ADDENDUM NUMBER SIX
To Contract Documents for:
CLIVE PUBLIC SAFETY FACILITY
SVPA Project No. 19056

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September 16, 2020

This addendum is issued to modify, clarify, or amend the original Project Manual and/or Drawings and is hereby made part of the Contract Documents dated August 27, 2020. The Contractor shall be responsible for incorporating items in this Addendum to the Work. Attach this addendum to the Project Manual(s) in your possession. Acknowledge receipt of this Addendum by number where indicated on the Bid Form. Failure to do so may subject Bidders to disqualification. The following shall take precedence over anything to the contrary in the Project Manual, in the Drawings, or in prior Addenda.

This Addendum consists of (2) pages and the following attachments:
(3) Re-Issued Sections 280500, 281300, 283100
(2) NEW Sections 280503, 282300

CHANGES TO THE SPECIFICATIONS

1. REPLACE the following Sections in their entirety, attached to this Addendum:
   A. 28 05 00 Basic Electronic Safety and Security
   B. 28 13 00 Electronic Access Control
   C. 28 31 00 Fire Alarm and Detection Systems

2. ADD the following Sections to the Contract Documents in their entirety, attached to this Addendum:
   A. 28 05 03 Through Penetration Firestopping
   B. 28 23 00 Video Surveillance

END OF ADDENDUM 06
SECTION 28 05 00
BASIC ELECTRONIC SAFETY AND SECURITY SYSTEM REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Basic Safety and Security System Requirements (herein referred to Security) specifically applicable to Division 28 sections, in addition to Division 1 - General Requirements.

B. All materials and installation methods shall conform to the applicable standards, guidelines and codes referenced herein and within each specification section.

1.2 SCOPE OF WORK

A. This Specification and the accompanying drawings govern the work involved in furnishing, installing, testing and placing into satisfactory operation the security systems as shown on the drawings and specified herein.

B. Each Contractor shall provide all new materials as indicated in the schedules on the drawings, and/or in these specifications, and all items required to make their portion of the security systems a finished and working system.

C. Description of systems include but are not limited to the following:

1. Electronic access control system

2. Video surveillance

3. Fire detection and alarm

4. Low voltage security wiring (less than +120VAC) as specified and required for proper system control and communications.

5. All associated electrical backboxes, conduit, miscellaneous cabling, and power supplies required for proper system installation and operation as defined in the “Suggested Matrix of Scope Responsibility”.

6. Firestopping of penetrations of fire-rated construction as described in Specification Section 28 05 03.

1.3 WORK SEQUENCE

A. All construction work that will produce excessive noise levels and interference with normal building operations, as determined by the Owner, shall be scheduled with the Owner. It may be necessary to schedule such work during non-occupied hours. The Owner shall reserve the right to set policy as to when restricted construction hours will be required.

B. Itemize all work and list associated hours and pay scale for each item.

1.4 DIVISION OF WORK BETWEEN ELECTRICAL AND SECURITY CONTRACTORS

A. Division of work is the responsibility of the Prime Contractor. Any scope of work described in the contract document shall be sufficient for including said requirement in the project. The Prime Contractor shall be solely responsible for determining the appropriate
subcontractor for the described scope. In no case shall the project be assessed an additional cost for scope that is described in the contract documents. The following division of responsibility is a guideline based on typical industry practice.

B. Definitions:

1. "Electrical Contractor" as referred to herein refers to the Contractors listed in Division 28 of this Specification.

2. "Electrical Contractor" shall also refer to the Contractor listed in Division 28 of this specification when the "Suggested Matrix of Scope Responsibility" indicates the work shall be provided by the EC. Refer to the Contract Documents for the "Suggested Matrix of Scope Responsibility".

3. "Security Contractor" as referred to herein refers to the Contractors listed in Division 28 of this Specification.

4. Low Voltage Security Wiring: The wiring (less than 120VAC) associated with the Security Systems, used for analog and/or digital signals between equipment.

C. General:

1. The purpose of these Specifications is to outline typical Electrical and Security Contractor's work responsibilities as related to security systems including back boxes, conduit, cable tray, power wiring and low voltage security wiring. The prime contractor is responsible for all divisions of work.

2. The exact wiring requirements for much of the equipment cannot be determined until the systems have been purchased and submittals are approved. Therefore, only known wiring, conduits, raceways, and electrical power as related to such items, is shown on the Security Drawings. Other wiring, conduits, raceways, junction boxes, and electrical power not shown on the Security Drawings but required for the successful operation of the systems shall be the responsibility of the Security Contractor and included in the Contractor's bid.

3. Where the Electrical Contractor is required to install conduit, conduit sleeves and/or power connections in support of Security systems, the final installation shall not begin until a coordination meeting between the Electrical Contractor and the Security Contractor has convened to determine the exact location and requirements of the installation.

4. Where the Electrical Contractor is required to install cable tray that will contain Low Voltage Security Wiring, the installation shall not begin until the Security Contractor has completed a coordination review of the cable tray shop drawing.

5. This Contractor shall establish Electrical and Security utility elevations prior to fabrication and installation. The Security Contractor shall cooperate with the Electrical Contractor and the determined elevations in accordance with the guidelines below. This Contractor shall coordinate utility elevations with other trades. When a conflict arises, priority shall be as follows:

   a. Lighting Fixtures
   b. Gravity Flow Piping, including Steam and Condensate
   c. Sheet Metal
   d. Electrical Busduct
   e. Cable Trays, including 12" access space
f. Sprinkler Piping and other Piping


g. Conduit and Wireway


h. Open Cabling

D. Electrical Contractor's Responsibility:

1. Assumes all responsibility for all required conduit and power connections when shown on the "Suggested Matrix of Scope Responsibility" to be provided by the Electrical Contractor.

2. Assumes all responsibility for providing and installing cable tray.


4. This Contractor is responsible for coordination of utilities with all other Contractors. If any field coordination conflicts are found, the Contractor shall coordinate with other Contractors to determine a viable layout.

E. Security Contractor’s Responsibility:

1. Assumes all responsibility for the low voltage security wiring of all systems, including cable support where open cable is specified.

2. Assumes all responsibility for all required backboxes, conduit and power connections not specifically shown as being provided by the Electrical Contractor on the "Suggested Matrix of Scope Responsibility."

3. Assumes all responsibility for providing and installing all ladder rack and other cable management hardware (as defined herein).

4. Responsible for providing the Electrical Contractor with the required grounding lugs or other hardware for each piece of security equipment which is required to be bonded to the telecommunications bonding system.

5. This Contractor is responsible for coordination of utilities with all other Contractors. If any field coordination conflicts are found, the Contractor shall coordinate with other contractors to determine a viable layout.

1.5 COORDINATION DRAWINGS

A. Definitions:

1. Coordination Drawings: A compilation of the pertinent layout and system drawings that show the sizes and locations, including elevations, of system components and required access areas to ensure that no two objects will occupy the same space.

   a. Mechanical trades shall include, but are not limited to, mechanical equipment, ductwork, fire protection systems, plumbing piping, medical gas systems, hydronic piping, steam and steam condensate piping, and any item that may impact coordination with other disciplines.

   b. Electrical trades shall include, but are not limited to, electrical equipment, conduit 1.5" and larger, conduit racks, cable trays, pull boxes, transformers, raceway, busway, lighting, ceiling-mounted devices, and any item that may impact coordination with other disciplines.
c. Technology trades shall include, but are not limited to, technology equipment, racks, conduit 1.5" and larger, conduit racks, cable trays, ladder rack, pull boxes, raceway, ceiling-mounted devices, and any item that may impact coordination with other disciplines.

d. Maintenance clearances and code-required dedicated space shall be included.

e. The coordination drawings shall include all underground, underfloor, in-floor, in chase, and vertical trade items.

2. The contractors shall use the coordination process to identify the proper sequence of installation of all utilities above ceilings and in other congested areas, to ensure an orderly and coordinated end result, and to provide adequate access for service and maintenance.

B. Participation:

1. The contractors and subcontractors responsible for work defined above shall participate in the coordination drawing process.

2. One contractor shall be designated as the Coordinating Contractor for purposes of preparing a complete set of composite electronic CAD coordination drawings that include all applicable trades, and for coordinating the activities related to this process. The Coordinating Contractor for this project shall be the Mechanical Contractor.

   a. The Coordinating Contractor shall utilize personnel familiar with requirements of this project and skilled as draftspersons/CAD operators, competent to prepare the required coordination drawings.

3. Electronic CAD drawings shall be submitted to the Coordinating Contractor for addition of work by other trades. IMEG will provide electronic file copies of ventilation drawings for contractor's use if the contractor signs and returns an "Electronic File Transfer" waiver provided by IMEG. IMEG will not consider blatant reproductions of original file copies an acceptable alternative for coordination drawings.

C. Drawing Requirements:

1. The file format and file naming convention shall be coordinated with and agreed to by all contractors participating in the coordination process and the Owner.

   a. Scale of drawings:

      1) General plans: 1/4 Inch = 1 '-0" (minimum).

      2) Mechanical, electrical, communication rooms, and including the surrounding areas within 10 feet: 1/2 Inch = 1'-0" (minimum).

      3) Shafts and risers: 1/2 Inch = 1'-0" (minimum).

      4) Sections of shafts and mechanical and electrical equipment rooms: 1/4 Inch = 1 '-0" (minimum).

      5) Sections of congested areas: 1/2 Inch = 1'-0" (minimum).
2. Ductwork layout drawings shall be the baseline system for other components. Ductwork layout drawings shall be modified to accommodate other components as the coordination process progresses.

3. There may be more drawings required for risers, top and bottom levels of mechanical rooms, and shafts.

4. The minimum quantity of drawings will be established at the first coordination meeting and sent to the A/E for review. Additional drawings may be required if other areas of congestion are discovered during the coordination process.

D. General:

1. Coordination drawing files shall be made available to the A/E and Owner's Representative. The A/E will only review identified conflicts and give an opinion but will not perform as a coordinator.

2. A plotted set of coordination drawings shall be available at the project site.

3. Coordination drawings are not shop drawings and shall not be submitted as such.

4. The contract drawings are schematic in nature and do not show every fitting and appurtenance for each utility. Each contractor is expected to have included in his/her bid sufficient fittings, material, and labor to allow for adjustments in routing of utilities made necessary by the coordination process and to provide a complete and functional system.

5. The contractors will not be allowed additional costs or time extensions due to participation in the coordination process.

6. The contractors will not be allowed additional costs or time extensions for additional fittings, reroutings or changes of duct size, that are essentially equivalent sizes to those shown on the drawings and determined necessary through the coordination process.

7. The A/E reserves the right to determine space priority of equipment in the event of spatial conflicts or interference between equipment, piping, conduit, ducts, and equipment provided by the trades.

8. Changes to the contract documents that are necessary for systems installation and coordination shall be brought to the attention of the A/E.

9. Access panels shall preferably occur only in gypsum board walls or plaster ceilings where indicated on the drawings.
   a. Access to mechanical, electrical, technology, and other items located above the ceiling shall be through accessible lay-in ceiling tile areas.
   b. Potential layout changes shall be made to avoid additional access panels.
   c. Additional access panels shall not be allowed without written approval from the A/E at the coordination drawing stage.
   d. Providing additional access panels shall be considered after other alternatives are reviewed and discarded by the A/E and the Owner's Representative.
e. When additional access panels are required, they shall be provided without additional cost to the Owner.

10. Complete the coordination drawing process and obtain signoff of the drawings by all contractors prior to installing any of the components.

11. Conflicts that result after the coordination drawings are signed off shall be the responsibility of the contractor or subcontractor who did not properly identify their work requirements or installed their work without proper coordination.

12. Updated coordination drawings that reflect as-built conditions may be used as record documents.

1.6 QUALITY ASSURANCE

A. Qualifications:

1. Only products of reputable manufacturers as determined by the Architect/Engineer will be acceptable.

2. Each Contractor and their subcontractors shall employ only workers who are skilled in their respective trades and fully trained. All workers involved in the installation, termination, testing, and placing into operation electronic security devices shall be individually trained by the manufacturer.

3. The Contractor shall be experienced in all aspects of this work and shall be required to demonstrate direct experience on recent systems of similar type and size.

4. The Contractor shall own and maintain tools and equipment necessary for successful installation and testing of electronic security devices and have personnel adequately trained in the use of such tools and equipment.

5. A resume of qualification shall be submitted with the Contractor’s bid indicating the following:

   a. A list of recently completed projects of similar type and size with contact names and telephone numbers for each.

B. Compliance with Codes, Laws, Ordinances:

1. Conform to all requirements of the City of Clive, Iowa Codes, Laws, Ordinances and other regulations having jurisdiction.

2. In the event there are no local codes having jurisdiction over this job, the current issue of the National Electrical Code shall be followed.

3. If there is a discrepancy between the codes and regulations having jurisdiction over this installation, and these specifications, Architect/Engineer shall determine the method or equipment used.

4. If the Contractor notes, at the time of bidding, any parts of the drawings and specifications which are not in accordance with the applicable codes or regulations, he shall inform the Architect/Engineer in writing, requesting a clarification. If there is insufficient time to follow this procedure, he shall submit with
the proposal, a separate price required to make the system shown on the drawings comply with the codes and regulations.

5. Verify the installation environment prior to purchasing or installing any cable. Cable installed in a plenum environment shall be appropriately rated. Bring all discrepancies between the contract documents and installation conditions to the attention of the Architect/Engineer prior to purchase or installation.

6. All changes to the system made after the letting of the contract, in order to comply with the applicable codes or the requirements of the Inspector, shall be made by the Contractor without cost to the Owner.

C. Permits, Fees, Taxes, Inspections:

1. Procure all applicable permits and licenses.

2. Abide by all applicable laws, regulations, ordinances, and other rules of the State or Political Subdivision wherein the work is done, or as required by any duly constituted public authority.

3. Pay all applicable charges for such permits or licenses that may be required.

4. Pay all applicable fees and taxes imposed by the State, Municipal and/or other regulatory bodies.

5. Pay all charges arising out of required inspections due to codes, permits, licenses or as otherwise may be required by an authorized body.

6. Pay all charges arising out of required contract document reviews associated with the project and as initiated by the Owner or authorized independent agency/consultant.

7. All equipment, and materials shall be as approved or listed by the following: (Unless approval or listing is not applicable to an item by all acceptable manufacturers.)
   a. Factory Mutual
   b. Underwriters' Laboratories, Inc.

D. Examination of Drawings:

1. The drawings for the Security Systems work are diagrammatic, intended to convey the scope of the work and to indicate the general arrangements and locations of equipment etc., and the approximate sizes of equipment.

2. Contractor shall determine the exact locations of equipment and the exact routing of cabling to best fit the layout of the job. Scaling of the drawings will not be sufficient or accurate for determining this layout. Where a specific route is required, such route will be indicated on the drawings.

3. Where job conditions require reasonable changes in indicated arrangements and locations, such changes shall be made by the Contractor at no additional cost to the Owner.
4. If an item is either shown on the drawings, called for in the specifications or required for proper operation of the system, it shall be considered sufficient for including same in this contract.

5. The determination of quantities of material and equipment required shall be made by the Contractor from the drawings. Schedules on the drawings and in the specifications are completed as an aid to the Contractor but where discrepancies arise, the greater number shall govern.

6. Where words "provide", "install", or "furnish" are used on the drawings or in the specifications, it shall be taken to mean, to furnish, install and terminate completely ready for operation, the items mentioned.

E. Electronic Media/Files:

1. Construction drawings for this project have been prepared utilizing AutoCAD MEP Revit.

2. Contractors and Subcontractors may request electronic media files of the contract drawings and/or copies of the specifications. Specifications will be provided in PDF format.

3. Upon request for electronic media, the Contractor shall complete and return a signed "Electronic File Transmittal" form provided by IMEG.

4. If the information requested includes floor plans prepared by others, the Contractor will be responsible for obtaining approval from the appropriate Design Professional for use of that part of the document.

5. The electronic contract documents can be used for preparation of shop drawings and as-built drawings only. The information may not be used in whole or in part for any other project.

6. The drawings prepared by IMEG for bidding purposes may not be used directly for ductwork layout drawings or coordination drawings.

7. The use of these CAD documents by the Contractor does not relieve them from their responsibility for coordination of work with other trades and verification of space available for the installation.

8. The information is provided to expedite the project and assist the Contractor with no guarantee by IMEG as to the accuracy or correctness of the information provided. IMEG accepts no responsibility or liability for the Contractor's use of these documents.

F. Field Measurements:

1. Before ordering any materials, this Contractor shall verify all pertinent dimensions at the job site and be responsible for their accuracy.
1.7 SUBMITTALS

A. Submittals shall be required for the following items, and for additional items where required elsewhere in the specifications or on the drawings.

1. Submittals list:

<table>
<thead>
<tr>
<th>Specification</th>
<th>Submittal Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>28 05 03</td>
<td>Through-Penetration Firestopping</td>
</tr>
<tr>
<td>28 13 00</td>
<td>Electronic Access Control</td>
</tr>
<tr>
<td>28 23 00</td>
<td>Video Surveillance</td>
</tr>
<tr>
<td>28 31 00</td>
<td>Fire Alarm and Detection</td>
</tr>
</tbody>
</table>

B. General Submittal Procedures: In addition to the provisions of Division 1, the following are required:

1. Transmittal: Each transmittal shall include the following:
   a. Date
   b. Project title and number
   c. Contractor's name and address
   d. Division of work (e.g., plumbing, heating, ventilating, etc.)
   e. Description of items submitted and relevant specification number
   f. Notations of deviations from the contract documents
   g. Other pertinent data

2. Submittal Cover Sheet: Each submittal shall include a cover sheet containing:
   a. Date
   b. Project title and number
   c. Architect/Engineer
   d. Contractor and subcontractors' names and addresses
   e. Supplier and manufacturer's names and addresses
   f. Division of work (e.g., plumbing, heating, ventilating, etc.)
   g. Description of item submitted (using project nomenclature) and relevant specification number
   h. Notations of deviations from the contract documents
   i. Other pertinent data
   j. Provide space for Contractor's review stamps

3. Composition:
   a. Submittals shall be submitted using specification sections and the project nomenclature for each item.
   b. Individual submittal packages shall be prepared for items in each specification section. All items within a single specification section shall be packaged together where possible. An individual submittal may contain items from multiple specifications sections if the items are intimately linked (e.g., pumps and motors).
   c. All sets shall contain an index of the items enclosed with a general topic description on the cover.
4. Content: Submittals shall include all fabrication, erection, layout, and setting drawings; manufacturers' standard drawings; schedules; descriptive literature, catalogs and brochures; performance and test data; wiring and control diagrams; dimensions; shipping and operating weights; shipping splits; service clearances; and all other drawings and descriptive data of materials of construction as may be required to show that the materials, equipment or systems and the location thereof conform to the requirements of the contract documents.

5. Contractor’s Approval Stamp:
   a. The Contractor shall thoroughly review and approve all shop drawings before submitting them to the Architect/Engineer. The Contractor shall stamp, date and sign each submittal certifying it has been reviewed.
   b. Unstamped submittals will be rejected.
   c. The Contractor’s review shall include, but not be limited to, verification of the following:
      1) Only approved manufacturers are used.
      2) Addenda items have been incorporated.
      3) Catalog numbers and options match those specified.
      4) Performance data matches that specified.
      5) Electrical characteristics and loads match those specified.
      6) Equipment connection locations, sizes, capacities, etc. have been coordinated with other affected trades.
      7) Dimensions and service clearances are suitable for the intended location.
      8) Equipment dimensions are coordinated with support steel, housekeeping pads, openings, etc.
      9) Constructability issues are resolved (e.g., weights and dimensions are suitable for getting the item into the building and into place, sinks fit into countertops, etc.).
   d. The Contractor shall review, stamp and approve all subcontractors' submittals as described above.
   e. The Contractor’s approval stamp is required on all submittals. Approval will indicate the Contractor’s review of all material and a complete understanding of exactly what is to be furnished. Contractor shall clearly mark all deviations from the contract documents on all submittals. If deviations are not marked by the Contractor, then the item shall be required to meet all drawing and specification requirements.

6. Submittal Identification and Markings:
   a. The Contractor shall clearly mark each item with the same nomenclature applied on the drawings or in the specifications.
   b. The Contractor shall clearly indicate the size, finish, material, etc.
c. Where more than one model is shown on a manufacturer's sheet, the Contractor shall clearly indicate exactly which item and which data is intended.

d. All marks and identifications on the submittals shall be unambiguous.

7. Schedule submittals to expedite the project. Coordinate submission of related items.

8. Identify variations from the contract documents and product or system limitations that may be detrimental to the successful performance of the completed work.

9. Reproduction of contract documents alone is not acceptable for submittals.

10. Incomplete submittals will be rejected without review. Partial submittals will only be reviewed with prior approval from the Architect/Engineer.

11. Submittals not required by the contract documents may be returned without review.

12. The Architect/Engineer's responsibility shall be to review one set of shop drawing submittals for each product. If the first submittal is incomplete or does not comply with the drawings and/or specifications, the Contractor shall be responsible to bear the cost for the Architect/Engineer to recheck and handle the additional shop drawing submittals.

13. Submittals shall be reviewed and approved by the Architect/Engineer before releasing any equipment for manufacture or shipment.

14. Contractor's responsibility for errors, omissions or deviation from the contract documents in submittals is not relieved by the Architect/Engineer's approval.

C. Electronic Submittal Procedures:

1. Distribution: Email submittals as attachments to all parties designated by the Architect/Engineer, unless a web-based submittal program is used.

2. Transmittals: Each submittal shall include an individual electronic letter of transmittal.

3. Format: Electronic submittals shall be in PDF format only. Scanned copies, in PDF format, of paper originals are acceptable. Submittals that are not legible will be rejected. Do not set any permission restrictions on files; protected, locked, or secured documents will be rejected.

4. File Names: Electronic submittal file names shall include the relevant specification section number followed by a description of the item submitted, as follows. Where possible, include the transmittal as the first page of the PDF instead of using multiple electronic files.

   a. Submittal file name: 28 XX XX.description.YYYYMMDD
   b. Transmittal file name: 28 XX XX.description.YYYYMMDD

5. File Size: Files shall be transmitted via a pre-approved method. Larger files may require an alternative transfer method, which shall also be pre-approved.
1.8 SCHEDULE OF VALUES

A. The requirements herein are in addition to the provisions of Division 1.

B. Format:
   1. Use AIA Document Continuation Sheets G703 or another similar form approved by the Owner and Architect/Engineer.
   2. Submit in Excel format.
   3. Support values given with substantiating data.

C. Preparation:
   1. Itemize work required by each specification section and list all providers. All work provided by subcontractors and major suppliers shall be listed on the Schedule of Values. List each subcontractor and supplier by company name.
   2. Break down all costs into:
      a. Material: Delivered cost of product with taxes paid.
      b. Labor: Labor cost, excluding overhead and profit.
   3. Itemize the cost for each of the following:
      a. Overhead and profit.
      b. Bonds.
      c. Insurance.
      d. General Requirements: Itemize all requirements.
   4. For each line item having an installed cost of more than $5,000, break down costs to list major products or operations under each item. At a minimum, provide material and labor cost line items for the following:
      a. Security systems:
         1) Surveillance
         2) Access control

D. Update Schedule of Values when:
   1. Indicated by Architect/Engineer.
   2. Change of subcontractor or supplier occurs.
   3. Change of product or equipment occurs.

1.9 CHANGE ORDERS

A. A detailed material and labor takeoff shall be prepared for each change order, along with labor rates and markup percentages. Change orders with inadequate breakdown will be rejected.

B. Change order work shall not proceed until authorized.
1.10 EQUIPMENT SUPPLIERS' INSPECTION
   A. The following equipment shall not be placed in operation until a representative of the manufacturer has inspected the installation and certified that the equipment is properly installed and that the equipment is ready for operation:
      1. Firestopping, including mechanical firestop systems.

1.11 PRODUCT DELIVERY, STORAGE, HANDLING & MAINTENANCE
   A. Exercise care in transporting and handling to prevent damage to fixtures, equipment and materials.
   B. Store materials on the site to prevent damage.
   C. Keep fixtures, equipment and materials clean, dry and free from harmful conditions.

1.12 NETWORK / INTERNET CONNECTED EQUIPMENT
   A. These specifications may require certain equipment or systems to have network, Internet and/or remote access capability ("Network Capability"). Any requirement for Network Capability shall be interpreted only as a functional capability and is not to be construed as authority to connect or enable any Network Capability. Network Capability may only be connected or enabled with the express written consent of the Owner.

1.13 WARRANTY
   A. At a minimum, provide a one (1) year warranty for all equipment, materials, and workmanship. Individual specifications sections within Division 28 may require additional warranty requirements for specific equipment or systems.
   B. The warranty period for the entire installation described in this Division of the specifications shall commence on the date of substantial completion unless a whole or partial system or any separate piece of equipment or component is put into use for the benefit of any party other than the installing contractor with prior written authorization. In this instance, the warranty period shall commence on the date when such whole system, partial system or separate piece of equipment or component is placed in operation and accepted in writing by the Owner or their representative.
   C. Warranty requirements shall extend to correction, without cost to the final user, of all work and/or equipment found to be defective or nonconforming to the contract documents. The Contractor shall bear the cost of correcting all damage resulting from such defects or nonconformance with contract documents exclusive of repairs required as a result of improper maintenance or operation, or of normal wear as determined by the Architect/Engineer.

1.14 INSURANCE
   A. This Contractor shall maintain insurance coverage as set forth in Division 1 of these specifications.

1.15 MATERIAL SUBSTITUTION
   A. Where several manufacturers' names are given, the first named manufacturer constitutes the basis for job design and establishes the equipment quality required.
B. Equivalent equipment manufactured by the other named manufacturers may be used. Contractor shall ensure that all items submitted by these other manufacturers meets all requirements of the drawings and specifications and fits in the allocated space. The Architect/Engineer shall make the final determination of whether a product is equivalent.

C. Any material, article or equipment of other unnamed manufacturers which will adequately perform the services and duties imposed by the design and is of a quality equal to or better than the material, article or equipment identified by the drawings and specifications may be used if approval is secured in writing from the Architect/Engineer via addendum. The Contractor bears full responsibility for the unnamed manufacturers equipment adequately meeting the intent of design. The Architect/Engineer may reject manufacturer at time of shop drawing submittal. The Contractor assumes all costs incurred by other trades on the project as a result of changes necessary to accommodate the offered material, equipment or installation method.

D. Should this Contractor be unable to secure approval from the Architect/Engineer for other unnamed manufacturers as outlined above, this Contractor may list voluntary add or deduct prices for alternate materials on the bid form. These items will not be used in determining the low bidder. Should a voluntary alternate material be accepted, This Contractor shall assume all costs that may be incurred as a result of using the offered material, article or equipment necessitating extra expense on This Contractor or on the part of other Contractors whose work is affected.

PART 2 - PRODUCTS

2.1 REFER TO INDIVIDUAL SECTIONS

PART 3 - EXECUTION

3.1 JOBSITE SAFETY

A. Neither the professional activities of the Architect/Engineer, nor the presence of the Architect/Engineer or his or her employees and subconsultants at a construction site, shall relieve the Contractor and any other entity of their obligations, duties and responsibilities including, but not limited to, construction means, methods, sequence, techniques or procedures necessary for performing, superintending or coordinating all portions of the work of construction in accordance with the contract documents and any health or safety precautions required by any regulatory agencies. The Architect/Engineer and his or her personnel have no authority to exercise any control over any construction contractor or other entity or their employees in connection with their work or any health or safety precautions. The Contractor is solely responsible for jobsite safety. The Architect/Engineer and the Architect/Engineer’s consultants shall be indemnified and shall be made additional insureds under the Contractor’s general liability insurance policy.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Installation of all conduit and cabling shall comply with Sections 26 05 33 and 26 05 13. Additional conduit requirements described within this Division shall be supplemental to the requirement described in Section 26 05 33. Should conflicts exist between the two Divisions the more stringent (more expensive material and labor) condition shall prevail until bidding addendum or construction clarification or RFI can be submitted and responded to. In no case shall the Contractor carry the least stringent condition in the pricing.
B. It is the Contractor's responsibility to survey the site and include all necessary costs to perform the installation as specified.

C. The Contractor shall be responsible for identifying and reporting to the Architect/Engineer any existing conditions including but not limited to damage to walls, flooring, ceiling and furnishings prior to start of work. All damage to interior spaces caused by this Contractor shall be repaired at this Contractor's expense to pre-existing conditions, including final colors and finishes.

D. All cables and devices installed in damp or wet locations, including any underground or underslab location, shall be listed as suitable for use in such environments. Follow manufacturer's recommended installation practices for installing cables and devices in damp or wet locations. Any cable or device that fails as a result of being installed in a damp or wet location shall be replaced at the Contractor's expense.

3.3 FIELD QUALITY CONTROL

A. General:

1. Refer to specific Division 28 sections for further requirements.

2. The Contractor shall conduct all tests required and applicable to the work both during and after construction of the work.

3. The necessary instruments and materials required to conduct or make the tests shall be supplied by the Contractor who shall also supply competent personnel for making the tests who has been schooled in the proper testing techniques.

4. In the event the results obtained in the tests are not satisfactory, This Contractor shall make such adjustments, replacements and changes as are necessary and shall then repeat the test or tests which disclose faulty or defective work or equipment, and shall make such additional tests as the Architect/Engineer or code enforcing agency deems necessary.

B. Protection of cable from foreign materials:

1. It is the Contractor's responsibility to provide adequate physical protection to prevent foreign material application or contact with any cable type. Foreign material is defined as any material that would negatively impact the validity of the manufacturer's performance warranty. This includes, but is not limited to, overspray of paint (accidental or otherwise), drywall compound, or any other surface chemical, liquid or compound that could come in contact with the cable, cable jacket or cable termination components.

2. Application of foreign materials of any kind on any cable, cable jacket or cable termination component will not be accepted. It shall be the Contractor's responsibility to replace any component containing overspray, in its entirety, at no additional cost to the project. Cleaning of the cables with harsh chemicals is not allowed. This requirement is regardless of the PASS/FAIL test results of the cable containing overspray. Should the manufacturer and warrantor of the structured cabling system desire to physically inspect the installed condition and certify the validity of the structured cabling system (via a signed and dated statement by an authorized representative of the structured cabling manufacturer), the Owner may, at their sole discretion, agree to accept said warranty in lieu of having the affected cables replaced. In the case of plenum cabling, in addition to the statement from...
the manufacturer, the Contractor shall also present to the Owner a letter from the local Authority Having Jurisdiction stating that they consider the plenum rating of the cable to be intact and acceptable.

3.4 PROJECT CLOSEOUT

A. Refer to the Division 1 Section: PROJECT CLOSEOUT for requirements. The following paragraphs supplement the requirements of Division 1.

B. Final Jobsite Observation:

1. The Architect/Engineer will not perform a final jobsite observation until the project is ready. This is not dictated by schedule, but rather by completeness of the project.

2. Refer to the end of Section 27 05 00 for a “STATEMENT INDICATING READINESS FOR FINAL JOBSITE OBSERVATION.”

3. The Contractor shall sign this form and return it to the Architect/Engineer so that the final observation can commence.

