and initial phases of quality control to provide technical assistance.
3. The Contractor shall also be available on an as needed basis to provide assistance with follow-up phases of quality control.
4. The Contractor shall participate in the testing and validation of the system and shall provide certification that the system installed is fully operational as all construction document requirements have been fulfilled.

3.2 TESTING AND TRAINING

- A. All testing and training shall be compliant with the VA General Requirements, Section 01 00 00, GENERAL REQUIREMENTS.

----END---

SECTION 28 26 00
ELECTRONIC PERSONAL PROTECTION SYSTEM (EPPS)

PART 1 – GENERAL

1.1 DESCRIPTION

- A. The Electronic Security System Contractor (ESSC) shall provide a fully integrated Security System on a dedicated Security System Network. The EPPS is a sub system to the Integrated Security System. Provide and install complete Duress-Panic Alarms, Emergency Phones/ Call-Boxes, and Intercom Systems, hereafter referred to as EPPS System.
- B. The duress, panic alarm system shall be a subsystem of the ACS. Inputs and outputs of the panic alarm system shall be inputs and outputs to the ACS.

1.2 RELATED WORK

- A. For firestopping application and use, Section 07 84 00, FIRESTOPPING.
- B. For labeling and signs, Section 10 14 00, SIGNAGE.
- C. For parking equipment requirements, Section 11 12 00, PARKING CONTROL EQUIPMENT.
- D. For connections, Section 26 05 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW).
- E. For infrastructure, Section 26 05 36, CABLE TRAYS FOR ELECTRICAL SYSTEMS.
- F. For other communication systems, Section 27 05 11, REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS.
- G. For grounding of equipment, Section 27 05 26, GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS.
- H. For infrastructure, Section 26 05 33, RACEWAY AND BOXES FOR ELCTRICAL SYSTEMS.
- I. For cabling requirements, Section 27 15 00, COMMUNICATIONS HORIZONTAL CABLING.
- J. For routing requirements, Section 27 31 00, VOICE COMMUNICATIONS SWITCHING AND ROUTING EQUIPMENT.
- K. For integration with PACS, Section 28 13 11, PHYSICAL ACCESS CONTROL SYSTEM (PACS).
- L. For integration with IDS, Section 28 16 11, INTRUSION DETECTION SYSTEM (IDS).
- M. For security cameras, Section 28 23 00, VIDEO SURVEILLANCE.
- N. For monitoring of equipment, Section 28 13 16, ACCESS CONTROL SYSTEM AND DATABASE MANAGEMENT.
- O. For Warranty of Construction, Section 00 72 00, GENERAL CONDITIONS.

- P. For General Requirements, Section 01 00 00, GENERAL REQUIREMENTS.

1.3 QUALITY ASSURANCE

- A. The Contractor shall be responsible for providing, installing, and the operation of the EPPS System as shown. The Contractor shall also provide certification as required.
- B. The security system shall be installed and tested to ensure all components are fully compatible as a system and can be integrated with all associated security subsystems, whether the security system is stand-alone or a part of a complete Information Technology (IT) computer network.
- C. The Contractor or security sub-contractor shall be a licensed security Contractor as required within the state or jurisdiction of where the installation work is being conducted.

1.4 SUBMITTALS

- A. Submit below items in conjunction with Master Specification Sections 01 33 23, SHOP DRAWING, PRODUCT DATA, AND SAMPLES, and Section 02 41 00, DEMOLITION.
- B. Provide certificates of compliance with Section 1.3, Quality Assurance.
- C. Provide a pre-installation and as-built design package in both electronic format and on paper, minimum size 48 x 48 inches (1220 x 1220 millimeters); drawing submittals shall be per the established project schedule.
- D. Pre-installation design and as-built packages shall include, but not be limited to:
 - 1. Index Sheet that shall:
 - a. Define each page of the design package to include facility name, building name, floor, and sheet number.
 - b. Provide a list of all security abbreviations and symbols.
 - c. Reference all general notes that are utilized within the design package.
 - d. Specification and scope of work pages for all security systems that are applicable to the design package that will:
 - 1) Outline all general and job specific work required within the design package.
 - 2) Provide a device identification table outlining device Identification (ID) and use for all security systems equipment utilized in the design package.
 - 2. Drawing sheets that will be plotted on the individual floor plans or site plans shall:
 - a. Include a title block as defined above.
 - b. Define the drawings scale in both standard and metric measurements.
 - c. Provide device identification and location.
 - d. Address all signal and power conduit runs and sizes that are associated with the design of the electronic security system and other security elements (e.g., barriers, etc.).
 - e. Identify all pull box and conduit locations, sizes, and fill capacities.
 - f. Address all general and drawing specific notes for a particular drawing sheet.
 - 3. A riser drawing for each applicable security subsystem shall:
 - a. Indicate the sequence of operation.

-
- b. Relationship of integrated components on one diagram.
 - c. Include the number, size, identification, and maximum lengths of interconnecting wires.
 - d. Wire/cable types shall be defined by a wire and cable schedule. The schedule shall utilize a lettering system that will correspond to the wire/cable it represents (example: A = 18 AWG/1 Pair Twisted, Unshielded). This schedule shall also provide the manufacturer's name and part number for the wire/cable being installed.
 - 4. A system drawing for each applicable security system shall:
 - a. Identify how all equipment within the system, from main panel to device, shall be laid out and connected.
 - b. Provide full detail of all system components wiring from point-to-point.
 - c. Identify wire types utilized for connection, interconnection with associate security subsystems.
 - d. Show device locations that correspond to the floor plans.
 - e. All general and drawing specific notes shall be included with the system drawings.
 - 5. A schedule for all of the applicable security subsystems shall be included. All schedules shall provide the following information:
 - a. Device ID.
 - b. Device Location (e.g. site, building, floor, room number, location, and description).
 - c. Mounting type (e.g. flush, wall, surface, etc.).
 - d. Power supply or circuit breaker and power panel number.
 - 6. Detail and elevation drawings for all devices that define how they were installed and mounted.
 - E. Pre-installation design packages shall be reviewed by the Contractor along with a VA representative to ensure all work has been clearly defined and completed. All reviews shall be conducted in accordance with the project schedule. There shall be four (4) stages to the review process:
 - 1. 35 percent
 - 2. 65 percent
 - 3. 90 percent
 - 4. 100 percent
 - F. Provide manufacturer security system product cut-sheets. Submit for approval at least 30 days prior to commencement of formal testing, a Security System Operational Test Plan. Include procedures for operational testing of each component and security subsystem, to include performance of an integrated system test.
 - G. Submit manufacture's certification of Underwriters Laboratories, Inc. (UL) listing as specified. Provide all maintenance and operating manuals per the VA General Requirements, Section 01 00 00, GENERAL REQUIREMENTS.

1.5 PUBLICATIONS

- A. The publications listed below (including amendments, addenda, revisions, supplement, and errata) form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American National Standards Institute (ANSI):
ANSI S3.2-99 Method for measuring the Intelligibility of Speech over Communications Systems
- C. Department of Justice American Disability Act (ADA)
28 CFR Part 36 ADA Standards for Accessible Design
- D. National Fire Protection Association (NFPA):
70-05 National Electrical Code
- E. National Electrical Manufacturers Association (NEMA)
250-03 Enclosures for Electrical Equipment (1000 Volts Maximum)
- F. Underwriters Laboratories, Inc. (UL):
305-00 Standard for Panic Hardware
444-02 Communications Cables
636-95 Standard for Holdup Alarm Units and Systems
- G. Uniform Federal Accessibility Standards (UFAS), 1984

1.6 WARRANTY OF CONSTRUCTION.

- A. Warrant EPPS System work subject to the Article "Warranty of Construction" of FAR clause 52.246-21.

PART 2 – PRODUCTS

2.1 EQUIPMENT AND MATERIALS

- A. General:
 - 1. All equipment shall be rated for continuous operation. Environmental conditions (i.e. temperature, humidity, wind, and seismic activity) shall be taken under consideration at each facility and site location prior to installation of the equipment.
 - 2. All equipment shall operate on a 120 or 240 volts alternating current (VAC); 50 hertz (Hz) or 60 Hz Alternating Current (AC) power system unless documented otherwise in subsequent sections listed within this spec. All equipment shall have a battery back-up source of power that will provide 12 hours (hrs.) of run time in the event of a loss of primary power to the security systems until a backup generator comes on-line.
 - 3. The EPPS systems shall be designed, installed, and programmed in a manner that will allow for easy of operation, programming, servicing, maintenance, testing, and upgrading of the system.

4. The Contractor shall provide the Contracting Officer with written verification, that the type of wire/cable being provided is recommended and approved by the OEM. Cabling shall meet the interconnecting wiring requirements of NFPA 70, National Electrical Code. The Contractor is responsible for providing the correct protection cable duct and/or conduit and wiring.
5. When integrating with other communications or security subsystems the Contractor shall utilize integrating methods that are approved by the Contracting Officer. At a minimum, the Integration will be a single software graphical user interface program. This program will be the interface that all ESS subsystems shall report to. This program will receive inputs and initiate outputs to and from the individual subsystem equipment systems that comprise the EPPS.
6. Systems shall be scaleable, not vendor specific, and allow expansion as required.
7. Wireless systems shall use ultrasonic, infrared and radio frequency waves to link distributed transmitters and receivers. Specific characteristics of particular facility will determine best application. Contractor is responsible for determining best system using prediction program to determine where readable signals can be obtained and identify "dead spots".
8. All hardwired alarms, switches, and junction boxes shall be protected from tampering and include line supervision.
9. The installation and placement of intercom units and emergency-call boxes in strategic locations shall also require that signage be posted near these devices. The signage, in accordance with Section 10 14 00, SIGNAGE shall communicate the location of the device and its unique identification number, and brief instruction on how to access/use the device. The signage may appear on the device, on a pole or wall near the device location and shall be printed in a manner that is easily read during daylight and hours of darkness.

2.2 EQUIPMENT ITEMS

- A. All systems shall be designed to provide continuous electrical supervision of the complete and entire system.
- B. Noise filters and surge protectors shall be provided for all intercommunications equipment to ensure protection from primary AC power surges and to ensure noise interference is not induced into low voltage data circuits.
- C. All alarm and initiating and signaling circuits shall be supervised for open circuits, short circuits, and system grounds. Main and Uninterrupted Power Supply (UPS) power circuits shall be supervised for any change in operating conditions (e.g. low battery, primary to back up battery, and UPS online). When an open, short or ground occurs in any system circuit, an audible and visual fault alarm signal shall be initiated at the master control station and all remote locations.
- D. Control Unit: Shall consist of the components to constantly monitor and verify alarm activation; identify zone of activation and location of activation.
- E. Audible Signal Device for Duress-Panic: Provides alarm activation and audible sound for alarms, as well as supervisory and trouble signals that shall be distinctive.
- F. Assessment: This capability shall consist of electronic devices required to visually and audibly verify the validity of alarms. Assessment also includes providing indication of tampering, fail-safe, low battery, and power losses.

