ADDENDUM NUMBER 1

DATE:	October 27, 2025
PROJECT:	White Mound Maintenance Building
PROJECT NUMBER:	SH9030
OWNER:	Sauk County
ARCHITECT/ENGINEER:	Jewell Associates Engineers, Inc.
TO:	Prospective Bidders

This Addendum forms a part of the Contract Documents and modifies the Bidding Documents dated October 24, 2025, with amendments and additions noted below.
Acknowledge receipt of this Addendum in the space provided in the Bid Form. Failure to do so may disqualify the Bidder.
This Addendum consists of 49 pages.

CHANGES TO THE PROJECT MANUAL

a) Add Sections 27 and 28 to the project manual.

END OF DOCUMENT

SECTION 27 15 00 – HORIZONTAL CABLING REQUIREMENTS

PART 1 GENERAL

1.1. SECTION INCLUDES

A. This section describes the products and execution requirements relating to furnishing and installing horizontal communications cabling and termination components.

1.2. QUALITY ASSURANCE

A. The installing contractor must be certified by the manufacturer of the structured cabling system.

1.3. SUBMITTALS

A. Under the provisions of Division 1, prior to the start of work the Contractor shall submit:
   1. Manufacturer's data covering all products proposed, including construction, materials, ratings and all other parameters identified below.
   2. Manufacturer's installation instructions.

PART 2 - PRODUCTS

A. CAT 6 Enhanced Cable:
   1. The horizontal cable requirements must be met as well as the following channel requirements.
   2. CAT 6 cable shall terminate on rack-mounted modular patch panels in their respective communication equipment room as indicated on the drawings.
   3. Performance Tests shall be conducted using swept frequency testing through 250 MHz for the channel. All numbers given are for a 4-connection channel.
   4. Performance data shall be characterized as "Guaranteed Headroom" and shall be guaranteed by the manufacturer to perform at guaranteed margins over ANSI/TIA/EIA-568-C.2.
   5. The structured cabling and connectivity must be provided by the same company. For the purpose of this specification that shall mean that the cabling and connectivity must be marketed, branded, supported, warranted, and distributed by the same company. Specifically, products made by others through an OEM relationship are acceptable if the products are marketed, branded, supported, warranted, and distributed by the same company.
   6. The 4-connector channel performance margins in the table below shall be guaranteed margins above ANSI/TIA/EIA-568-C.2:

Electrical Value (1 - 250 MHz)	Minimum Margin
Insertion Loss:	14.0%
NEXT:	7.0 dB
PS NEXT:	8.0 dB
ACR-F (ELFEXT):	8.0 dB
PS ACR-F (PS ELFEXT):	8.0 dB
Return Loss:	4.0 dB

2.2. CONNECTORS/COUPLERS/ADAPTERS

A. Coax (F-Connector):
1. RG-6 coax cable shall be terminated at the work area and at communication equipment rooms in a male F-type connector.
2. The male F-type connector shall:
   a. Be matched to the RG-6 coax cable type proposed by the Contractor.
   b. Be a single-piece F-type connector.
   c. Incorporate a 1/2" crimp ring which uses hex crimp.
3. The male F-type connectors shall be mated to female/female feed-thru couplings at both the information outlet and modular patch panel locations. These couplings shall be matched to the male F-type connector. Couplings shall be of sufficient length as to allow for the male F-type connector to fully seat (both sides).

2.3. FACEPLATES/JACKS

A. CAT 6 Jacks:
1. CAT 6 horizontal cable shall each be terminated at their designated work area location on RJ-45 modular jacks. These modular jack assemblies shall snap into a modular mounting frame. The combined modular jack assembly is referred to as an information outlet.
2. The same orientation and positioning of modular jacks shall be utilized throughout the installation. Prior to installation, the Contractor shall submit the proposed configuration for each information outlet type for review by the Architect/Engineer.
3. Information outlet faceplates shall incorporate recessed designation strips at the top and bottom of the frame for identifying labels. Designation strips shall be fitted with clear plastic covers.
4. Any unused modular jack positions on an information outlet faceplate

shall be fitted with a removable blank inserted into the opening.