C. Before final payment will be authorized, this Contractor must have completed the following:

1. Submitted operation and maintenance manuals to the Architect/Engineer for review.

2. Submitted bound copies of approved shop drawings.

3. Record documents including edited drawings and specifications accurately reflecting field conditions, inclusive of all project revisions, change orders, and modifications.

4. Submitted a report stating the instructions given to the Owner's representative complete with the number of hours spent in the instruction. The report shall bear the signature of an authorized agent of This Contractor and shall be signed by the Owner's representative as having received the instructions.

5. Submitted testing reports for all systems requiring final testing as described herein.

6. Submitted start-up reports on all equipment requiring a factory installation inspection and/or start.

7. Provide spare parts, maintenance, and extra materials in quantities specified in individual specification sections. Deliver to project site insert address here; submit receipt to Architect/Engineer prior to final payment being approved.

3.5 OPERATION AND MAINTENANCE MANUALS

A. General:

1. Provide an electronic copy of the O&M manuals as described below for Architect/Engineer's review and approval. The electronic copy shall be corrected as required to address the Architect/Engineer's comments. Once corrected, electronic copies and paper copies shall be distributed as directed by the Architect/Engineer.
2. Approved O&M manuals shall be completed and in the Owner's possession prior to Owner's acceptance and at least 10 days prior to instruction of operating personnel.

B. Electronic Submittal Procedures:

1. Distribution: Email the O&M manual as attachments to all parties designated by the Architect/Engineer.

2. Transmittals: Each submittal shall include an individual electronic letter of transmittal.

3. Format: Electronic submittals shall be in PDF format only. Scanned copies, in PDF format, of paper originals are acceptable. Submittals that are not legible will be rejected. Do not set any permission restrictions on files; protected, locked, or secured documents will be rejected.

4. File Names: Electronic submittal file names shall include the relevant specification section number followed by a description of the item submitted, as follows. Where possible, include the transmittal as the first page of the PDF instead of using multiple electronic files.
   a. O&M file name: O&M.div28.contractor.YYYYMMDD
   b. Transmittal file name: O&Mtransmittal.div28.contractor.YYYYMMDD

5. File Size: Files shall be transmitted via a pre-approved method. Larger files may require an alternative transfer method, which shall also be pre-approved.

6. Provide the Owner with an approved copy of the O&M manual on compact discs (CD), digital video discs (DVD), or flash drives with a permanently affixed label, printed with the title “Operation and Maintenance Instructions”, title of the project and subject matter of disc/flash drive when multiple disc/flash drives are required.

7. All text shall be searchable.

8. Bookmarks shall be used, dividing information first by specification section, then systems, major equipment and finally individual items. All bookmark titles shall include the nomenclature used in the construction documents and shall be an active link to the first page of the section being referenced.

9. Binder Requirements: The Contractor shall submit O&M manuals in heavy duty, locking three ring binders. Incorporate clear vinyl sheet sleeves on the front cover and spine for slip-in labeling. "Peel and stick" labels are not acceptable. Sheet lifters shall be supplied at the front of each notebook. The three-ring binders shall be 1/2" thicker than initial material to allow for future inserts. If more than one notebook is required, label in consecutive order. For example: 1 of 2, 2 of 2. No other form of binding is acceptable.

10. Binder Labels: Label the front and spine of each binder with “Operation and Maintenance Instructions”, title of project, and subject matter.

11. Index Tabs: Divide information by specification section, major equipment, or systems using index tabs. All tab titling shall be clearly printed under reinforced plastic tabs. All equipment shall be labeled to match the identification in the construction documents.
C. Operation and Maintenance Instructions shall include:

1. Title Page: Include title page with project title, Architect, Engineer, Contractor, all subcontractors, and major equipment suppliers, with addresses, telephone numbers, website addresses, email addresses and point of contacts. Website URLs and email addresses shall be active links in the electronic submittal.

2. Table of Contents: Include a table of contents describing specification section, systems, major equipment, and individual items.

3. Copies of all final approved shop drawings and submittals. Include Architect’s/Engineer’s shop drawing review comments. Insert the individual shop drawing directly after the Operation and Maintenance information for the item(s) in the review form.

4. Copy of final approved test and balance reports.

5. Copies of all factory inspections and/or equipment startup reports.


7. Schematic wiring diagrams of the equipment that have been updated for field conditions. Field wiring shall have label numbers to match drawings.

8. Dimensional drawings of equipment.

9. Capacities and utility consumption of equipment.

10. Detailed parts lists with lists of suppliers.

11. Operating procedures for each system.

12. Maintenance schedule and procedures. Include a chart listing maintenance requirements and frequency.

13. Repair procedures for major components.

14. List of lubricants in all equipment and recommended frequency of lubrication.

15. Instruction books, cards, and manuals furnished with the equipment.

3.6 INSTRUCTING THE OWNER’S REPRESENTATIVE

A. Adequately instruct the Owner’s designated representative or representatives in the maintenance, care, and operation of the complete systems installed under this contract.

B. Provide verbal and written instructions to the Owner’s representative or representatives by FACTORY PERSONNEL in the care, maintenance, and operation of the equipment and systems.

C. The Owner has the option to make a video recording of all instructions. Coordinate schedule of instructions to facilitate this recording.

D. The Architect/Engineer shall be notified of the time and place for the verbal instructions to be given to the Owner’s representative so that their representative can be present if desirable.
E. Refer to the individual specification sections for minimum hours of instruction time for each system.

F. Operating Instructions:
   1. The Contractor is responsible for all instructions to the Owner and/or Owner's operating staff on the security systems.
   2. If the Contractor does not have Engineers and/or Technicians on staff that can adequately provide the required instructions on system operation, performance, troubleshooting, care and maintenance, they shall include in the bid an adequate amount to reimburse the Owner for the Architect/Engineer to perform these services.

3.7 SYSTEM COMMISSIONING

A. The security systems included in the construction documents are to be complete and operating systems. The Architect/Engineer will make periodic job site observations during the construction period. The system start-up, testing, configuration, and satisfactory system performance is the responsibility of the Contractor. This shall include all calibration and adjustments of electrical equipment controls, equipment settings, software configuration, troubleshooting and verification of software, and final adjustments that may be required.

B. All operating conditions and control sequences shall be simulated and tested during the start-up period.

C. The Contractor, subcontractors, and equipment suppliers are expected to have skilled technicians to ensure that the system performs as designed. If the Architect/Engineer is requested to visit the job site for the purpose of troubleshooting, assisting in the satisfactory start-up, obtaining satisfactory equipment operation, resolving installation and/or workmanship problems, equipment substitution issues or unsatisfactory system performance, including call backs during the warranty period through no fault of the design; the Contractor shall reimburse the Owner on a time and material basis for services rendered at the Architect/Engineer's standard hourly rates in effect at the time the services are requested. The Contractor shall be responsible for making payment to the Owner for services required that are product, installation or workmanship related. Payment is due within 30 days after services are rendered.

3.8 RECORD DOCUMENTS

A. Refer to the Division 1 Section: PROJECT CLOSEOUT for requirements. The following paragraphs supplement the requirements of Division 1.

B. Mark specifications to indicate approved substitutions, change orders, and actual equipment and materials used.

C. This Contractor shall maintain at the job site, a separate and complete set of Security Drawings which shall be clearly and permanently marked and noted in complete detail any changes made to the location and arrangement of equipment or made to the Technology Systems and wiring as a result of building construction conditions or as a result of instructions from the Architect or Engineer. All Change Orders, RFI responses, Clarifications and other supplemental instructions shall be marked on the documents. Record documents that merely reference the existence of the above items are not acceptable. Should This Contractor fail to complete Record Documents as required by this
contract, This Contractor shall reimburse Architect/Engineer for all costs to develop record documents that comply with this requirement. Reimbursement shall be made at the Architect/Engineer’s hourly rates in effect at the time of work.

D. Record actual routing of all conduits sized 2” or larger.

E. The above record of changes shall be made available for the Architect and Engineer’s examination during any regular work time.

F. Upon completion of the job, and before final payment is made, This Contractor shall give the marked-up drawings to the Architect/Engineer.

3.9 ADJUST AND CLEAN

A. Contractor shall thoroughly clean all equipment and systems prior to the Owner's final acceptance of the project.

B. Contractor shall clean all foreign paint, grease, oil, dirt, labels, stickers, and other foreign material from equipment.

C. Contractor shall remove all rubbish, debris, etc., accumulated during the Contractor's operations from the premises.

END OF SECTION 28 05 00
SECTION 28 05 03
THROUGH PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Through-Penetration Firestopping.

1.2 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing products specified in this Section.
B. Installer: Individuals performing work shall be certified by the manufacturer of the system selected for installation.

1.3 REFERENCES

A. UL 263 - Fire Tests of Building Construction and Materials
B. UL 723 - Surface Burning Characteristics of Building Materials
C. ANSI/UL 1479 - Fire Tests of Through Penetration Firestops
D. UL 2079 Tests for Fire Resistance of Building Joint Systems
E. UL Fire Resistance Directory Through Penetration Firestop Systems (XHEZ)
F. Intertek / Warnock Hersey - Directory of Listed Products
I. OSHPD - Office of State Wide Health Planning and Development (California)
J. CBC California Building Code
K. The Building Officials and Code Administrators National Building Code
N. NFPA 5000 - Building Construction Safety Code

1.4 SUBMITTALS

A. Submit under provisions of Division 1 Section 28 05 00.
B. Submit Firestopping Installers Certification for all installers on the project.
C. Shop Drawings: Submit for each condition requiring firestopping. Include descriptions of the specific penetrating item, actual wall/floor construction, manufacturer’s installation instructions, and UL or Intertek / Warnock Hersey Assembly number.
D. Through-Penetration Firestop System Schedule: Indicate locations of each through-penetration firestop system, along with the following information:
   1. Types of penetrating items.
   2. Types of constructions penetrated, including fire-resistance ratings and, where applicable, thicknesses of construction penetrated.
   3. Through-penetration firestop systems for each location identified by firestop design designation of qualified testing and inspecting agency.
   4. F and T ratings for each firestop system.
E. Maintain a notebook on the job site at all times that contains copies of approved submittals for all through penetration firestopping to be installed. Notebook shall be made available to the Authority Having Jurisdiction at their request and turned over to the Owner at the end of construction as part of the O&M Manuals.

F. Submit VOC rating of firestopping material in g/L (less water) with documentation that it meets the limits set forth in SCAQMD Rule 1168.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store, protect and handle products on site. Accept material on site in factory containers and packing. Inspect for damage. Protect from deterioration or damage due to moisture, temperature changes, contaminants, or other causes. Follow manufacturer’s instructions for storage.

B. Install material prior to expiration of product shelf life.

1.6 PERFORMANCE REQUIREMENTS

A. General: For penetrations through the following fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated.

1. Fire-resistance-rated walls including fire partitions, fire barriers, and smoke barriers.

2. Fire-resistance-rated horizontal assemblies including floors, floor/ceiling assemblies, and ceiling membranes of roof/ceiling assemblies.

B. Rated Systems: Provide through-penetration firestop systems with the following ratings determined per UL 1479:

1. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.

2. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings:

   a. Floor penetrations located outside wall cavities.
   b. Floor penetrations located outside fire-resistance-rated shaft enclosures.
   c. Wall penetrations above corridor ceilings which are not part of a fire-resistive assembly.
   d. Wall penetrations below any ceiling that are larger than 4” diameter or 16 square inches.

3. L-Rated Systems: Provide through-penetration firestop systems with L-ratings of not more than 5.0 cfm/sq.ft. (0.0254 cu. m/s x sq. m) at both ambient temperature and 400°F (204°C) for smoke barriers.

C. For through-penetration firestop systems exposed to light, traffic, moisture, or physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.
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D. For through-penetration firestop systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

E. For through-penetration firestop systems in air plenums, provide products with flame-spread and smoke-developed indexes of less than 25 and 50, respectively, as determined per ASTM E 84.


1.7 MEETINGS

A. Pre-installation meeting: A pre-installation meeting shall be scheduled and shall include the Construction Manager, General Contractor, all Subcontractors associated with the installation of systems penetrating fire barriers, Firestopping Manufacturer's Representative, and the Owner.

1. Review foreseeable methods related to firestopping work.

2. Tour representative areas where firestopping is to be installed; inspect and discuss each type of condition and each type of substrate that will be encountered, and preparation to be performed by other trades.

1.8 WARRANTY

A. Provide one year warranty on parts and labor.

B. Warranty shall cover repair or replacement of firestop systems which fail in joint adhesion, cohesion, abrasion resistance, weather resistance, extrusion resistance, migration resistance, stain resistance, general durability, or appear to deteriorate in any manner not clearly specified by the manufacturer as an inherent quality of the material.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the through-penetration firestop systems indicated for each application that are produced by one of the following manufacturers. All firestopping systems installed shall be provided by a single manufacturer.

1. 3M; Fire Protection Products Division
2. Hilti, Inc.
3. RectorSeal Corporation, Metacaulk
4. Tremco; Sealant/Weatherproofing Division
5. Johns-Manville
6. Specified Technologies Inc. (S.T.I.)
7. Spec Seal Firestop Products
8. AD Firebarrier Protection Systems
9. Wiremold/Legrand: FlameStopper
10. Dow Corning Corp
11. Fire Trak Corp
12. International Protective Coating Corp
2.2 THROUGH PENETRATION FIRESTOP SYSTEMS

A. Provide materials and systems classified by or listed by Intertek / Warnock Hersey to provide firestopping equal to time rating of construction being penetrated.

B. All firestopping materials shall be free of asbestos, lead, PCB’s, and other materials that would require hazardous waste removal.

C. Firestopping shall be flexible to allow for normal penetrating item movement due to expansion and contraction.

D. Firestopping systems for plumbing and wet pipe sprinkler piping shall be moisture resistant.

E. Provide firestopping systems capable of supporting floor loads where systems are exposed to possible floor loading or traffic.

F. Provide firestopping systems allowing continuous insulation for all insulated pipes.

G. Provide firestopping systems classified by UL or listed by Intertek / Warnock Hersey for penetrations through all fire rated construction. Firestopping systems shall be selected from the UL or listed by Intertek / Warnock Hersey Fire Resistance Directory Category XHEZ based on substrate construction and penetrating item size and material and shall fall within the range of numbers listed:

1. Combustible Framed Floors and Chase Walls - 1 or 2 Hour Rated
   F Rating = Floor/Wall Rating
   T Rating = Floor/Wall Rating
   L Rating = Penetrations in Smoke Barriers

<table>
<thead>
<tr>
<th>Penetrating Item</th>
<th>UL System No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Penetrating Item</td>
<td>FC 0000-0999*</td>
</tr>
<tr>
<td>Metallic Pipe or Conduit</td>
<td>FC 1000-1999</td>
</tr>
<tr>
<td>Non-Metallic Pipe or Conduit</td>
<td>FC 2000-2999</td>
</tr>
<tr>
<td>Electrical Cables</td>
<td>FC 3000-3999</td>
</tr>
<tr>
<td>Cable Trays</td>
<td>FC 4000-4999</td>
</tr>
<tr>
<td>Insulated Pipes</td>
<td>FC 5000-5999</td>
</tr>
<tr>
<td>Bus Duct and Misc. Electrical</td>
<td>FC 6000-6999</td>
</tr>
<tr>
<td>Duct without Damper and Misc. Mechanical</td>
<td>FC 7000-7999</td>
</tr>
<tr>
<td>Multiple Penetrations</td>
<td>FC 8000-8999</td>
</tr>
</tbody>
</table>

2. Non-Combustible Framed Walls - 1 or 2 Hour Rated
   F Rating = Wall Rating
   T Rating = 0
   L Rating = Penetrations in Smoke Barriers

<table>
<thead>
<tr>
<th>Penetrating Item</th>
<th>UL System No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Penetrating Item</td>
<td>WL 0000-0999*</td>
</tr>
<tr>
<td>Metallic Pipe or Conduit</td>
<td>WL 1000-1999</td>
</tr>
<tr>
<td>Non-Metallic Pipe or Conduit</td>
<td>WL 2000-2999</td>
</tr>
<tr>
<td>Electrical Cables</td>
<td>WL 3000-3999</td>
</tr>
<tr>
<td>Cable Trays</td>
<td>WL 4000-4999</td>
</tr>
<tr>
<td>Insulated Pipes</td>
<td>WL 5000-5999</td>
</tr>
<tr>
<td>Bus Duct and Misc. Electrical</td>
<td>WL 6000-6999</td>
</tr>
</tbody>
</table>
### Penetrating Item | UL System No. 
--- | --- 
Duct without Damper and Misc. Mechanical | WL 7000-7999 
Multiple Penetrations | WL 8000-8999 

3. Concrete or Masonry Floors and Walls - 1 or 2 Hour Rated 
F Rating = Wall/Floor Rating 
T Rating (Walls) = 0 or Wall Rating 
T Rating (Floors) = Floor Rating 
L Rating = Penetrations in Smoke Barriers 

### Penetrating Item | UL System No. 
--- | --- 
No Penetrating Item | CAJ 0000-0999* 
Metallic Pipe or Conduit | CAJ 1000-1999 
Non-Metallic Pipe or Conduit | CAJ 2000-2999 
Electrical Cables | CAJ 3000-3999 
Cable Trays | CAJ 4000-4999 
Insulated Pipes | CAJ 5000-5999 
Bus Duct and Misc. Electrical | CAJ 6000-6999 
Duct without Damper and Misc. Mechanical | CAJ 7000-7999 
Multiple Penetrations | CAJ 8000-8999 

*Alternate method of firestopping is patching opening to match original rated construction.

H. Any opening in walls or floors not covered by the listed series of numbers shall be coordinated with the firestopping manufacturer.

I. Any openings in floors or walls not described in the UL or listed by Intertek / Warnock Hersey Fire Resistance Directory, or outlined in manufacturer’s information shall be sealed in a manner agreed upon by the Firestopping Manufacturer, Owner, and the Authority Having Jurisdiction.

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**PART 3 - EXECUTION**

3.1 **EXAMINATION**

A. Ensure all surfaces that contact seal materials are free of dirt, dust, grease, oil, rust, or loose materials. Clean and repair surfaces as required. Remove laitance and form-release agents from concrete.

B. Ensure substrate and penetrating items have been permanently installed prior to installing firestopping systems. Ensure penetrating items have been properly spaced and have proper clearance prior to installing firestopping systems.

C. Surfaces to which sealing materials are to be installed must meet the selected UL or Intertek / Warnock Hersey system substrate criteria.

D. Prime substrates where recommended in writing by through-penetration firestop system manufacturer. Confine primer to area of bond.
3.2 INSTALLATION

A. In existing construction, provide firestopping of openings prior to and after installation of penetrating items. Remove any existing coatings on surfaces prior to firestopping installation. Temporary firestopping shall consist of packing openings with fire resistant mineral wool for the full thickness of substrate, or an alternate method approved by the Authority Having Jurisdiction. All openings shall be temporarily firestopped immediately upon their installation and shall remain so until the permanent UL or listed by Intertek / Warnock Hersey listed firestopping system is installed.

B. Install penetration seal materials in accordance with printed instructions of the UL or Intertek / Warnock Hersey Fire Resistance Directory and with the manufacturer’s printed application instructions.

C. Install dams as required to properly contain firestopping materials within openings and as required to achieve required fire resistance rating. Remove combustible damming after appropriate curing.

3.3 CLEANING AND PROTECTING

A. Clean excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not cause damage.

B. Provide final protection and maintain conditions during and after installation that ensure that through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce systems complying with specified requirements.

3.4 IDENTIFICATION

A. Provide and install labels adjacent to each firestopping location. Label shall be provided by the firestop system supplier and contain the following information in a contrasting color:

1. The words "Warning - Through Penetration Firestop System - Do Not Disturb. Notify Building Management of Any Damage."

2. Firestop System Supplier; UL or listed by Intertek / Warnock Hersey system number; date installed; contractor name and phone number; manufacturer's representative name, address, and phone number.

3.5 INSPECTION

A. All penetrations shall be inspected by the manufacturer's representative to ensure proper installation.

B. Access to firestop systems shall be maintained for examination by the Authority Having Jurisdiction at their request.

C. Proceed with enclosing through-penetration firestop system with other construction only after inspection reports are issued and firestop installations comply with requirements.

D. The contractor shall allow for visual destructive review of 5% of installed firestop systems (minimum of one) to prove compliance with specifications and manufacturer’s instructions and details. Destructive system removal shall be performed by the contractor and
witnessed by the engineer and manufacturer’s factory representative. The engineer shall have sole discretion of which firestop system installations will be reviewed. The contractor is responsible for all costs associated with this requirement including labor and material for removing and replacing the installed firestop system. If any firestop system is found to not be installed per manufacturer’s specific instructions and details, all firestop systems are subject to destructive review and replacement at the engineer’s discretion and the contractor’s expense.

END OF SECTION 28 05 03
PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Server
B. Client Workstations
C. Field Control Hardware
D. Application Software
E. Access Control Graphical User Interface
F. Credentials and Badging
G. Portal Devices
H. Asset Management
I. Visitor Management
J. Interfaces and Integrations

1.2 RELATED WORK

A. Section 08 71 00 – Door Hardware
B. Section 26 05 13 – Wire and Cable
C. Section 26 05 33 – Conduits and Boxes
D. Section 26 05 35 – Surface Raceways
E. Section 27 05 26 – Communications Bonding
F. Section 27 05 28 – Interior Communication Pathways
G. Section 27 05 43 – Exterior Communication Pathways
H. Section 27 05 53 – Identification and Administration
I. Section 27 15 00 – Horizontal Cabling Requirements
J. Section 28 05 00 – Basic Electronic Safety and Security System Requirements.
K. Section 28 05 03 – Through Penetration Fire stopping.
L. Section 28 23 00 – Video Surveillance
M. Section 28 31 00 – Fire Detection and Alarm Systems.

1.3 QUALITY ASSURANCE

A. Manufacturer: The manufacturer shall have a minimum of ten (10) years documented experience in the development and manufacture of access control software and hardware. The software developer shall be, at a minimum, a Microsoft Silver Certified Integrator and Partner for those systems that reside in a Microsoft environment.

B. Contractor:

1. Shall be a factory-authorized installation, service and support company specializing in the selected manufacturer’s product, with demonstrated prior experience of a minimum of ten (10) years installing, programming and supporting the selected manufacturer’s system.

2. Shall have been in business for a minimum of ten (10) years and shall have installed a minimum of three (3) similar or larger sized systems. Contractor shall have a minimum of two (2) service technicians who are certified in the proposed manufacturer’s system.
3. Shall have as a regular, full time employee retain the services of a minimum of one employee with the following certification(s) or education Should more than one certification be required, one employee may maintain multiple certifications.
   a. A certification of RCDD from BICSI or CNIDP from CNet.
   b. A certification of MCSA: Server or MCSE: Server Infrastructure from Microsoft.

C. Material:
   1. All material which is Contractor furnished shall be new, unused and free from defects.
   2. Where more than one of any specified item of equipment or material is used, all such items shall be the same product from the same manufacturer.

1.4 REFERENCES
A. International Building Code
B. NFPA 70 – National Electrical Code.
C. The BOCA National Building Code
E. UL 464 – Standard for Audible Signal Appliances.
G. UL 609 – Standard for Local Burglar Alarm Units and Systems
I. UL 827 – Standard for Central Station Alarm Services.
J. UL 1076 – Standard for Proprietary Burglar Alarm Units and Systems.
N. UL 1778 – Uninterruptible Power Systems.

1.5 SUBMITTALS
A. Submit shop drawings and product data under provisions of Section 28 05 00.
B. Product Data Submittal: Provide manufacturer’s technical product specification sheet for each individual component type. Submitted data shall show the following:
   1. Compliance with each requirement of these documents. The submittal shall acknowledge each requirement of this section, item-by-item.
   2. All component options and accessories specific to this project.
   3. Electrical power consumption rating and voltage including UPS sizing.
   4. Heat generation for all power consuming devices.
   5. Wiring requirements.
   6. Server processor(s), workstation configurations, total and available disk space, and memory size.
7. All network bandwidth, latency and reliability requirements.

8. Backup/archive system size and configuration.

9. Submit two of each type of credential to be used (access card, key fob, etc.).

C. System Drawings: Project-specific system CAD drawings shall be provided as follows:

1. Provide a system block diagram noting system components and interconnection between components. The interconnection of components shall clearly indicate all wiring required in the system. When multiple pieces of equipment are required in the exact same configuration (e.g., multiple identical controllers), the diagram may show one device and refer to the others as “typical” of the device shown. The diagram shall list room numbers where each controller will be located. This block diagram shall be provided in Adobe PDF.

2. Provide a schedule of all controllers and the doors/points each controller controls. This schedule shall be provided in Adobe PDF.

3. Provide schedules describing each system input location by an architecturally familiar reference, e.g., Door 312A. The architectural door schedule shall be used as the basis. These schedules shall be provided in Adobe PDF.

D. Submit sample format of site-specific programming guides to be used for system planning/programming conference with Owner. These guides shall be provided in Adobe PDF.

E. So that required Owner personnel are present at the planning/programming conference required in Part 3 of this section, submit meeting agenda for the conference a minimum of two weeks prior to the conference.

F. Submit detailed description of Owner training to be conducted at project end, including specific training times. Refer to Part 3 of this section for details.

G. IP Addresses: Contractor shall provide to Owner, in a documented transmittal and in Microsoft Excel format, the names and locations of devices which require an IP address. An authorized representative of the Owner shall furnish the addresses for the associated devices in Microsoft Excel format in a documented transmittal. Should Owner change the IP address structure after approval of the list, Owner may be responsible for additional fees involved with reprogramming.

H. Quality Assurance:

1. Provide materials documenting experience requirements of the manufacturer and Installing Contractor. Provide documentation of the training and other applicable certifications of the Contractor.

2. Provide system checkout test procedure to be performed at acceptance. Test procedures shall include all external alarm events.

**1.6 SYSTEM DESCRIPTION**

A. This section describes the furnishing, installation, programming and commissioning of a complete, turnkey access control / video surveillance system. The terms “access control system” and “security management system”, or SMS, may be used interchangeably herein.
B. The company, manufacturer, and product names used in this section are for identification purposes only. All trademarks and registered trademarks are the property of their respective owners.

C. Performance Statement: This section and the accompanying access control-specific design documents are performance based, describing the minimum material quality, required features, and operational requirements of the system. These documents do not convey every wire that must be installed and every equipment connection that must be made. Based on the equipment constraints described and the performance required of the system, as presented in these documents, the vendor and the Contractor are solely responsible for determining all wiring, programming, and miscellaneous equipment required. The Contractor shall be responsible for determining quantities of materials required for a complete and operational system. Floor plan drawings and schedules have been developed to aid the Contractor in determining device quantities and installation locations, but, where discrepancies between floor plans and schedules arise, the greater number shall govern.

D. Basic System Description:

1. The access control system shall provide the following functionality:
   a. Electronic control access to designated areas.
   b. Validation of cardholder credentials by use of personnel database, card formats, PINs, and biometric information. The system shall compare the time, location, and unique credentials of an attempted entry with information stored in the database.
   c. Access to designated areas will be validated only when a user's credential has a valid number for its facility and the number is valid for the current time and for the reader where it is used.
   d. The system software shall access the database that validates the person and monitors the security of a building by use of intelligent system controllers, reader interfaces, locks, readers, inputs and outputs. When access has been validated, a signal to the portal locking device shall be activated to enable alarm free access at that location.
   e. The system shall be configured by use of application software.
   f. The system shall monitor activities using operator monitoring software which includes graphical maps which display alarms, status and activity.
   g. The system shall differentiate and restrict administrative and operational access through use of password authentication.
   h. The system shall report on various aspects of the system by use of reports, both default and customizable. Reports shall be able to be printed.
   i. The system shall have the capability to report alarms both audibly and visually.
   j. The system shall control hardware from the monitoring station by use of manual actions and events.
k. The system shall provide record and data management by use of journals. There shall be a full audit trail.

l. The system shall allow for data to be imported from other products by use of database migration tools. These products may include Human Resources databases for name and/or time and attendance information, information from previous access control systems consisting of badge numbers from credentials that will be re-used, Microsoft Excel spreadsheets, or other systems as defined herein.

m. The system shall allow access using a web interface or a mobile application for use on the iOS and Android operating systems.

E. Integrations, Software Development Kit (SDK) and Application Programming Interface (API):

1. The manufacturers of the systems that are integrated shall make an SDK available to other manufacturers.

2. Prior to the release of this section, the manufacturers of the systems that are to be integrated shall have made available to each other all APIs to perform the specific integrated functions required in this section.

3. The integrations shall be completed and tested and shall have been implemented on at least one system of similar size prior to the release of this section. The integrations shall not be accomplished for the first time for this project unless written pre-approval has been granted by Owner to Contractor prior to bid deadline.

4. During the warranty period, should a new API or version of software be released by the SMS manufacturer or any of the manufacturers of systems or devices that are integrated, that API or version of software shall be installed in the appropriate system or device defined in this section at no charge to Owner. Should any loss of functionality in the integration be exposed through this installation, as compared to the accepted system, Contractor shall correct the functionality at no charge to Owner.

5. Any and all development costs for specified functionality or inter-system integrations shall be included in the Contractor’s bid. No additional costs or fees for the integrations shall be charged to Owner from the time of notice to proceed through system acceptance.

1.7 OWNER FURNISHED MATERIAL

A. Telephone service
B. Data circuit / internet service
C. Active telephone service equipment, such as key system, PBX or VOIP switch equipment
D. Active computer network equipment:

1. Routers
2. Switches
3. Hubs
4. Wireless access points
5. Uninterruptible power supplies for Owner furnished products
1.8 LICENSING REQUIREMENTS

A. All user licenses required for system operation shall be included in the Contractor’s bid. User licenses shall include server and workstation software, network controllers, card readers, printers, badging stations, and any other licensing that is required by the manufacturer for operation of any system component.

1. Licenses shall be provided on a one-to-one basis. One license shall be provided for each device requiring a license plus 10% growth. In the event the manufacturer requires the purchase of a block of licenses, license blocks provided shall be no greater than what is required for the number of devices in this project plus 10% growth. Contractor shall document the number of remaining licenses in the project record documents and Operations and Maintenance data.

2. In addition to the licensing requirements listed above, provide licensing and configuration of system administration/operation software for 1 workstation. The workstation licenses shall be concurrent use seats, and the client software shall be able to be loaded on an unlimited number of workstations at no extra cost to the Owner. Contractor shall install client software on the same number of machines as licenses provided. As part of the training, Contractor shall demonstrate to Owner how to install client software on additional workstations.

3. All Contractor-furnished software shall contain a perpetual, permanent license in which no other fees beyond the single payment for the work of this section are required in order to use the proposed software indefinitely. Owner understands that, after the initial warranty period has expired, maintenance and technical support fees may be required annually, quarterly, or monthly in order to receive software updates and technical support. However, it remains the option of Owner to purchase or decline this service. If Owner chooses to discontinue or never purchase this service, the software shall continue to be legally licensed for use. All software shall be the latest version released, and all Contractor-furnished servers and workstations shall be current on all patches and updates for all software on the machines at the time of acceptance of the associated systems.

4. The SMS shall require only a single license key present on the server for the SMS to operate. The key shall be a physical device or a software key. License keys shall not be required at the client workstations.