- G. Alarm Monitoring and Reporting: Shall annunciate information to at least two (2) separate locations. The alarms shall maintain the capability to respond with local and remote visible and audible signals upon activation of an alarm. The alarms shall have the capability of operating in a silent mode, alerting personnel monitoring the system that the device has been activated.
- H. The intercom and emergency call-box systems shall be provided with normally acceptable speech intelligibility, defined as a score of at least 70% in accordance with ANSI S3.2
- I. Master Stations for Emergency Call Box and Security Intercoms:
1. All master stations shall have a "call-in" switch to provide an audible and visual indication of incoming calls from remote stations. Individual visual indication shall identify the calling station and status, and remain actuated until a call is answered by a master station.
 2. Master stations shall be equipped with a handset with a switch for private conversations.
 3. Intercom master stations shall also have an all-call feature, and have the ability to receive video from a video intercom unit.
 4. Master stations shall have the capability to selectively communicate with any remote station by actuating assigned station number on a keypad or select button for that station.
 5. Master stations may be standalone or can be integrated with the Access Control System and Database Management. The Contractor will be responsible for the integration of the Master station with the Access Control System and Database Management in accordance with OEM instructions and Section 28 13 16, ACCESS CONTROL SYSTEM AND DATABASE MANAGEMENT.
- J. Duress-Panic Alarms:
1. Housing shall be a rugged corrosion-resistant housing of stainless steel or similar material that is weather and dust proof.
 2. Actuating device shall include a minimum of a plunger button whose head is recessed from the face/front edge of the housing and be designed to avoid accidental activation using switch guard or multiple buttons (i.e., requires pressing two (2) buttons simultaneously)
 3. Wireless stationary devices will meet the same specifications as Personal Duress/Panic Alarms.
 4. Alarm switch/button shall lock-in upon activation until manually reset with key or manufacture provided device.
 5. The switch shall be a positive-acting, double-pole, and double-throw switch.
 6. Duress/Panic alarms shall meet UL 305 Standard for Panic Alarms. To reduce the possibility of false alarms and ensure installation functionality UL 636 Standard for Holdup Alarms standards shall be met.
 7. Alarms used for concealed application requires silent alarm notification to a monitoring station. They shall annunciate at the Access Control System and Database Management, monitored by a central station or direct connect to local police, depending on local ordinance requirements.
 8. Shall be capable of being mounted for hand or foot use in a manner that is unable to be viewed by the public. Larger systems use a computer that intercepts and processes alarms and displays them on a monitor. The central computer can make an announcement over facility hand held radios, pagers or telephones, or at the Access Control System and Database Management so that the other security personnel can be immediately notified. These systems shall be hardwired.
 9. Components:
 - a. Transmitter
 - b. Locator subsystem
 - c. Receiver
 - d. Software

10. Wiring will be four (4) conductor #18 American Wire Gauge (AWG).
 11. Duress-Panic Alarm Technical Characteristics:

Temperature Range	0° to 110°F (-17.8°C to 43.3°C)
Nominal Voltage	12 V DC @ 6 mA
Current	Max 8 mA
Operational Voltage	7 V DC to 15 V DC
Operational life	Rated for 0,000 activations
Battery Activations	500
Actuator	Dual button plunger with activation lock
LED	Bi-color – on and activated

K. Personal Duress-Panic Alarm:

1. These systems are wireless only and can be worn as a belt clip, with a neck lanyard or with a wrist band. These alarms can be either active (manually operated) or passive mode (if detached from body, or body position changes to a prone position) alarm activates. They also provide identification of individual and location.
2. Components:
 - a. Transmitter
 - b. Repeaters (for wireless and increase distance)
 - c. Locator subsystem
 - d. Receiver
 - e. Software
3. Wireless transmitters shall send a periodic check in signal to the main computer or processor. If the signal is not received according to a definable time window, a supervisory alert will be generated. Wireless devices shall report a low battery condition well in advance to the failure of the battery.
4. Shall consist of a compact lightweight transmitter enclosed in a durable fire-retardant ABS plastic case that can be easily worn.
5. Transmitters may use ultrasonic, radio frequency (RF), or infrared (IR) to transmit signals. Each has advantages and disadvantages. Selection of system shall be dependent on defined usage and range of communications required.
6. Sensors shall be adjustable to activate automatically when mounted on a belt and the user is in a horizontal position for longer than one (1) to fifteen (15) minutes. Adjustment capability shall not be accessible to personnel wearing the panic alarm device.
7. Radio frequencies for transmitter will comply with Federal Communication Commission (FCC) regulations.
8. Radio frequency transmitters will use frequency modulation signal hopping.
9. Personal Duress-Panic Alarm Technical Characteristics:

Temperature Range	0° to 110°F (-17.8°C to 43.3°C)
Nominal Voltage	12 V DC @ 6 mA
Current	Max 8 mA
Operational Voltage	7 V DC to 15 V DC

Battery Life	Regular battery 60 hour duration or Nickel-Metal Hydride (NiMH) rechargeable 12 hrs. 20 hr. per charge
Battery Lifespan	500 activations
Actuator	Plunger with activation lock
LED	Bi-color – on and activated
Passive Activation	Adjustable Prone position 1-15 minutes

L. Emergency Call Box Enclosures:

1. Consist of remote call stations, master station and a telephone Private Branch Exchange (PBX). They shall have two-way voice communications. Calls are directed to a pre-programmed extension. These systems are effective for a multi-facility environment or stand-alone facility with a parking structure or large parking lot. In addition, they may contain built-in CCTV system capabilities or can be integrated to work with standalone CCTV systems.
2. Emergency Call Boxes will be housed in an National Electric Manufacturers Association (NEMA) 250 Enclosures for Electrical Equipment compliant enclosures. Call-box enclosure shall include blue light/or similar strobe mounted behind or on top of the call box: A blue light or color lit strobe shall be activated (e.g. to inform others visually that assistance is required) when the emergency switch/button/phone is pressed/taken off-hook and shall flash for the duration of a call.
3. The faceplate shall be constantly lit by ultra bright LEDs.
4. Enclosure and bracket system shall be designed to resist extreme weather conditions and constructed of weather resistant stainless steel.
5. Emergency Call Box Enclosure Technical Characteristics:

Construction	Minimum 11 gauge stainless steel Impact resistant polycarbonate window for lights
Mounting	Wall, pole or kiosk
Power	120 VAC: 44 Watts Maximum or 24 VDC: 18 Watts Maximum
Lighting	Strobe: 1.5 million candlepower 70 flashes per minute. Blue Light: 7 watt high efficiency 10,000 hour compact fluorescent. Faceplate Light: Ultra bright LEDs 100,000 hour lifetime.

M. Emergency Call Boxes:

1. Emergency Call Box shall be indoor/outdoor-rated, Uniform Federal Accessibility Standards (UFAS) and Americans with Disability Act (ADA) compliant, and provide hands-free usage. Phone shall also include cast metal raised letter and Braille signage for UFAS/ADA compliance.
2. Emergency Call Box shall include built-in auto-dialer that dials two (2) numbers: if first number doesn't answer, automatically dials a second number.
3. The System shall include auto-answer to allow for monitoring and initiating calls with an Emergency Phone.

4. Emergency Call Box shall use flush mount enclosure (FME,) shall include two (2) piece housing construction with full front lip to allow tight gasket seal between the speakerphone and enclosure. Screws shall be tamper free.
5. When activated the Emergency Call Box shall automatically place a call to the pre-programmed number(s). If the number is busy it should automatically call a second number.
6. The electronics enclosure shall be capable of using interchangeable faceplates: a single-button faceplate, a two-button faceplate, or a two-button faceplate with keypad.
7. The system shall use a "plain old telephone service" (POTS) line or analog PBX and shall be capable of integration with existing CCTV and Access Control System and Database Management via software at the SMS head-end.
8. Depending on distance and existing phone line capabilities, RF or use of wireless phone connections may be considered. The Contractor and Contracting Officer shall select appropriate system based on facility telecommunication system capabilities and desired system requirements.
9. Monitoring/Diagnostic capability at control and monitoring stations shall include the capability to automatically poll each Emergency Call Box, report incoming calls, identify location, and keep permanent records of all events with the use of a Windows based compatible software package and shall also meet the requirements of the Security Management System (SMS).
10. A speaker/handset shall be provided. Lifting the handset shall automatically cut out the loudspeaker in the station and all conversation shall be carried through the handset. Where noise does not exceed 55 dB, hands-free operations may be performed from distances up to 20 feet (ft.) (6.096 m). In higher noise environments only a talk-listen switch shall be utilized.
11. If system is a hardware type master station it shall be capable of:
 - a. LED display of identification code for emergency phones;
 - b. Indicate whether call was initiated by pushing button or by an auxiliary device;
 - c. Include RJ11 ports for connection to telephone line and standard telephone; and
 - d. Powered by 9 VDC, 500mA power supply that connects to 120 volt alternating current (VAC).
12. System shall include auto-answer to allow security to monitor and initiate calls with Emergency Call Box.
13. Contractor shall provide the capability to connect up to 8 phones on one (1) phone line while retaining ability to call each phone individually and without affecting performance. System shall also be able to create a closed system without need for any phone lines.
14. The System shall include the capability to record a message identifying the location of the caller.
15. It shall remotely be able to adjust speakerphone & microphone sensitivity.
16. Emergency Call Box Technical Characteristics:

Construction	12 gauge (2.8mm) #4 brushed stainless steel face plate
Operating Temperature	-4°F to +149°F (-20°C to +65°C)
Communication	2-way hands-free communication
Digital Capacity	Up to 18 digits, including pauses, for each of two (2) phone numbers
Dialing Speed	Minimum 10 tones per second
Power Source	Power over Ethernet 802.3 at

Connection	Parallel tip and ring connected to RJ11 connector for quick installation
Memory	Erasable Programmable Read-only Memory (EPROM)
Circuit Protection	Lightening suppressed and full wave polarity guarded
Programming	Non-volatile EEPROM programming can be done from any telephone. No battery back-up needed
Wiring Requirements	1 twisted-shielded pair (gauge depends on distance)
Camera	Option for pin-hole color camera or Integration with existing CCTV
LED	Call confirmation
Activation	Sound or 1.5 in. minimum piezoelectric button
Labeling	"Push for Help" or "Emergency"