5. The information outlet faceplate shall be constructed of high impact plastic (except where noted otherwise). The information outlet faceplate color shall (1) match the faceplate color used for other utilities in the building or (2) when installed in surface raceway (if applicable), match the color of that raceway.
6. All information outlets and the associated modular jacks shall be of the same manufacturer throughout the project.
7. The CAT 6 modular jacks shall be non-keyed 8-pin modular jacks.
8. The interface between the modular jack and the horizontal cable shall be a 110-type termination block or insulation displacement type contact. Termination components shall be designed to maintain the horizontal cable's pair twists as closely as possible to the point of mechanical termination.
9. CAT 6 modular jacks shall be pinned per TIA-568B.
10. CAT 6 termination hardware shall, as a minimum, meet all the mechanical and electrical performance requirements of the following standards:
    a. ANSI/TIA/EIA-568-A-5
    b. ANSI/TIA/EIA-568A
    c. ISO/IEC 11801
    d. IEC 603-7
    e. CC PART 68 SUBPART F

2.4. RG-6 BROADBAND RF COAXIAL CABLE

A. Basic Construction:
1. Center conductor: 18 AWG bare copper covered steel; 0.040" OD (nominal); foamed polyethylene dielectric.
2. Four Layer Shield:
    a. Inner shield: aluminum-polypropylene-aluminum laminated tape with overlap bonded to dielectric.
    b. Second shield: 60% 34 AWG bare aluminum braid wire.
    c. Third shield: non-bonded aluminum foil tape.
    d. Outer shield: 40% 34 AWG bare aluminum braid wire.

B. Electrical Performance Characteristics:
1. Impedance: 75 ohms.
2. Velocity of propagation: ≥ 82%.
3. Maximum attenuation (per 100 feet) for non-plenum rated cable:
    a. at 55-MHz: 1.60 dB
    b. at 450-MHz: 4.26 dB
    c. at 750-MHz: 5.59 dB
    d. at 1000-MHz: 6.54 dB
4. Maximum attenuation (per 100 feet) for plenum-rated cable:
    a. at 50-MHz: 1.60 dB

b. at 400-MHz: 4.60 dB
c. at 700-MHz: 6.60 dB
d. at 1000-MHz: 8.20 dB

PART 3 - EXECUTION

3.1. CABLE INSTALLATION REQUIREMENTS

A. Horizontal Cabling:

1. The maximum horizontal cable drop length for Data UTP shall not exceed 295 feet (90 meters) in order to meet data communications performance specifications. This length is measured from the termination panel in the wiring closet to the outlet and must include any slack required for the installation and termination. The Contractor is responsible for installing horizontal cabling in a fashion so as to avoid unnecessarily long runs. Any area that cannot be reached within the above constraints should be identified and reported to the Architect/Engineer prior to installation. Changes to the contract documents shall be approved by the Architect/Engineer.
2. All cable shall be free of tension at both ends. In cases where the cable must bear some stress, Kellum grips may be used to spread the strain over a longer length of cable.
3. Manufacturer's minimum bend radius specifications shall be observed in all instances.
4. Horizontal cabling installed as open cabling shall be supported at a maximum of 5' between supports. Refer to the specifications for required cable supports.
5. Horizontal cabling installed as open cable or in cable tray shall be bundled at not less than 10' intervals with hook-and-loop tie wraps. The use of plastic cable ties is strictly prohibited.
6. The maximum conduit fill for horizontal cabling shall not exceed 40% regardless of conduit length.
7. Cable sheaths shall be protected from damage from sharp edges. Where a cable passes over a sharp edge, a bushing or grommet shall be used to protect the cable.
8. A coil of 3 feet in each cable shall be placed in the ceiling at the last support (e.g., J-hook, bridle ring, etc.) before the cables enter a fishable wall, conduit, surface raceway or box. At any location where cables are installed into movable partition walls or modular furniture via a service pole, approximately 15-feet of slack shall be left in each horizontal cable under 250 feet in length to allow for change in the office layout without re-cabling. These "service loops" shall be secured at the last cable support before the cable leaves the ceiling and shall be coiled from 100% to 200% of the cable recommended minimum bend radius.
9. To reduce or eliminate EMI, the following minimum separation distances

from 480V power lines shall be adhered to:

a. Twelve (12) inches from power lines of <5-kVa.
b. Eighteen (18) inches from high-voltage lighting (including fluorescent).
c. Thirty-nine (39) inches from power lines of 5-kVa or greater.
d. Thirty-nine (39) inches from transformers and motors.

3.2. CABLE TERMINATION REQUIREMENTS

A. Cable Terminations - Data UTP:

1. Modular patch panels shall be designed and installed in a fashion as to allow future horizontal cabling to be terminated on the panel without disruption to existing connections.
2. If the "last" patch (per rack) is greater than 75% utilized, one additional patch panel shall be provided for future use.
3. At information outlets and modular patch panels, the Contractor shall ensure that the twists in each cable pair are preserved to within 0.5-inch of the termination for data cables. The cable jacket shall be removed only to the extent required to make the termination.

B. Cable Terminations - RG-6 Coax:

1. When preparing the RG-6 coaxial cable for termination, manufacturer's installation procedures shall be adhered to. Special care shall be taken to ensure the proper center conductor length as specified by the manufacturer.
2. All coaxial cable connectors shall be mated to the cable using only the appropriate purpose-designed tools recommended by the manufacturer for that purpose.