1.9 PROJECT RECORD DOCUMENTS

A. Submit documents under the provisions of Section 28 05 00.

B. Provide final system block diagram showing any deviations from shop drawing submittal.

C. Provide statement that system checkout test, as outlined in the shop drawing submittal, is complete and satisfactory.

D. Provide schedules documenting:

1. Controller installation locations including specific door numbers being controlled.
2. All terminal block wiring, including cable numbers.

E. Warranty: Submit written warranty and complete all Owner registration forms.

F. Complete all operation and maintenance data manuals as described below.
1.10 OPERATION AND MAINTENANCE DATA

A. Submit documents under the provisions of Section 28 05 00.

B. Manuals: Final copies of the manuals shall be delivered within 14 days after completing the installation test. Each manual's contents shall be identified on the cover. The manual shall include names, addresses, and telephone numbers of the contractor responsible for the installation and maintenance of the system, and the factory representatives for each item of equipment for each system. The manuals shall have a table of contents and labeled sections. The final copies delivered after completion of the installation test shall include all modifications made during installation, checkout, and acceptance testing. Manuals shall be submitted in both hardcopy and electronic format OR Manuals shall be submitted in electronic format only, Adobe PDF. The manuals shall consist of the following:

1. Hardware Manual: The manual shall describe all equipment furnished including:
   a. General description and specifications.
   b. Installation and checkout procedures.
   c. System and equipment layout and electrical schematics to the control board and field device level. For multiple devices wired identically, only one wiring diagram is required per door configuration, to be labeled “TYPICAL”.
   d. Alignment and calibration procedures.
   e. Manufacturers repair parts list indicating sources of supply.

2. Software Manual: The software manual shall describe the functions of all software and shall include all other information necessary to enable proper loading, testing, and operation. The manual shall include:
   a. Definition of terms and functions.
   b. System use and application software.
   c. Initializations, startup, and shutdown procedures.
   d. Reports generation.
   e. Details on forms customization and field parameters.

3. Operator's Manual: The operator's manual shall fully explain all procedures and instructions for the operation of the system including:
   b. Log in/Log out procedures.
   c. Use of system, command, and applications software.
   d. Recovery and restart procedures.
   e. Graphic alarm presentation.
   f. Use of report generator and generation of reports.
   g. Data entry.
   h. Operator commands.
   i. Alarm messages.
   j. System permissions functions and requirements.

4. Maintenance Manual: The maintenance manual shall include descriptions of maintenance for all equipment including inspection, cleaning, periodic preventive maintenance, fault diagnosis, and repair or replacement of defective components.
1.11 WARRANTY

A. Unless otherwise noted, provide warranty for one (1) year after date of Substantial Completion for all materials and labor.

B. Onsite Work During Warranty Period: This work shall be included in the Contractor's bid and performed during regular working hours, Monday through Friday.

1. Inspections: The Contractor shall perform two minor inspections at six-month intervals (or more often if required by the manufacturer), and two major inspections offset equally between the minor inspections to effect quarterly inspection of alternating magnitude.

2. Minor Inspections: These inspections shall include:
   a. Visual checks and operational tests of all equipment, field hardware, and electrical and mechanical controls.
   b. Mechanical adjustments if required on any mechanical or electromechanical devices.

3. Major Inspections: These inspections shall include all work described under paragraph Minor Inspections and the following work:
   a. Clean all equipment, including exterior surfaces and accessible and serviceable interior surfaces.
   b. Perform diagnostics on all equipment.
   c. Check, test, and calibrate (if required) all sensors.
   d. Run all system software diagnostics and correct all diagnosed problems.

C. Operation: Upon the completion of any scheduled adjustments or repairs, Contractor shall verify operation of the SMS.

D. Service: The Owner will initiate service calls when the SMS is not functioning properly. If requested by the Owner, the Contractor shall respond or remain at the site after normal business hours, and the Owner shall reimburse the Contractor for the incremental cost difference between premium labor rates and standard labor rates. This reimbursement applies to premium labor rates that do not exceed time-and-one-half rates after normal business hours and double-time rates for Sundays and holidays. The Owner shall be furnished with telephone number(s) where service personnel can be reached 24/7/365. Qualified service personnel shall be at the site within 24 hours after receiving a request for service.

E. Records, Logs and Work Requests: Contractor shall keep records and logs of each task completed under and outside of warranty. These logs shall be maintained in Microsoft Word or Excel. The log shall include the model and 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, description of work performed, the amount and nature of the material used, and the time and date of commencement and completion of the work. Complete logs shall be kept and shall be available for review on site, demonstrating that planned and systematic adjustments and repairs have been accomplished for the SMS. The Contractor shall deliver a record of the work performed within three (3) business days after work is completed. Defective items that have been replaced shall be given to the Owner. Should the replacement item be a temporary replacement until the removed item is repaired, Contractor shall retain possession of the defective item for repair and subsequent re-installation.
F. System Modifications: Modifications by the Contractor are allowed after system acceptance. Contractor shall make recommendations for system modification in writing to the Owner. No system modifications shall be made without prior, written approval of the Owner. Any modifications made to the system shall be incorporated into the Operations and Maintenance Manuals, and other documentation affected. The Owner shall be provided with electronic restorable versions of all configurations prior to the modifications being made.

G. Software: At no charge, the Contractor shall provide to Owner all updates released by the manufacturer during the period of the warranty and verify operation of the system upon installation. These updates include system software updates, patches, bug fixes and revisions, as well as firmware updates. These updates shall be accomplished in a timely manner, fully coordinated with SMS administrators and operators, shall include training for the new changes/features, and shall be incorporated into the Operations and Maintenance Manuals and software documentation.

H. Refer to the individual product sections for further warranty requirements of individual system components.

1.12 ANNUAL SERVICE CONTRACT

A. Provide annual cost for extended service and maintenance agreement after the first year for the access control system according to the following terms:

1. The term of the warranty shall begin on the system acceptance date and shall continue for one (1) year. The extended service and maintenance warranty shall begin following this first year if accepted by the Owner. The term shall be automatically renewed for successive one-year periods unless canceled in writing by the Owner with Contractor confirmed receipt, up to the date of expiration. The service and maintenance agreement shall include the following basic services to the Owner, including all necessary parts, labor and service equipment:

   a. Repair or replace any security equipment item that fails to perform as initially installed, as specified, or as determined per the manufacturer’s performance criteria.

   b. Perform preventive maintenance on the security equipment during the 6th month and 12th month of the service contract. This preventive maintenance shall include cleaning, realignment, inspection, and testing of security devices. The Owner shall receive a written report of these inspections that identifies the security system’s status and, if required, a list of all necessary repairs or replacements.

   c. Provide maintenance on the SMS system software. At no charge, the Contractor shall provide to Owner all updates released by the manufacturer during the period of the service contract and verify operation of the system upon installation. These updates include system software updates, patches, bug fixes and revisions, as well as firmware updates. These updates shall be accomplished in a timely manner, fully coordinated with SMS administrators and operators, shall include training for the new changes/features, and shall be incorporated into the Operations and Maintenance Manuals and software documentation. Contractor shall not be responsible for maintenance of Owner data.
2. The Contractor shall be compensated for any repairs or maintenance provided as a result of Owner abuse, misuse, intentional damage, accidental damage, or power fluctuations exceeding specified equipment tolerances.

3. Service: The Owner will initiate service calls when the SMS is not functioning properly. If requested by the Owner, the Contractor shall respond or remain at the site after normal business hours, and the Owner shall reimburse the Contractor for the incremental cost difference between premium labor rates and standard labor rates. This reimbursement applies to premium labor rates that do not exceed time-and-one-half rates after normal business hours and double-time rates for Sundays and holidays. The Owner shall be furnished with telephone number(s) where service personnel can be reached 24/7/365. Qualified service personnel shall be at the site within 24 hours after receiving a request for service.

B. Provide complete terms and conditions of warranty and service.

C. The Owner will enter into a contract directly with the vendor. This specification section is not a contract between the Owner and the vendor to perform these services.

PART 2 - PRODUCTS

2.1 ELECTRONIC ACCESS CONTROL SYSTEM MANUFACTURERS

A. Basis of Design: Avigilon
B. Approved Alternate: Genetec
C. Approved Alternate: S2/Lenel

D. Should the access control manufacturer offer, as an option, the use of hardware by Mercury Security, the Contractor proposed solution shall utilize this hardware. Contractor shall state whether or not the software is compatible with the SCP, AP and EP families of Mercury Security hardware. For future additions or defective hardware replacements, the system shall not be “locked” to require Mercury Security hardware be purchased only from the access control software manufacturer or from the original Installing Contractor.

E. Approval of Alternate Manufacturers:

1. Contractors seeking approval for alternate manufacturers for any devices or software in this section shall submit requests for approved equals as defined by Division 1 in addition to submitting:
   a. Bill of materials for each piece of hardware and software proposed.
   b. Manufacturer’s data sheet for each piece of equipment proposed.
   c. Line-by-line typewritten statement of compliance or non-compliance comparing Part 2 of this section with the published specifications of the proposed alternate products. This compliance statement shall be signed by an officer of the local contractor branch office that proposes to install the alternate product and either an officer of the manufacturer or an officer of the manufacturer’s representative.

2. Refer to the project drawings for manufacturer and model numbers for the Basis of Design products.
2.2 SERVER

A. The system shall not be required to have a traditional or virtual server and, instead, may be provided with embedded server functionality integral to the controller if the following three (3) conditions are met. The server specified below shall apply if the system does not meet these three (3) conditions:

1. The network controller is a distributed architecture, native IP network appliance.

2. The network appliance contains an onboard, embedded operating system (e.g., Linux-based), web server, ODBC-compliant database engine, data storage device and application logic controller.

3. The network appliance contains onboard SSL communications.

B. If the system architecture utilizes traditional servers, the system shall be a true multi-tasking, multi-threading application system architecture designed specifically for the Windows environment. All modules, including access control, alarm monitoring, credential management, etc., shall be built from a single unified 32-bit source code set.

C. The system shall communicate on a TCP/IP based Ethernet LAN capable of utilizing 10/100/1000 BaseT.

D. The system shall be functional in a virtual server environment.

E. Provisioning:

1. The server shall be furnished by the Contractor and shall meet the specifications defined by the SMS software manufacturer to meet or exceed the functionality and performance specifications of the system and integrations defined in this and related sections. Contractor shall coordinate with Owner for possible requirements to utilize a specific manufacturer. Contractor furnished server shall have a three (3) year limited warranty.

2. Acceptable manufacturers of Contractor-furnished server are:

   a. Dell – Basis of Design Power Edge R730 Series
   b. HP
   c. Iomnis
   d. Approval of Alternate Manufacturers:

      1) Contractors seeking approval for alternate manufacturers for the server in this section shall submit requests for approved equals as defined by Division 1 in addition to submitting:

         a) Bill of materials for each piece of hardware proposed.
         b) Manufacturer’s data sheet for each piece of equipment proposed
         c) Line-by-line typewritten statement of compliance or non-compliance comparing Part 2 of this section with the published specifications of the proposed alternate products. This compliance statement shall be signed by an officer of the local contractor branch office that proposes to install the alternate product and either an
officer of the manufacturer or an officer of the manufacturer’s representative.

2) Refer to the project drawings for manufacturer and model numbers for the Basis of Design products.

F. Hardware:

1. Enterprise class server.
2. Rack mount configuration.
3. Six (6) USB 2.0 ports, one (1) two port 10/100/1000 Ethernet NIC.
4. Dual, redundant, hot swappable power supplies.
5. RAID Level 5 configuration with separate drives for data base, 500GB, and operating system, 500GB. One spare hot swappable hard drive for the database and one for the operating system.
6. Enterprise class hard drives, minimum 7200 RPM, 3.5” SATA, minimum mean time between failure, MTBF, 1.2 M hours, 100% duty cycle 24x7.
7. 8 GB RAM.
8. Internal DVD+/- RW ROM SATA drive.
11. Two (2) cooling fan modules, each with two fans, hot swappable.
12. Rack mount LCD monitor with integrated keyboard, touchpad and KVM switch. This monitor, keyboard and touchpad may also serve the video management system server, if present, through the KVM switch.
13. Backup Power:
   a. Contractor-Furnished Uninterruptible Power Supply (UPS):
      1) Single UPS shall serve all rackmounted equipment, refer to drawings.
      2) Line interactive, simulated or true sine wave.
      3) The critical load is normally supplied by utility power, and internal batteries are simultaneously float charged. The UPS shall boost or buck the voltage as needed, caused by fluctuations in utility voltage. Upon utility power failure, the UPS shall automatically switch to supplying load power from the batteries and internal inverter.
4) Manufacturers:
   a) APC: Smart UPS Series
   b) Minuteman Pro-LCD Series
   c) Emerson/Liebert
   d) Eaton
   e) Approved Equal

5) Compliance:
   a) Surge Suppression: ANSI C62.41
   b) Safety: UL 1778
   c) EMC: FCC Part 15

6) Output rated for 20,000 kVA.

7) Hot swappable batteries.

8) Rack mount.

9) Input of 208 VAC, single phase, hardwired electrical connection.

10) Supports external battery pack.

11) Web browser or SNMP monitoring.

12) Operating ambient temperature of 32°F to 104°F.

13) Relative humidity 0% to 95% non-condensing.

14) Internal input circuit breaker.

15) Audible alarms for low battery warning, internal faults, overload, weak/dead battery.

16) Transfer time of 6 m sec typical.

17) Emergency Power Off (EPO) switch.

18) Modes of Operation:
   a) Normal/On-line – critical load is supplied by AC source, harmonics are filters and batteries are float charged
   b) Boost – with a sag in utility power from 90 VAC to 105 VAC, UPS shall boost the voltage until AC source rises to 112 VAC
   c) Buck – with a swell in utility power ranging from 130 VAC to 150 VAC, UPS shall buck the voltage until AC source drops to 125 VAC
   d) Battery – upon failure, brownout or overvoltage of AC power, the load shall be supplied power from the UPS batteries and inverter
   e) Recharge – batteries shall be recharged to 90% capacity within 8 hours after return of normal AC power from low battery cut off
f) DC start – UPS shall start and operate without AC power applied

G. The SMS software shall utilize the native Windows security features and be registered with the Windows operating system as a service. The security features shall be configured with the following layers:

1. Workstation: Prohibits non-operators from accessing the system.
2. Desktop: Controls which applications a given operator can run.
3. Applications Commands: Controls which commands within an application a given operator can perform.
4. Files: Controls an operator's read/write access rights to individual files.
5. Breakthrough Alarms: The operating system shall allow high priority alarm condition notification regardless of the application software currently opened.

H. Upgrades or expansion of the SMS to a larger size system in scale shall not require installation of a different and/or new SMS application or require the administrator/operator to learn a different and/or new interface from the previous version.

I. Associated Software:

1. Support for web client.
2. Support for mobile client.

2.3 CLIENT WORKSTATIONS

A. Provisioning:

1. The workstation(s) shall be furnished by the Contractor and shall meet the specifications defined by the SMS software manufacturer to meet or exceed the functionality and performance specifications of the system and integrations defined in this and related sections. Contractor shall coordinate with Owner for possible requirements to utilize a specific manufacturer. Contractor furnished workstation(s) shall have a three (3) year limited warranty.

2. Contractor shall install client software on up to 2 additional owner workstations.

B. Hardware:

1. Desktop configuration
2. Pentium Dual Core CPU, 2.5 GHz or greater
3. 8 GB RAM
4. 100GB hard drive, 7200 RPM
5. Four (4) USB 2.0 ports, single dual 10/100/1000 network interface card
6. Audio with amplified speakers with AC adapter OR integrated speakers
7. One (1) 19" flat screen LCD monitor(s)
8. USB keyboard, USB optical mouse
9. Three (3) year limited warranty
10. Dedicated 256 MB SVGA accelerated video card OR NVIDIA graphics dual output board, PCI Express x 16 graphics bus, 512 MB DDR3 memory buffer, 1280 x 1024 resolution
11. 16x DVD/CD RW drive
C. Operating System:

1. Windows 8.1 Professional
2. Windows 10 Professional

2.4 FIELD CONTROL HARDWARE

A. Interior Control Panels:

1. Control boards, power distribution and terminals shall be enclosed in a NEMA stainless steel rated enclosure that is key lockable. All enclosures that are part of this project shall be keyed alike. Contractor shall furnish and install a mechanically fastened tamper switch on the interior of the enclosure.

2. Control boards are allowed to be in an enclosure separate from the power supplies/power distribution. Should they be in separate enclosures, the interface wiring shall be in rigid metallic conduit, RMC, with Myers hubs at both ends of the conduit.

3. Control panels may be rack mountable only in enclosure(s) specifically for rack mounting. Control boards and power supplies shall be located in the enclosure. The enclosure shall have screw or compression terminals on the rear panel for connection of field devices.

4. Intra-enclosure wiring shall be dressed using tie wraps and/or covered plastic wire way. Hook-up wires for identical purposes shall have the same color insulation. For example, if one input pair utilizes green and white insulated conductors, all similar inputs shall use green and white insulated conductors. The same color scheme shall be followed for all access control panels that are part of this project.

5. Cabling from field devices such as readers, door position switches, request-to-exit devices and locking devices shall not be directly terminated to the control boards and power supplies. The field devices shall be terminated to terminals located on the left side, right side or both sides of the enclosure back panel. Intra-enclosure wiring shall be routed from the terminals to the control boards and power distribution. Quantity and functional sequence of the terminals shall be identical portal to portal.

6. All devices inside the enclosure, less cabling and batteries, shall be mechanically fastened to a removable solid or perforated metal back panel with either:

   a. Metal or plastic standoffs
   b. DIN rail

7. Hook and loop fasteners, double sided tape or adhesives are not allowed to attach devices to the back panel. Mounting devices to the interior of the door shall only be allowed when the following two (2) conditions are met:

   a. The access control hardware manufacturer offers prefabricated enclosures with devices mounted to the interior of the door.
   b. Only the same devices that the access control manufacturer mounts to the interior of the door are allowed to be mounted in a different enclosure, and those devices shall be mounted in an identical manner.
8. 120V 20A input power shall be hard wired to a circuit breaker disconnect and to one duplex receptacle on the interior of the enclosure. Should devices in the enclosures require plug-in transformers/power supplies, the receptacle shall be utilized. One (1) power strip with integrated circuit breaker shall be located in the bottom of the enclosure as needed.

9. Power to the locking devices shall be provided by a power distribution board with no fewer than four (4) outputs. Each lock shall be individually protected. The power distribution board shall:
   a. Provide protection with fuses or positive temperature coefficient (PTC) devices.
   b. Provide control so that each output is individually selectable as latching or non-latching with fire alarm activation.
   c. Provide control so that each output shall have Fail Safe and Fail Secure terminals.
   d. Provide a fire alarm input with associated trigger LED.
   e. Provide an individual LED per output to indicate when an input has been triggered and the associated output has been activated.
   f. Accept a dry, closed contact input to activate the individual lock outputs.
   g. Provide a dry, Form C relay that energizes on activation of the fire alarm input. This output may then be used as a fire alarm input to other power distribution boards in the same or a different enclosure, or may provide input to another device such as a multi-pole relay.

10. A minimum of four (4) 12V 7 AH rechargeable, sealed, lead acid batteries shall be located in the bottom of the enclosure. Two of the batteries shall be connected in series for 24V devices, and two batteries shall be connected in parallel for 12V devices. Contractor shall provide additional batteries as needed to power all devices for a minimum of 48 hours. Connections to the batteries shall be made with appropriate terminals crimped on the connecting conductors. Batteries shall be clearly labeled in a permanent manner with the date of installation.

11. Power to control boards, readers and auxiliary devices such as request-to-exit motion detectors shall be provided by a power distribution board with no fewer than four (4) outputs. All devices powered by the same voltage at an individual portal shall be protected by the same fuse or PTC unless current requirements dictate otherwise. Individual fuses or PTCs may protect more than one control board.

12. All access control panels, when populated with control boards and power supplies, shall have the following capacities:
   a. Control of a minimum of two (2) portals.
   b. Spare capacity of a minimum of one (1) access control portal, two (2) auxiliary inputs and two (2) auxiliary outputs greater than the requirements of the project at the time of system specification.
c. Five (5) spare fuses of each type used, to be in their original packaging, to be located in each power supply enclosure.

d. 50% spare current capacity on all power supplies located in unconditioned spaces and 40% spare capacity for those in conditioned spaces. Lower spare capacities are allowable based on prior approval of Contractor-provided power calculations.

13. Locations where enclosures may be mounted are shown on the plans. Final location, with approval of Owner’s representative, shall be selected by Contractor based on distribution of controlled portals and devices.

14. At time of Substantial Completion, Contractor shall furnish a schematic diagram of intra-enclosure wiring and a complete bill of materials for the enclosures and the devices located within. This documentation shall include a schedule of fuses and the device(s) that each fuse protects. This documentation shall be placed by Contractor in a Contractor-furnished print pocket located on the inside of the enclosure door.

B. Intelligent System Controllers (ISC):

1. The controller shall communicate with the host via an on board 10/100 Base T Ethernet port.

2. The controllers shall be a distributed architecture with full peer-to-peer networking capability. Master/Slave controller configurations are not acceptable. All controllers in the system shall be capable of operating in a standalone mode if communication is lost with the server or main controller. In no case shall a controller depend on communication with an upstream controller for proper standalone operation.

3. The communications bus shall be supervised for wiring integrity. If a communication failure is detected, the system shall report the loss. All controllers unable to receive communication shall operate as standalone devices including grant/deny decisions, complete with event buffers. All events shall be uploaded to the server upon restoration of communications.

4. Controllers shall be AES 128-bit symmetrical block encryption devices conforming to FIPS-197.

5. Controllers shall support SHA-1 authentication security.

6. The controllers shall utilize flash memory or similar technology, allowing program updates to be downloaded from the server. Program storage shall be in ROM.

7. The controllers shall have the capacity for 15,000 cardholders and 45,000 transactions. All access decisions involving these cardholders shall be made at the lowest controller level without communication to the server.

8. 32-bit microprocessor controlled.

9. Handle all non-host related access control monitoring and decision making.

10. LED indicators for power, fault and communications.
11. Provide for local and global input/output linking:
   a. The SMS shall support a global linkage feature whereby any input/output/event shall be linked to any other input/output/event in the SMS. Input/output linkages shall be able to span across intelligent system controllers.
   b. System administrators shall be able to create global input/output function lists, each consisting of a sequence of actions to be performed, such as changing card reader modes, activating outputs, and opening or closing anti-pass back areas. Each function list may include up to six actions.

12. Reporting of transactions and status information to the server.

13. Interface with standard reader technologies without special interface hardware, additional logic panels or other integrators. Supported technologies shall include:
   a. 13.56 MHz Contactless Smart with or without biometrics or keypad
   b. 13.56 MHz Multi-technology Smart
   c. Proximity, with or without keypad
   d. Magnetic stripe, with or without keypad
   e. Wiegand
   f. Bar code
   g. Keypad
   h. Biometric, with Wiegand output

C. Reader Interface Module (RIM):

1. Reader interface modules are not shown on the plans. Refer to the installation section of this specification for allowable equipment mounting locations. It is the responsibility of the Contractor to determine the number and configuration of reader interface modules required based on the inherent characteristics of each product line and the requirements and restrictions described in this document.

2. RIM shall interface with and accept data from TTL, Wiegand and RS-485 type readers and door hardware.

3. RIM shall provide a minimum of three (3) inputs per portal for portal position, request to exit and auxiliary input.

4. RIM shall provide a minimum of two (2) outputs per portal for locking device and auxiliary output. Each output shall be Form C and shall be rated at 3A at 28VDC.

5. RIM shall communicate to controller by RS-485.

D. Input Control Module (ICM):

1. The input control module shall provide supervised and non-supervised alarm input zones and monitor/report line fault conditions, alarm conditions, power faults and tampers.

2. Input control modules are not shown on the plans. Refer to the installation section of this specification for allowable equipment mounting locations. It is the responsibility of the Contractor to determine the number and configuration of input control modules required, based on the inherent characteristics of each product line and the requirements and restrictions described in this document.
3. UL 294 and 1076 listed.
4. Each input configurable for normally open or normally closed.
5. Each input configurable for timing.
6. Each input configurable for end of line resistance.
7. Status LEDs for communication to the host, heartbeat and input status.
8. Communications line supervision.
9. AES 128 bit encryption.
10. 2-wire RS485 communications.
11. No fewer than eight (8) inputs per board/control module.
12. Assignment of unit addresses and communications speed.
13. Alarm Masking: The ability to mask the alarm input on a time zone basis.
15. Configuration of Debounce Time: The ability to control the amount of time that an input state change must remain consistent in order for it to be considered a real change of state.
16. Elevator control support for number of floors shown on the drawings.
17. Noise rejection filtering to prevent false alarms.
18. Global Linkage: The ability to link outputs with inputs that are attached to any ICM/output control module (OCM).
19. Checkpoint: The ability to configure an input as a designated stop on one or more guard tours.
20. Entry/Exit Delay: The ability to set up entry/exit delays for inputs that are attached to any ICM. This shall include:
   a. Non-Latched Entry: When an input activates, the alarm will not be reported until the entry delay expires. If the input is still active when the entry delay expires, the alarm will be reported. If the input is not active when the entry delay expires, then the alarm will not report.
   b. Latched Entry: When an input activates, the alarm will not be reported until the entry delay expires. If the input is still active when the entry delay expires and the alarm has not been masked, the alarm will be reported. If the input has been masked when the entry delay expires, then the alarm will not report.
   c. Exit Delay: When an input activates, the alarm will not be reported (operates as if masked) until the exit delay expires. If the input is still active when the exit delay expires, the alarm will be reported. If the input is not active when the exit delay expires, the alarm will not be reported.
E. Output Control Module (OCM) and Functionality:

1. Output control modules are not shown on the plans. Refer to the installation section of this specification for allowable equipment mounting locations. It is the responsibility of the Contractor to determine the number and configuration of output control modules required, based on the inherent characteristics of each product line and the requirements and restrictions described in this document.

2. The output control module(s) shall provide Form C relay contacts for load switching, rated at 3A at 28VDC.

3. Each relay shall support “On” “Off” and “Pulse.”

4. Outputs can be pulsed from 0.1 seconds to 24 hours.

5. Status LEDs for communication to the host, heartbeat and relay status.

6. 2-wire RS485 communications.

7. No fewer than eight (8) outputs per board/control module.

8. Communications line supervision.

2.5 APPLICATION SOFTWARE

A. General Performance:

1. The application software, in conjunction with the associated hardware, shall have the following features, functionality and capabilities. The functions that are to be implemented shall be determined in the planning conference between Contractor and Owner referenced in Part 3 of this section.

2. All Users:

   a. All users shall be capable of being authenticated against Active Directory using LDAP before being granted system access. Should the Owner not use Active Directory, the system shall provide a built-in login and credential management tool to permit rules-based access rights on a per-user basis.

   b. The access rights shall be selectable on a per-user basis. In addition, user groups shall be capable of being assigned whereby each user group has a common set of access rights. Users shall be capable of being assigned to these user groups by the system administrator.

3. Operators:

   a. The SMS operator interface shall be standard Windows style graphical interface allowing point and click access to features such as drop-down menus, radio buttons, check boxes, list boxes and other standard Windows components.

   b. On-line Context Sensitive Help: The SMS shall provide on-line context sensitive help files to guide system administrators and system operators in the configuration and operation of the SMS. The help menu shall be available from any window in the SMS by pressing one function key or
clicking on the “HELP” icon/selection in the toolbar. Help windows shall be context sensitive so operators and system administrators can move from form to form without leaving the help window. The SMS shall come with complete on-line documentation on CD or the ability to offload the documentation to removable media.

c. Operator Groups: A minimum of 32 operator groups, allowing specific system module privileges to be accessed with each module being granted specific views, edit and execute privileges.

d. Operator Levels: System access shall require a valid operator name and password login using an electronic credential consisting of DESCRIBE CREDENTIAL, governing a specific operator’s level of access to each menu item.

e. The SMS shall allow a system operator to login over another system operator who is already logged into the same client workstation without the need to reboot the system. This process shall log the first system operator off alarm monitoring and log the new system operator on, changing any permission necessary for that system operator.

4. Logs, Status, Maintenance, Diagnostics:

a. Historical Log: The system shall allow event history to be written to the hard disk in an archive format. At a minimum, the system shall support 500,000 transactions. Warning messages shall be generated at a user defined level of capacity. The system shall have the ability to offload the archive files to removable media automatically or manually.

b. System Status: The system shall query the status of any or all of the system’s access control points, inputs and outputs.

c. System Maintenance/Diagnostics: The system shall provide for remote diagnostic capabilities. In addition, online diagnostics and communications maintenance shall be able to be activated from the operator interface.

5. Administrator:

a. The SMS shall provide system administrators with the ability to segment their access control SMS field hardware devices into various zones or areas where alarm monitoring client workstations will monitor. These zones shall be assigned an alphanumeric name using up to a minimum of 64 characters.

b. The SMS shall allow other devices such as card readers, input and output modules and intelligent system controllers to be automatically part of the monitoring zone when an intelligent system controller is selected, and it shall allow the system administrator to define which devices such as card readers, etc. belong to that monitor zone.

c. Updating of monitor zones shall take place in real time and without requiring operators to re-login.
6. General:

a. Elevator control support for the number of floors and cabs shown on the drawings.

b. The SMS software shall be written to Microsoft’s published standards for user interface design, secure coding practices and database implementation guidelines such as Microsoft Open Database Connectivity (ODBC) interface.

c. All tasks shall be accessible from any compatible client workstation on the network using one or all of the following:

1) Traditional client/server architecture.

2) N-Tier architecture where the SMS shall support the expansion of the system architecture and allow for end-user deployment. The SMS shall allow, but not require, the separation of the database, application server, web server and client interface. The system shall require that all connections to the database be performed through a trusted link from the client or internet browser interface.

3) Centralized publishing of applications using Windows Terminal Server and Citrix through any compatible internet browser application and/or by mobile computer including tablet PC.

d. The SMS shall use an open architecture where all data must reside on a single database and must be accessible in real time to every SMS workstation or web-based client connected to the network. The system database shall be used to create and maintain the cardholder database. A screen designer module shall allow the creation and editing of custom database tables and data entry screens.

e. The SMS shall be able to connect to and interface bi-directionally with external data sources using all of the following methods:

1) ASCII with support for XML-formatted text exchange of data activated both manually and automatically.

2) ASCII with support for XML-formatted text exchange of data using a direct table interface activated both manually and automatically.

3) Real time exchange of data via Active Directory/LDAP utilizing an API supported by the SMS manufacturer. The live exchange of data shall permit exposure of SMS events and transactions to other data sources in real time and allow for receipt of data into the SMS, permitting this data to be acted upon and trigger linked events in the SMS in real time.
f. Security: Access privileges within the application software shall be permitted by use of a password protection system. The cardholder database shall have the following password security levels.

1) A minimum of six (6) unique operator access levels
2) Ability to view only the database fields
3) Ability to restrict operator viewing to any of the individual database screens within a record
4) Ability to restrict operator viewing to any of the database partitions

Cardholder Configurations: The system shall have the capacity to support a minimum of 25,000 100,000 250,000 cardholder files. Each cardholder shall be capable of having up to five (5) access levels actively assigned to their account.