N. Strobes and Beacon:

- Used for visual recognition of device activation once an emergency phone or intercom is activated. They provide unit identification and quick location of the caller.
- Strobes and Beacons Technical Characteristics:

STROBE	
Input Voltage	10.5 – 28 VDC or VAC
Input Current	Average 1 amp
Input Current	Peak 3 amp
Intensity	1,000,000 candlepower
Control Circuit Output	2 mA max
Flash Rate	60 – 75 times per minute
BEACON	
Input Voltage	10.5 - 28 VAC or VDC
Input Current	@24.0 : 427 MA

O. Security Intercoms:

- Shall be utilized to assist in controlling entry to a site, parking lot, facility, main and alternate entries, loading dock areas. They are also used for emergencies. These systems shall have two-way voice communications. Intercoms may also have key-pads that allow for specific call connections or may provide a directory. These systems consist of both remote and master stations. Intercom shall be externally powered for distances over 1,500 feet (457.2 meters) (m) from the master control unit.
- The Intercom shall be programmable from a remote location and have a three number dialing capability per activation button, or include a keypad for dialing authorized and published extensions.
- The Intercom shall have an internally mounted electronics enclosure and auxiliary power.
- The Contractor shall be responsible for integration of intercom with auxiliary output to electronic or magnetic door releases, as well as CCTV, as required. The integration will be from auxiliary output of the PACS thereby forcing the intercom system to initiate an input request to the PACS. The PACS will make the decisions on what electronic locks are released and by whom. The security intercom system shall be IP, client server based and fully integrated into the SMS and PSIM.

5. Security Intercom Technical Characteristics:

Construction	12 gauge (2.8mm) #4 brushed stainless steel face plate
Operating Temperature	-4°F to +149°F (-20°C to +65°C)
Communication	2-way hands-free communication
Digital Capacity	Up to 18 digits, including pauses, for each of two (2) phone numbers
Dialing Speed	Minimum 10 tones per second
Power Source	Power over Ethernet 802.3 at
Connection	Parallel tip and ring connected to RJ11 connector for quick installation
Memory	EPROM
Circuit Protection	Lightening suppressed and full wave polarity guarded
Programming	Non-volatile EEPROM programming can be done from any telephone.
Wiring Requirements	Unshielded pair CAT 6A
LED	Call confirmation
Activation	1.5 in. (38.1mm) minimum piezoelectric button
Labeling	"Information" or "Help" – To Be Determined

2.3 INSTALLATION KIT

- A. General: A kit shall be provided that, at a minimum, includes all connectors and terminals, labeling systems, barrier strips, wiring blocks or wire wrap terminals, heat shrink tubing, cable ties, solder, hangers, clamps, bolts, etc., required to accomplish a neat and secure installation. Unfinished or unlabeled wire connections will not be allowed. Contractor shall turn over to the Contracting Officer all unused and partially opened installation kit boxes, coaxial cable reels, conduit, cable tray, and/or cable duct bundles, wire rolls, and physical installation hardware. This is an acceptable alternate to the individual spare equipment requirement as long as the minimum spare items are provided in this count. The following installation sub-kits are required as a minimum:
- B. System Grounding:
1. The grounding kit shall include all cable in accordance with UL 444 Communications Cables, and installation hardware required. All grounding will be according to the NEC.
 2. This includes, but is not limited to:
 - a. Coaxial Cable Shields
 - b. Control Cable Shields
 - c. Data Cable Shields
 - d. Conduits
 - e. Cable Duct
 - f. Cable Trays
 - g. Power Panels
 - h. Connector Panels
- C. Coaxial Cable: The coaxial cable kit shall include all coaxial connectors, cable tying straps, heat shrink tabbing, hangers, clamps, etc., required to accomplish a neat and secure installation.

- D. Wire And Cable: The wire and cable kit shall include all connectors and terminals, barrier straps, wiring blocks, wire wrap strips, heat shrink tubing, tie wraps, solder, hangers, clamps, labels etc., required to accomplish a neat and orderly installation.
- E. Equipment Interface: The equipment interface kit shall include any item or quantity of equipment, cable, mounting hardware and materials needed to interface Systems and Subsystems according to the OEM requirements and this specification.
- F. Labels: The labeling kit shall include any item or quantity of labels, tools, stencils, and materials needed to label each subsystem according to the OEM requirements, as-installed drawings, and this specification.
- G. Documentation: The documentation kit shall include any item or quantity of items, computer discs, as installed drawings, equipment, maintenance, and operation manuals, and OEM materials needed to correctly provide the system documentation as required by this document and explained herein.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. System installation shall be installed in accordance with NFPA 731 Standards for the Installation of Electric Premises Security Systems and appropriate installation manual for each type of subsystem designed, engineered, and installed.
- B. The location and type of duress, intercom, or call-box to be installed will be in accordance with physical security requirements unique to each VA facility.
- C. For EPPS systems (i.e. use current panic/duress and emergency call boxes) that can operate through existing VA facility telephone system lines, software programming and hardware, refer to Section 27 51 23, INTERCOMMUNICATIONS AND PROGRAM SYSTEMS to integrate additional EPPS equipment.
- D. Concealed duress/panic devices shall be mounted in such a way that their location is only known by the person having knowledge of the activating device location. No wiring shall be exposed to identify the location of the activation device.
- E. Floor mounted duress alarms shall be attached to millwork on floor. When mounted under millwork, wiring shall be routed in millwork to conduit system via flexible conduit.
- F. Hard-wired duress panic alarm switches shall be wired to individual alarm points within the Physical Access Control System Control Panel.
- G. Wall and post mounted stations shall be mounted to meet UFAS/ADA requirements and use tamper proof bolts and screws. Testing will be finished before installation of fasteners.
- H. Cleaning: Subsequent to installation, clean each system component of dust, dirt, grease, or oil incurred during installation in accordance to manufacture instructions.
- I. Provisions shall be made for systems in high-noise areas or areas with electrical interference environments.

- J. Adjustment/Alignment/Synchronization: Contractor shall prepare for system activation by following manufacturer's recommended procedures for adjustment, alignment, or programming. Prepare each component in accordance with appropriate provisions of the component's installation, operations, and maintenance instructions.
- K. Contractor shall program all the components of the EPPS into the PSIM. Contractor shall schedule adequate time to work with the VA Security Chief of Operations and obtain sign-off prior to completion. Components shall have proper input and output mapping to the PSIM as well as call-up sequencing and coordination with nearest PTZ cameras.

3.2 TESTS AND TRAINING

- A. All testing and training shall be compliant with the VA General Requirements, Section 01 00 00, GENERAL REQUIREMENTS.

---END---

SECTION 28 31 00
FIRE DETECTION AND ALARM

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section of the specifications includes the furnishing, installation and connection of the fire alarm and emergency signaling equipment to form a complete coordinated system ready for operation. The system shall include, but not be limited to, alarm initiating devices, alarm notification appliances, control units, fire safety control devices and functions, annunciators, power supplies, and wiring as shown on the drawings and specified. All work and system operating sequences shall be closely coordinated with the facility fire plan and emergency response personnel.
- B. Fire alarm systems shall comply with requirements of NFPA 72 unless variations to NFPA 72 are specifically identified within these contract documents by the following notation: "variation". The design, system layout, document submittal preparation, and supervision of installation and testing shall be provided by a factory-trained system designer that is certified NICET level III or a registered fire protection engineer. NICET-certified technicians (Level III minimum) shall provide onsite to supervise system installation, startup and testing. Factory engineers from the equipment manufacturer, thoroughly familiar and knowledgeable with the project and all equipment utilized, shall provide additional technical support at the site as required by the Contracting Officer or his authorized representative. Installers shall have a minimum of two years experience installing fire alarm systems.
- C. Fire alarm and emergency signals:
 - 1. Each building shall have a complete digital multi-channel Fire Alarm and Emergency Voice Communications System, which will include automatic digitized voice pre-recorded voice messages and manual voice paging. In the event of fire alarm activation, a digitized coded voice message will identify the area of the building from which the alarm was initiated.
 - 2. In addition to the coded Alarm message, pre-recorded messages shall include Alert, Drill, Testing and Testing Complete messages as described herein. Pre-recorded tones shall include a 450Hz throughout the building for consideration to animal holding areas, Temporal Code 3 evacuation tone and a 900Hz pre-alert tone. The system shall provide for automatic and manual broadcast of any pre-recorded signals from the main Fire Alarm Control Unit and other designated locations on a per floor and evacuation zone basis.
- D. Alarm signals (by device), supervisory signals (by device) and system trouble signals (by individual fault) shall be distinctly annunciated at the Campus Fire Command Center, main fire alarm control unit located at each protected premises, and at the approved off-site Supervising Station.
- E. The main fire alarm control unit shall operate as a dedicated network node to the campus fire alarm network.

1.2 SCOPE

- A. A new, fully addressable fire alarm system shall be designed and installed in accordance with the specifications and drawings. Device location and wiring runs shown on the drawings are for reference only unless specifically dimensioned. Actual locations shall be coordinated in the field in accordance with NFPA 72 and this specification.
- B. The local building (protected premises) system shall be configured with the necessary hardware to support integration with a dedicated campus-wide fiber optic fire alarm network. The network will utilize peer-to-peer network communications to support point-level event annunciation and control and emergency voice/alarm communications functions from the Network annunciators and facility Fire Command Center workstation(s).
- C. Each floor or evacuation zone shown on the Contract Drawings shall be considered a separate paging and evacuation signaling zone.
- D. Each fire protection system shall be individually supervised by the protected premises Fire Alarm system.
- E. The protected premises system shall interface directly to all HVAC/Mechanical system equipment to initiate shutdown of fans or air handling units in the event of activation of related automatic detectors.
- F. Provide all required Emergency Elevator Service functions in accordance with ANSI A17.1, to include primary and alternate recall, fire hat indication, supervision and disconnect of elevator power.
- G. The system shall interface with the Facility security management system and provide remote release of stairwell doors from the facility Fire Command Center(s).
- H. Basic Performance:
 - 1. Alarm, supervisory and trouble signals from each building fire alarm system shall be digitally encoded by UL listed electronic devices onto a multiplexed communication system.
 - 2. Response time between alarm initiation (contact closure) and recording at the main fire alarm control unit (appearance on alphanumeric read out) shall not exceed ten (10) seconds.
- I. Circuits and Pathways
 - 1. Network Communications and Vertical Trunk Wiring
 - a. All network wiring and audio risers shall be Class X circuits as defined in NFPA 72, utilizing physically separated outgoing and return loops and Level 2 survivability (minimum).
 - b. Network communications and all other circuits that serve occupant notification shall have a minimum of Level 2 Survivability in accordance with NFPA 72 and these Specifications.
 - 2. Addressable Signaling Line Circuit (SLC)
 - a. Vertically-wired addressable loop SLC trunk wiring shall be configured as Class B circuits with Level 2 survivability (minimum).