END OF SECTION 27 15 00

SECTION 28 00 10 - ELECTRONIC SAFETY AND SECURITY PROVISIONS

PART 1 GENERAL

1.1. RELATED DOCUMENTS

A. Refer to Division 00 - Procurement and Contracting Requirements and Division 01 – General Requirements, which all apply to work under this section.

1.2. DESCRIPTION OF WORK

A. This section applies to all work under this division. This shall include, but not necessarily be limited to, the following:
   1. Furnish, install, and terminate all system equipment and cabling as applicable and per drawings.
   2. Furnish and install any cabinets, racks and cable management as required and as indicated.
   3. Furnish any other material required to form a complete and operational system.
   4. Provide As-Built drawings per Division 0 and/or Division 1 specification.
   5. Provide Owner training and testing documentation.
   6. All elements of the construction shall be performed by workmen skilled in the particular craft involved, and regularly employed in that particular craft.
   7. All work shall be performed in a neat, professional manner in keeping with the highest standards of the craft.

1.3. CODES AND STANDARDS

A. All work shall be done in accordance with the applicable portion of the following codes and standards:
   1. National Electrical Code
   2. Local Electrical Code
   3. National Fire Protection Association
   4. National Electrical Manufacturers Association
   5. Standards of Institute of Electrical and Electronic Engineers
   6. Applicable Building Codes
   7. Occupational Safety and Health Act
   8. Wisconsin Administrative Codes
   9. ANSI TIA-526-7 Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant
   10. ANSI TIA-526-14-C Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant
   11. ANSI TIA-568-C.0 Generic Telecommunications Cabling For Customer Premises

12. ANSI TIA-568-C.1 Commercial Building Telecommunications Cabling Standard Part 1: General Requirements
13. ANSI TIA-568-C.2 Balanced Twisted-Pair Telecommunications Cabling and Components Standards
14. ANSI TIA-568-C.3 Optical Fiber Cabling Components Standard
15. ANSI TIA-568-C.4 Broadband Coaxial Cabling and Components Standard
16. ANSI TIA-569-D Telecommunications Pathways and Spaces
17. ANSI TIA-570-C Residential Telecommunications Infrastructure Standard
18. ANSI TIA-598-D Optical Fiber Cable Color Coding
19. ANSI TIA-606-B Administration Standard for Commercial Telecommunications Infrastructure
20. ANSI TIA-607-B Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
21. ANSI TIA-758-B Customer-owned Outside Plant Telecommunications Infrastructure Standard
22. National Fire Protection Agency (NFPA - 70), National Electrical Code (NEC)

B. All Contractors shall familiarize themselves with all codes and standards applicable to their work. No extra compensation will be allowed for corrections or changes in the work required due to failure to comply with the applicable codes and standards. Where two or more codes or standards are in conflict, that requiring the highest order of professionalism shall take precedence, but such questions shall be referred to Design Professional for final decision.

1.4. REQUIREMENTS & FEES OF REGULATORY AGENCIES

A. Contractor shall comply with the rules and regulations of the local serving utility companies and shall check with each utility company providing service to this project and determine or verify their requirements regarding incoming services.

B. Secure and pay for all permits, licenses, fees and inspections.

1.5. DRAWINGS

A. Drawings for the work are in part diagrammatic, and are intended to convey the scope of the work and to indicate in general the location of equipment.

B. Contractor shall layout their own work and shall be responsible for determining the exact quantities and locations for equipment.

C. Contractor shall take own field measurements for verifying locations and dimensions; scaling of the drawings will not be sufficient for laying out the work.

D. Because of the scale of the drawings, certain basic items for a complete

installation are not shown, but where such items are required by code or where they are required for proper installation and operation of the work, such items shall be furnished and installed.

1.6. ACTIVE SERVICES

A. Contractor shall be responsible for verifying exact locations of all existing services prior to beginning work in that area.

B. When active services are encountered which require relocation, Contractor shall make request to authorities with jurisdiction for determination of procedures.

C. Where existing services are to be abandoned, they shall be terminated in conformance with requirements of the authorities having jurisdiction.

1.7. SITE INSPECTION

A. Contractor shall inspect the site prior to submitting bid for work to become familiar with the conditions of the site which will affect the work and shall verify points of connection with utilities and/or existing system wiring.

B. Extra payment will not be allowed for changes in the work required because of Contractor's failure to make this inspection.

1.8. COORDINATION AND COOPERATION

A. It shall be the Contractor's responsibility to schedule and coordinate work with the schedule of the General Contractor so as to progress the work expeditiously, and to avoid unnecessary delays.