Cardholder Configurations: The system shall have the capacity to support a minimum of 25,000 100,000 250,000 cardholder files. Each cardholder shall be capable of having up to five (5) access levels actively assigned to their account.

The system shall have cardholder identifications for “Visitor” and “Escort”, with an associated optional validity period assignable with an activation and deactivation date.

i. The cardholder database screen shall have the following data associated with each cardholder:

1) Last edit by operator with edited date and time
2) Last date/time card was used
3) Last reader giving valid access
4) Last reader denying access
5) Anti-pass back status

j. The system shall provide advanced query capability with the following search criteria: equal to, not equal to, greater than, greater than or equal to, less than, less than or equal to, like, is empty, is not empty, is between, and, or, not.

k. Access Control Configuration: The configuration application shall be password protected, restricting what each individual may edit or display inside the configuration application.

l. Text descriptions of access points such as doors.

7. Time Zones:

a. The SMS shall be capable of creating and storing up to 255 time zones. Each time zone shall have a minimum of six (6) intervals. Each interval shall be assignable to any day of the week.

b. Each time zone shall be assignable to an alphanumeric name. Time zones shall be applied to access levels, card reader modes, alarm inputs, alarm outputs, and alarm masking and logging functions. Time zones shall be allowed to belong to any or all access levels so that the time zone only has to be defined once.
8. Access Levels:
   a. The SMS shall be capable of defining a minimum of 32,000 access levels with a minimum of 32 access levels per cardholder per database segment. Access levels shall consist of a combination of card readers and time zones.
   b. Each access level shall be assignable to an alphanumeric name.
   c. Card readers shall have the ability to be assigned to any or all access levels defined in the SMS. Individual card readers shall be capable of having a distinct time zone assigned to it.
   d. The SMS shall allow an 'Allow User Commands' option to be assigned on a per access level basis where keypad readers are in use.
   e. The SMS shall allow a 'First Card Unlock' option to be assigned on a per access level basis. First Card Unlock feature, when configured, retards a pre-determined time zone activated unlock command until a valid credential has been presented and granted access to the portal.

9. Temporary Access Levels:
   a. The SMS shall be capable of assigning temporary access levels inclusive of the 32,000 assignable access levels.
   b. Each temporary access level shall be assignable to an alphanumeric name.
   c. Each temporary access level shall be definable with a start and end date.
   d. Temporary access levels shall be stored in the ISC, and functionality shall be maintained in the event of disconnection with the ISC.

10. Access Groups:
   a. The SMS shall be capable of assigning access groups, with a maximum of 32 access levels per access group.
   b. Each access group shall be assignable to an alphanumeric name.

11. Precision Access Levels:
   a. The SMS shall be capable of assigning precision access levels in addition to the 32,000 access levels, with the ability to assign unlimited card reader and time zone combinations. Precision access levels provide capability of assigning a unique access level on a per card basis.
   b. Each precision access level shall be assignable to an alphanumeric name.

12. Holidays:
   a. The SMS shall provide a minimum of 255 holiday assignments using an embedded calendar. Holidays shall be assigned an alphanumeric name and shall be grouped into eight (8) types of holidays, and shall be
assignable to individual time zones. Access rights, card reader modes, and alarm masking schedules must be able to be altered when the current date is designated as a holiday.

b. Dates for Daylight Saving Time changes shall be definable and shall take effect automatically.

c. The SMS shall support holiday ranges that allow a single holiday to span across multiple calendar days.

13. Database Segmentation:

a. The SMS shall be required to support data segmentation whereby each segment shall have its own set of cardholders, field hardware, and system parameters (time zones, access levels, etc.). This segmentation shall expand the limitations of the SMS parameters (e.g., access levels and time zones) to the maximum capacity of each parameter multiplied by the number of segments. The following list shall be made available for segmentation:

1) Access group
2) Access levels
3) Actions
4) Action groups
5) Alarm inputs
6) Alarm mask groups
7) Alarm outputs
8) Areas
9) Credential types
10) Card formats
11) Cardholders
12) Card readers
13) Central station receivers
14) Device groups
15) Digital video archive servers
16) Fire alarm panels
17) Guard tours
18) Global I/O function lists
19) Global I/O links
20) Holidays
21) Intercom panels
22) Intercom stations
23) ISC
24) Maps
25) Monitor zones
26) Precision access groups
27) Receiver accounts
28) System operators
29) Time zones
30) Tour groups
31) Visitors
32) User permission groups
14. Field Hardware Communications:
   a. The SMS shall support communications with the intelligent system controllers (ISCs) by the following protocols:
      1) RS-232
      2) RS-485
      3) TCP/IP
      4) Dial-up modem
   b. Communication baud rate shall be system selectable with a range between 1,200- to 115,200 bits per second.
   c. Download communication between the SMS and the ISC shall be fully multi-tasking and shall not interfere with operational functions.
   d. Upon loss of communications between the SMS server and the ISC, an alarm shall be created with a time stamp. Upon re-established communication, the SMS and the ISC shall automatically re-synchronize from the point of communication loss without operator intervention.

15. Dual Path Field Hardware Communication:
   a. The SMS shall support dual path communications between the SMS server and the ISCs. This shall allow for a redundant communication path in the event the primary path fails. The secondary path shall support all primary path protocols.
   b. In the event of a communication failure of the primary path, the ISC shall initiate a switchover to the secondary path. During this fail switchover period, the ISC shall periodically check to see if the primary path has been re-established and will automatically switch back upon a successful connection. Alarms shall be generated upon loss or restoration of communications.

16. Intelligent System Controller Remote Support:
   a. The SMS shall support remote operations to and from the intelligent system controller (ISC). The remote connection shall be either a constant connection or a scheduled connection. If the connection is constant, then every panel shall have its own connection at the host. If the connection is scheduled, then all panels using remote connections shall have the ability to share the same host connection(s).
   b. System administrators shall have the ability to define the remote connections available in the pool. For each connection, system administrators shall be able to define the connection type and the client workstation to which it is installed.
   c. Remote sessions shall occur under any of the user defined scenarios:
      1) On Demand Connection: A system operator shall have the ability to automatically initiate a remote session to an ISC via the alarm monitoring module.
2) Scheduled Connection: System administrators shall have the ability to configure the SMS so that the ISC remotes into the SMS at pre-determined times through use of time zones.

3) Critical Alarm Activated: System administrators shall have the ability to configure the SMS so that the ISC initiates a remote session with the SMS when a critical alarm is activated in the field.

4) Buffer Threshold: System administrators shall have the ability to configure the SMS so that the ISC initiates a remote session with the SMS when a pre-determined number of events are stored in the ISC memory buffer.

17. Area Control:

a. Area control shall be a security method of preventing a person from passing their credential to another person for dual entry into a single location using one card. The SMS shall support the following area control features.

b. Global Hard Anti-Pass Back:

1) The Global Hard Anti-Pass Back feature shall require that a credential always be used to enter and exit an area. The controlled areas shall have both entry and exit card readers at all portals. Entry and exit readers shall be able to span across multiple ISCs. Areas shall be logically defined under the SMS, and area control shall not be required at all areas. Global Hard Anti-Pass Back shall work in the following manner:

a) A cardholder must present his/her credential at the entry card reader of the area that the person wishes to enter. Once access has been granted into the area, the cardholder cannot present the credential to another entry card reader within the same area without first presenting his/her credential to the respective exit card reader of that area. Should a cardholder attempt to use any other card reader in the same area besides the occupied area’s exit card reader once access has been granted to that area, the cardholder shall be denied access and an alarm shall be reported to the alarm monitoring client workstation. Nested control areas (areas inside areas) shall be definable with a minimum of 64 entry and exit card readers. It shall be possible to have an area within an area and/or multiple areas that are independent of each other in which Global Hard Anti-Pass Back rules shall apply.

c. Global Soft Anti-Pass Back:

1) The Global Soft Anti-Pass Back feature shall require that a credential be used to enter and exit an area. The controlled areas shall have both entry and exit card readers at all portals. Entry and exit readers shall be able to span across multiple
ISCs. Areas shall be logically defined under the SMS, and area control shall not be required at all areas. Global Soft Anti-Pass Back shall work in the following manner:

a) A cardholder must present his/her credential at the entry card reader of the area that the person wishes to enter. Once access has been granted into the area, the cardholder cannot present the credential to another entry card reader within the same area without first presenting his/her credential to the respective exit card reader of that area. Should a cardholder attempt to use any other card reader in the same area besides the occupied area’s exit card reader once access has been granted to that area, the cardholder shall be allowed access (if that cardholder has the appropriate access level to access the new area), and an alarm shall be reported to the alarm monitoring client workstation. It shall be possible to have an area within an area and/or multiple areas that are independent of each other.

d. The following summary criteria shall apply under Global Hard or Soft Anti-Pass Back:

1) Initially all card holders are reset to Area 0.

2) Any cardholder shall enter a controlled area any time after Time 0 by presenting a credential to a SMS entry card reader.

3) A cardholder shall not exit the controlled area unless he/she has entered the area presenting a credential to the SMS entry card reader.

4) A cardholder shall not enter the controlled area a second time unless the cardholder has exited that area previously.

5) A cardholder shall be able to enter through any entry card reader and exit through any exit card reader of a single controlled area.

6) These options shall include a "forgiveness" feature that will allow the system administrator to reactively reset the anti-pass back of all cardholders to Area 0, either through a manual override or a time zone command.

7) The SMS shall provide an anti-pass back exempt option for privileged or VIP cardholders. Cardholders with this option will not have anti-pass back rules applied to them.

8) The SMS shall also have a "forgiveness" feature that will allow the system administrator to proactively assign an automatic reset to an individual cardholder. This shall allow the system administrator to reset the anti-pass back of an individual cardholder to Area 0 automatically for a defined number of times.
e. Timed Anti-Pass Back:

1) Timed Anti-Pass Back shall allow the system administrator to decide how long after a cardholder has presented their credential that they will have to wait before the same credential will be accepted again at the same card reader. This helps prevent multiple swipes by an individual to allow access to others through turnstile doors.

f. Two-Person Control:

1) Two-Person Rule shall be provided to restrict access to certain areas unless there are two (2) cardholders present. This restricts individuals from being alone in restricted or highly secure areas. When an area is configured for Two-Person Rule, the following criteria shall prevail:

   a) The card reader shall grant access only if two valid cardholders (with authorized access levels) swipe their credentials one after the other. In the event a second authorized card is not presented within 10 seconds of the first authorized credential, the card reader shall reset and the first card will have to be swiped again.

   b) Once two people occupy an area, individual access shall be granted.

   c) Individual exit shall be permitted until an area is occupied by only two cardholders, at which point the Two-Person Rule applies for exit.

g. Occupancy Limit:

1) Occupancy Limit shall restrict the number of cardholders that shall be present in an area at any given time. The Occupancy Limit area shall be able to be defined by the system administrator up to the limits of the cardholder capacity of the system. Once the occupancy limit has been reached, a cardholder must swipe out of the exit card reader before the next cardholder may enter. Each area for which Occupancy Limit is enabled shall be definable with up to 64 entry/exit card readers. Multiple Occupancy Limit areas shall be definable.

h. Musterering:

1) The SMS shall support Musterering functionality. The Musterering function shall provide an automatic capability for registering cardholders that are on site during an incident. Designated exit and entry card readers shall be used to enter and leave hazardous locations and safe locations. When an incident occurs, a muster report shall be generated that consists of a listing of all personnel that are within the hazardous locations, as well as all personnel that have registered in a safe location.
i. Alarm Masking Groups:

1) The SMS shall support a group alarm masking feature whereby system administrators shall be able to create groups of alarm inputs that enable them to mask or unmask multiple input control module inputs and card reader inputs simultaneously.

2) The following events shall have the ability to be part of an alarm masking group:

   (1) Input Control Module Events
   (2) Alarm Input Active
   (3) Card Reader Events
   (4) Auxiliary Input Active
   (5) Denied Count Exceeded
   (6) Door Contact Tamper
   (7) Door Forced Open
   (8) Door Held Open
   (9) Card Reader Input Tamper

   a) Alarm Masking Groups shall be able to be masked as a group or as individual points.

   b) Alarm Masking Groups must support the ability to be masked multiple times. Alarm Masking Groups shall be able to be masked and/or unmasked via alarm monitoring commands by guards, via card reader keypad function keys, or via global linkage commands.

   c) The SMS shall support “2-man control” for masking Alarm Masking Groups.

   d) The SMS shall support an Alarm Masking Group status change (masked to unmasked or unmasked to masked) action to be linked to a function list that is capable of performing many system actions, such as activating a relay output. The SMS shall support a minimum of 64 Alarm Masking Groups per intelligent system controller, with a minimum of 200 alarm inputs per Alarm Masking Group.

j. Cardholder Escort Control:

1) The SMS shall support comprehensive escort functionality based upon access levels. Access levels shall include options for “Escort Required”, “Designated Escort”, “Not an Escort” and “Does not require an Escort.” Contractor shall integrate escort level and designation into badge design in cooperation with Owner.

2) The escort feature shall be capable of one-to-one and one-to-many Escort to Escorted functionality.
k. Cardholder Use Limits:

1) The SMS shall support a Cardholder Use Limit feature that shall allow system administrators to specify the maximum number of times that a cardholder may use their credential at card readers in the SMS.

l. Extended Individual Strike Times:

1) The SMS shall support Extended Individual Strike Times that allows a card reader’s strike to be active for an extended period of time beyond the pre-determined standard strike time on a per cardholder basis. The extended strike time shall be user definable up to 255 seconds. Extended strike times shall be set on a card reader by card reader basis.

m. Extended Individual Door Held Open Times:

1) The SMS shall support Extended Individual Door Held Open Times that allow a card reader’s door to be held open for an extended period of time beyond the pre-determined standard held open time on a per cardholder basis. The extended held open time shall be user definable up to eight (8) hours. Extended held open times shall be set on a card reader by card reader basis.

n. Extended, On Demand, Door Held Open Times:

1) The SMS shall support Extended, On Demand, Door Held Open Times via a command keypad located in the field. The Extended Held Open command configuration shall consist of a command key sequence that shall be from three to six keys used to enter the number of minutes to extend the door held open time (up to 999 minutes) and a pre-alarm time (from 0 to 30 minutes).

2) Only those cardholders having command authority at a given card reader configured for ‘Allow User Commands’ shall have the ability to execute the Extended Held Open command at that card reader. The Extended Held Open command shall be available after a valid cardholder has received an access grant at the card reader. The cardholder shall have a period of 15 seconds after the access grant to enter the extended held open command sequence.

o. Guard Tour:

1) The SMS shall support Guard Tour functionality. A tour shall consist of one or more checkpoints defined as card readers or alarm inputs that a guard shall check during a guard tour.

2) Each tour shall be assigned a name of up to 128 characters and subsequently assigned to one or more alarm monitoring workstations that indicate from where automatic tours are to be launched.
3) Each tour shall consist of a series of checkpoints that shall include card readers and/or alarm inputs. Tour checkpoints shall be ordered in the sequence within which they are to be visited. Tour checkpoints shall be assigned minimum and maximum times within which to be reached. A “Tour Beginning” checkpoint shall also be defined to be linked with output actions. Checkpoints shall be able to be placed onto a graphical map.

4) A tour shall be able to be linked to live video. Instructional text shall be assigned to a tour. These instructions shall be able to be viewed and printed prior to launching the tour from an alarm monitoring workstation.

5) Tours shall have the option of being scheduled.

6) The SMS shall support random tours.

p. **Tour Groups:**

1) The SMS shall support tour groups. Tour groups will consist of one or more tours, listed by alphanumeric names.

q. **Guard Tour Live Tracking:**

1) The Guard Tour Live Tracking window shall be opened automatically at the initiating monitoring station whenever a tour is launched. The Guard Tour Live Tracking window shall consist of a series of columns including:

   a) Checkpoint sequence number
   b) Checkpoint name
   c) Checkpoint status
   d) Checkpoint minimum time
   e) Checkpoint maximum time
   f) Checkpoint time

2) The following checkpoint statuses shall be supported:

   a) Checkpoint Not Reached
   b) Checkpoint Reached On Time
   c) Checkpoint Reached Early
   d) Checkpoint Overdue
   e) Checkpoint Reached Late
   f) Checkpoint Out of Sequence
   g) Checkpoint Missed
   h) Guard Tour Initiated
   i) Guard Tour Completed
   j) Guard Tour Completed With Errors
   k) Guard Tour Cancelled
   l) Guard Tour Terminated

r. **Guard Tour Live Video:**

1) Multiple live camera views shall be able to be displayed simultaneously in a “sliding window” format. The next checkpoint
to be hit shall be able to be highlighted within the surveillance system.

s. Elevator Control:

1) The SMS shall support Elevator Control using standard access control field hardware.

2) For card readers placed within elevator cabs, Elevator Control shall permit the restriction of cardholder access to certain floors while also allowing general access to other floors.

3) For card readers placed in elevator lobbies, Elevator Control shall permit the restriction of cardholder access from calling the elevator using the elevator call buttons until an allowed credential is presented at the card reader.

4) The feature shall allow, at the elevator, the use of any card reader and all card reader modes used on any other card reader in the SMS. Each elevator card reader shall control access for the number of floors shown on the plans.

5) The SMS shall be able to track which floor was selected by an individual cardholder for auditing and reporting purposes.

t. Graphical System Overview Tree:

1) A Graphical System Overview Tree shall display a graphical representation of all field hardware including hardware from other systems which are interfaced. System administrators shall be able to modify a device that is depicted on the Graphical System Overview Tree or see its properties by double clicking on the icon, and the SMS shall bring them to the appropriate form.

u. Pre-Alarm:

1) The SMS shall support a Pre-Alarm feature at the card reader. The pre-alarm will sound a tone at the card reader prior to the door held open alarm. The pre-alarm setting shall be configurable for up the maximum allowable door hold open time.

v. Alarm/Event Logging:

1) All alarms and events in the SMS shall, by default, always be recorded in the database. The SMS shall give system administrators the ability to select, on a time-zone basis, the times that they require the SMS to log specific events to the database.

2) System administrators shall have the option for particular alarm/events to be set to log or not to log on any individual reader and/or input.
w. Scheduling Utility:

1) The SMS shall provide an integral Scheduling Utility. The Scheduling Utility shall allow system administrators to schedule actions to occur on a one-time or a recurring basis. Recurring schedules shall be configured to begin immediately, last indefinitely, or have optional start and end dates.

2) The Scheduling Utility shall be available from both the system administration and alarm monitoring modules.

3) The types of actions that shall be schedulable include, but are not limited to:

   a) Action Group
   b) Event Archiving/Purging
   c) Arm/Disarm Area
   d) Start of Guard Tour
   e) Execution of Scripts
   f) Activate, Deactivate, Pulse Device Output and Device Output Groups
   g) Global Anti-Pass back Reset
   h) Download Firmware to equipment.
   i) Download Database to ISC
   j) Execute Function List
   k) Mask/Unmask Inputs, Input Groups, Alarm Mask Groups, Door Forced Open or Held Open
   l) Open Door, Open Door Group
   m) Change Reader Mode
   n) Automatic Reports
   o) Reset Use Limit
   p) Move Bulk Credentials from an Area
   q) Deactivate Credentials
   r) Logout Visitors
   s) Schedule PTZ Presets

4) The Scheduling Utility shall maintain a history log in the database for actions that it executes.

18. Multiple Card Formats:

   a. Each ISC shall support a minimum of eight (8) access control card formats and, if applicable, eight (8) asset formats.

19. Card Reader Cipher Mode:

   a. The SMS shall support a Card Reader Cipher Mode that shall allow authorized cardholders to enter their credential ID by typing it into a card reader keypad, thus emulating the presentation of the credential to the card reader.

20. Denied Access Attempts Counter:

   a. The SMS shall support a Denied Access Attempts Count on a per card reader basis. The "Denied Attempts Count" value shall be configurable
from 0 to 255. The following access denial types shall cause the current denied count to be incremented:

1) Unknown PIN entry at a card reader configured as ‘PIN or Card’ mode.

2) Invalid cipher entry at a card reader in Cipher Mode.

3) Invalid PIN entered for a given card at a card reader configured as ‘Card and PIN’ mode.

4) Non-matching biometric presented for a given card at a card reader in Biometric Verify mode.

21. Card Reader Time Zone Overrides:

a. The SMS shall allow for the pre-defined default card reader settings to be overridden or temporarily changed on a time-zone basis. At the beginning of the selected time zone, the selected card reader’s operational mode shall be modified from its default mode to any one of the following modes: Locked, Unlocked, Facility Code, Card Only, Card or PIN, Card and PIN, Card and Biometric, Card or PIN and Biometric, and/or Card and PIN and Biometric. The aforementioned options shall be available depending on the type of card reader used.

b. Each card reader shall have the ability to have multiple time zone setting overrides assigned to them as required by the system administrator.

22. Alarm/Event Routing:

a. The SMS shall be capable of allowing system administrators to route alarms and events to various alarm monitoring client workstations on the network. The SMS shall allow any alarm or event to be routed to one or multiple client workstations on the network regardless of where the alarm is generated in the field. Alarms shall be routed to client workstations on a device-by-device level.

b. The SMS shall be capable of automatic re-routing of an alarm from workstation X to workstation Y if the alarm is not responded to within a user definable time period.

c. The SMS shall implement network synchronization such that in the event that an alarm is routed to multiple client workstations, once the first client workstation acknowledges the alarm, the alarm shall be cleared from all other client workstations. As such, alarms that are routed to an Alarm Monitoring client workstation that does not have a System Operator logged in shall be queued so that all unacknowledged alarms will report to that client workstation once a System Operator has logged into the SMS. Alarms/Events shall be routed based on default settings or time zone control.

23. Text Instructions:

a. The SMS shall allow for a set of text instructions to be associated with each alarm that arrives into the SMS. The text instruction function shall allow the system administrator to enter a minimum of 32,000 characters
24. Customizable Voice Instructions:

a. The SMS shall allow for a customizable voice instruction to be associated with SMS alarms. The customizable voice instruction feature shall allow the system administrator to record a voice instruction of unlimited length.

25. Alarm Attributes:

a. The system administrator shall have the ability to configure how the SMS handles the annunciation of alarms on an individual basis. Each alarm and/or event shall have the option(s) to:

1) Display at one or more alarm monitoring client workstation.

2) Allow higher priority alarms to be displayed on the alarm monitoring client workstation ahead of lower priority alarms.

3) Require the field device that generated the alarm to be restored to its normal state before the alarm is cleared.

4) Print the alarm to the local event printer.

5) Have a customized voice message annunciate at the client workstation.

6) Have the alarm breakthrough to the alarm monitoring window should the system operator be working in another application

7) Allow system operators to change the journal entry once the alarm has been acknowledged.

8) Ensure that the alarm will not be able to be deleted from the alarm monitoring window upon acknowledgment.

9) Display text and audio instructions outlining the procedures to follow when responding to the alarm.

10) Automatically call-up associated maps.

11) Automatically call up the associated cardholder record.

12) Automatically call up the associated cardholder photo using the video verification function.

13) Require a password to view the alarm.

14) Require a password to acknowledge the alarm.

15) Require acknowledgment to clear.

16) Allow mandatory journal entry upon acknowledgment.
17) Use pre-defined journal entries for alarms.
18) Select the option for journal entry based upon the specific alarm.
19) Send surveillance interface commands to the surveillance system.
20) Automatically send an e-mail message.
21) Automatically send an alphanumeric page.
22) Have the alarm appear on the alarm monitoring window with a flashing colored coded bar across the alarm for high priority alarms.
23) Have the alarm, when acknowledged, display an alternative flashing color coded bar across the alarm than for the original alarm color.
24) Trigger a function list(s) when the alarm is acknowledged.
25) Require user logon for acknowledgment.
26) Have the ability to mark an alarm as “In Progress” where the system shall silence any repeating audio notifications on the workstation where the alarm was routed, and remove the alarm sprite notification on the graphical map. Additional operators’ monitoring alarms shall be notified that the alarm has been marked “In Progress”.

26. Alarm-Event Mappings:

   a. The SMS attributes in Alarm Attributes shall be assignable on a ‘global’ basis to all devices that share an alarm description. Thus, the ‘Door Forced Open’ alarm attributes shall apply to any door with a card reader that is forced open in the SMS. The SMS shall have the capability to assign a unique group of alarm attributes to specific device/alarm combinations to redefine the global settings for specific case settings. Each device/alarm combination shall have the ability to have its own unique attribute set if the system administrator desires.

27. System Downloads:

   a. The SMS shall provide for the downloading of data to the ISCs. Downloads shall load SMS information such as time zones, access levels, alarm configurations, cardholder information and card reader configurations.

   b. All ISCs on the SMS shall be capable of either full or selective downloads to individual intelligent system controllers, and bi-directionally so that alarms will still report to their respective alarm monitoring client workstations as cardholder information is being downloaded.

   c. Information on cardholder status, credential status, time zones or access levels shall download in real time as they are added, modified, or deleted from the SMS.
28. Portal Configuration Options:

a. The SMS shall include the following options for each portal on the system:

1) Allow user commands such as manual door unlock
2) Rename auxiliary inputs
3) Rename auxiliary outputs
4) Independently supervise REX and DPS
5) Configure REX and DPS as Normally Open or Normally Closed
6) Deny if duress
7) Assume door used
8) Alarm masking
9) Activate outputs
10) Two card control
11) Checkpoint
12) Do not activate strike on REX
13) The ability to allow system administrators to determine on a time-zone basis to log or not to log on a card reader by card reader basis
14) Access grants
15) Access denied
16) Card reader status alarms
17) The SMS shall allow for user definable door strike functionality for each card reader in the SMS
18) The SMS shall allow for each card reader to be selected as either an ‘In’ reader, ‘Out’ reader, or ‘None’ to allow for ease of reporting time and attendance basic ‘Time In’ and ‘Time Out’ data.
19) Enforce Use Limit: This option shall enable card use limits at the card reader, limiting the number of times that cardholders may use their credential to gain access at the card reader
20) Supervise Door: Sets the SMS so that the card reader door contact is wired as a supervised input

29. The SMS shall allow for one or more access points in a specified area to be armed and disarmed directly from a control keypad.

30. Real-Time, Live Video User Verification:

a. The SMS shall have the capability of interfacing to a surveillance system and displaying a live video image next to a stored cardholder image record. This feature shall be system configurable.

31. Traces:

a. The SMS shall allow for a live or historical trace on any ISC, ICM, alarm input, credential (cardholder), monitor zone, or card reader. If applicable, the SMS shall allow for a trace on any asset, intercom, or camera. Multiple traces may be run simultaneously. The SMS shall allow system operators to filter alarm types from the history trace window. Alarms that shall be filtered from the trace window are access granted alarms, access denied alarms, system alarms, duress alarms, and area control alarms.
b. Destination Assurance: The system shall provide the ability to alert the system operator when a cardholder does not reach a required location and present their credential after entering at a designated checkpoint in a designated period of time.

32. Real-Time, Dynamic Graphical Maps:

a. The SMS shall support graphical maps that display device and group status, function lists and video cameras dynamically in real time. The maps may be configured to appear on command or when specified alarms are selected for acknowledgment. Map device icons shall have the ability to dynamically change shape and/or color to reflect the current state of the device.

b. The SMS shall support all map formats listed below:

1) Adobe Photoshop (.psd)
2) AutoCAD DXF (.dxf)
3) Encapsulated Post Script (.eps)
4) JPEG (.jpg)
5) TIFF (.tif)
6) Windows Metafile (.wmf, .emf)
7) Windows Bitmap (.bmp, .dib)

c. The SMS shall support map hierarchies or maps within maps. There shall be no limit to the number of maps that shall be nested hierarchically with each other. Multiple maps may be displayed simultaneously.

d. The SMS shall support user defined icons for field hardware devices. The SMS shall also give system operators the ability to affect the mode of card readers, open doors, start a trace on a device, mask/unmask alarm inputs, and activate/deactivate/pulse an output from the map icons.

e. The graphical maps shall have the ability to be printed to a local printer.

2.6 ACCESS CONTROL GRAPHICAL USER INTERFACE (GUI)

A. A workstation based custom GUI shall be provided for complete display of real time system activity.

B. The GUI shall provide the following features:

1. Display in real-time, the status of devices by dynamically changing shape or color to indicate status.

2. Acknowledge alarm conditions.

3. Perform manual operations on all monitor and control points.

4. Perform graphic editing functions.

5. Customization of icons color or shape based on status.
C. Graphical representations shall be made of the following activity:

1. **Cardholder Activity:** Access granted (including duress), access denied, lost card used, stolen card used, inactive card used, unescorted visitor.

2. **Input Point Activity:** Input condition (normal, abnormal, cut, short, shunt, unshunt).

3. **Output Point Activity:** On status (automatic, by operator, by link), off status (automatic, by operator, by link), access level on, access level off.

4. **Door Activity:** Auto unlock, auto lock, closed, opened, forced open, left open, door switch cut, door switch shorted, REX status (cut, shorted, normal, abnormal), input unlock, operator lock, operator unlock.

5. **Controller Activity:** Controller on-line, controller off-line, controller communications normal, communications cut.

6. **System Activity:** System error, workstation start, workstation stop, printer off-line, printer unavailable, printer overflow, unknown card.

7. **Regional Group Activity:** Occupancy restriction (high limit, low limit), anti-pass back (entry, exit), policy violation, escort left, number of escorts, numbers of users, number of visitors.

D. The GUI shall have the ability to display a minimum of 100 custom graphical screens, developed by the SMS vendor with electronic maps provided by Owner.

E. The system shall have the ability to automatically call up specific maps. Each input point shall be linked to a primary map.

F. Graphical editing software shall be included, allowing the Owner to create and edit the graphical screens.

G. Graphics screens shall be developed using a minimum of eight (8) colors from a palette of 64 available.

H. The system shall operate on a Windows workstation as provided and recommended by the SMS vendor. The software system may be a combined access control/video surveillance software package.

2.7 CREDENTIALS AND BADGING

A. Badging Station:

1. **Provisioning:**

   a. The workstation shall be furnished by the Contractor and shall meet the specifications defined by the SMS software manufacturer to meet or exceed the functionality and performance specifications of the system and integrations defined in this and related sections. Contractor shall coordinate with Owner for possible requirements to utilize a specific manufacturer. Contractor-furnished workstation(s) shall have a three (3) year limited warranty. The workstation shall be one of the two administrative workstations, and be the same workstation as provided for the video management system.
2. Software:
   
a. General:
      
1) The SMS shall support a credential design module that is integral to the SMS source code with the ability to create and maintain credential designs. Features shall include the ability to support:
      
a) Complete credential design and layout tools
b) Chroma key
c) Image import
d) Ghosting
e) Signature capture
f) Barcodes
g) Smart chip support

b. Licensing

1) Required badging/credential management licensing shall be furnished.