- b. Horizontal SLC branch circuits shall be Class B wired circuits with a minimum of Level 1 survivability.
 - c. Fault Tolerance: SLC wiring shall utilize fault isolation modules so that a single wiring fault on the conductors serving one floor or evacuation signaling zone will not affect the operation of devices serving any other zone. SLCs shall not exceed 75% of the number of each type of device the circuit is capable of supporting.
3. Audible Notification Circuits
- a. Speaker Notification Appliance Circuits (NAC) shall be configured as Class B circuits, with a minimum Level 2 pathway survivability from their point of origin to the area served, and Level 1 within the evacuation signaling zone served.
 - b. The system shall be provided with the minimum listed speaker circuits as follows:
 - 1) Two (2) speaker circuits for each evacuation signaling zone.
 - 2) One (1) speaker circuit for each stairwell, configured as a vertical paging zone.
 - 3) One (1) speaker circuit for each elevator group.
 - 4) Speaker circuits shall be individually selective by evacuation signaling zones.
 - c. Speaker circuits on floors shall be wired such that two adjacent speakers are on different speaker circuits.
 - d. Twisted shielded cable shall be utilized for speaker circuits. The Contractor must ensure proper grounding methods are used to eliminate system-wide speaker noise.
 - e. Speaker circuits shall emanate from panel mounted circuit outputs; field-located addressable modules shall not be used to supervise and control speaker circuits.
4. Visual Notification Circuits
- a. Visual Notification Appliance Circuit (NAC) wiring shall be configured as Class B, circuits, with a minimum Level 2 pathway survivability from their point of origin to the area served, and Level 1 within the evacuation signaling zone served.
 - b. The system shall be provided with a minimum of two (2) visual NACs for each floor, evacuation zone; whichever is greater. The actual number of circuits to be installed shall be coordinated with the supplier's shop drawings.
 - c. Visual notification appliance circuits shall emanate from panel mounted power supply outputs; field-located addressable modules shall not be used to supervise or control visual appliance circuits.
 - d. Circuits shall be wired such that two adjacent devices are on different circuits.

1.3 RELATED WORK

- A. Section 01 00 00, GENERAL REQUIREMENTS: Restoration of existing surfaces.
- B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES: Procedures for submittals.
- C. Section 01 91 13, COMMISSIONING.
- D. Section 07 84 00, FIRESTOPPING: Fire proofing wall penetrations.
- E. Section 08 71 00, DOOR HARDWARE.

- F. Section 09 91 00, PAINTING: Painting for equipment and existing surfaces.
- G. Section 21 13 13, WET-PIPE SPRINKLER SYSTEMS: Sprinkler systems.
- H. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements for items which are common to other Division 26 sections.
- I. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits and boxes for cables/wiring.
- J. Section 26 05 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW: Cables/wiring.

1.4 SUBMITTALS

- A. General: Submit 4 copies and 1 reproducible in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, and Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
- B. Fire alarm system shop drawings shall be prepared by a qualified, factory-trained, NICET-Certified Fire Alarm system designer (level III minimum). Copies of the shop drawings shall be maintained on-site to serve as working documents during installation.
- C. Prepare shop drawings using Autodesk Revit version 12 and include all contractor's information. Layering shall be by VA criteria as provided by the Contracting Officer's Technical Representative (COTR). Bid drawing files on using Autodesk Revit version 12 will be provided to the Contractor at the pre-construction meeting. The contractor shall be responsible for verifying all critical dimensions shown on the drawings provided by VA. Shop drawings shall be prepared in accordance with NFPA 72 recommended practices and contain the following:
 - 1. Any exceptions or deviations from the specified features and functions shall be noted and justified in writing. Failure to note any deviations from the requirements stated herein will result in disapproval.
 - 2. Complete point-to-point riser diagrams showing all equipment including the size, type, number and reference designations for all circuits and devices. Each device shall be shown with address numbers or any other required field device settings, including speaker tap settings and candela rating of notification appliances. Riser diagrams shall consist of:
 - a. A complete one-line network riser diagram, showing control equipment panels and intended room locations.
 - b. Detailed point-to-point riser diagram(s) showing all equipment, devices and circuits connected to each fire alarm control panel.
 - 3. Scaled drawings of each system panel showing dimensions, panel switch label assignments, internal module placement, field wiring terminations and spare capacity allowances. Where multiple equipment cabinets are used in a single location, these shall be shown together in elevation to assist in the coordination of equipment installation and ensure proper space allocation.
 - 4. A complete, itemized bill of materials with quantities, descriptions and cross-reference information for all equipment.

5. A complete list of all addressable devices with corresponding address number, device type, and alphanumeric message nomenclature for review and coordination. Note: Final nomenclature may vary from the room designations currently shown on the Drawings, and will be subject to review and approval by the Owner and Architect prior to system programming.
6. Sequence of Operation: Provide a complete sequence of operation in the form of an NFPA Input/Output programming matrix for the entire system as shown in NFPA 72.
7. Original catalog data sheets for each item, with applicable components being submitted clearly noted. All equipment shall be subject to approval, and no equipment shall be ordered without prior approval.
8. Floor plans showing all devices and equipment to be installed with field settings, circuit, and device designations noted. Field settings shall include the device address, candela rating and speaker-tap setting as applicable. Circuit identifier and device numbers shall be clearly defined and consistent between related documents.
9. Provide battery calculations to demonstrate the standby power requirements specified herein.
10. Provide system calculations for all notification circuits, amplifiers and power supplies submitted. Notification Appliance Circuit calculations shall use the end-loading method described in NFPA recommended practices and be as follows:
 - a. Show wire size, estimated circuit length, and maximum allowable wiring distance as designed.
 - b. Visual circuit calculations shall be based upon a 20.4vDC (minimum) battery terminal starting voltage and utilize UL maximum current draw rating for each appliance.
 - c. Visual circuits shall be designed for a maximum 4.4 volt drop.
 - d. Speaker circuits shall be designed for a maximum 3dBA loss.
11. Provide a copy of the Original Equipment Manufacturer's Warranty Statement.
12. Confirmation that qualified representatives of the system supplier will provide on-site project supervision during system installation, startup, testing and training. Lead system technicians assigned to the project shall be identified, and documentation of their qualifications shall be provided upon request.
13. Provide an outline of the vendor's Acceptance and Test procedures, including a copy of the supplier's standard Commissioning Report checklist.
14. An overview of the proposed training agenda designed specifically for the project as required herein.
15. Two weeks prior to final inspection, the Contractor shall deliver to the COTR one (1) set of reproducible, as-built shop drawings, two hard copies and one (1) set of the as-built drawing computer files using Autodesk REVIT Version 12 and AutoCAD 2007 or later. As built documents shall show all aspects of the fire alarm system.

D. Manuals

1. Submit simultaneously with the shop drawings, companion copies of complete maintenance and operating manuals including technical data sheets for all items used in the system, power requirements, device wiring diagrams, dimensions, and information for ordering replacement parts.
 - a. Wiring diagrams shall have their terminals identified to facilitate installation, operation, expansion and maintenance.
 - b. Include complete listing of all software used and installation and operation instructions.

- c. Provide a clear and concise description of operation that gives, in detail, the information required to properly operate, inspect, test and maintain the equipment and system. Provide all manufacturer's installation limitations including but not limited to circuit length limitations.
 - d. Complete listing and transcript of all digitized voice messages.
 - e. Include information indicating who will provide emergency service and perform post contract maintenance.
 - f. Provide a replacement parts list with current prices. Include a list of recommended spare parts, tools, and instruments for testing and maintenance purposes.
 - g. A computerized preventive maintenance schedule for all equipment. The schedule shall be provided on disk in a computer format acceptable to the VAMC and shall describe the protocol for preventive maintenance of all equipment. The schedule shall include the required times for systematic examination, adjustment and cleaning of all equipment. A print out of the schedule shall also be provided in the manual. Provide the disk in a pocket within the manual.
 - h. Furnish manuals in 3 ring loose-leaf binder or manufacturer's standard binder.
 - i. A print out for all devices proposed on each signaling line circuit with spare capacity indicated.
2. One week after final inspection, deliver four copies of the final updated maintenance and operating manual to the COTR.
 - a. The manual shall be updated to include any information necessitated by the maintenance and operating manual approval.
 - b. Include complete "As Built" shop drawings that consist of the information provide in the original shop drawing submittal, modified to show the entire system as constructed, including their interconnecting wiring. As built documents shall incorporate all field changes to the original equipment submittals, whether made as a result of change order or field modification. Show all final terminal identifications.
 - c. Complete listing of all programming information, including all control events per device including an updated input/output matrix, with a hard copy printout and electronic copy of the final site specific system program.
 - d. Complete Test and Inspection forms, and a Record of Completion of the Installation as required by NFPA 72 for each building. The certificate shall identify any variations from the National Fire Alarm Code.
 - e. Certificate from equipment manufacturer assuring compliance with all manufacturers installation requirements and satisfactory system operation.
 - f. Final outline and detailed lesson plans for on-site user training specified and required. Include a coordinated schedule for all training sessions and copies of the handout materials.

E. Certifications:

1. Together with the shop drawing submittal, submit the technician's NICET level III fire alarm certification as well as certification from the control unit manufacturer that the proposed performer of contract maintenance is an authorized representative of the major equipment manufacturer. Include in the certification the names and addresses of the proposed supervisor of installation and the proposed performer of contract maintenance. Also include the name and title of the manufacturer's representative who makes the certification.
2. Together with the shop drawing submittal, submit a certification from either the control unit manufacturer or the manufacturer of each component (e.g., smoke detector) that the components being furnished are compatible with the control unit.
3. Together with the shop drawing submittal, submit a certification from the major equipment manufacturer that the wiring and connection diagrams meet this specification, UL and NFPA 72 requirements.

1.5 WARRANTY

- A. All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of five (5) years from the date of acceptance of the entire installation by the Contracting Officer.