3. Hardware:
   
a. Desktop configuration,
b. Pentium Dual Core CPU, 2.5 GHz or greater
c. 8 GB RAM
d. 100 GB hard drive, 7200 RPM
e. Four (4) USB 2.0 ports, 10/100/1000 network interface card
f. One (1) 19” flat screen LCD monitor
g. Dedicated 256 MB SVGA accelerated video card OR NVIDIA graphics dual output board, PCI Express x 16 Graphics bus, 512 MB DDR3 memory buffer, 1280 x 1024 resolution
h. Internal DVD +/- RW ROM drive
i. Printer:

1) Printer Manufacturer shall be:
   
a) Fargo DTC Series
b) Magicard Enduro Series

2) The SMS shall support a printer with industry standard and Microsoft certified drivers. The printer shall support:
   
a) Double sided printing at a resolution of no less than 300 dpi, full color on the front, monochrome on the back
b) Edge to edge printing
c) High speed printing per card of a minimum of 7 seconds for monochrome and 35 seconds for YMCKO
d) Holographic overlay
e) Inline magnetic stripe encoding
f) Inline Contactless Smart card encoding
g) An input feeder/hopper with a minimum capacity of 100 cards and an output stacker/hopper with a minimum capacity of 30 cards
j. Images:

1) Camera:
   a) The badging station shall be compatible with flash lighting and USB connected cameras, allowing the capture of a cardholder image at a minimum resolution of 3 mega pixels.
   b) SMS image capture, storage, and hardware compression techniques must be in compliance with the ANSI standard or JPEG (Joint Photographic Experts Group).
   c) The SMS shall provide the ability to capture a cardholder’s image through the use of any industry standard scanner or digital camera that utilizes a TWAIN interface. Images shall be able to be scanned at up to 16.7 million colors for a true color scanned image. When using a digital camera that supports multiple resolutions, the system shall allow the operator to select the desired resolution.
   d) Include required USB interface box, camera, camera power supply, integral or external integrated flash, tripod and 4’ x 4’ wall mounted white backdrop.

2) Image Import:
   a) The SMS shall allow system operators to have the ability to import a cardholder’s image at the time of enrollment. The SMS shall support importing image formats of Bitmap (.bmp, .dib), JPEG (.jpg), JFIF (.jif), Adobe Photoshop (.psd), Macintosh PICT (.pct), Portable Network Graphics (.png), TIFF (.tif), Windows Metafile (.wmf, .emf).

4. Badge Design:
   a. Provide training and work in conjunction with Owner for development of four (4) badge designs.

5. Supplies:
   a. Print Ribbons:
      1) Ribbons shall be provided to print 500 hundred (#00) badges, plus one spare ribbon of the same type and capacity.
   b. Cleaning Kits:
      1) One cleaning kit shall be provided for every ribbon provided.
   c. Lanyards and Sleeves:
      1) Lanyards and badge sleeves shall be furnished by Owner.
d. Badge Quantities:
   
   1) Badge quantities and types shall be as defined below.

B. Credentials:

   
   a. Maximum Dimensions: CR 79: 3.313" x 2.063" x 0.04", CR 80: 3.375" x 2.125" x 0.04".
   
   b. Construction to be of PVC or polyester laminate with a high coercivity magnetic stripe rated 4000 Oersted.
   
   c. Each card shall contain a unique serial number.
   
   d. Cards shall contain options for various memory capacities of 2k, 16k or 32k with a fixed number of application areas or areas which are sized by dynamic allocation.
   
   e. Each application area shall contain a unique authentication key. The card and reader shall require matching keys in order to function together. All RF communication between card and reader shall be encrypted using a secure algorithm.
   
   f. The card shall be protected with DES or 3DES encryption algorithms.
   
   g. The cards shall be provided with custom keys uniquely matched to individual sites/customers to allow a non-interchangeable, high level of security through the use of formatting programs such as HID iClass Elite or Corporate 1000.
   
   h. Cards shall be encoded with bit lengths that are compatible with all other components of the SMS.
   
   i. Application areas shall be reserved for cashless vending applications or future applications as Owner requires.
   
   j. Cards shall support programming and updating of custom applications after issue.
   
   k. Cards shall be capable of having a photo and/or other graphical images printed directly on the surface of the card.
   
   l. Provide optional slot punch-outs on the short and long edge of the card.
   
   m. Provide 250 Contactless Smart cards multi-technology cards. Cards shall be individually numbered with sequential matching of internal and external numbers.
   
   n. Cards shall be provided with a lifetime warranty; 15 months for the magnetic stripe.
C. Credential Management:

1. The SMS shall support a Credential Management and Enrollment module that is integral to the SMS source code with the ability to create and maintain the cardholder database. Features shall include the ability to:
   a. Add, modify and delete records based upon permissions
   b. Capture photo images, biometric information and signatures
   c. Print credentials
   d. Boolean search on any single or multiple fields
   e. Customization of screen layout and field names
   f. Advanced customization of fields, field names and screen tabs (pages) with optional Forms Designing and Editing module
   g. Determine single or multiple active credentials
   h. Assign access levels and access groups
   i. Bulk assignment/modification/deletion of access levels
   j. Bulk deletion of cardholder records.
   k. Native support for U.S. Government CHUID Standard
   l. Limit the number of times the credential can be printed
   m. Limit the access for searching the database based upon user defined criteria
   n. Mobile badging operations.

2. The SMS shall support the following bar codes:
   a. Code 3 of 9 (3:1)
   b. Code 93
   c. UPCA
   d. EAN 13
   e. EAN 8
   f. Code 128 A
   g. Code 128 B
   h. Code 128 C
   i. Codabar
   j. PostNET (Zip + 4 Postal)
   k. Code 3 of 9 (2:1)
   l. Interleaved 2 of 5 (2:1)
   m. PDF-417 (2D)
   n. Code 128 Auto
   o. UCC-128
   p. MSI Plessey
   q. Extended Code 3 of 9
   r. Extended Code 93
   s. 2D Aztec

2.8 PORTAL DEVICES

A. Credential Readers:

1. Manufacturers:
  a. HID Multiclass SE
  b. Pre-approved equal
2. Multi-Technology:
   a. Compatible with 125 kHz proximity, 13.56 MHz Contactless Smart card, MIFARE, DESFire EV1.
   b. Backwards compatibility with legacy 13.56 MHz Contactless Smart cards and 125 kHz proximity access control formats, including 26, 32, 35, 37 bit as well as HID Corporate 1000 format.
3. Card readers manufactured specifically for non-access control applications shall not be acceptable.
4. FIPS 201 compliant.
5. Provide compatibility with most access control systems by providing card data outputs in Wiegand and Clock/Data.
6. Allow the firmware to be updated in the field without the need to remove the reader from the wall.
7. Secure mounting methods using tamper resistant screws.
8. An audio beeper that provides various tones to signify access granted, access denied, power up and diagnostics.
9. Tri-color LED or three (3) LEDs for visual notification of various conditions.
11. The ability to transmit an alarm from an integrated tamper switch.
12. Support dual authentication of identity through the combined use of access badge and personal identification number (PIN) on an integrated 12 key keypad.
13. PBT polymer or UL94 polycarbonate.
14. Read Range:
   a. Using 125 kHz cards or 13.56 MHz Contactless Smart cards, minimum operational read range shall not be less than one (1) inch after the readers have been installed in their permanent locations.
15. Operational voltage of 5-16 VDC, with operating temperature range of -31° F to 150° F, and rated for outdoor use with a minimum rating of IP55.
16. Readers and credentials shall be compatible with each other and shall be from the same manufacturer.
17. Available in sizes to be mounted to a standard single gang box or to a mullion. Maximum sizes:
   a. Single gang box mount, with or without keypad: 5.1” x 3.1” x 1.1”
   b. Mullion mount: 6.0” x 1.9” x 0.9”
18. Lifetime warranty against defects in material and workmanship.
B. High Security Scramble Keypad:

1. Manufacturers:
   a. Identiv Hirsch
   b. RBH Access
   c. Pre-approved equal

2. Provide random keypad number assignment upon code entry, reducing button wear patterns and possibility of onlooker pattern recognition.

3. Provide compatibility with most access control systems by providing outputs in RS485, ethernet with legacy Wiegand support.

4. Allow the firmware to be updated in the field without the need to remove the keypad from the wall.

5. Secure mounting methods using tamper resistant screws.

6. An audio beeper that provides various tones to signify access granted, access denied, power up and diagnostics.

7. Adjustable illumination for visibility under various conditions.

8. The ability to transmit an alarm from an integrated tamper switch.

9. Operational voltage of 5-16 VDC, with operating temperature range of -31° F to 150° F, and rated for outdoor use with a minimum rating of IP55.

10. Available in sizes to be mounted to a standard single gang box or to a mullion. Maximum sizes:

   a. Single gang box mount: 4.5" x 3.5" x 1.75"

11. Lifetime warranty against defects in material and workmanship.

C. Request-To-Exit Motion Detector:

1. Manufacturers:
   a. Bosch DS 160 Series
   b. Pre-approved equal

2. Door monitor with sounder alert. Sounder alert shall have adjustable volume.

3. Adjustable latch time.

4. Selectable fail safe/fail secure.

5. Activation LED.

6. 12 or 24 VDC operation.

7. Sequential logic input.

8. Two (2) Form C contacts.


10. Field of view masking.
D. Request-To-Exit Button:

1. Manufacturers:
   a. Dynalock 6290 Series
   b. Seco-Larm SD7213 Series
   c. RCI 991 Series
   d. Pre-approved equal

2. 0-60 second adjustable pneumatic action.

3. Contacts shall be one of the following:
   a. DPDT
   b. SPDT double break with isolated common
   c. DPST
   d. Normally closed SPST with normally open SPST

4. One and one-half inches (1-1/2") to two inches (2") red mushroom button.

5. Stainless steel or aluminum plate labeled “EXIT” or “PUSH TO EXIT”.

6. Available in mullion mount.

E. Door Position Switch

1. Manufacturers:
   a. GE
   b. GRI
   c. Honeywell
   d. Pre-approved equal

2. Interior or Perimeter Door:
   a. One (1) inch or 0.75 (3/4) inch diameter, recessed
   b. DPDT contacts
   c. 0.75" to 1.25" (3/4" to 1-1/4") gap for wood door
   d. Maximum 0.375" to 0.625" (3/8" to 5/8") gap for steel door
   e. Basis of Design: UTC/GE/Sentrol 1076D

3. Overhead Door:
   a. Three (3) inch gap
   b. SPDT contacts
   c. 18” stainless steel armored cable
   d. Aluminum construction
   e. Basis of Design: UTC/GE/Sentrol 2207AU

4. Steel Door:
   a. A rare earth magnet shall be used.
5. Cage/Gate:
   a. Maximum 1.5 (1-1/2) inch gap
   b. DPDT contacts
   c. Three feet (3') stainless steel armored cable
   d. Aluminum construction
   e. Basis of Design: UTC/GE/Sentrol 2507AD

F. Duress Buttons:

1. Manufacturers:
   a. Honeywell (Hardwired) 269R, 270R
   b. United Security Products (Hardwired) HUB Series
   c. Inovonics (Wireless) EN4216/32 MR Series
   d. Linear (Wireless) DXSR-1508
   e. Honeywell (Wireless) 5800 Series
   f. Pre-approved equal

2. Multi technology:
   a. Hardwired:
      1) DPDT contacts
      2) Silent operation
      3) Recessed activation button to prevent accidental activation.
      4) Screw terminal connections
      5) Key switch resettable
      6) Momentary Latching contacts

   b. Wireless:
      1) Transmitter supervision with minimum SPST relay outputs or communication with compatible control panel
      2) Available repeaters for increased range or alternate long range model from the same manufacturer
      3) Minimum 300 MHz operation
      4) Outputs activated per transmitter

G. Cable:

1. Composite cable is allowed, although sufficient conductors may not be available in composite cables for all portal configurations. Contractor shall be responsible for additional required cables beyond one composite cable to each portal to meet functional requirements of the system.
   a. Reader: 22 AWG, 3 pair, stranded, overall shield. Shield shall be grounded at control panel end only.
   b. Request to Exit Motion Detector: 22 AWG, 4 conductor, stranded.
   c. Door Position Switch: 22 AWG, 2 conductor, stranded.
   d. Request to Exit Button: 18 AWG, 4 conductor, stranded.
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e. Lock: Minimum 18 AWG, 4 conductor, stranded.
   1) Lock may require heavier gauge cable depending on door
      hardware solution power requirements. Contractor shall
      coordinate with door hardware provider for higher current
      devices and shall adjust the gauge of the lock cable accordingly.

f. Auxiliary Devices: Refer to plans for requirements.

H. Locks and Door Hardware:

   1. Electric/electronic locks shall be furnished and installed by the door hardware
      provider.

   2. Access Control Contractor shall interface with and terminate cables to locks.

   3. Access Control Contractor shall coordinate with door hardware provider for
      specified sequences of operation at the various portals.

   4. Electrified cylindrical and electrified mortise locks shall have an integrated
      request-to-exit device.

   5. Electric strikes shall have an integrated latch bolt monitor, and the dead latch
      shall be seated properly so that the strike cannot be defeated by manipulation.

   6. Magnetic locks shall have a magnetic bond sensor.

   7. Refer to architectural specifications and/or the architectural door schedule.

2.9 ASSET MANAGEMENT

A. The Asset Management System (AMS) shall be provided as an integrated solution that is
   seamlessly integrated with the SMS and all integrated SMS systems. All asset data shall
   be stored in the SMS database, and all related functions and features of the SMS shall
   be incorporated into the AMS.

B. The AMS shall employ a distributed architecture so that all access / asset decisions are
   only made locally at the ISC. All assets shall be stored locally at the ISC, and all
   decisions to grant asset access shall be made by the local ISC. Decisions made at the
   Host or Database Server PC shall not be allowed.

C. The AMS shall employ asset technology independence. The AMS shall support multiple
   asset technologies including radio frequency identification (RFID) and barcode.

D. The AMS shall support multiple card reader technologies. The AMS shall support any
   card reader that outputs a standard Wiegand communications protocol, including
   proximity and barcode readers.

2.10 VISITOR MANAGEMENT SYSTEM (VIMS)

A. Software:

   1. Manufacturers:
      a. HID Easy Lobby
      b. Pre-approved equal
2. Functionality:

a. A visitor management system (VIMS) shall be provided as a standalone, seamlessly integrated solution within the SMS. All functionality described from this point forward shall reflect functionality of the seamlessly integrated system.

b. The VIMS shall allow the operator to enroll, schedule, assign to an employee, capture photos, assign access levels, sign in or out, print badges, and track visitors as they move throughout the facilities.

c. Site visitors shall have, via the VIMS, the ability to be assigned access levels and move throughout the facility using an assigned credential. Visitor alarms shall report in the main alarm monitoring window and shall be logged to the SMS database. All visitor data shall reside on the SMS database.

d. A record for each visitor shall be created in the VIMS by entering the required data into appropriate data fields. The SMS shall provide the ability to define dropdown list box fields for repetitively entered text (e.g.: company representing, reason for visit, etc.). Dropdown list boxes shall allow the operator a variety of pre-defined choices for data input. The screen design shall be configurable to allow the entry of data in any format desired.

e. A data import function shall be available to pre-load the VIMS with visitor records and industry standard image formats. This import function shall be capable of adding records to the database at any time.

f. Visitors to an organization shall be assigned to a cardholder in the database for the scheduled visit. A visitor shall be assigned to more than one cardholder if multiple visits are involved. Cardholders shall have the ability to have multiple visits assigned to them. The SMS shall have the ability to be configured for which cardholders are authorized to host visitors.

g. The VIMS shall support visitor self-registration at a kiosk.

h. The VIMS shall support visitor pre-registration by employees through a web-based application.

i. The VIMS shall allow operators to pre-schedule a visit for a visitor. The information that is required for a visit shall be user defined by the SMS administrator. Fields that shall be defined include:

1) Visit Time/Date In
2) Visit Time/Date Out
3) Visit Type
4) Purpose of Visit

j. The VIMS shall provide the option for visitor “Sign In”. When signing in, a dialog box shall prompt the operator to optionally print a disposable credential, assign an access control credential to a visitor, and notify the cardholder of the visitor arrival via email. When the scheduled visitor has been signed in but not signed out, the option to “Sign Out” shall be made
available. When signing out, the actual Time Out field shall be updated, and all active credentials for the visitor shall be deactivated.

k. The VIMS shall support a visitor logout action that signs out all active visits for a particular visitor based upon an event or transaction.

l. The VIMS shall support bulk sign-in capabilities to allow for batch sign-in for all visitors associated with a single visit.

m. The VIMS shall allow system administrators to configure the system such that visitors are unable to sign in for a pre-scheduled visit before the pre-scheduled visit Time In defined.

n. The VIMS shall include an advanced visit status user interface. The user interface shall be automatically updated and shall display:

1) All visits currently in progress (signed-in)
2) Visitors due in during the next user defined minutes
3) Visitors whose visit should have started, but who have not checked in
4) Visits due to expire in the next user defined minutes
5) Overstayed visits
6) Completed visits

o. The VIMS shall support integration with email systems. When scheduling a visit, system operators shall have the ability to send an email message to one or more recipients that includes the scheduled visit information. Upon changing the initial visit details, an email update shall be sent to all email recipients of the initial visit notification email.

p. The VIMS shall provide a screen designer tool that allows SMS administrators to choose the layout and design of the VIMS forms.

q. Each visitor shall have his/her own unique record in the SMS database. Each visitor record shall have the following information stored with them.

1) User defined fields of visitor information:

   a) Photo
   b) Current credential assigned with credential type
   c) Current credential information
   d) Previous credential history
   e) Assigned access levels with expiration dates
   f) Cardholder / visit link

r. The VIMS shall maintain a complete visit history that shall be stored with each visit, complete with the cardholder visited, time in and out, as well as the purpose of the visit.

s. The VIMS shall have the ability to trace visitors who are carrying access cards.

t. The VIMS shall support historical traces. Historical traces shall allow system operators to specify the number of days prior of information that they would like displayed for the particular visitor that is being traced.
B. Reader/Scanner:

1. Manufacturers:
   
   a. Intellicheck Driver’s License Reader
   b. Snapshell Driver’s License and Business Card Scanner
   c. Scanshell 1000 Passport, Driver’s License, Business Card Scanner
   d. Cardscan B9 Business Card Scanner
   e. Assure Tec ID-150 Driver’s License Scanner
   f. Assure Tec ID-150A Driver’s License Scanner with authentication
   g. ID Tech Mag Stripe Reader 33411
   h. Topaz 1 x 5 LCD Signature Pad
   i. Topaz 4 x 5 LCD Signature Pad
   j. Approved equal

2. Functionality:
   
   a. Use optical character recognition to read the front of a typical business card and automatically populate the relevant fields. All relevant data may not be captured based on the card design, colors, graphics and logos. Owner shall have control over which fields from the card are stored.

   b. Decode information from the magnetic stripe or 2D barcode on the license and automatically populate the relevant fields. Owner shall have control over which fields from the license are stored.

   c. Capture the visitor’s image from the credential as an option. Owner shall retain the option of importing an image from an attached camera.

   d. Once enrolled, a visitor shall not require re-entry of information. Upon a return visit, the visitor’s information shall be available via a Boolean search from any of the VIMS data fields.

   e. The VIMS shall allow for re-assignment of credential IDs for use with re-assignable visitor credentials. Credential IDs shall be stored in the database, and requested reports shall show the specific credential ID linked to the specific visitor record for the time period requested.

   f. The VIMS shall have the ability to capture a visitor’s signature. Signatures may also be captured by importing a signature file into the SMS or by scanning it in using an industry standard scanning device that utilizes a TWAIN interface.

C. Camera:

1. Manufacturers:
   
   a. Logitech Orbit PTZ
   b. Same manufacturer and model as access control badgeing camera
   c. Approved equal

2. Functionality:
   
   a. Minimum 1.3 Mega pixel resolutions.

   b. USB 2.0 connectivity.
c. The VMS shall include equipment required to capture visitor images. While capturing visitor images, the operator must have the option of capturing a new image without affecting the existing record. VIMS image capture, storage, and hardware compression techniques must be in compliance with the ANSI standard or JPEG (Joint Photographic Experts Group).

d. The VIMS shall allow system operators to import a visitor's image at the time of enrollment. The VIMS shall support the same image formats as the SMS.

D. Printer:

1. Manufacturers:
   a. Printer as used for access control system badging
   b. Dymo 450 Turbo black and white thermal printer
   c. Approved equal

2. Functionality:
   a. The visitor credential format, including layout, background color, location of photo, text, applicable graphics or company logos, etc., shall be designed through use of the VIMS graphical user interface (GUI).

2.11 INTERFACES AND INTEGRATIONS

A. Video Surveillance Integration and Interface:

1. The SMS shall be required to integrate with the surveillance system.

2. The SMS integration to the surveillance system shall be classified as a high-level interface. The supported surveillance system manufacturers shall be those listed in Section 28.23.00. Dry contact closure or other low-level interface methods are not acceptable. The SMS shall be capable of passing alarm information via a Serial RS232 interface with any surveillance system that utilizes ASCII commands, or by a TCP/IP protocol interface using APIs. The two systems may be from different or the same manufacturers.

3. Command information sent through the high-level interface shall include input point, door event, terminal controller points, operator events and system events, with the associated surveillance system commands.

4. The SMS vendor shall be responsible for providing the interface programming in a protocol that is understandable by the surveillance system.

5. The SMS to surveillance system integration shall perform the following:
   a. Display a live video image next to a stored cardholder image record upon presentation of an access badge to a reader.
   b. Any alarm event in the SMS shall have the ability to be associated with a video clip in real time, with configurable pre- and post-event recording duration.
c. SMS alarm events shall be capable of triggering a defined video sequence of operation, such as camera movement to a preset position.

d. PTZ control via the SMS, including activating presets and starting/stopping tours.

e. Video alarm acknowledgement, such as motion detection, and alarm reset shall be supported from the SMS.

f. In the SMS, display a tiled screen of operator-selected live images in a similar format as what is viewable via the video management system alone.

g. Ability to view recorded images based on operator selected date, time and duration through the SMS.

h. Linking of an access control event to a video clip so that clicking on an event begins playing of that clip.

i. Ability to click on a camera icon on the SMS map to display live video from that camera and to select recorded video from the same camera.

6. Should the integration fail or malfunction after installation, the systems shall be able to operate independently until the problem(s) is resolved.

B. Text Paging Interface Option:

1. The SMS shall support a paging interface seamlessly integrated within the SMS alarm monitoring module. System operators shall have the ability to manually or automatically send numeric or alphanumeric paging messages on demand regarding any alarm currently displayed in the main alarm monitoring window. Pages shall have the ability to be sent to multiple pagers if desired. The SMS shall allow any pager to be accessed through a paging terminal that communicates through the TAP (telenumber alphanumeric paging) protocol.

C. Email Interface Option:

1. The SMS shall support an email interface seamlessly integrated within the SMS alarm monitoring module. System operators shall have the ability to manually or automatically send ASCII text email messages from the alarm monitoring module on demand regarding any alarm currently displayed in the main alarm monitoring window. Emails shall have the ability to be sent to multiple email accounts if desired. The SMS shall integrate with Microsoft Exchange Server.

D. Intelli-Check ID Check Integration:

1. The SMS shall integrate with the Intelli-Check ID Check 1400 product for the scanning of credentials including driver's licenses, military and government issued IDs. This integration will populate cardholder form during the enrollment process.
PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with the manufacturer’s instructions and recommendations for installation of all products.

B. Provide all system wiring between all components as shown on the project drawings or as directed by the manufacturer, whichever is the more stringent requirement.

C. Network controllers shall be installed centralized in the nearest telecommunications room(s). Mount controllers to the structural walls in a location coordinated with other utilities. Coordinate exact location with Architect/Engineer Owner prior to installation. Provide dedicated +120 VAC emergency power circuit to the controllers using #12 AWG wiring from the nearest emergency electrical power distribution panel board.

D. Provide wiring and connection to all electrified locking hardware devices. Complete programming and testing of all electrified locking hardware devices.

E. Install all credential readers in accordance with manufacturer’s instructions where shown on floor plans, in accordance with the Americans with Disabilities Act (ADA) requirements. Provide wiring and connection to all credential readers. Complete programming, adjustment, and testing of all credential readers.

F. Provide wiring and connection to all hardware request-to-exit devices that are integral to electrified door hardware. Provide wiring and connection to all request-to-exit motion detectors. Complete programming and testing of all integrated request-to-exit devices. Where possible, avoid false activation by persons passing by but not exiting.

G. Install all request-to-exit motion detectors in accordance with manufacturer’s instructions directly above the door frame, centered on the door opening. Adjust sensitivity to permit operation on motion of persons within 2'-0" of door. Avoid false activation by persons passing by where possible.

H. Install all request-to-exit pushbuttons in accordance with manufacturer’s instructions where shown on floor plans, in accordance with the Americans with Disabilities Act (ADA) requirements. Provide wiring and connection to all request-to-exit pushbuttons. Complete programming, adjustment and testing of all request-to-exit pushbuttons.

I. Install all door alarm contacts in accordance with manufacturer’s instructions either recessed in the door header or surface mounted as required. Provide wiring and connection to door alarm contact devices. Complete programming, adjustment and testing of all door alarm contacts.

J. Install all duress switches in accordance with manufacturer’s instructions, surface mounted under counter in locations shown on plans. Verify exact mounting location with Owner prior to cable rough-in or installation. For hard wired devices, provide wiring and connection to duress switch devices. For wireless duress switch devices, mount receivers in accessible locations. Complete programming, adjustment and testing of all duress switch devices. Wireless testing shall include signal reception when transmitter is in all sections of the area in which it will be used in normal operations.

K. Install, wire, configure, adjust, program and test all access control system servers, workstations, badging workstations and other user interfaces.
L. Install, wire, configure, adjust, program, and test all specified interfaces and integrations between access control and other systems. Contractor shall provide all cabling, wiring, terminations, components, devices, accessories, hardware, software and other material and accessories necessary to complete all specified interfaces and integrations and make them fully operational.

M. All low voltage access control cabling shall route through divided portion of cable tray to the fullest extent possible. If no divided portion of cable tray exists, cabling shall route in conduit end-to-end.

N. Electronic access control system cabling shall not be spliced.

O. Flexible conduit is not allowed except with prior approval. Refer to Section 26 05 33 for conduit requirements. Refer to Section 27 05 28 for cable hanger and support requirements.

P. Each cable shall be appropriately identified, as defined on the record documents, at each end’s termination point using pressure sensitive label strips.

Q. The conductor color code used in terminating system cabling at system devices shall remain consistent from device to device for each unique device type throughout the project.

R. Install and tighten all connectors in accordance with manufacturer's instructions using the appropriately designed tools recommended by the manufacturer for that purpose. Do not strip or damage connectors, terminals, or equipment by over tightening termination fasteners.

S. Grounding and Bonding Requirements:

   1. Provide a minimum of 6AWG bonding conductor from each electronic access control system control panel, power supply and surge suppression device to the nearest telecommunications grounding busbar. Actual bonding conductor size is determined by its length; refer to Section 27 05 26 for grounding and bonding conductor sizing criteria.

   2. Cables containing shields shall not have the shields grounded at conduits, boxes, racks, etc. Ground the shield only at the control panel end.

T. Coordinate installation of all devices with other trades and utilities in the vicinity.

U. Cabling shall be plenum rated when installed outside conduit in plenum ceilings.

3.2 FIELD QUALITY CONTROL

A. Where these specifications require a product or assembly without the use of a brand or trade name, provide a product that meets the requirements of the specifications as supplied and warranted by the system vendor. If the product or assembly is not available from the system vendor, provide product or assembly as recommended by the system vendor.

B. Periodic observations will be performed during construction to verify compliance with the requirements of the specifications. These services do not relieve the Contractor of responsibility for compliance with the contract documents.
C. Furnish products listed and classified by Underwriters Laboratories, Inc. (UL) as suitable for purpose specified and indicated.

3.3 MANUFACTURER AND INTEGRATOR COMBINED FIELD SERVICES

A. Installation shall be performed by a factory-trained and certified Contractor.

B. The Contractor shall provide a comprehensive, site-specific customer planning guide for the system. The Contractor shall conduct conference(s) with the Owner prior to any installation to discuss the programming and configuration options of the system and the planning guide.

C. The Contractor shall include labor for all planning and all programming activities required to implement the Owner’s access policies for each system point and each operator and administrator. Any software programmable access policy, within the bounds of the hardware specified, shall be included.

D. It shall be the responsibility of the Contractor to provide a complete, functional system as described by the design documents. These responsibilities include:

1. Complete hardware setup, installation, wiring and software configuration of the system server, all workstations and all peripheral hardware.

2. Complete programming of all operator software in accordance with the Owner’s access policies determined by the planning guide conference(s).

3. Manual data entry of 100 cardholders based on a printed roster provided by the Owner.

4. Configuration of the network software for operation of the system. Templates shall be established representative of all user access right levels.

5. Programming of all cardholder database screens including cardholder information screens, report templates, queries, etc. Encoding of 100 Contactless Smart cards shall be included.

6. Programming of all custom graphic GUI screens including devices.

7. Complete system diagnostic verification.

E. The SMS Installation Contractor shall be present at meetings to coordinate all door hardware requirements with the door hardware vendor.

3.4 SYSTEM DOCUMENTATION

A. Complete documentation shall be provided for the system. The documentation shall describe:

1. All operational parameters of the system
2. Complete documentation of programming and access policies
3. Complete operating instructions for all hardware and software

B. The following sections shall be provided in the system documentation:


5. Refer to Part 1 for details.

3.5 SYSTEM TRAINING

A. All labor and materials required for on-site system training by a certified representative of the system manufacturer shall be provided. Training shall be conducted at the project site using the project equipment.

B. Coordinate training days and times with Owner.

C. Provide a training outline agenda describing the subject matter and the recommended audience for each topic.

D. At a minimum, the following training shall be conducted:

   1. System Administrators: A course detailing the system functions, configurations and operations. Provide training on all aspects of the system including data import/export, report, cardholder management, system workstation and server configuration and maintenance, software and hardware configuration and peripheral hardware operation.

   2. Operators: A course detailing the operational features of all aspects of the user interface. Topics shall include alarm monitoring functions, reports, error handling, alarm handling, output relay control, operation of integrated systems interface, and general overview of the report hardware.

   3. GUI Editing: Conduct detailed training on using the GUI editing software. Topics shall include the editing of existing graphical maps and the creation of new graphical maps.

E. Minimum on-site training times shall be:

   1. System Administrators: Eight (8) hours

   2. Operators: Eight (8) hours.

   3. GUI Editing: Eight (8) hours.

   4. Integrations: Eight (8) hours

   5. Badging System: Eight (8) hours.

   6. Four (4) additional hours of training each quarter for the 12-month period of the project warranty shall be provided. A minimum of half of this additional training shall be on site; the remainder may be support by telephone or email.
shall document this training, including dates performed, trainer and Owner representative(s) present. Each phone call or email shall be documented as a minimum of 15 minutes duration.

7. Operators and administrators are present 24 hours a day, 7 days a week. Contractor shall coordinate with Owner to provide training for all appropriate personnel, which may require Contractor to be present on site during non-business hours. Therefore, the hours in any or all categories defined above may be divided among the various shifts.

3.6 SYSTEM ACCEPTANCE

A. The SMS vendor shall submit for review a formal acceptance and system checkout program. The system checkout procedures shall include all system components, software and functionality. The Contractor shall perform the tests and document all results under the supervision of the manufacturer’s systems engineer.

B. All operational scenarios, as defined by the customer planning guide, shall be tested to simulate the actual use of the system in the normal operating environment. The successful completion of these operational scenarios shall be documented.

C. The system shall not be accepted until all requirements of system documentation and training have been completed.

END OF SECTION 28 13 00
PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Network Video Management System (NVMS).
B. Video Storage Solution
C. Cameras and Accessories.
D. Cabling.

1.2 RELATED WORK

A. Section 26 05 33 - Conduit and Boxes
B. Section 26 05 13 - Wire and Cable
C. Section 27 15 00 - Horizontal Cabling Requirements
D. Section 28 05 00 - Basic Electronic Safety and Security System Requirements
E. Section 28 31 00 - Fire Alarm and Detection
F. Section 28 13 00 - Electronic Access Control

1.3 QUALITY ASSURANCE

A. NVMS Software Developer (Manufacturer): The NVMS system shall be a single-source manufacturer such that the single manufacturer develops, supports, and warrants the NVMS software solution. The manufacturer shall have three (3) years documented experience.

1. The software developer shall be, at a minimum, a Microsoft Gold Certified Integrator and Partner for systems that reside in a Microsoft environment.

2. The software developer shall be an active ONVIF member with current available product recognized by ONVIF as a Conformant Product.

B. Integrator/Installer (Contractor): The Contractor must be a NVMS-certified installation, service, and support company specializing in the selected manufacturer's product, with demonstrated prior experience with the selected manufacturer's system installation and programming. The installer shall have a Microsoft MCSE or equivalent technician for the purposes of server deployment, software configuration, and system integration.

1. The integrator must have local service representatives within 120 miles of the project site.

1.4 REFERENCES

A. NFPA 70 - National Electrical Code
B. Electronic Industries Association (EIA) Video Surveillance Equipment Standards
C. UL 2044 - Standard for Commercial Closed Circuit Television Equipment
D. UL 3044 - Standard for Safety for Surveillance Closed Circuit Television Equipment
1.5 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 28 05 00.

B. Product Data Submittal: Provide manufacturer’s technical product specification sheet for each individual component type. Submitted data shall show the following:

1. Compliance with each requirement of these documents.
2. All component options and accessories specific to this project.
3. Electrical power consumption rating and voltage.
4. Heat generation for all power consuming devices.
5. All required wiring shall be identified.
6. Number of IP addresses that will be required from the Owner’s Information Systems Department.

7. Statement of Acceptability of Designed Server:
   a. If the Contractor agrees that the server(s) designed and described herein is acceptable for the chosen manufacturer’s solution and meets the demand of the application, this shall be stated in writing and submitted as part of the shop drawing submittal.
   b. If the Contractor does not agree that the server(s) designed and described herein is acceptable for the chosen manufacturer’s solution, Contractor shall itemize the quantity, technical specifications, and capacities of the servers required to support the functionality and device quantities required by the project drawings. Indicate the capacity utilization factor for each server.
   c. Contractor’s bid shall include any required changes in server(s) capacity.

8. Calculation for storage required using the criteria contained in the project drawings.

9. Calculation for required network bandwidth, including any latency restrictions.

10. Provide annual cost and all terms and conditions for the NVMS Software Maintenance Agreement. Include all additional costs and terms and conditions for any Annual Service Contracts provided by the Contractor for all services that are not included in the Software Maintenance Agreement.

C. System Drawings: Project-specific system CAD drawings shall be provided as follows:

1. Provide a system block diagram noting system components and interconnection between components. The interconnection of components shall clearly indicate all wiring required in the system. When multiple pieces of equipment are required in the exact same configuration (e.g., multiple identical cameras), the diagram may show one device and refer to the others as “typical” of the device shown.

D. Sample format of site-specific programming guides to be used for system planning/programming conference with Owner.
E. Meeting agenda for planning/programming conference required in Part 3 of this specification.

F. Submit detailed description of Owner training to be conducted at project end, including specific training time.

G. Quality Assurance:
   1. Provide materials documenting experience requirements of the manufacturer and installing contractor.
   2. Provide system checkout test procedure to be performed at acceptance. Test procedures shall include all external alarm events.

H. Coordination Drawings:
   1. Include all ceiling-mounted devices in composite electronic coordination files. Refer to Section 28 05 00 for coordination drawing requirements.

1.6 SYSTEM DESCRIPTION

A. This specification section describes the furnishing, installation, commissioning and programming of a complete, turnkey combination access control / video surveillance system.

B. Performance Statement: This specification section and the accompanying project drawings are performance based, describing the minimum material quality, required features, and operational requirements of the system. These documents do not convey every wire that must be installed and every equipment connection that must be made. Based on the equipment constraints described and the performance required of the system as presented in these documents, the vendor and the Contractor are solely responsible for determining all wiring, programming and miscellaneous equipment required for a complete and operational system.

C. Refer to the project drawings for model numbers for the Basis of Design for all equipment.

1.7 LICENSING REQUIREMENTS

A. All licenses required for system operation shall be included in the Contractor's bid. Licenses shall include, but not be limited to, server and workstation software, cameras, encoders/decoders, and any other licensing that is required by the manufacturer for operation of any system component.

   1. Camera licenses shall be provided for all cameras listed on the Camera Schedule whether cameras are new or existing.

   2. If the manufacturer requires the purchase of a block of licenses (instead of selling a single license for a single device) the Contractor's bid shall include the appropriate block of licenses that accommodates all device quantities described by the project drawings, plus 8 additional devices for future growth.

   3. Camera licensing that is restricted to a particular device MAC address or in any way is only valid for a particular manufacturer or model number is not acceptable. Camera licenses shall be issued such that the Owner can replace a camera with another camera brand and/or model number and transfer the license from the old camera to the new camera at no additional cost at any future time. This license
transfer procedure shall be capable of being performed by the Owner and shall not require the services of an integrator.

a. Exception: When a camera license is issued as a no-cost license in the limited condition that the NVMS manufacturer and the camera manufacturer are the same company, it is permissible to charge a future license fee to the Owner if the Owner elects to replace the NVMS manufacturer-branded camera with a third-party manufacturer’s camera.

4. The Contractor shall fill out the NVMS Bid Inventory Form located herein and provide at the time of bid.

1.8 PROJECT RECORD DOCUMENTS

A. Submit documents under the provisions of Section 28 05 00.

B. Provide final system block diagram showing any deviations from shop drawing submittal.

C. Provide statement that system checkout test, as outlined in shop drawing submittal, is complete and satisfactory.

D. Provide final camera type and camera requirements schedules documenting all changes made during construction.

E. Warranty: Submit written warranty and complete all Owner registration forms.

F. Complete all operation and maintenance manuals as described below.

1.9 OPERATION AND MAINTENANCE DATA

A. Submit documents under the provisions of Section 28 05 00.

B. Manuals: Final copies of the manuals shall be delivered within 14 days after completing the installation test. Each manual's contents shall be identified on the cover. The manual shall include names, addresses, and telephone numbers of the contractor responsible for the installation and maintenance of the system and the manufacturer for each piece of equipment for each system. The manuals shall have a table of contents and labeled sections. The final copies delivered after completion of the installation test shall include all modifications made during installation, checkout, and acceptance testing. The manuals shall consist of the following:

1. Hardware Manual: The manual shall describe all equipment furnished including:

   a. General description and specifications.
   b. Installation and check out procedures.
   c. System layout drawings and schematics.
   d. Alignment and calibration procedures.

2. Software Manual: The software manual shall describe the functions of all software and shall include all other information necessary to enable proper installation, testing, and operation. The manual shall include:

   a. Definition of terms and functions.
   b. System use and application software.
   c. Graphical user interface use.
   d. Reports generation.
3. Operator’s Manual: The operator’s manual shall fully explain all procedures and instructions for the operation of the system including:
   b. System startup and shutdown procedures.
   c. Use of system.
   d. Recovery and restart procedures.
   e. Use of report generator and generation of reports.
   f. Data entry.
   g. Operator commands.
   h. Alarm messages.
   i. System permissions functions and requirements.

4. Maintenance Manual: The maintenance manual shall include descriptions of maintenance for all equipment including inspection, periodic preventive maintenance, fault diagnosis, and repair or replacement of defective components.

1.10 WARRANTY

   A. Unless otherwise noted, provide warranty for one (1) year after Date of Substantial Completion for all materials and labor.

   B. Onsite Work During Warranty Period: This work shall be included in the Contractor’s bid and performed during regular working hours, Monday through Friday.

   1. Inspections: Perform one minor inspection six-months after Substantial Completion and one major inspection prior to the expiration of the warranty.

   2. Minor Inspections: Inspections shall include:
      a. Visual checks and operational tests of all equipment, field hardware, and electrical and mechanical controls.
      b. Mechanical adjustments if required on any mechanical or electromechanical devices.
      c. Install all available software updates, patches, or bug fixes available from the NVMS manufacturer.

   3. Major Inspections: Inspections shall include all work described under paragraph Minor Inspections and the following work:
      a. Clean all equipment, including interior and exterior surfaces.
      b. Perform diagnostics on all equipment, including all system software diagnostics, and correct all diagnosed problems.
      c. Adjust all camera alignments that have become out of alignment from their documented position at Substantial Completion.
      d. Install all available software updates, patches, or bug fixes available from the NVMS manufacturer.
      e. All warrantable system deficiencies during the Major Inspection shall be remedied under warranty at no cost to the Owner.
C. Operation: Upon the performance of any scheduled adjustments or repairs, verify operation of the NVMS system.

D. Emergency Service: The Owner will initiate service calls when the NVMS system is not functioning properly. Qualified personnel shall be available to provide service within the distance defined above. The Owner shall be furnished with telephone number(s) where service personnel can be reached 24/7/365.

E. Records and Logs: Keep records and logs of each task completed under warranty. The log shall contain all initial settings upon Substantial Completion. Complete logs shall be kept and shall be available for review on site, demonstrating that planned and systematic adjustments and repairs have been accomplished for the NVMS system.

F. Work Requests: Record each service call request on a service request form. The form shall include the model and 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 what must be done, the amount and nature of the materials used, the time and date work started, and the time and date of completion. Deliver a record of the work performed within five (5) days after work is accomplished.

G. System Modifications: Make any recommendations for system modification in writing to the Owner. No system modifications shall be made without prior approval of the Owner. Any modifications made to the system shall be incorporated into the operations and maintenance manuals, and other documentation affected. To the fullest extent possible, the Owner shall be provided with electronic restorable versions of all configurations prior to the modifications being made.

H. Software: Provide all software updates during the period of the warranty and verify operation in the system. These updates shall be accomplished in a timely manner, fully coordinated with NVMS system operators, shall include training for the new changes/features enabled, and shall be incorporated into the operations and maintenance manuals, and software documentation.

I. Refer to the individual product sections for further warranty requirements of individual system components.

1.11 SOFTWARE MAINTENANCE AGREEMENT/ANNUAL SERVICE CONTRACT

A. Provide annual cost and all terms and conditions for the Software Maintenance Agreement (SMA) provided by the NVMS manufacturer and/or the Contractor.

B. The Owner will enter into a contract directly with the vendor. This specification is not a contract between the Owner and the vendor to perform these services. The cost and terms of the SMA may be used by the Owner for NVMS solution selection.

PART 2 - PRODUCTS

2.1 NETWORK VIDEO MANAGEMENT SYSTEM – GENERAL REQUIREMENTS

A. The network video management system (NVMS) shall be an enterprise-class client/server based video security solution that provides management of digital video, audio and data across a TCP/IP network a commercial class PC-based software solution that provides management of digital video and data across a TCP/IP network.
B. Provide a turnkey solution that includes furnishing, installation, and configuration of a separate IP network, complete with all required network electronics, switches, and other hardware. The VMS shall utilize network switch ports provided by the Owner for all required IP connections. Provide the Owner with a complete list of all IP ports required.

C. ONVIF Compliance

1. The NVMS system shall be ONVIF certified as an ONVIF Network Video Client.

2. Cameras shall be ONVIF certified as an ONVIF Network Transmitter unless specifically noted as an exception to this requirement in the project drawings.

D. The NVMS system shall be an “open system.”

1. To meet this requirement, the NVMS must directly support cameras from a minimum of three (3) readily available camera manufacturers.

2. The three (3) camera manufacturers must have no corporate relationship to the NVMS manufacturer.

3. “Directly support” shall be defined as plug-n-play using drivers that are commercially available at the time of bid that utilize the ONVIF specification as the means of integration.

4. In addition to the requirement to support three (3) independent manufacturer’s cameras, the NVMS may support an unlimited additional quantity of in-house or other proprietary cameras.

5. The open system shall not require proprietary storage solutions. It shall support third party storage solutions, including:

   a. Commercially available Direct Attached Storage (DAS) devices.

   b. Network Attached Storage (NAS) devices.

   c. Storage Area Networks (SAN) for primary or archival storage purposes. Primary support for SAN shall be defined as:

      1) The ability to directly record to SAN device without first recording to an NAS or DAS.

      2) The NVMS is provided with a user experience that makes the video recorded to the SAN transparent to the user. This shall be defined as:

         a) Full search, bookmarking, and other software features for finding, marking, locating, and identifying video are supported by the NVMS for video recorded to a SAN in an identical way to video that is recorded to an NAS or DAS.

         b) No loading of the video from the SAN into the NVMS shall be required.

         c) Full playback, windowing of camera video, archiving, and exporting is supported by the NVMS for video recorded to
the SAN in an identical way as video recorded to an NAS or DAS.

6. The system must have a published API/SDK permitting third party integrations to the product without restrictions.

7. The NVMS shall support active directory using LDAP protocol.

E. The NVMS system shall consist of the following hardware/software components:

1. Software:
   a. Server and client desktop PC control software
   b. Recording services, archival services, and storage management
   c. Configuration tools

2. System storage as specified on the project drawings.

3. Cameras and related hardware as specified on the project drawings.

4. Hardware: Servers, workstations, and miscellaneous hardware (keyboard, mouse, KVM) as specified on the projects drawings.

5. Network electronics and related hardware and software as specified on the project drawings.

F. Video from any camera on the system (on the LAN, WAN or Internet) shall be capable of being viewed from single or multiple workstations simultaneously at any time, limited only by network bandwidth.

G. The NVMS shall support simultaneous displaying of live (30 fps) video of a minimum of 16 cameras while the video monitoring screen is configured in a 16-camera split configuration. In no case shall the frame rate of the camera be required to be restricted to less than 30 fps to display a 16-camera split view.

H. Simultaneous display and recording of every camera shall be supported with independent user-adjustable frame rates that can be set differently for the display stream and the recording stream. These independent settings shall be unique per camera.

I. The NVMS monitoring software shall support any combination of recorded and live video in any multiple camera split view, including viewing recorded video and live video from the same camera.

J. The NVMS shall support continuous recording and event-based recording simultaneously. This shall be capable of being set on a per camera basis.

K. Viewing of video (live and recorded) shall be possible from client software from any client hardware that is connected to the security LAN/WAN or Internet (through appropriate firewalls). In addition, system administration shall be permitted from remote client hardware.

2.2 NVMS MANUFACTURERS

A. Basis of Design: Avigilon
B. Approved Alternate: Genetec
C. Approved Alternate: S2/Lenel
2.3 NVMS SERVER REQUIREMENTS

A. The NVMS shall operate on the Windows 2008 Server Operating System. The server software shall be a multi-tasking, multi-threading application system architecture designed specifically for the Windows environment.

B. The server shall communicate on a TCP/IP based Ethernet LAN capable of utilizing 100/1000BaseT.

C. The server shall be provided by the NVMS system vendor.

D. The server(s) requirements have been calculated based on the NVMS Basis of Design manufacturer noted above. By submitting a bid, the Contractor acknowledges that the calculated server requirements listed here may not be sufficient for a listed alternate, acceptable manufacturer selected by the Contractor. The Contractor shall modify the calculated server requirements listed herein based on the calculated requirement of the chosen manufacturer. The server requirements for the basis of design are as follows:

1. Server Quantity and Location: Refer to project drawings for quantity of servers required and their location.

2. Server Hardware Specification:
   a. Processor: Dual 2.6 KHz 6-core
   b. RAM: 8 GB
   c. On-Board Storage: Two (2) 500GB 7200 RPM drives in RAID1 configuration to be used only for the server software. This is not the required video storage capacity.
   d. Video Card: 8 GB Video Card Matrox G200eW or equal
   e. Power Supplies: Two (2) redundant 750W power supplies.
   f. Accessories: Keyboard, mouse, 22” 16x9 widescreen monitor, Gigabit Ethernet.

E. The NVMS shall operate on SQL Server 2008 SQL Server Express SQL Server or Oracle. All licensing shall be included in the Contractor’s bid.

2.4 NVMS CLIENT REQUIREMENTS

A. The NVMS PC workstation(s) shall be provided by the NVMS system. The PC workstation shall be the same workstation for access control.

B. The workstation(s) for the basis of design are as follows:

1. Workstation Quantity and Location: Refer to project drawings for quantity of servers required and their location.

2. Workstation Hardware Specification:
   a. Processor: Intel Core i5 or equal
b. RAM: 8 GB

c. On-Board Storage: One (1) 500GB 7200 RPM drive to be used only for required client software. This is not the required video storage capacity.

d. Video Card: 2 GB on-board video card.

e. Accessories: Keyboard, mouse, 19” 16x9 widescreen monitor, 802.11 A/B/G WIFI, on-board sound card, Gigabit Ethernet adapter.


2.5 NVMS SYSTEM DETAILED REQUIREMENTS

A. Network Requirements: The NVMS shall support Ethernet 10/100 BaseT and Gigabit Ethernet.

1. Network protocols shall be supported including TCP/IP, IPX, and UDP.

2. The network interface shall allow remote access of the NVMS from anywhere on the end-user’s LAN/WAN or Internet (behind firewall).

3. The system shall permit limiting of frame rate transmission to individual clients.

4. Both Multicast and Unicast shall be supported.

5. All transmission of system data shall be secured using Secure Socket Layer (SSL) security on the TCP/IP network.


B. Video Formats:

1. The NVMS shall support MJPEG, JPEG2000, MPEG-4, and H.264 compression formats.

2. The system shall support any single stream of bandwidth up to 90Mbit/sec at 30 fps at 4872 x 3248 resolution with no system performance degradation, assuming appropriate network bandwidth.

3. Video shall be recorded using a 256-bit encryption algorithm with authentication (watermarking) software suitable for evidentiary proceedings. The watermarking feature shall provide evidence of altered video.

a. The video shall be watermarked with the authentication key/signature during recording of live video to the drive.

b. A video player shall be provided with the NVMS system.

1) The player shall have the ability to validate the authentication upon playback.

2) This authentication shall provide the storage media name, camera name, video time, and user information.

3) The authentication shall have the ability to be password protected.
4. Resolution:
   a. The camera resolution shall be user selectable on a per-camera basis. Selecting or changing resolution shall not require a restart of the application, server, or workstation.
   b. The system shall support the following resolutions:
      1) NTSC Resolutions: 0CIF (176 x 120), CIF (352 x 240), 2CIF (704 x 240), 4CIF (704 x 480).
      2) VGA Resolutions: QVGA (320 x 240), VGA (640 x 480), SVGA (800 x 600), XGA (1024 x 768), 4xVGA (1280 x 960).
      3) Megapixel Resolutions: SXGA (1280 x 1024: 1.3MP), SXGA+ (1400 x 1050: 1.4MP), UXGA (1600 x 1200: 1.9MP), WUXGA (1920 x 1200: 2.3MP), QXGA (2048 x 1536: 3.1MP), WQXGA (2560 x 1600: 4.1MP), QSXGA (2560 x 2048: 5.2MP), 3296 x 2472: 8MP, 4000 x 2672: 11MP, 4864 x 3248: 16MP, 6576 x 4384: 29MP.
         a) 16:9 and 4:3 formats shall be supported.
      4) HDTV Resolutions: 720p, 1080(i/p) in 16:9 format.

C. Remote Clients:

1. The NVMS system shall include the ability to view live video or playback recorded video over the LAN/WAN or the Internet from any PC. This function shall NOT require any installed client software. An industry standard Web Browser (e.g., Internet Explorer, Firefox, Chrome) shall be the only software required to view non-authenticated video from a remote PC.
   a. Any plug-ins (e.g., ActiveX, Java, Flash) required to view remote video shall be capable of being pushed to the user’s PC at the time of initiating the remote video viewing session.
   b. Remote viewing shall be supported whether the remote client is:
      1) Inside the firewall containing the NVMS.
      2) Outside the firewall containing the NVMS.
      3) Accessing the NVMS through a VPN.

2. Remote Client Features:
   a. Display live video.
   b. Digital zooming and panning of fixed cameras.
   c. PTZ camera control in real time, including adjusting PTZ lock and dwell times.
   d. Ability to access video from all accessible recording devices.
   e. Priority-based camera control takeover.
Customizable camera viewing screen split configurations that are retained under the user login between remote client sessions.

D. Mobile Clients (Apps):

1. The NVMS shall include a mobile video viewing application for the iOS/Apple] Android operating system.

   a. The iOS application shall be a single universal application supporting both the iPhone 4s and iPad 2 resolutions. An iPhone application that scales up for use on the iPad using the iPad 1x/2x feature is not acceptable.

   b. The Android application shall be a universal application that supports Android smartphones and Android tablets. The Android application shall support Android codeset name Ice Cream Sandwich and may require a minimum installed codeset of Gingerbread.

2. Features:

   a. The mobile client shall permit viewing of live video or playback of recorded video.

   b. Split screen video display shall be supported. The split screen shall permit live and recorded video simultaneously in the screen split. The screen split layout shall be retained between mobile client sessions.

   c. Provide time synchronization of the video of different cameras to account for mobile network latency to ensure that live video from multiple cameras is time synchronized.

   d. The mobile client shall be optimized with video compression to support video viewing on mobile networks. The mobile client shall maintain a minimum of 7 fps per camera on a mobile network performing at 200 Kbit/s with a latency of 200ms.

   e. All transmission of system data shall be secured using Secure Socket Layer (SSL) security at a minimum.

E. Workstation Client Software Requirements:

1. The client software for the NVMS shall run as an application on Windows 8.1 or Windows 10 64-bit. The client software shall not require a PC more robust than that defined above in the section entitled “NVMS CLIENT REQUIREMENTS.” Should the workstation client software require a PC configuration more robust than that defined herein, the cost of upgrading the workstation hardware to the more robust requirement shall be paid by the Contractor.

2. Licensing:

   a. Provide licensing for 4 concurrent clients on the system.

3. The client software shall provide video signal detection and provide alerts whenever video is lost on any input channel.

4. Updates to the client software shall be capable of being pushed to all clients from the NVMS server.
5. The client software shall provide a graphical mapping feature. The graphical map shall accommodate the importation of CAD files, or custom development of floor plans or site plans to create a to-scale or not-to-scale graphical representation of the system layout including all cameras.

a. Cameras located on the graphical map shall be "live," which is defined as the ability to click the camera in the graphical user interface (GUI) to see camera information and live video. The camera name shall be available to the user via a "mouse hovering" maneuver over the camera icon.

b. For site cameras, the graphical map shall consist of an overall site plan showing all exterior cameras. Buildings and other physical entities on the site shall be graphically represented.

1) The buildings shown on the site plan shall visually indicate to the user that cameras are located inside that building's interior, if applicable.

c. The user shall be able to click a building that contains cameras to obtain a new graphical layout of that building. Once the building interior layout graphical map is on screen, interior cameras shall be represented by icons.

d. The user shall have the ability to navigate back to the main (previous) graphical map via a single-click graphical icon.

6. Camera Configuration:

a. Each camera shall be configurable for a 32-alphanumeric character name.

b. The system shall allow for the setup and adjustment of brightness, contrast, archiving, motion detection, and Pan/Tilt/Zoom on a per camera basis.

c. The NVMS shall support a separate frame rate for recording and a separate frame rate for viewing for every camera input (assuming the camera provides two streams). These frame rates shall be capable of being independently set for each camera input.

d. The NVMS shall support the PTZ control of analog NVMS cameras through the encoders.

e. The compression algorithm formats MJPEG and MPEG4 shall be supported in the same system and shall be individually selectable on a per-camera basis.

f. Each individual camera shall be capable of having individual camera settings that shall include (at a minimum):

1) Continuous recording.
2) Motion-based recording capability shall be provided including:
   a) Motion as determined by the NVMS software using:
      (1) Entire screen motion detection
      (2) User defined area triggers
   b) Motion as determined at the camera.
   c) Motion trigger by digital inputs from external trigger systems such as contact closures, alarm inputs, POS integration, etc.
      (1) Motion triggers received by external trigger inputs shall be recorded by the event recording capabilities of the NVMS and identifiable on a timeline during playback and in reports.

3) Alarm-initiated recording.
   a) When a camera enters alarm recording mode, the NVMS shall have the capability of changing to different camera settings for the recorded video during the duration of the alarm mode. The settings capable of being changed shall include the frame rate and the resolution. These setting changes shall be configurable in advance per camera by the User through the software GUI.

4) Time-based recording on a preset schedule.

5) Manual (user) activation of the start and stop of the recording process through the GUI.
   a) The NVMS software shall prevent any user from manually starting and stopping the recording of video based on that user's login credential.

6) Defined pre-event and post-event recording buffers shall be provided for all non-continuous recording events.

7) Each camera shall be capable of having unique storage retention settings.
   g. The NVMS shall support unidirectional audio recording utilizing the built-in audio recording capability of audio-equipped IP cameras.

F. Software Security Requirements:

1. All users shall be capable of being authenticated against Active Directory using LDAP, before being granted system access. Should the Owner not use Active Directory, the NVMS shall provide a built-in login and credential management tool to permit rules-based access rights on a per-user basis.

2. The access rights shall be selectable on a per-user basis. In addition, user groups shall be capable of being assigned whereby each user group has a common set
of access rights. Users shall be capable of being assigned to these user groups by the system administrator.

3. Access rights available for customization shall include:

a. Live Video Viewing:
   1) Use of PTZ controls.
   2) Start and stop of manual recording.
   3) Access to and exclusive from individual cameras and monitors.
   4) Access to system settings.
   5) Ability to define video blocking positions of PTZ cameras for certain users.

b. Viewing Recorded Video:
   1) Ability to export recorded video, including email.
   2) Access to system archiving and backup.
   3) Ability to watch recorded video from individual cameras.
   4) Ability to delete recorded video.

c. Camera Setup:
   1) Add or remove cameras from the system.
   2) Change camera settings including resolution and frame rate.
   3) Change motion detection and other defined triggers.

d. General Settings:
   1) Change client software settings.
   2) Ability for user to configure or change custom viewing screen configurations.
   3) Modify server settings.
   4) Change recording or bandwidth settings.
   5) Configure users.
   6) Access and configure external messaging capabilities.
   7) View, print, save and clear the system log.

G. Pan/Tilt/Zoom (PTZ) Control:

1. The NVMS shall support PTZ control from any client, including remote and mobile clients.

2. The following PTZ features shall be supported:

   a. Priority Levels
   b. Device Group Control
   c. PTZ Override (Lockout)
   d. Proportional PTZ Control
   e. Preset Lock via video screen
   f. Preset Tour
H. Video Archiving:

1. The archiving feature shall be hardware independent, providing the ability to utilize commercial off-the-shelf mass storage devices as archived video destinations, including optical DVD, DAS, NAS, SAN, and other external storage drives.

2. The archiving software shall provide the ability to manage and store video information from multiple recorded video locations to a central location.

3. Each NVMS server shall have the ability to set its own unique archiving settings. Video shall automatically be archived based on user-defined "percentage full" settings. When the NVMS reaches the designated capacity threshold, video shall be automatically copied to the archive storage destination, and space on the source of the recorded video shall be released for overwrite by new video information using a first-in, first-out algorithm.
   a. Exception: Video marked or tagged by the user or by automated alarm inputs shall be retained by the archiving process despite its location in the first-in, first-out timeline.

4. Regardless of the video’s storage location (local or in the archive), the NVMS software shall automatically retrieve video associated with an event on demand by the user in response to a search, browse, or other retrieval action. The actual storage location of the video shall be transparent to the user.
   a. Exception: Video archived to removable media (e.g., removable hard drives or optical DVD) shall require prompting to the user to insert the appropriate media.

5. Archiving shall be capable of being scheduled such that archiving will only run during certain hours defined by the Owner.

6. The NVMS solution shall be permitted to utilize advanced algorithms for managing onboard storage such as reducing the frame rate of recorded video for the oldest video as an alternative to completely removing the video using a first-in, first-out algorithm. If this option exists in the NVMS software, it must have the following features:
   a. Ability of the Owner to completely disable the feature.
   b. Ability to set a minimum frame rate that the system will not exceed.
   c. Ability to set the feature on a per-camera basis.

I. Video Viewing Layouts:

1. The NVMS shall support the ability to save the list of camera views currently being displayed, along with the currently selected template, with a user-defined name to be loaded as needed by the system operator.

2. System operators shall have the ability to define multiple viewing templates that can be recalled and configured on an as-needed basis.

3. This feature shall be subject to the access rights provided by the system administrator through their login credential.
J. Still Image Capture/Save:

1. During playback or monitoring of video, the system shall have the ability to create and save a still picture. This operation shall not affect any other operation and shall not alter the recorded video. The file format shall be an industry standard format (JPEG, TIFF) allowing for file transfer via e-mail, printing, or file transfer to other media.

2. This feature shall be subject to the access rights provided by the system administrator through their login credential.

K. Export Video Clip to File:

1. The NVMS shall have the ability to save and export recorded video to a file (MPEG, AVI) for sharing and reviewing video clips. The start and end times for each video segment shall be user defined. The exported video clip shall be viewable via a standard Windows media player.

2. This feature shall be subject to the access rights provided by the system administrator through their login credential.

L. Automated Motion Video Searching:

1. The system shall support advanced automated motion video searching against pre-recorded video. The automated motion video search shall analyze frames in a video segment to detect motion activity from image to image. It shall display thumbnail images of the frames with activity, complete with a histogram depicting the relative amount of activity within each frame.

2. The search shall be defined by selecting a specific camera and a specific time period in which the suspected activity took place. All motion events associated with that camera and time period shall be displayed in either a trace or thumbnail format for review.

3. Motion shall be capable of being restricted to any user-defined area of the screen as drawn by the user using a windowing tool in the software.

M. Video System Analytics (VSA):

1. The NVMS shall provide an embedded Video System Analytics solution.

2. The result of a trigger of an VSA shall be user definable and shall include:
   a. Marking video.
   b. Adjusting recording characteristics including frame rate and resolution.
   c. Activating changes in the monitoring of cameras, including showing full screen video of the triggered camera.
   d. Providing screen prompting to the system operator.
3. The set of Intelligent Video Analysis algorithms shall provide the following functionality:

a. Alert Types:

1) Smart Video Motion Detection. This VSA shall have algorithms to filter out minor vibrations. The sensitivity of this filter shall be user adjustable. This VSA shall also provide motion masking where the user can define an area of the frame where motion will be ignored.

2) Camera Tampering. When the VSA detects a camera is moved from its original position, when the camera view is obstructed, or when the focus is changed, this VSA shall activate.

3) Sudden Change in Light Intensity. This VSA shall trigger when there is an extreme change in ambient light – light to dark or dark to light. The sensitivity of this VSA shall be user definable.

4) New Object in Scene. This VSA shall detect an object that was not present when the VSA originally learned the scene or that has been inserted into the scene in a user defined area in the field of view.