1.6 GUARANTY PERIOD SERVICES

- A. Complete inspection, testing, maintenance and repair service for the fire alarm system shall be provided by a factory trained authorized representative of the manufacturer of the major equipment for a period of five years from the date of acceptance of the entire installation by the Contracting Officer.
- B. Contractor shall provide all necessary test equipment, parts and labor to perform required inspection, testing, maintenance and repair.
- C. All inspection, testing, maintenance and permanent records required by NFPA 72, and recommended by the equipment manufacturer shall be provided by the contractor. Work shall include operation of sprinkler system alarm and supervisory devices as well as all equipment connected to the fire alarm system. It shall include coordinated testing of all interfaced equipment including but not limited to elevators, HVAC equipment shutdown and control, extinguishing systems.
- D. Maintenance and testing shall be performed in accordance with NFPA 72. A computerized preventive maintenance schedule shall be provided and shall describe the protocol for preventive maintenance of equipment. The schedule shall include a systematic examination, adjustment and cleaning of all equipment.
- E. Non-included Work: Repair service shall not include the performance of any work due to improper use, accidents, or negligence for which the contractor is not responsible.
- F. Service and emergency personnel shall report to the Engineering Office or their authorized representative upon arrival at the hospital and again upon the completion of the required work. A copy of the work ticket containing a complete description of the work performed and parts replaced shall be provided to the VA Contracting Officer or his authorized representative.
- G. Emergency Service:
 - 1. Warranty Period Service: Service other than the preventative maintenance, inspection, and testing required by NFPA 72 shall be considered emergency call-back service and covered under the warranty of the installation during the first year of the warranty period, unless the required service is a result of abuse or misuse by the Government. Written notification shall not be required for emergency warranty period service and the contractor shall respond as outlined in the following sections on Normal and Overtime Emergency Call-Back Service. Warranty period service can be required during normal or overtime emergency call-back service time periods at the discretion of the Contracting Officer or his authorized representative.
 - 2. Normal and overtime emergency call-back service shall consist of an on-site response within two hours of notification of a system trouble.

3. Normal emergency call-back service times are between the hours of 7:30 a.m. and 4:00 p.m., Monday through Friday, exclusive of federal holidays. Service performed during all other times shall be considered to be overtime emergency call-back service. The cost of all normal emergency call-back service for years 2 through 5 shall be included in the cost of this contract.
 4. Overtime emergency call-back service shall be provided for the system when requested by the Government. The cost of the first 40 manhours per year of overtime call-back service during years 2 through 5 of this contract shall be provided under this contract. Payment for overtime emergency call-back service in excess of the 40 man hours per year requirement will be handled through separate purchase orders. The method of calculating overtime emergency call-back hours is based on actual time spent on site and does not include travel time.
- H. The Contractor shall maintain a log at the main fire alarm control unit serving each building. The log shall list the date and time of all examinations and trouble calls, condition of the system, and name of the technician. Each trouble call shall be fully described, including the nature of the trouble, necessary correction performed, and parts replaced.
- I. In the event that VA modifies the fire alarm system post-Acceptance but during the five year Guaranty Period Service period, Contractor shall be required to verify that the system, as newly modified or added, is consistent with the manufacturer's requirements; any verification performed will be equitably adjusted under the Changes clause. The post-Acceptance modification or addition to the fire alarm system shall not void the continuing requirements under this contract set forth in the Guarantee Period Service provision for the fire alarm system as modified or added. The contract will be equitably adjusted under the Changes clause for such additional performance.

1.7 APPLICABLE PUBLICATIONS

- A. The publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. The publications are referenced in text by the basic designation only.
- B. National Fire Protection Association (NFPA):
70-2011 National Electrical Code (NEC)
72-2010 National Fire Alarm Code
90A-2009 Installation of Air Conditioning and Ventilating Systems
101-2009 Life Safety Code
- C. Underwriters Laboratories, Inc. (UL):
2009 Fire Protection Equipment Directory - B
- D. Factory Mutual Research Corp (FM): Approval Guide, 2005 Edition
- E. American National Standards Institute (ANSI):
ANSI S3.41 Audible Emergency Evacuation Signal
ANSI A17.1 Safety Code for Elevators
- F. International Code Council, International Building Code (IBC) 2009 Edition

1.8 COMMISSIONING

- A. Commissioning of the systems specified in this section shall be part of the construction process. Documentation and testing of these systems; as well as training of the VAMC operation and maintenance personnel, is required in cooperation with the VA Resident Engineer and the Commissioning Authority. Project Close-out is dependent on successful completion of all commissioning procedures, documentation, and issue closure. Refer to Section 019113, COMMISSIONING, for detailed commissioning requirements.

PART 2 - PRODUCTS

2.1 EQUIPMENT AND MATERIALS, GENERAL

- A. All equipment and components shall be new and the manufacturer's current model. All equipment shall be tested and listed to the latest standards published by Underwriters Laboratories, Inc. or Factory Mutual Research Corporation for use as part of a fire alarm system. The authorized representative of the manufacturer of the major equipment shall certify that the installation complies with all manufacturer's requirements and that satisfactory total system operation has been achieved.
- B. All devices and hardware located in Behavioral Health, Mental Health or Psychiatric treatment areas shall be provided with tamperproof hardware and fasteners.

2.2 CONDUIT, BOXES, AND WIRE

- A. Conduit shall be in accordance with Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS and as follows:
1. All new and reused conduit shall be installed in accordance with NFPA 70.
 2. Conduit fill shall not exceed 40 percent of interior cross sectional area.
 3. All new conduit shall be 19 mm (3/4 inch) minimum.
- B. Wire:
1. All new wiring shall be installed in a conduit or raceway.
 2. Wiring shall be in accordance with NEC article 760, Section 26 05 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW), and as recommended by the manufacturer of the fire alarm system. All wires shall be color coded. Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 18 AWG for initiating device circuits and 14 AWG for notification device circuits.
 3. Any fire alarm system wiring that extends outside of a building shall have additional power surge protection to protect equipment from physical damage and false signals due to lightning, voltage and current induced transients. Protection devices shall be shown on the submittal drawings and shall be UL listed or in accordance with written manufacturer's requirements.
 4. All wire or cable used in underground conduits including those in concrete shall be listed for wet locations.
- C. Terminal Boxes, Junction Boxes, and Cabinets:
1. Shall be galvanized steel in accordance with UL requirements.

2. All new and reused boxes shall be sized and installed in accordance with NFPA 70.
3. New and existing covers shall be repainted red in accordance with Section 09 91 00, PAINTING and shall be identified with white markings as "FA" for junction boxes and as "FIRE ALARM SYSTEM" for cabinets and terminal boxes. Lettering shall be a minimum of 19 mm (3/4 inch) high.
4. Terminal boxes and cabinets shall have a volume 50 percent greater than required by the NFPA 70. Minimum sized wire shall be considered as 14 AWG for calculation purposes.
5. Terminal boxes and cabinets shall have identified pressure type terminal strips and shall be located at the base of each riser. Terminal strips shall be labeled as specified or as approved by the COTR.

2.3 FIRE ALARM CONTROL UNIT

A. General:

1. The building shall be provided with fire alarm control unit(s) as shown and required, which utilizes multiplex communications to operate as a supervised fire alarm system. A designated main fire alarm control unit shall serve as the primary panel and provide complete operator controls and functions for the protected premises system.
2. Each primary and secondary power source shall be supervised for loss of power.
3. All circuits and devices shall be monitored for integrity.
4. Visually and audibly annunciate any trouble condition including, but not limited to main power failure, grounds, device fault and system wiring derangement.
5. The following primary controls shall be visible through a front access panel of the designated local main fire alarm control unit:
 - a. 80 character alphanumeric display (minimum).
 - b. Common Alarm, Trouble, Supervisory and Power On LED indicators.
 - c. Related system status indicators.
 - d. Event acknowledgement switches.
 - e. Alarm silence switch.
 - f. System Reset switch.
6. The main fire alarm control unit shall transmit system events to the Remote Supervising Station via Digital Alarm Communicator/Transmitter and provide complete integration with the campus-wide fire alarm network as described herein.

B. Enclosure:

1. The control unit shall be housed in a cabinet suitable for semi-flush and surface mounting. Cabinet and front shall be corrosion protected, given a rust-resistant prime coat, and manufacturer's standard finish.
2. Cabinet shall contain all necessary panel components including relays, modules, terminals, indicators, legend plates and switches to provide control for the system.
3. Cabinets that house an operator's display, indicators and controls shall have a clear door assembly that allows viewing of the system controls without access to the locked cabinet. Provide filler panels or solid door assemblies for all cabinets or sections that do not provide user interface.

C. Power Supply:

1. Each control unit shall derive its normal power from a 120 volt, 60 Hz dedicated supply connected to the emergency power system. Standby power shall be provided by a 24 volt DC battery as hereinafter specified.

The normal power shall be transformed, rectified, coordinated, and interfaced with the standby battery and charger to provide a minimum of 27 amps of nominal 24v system power from each Fire Alarm Control Unit.

2. The door holder power shall be arranged so that momentary or sustained loss of main operating power shall not cause the release of any door.
3. Power for smoke detectors and other initiating and control modules shall be derived from the corresponding fire alarm control unit serving the respective devices.
4. Provide protectors to protect the fire alarm equipment from damage due to lightning or voltage and current transients.
5. Provide new separate and direct ground lines to the outside to protect the equipment from unwanted grounds

D. Audio Amplifiers:

1. Provide audio amplifier modules shall be integral to each Fire Alarm Control Panel shown. Amplifiers shall have a dedicated power supply, transformer and speaker circuit outputs. Amplifiers shall provide a minimum of 100 Watts at 70 VRMS output with a frequency response of 120 to 12,000 Hz. Provide a sufficient quantity of amplifiers to operate all system speakers simultaneously, plus a total of 50% spare capacity.
2. Amplifiers shall be sized to accommodate each speaker set at one (1) watt tap and each high output speaker at 8 watts.
3. Each amplifier shall process multi-channel audio signals that originate from the main Fire Alarm Control Panel or designated remote panels.
4. Each amplifier shall be supported by a dedicated power supply and provide 50 watts of audio power and no less than 3 speaker circuit outputs. Provide a minimum of two (2) amplifier modules integral to each Fire Alarm Control Panel shown for a minimum of 100 watts per panel.
5. Each system panel shall be provided with redundant amplifiers or a floating back-up amplifier to serve audio circuits in the event of an amplifier failure.
6. Where floating backup amplifiers are provided, one backup amplifier shall be provided per cabinet, and will serve no more than two (2) amplifiers.
7. Each audio output circuit shall be wired in a Class B fashion.
8. Amplifiers shall be continuously supervised for operational status.