5) Object Removed from Scene. When an object that was present when the VSA originally learned the scene view has been removed from the scene, this VSA shall activate. This VSA shall be capable of being applied to a window of the total field of view as defined by the user.

6) Specific Object Detected in Scene. This VSA shall trigger when an object is detected that is defined by specific properties including people, automobiles, or an object of a specific color.

7) Congestion in Defined Area. This VSA shall occur when the VSA detects congestion in a specific area of the scene as defined by the user.

8) Directional Motion VSA shall occur when the VSA detects an object moving in a direction specified in the setup of this feature.

9) Object Crosses a Defined Region. This VSA shall detect an object moving across a virtual boundary or into a defined area from a specified direction.

10) Moving Object Stops. This VSA shall detect when a moving object in the scene ceases to move.

11) Static Object Starts to Move. VSA shall occur when the VSA detects when a static object in the scene starts to move.

12) Object Moves Too Fast. This VSA shall trigger when an object is moving faster than a pre-defined speed.

13) Loitering. This VSA shall detect when a person or group of people in the scene slows down or ceases to move for a specified period of time.
14) Detection of a Human Face. This VSA shall trigger when the VSA detects a frontal view of a human face.

15) People Counting. This VSA shall be used when a camera is positioned in a top-down view of an entry/exit portal. This feature shall provide an alarm with a positive count for entry and a negative count for exit.
   b. The VSA shall support the ability to store the graphical output for a specific event for use with VSA alarms. This feature shall allow the graphical output of a specific event to be stored as a file and later used as an overlay to be used and associated with an alarm for historical searching.
   c. The VSA shall support CIF, 4CIF, and D1 video resolutions during video processing.
   d. The VSA shall support video infrared imaging.

N. Intelligent Audio Analysis:
   1. The NVMS shall provide the ability to perform analysis on audio streams associated with recorded video.
   2. Supported audio analytics shall include high pitched sounds, impact sounds, or other dramatic changes to a defined ambient noise threshold.
   3. When searching for these audio alarms, the search shall include video stored locally or on an archive destination.

O. The NVMS shall provide up to 10 different and independent programmable recording schedules.
   1. The schedules may be programmed to provide different record frame rates for day, night, and weekend periods, as well as holidays and exception days.
   2. Advanced task schedules may also be programmed that could specify allowed logon times for user groups, when events may trigger alarms, and when data backups and archiving should occur.

P. The VMS shall support Dual Authorization logon. It shall function as follows:
   1. Dual Authorization user groups may be created.
   2. Logon pairs, consisting of any two normal user groups, may be assigned to each Dual Authorization user group.
   3. A separate set of privileges and priorities can be assigned for each Dual Authorization user group.
   4. For each user group assigned as part of a logon pair, it shall be configurable whether the group can:
      a. Log on either individually or as part of the logon pair.
      b. Log on only as part of the logon pair.
5. If a user that is part of logon pair logs on individually, then the user shall receive the privileges and priorities of the user’s assigned user group. If the same user logs in as part of a logon pair, then the user shall receive the privileges and priorities assigned to the Dual Authorization group to which the pair is assigned.

Q. The NVMS shall auto-discover cameras and encoders. Device detection shall support devices in different subnets.

R. The NVMS shall be designed in such a way that server downtime or loss of communication to the server does not affect the functionality of the recording services. Normal recording and motion recording shall continue during server downtime.

2.6 NVMS RECORDING REQUIREMENTS

A. The NVMS shall provide management of the recording and playback of video, audio, and data (bookmarking, alarm data, etc.).

B. Refer to the Camera Schedules on the project drawings for specific variables to be used on a per-camera basis for the purpose of calculating storage capacity and retention.
   1. Total distributed storage requirements shall be determined based on a minimum of 60 days storage retention.
   2. Cameras, unless otherwise noted on the Camera Schedule(s), shall be assumed to be recording 24 hours per day, 7 days per week, 365 days per year. Specific per-camera assumptions stated on the Camera Schedule for percent motion shall be used in the storage calculation.
   3. Compression shall be permitted to be used in the storage calculation. The compression algorithm (MPEG-4, H.264, etc.) shall be used on a per-camera basis. If the NVMS permits variable levels of compression intensity, the use of the “average” or “medium” level setting shall be used in the storage calculation unless otherwise noted.
   4. The Contractor shall provide the complete storage analysis and calculation as a shop drawing.

C. Network Video Recorder (NVR) Hardware Platform:
   1. The NVR shall be defined as a storage device for recording IP video streams from IP cameras or from analog cameras that have been encoded to IP. In both cases, the NVR shall record IP streams from cameras or encoders located anywhere on the IP network without being direct-cable connected to the NVR.
   2. Refer to the project drawings for specific requirements, model numbers, and basis of design for the NVR.
   3. NVR Configuration:
      a. The NVR shall contain one hard drive for the operating system and software, and all hard drive storage required to achieve the required storage retention.
      b. Provide with RAID 5 hard disk controller configuration for the video storage hard drives.
4. The NVMS shall provide a failover function where an NVR can be assigned as a backup to other NVRs. When an assigned NVR goes out of service, the failover NVR takes over the responsibilities of the failed NVR. When the primary NVR returns to service, the control shall be automatically transferred back to the primary NVR.

5. It shall be possible to assign a redundant NVR to every NVR for use in normal operation of all NVR(s) in the system. The redundant NVR shall record the same streams as the primary NVR. The redundant NVR shall have its own disk drives where it shall store the recorded data.

   a. It shall be possible to view the data recorded by the redundant NVR in the client software. The redundant NVR shall have camera symbols that can be placed in the camera selection tree. These cameras shall have the same name as the cameras of the primary NVR. An indication shall be provided to indicate that the camera names are located on the redundant NVR.

2.7 NVMS ALARM REQUIREMENTS

A. The NVMS shall provide the capability to accept external alarm triggers in the following formats:

1. Momentary or maintained low voltage contact closures
2. Digital I/O (0 / 10V DC)
3. RS-232 integration
4. Custom integration

B. Alarms shall be capable of being scheduled such that they are only active during defined times.

C. The NVMS shall allow alarms to be individually restricted to specific user groups or users.

D. A single alarm event shall be capable of activating a series of output events including:

   1. Mark recorded video.
   2. Initiate an email, text message, or both.
   3. Initiate an on-screen alarm prompt in a segmented “Alarm Queuing Window.”
   4. Modify recorded video settings including resolution and frame rate.
   5. Modify video viewing options including bringing associated video full screen on any output.

E. The alarm queue shall display alarms in order of their priority, with rows for higher priority alarms always displayed above lower priority alarm rows. The display order for equal priority alarms shall be selectable between new alarms displayed above existing alarms or new alarms displayed below existing alarms.

F. Alarm Processing: The video management system shall operate as follows:

   1. When an alarm is accepted by a user, it shall be removed from the other users' alarm lists.
2. The user shall be able to cancel acceptance of any alarm that has been previously accepted. In this case, the alarm shall re-appear in the alarm lists of all members of the user groups assigned to this alarm.

G. The NVMS shall support the association of workflows with alarms. Workflows shall consist of action plans and comment boxes. An action plan shall display a text document, HTML page, or web site that typically contains instructions for handling the alarm. Comments entered in the comment boxes shall be logged in the system logbook.

1. The NVMS shall be configurable to force an alarm workflow. In this case, the alarm cannot be cleared until the workflow is processed.

H. The NVMS shall offer the possibility to automatically clear alarms when the originating event condition is no longer true.

I. Alarms shall be capable of being configured to send cameras to defined positions.

2.8 NVMS INTERFACES AND INTEGRATIONS

A. Security Management System Integration:

1. Refer to the project drawings for all information regarding the Security Management System (SMS).

2. The NVMS shall be integrated with the SMS to provide communication and alarm functionality between the two systems defined as follows, at a minimum:
   a. Any alarm/event in the SMS shall have the ability to be associated with a digital video clip in real time.
      1) The NVMS shall support user-defined video marking that includes time before and after the alarm event.
      2) SMS alarm events shall be capable of triggering a defined video sequence of operation.
   b. The NVMS shall support NVMS PTZ control via the SMS video interface.
   c. The integration shall support bidirectional alarm monitoring, alerting, and acknowledgement for either system from either system.
      1) Both alarm acknowledgement and alarm reset shall be supported.
   d. Video Camera Groups/Video Camera Tours:
      1) The NVMS shall support camera grouping to allow for video camera tours in the SMS Alarm Monitoring Module.
      2) An unlimited number of camera groups shall be supported in the SMS, and each camera group shall support an unlimited number of cameras. Cameras within a camera group shall be capable of spanning any storage media. Individual cameras shall have the ability to be placed into multiple camera groups.
      3) The SMS shall provide for video camera tours that rotate live video between each of the cameras defined in the video camera group.
at a user-defined increment. The time increment shall be user definable in whole seconds.

3. The integration shall be:
   a. An integrated product from a single manufacturer, such that a single manufacturer supplies, supports, and warrants the entire solution including the integration.
   b. An integration of two separate companies through ONLY an open API/SDK. The API/SDK integration must be complete, functional, and in use in the marketplace. The ability to integrate through an API/SDK without the integration being done in the marketplace is not acceptable. Custom or proprietary integrations are not acceptable.

B. Additional Integration Requirements:
   1. Relays from devices connected to the system shall be controllable from command scripts, the NVMS SDK, and icons on the user interface.
   2. Input and relay state changes from devices connected to the system shall be recognizable as events in the NVMS.
   3. The video management system shall be capable of monitoring third party equipment using SNMP and Rmon protocols.
   4. The video management system shall provide a command script interface that allows system operations to be programmatically controlled.
      a. The system shall provide a built-in editor for the creation of the command scripts.
      b. The system shall be configurable such that operators can execute the created scripts by double-clicking on representative icons in a logical tree or site map.
      c. The system shall be configurable such that the created scripts can be executed automatically in response to a system event. The automatic event-driven execution shall optionally be schedule-dependent.
      d. The system shall be configurable to execute a user-group dependent command script on user logon.
      e. The system shall be configurable to execute an alarm-dependent command script on user acceptance of the alarm.
   5. The video management system shall provide a software interface that allows third-party software to generate events in the video management system. The software shall support any COM programming languages (e.g., Visual Basic and C++), any .Net programming language (e.g., C#) or JavaScript.
   6. The NVMS shall allow third-party software to include up to 10 data fields and an alarm ID, along with the virtual input event.
      a. These fields shall be searchable in the system logbook.
b. The virtual input data shall be capable of being displayed in playback mode synchronously with the associated video.

C. SDK Integration:

1. The video management system shall provide a documented Software Development Kit (SDK) to allow integration with third-party software.

2. The SDK shall expose all functionality of the command scripts, including, for example:

   a. Control of operator workstation image window layout
   b. Sending messages to specific workstations
   c. Assignment of cameras, documents, URLs, and maps to operator client workstation image panes
   d. Assignment of cameras to analog monitors connected to encoders
   e. Dome control
   f. Alarm generation
   g. Recording mode control
   h. Exporting of recorded data
   i. Relay control

3. SDK functionality shall be password protected.

4. The SDK shall be accessible from all .Net programming languages.

D. OPC Server:

1. The VMS shall provide an OPC server for integration into third-party software systems, such as building management systems.

2. The OPC interface shall follow the OPC Alarms and Events standard.

2.9 NVMS CABLING

A. Refer to Division 27 for all cabling requirements.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with the manufacturer's instructions and recommendations for installation of all products.

B. Provide all system wiring between all components as shown on the project drawings or as directed by the manufacturer, whichever is the more stringent requirement.

C. Mount all cameras in the approximate locations shown on the drawings. Coordinate installation with other trades and utilities in the vicinity. Cameras containing fixed lenses, moved by more than 1'-0" from their location shown on the drawings, shall have a new lens calculation performed by the Contractor. Provide Architect/Engineer with results of lens calculation before proceeding with installation.
D. Coordinate with Owner’s IT Department to acquire network connections as well as any network configuration information, such as IP numbers, that will be required to connect NVMS to Owner network (if applicable).

E. Provide all low voltage and +120 VAC power to all devices as required for proper system operation. Refer to Sections 26 05 33 and 26 05 13 for further requirements.

F. All low voltage security wiring shall be routed with other low voltage cabling and shall use the cable tray to the fullest extent possible routed and supported separately from all other telecommunications cabling.

G. Cabling shall be plenum rated when installed outside of conduit in plenum ceilings.

3.2 FIELD QUALITY CONTROL

A. Where these specifications require a product or assembly without the use of a brand or trade name, provide a product that meets the requirements of the specifications as supplied and warranted by the system vendor. If the product or assembly is not available from the system vendor, provide product or assembly as recommended by the system vendor.

B. Periodic observations will be performed during construction to verify compliance with the requirements of the specifications. These services do not relieve the Contractor of responsibility for compliance with the project drawings.

C. It shall be the Contractor’s responsibility to correct all inadequate picture quality issues prior to acceptance of the system.

3.3 MANUFACTURER’S FIELD SERVICES

A. Installation shall be performed by a factory-trained and certified Contractor.

   1. Provide a comprehensive, site-specific customer planning guide for the system. Conduct a conference with the Owner prior to any installation to discuss the programming options of the system and the planning guide. The result of this planning guide shall be the determination of the system options for each device and for the software.

B. Include labor for all planning and all programming activities required to implement the Owner’s operational preferences for each device and software. Any software programmable option, within the bounds of the capabilities of the hardware specified, shall be included.

C. Provide a complete, functional system as described by the project drawings. These responsibilities include:

   1. Complete hardware setup, installation, wiring, and software configuration of the system, including all remote operator locations and all peripheral hardware.

   2. Complete programming of all hardware and software options in accordance with the Owner’s preferences as determined by the planning guide conference.

   3. Programming of all custom graphic GUI screens including devices.

   4. Complete system diagnostic verification.
D. Provide an authorized manufacturer representative to commission the system and ensure that facility-wide standards and project setup procedures are adhered to.

3.4 SYSTEM ACCEPTANCE

A. Submit for review a formal acceptance and system checkout program. The system checkout procedures shall include all system components and software. Perform the tests and document all results under the supervision of the manufacturer’s system engineer.

B. All operational scenarios, as defined by the customer planning guide, shall be tested to simulate the actual use of the system in the normal operating environment. The successful completion of these operational scenarios shall be documented.

3.5 SYSTEM DOCUMENTATION

A. Complete documentation shall be provided for the system. The documentation shall describe:

1. All operational parameters of the system.
2. Complete documentation of all programming and options.
3. Complete operating instructions for all hardware and software.

B. The following sections shall be provided in the system documentation:


3.6 SYSTEM TRAINING

A. All labor and materials required for on-site system training by a certified representative of the system manufacturer shall be provided. Training shall be conducted at the project site using the project equipment.

B. Provide two weeks advanced notice of training to the Owner.

C. Provide a training outline agenda describing the subject matter and the recommended audience for each topic.

D. At a minimum, the following training shall be conducted:

1. System Administrators: A course detailing the system functions and operations. Provide configuration training on all aspects of the system.

2. Users: Provide a detailed course outlining the operational features of all aspects of the user interface. Topics shall include alarm monitoring functions, reports, error handling, alarm handling, output relay control, and general overview of the report hardware.
3. GUI Editing: Conduct detailed training on using the GUI editing software. Topics shall include the editing of existing graphical maps and the creation of new graphical maps.

E. Minimum on-site training times shall be:

1. System Administrators: Three (3) days.
2. Users: One (1) day.
3. GUI Editing: One (1) day.

END OF SECTION 28 23 00
## NVMS Bid Inventory Form

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost/Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total fixed (lump sum cost) for the entire project:</td>
<td></td>
</tr>
<tr>
<td>Itemize the total fixed lump sum cost as follows:</td>
<td></td>
</tr>
<tr>
<td>• Software cost for NVMS including all implementation services.</td>
<td></td>
</tr>
<tr>
<td>• Cost for all camera hardware and associated accessories.</td>
<td></td>
</tr>
<tr>
<td>Itemize software cost for the following (show the math):</td>
<td></td>
</tr>
<tr>
<td>• Fixed, non-reoccurring flat base cost (if any)</td>
<td></td>
</tr>
<tr>
<td>• Fixed, non-reoccurring per-camera licensing fee (if any)</td>
<td></td>
</tr>
<tr>
<td>• Recurring flat base cost (if any – do NOT include optional software maintenance agreement costs)</td>
<td></td>
</tr>
<tr>
<td>• Recurring flat per-camera licensing fee (if any)</td>
<td></td>
</tr>
<tr>
<td>• Client workstation licensing fees (if any)</td>
<td></td>
</tr>
<tr>
<td>• Remote Client licensing fees (if any)</td>
<td></td>
</tr>
<tr>
<td>• Mobile Client licensing fees (if any)</td>
<td></td>
</tr>
<tr>
<td>• Itemize all other license fees not included above.</td>
<td></td>
</tr>
<tr>
<td>Add all required and optional software maintenance agreement costs (do NOT include in bid cost).</td>
<td></td>
</tr>
<tr>
<td>Acknowledge receipt of addenda by writing addendum number to the right.</td>
<td></td>
</tr>
</tbody>
</table>
Include below Server Acknowledgement Statement per Section 28 23 00, Article 2.3, Paragraph D.

<table>
<thead>
<tr>
<th>List below all separate software options, licensing or other monetary features that the Integrator interprets as not being requested by this RFP, but that are available from the NVMS manufacturer for purchase. Attach separate document if needed.</th>
</tr>
</thead>
</table>

SECTION 28 31 00
FIRE ALARM AND DETECTION SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Fire alarm and detection systems

1.2 RELATED WORK

A. Section 26 05 53 - Electrical Identification: Refer to electrical identification for color and identification labeling requirements.

1.3 QUALITY ASSURANCE

A. Manufacturer: Company specializing in smoke detection and fire alarm systems with ten years’ experience.

B. Installer: A factory-authorized Electrical or Security Contractor licensed with the State and local jurisdiction with five years’ experience in the design, installation, and maintenance of fire alarm systems by that manufacturer.

C. Qualifications: The person managing/overseeing the preparation of shop drawings and the system installation/programming/testing shall be trained and certified by the system manufacturer and shall be Fire Alarm Certified by NICET, minimum Level 2. This person’s name and certification number shall appear on the start-up and testing reports.

1.4 REFERENCES

A. NFPA 70 - National Electrical Code
B. NFPA 72 - National Fire Alarm and Signaling Code
D. UL 2017 - General Purpose Signaling Devices and Systems

1.5 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 26 05 00 and as noted below.

1. Failure to comply with all the following and all the provisions in 26 05 00 will result in the shop drawing submittal being rejected without review.

2. Failure to submit the fire alarm without all requirements fulfilled in a single comprehensive submittal will be grounds to require a complete resubmittal.

B. Provide product catalog data sheets as shop drawings.

1. Provide a product catalog data sheet for each item shown on the Electrical Symbols List and for each piece of equipment that is not shown on the drawings but required for the operation of the system.

2. Where a particular Electrical Symbols List item has one or more variations (such as those denoted by subscripts, etc.) a separate additional product catalog data sheet shall be provided for each variation that requires a different part number to
be ordered. The corresponding Electrical Symbols List symbol shall be shown on the top of each sheet.

3. Where multiple items and options are shown on one data sheet, the part number and options of the item to be used shall be clearly denoted.

C. Submit CAD floor plans as shop drawings:

1. The complete layout of the entire system, device addresses, auxiliary equipment, and manufacturer's wiring requirements shall be shown.

2. A legend or key shall be provided to show which symbols shown on the submittal floor plans correspond with symbols shown on the Contract Documents.

D. About all fire alarm circuits, provide the following: manufacturer's wiring requirements (manufacturer, type, size, etc.) and voltage drop calculations.

E. Provide installation and maintenance manuals under provisions of Section 26 05 00.

F. Submit manufacturer's certificate that system meets or exceeds specified requirements.

G. Provide information on the system batteries as follows: total battery capacity, total capacity used by all devices on this project, total available future capacity.

H. Voice Alarm Communication System: Submit equipment rack or console layout, grounding schematic, amplifier power calculations, and wiring diagram.

I. Submit photocopy proof of NICET certification of the person overseeing the preparation of drawings and installation/testing.

J. When required to comply with local or state regulatory reviews, the fire alarm submittal shall have a NICET Certification of the state in which the project is completed. NOTE: The Architect/Engineer cannot stamp and seal submittal drawings not prepared under their supervision.

1.6 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Provide quantity equal to 2 percent (2%) of amount of each type installed, but no less than two (2) units of each type.

   a. Smoke and heat detectors, manual pull stations, duct smoke detectors, monitor modules, control modules and relays.

   b. Notification appliances: Speakers, speaker strobes, and strobes.

2. Keys: The installing contractor shall collect all equipment spare keys provided with each lockable or resettable device/cabinet [minimum of one (1) set each] and shall turn over to the Owner upon completion.

3. All spare parts shall be housed in metal cabinet labeled "Fire Alarm Spare Parts."
1.7 DELIVERY, STORAGE, AND HANDLING
A. Deliver products to site under provisions of Section 26 05 00.
B. Store and protect products under provisions of Section 26 05 00.

1.8 REGULATORY REQUIREMENTS
A. System: UL or FM Global listed.
B. Conform to requirements of NFPA 101.
C. Conform to requirements of Americans with Disabilities Act (ADA).
D. Conform to UL 864 Fire Alarm, UL 1076 Security, UL2017 General Signaling.

1.9 SYSTEM DESCRIPTION
A. Performance Statement: This specification section and the accompanying fire alarm specific design documents describe the minimum material quality, required features, and operational requirements of the system. These documents do not convey every wire that must be installed and every equipment connection that must be made. Based on the equipment described and the performance required of the system, as presented in these documents, the Vendor and the Contractor are solely responsible for determining all wiring, programming and miscellaneous equipment required for a complete and operational system.

B. This section of the specifications includes the furnishing, installation and connection of the microprocessor controlled, intelligent reporting, fire alarm equipment required to form a complete coordinated system that is ready for operation. It shall include, but is not limited to, alarm initiating devices, voice evacuation equipment, control panels, auxiliary control devices, annunciators, power supplies, and wiring as indicated on the drawings and specified herein.

C. Fire Alarm System: NFPA 72; Automatic and manual fire alarm system, non-coded, analog-addressable with automatic sensitivity control of certain detectors, multiplexed signal transmission.

D. Voice Communication: The facility shall have an emergency voice alarm communication system. The digitized recorded voice message shall notify occupants that a fire condition has been reported. Emergency manual voice override shall be provided.

E. Emergency Communication System (ECS): A system capable of reproduction of prerecorded, synthesized, or live messages with voice intelligibility to indicate the existence of an emergency situation and communicating information necessary to facilitate an appropriate response and action. The system shall provide alerting in the building.

F. System Supervision: Provide electrically supervised system, with supervised Signal Line Circuit (SLC) and Notification Appliance Circuit (NAC). Occurrence of single ground or open condition in initiating or signaling circuit places circuit in TROUBLE mode. Component or power supply failure places system in TROUBLE mode.

G. Alarm Reset: Key-accessible RESET function resets alarm system out of ALARM if alarm initiating circuits have cleared.
H. Lamp Test: Manual LAMP TEST function causes alarm indication at each zone at fire alarm control panel and at annunciator panels.

I. Drawings: Only device layouts and some equipment have been shown on the contract drawings. Wiring and additional equipment to make a complete and functioning system has not been shown but shall be submitted on the shop drawings.

### 1.10 PROJECT RECORD DOCUMENTS

A. Submit documents under the provisions of Section 26 05 00.

B. Include location of end-of-line devices.

C. Provide a CAD drawing of each area of the building (minimum scale of 1/16” = 1’-0”) showing each device on the project and its address. The devices shall be shown in their installed location and shall be labeled with the same nomenclature as is used in the fire alarm panel programming.

D. Submit test results of sound pressure level (dBA) and intelligibility (STI) with the rooms tested designated on the floor plan. Notification devices shall have the tap wattage designated.

### 1.11 OPERATION AND MAINTENANCE DATA

A. Submit data under provisions of Section 26 05 00.

B. Include operating instructions, and maintenance and repair procedures.

C. Include results of testing of all devices and functions.

D. Include manufacturer’s representative’s letter stating that system is operational.

E. Include the CAD floor plan drawings.

F. Include shop drawings as reviewed by the Architect/Engineer and the local Authority Having Jurisdiction.

### 1.12 DOCUMENT STORAGE CABINET

A. The cabinet shall have all fire alarm system documents, including record drawings, wiring diagrams, operation manuals, etc. A legend sheet permanently attached to the door shall contain system passwords and inspection logs. The enclosure shall also provide two (2) key ring holders for system keys and a location for a standard size business card with service contact information. The cabinet will have, permanently and securely mounted inside, a digital flash memory device with a minimum of 4 GB of storage capacity and a standard USB B connector for uploading and downloading electronic versions of record documents and system programming information.

B. The cabinet shall be red in color with an identification label reading “FIRE ALARM DOCUMENTS”. Refer to Identification Section 26 05 53. The cabinet shall be lockable.

C. The final version of the system database program shall be stored within the cabinet.

D. Locate cabinet in the electrical room.
1.13 WARRANTY

A. Provide one (1) year warranty on all materials and labor from Date of Substantial Completion.

B. Warranty requirements shall include furnishing and installing all software upgrades issued by the manufacturer during the one (1) year warranty period.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Johnson Controls - Simplex
B. Notifier by Honeywell
C. Edwards - EST
D. Siemens Fire Safety
E. Garnwell - FCI

2.2 [FAP-#]: FIRE ALARM CONTROL PANEL (FAP)

A. Control Panel: Modular, power-limited electronic design. Provide surface wall-mounted enclosure as shown on plans. Enclosure shall be minimum 0.060 steel with provisions for electrical conduit connections into the sides and top. The door shall provide a key lock and shall include a glass or other transparent opening for viewing of all indicators.

B. Each Signaling Line Circuit (SLC loop) shall not be loaded over 80% of the maximum device capacity. For example, in the minimum system capacity column listed below, if the fire alarm manufacturer’s system capacity of analog sensors per loop is 99 devices, then no more than 79 devices shall be wired on that loop. The minimum system capacity shall be as follows:

| Minimum Total Addressable Points: | 250 |
| Minimum Total SLC loops (including board, ready for field connections): | 1 |
| Panel Expansion Capability, Minimum Total SLC loops: | 10 |
| Minimum Node capacity for Network System: | 100 |

C. Signal Line Circuit (SLC) and Notification Appliance Circuit (NAC) Boards:

1. Each board shall communicate directly with each addressable analog sensor and binary input to determine normal, alarm, or trouble conditions. Analog signals would be used for automatic test and determination of maintenance requirements.

2. Each board shall contain its own microprocessor and shall be provided to monitor addressable inputs and to control addressable outputs (addressable relays). The board shall communicate and provide power to all devices on its loop over a single pair of wires, except where 4-wire devices require a separate power circuit.

3. Pathway Class B: Circuits NOT capable of transmitting an alarm beyond the location of the fault condition. Wiring of outgoing and return conductors is permitted to be run in the same conduit or cable.
4. Pathway Survivability Level 0: Circuits have no requirements for pathway survivability beyond the requirements of the code.

5. Shared Pathway Designation Level 1: Physical segregation of life safety and non-life safety data is not required. Life safety data shall be the priority.

D. Central Processing Unit:

1. The central processing unit (CPU) shall communicate with the monitor and control all other modules in the panel. Removal, disconnection or failure of any control panel module shall be detected and reported to the CPU.

2. The CPU shall execute all control-by-event programs for specific action to be taken if a designated situation is detected in the system. A real-time system clock for time annotations on the display and printer shall be included.

3. All power for the unit shall be supervised and supplied by the FAP.

E. Display:

1. The board shall provide all controls and indicators used by the system operator and may also be used to program all control panel parameters.

2. The board shall provide an alphanumerical array for display of custom alphanumerical labels for all addressable points. It shall also provide indicators for AC Power, System Alarm, System Trouble, Display Trouble and Signal Silence.

3. Displayed descriptions of addressable points shall include actual room names/numbers selected by the Owner. This information shall be obtained prior to programming. Room names/numbers shown on floor plans shall not be used.

4. The board shall provide a touch key-pad with control capability to command all system functions and entry of any alphanumerical information. Twenty different passwords with four levels of security shall be supported to prevent unauthorized manual control or programming.

F. Memory: The CPU and display interface board shall be augmented by non-volatile field programmable memory. EPROM memory will also be allowed provided the memory is burned in with minimum expansion capability equal to the total system capacity of the panel. Memory shall not be lost upon primary and secondary power failure.

G. Power Supply:

1. Input power shall be 120 VAC, 60 Hertz. Output power shall be as noted on the device specifications and drawings. Each component of the fire alarm system requiring 120 VAC input power shall be served from a dedicated branch circuit. Provide two #12 conductors and one #12 ground in 3/4" conduit to a dedicated 20A/1P circuit breaker with a red handle and a manufacturer's standard handle lock-on device. Identify/label breaker and branch circuit in accordance with NFPA requirements and Specification Section 26.05.53.

2. Adequate to supply 125% of all control panel and peripheral power needs as well as 125% of power required for all external audio-visual devices. The power supply may be increased as needed by adding additional modular expansion power supplies. Over-current protections shall be provided on all power outputs.
3. All power supplies shall be designed and installed to meet UL and NFPA requirements for power-limited operation on all external initiating and indicating circuits.

4. The power supply shall provide integral charger for use with internal batteries. Battery capacity shall be sufficient for operation of the entire system for 24 hours in a non-alarm state followed by alarm mode for 15 minutes, plus 25% spare capacity for future devices.

H. Surge Protection:

1. All fire alarm control panels, NAC panels, etc. shall be provided with a surge protection device (SPD). The SPD shall be UL listed to Standard 1449 Rev 3. The unit should be clearly labeled in accordance with Identification Section 26 05 53. The SPD shall have thermal fuses to protect against fire in short circuit conditions. The unit shall provide visual indication that the unit is protecting and functioning.

2. Any communications or signaling circuits associated with the fire alarm system, which leave or enter a facility, shall be provided with a surge protection device. The devices shall be as recommended by the fire alarm system manufacturer.

I. Digital Communicator:

1. Provide dual phone line interface capable of fire alarm notification to the local fire department, fire protection agency, or monitoring service. Communicator shall report in SIA and most major communication formats, with the capability of transmitting each device address point in a format compatible with the central station receiver.

2. Monitoring fees and initial connection charges are not part of this project.

3. Communicator shall be fully supervised and shall operate on loop start phase lines ahead of the building PBX system.

4. Communicator shall be FCC registered. Contractor shall provide two RJ31X jacks.

5. Approvals: UL listed - UL 864/NFPA 72, FM approved.

6. The communicator shall be provided integral to the fire alarm panel as furnished by the fire alarm panel manufacturer. If the panel construction requires a separate unit, the unit shall be as manufactured by Silent Knight, Ademco, or fire alarm panel manufacturer approved equal.

J. [VCC-#]: Digitized Voice Command Center (VCC):

1. The Digitized Voice Command Center (VCC) shall contain all equipment required for all audio control, signaling, and supervisory functions. This shall include digital voice units, speaker zone indication, and microphones.

2. Function: The Voice Command Center equipment shall perform the following functions:
   a. Operate as a supervised single channel automatic digitized voice evacuation system with manual emergency voice communication system.
b. Audibly and visually annunciate the active or trouble condition of every signal circuit.

c. Audibly and visually annunciate any trouble condition of tone generators and digital voice units required for normal operation of the system.

d. Provide all-call activities through activation of a single control switch.

e. Provide automatic, digitally recorded voice messages and tones.

3. Audio Amplifiers:

a. The audio amplifiers will provide a single channel audio power at 25/70 volts RMS for distribution to speaker circuits.

b. The audio amplifier shall include an integral power supply, and shall provide the following controls and indicators:

1) Normal Audio Level LED
2) Incorrect Audio Level LED
3) Battery Trouble LED
4) Amplifier Trouble LED
5) Audio Amplifier Gain Adjust

c. Includes audio input and amplified output supervision backup input.

4. Audio Message Generator (Digitized Voice):

a. Each initiating zone or intelligent device shall interface with an emergency voice communication system capable of transmitting a digitized voice message to all speakers in the building.

b. Actuation of any alarm initiating device shall cause a digitized message to sound over the speakers. The message shall be repeated four (4) times.

c. A built-in microphone shall be provided to allow paging through speaker circuits.

d. The audio message generator shall have the following controls and indicators to allow for proper operator understanding and control:

1) All Call LED
2) On-Line LED
3) All Call Switch

5. Voice Messages:

a. A pre-programmed custom digital voice message shall be used for notification appliance speaker circuits. The messages shall be approved by the Authority Having Jurisdiction (AHJ). Voice messages shall be from a female voice. The messages shall be provided in the multi-lingual language of the predominant building population.

b. Message shall be preceded by a tone and message shall be repeated four times until silenced.
c. Messages shall be annunciated by a single channel in all evacuation signal zones throughout the building.

d. Primary messages shall be annunciated in the zone of fire alarm and adjoining areas’ evacuation signaling zones, and the secondary message in all other evacuation signaling zones.

e. Message shall be as shown in the following table. These messages are not intended to specify the exact wording required, but to specify the minimum information conveyed by the message:

<table>
<thead>
<tr>
<th>Alarm Type</th>
<th>NAC Area</th>
<th>Preceding Tone</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire Alarm</td>
<td>Single Channel-all areas</td>
<td>Three Chimes</td>
<td>May I have your attention please? A fire emergency has been reported in the building. Proceed calmly to the nearest exit and leave the building immediately.</td>
</tr>
<tr>
<td>Test</td>
<td>All areas</td>
<td>One Chime</td>
<td>“May I have your attention please? May I have your attention please? This is a test of the building emergency alarm system. This is only a test.”</td>
</tr>
<tr>
<td>All Clear</td>
<td>All areas</td>
<td>One Chime</td>
<td>“May I have your attention please? May I have your attention please? The reported emergency has been investigated and normal conditions have been restored. You may return to all areas of the building.”</td>
</tr>
<tr>
<td>Severe Weather</td>
<td>All areas</td>
<td>Wail</td>
<td>“May I have your attention please? May I have your attention please? A severe weather warning has been received. Please walk to the nearest designated safe area. Stay away from windows and glass. Do not use the elevators.”</td>
</tr>
</tbody>
</table>

6. Speaker Circuit Control Switches/Indicators:

   a. Buttons shall be provided on the voice command center to manually activate all auxiliary messages. (i.e. all clear, severe weather, homeland security warning, custom message)

2.3 SIGNALING LINE CIRCUIT DEVICES

A. [FA-120]: Smoke Detectors:

1. Analog Photoelectric Type Sensor: Shall use the photoelectric principle to measure smoke density and send data to the control panel representing the analog level of smoke density measured.

2. Each smoke detector shall connect directly to an SLC loop.

3. Each detector shall be mounted, where shown on the drawings, on a twist-lock base with all mounting hardware provided. Provide a two-piece head/base design.
4. Each detector shall have a manual switching means to set the internal identifying code (address) of that detector, which the control panel shall use to identify its address with the type of sensor connected.

5. Dual alarm and power indicators shall be provided that flash under normal conditions and remain continuous under alarm or trouble conditions. Remote indicator terminals shall be provided. Provide a remote LED indicator device if detector is not visible from a floor standing position.

6. A test means shall be provided to simulate an alarm condition.

7. Where operation is noted as required below 32°F and/or above 120°F, a conventional device shall be installed with a unique monitor module located in the nearest available location with maintained temperatures between 32°F and 120°F.

8. Audible sounder detector base for sleeping room applications:
   a. The audible base shall sound an alarm in the local room in UL2017 operation and UL484 for general evacuation. The unit shall be programmable by the main control panel for the duration of operation.
   b. The audible sounder base shall sound Temporal 3 (fire) or Temporal 4 (CO alarm) and be at 75 dB at 10 feet.

9. A subscript is used to identify the device with a specific sequence of operation as follows: D=HVAC Control, DH=Door Hold Release.

B. [FA-122]: Duct Smoke Detectors:

1. Duct-type smoke detectors shall use the same analog photoelectric sensor technology, with the same features specified for standard smoke detectors, except with additional features as specified below.

2. Provide sampling tubes and mounting hardware to match the duct to which it is attached. Where the detector housing is larger than the duct height, the Contractor shall fabricate a mounting bracket for the detector and attach according to the fire alarm manufacturer’s recommendations.

3. Provide a remote alarm LED indicator device (FA-240/241) if detector is not visible from a floor-standing position. If detector is located above a suspended ceiling, mount remote indicator in ceiling directly below detector with a white single-gang faceplate labeled: Duct Smoke Detector.

C. Manual Pull Stations:

1. Manual stations shall match the description on the drawings (refer to the General Electrical Equipment Schedule). The stations shall be mounted where shown on the drawings and be provided with all necessary mounting hardware.

2. [FA-130]: Addressable, single action, reset key lock, semi-flush mount, red high abuse plastic or cast metal construction with white lettering.

3. Manual stations shall connect directly to an SLC loop. Stations shall provide address setting means using rotary decimal or DIP switches.
4. Where operation is noted as required below 32°F and/or above 120°F, a conventional device shall be installed with a unique monitor module located in the nearest available location, with maintained temperatures between 32°F and 120°F.

D. Heat Detectors:

1. [FA-140]: Combination rate of rise and 135°F fixed temperature analog thermal type sensor. Factory programmed to alarm at 135°F and at 15°F per minute rate-of-rise. Sensor shall measure heat level and send data to the control panel representing the analog level of thermal measurement and rate-of-rise.

a. A subscript is used to identify the device with a specific sequence of operation as follows: D = HVAC shutdown

2. [FA-141]: 200°F fixed temperature. Provide a remote addressable monitor module to interface with addressable system as shown on the plans.

3. Provide a two-piece head/base design, with a manual switching means to set the internal identifying code (address) of that detector, which the control panel shall use to identify its address with the type of sensor connected.

4. Heat detectors shall connect directly to SLC loops. Where fixed temperature or explosion proof detectors are used, one monitor module may be used to monitor all detectors in one room/area as shown on the drawings.

5. Detectors shall be mounted, where shown on the drawings, on a twist-lock base with all mounting hardware provided.

6. Provide a remote LED indicator device if detector is not visible from a floor-standing position.

7. Dual alarm and power indicators shall be provided that flash under normal conditions and remain continuous under alarm or trouble conditions. A connection for attachment of a remote indicator shall be provided.

8. A test means shall be provided to simulate an alarm condition.

9. Where operation is noted as required below 32°F and/or above 120°F, a conventional device shall be installed with a unique monitor module located in the nearest available location with maintained temperatures between 32°F and 120°F.

E. [FA-150]: Carbon Monoxide/Heat/Smoke Combination Detector:

1. Multi-criteria sensor for photoelectrical smoke sensing, heat and carbon monoxide (CO) detection. Carbon monoxide electrolytic sensing module shall provide toxic gas sensing to UL2034 and UL2075 standards.

2. The combined photoelectric smoke detection/heat/CO module shall have separate sensors that adjust the detection profile in response to the input from the sensors.

3. The combined photoelectric smoke detection / CO module shall have selectable modes of operation for OSHA compliant toxic gas sensing, enhanced fire sensing, and nuisance alarm reduction mode.
4. The detector shall use only one address on the SLC.

5. CO sensor cartridge element shall be field replaceable.

6. Audible sounder detector base for sleeping room applications:
   a. The audible base shall sound an alarm in the local room in UL2017 operation and UL484 for general evacuation. The unit shall be programmable by the main control panel for the duration of operation.
   b. The audible sounder base shall sound Temporal 3 (fire) or Temporal 4 (CO alarm) and be at 75 dB at 10 feet.

F. [FA-160]: Monitor Modules:

1. Monitor Module shall connect directly to an SLC loop and receive power from a separate 24 VDC circuit. It shall interface initiating devices with the control panel using Style D or Style B circuits. Contractor option: Use an interface module (2-wire operation) for Style B circuits connected to normally-open dry contacts, such as a flow switch.

2. The module shall be mounted in an enclosure located in an accessible service location as near as possible to the device(s) being monitored, or where shown on the drawings. All mounting hardware shall be provided.

3. The module shall supply the required power to operate the monitored device(s).

4. The module shall provide address setting means using rotary decimal or DIP switches.

G. [FA-161]: Addressable Relays:

1. Relay that represents an addressable control point used primarily for the control of auxiliary devices as indicated on the drawings. Contractor to provide additional slave relay(s), as required, rated for the electrical load being controlled (contractor to match voltage, amps, etc.).

2. Relay shall connect directly to an SLC loop and receive power from a separate 24 VDC circuit.

3. The relay shall be mounted in an enclosure located in an accessible service location as near as possible to the device(s) being controlled, unless otherwise shown on the drawings. All mounting hardware shall be provided.

4. The relay shall supply 24 VDC power to the device(s) being controlled, unless otherwise indicated on the drawings.

2.4 NOTIFICATION APPLIANCE DEVICES

A. Device Color:

1. Wall Mounted: Red housing with white lettering or pictogram.

2. Ceiling Mounted: White housing with red lettering or pictogram.
B. Visual Alarm Devices:
   1. [FA-200]: Wall mounted.
   2. [FA-201]: Ceiling mounted.
   3. High intensity (candela rating as scheduled on the drawings) xenon strobe or equivalent under a lens. Candela rating shall be visible from exterior of the device.
      a. Candela Ratings: V1=15, V3=30, V7=75, VH=110, VS=177.
   4. The maximum pulse duration shall be 0.2 seconds with a maximum duty cycle of 40%. The flash rate shall be 1 Hz. Where more than two strobes are visible from any one location, the fire alarm visual devices shall be synchronized.
   5. Device, housing, and backbox shall be UL listed for fire alarm/emergency applications.

C. [FA-210]: Audio (Speaker) Alarm Devices - Wall Mounted:
   1. Sound rating shall be dependent on the tap (wattage) setting. Tap settings shall be available in 3 dBA increments. A minimum of four (4) tap settings should be available to allow field adjustment of the sound output across a minimum range of 78 to 87 dBA, 400Hz to 4KHz (6 dBA cutoff) frequency range.
   2. Speakers shall operate on a 25V RMS system, unless otherwise noted on drawings.
   3. Speakers shall clearly reproduce a signal consisting of a live or prerecorded human voice with voice intelligibility.
   4. Speaker, housing, and backbox shall be UL listed for fire alarm/emergency applications.

D. [FA-230]: Audio (Speaker) Alarm Devices - Ceiling Mounted:
   1. 4" speaker, round housing, flush mounted (provide tile bridge where applicable).
   2. Sound rating shall be dependent on the tap (wattage) setting. Tap settings shall be available in 3 dBA increments. A minimum of four (4) tap settings should be available to allow field adjustment of the sound output across a minimum range of 78 to 87 dBA, 400Hz to 4KHz (6 dBA cutoff) frequency range. Speakers shall operate on a 25V RMS system, unless otherwise noted on drawings.
   3. Speakers shall clearly reproduce a signal consisting of a live or prerecorded human voice and background music with voice intelligibility.
   4. Speaker, housing, and backbox shall be UL listed for fire alarm/emergency applications.

E. Combination Audio (Voice) and Visual Notification Device:
   1. [FA-211]: Wall mounted.
   2. [FA-231]: Ceiling mounted.
3. Combine speaker and visual components into a single device. Refer to the corresponding paragraphs above for requirements of each component.

F. [FA-203]: Weatherproof Visual Notification Device:

1. High intensity strobe, square housing, 75 candela rating, suitable for wet locations. Provide with weatherproof back box.


3. Conduit shall not be exposed.

G. [FA-212]: Weatherproof Voice/Visual Notification Device:

1. Speaker with high intensity 75 candela rated strobe. 25 VRMS with a minimum of four (4) tap settings which shall allow field adjustment of the sound output across a minimum range of 78 to 87 dBA (UL 1480), 400 Hz to 4 KHz (6dBA cutoff) frequency range.


3. Conduit shall not be exposed.

2.5 DOOR HOLD-OPEN DEVICES

A. [FA-270]: Electromagnetic Door Holder Devices:

1. Flush wall mounted

2. Voltage: 120V

3. Holding force shall be 25 pounds minimum.

4. Provide fail-safe operation; power failure releases door.

5. Provide self-adjusting swivel catch plate with pivot points to adjust to door alignment changes.

6. Provide all hardware and wiring needed to accommodate the complete functioning door holder installation.

7. Ensure that the door hardware and trim projections are compatible with total projection of door release.

8. Provide firm anchoring for the electromagnet, such that the mounting box and device will not move independently from the wall or floor they are mounted to. This device and mounting will function as a doorstop and hold the force of the door closer mechanism.

9. Follow manufacturer’s recommended installation and location instructions unless noted otherwise.

10. Electromagnetic door holder devices, housing, and back box shall be UL listed.
2.6 **[NEP-#]: NAC EXTENDER PANELS (NEP)**

A. As shown on the plans or as a Contractor’s option if not shown, furnish and install NAC extender panels as necessary to provide remote power supply for notification appliance circuits (NAC). Contractor shall indicate quantity and locations of each NEP on the shop drawing submittals.

B. Each NEP shall be self-contained remote power supply with batteries, and battery charger mounted in a surface lockable cabinet. Battery capacity shall be sufficient for operation for 24 hours in a non-alarm state followed by alarm for 15 minutes, plus 25% spare capacity for future devices. Each NEP provides a minimum of up to 4 outputs, 2A continuous, or 6A full load total capacity.

C. Power for each NEP shall be from a local 120 VAC circuit. Provide two #12 conductors and one #12 ground in 1/2" conduit to each NEP from a dedicated 20A/1P circuit breaker with a red handle and a manufacturer’s standard handle lock-on device. Coordinate panel and circuit number with Architect/Engineer prior to installation.

D. NAC extender panels may be installed only in locations coordinated with the Architect/Engineer.

E. Mounting: Surface.

2.7 **ANNUNCIATION**

A. **[FAA-#]: Remote LCD Annunciators:**
   1. Auxiliary annunciators shall indicate alarm and trouble conditions visually and audibly as shown on the drawings. Provide local TROUBLE ACKNOWLEDGE, TEST, and ALARM SILENCE capability. Minimum 80-character display.
   2. Communications and power to the annunciators shall be supervised. The annunciator shall receive power from the fire alarm control panel.
   3. A single key switch shall enable all switches on the annunciator.
   4. Mounting: Flush

B. **Facility Management Control System (FMCS) Interface:**
   1. Provide BACnet IP interface for fire alarm panel to communicate status with the FMCS. Provide list of points and descriptions to FMCS supplier.
      a. UL listed to Standard 864. Provide RJ45 connection and cable.

C. **[FA-241]: Fire Alarm Remote Indicator:**
   1. Red LED type.
   2. Mounts flush to a single gang box.

D. **[FA-242]: Fire Alarm Remote Indicator and Test Switch:**
   1. Red LED type.
   2. Key switch test selector.
   3. Mounts flush to a single gang box.
2.8 ETHERNET NETWORK

A. Campus Ethernet IP Network: A complete fire alarm and mass notification Ethernet network shall be provided. The network shall be Class X wiring, Resilient Ethernet Protocol (REP) 100BaseTX / 100 Mbps that shall be able to operate with any single break and restore network communications.

B. The IP network shall be fiber optic cable, single or multi-mode fiber. The TCP/IP network switches shall be industrial grade managed switching hubs. Network switches shall be UL864 listed, shall provide a minimum of four (4) or a maximum of eight (8) 10/100 Mbps shielded RF-45 connectors for Ethernet connections, and selectable multi-mode or single-mode fiber ports. The switches shall operate on a nominal 24 VDC supplied from a battery backed up fire alarm control panel or booster power supply to ensure power to the switch is always available. Switches shall provide LED indicators for data rate, activity/link integrity, power, and loop detection.

C. IP Monitor and Relay Module: The IP relay/input module shall have a minimum of four (4) dry contact inputs and four (4) dry contact outputs. The relay output shall be rated at 0.5 amps at 24 VDC. This unit shall be monitored and controlled by the graphics workstation to operate functions and/or operations/activations on any fire alarm network system connected to the GEGW. The module shall be UL2572 and UL864 listed.

D. Voice Over IP Module Encoder/Decoder: Each control panel audio source connected to the LAN/WAN network interface shall consist of a supervised audio decoder capable of decoding MP3, WMA, G.700, and PCM data streams in HTTP, UDP, or RTP format. Audio decoder shall operate on filtered-regulated 24 VDC power derived from the panel power supply. Power shall be supplied directly from the FACP to ensure reliable and monitored power. UL 2572 and UL864 listed.

2.9 CONNECTIONS TO AUXILIARY DEVICES PROVIDED BY OTHERS

A. [FA-260]: Flow Switch:

1. Connection to flow switch to monitor fire protection flow switch or discharge output contacts. Normally open dry contacts for fire alarm interface. Furnished and installed by MC; wired by EC.

B. [FA-261]: Monitor Switch:

1. Connection to monitor switch to monitor fire protection system supervisory switches or output contacts. Normally open dry contacts for fire alarm interface. Furnished and installed by MC; wired by EC.

2.10 WIRING

A. Fire alarm wiring/cabling shall be furnished and installed by the Contractor in accordance with the manufacturer's recommendations and pursuant to National Fire Codes. Cabling shall be UL listed and labeled as complying with NFPA 70, Article 760 for power-limited fire alarm signal service.

B. Approved manufacturers of fire alarm cable:

1. Comtran Corp.
2. Helix/HiTemp Cables, Inc.
3. Rockbestos-Suprenant Cable Corp.
4. West Penn Wire/CDT.
5. Radix.

PART 3 - EXECUTION

3.1 SEQUENCES OF FIRE ALARM OPERATION

A. General:

1. Refer to the Fire Alarm Operation Matrix on the drawings for basic requirements and system operation.

2. All system output programs assigned via control-by-event equations to be activated by the particular point in alarm shall be executed, and the associated system outputs (alarm notification appliances and/or relays) shall be activated.

B. Panel/Annunciator Alarm, Trouble, Supervisory Indication:

1. Appropriate system Alarm, Trouble, or Supervisory LED shall flash at the control panel, transponder, and annunciator locations.

2. A local signal in the control panel shall sound.

3. The LCD display shall indicate all information associated with the condition, including the name of the item, type of device and its location within the protected premises.

4. History storage equipment shall log the information associated with the fire alarm control panel (FAP) condition, along with the time and date.

5. Transmit the appropriate signal (supervisory, trouble, alarm) to the central station via the digital communicator.

C. Audible Alarms Sequence:

1. Audible alarms throughout the building shall sound.

D. Visual Alarms Sequence:

1. Visual alarms throughout the building shall flash.

E. Kitchen Hood Fire Suppression System Sequence:

1. The fire alarm system shall utilize an addressable relay to de-energize the hood supply fan controller.

2. The fire alarm system shall utilize an addressable monitor module to monitor the fire suppression system.

F. AHU and Mechanical Fan Shutdown Sequence:

1. The fire alarm system shall utilize addressable relays to de-energize all AHU motor controllers and mechanical fans. Coordinate other requirements with HVAC installer.
2. The fire alarm system shall directly shut down the AHU or mechanical fan through the local HVAC control device (i.e., variable frequency drive or motor starter).

3. Where a facility has more than one AHU or mechanical fan, each shall be shutdown individually based on input from initiation devices in the area served by the unit or designated for each air distribution system.

G. Door Holder Release Sequence:

1. The fire alarm system shall utilize an addressable relay to open the power connection to integral and magnetic door holders.

2. The fire alarm system shall utilize an addressable relay to open the 'hold' switch circuitry, integral to the power door.

3. Door holders shall release individually based on initiation devices in the vicinity of the door and noted specifically for door closure.

H. Sound Masking System Shutdown Sequence:

1. The fire alarm system shall utilize addressable relays or RS-485 interface to disconnect the signal source or de-energize the amplifiers to shut down all sound masking systems. Coordinate with masking system supplier to provide necessary interface at all sound system equipment locations.

2. The fire alarm interface and associated relays, etc. shall not induce any noise onto the audio system and shall not affect the performance or audio-quality of the system during normal use.

I. Ceiling Fan Shutdown Sequence:

1. The fire alarm shall utilize an addressable relay to de-energize the ventilation ceiling fan and controller. Coordinate the connection to the fan shutdown contacts on the fan controller or interrupt the power circuit with the addressable relay.

3.2 INSTALLATION

A. Install system in accordance with manufacturer's instructions and referenced codes.

B. Fire Alarm Control Panel:

1. Install the control panel where shown on the drawings.

2. All expansion compartments, if required, shall be located at the control panel.

3. Install the voice command center in the location as indicated on the drawings. This location should be primary fire department "attack" location. Coordinate with the local fire department prior to submitting shop drawings.

4. The fire alarm voice prerecorded messages shall be verified by the Contractor, as approved by the Owner, prior to the shop drawing submittal process.
C. Devices:

1. General:
   a. All ceiling-mounted devices shall be located where shown on the reflected ceiling and floor plans. If not shown on the reflected ceiling or reflected floor drawings, the devices shall be installed in the relative locations shown on the floor drawings in a neat and uniform pattern.
   b. All devices shall be coordinated with luminaires, diffusers, sprinkler heads, piping and other obstructions to maintain a neat and operable installation. Mounting locations and spacing shall not exceed the requirements of NFPA 72.
   c. Where the devices are to be installed in a grid type ceiling system, the detectors shall be centered in the ceiling tile.
   d. The location of all fire alarm devices shall be coordinated with other devices mounted in the proximity. Where a conflict arises with other items or with architectural elements that will not allow the device to be mounted at the location or height shown, the Contractor shall adjust location of device so that new location meets all requirements in NFPA 72 and all applicable building codes.

2. Per the requirements of NFPA, detector heads shall not be installed until after the final construction cleaning unless required by the local Authority Having Jurisdiction (AHJ). If detector heads must be installed prior to final cleaning (for partial occupancy, to monitor finished areas or as otherwise required by the AHJ), they shall not be installed until after the fire alarm panel is installed, with wires terminated, ready for operation. Any detector head installed prior to the final construction cleaning shall be removed and cleaned prior to closeout.

3. Protection of Fire Alarm System:
   a. A smoke detector shall be installed within the vicinity of the main fire alarm panel and every NAC extender panel per NFPA 72. A heat detector may be substituted when a smoke detector is not appropriate for the environment of installation.

4. Analog Smoke and Heat Detectors:
   a. In elevator shafts and elevator equipment rooms, provide a heat detector for elevator shutdown within 2' of every sprinkler head. Coordinate with fire protection contractor.

5. Duct-type Analog Smoke Detectors:
   a. Duct-type analog smoke detectors shall be installed on the duct where shown on the drawings and details. The sampling tubes shall be installed in the respective duct at the approximate location where shown on the electrical drawings to meet the operation requirements of the system.
   b. All detectors shall be accessible.
   c. Duct-type detectors shall be installed according to the manufacturer's instructions.
6. Manual Pull Stations:
   a. Stations shall be located where shown and at the height noted on the drawings.

7. Addressable Relays and Monitor Modules:
   a. Modules shall be located as near to the respective monitor or control devices as possible, unless otherwise indicated on the drawings.
   b. All modules shall be mounted in or on a junction box in an accessible location.
   c. Where not visible from a floor standing position, a remote indicator shall be installed to allow inspection of the device status from a local floor standing location.

8. Notification Appliance Devices:
   a. Devices shall be located where shown on the drawings.
   b. Wall-mounted audio, visual and audio/visual alarm devices shall be mounted as denoted on the drawings.
   c. Where ceiling mounted visual alarm devices or combination audio/visual alarm devices are shown where the ceiling is greater than 30'-0" high, they shall be stem mounted so that the entire unit is below 30'-0". This does not apply to audio-only alarm devices.

D. Annunciators:

1. Remote Annunciators: The annunciators shall be located where shown on the drawings and approved by the fire marshal.

E. Wiring:

1. Fire alarm wiring/cabling shall be provided by the Contractor in accordance with the manufacturer’s recommendations and pursuant to National Fire Codes.

2. Wiring shall be installed in conduit from device to above accessible ceilings. Exposed plenum-rated cable (FPLP) shall be used above accessible ceilings supported every 4 feet or run in cable trays (if applicable) maintaining a minimum of 5-inches clearance from all lighting ballasts. Fire alarm cabling shall not be installed in the same bridle rings or cable trays designated for the cabling of other systems.

3. All junction boxes with SLC and NAC circuits shall be identified on cover. Refer to Identification Section 26 05 13 for color and identification requirements.


5. Notification Appliance Circuits shall provide the features listed below. These requirements may require separate circuits for visual and audible devices.
   a. Fire alarm temporal audible notification for all audio appliances.
b. Synchronization of all visual devices where two or more devices are visible from the same location.

c. Ability to silence audible alarm while maintaining visual device operation.

6. Notification Appliance Circuits shall not span floors

7. Signal line circuits connecting devices shall not span floors Signal line circuits connecting devices shall be provided with an isolation module at each floor separation or as otherwise shown on the drawings.

8. No wiring other than that directly associated with fire alarm detection, alarm or auxiliary fire protection functions shall be in fire alarm conduits. Wiring splices shall be avoided to the extent possible, and if needed, they shall be made only in junction boxes, and enclosed by plastic wire nut type connectors. Transposing or changing color coding of wires shall not be permitted. All conductors in conduit containing more than one wire shall be labeled on each end, in all junction boxes, and at each device with “E-Z Markers” or equivalent. Conductors in cabinets shall be carefully formed and harnessed so that each drops off directly opposite to its terminal. Cabinet terminals shall be numbered and coded, and no unterminated conductors are permitted in cabinets or control panels. All controls, function switches, etc. shall be clearly labeled on all equipment panels.

F. Fire Alarm Cabling Color Code: Provide circuit conductors with insulation color coding as follows or using colored tape at each conductor termination and in each junction box.

1. Power branch circuit conductors: In accordance with Section 26 05 53.
2. Signaling line circuit: Overall red jacket with black and red conductors.
3. DC power supply circuit: Overall red jacket with violet and brown conductors.
4. Notification appliance circuit: Overall red jacket with blue and white conductors.
7. Central station fire alarm loop: Black and white conductors.

G. Devices surface mounted in finished areas shall be mounted on surface backboxes furnished by fire alarm equipment supplier. Backboxes shall be painted to match device, shall be the same shape and size as the device shall not have visible knockouts.

H. Make conduit and wiring connections to door release devices, sprinkler flow and pressure switches, sprinkler valve monitor switches, fire suppression system control panels, duct analog smoke detectors and all other system devices shown or noted on the Contract Documents or required in the manufacturer's product data and shop drawings.

3.3 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 26 05 00.

B. Test in accordance with NFPA 72, Chapter 14 and local fire department requirements. Submit documentation with O & M manuals in accordance with Section 14.6 of the Code.

C. Contractor shall test and adjust the fire alarm system as follows:

1. Speaker taps shall be adjusted to the lowest tap setting which achieves a sound level higher than or equal to the greatest of the following:

   a. 70dBA.
b. 15 dBA above ambient levels as indicated in NFPA 72 Table A.18.4.3.

c. 15 dBA above measured ambient. 5 dBA above the maximum measured sound level with duration of more than 60 seconds.

d. As specified on the drawings.

2. Sound level measurement procedure shall meet the following requirements:

a. All measurements shall use the ‘A’ weighted, dBA, sound measurement scale.

b. All measurements shall be taken after furnishings, wall coverings and floor coverings are in place.

c. All measurements shall be taken after fixed equipment (HVAC units, etc.) producing ambient noise is installed and is in operation.

d. Final ambient sound measurements shall be taken during occupancy and the units shall be re-adjusted at that time, if necessary.

e. All sound level measurements shall be taken at a height of 5’ above the finished floor level.

f. Measurements shall be taken in every unique room. If there are multiple rooms, which have the identical dimensions and function, 10%, or a minimum of 2 rooms shall be tested. The results from the rooms tested shall be averaged and the remaining rooms may be adjusted per the average.

g. Measurements shall be taken on a 20’ x 20’ grid and the results for all points taken shall be averaged. If the room is smaller than 20’ x 20’ a minimum of two measurements are required.

h. Measurements shall be taken halfway between speakers or halfway between a speaker and the wall. No measurements shall be taken at the extreme edges of the room, nor directly under speakers.

D. Additionally, test the voice alarm communication system intelligibility per IEC 60849:

1. The following acoustically distinguishable spaces shall be tested: All unique rooms shall be tested. If there are multiple rooms with the identical dimensions and function, 10%, or a minimum of two (2) rooms, shall be tested. The results from the rooms tested shall be averaged, and the remaining rooms may be adjusted per the average.

2. Utilize7 equipment designed to test per IEC 60849 per the equipment manufacturer’s instructions. This equipment includes a signal generator, which is input to the fire alarm system and a portable measurement device. This equipment is available from Simplex Grinnell or Gold Line.

3. Testing equipment that can simulate ‘crowd babble’ shall be used in rooms with occupancy of greater than 200.

4. Wide-area notification intelligibility shall be tested in acoustically distinguishable spaces and areas as designated by the Owner.
5. When testing for intelligibility, the quantity and location of the measurement points shall be the same as the points used for measurement of dBA level.

6. Provide a room by room report, showing the average dBA level and STI for each room tested, the number and location of. The report shall be presented to the Architect/Engineer in an Excel .xls file.

3.4 MANUFACTURER’S FIELD SERVICES

A. Provide manufacturer's field services under provisions of Section 26 05 00.

B. Include services of certified technician to supervise installation, adjustments, final connections, and system testing.

C. Note that room numbers depicted on the architectural/engineering drawings will not necessarily reflect the actual room (signage) numbers that the Owner selects. The Contractor and fire alarm manufacturer shall coordinate the actual room numbers as the Owner directs to identify each device. This list shall be a part of the floor plan record drawing to be turned in at the project closeout.

D. System occupancy adjustments: When requested by Owner within 12 months of date of Substantial Completion, provide on-site system adjustments to suit actual occupied conditions. For this purpose, provide up to two (2) site visits, 4 hours each visit, outside normal occupancy hours.

3.5 SYSTEM TRAINING

A. System training shall be performed under provisions of Section 26 05 00.

B. Minimum on-site training times shall be:
   1. System Operators: One (1) day.

END OF SECTION 28 31 00