E. Circuit Supervision: Each alarm initiating device circuit, signaling line circuit, and notification appliance circuit shall be supervised against the occurrence of a break or ground fault condition in the field wiring. These conditions shall cause a trouble signal to sound in the control unit until manually silenced by an off switch. Circuits shall be configured so that a single wiring fault (open, short or ground) will not affect the operation of any circuits serving another evacuation zone.

F. Supervisory Devices: All sprinkler system valves, standpipe control valves, post indicator valves (PIV), and main gate valves shall be supervised for off-normal position. Closing a valve shall sound a supervisory signal at the control unit until silenced by an off switch. The specific location of all closed valves shall be identified at the control unit. Valve operation shall not cause an alarm signal. Low air pressure switches and duct detectors shall be monitored as supervisory signals. The power supply to the elevator shunt trip breaker shall be monitored by the fire alarm system as a supervisory signal.

G. Trouble signals:

1. Arrange the trouble signals for automatic reset (non-latching).
2. System trouble switch off and on lamps shall be visible through the control unit door.

- H. Function Switches: Provide the following switches in addition to any other switches required for the system:
1. Remote Alarm Transmission By-pass Switch: Shall prevent transmission of all signals to the Remote Supervising Station when in the "off" position. A system trouble signal shall be energized when switch is in the off position.
 2. Alarm Off Switch: Shall disable the alarm notification circuits on the local building alarm system. A system trouble signal shall be activated when switch is in the off position.
 3. Trouble Silence Switch: Shall silence the trouble signal whenever the trouble silence switch is operated. This switch shall not reset the trouble signal.
 4. Reset Switch: Shall reset the system after an alarm, provided the initiating device has been reset. The system shall lock in alarm until reset.
 5. Lamp Test Switch: A test switch or other approved convenient means shall be provided to test the indicator lamps.
 6. Drill Switch: Shall activate a building-wide Drill sequence throughout the building without transmitting the event to the Remote Supervising Station.
 7. Door Holder By-Pass Switch: Shall prevent doors from releasing during fire alarm tests. A system trouble alarm shall be energized when switch is in the abnormal position.
 8. Elevator recall By-Pass Switch: Shall prevent the elevators from recalling upon operation of any of the devices installed to perform that function. A system trouble alarm shall be energized when the switch is in the abnormal position.
 9. HVAC/Smoke Damper By-Pass: Provide a means to disable HVAC fans from shutting down and/or smoke dampers from closing upon operation of an initiating device designed to interconnect with these devices.
- I. Remote Transmissions:
1. Provide discrete transmission of all alarm, supervisory and trouble signals to an approved Remote Supervising Station from each designated main fire alarm control unit and the campus Fire Command Centers.
 2. Remote Supervising Station reporting shall transmit all events in a Contact ID format via dedicated telephone lines in accordance with NFPA 72.
 3. Transmitters shall be compatible with the systems and equipment they are connected to such as timing, operation and other required features.
- J. Remote Control Capability: Each building fire alarm control unit shall be installed and programmed so that each must be reset locally after an alarm, before the main fire alarm control unit can be reset. After the local building fire alarm control unit has been reset, then the all system acknowledge, reset, silence or disabling functions can be operated by the main fire alarm control unit and the Campus Fire Command Centers.
- K. System Expansion: Design the control units and enclosures so that the system can be expanded in the future (to include the addition of twenty-five percent more alarm initiating, alarm notification and door holder circuits) without disruption or replacement of the existing control unit and secondary power supply.

2.4 STANDBY POWER SUPPLY

- A. Uninterrupted Power Supply (UPS):
1. The UPS system shall be comprised of a static inverter, a precision battery float charger, and sealed maintenance free batteries.
 2. Under normal operating conditions, the load shall be filtered through a ferroresonant transformer.

3. When normal AC power fails, the inverter shall supply AC power to the transformer from the battery source. There shall be no break in output of the system during transfer of the system from normal to battery supply or back to normal.
4. Batteries shall be sealed, gel cell type.
5. UPS system shall be sized to operate the central processor, workstations, printer, and all other directly connected equipment for five minutes upon a normal AC power failure.

B. Batteries:

1. Battery shall be of the sealed, maintenance free type, 24-volt nominal.
2. Battery shall have sufficient capacity to power the fire alarm system for not less than twenty-four (24) hours plus fifteen (15) minutes of alarm to an end voltage of 1.14 volts per cell, upon a normal AC power failure.
3. Battery racks shall be steel with an alkali-resistant finish. Batteries shall be secured in seismic areas 2B, 3, or 4.

C. Battery Charger:

1. Shall be completely automatic, with constant potential charger maintaining the battery fully charged under all service conditions. Charger shall operate from a 120-volt, 60 hertz emergency power source.
2. Shall be rated for fully charging a completely discharged battery within 48 hours while simultaneously supplying any loads connected to the battery.
3. Shall have protection to prevent discharge through the charger.
4. Shall have protection for overloads and short circuits on both AC and DC sides.
5. A trouble condition shall actuate the fire alarm trouble signal.
6. Charger shall have automatic AC line voltage regulation, automatic current-limiting features, and adjustable voltage controls.

2.5 ANNUNCIATION

A. Remote Annunciator – Local System:

1. Each remote annunciator shall provide a minimum 80-character alphanumeric display with message scrolling buttons, key-enabled common control switches (Acknowledge, Reset, Alarm Silence, Panel Silence), four user-programmable auxiliary control switches, and be wired in tandem with the Main Fire Alarm Control Panel.
2. Message shall identify all system events in clear English text. Each message shall include device type (pull station, smoke detector, waterflow, etc.), status (alarm, trouble, supervisory, etc.) and device location (building number, floor, zone, etc.).
3. The initial alarm received shall be indicated as such.
4. A selector switch shall be provided for viewing subsequent alarm messages.
5. The annunciator shall be UL listed for fire alarm application.
6. Annunciators shall include a one-way paging microphone and audio control to support Emergency Voice communications functions as described elsewhere in these Specifications.
7. Annunciators shall provide annunciation and control of the local building system.

2.6 EMERGENCY VOICE COMMUNICATION SYSTEM (EVCS)

A. General:

1. Provide a multi-channel audio controller, paging microphone and audio control select switches integral to the main Fire Alarm Control Panel serving each local building and designated Remote Panels. Audio controllers shall provide digital transmission of multiple simultaneous audio channels to amplifiers module located in each distributed fire alarm control unit (panel).
2. THE FOLLOWING DIGITIZED MESSAGES, RECORDED IN A FEMALE VOICE SHALL BE PROVIDED (SUBJECT TO FINAL OWNER/AHJ REVIEW AND APPROVAL):
 - a. Evacuation Message: "ATTENTION PLEASE – ATTENTION PLEASE. The signal tone you have just heard indicates a report of an emergency in this building. If your floor evacuation signal sounds after this message, walk to the nearest stairway exit and leave the floor. All occupants requiring assistance shall follow the building evacuation plan. While the report is being verified, occupants on other floors should await further instructions.
 - b. Alert Message: Provide a digitized coded voice message, which will correspond to each zone. The messages shall be arranged with a 3 second alert tone, a "Code Red" message followed by a description of the fire alarm area (building number, floor, level).
 - c. All Clear Message: "ATTENTION PLEASE – ATTENTION PLEASE. The building emergency has been cleared. You may return to normal activities."
 - d. Drill Message: "ATTENTION PLEASE – ATTENTION PLEASE. This is only a Drill. This is only a Drill. All occupants must report to the [nearest stairway exit door] [designated muster point] and await further instructions. Do not enter the stairways."
3. Pre-recorded messages and tones shall be as follows:
 - a. The pre-signal alert tone shall be a 10 second slow-whoop tone.
 - b. The evacuation tone shall be a 450Hz uniform temporal code three signal.
4. As a minimum, the following audio messages shall be distributed over a minimum of eight (8) separate audio channels:
 - a. Evacuation Message
 - b. Alert Message
 - c. Manual Page
 - d. Standby Message
 - e. All Clear Message
 - f. Drill Message
 - g. Test Message(s)
 - h. Spare
5. An emergency voice communication system shall serving the local building and support integration with the campus network.
 - a. Upon receipt of an alarm signal, the EVCS shall automatically broadcast the appropriate pre-recorded messages throughout the building.
 - b. The EVCS shall be arranged as a multi-channel system capable of transmitting up to eight different messages simultaneously.

6. The EVCS shall comply with the requirements of system supervision and monitoring for integrity stated herein.

B. Speaker Circuit Control Unit:

1. The speaker circuit control unit shall include switches to manually activate or deactivate speaker circuits grouped by building and floor, and to selectively broadcast any pre-recorded message, tone, or manual page on a selective and all-call basis.
2. Speaker circuit control switches shall provide on, off, and automatic positions and corresponding status indications.
3. The speaker circuit control unit shall include visual indication of active or trouble status for each group of speaker circuits in the system.
4. A trouble indication shall be provided if a speaker circuit group is disabled.
5. A lamp test switch shall be provided to test all indicator lamps.
6. A single "all call" switch shall be provided to activate all speaker circuit groups simultaneously.
7. A push-to-talk microphone shall be provided for manual voice paging from the Network Annunciator located at the security office, Fire Command Centers, and where otherwise shown. The microphone shall provide manual "all call" and selective paging to individual building(s), floors and evacuation signaling zones.
8. A voice message disconnect switch shall be provided to disconnect automatic digitized voice messages from the system. The system shall be arranged to allow manual voice messages and indicate a system trouble condition when activated.

C. Speaker Circuit Arrangement:

1. Speaker circuits shall be arranged such that there is a minimum of one speaker circuit zone.
2. Audio amplifiers and control equipment shall be electrically supervised for normal and abnormal conditions.
3. Speaker circuits shall be 70.7 VRMS with a minimum of 50% spare power available.
4. Speaker circuits and control equipment shall be arranged such that loss of any one speaker circuit will not cause the loss of any other speaker circuit in the system.

D. Digitized Voice Module (DVM):

1. The Digitized Voice Module shall provide prerecorded digitized evacuation and instructional messages. The messages shall be professionally recorded and approved by the COTR prior to programming.
2. The DVM shall be configured to automatically output to the desired circuits following a 10-second slow whoop alert tone.
3. Prerecorded magnetic taped messages and tape players are not permitted.
4. The digitized message capacity shall be no less than 15 second in length.
5. The digitized message shall be transmitted three times.
6. The DVM shall be supervised for operational status.
7. Failure of the DVM shall result in the transmission of uniform temporal code 3 evacuation tone.
8. The DVM memory shall have a minimum 50% spare capacity after those messages identified in this section are recorded. Multiple DVM's may be used to obtain the required capacity.

E. Audio Amplifiers:

1. Refer to Specification Section 2.3 (D) for requirements.

F. Tone Generator(s):

1. Tone Generator(s) shall be capable of providing a distinctive 450Hz temporal code 3 fire alarm signal as well as a slow whoop tone.
2. Tone Generator(s) shall be continuously supervised for operational status.

2.7 ALARM NOTIFICATION APPLIANCES

A. Speakers:

1. Shall operate on 70.7 VRMS with field selectable output taps from 0.25 to 2.0W and originally installed at the one-half watt tap. Speakers shall provide a minimum sound output of 80 dBA at ten feet with the one-half watt tap.
2. Frequency response shall be a minimum of 400 HZ to 4000 HZ.
3. 100 mm (4 inches) or 200 mm (8 inches) cone type speakers ceiling mounted with white colored baffles in areas with suspended ceilings and wall mounted in areas without ceilings.
4. High Output Speakers: Provide high output speakers with a multiple tap setting up to 8 watts in mechanical penthouses and other high ambient noise settings.
5. Where ambient conditions dictate weatherproof devices be used, provide the appropriate dual Listed (UL 1963/1971) device including the appropriate gasketed weatherproof backbox.

B. Strobes:

1. Furnish and install multi-candela, synchronized xenon strobes in compliance with NFPA 72, with finish selected by Architect and rated per ANSI/UL 1971. As a minimum, strobes shall support 15cd, 30cd, 75cd or 110cd settings, and clearly display the current setting of the device when installed. Strobe candela settings shall be as directed by NFPA 72 based on final (installed) locations of each device.
2. All appliances shall be direct-wired; devices that utilize a multi-part assembly with swipe or non-mechanical pressure-type contact connections will not be considered acceptable. The contractor shall provide surface mount backboxes and alternate outdoor-rated appliances where site conditions dictate.
3. Backplate shall be red or white with 13 mm (1/2 inch) permanent contrasting red or white letters as selected by Architect. Lettering to read "Fire", be oriented on the wall or ceiling properly, and be visible from all viewing directions.
4. Each strobe circuit shall have a minimum of twenty (20) percent spare capacity.
5. Strobes may be combined with the audible notification appliances specified herein.

2.8 ALARM INITIATING DEVICES

A. Manual Fire Alarm Stations:

1. Shall be non-break glass, address reporting type.
2. Station front shall be constructed of a durable material such as cast or extruded metal or high impact plastic. Stations shall be semi-flush type.
3. Stations shall be of single action pull down type with suitable operating instructions provided on front in raised or depressed letters, and clearly labeled "FIRE".
4. Operating handles shall be constructed of a durable material. On operation, the lever shall lock in alarm position and remain so until reset. A key shall be required to gain front access for resetting, or conducting tests and drills.
5. Unless otherwise specified, all exposed parts shall be red in color and have a smooth, hard, durable finish.

6. Stations identified as key operated only shall have a single standardized lock and key separate from the control equipment.
7. Where ambient conditions preclude the use of addressable devices, equivalent conventional devices shall be used and be supervised by a dedicated addressable module located in a properly heated/ventilated space.
8. In psychiatric areas, provide institutional key-operated pull stations designed for institutional use. The device shall be red with the words "FIRE ALARM" in white, raised letters. The station shall mechanically latch upon operation and remain so until manually reset. Only authorized individuals will have the tools/keys to initiate and reset the device.

B. Smoke Detectors:

1. Smoke detectors shall be UL listed for use with the fire alarm control unit being furnished.
2. Smoke detectors shall be analog/addressable type complying with applicable UL Standards for system type detectors. Smoke detectors shall be installed in accordance with the manufacturer's recommendations and NFPA 72.
3. Detectors shall have an indication lamp to denote an alarm condition. Provide remote indicator lamps and identification plates where detectors are concealed from view. Locate the remote indicator lamps and identification plates flush mounted on walls so they can be observed from a normal standing position.
4. All spot type and duct type detectors installed shall be of the photoelectric type.
5. Photoelectric detectors shall be factory calibrated and readily field adjustable for sensitivity. The minimum sensitivity range of all photoelectric detectors shall be .5% - 3.5% obscuration/ft., and each shall be set at a nominal 2.5% obscuration, plus or minus 0.25 percent obscuration per foot.
6. Detectors shall provide a visual trouble indication if they drift out of sensitivity range or fail internal diagnostics. Detectors shall provide an indication of sensitivity setting during testing. Detectors, along with the fire alarm control units shall be UL listed for testing the sensitivity of the detectors; system reports shall include sensitivity reports for each detector.
7. Smoke detectors located in on-call rooms and residential dwellings shall have an integral sounder base and be programmed for local alarm with supervisory event reporting to the protected premises panel. Activation of any such local detector shall also activate the visual appliances located in the room.

C. Heat Detectors:

1. Heat detectors shall be of the addressable restorable rate compensated fixed-temperature spot type.
2. Detectors shall have a minimum smooth ceiling rating of 2500 square feet.
3. Ordinary fixed temperature (135 degrees F) heat detectors shall be utilized in elevator shafts and elevator mechanical rooms and be coordinated with Division 21 for the appropriate temperature ratings. Intermediate temperature rated (200 degrees F) heat detectors shall be utilized in all other areas.
4. Provide a remote indicator lamp, key test station and identification nameplate (e.g. "Heat Detector - Elevator P-_____") for each elevator group. Locate key test station in plain view on elevator machine room wall.
5. Where ambient conditions preclude the use of addressable devices, equivalent conventional devices shall be used and be supervised by a dedicated address reporting interface device located in a properly heated/ventilated space. Water Flow and Pressure Switches:

D. Water Flow and Pressure Switches

1. Wet pipe water flow switches and dry pipe alarm pressure switches for sprinkler systems shall be connected to the fire alarm system by way of an address reporting interface device.
2. All new water flow switches shall be of a single manufacturer and series and non-accumulative retard type. See Section 21 12 00, FIRE-SUPPRESSION STANDPIPES and Section 21 13 13, WET-PIPE SPRINKLER SYSTEMS for new switches added. Connect all switches shown on the approved shop drawings.
3. All new switches shall have an alarm transmission delay time that is conveniently adjustable from 0 to 60 seconds. Initial settings shall be 30-45 seconds. Timing shall be recorded and documented during testing.

2.9 SUPERVISORY DEVICES

A. Duct Smoke Detectors:

1. Duct smoke detectors shall be provided and connected by way of an address reporting interface device. Detectors shall be provided with an approved duct housing mounted exterior to the duct, and shall have perforated sampling tubes extending across the full width of the duct (wall to wall). Detector placement shall be such that there is uniform airflow in the cross section of the duct.
2. Interlocking with fans shall be provided in accordance with NFPA 90A and as specified hereinafter under Part 3.2, "TYPICAL OPERATION".
3. Provide remote indicator lamps, key test stations and identification nameplates (e.g. "DUCT SMOKE DETECTOR AHU-X") for all duct detectors. Locate key test stations in plain view on walls or ceilings so that they can be observed and operated from a normal standing position.

B. Sprinkler and Standpipe System Supervisory Switches:

1. Each sprinkler system water supply control valve, riser valve or zone control valve, and each standpipe system riser control valve shall be equipped with a supervisory switch. Standpipe hose valves, and test and drain valves shall not be equipped with supervisory switches.
2. PIV (post indicator valve) or main gate valve shall be equipped with a supervisory switch.
3. Valve supervisory switches shall be connected to the fire alarm system by way of address reporting interface device. See Section 21 13 13, WET-PIPE SPRINKLER SYSTEMS for new switches to be added. Connect tamper switches for all control valves shown on the approved shop drawings.
4. The mechanism shall be contained in a weatherproof die-cast aluminum housing that shall provide a 19 mm (3/4 inch) tapped conduit entrance and incorporate the necessary facilities for attachment to the valves.
5. The entire installed assembly shall be tamper-proof and arranged to cause a switch operation if the housing cover is removed or if the unit is removed from its mounting.

2.10 ADDRESS REPORTING INTERFACE DEVICE

- A. Shall have unique addresses that reports directly to the building fire alarm panel.
- B. Shall be configurable to monitor normally open or normally closed devices for both alarm and trouble conditions.

- C. Shall have terminal designations clearly differentiating between the circuit to which they are reporting from and the device that they are monitoring.
- D. Shall be UL listed for fire alarm use and compatibility with the panel to which they are connected.
- E. Shall be mounted in weatherproof housings if mounted exterior to a building.

2.11 UTILITY LOCKS AND KEYS:

- A. All key operated test switches, control units, annunciator panels and lockable cabinets shall be provided with a single standardized utility lock and key.
- B. Key-operated manual fire alarm stations shall have a single standardized lock and key separate from the control equipment.
- C. All keys shall be delivered to the COTR.

2.12 SPARE AND REPLACEMENT PARTS

- A. Provide spare and replacement parts as follows:
 - 1. Manual pull stations - 5
 - 2. Key operated manual pull stations - 3
 - 3. Heat detectors - 2 of each type
 - 4. Fire notification appliances – 5 (each type)
 - 5. Smoke detectors - 20
 - 6. Duct smoke detectors with all appurtenances - 1
 - 7. Control equipment utility locksets - 5
 - 8. Control equipment keys - 25
 - 9. Key operated manual pull station keys – 50
 - 10. 2.5 oz containers aerosol smoke Listed and approved for use with the system- 12
 - 11. Printer paper - 3 boxes
 - 12. Printer replacement ribbons - 3
 - 13. Monitor modules (for sprinkler water flow, tamper and pressure switches monitoring, etc) - 9
 - 14. Control modules - 3
 - 15. Fire alarm SLC cable (same as installed) – 152 m (500 feet)
- B. Keys for key-operated manual pull stations shall be provided 30 days prior to actual installation.
- C. Spare and replacement parts shall be in original packaging and submitted to the COTR.
- D. Furnish and install a storage cabinet of sufficient size and suitable for storing spare equipment. Doors shall include a pad locking device. Padlock to be provided by the VA. Location of cabinet to be determined by the COTR.
- E. Provide to the VA, all hardware, software, programming tools, license and documentation necessary to permanently modify the fire alarm system on site. The minimum level of modification includes addition and deletion of devices, circuits, zones and changes to system description, system operation, and digitized evacuation and instructional messages.

2.13 INSTRUCTION CHART

- A. Provide a typeset printed or typewritten instruction card mounted behind a Lexan plastic or glass cover in a stainless steel or aluminum frame with a backplate. Install the frame in a conspicuous location observable from each control unit where operations are performed. The card shall show those steps to be taken by an operator when a signal is received under all conditions, normal, alarm, supervisory, and trouble. Provide an additional copy with the binder for the input output matrix for the sequence of operation. The instructions shall be approved by the COTR before being posted.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation shall be in accordance with NFPA 70, 72, 90A, and 101 as shown on the drawings, and as recommended by the major equipment manufacturer. Fire alarm wiring shall be installed in conduit. All conduit and wire shall be installed in accordance with Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS , Section 26 05 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW), and all penetrations of smoke and fire barriers shall be protected as required by Section 07 84 00, FIRESTOPPING.
- B. All new conduits, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas. All existing accessible fire alarm conduit not reused shall be removed.
- C. All new or reused exposed conduit shall be painted in accordance with Section 09 91 00, PAINTING to match surrounding finished areas and red in unfinished areas.
- D. Existing devices that are reused shall be properly mounted and installed. Where devices are installed on existing shallow backboxes, extension rings of the same material, color and texture of the new fire alarm devices shall be used. Mounting surfaces shall be cut and patched in accordance with Section 01 00 00, GENERAL REQUIREMENTS, Restoration, and be re-painted in accordance with Section 09 91 00, PAINTING as necessary to match existing.
- E. All fire detection and alarm system devices, control units and remote annunciators shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas. Exact locations to be approved by the COTR.
- F. Speakers shall be ceiling mounted and fully recessed in areas with suspended ceilings. Speakers shall be wall mounted and recessed in finished areas without suspended ceilings. Speakers may be surface mounted in unfinished areas.
- G. Wall-mount strobes shall be flush mounted 2,000 mm (80 inches) above the floor or 150 mm (6 inches) below ceiling, whichever is lower. Locate and mount to maintain a minimum 900 mm (36 inches) clearance from side obstructions.
- H. Manual pull stations shall be installed not less than 1050 mm (42 inches) or more than 1200 mm (48 inches) from finished floor to bottom of device and within 1500 mm (60 inches) of a stairway or an exit door.

- I. Mount valve tamper switches so as not to interfere with the normal operation of the valve and adjust to operate within two revolutions toward the closed position of the valve control, or when the stem has moved no more than one-fifth of the distance from its normal position.
- J. Connect flow and tamper switches installed under Section 21 13 13, WET-PIPE SPRINKLER SYSTEMS.

3.2 TYPICAL OPERATION

- A. Activation of any manual pull station, water flow or pressure switch, heat detector, or smoke detector shall cause the following operations to occur:
 - 1. Operate occupant notification via emergency voice communication system in the Building as follows:
 - a. Sound the designated evacuation message
 - b. Sound a uniform 450Hz temporal code 3 evacuation tone in the zone of alarm origin only.
 - 2. Report the event to the Campus Fire command Center and remote supervising station.
 - 3. Flash strobes continuously only in the zone of alarm.
 - 4. Transmit a separate alarm signal, via the main fire alarm control unit to the Supervising Station.
 - 5. Unlock the electrically locked exit doors within the zone of alarm.
- B. Heat detectors in elevator machine rooms shall, in addition to the above functions, disconnect all power to all elevators served by that machine room after a time delay. The time delay shall be programmed within the fire alarm system programming and be equal to the time it takes for the car to travel from the highest to the lowest level, plus 10 seconds.
- C. Smoke detectors in the primary elevator lobbies of Buildings shall, in addition to the above functions, return all elevators in the bank to the secondary floor.
- D. Smoke detectors in the remaining elevator lobbies, elevator machine room, or top of hoistway shall, in addition to the above functions, return all elevators in the bank to the primary floor and open the associated smoke vent.
- E. Operation of duct smoke detectors shall cause a system supervisory condition and shut down the ventilation system and close the associated smoke dampers as appropriate.
- F. Operation of any sprinkler or standpipe system valve supervisory switch or high/low air pressure switch shall cause a system supervisory condition.

3.3 TESTS

- A. Provide the service of a NICET level III, competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment to technically supervise and participate during all of the adjustments and tests for the system. Make all adjustments and tests in the presence of the COTR.

- B. When the systems have been completed and prior to the scheduling of the final inspection, furnish testing equipment and perform the following tests in the presence of the COTR. When any defects are detected, make repairs or install replacement components, and repeat the tests until such time that the complete fire alarm system meets all contract requirements. After the system has passed the initial test and been approved by the COTR, the contractor may request a final inspection.
1. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.
 2. Test the insulation on all installed cable and wiring by standard methods as recommended by the equipment manufacturer.
 3. Open each alarm initiating and notification circuit to see if trouble signal actuates.
 4. Ground each alarm initiation and notification circuit and verify response of trouble signals.
 5. Run water through all flow switches. Check time delay on water flow switches. Submit a report listing all water flow switch operations and their retard time in seconds.
- C. Provide functional testing of the entire system in accordance with manufacturer's instructions and NFPA 72 requirements. Testing shall include:
1. Testing of all main Fire Alarm Control unit functions.
 2. Testing of each and every automatic initiating device.
 3. Verification of proper airflow at each duct-mounted smoke detector using the appropriate airflow measurement.
 4. Measurement and recording of ambient and alarm sound levels throughout the building. The Contractor shall make the initial audible device settings and, following the initial sound measurements, make any necessary adjustments to ensure optimal system operation prior to final system acceptance.
- D. Functional Performance and Integrated Systems Testing (FP & IST) is part of the commissioning process and shall be performed by the Contractor and witnessed and documented by the Commissioning Authority. Refer to Section 01 91 13, COMMISSIONING, for performance and integrated systems testing and commissioning requirements.

3.4 FINAL INSPECTION AND ACCEPTANCE

- A. Prior to final acceptance a minimum 30 day "burn-in" period shall be provided. The purpose shall be to allow equipment to stabilize and potential installation and software problems and equipment malfunctions to be identified and corrected. During this diagnostic period, all system operations and malfunctions shall be recorded. Final acceptance will be made upon successful completion of the "burn-in" period and where the last 14 days is without a system or equipment malfunction.
- B. At the final inspection a factory trained representative of the manufacturer of the major equipment shall repeat the tests in Article 3.3 TESTS and those required by NFPA 72. In addition the representative shall demonstrate that the systems function properly in every respect. The demonstration shall be made in the presence of a VA representative.

3.5 INSTRUCTION

- A. The manufacturer's authorized representative shall provide instruction and training to the VA as follows:
 - 1. Six one-hour sessions to engineering staff, security police and central attendant personnel for simple operation of the system. Two sessions at the start of installation, two sessions at the completion of installation and two sessions 3 months after the completion of installation.
 - 2. Four two-hour sessions to engineering staff for detailed operation of the system. Two sessions at the completion of installation and two sessions 3 months after the completion of installation.
 - 3. Three eight-hour sessions to electrical technicians for maintaining, programming, modifying, and repairing the system at the completion of installation and one eight-hour refresher session 3 months after the completion of installation.
- B. The Contractor and/or the Systems Manufacturer's representative shall provide a typewritten "Sequence of Operation" including a trouble shooting guide of the entire system for submittal to the VA. The sequence of operation will be shown for each input in the system in a matrix format and provided in a loose leaf binder. When reading the sequence of operation, the reader will be able to quickly and easily determine what output will occur upon activation of any input in the system. The INPUT/OUTPUT matrix format shall be as shown in Appendix A to NFPA 72.
- C. Furnish the services of a competent instructor for instructing personnel in the programming requirements necessary for system expansion. Such programming shall include addition or deletion of devices, zones, indicating circuits and printer/display text.
- D. Training of the VAMC operation and maintenance personnel shall be required in cooperation with the VA Resident Engineer. The manufacturer's representative shall provide the training noted above concerning the configuration, operation and troubleshooting of the installed systems. The instruction shall be scheduled in coordination with the VA Resident Engineer after submission and approval of formal training plans. Refer to Section 017900, DEMONSTRATION AND TESTING, and Section 019113, COMMISSIONING, for Contractor training requirements.

3.6 INSPECTION, TESTING AND MONITORING AGREEMENT

- A. Before making final connections to the Remote Supervising Station, a Warranty Maintenance Contract must be in evidence. The Contract shall be in effect between the Owner and a UL-certified testing company qualified to conduct warranty service on the installed service. The contract shall provide for periodic testing and emergency service response on a 24 hour on call basis with a 4 hour response time.
- B. The Contractor shall furnish a one-year Remote Supervising Station Monitoring agreement, to support Contact ID event reporting of all system events to an approved Supervising Station.
- C. Testing shall be conducted and documented in accordance with NFPA requirements and manufacturer's instructions for all equipment and devices. Submit hard and electronic copies of test reports directly to the Owner following each test.
- D. As a minimum, the system shall be subject to at least one complete test annually. Tests may be conducted on a quarterly basis, with twenty-five percent of the total number of devices being tested each quarter, subject to the Owner's acceptance. The test contractor shall coordinate testing with related trades, including Fire Protection, Elevator and HVAC Systems.

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- E. Self-restoring detectors shall be exposed either to heat or smoke to test ability to initiate alarm.
- F. Quarterly test reports shall be maintained in accordance with the referenced standards and include the following information:
1. Date of test.
 2. Name and location being tested.
 3. Visual inspection and functional tests of system components and applicable manual and automatic initiating devices.
 4. Functional test of required system operations, including manual system functions, automatic sequences, and fire safety functions.
 5. Number of initiating devices tested with their corresponding device type, address or zone reference number.
 6. Number of notification circuits tested with their corresponding circuit types and reference numbers.
 7. Printout of a complete peak-value log and device sensitivity report.
 8. Condition of primary and secondary (standby) power supplies.
 9. Name of company conducting test.
 10. Name and signature of person conducting test.
- G. Agreement shall not cover:
1. Damage resulting from accidents, fire, storm, water, negligence, misuse, vandalism, nor defective or improper wiring.
 2. Testing of water flow switches or Fire Pump (to be tested by the Fire Protection System Contractor).
 3. The costs associated with integrated testing of related systems.
 4. Testing or repairs of door release mechanisms covered in another section of hardware contract.
 5. Testing or repairs of dampers, smoke hatches, elevator controls, and other peripheral equipment not provided by fire alarm supplier.
- H. The testing company shall be responsible for coordination between the testing of related systems and equipment, including Elevator Service, water flow, tamper, damper and fan controls, etc., to ensure that all are tested in a comprehensive manner at the same time.

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