B. Contractor shall fully examine the drawings and specifications for other trades and shall coordinate the installation of their work with the work of the other contractors. Contractor shall consult and cooperate with the other contractors for determining space requirements and for determining that adequate clearance is allowed with respect to their equipment, other equipment and the building. The Design Professional reserves the right to determine space priority of the contractors in the event of interference between piping, conduit, ducts and equipment of the various contractors.

C. Conflicts between the drawings and the specifications, or between the requirements set forth for the various divisions shall be called to the attention of the Design Professional. If clarification is not asked for prior to the taking of bids, it will be assumed that none is required and that the Contractor is in agreement with the drawings and specifications as issued. If clarification is required after the contract is awarded, such clarification will be made by the Design Professional

and the decision will be final.

D. Special care shall be taken for protection for all equipment. All equipment and material shall be completely protected from weather elements, painting, plaster, etc., until the project is substantially completed. Damage from rust, paint, scratches, etc., shall be repaired as required to restore equipment to original condition.

E. Protection of all equipment during the painting of the building shall be the responsibility of the Painting Contractor, but this shall not relieve the Contractor of the responsibility for checking to assure that adequate protection is being provided.

F. Where the final installation or connection of equipment in the building requires the Contractor to work in areas previously finished by the Owner, the Contractor shall be responsible that such areas are protected and are not marred, soiled or otherwise damaged during the course of such work. Contractor shall be responsible for patching and refinishing of such areas which may be damaged in this respect.

G. Where two or more specified items/systems in the specifications and/or the drawings are in conflict, that requiring the highest order of professionalism and the most financially expensive products shall take precedence. Such questions shall be referred to the Design Professional for final decision.

1.9. MATERIALS AND EQUIPMENT

A. All materials and equipment shall be the standard product of a reputable manufacturer regularly engaged in the manufacture of the specified item unless authorized in writing by Design Professional. Where more than one unit is required of the same items, they shall be furnished by the same manufacturer except where specified otherwise.

B. All material and equipment shall be installed in strict accordance with the manufacturer's recommendations.

C. The equipment specifications cannot deal individually with any minute items such as parts, controls, devices, etc., which may be required to produce the equipment performance and function as specified, or as required to meet the equipment guarantees. Such items when required shall be furnished as part of the equipment, whether or not specifically called for.

1.10. SUBMITTALS

A. Contractor shall furnish, to the Design Professional, complete sets of shop

drawings and other submittal data. Contractor shall review and sign shop drawings before submittal. Refer to Section 01 30 00 - Administrative Requirements for additional requirements.

B. Shop drawings shall be bound into sets and cover related items for a complete system as much as practical and shall be identified with symbols or "plan marks" used on drawings. Incomplete, piecemeal or unbound submittals will be rejected.

C. The Design Professional will review shop drawings solely to assist contractors in correctly interpreting the plans and specifications.

D. Contract requirements cannot be changed by shop drawings which differ from contract drawings and specifications.

E. Submittals required by the various sections of the Project Manual include, but are not necessarily limited to those identified in the submittal schedule below.

F. After award of contract, the contractor shall provide a completed submittal schedule including dates that the submittals will be to the Design Professional for review.

G. Submit required information on the following items:

SPEC SECTION	EQUIPMENT	DETAIL DWGS	PROD DATA	SAMPLES	INSTALL METHODS	O&M MANUAL	CERTIFICATE OF SYSTEM DEMON-STRATION	OTHER (SEE NOTES)
28 31 00	Fire Alarm & Detection System	X	X		X	X		
28 50 00	Access Control System		X			X		
28 60 00	Video Surveillance System		X			X		
Notes:								

1.11. OPERATION AND MAINTENANCE MANUALS

A. Operation and maintenance manuals shall be submitted to the Design Professional in duplicate upon completion of the job. Refer to Division 01 specifications for additional information.

B. Submit manuals in duplicate upon completion of the job. Manuals shall be bound

in a three-ring hard backed binder. Front cover and spine of each binder shall have the following lettering done:

OPERATION
AND
MAINTENANCE
MANUAL
FOR
(SYSTEM TYPE) SYSTEMS

(PROJECT NAME)
(LOCATION)
(DATE)

SUBMITTED BY
(NAME, ADDRESS AND PHONE NUMBER OF CONTRACTOR)

C. Provide a master index at the beginning of manual showing items included. Each section shall contain the following information for equipment furnished under this contract:
   1. Equipment and system warranties and guarantees.
   2. Installation instructions.
   3. Operating instructions.
   4. Maintenance instructions.
   5. Spare parts identification and ordering list.
   6. Local service organization, address, contact and phone number.
   7. Shop drawings with reviewed stamp of Design Professional and Contractor shall be included, if applicable, along with the items listed above.

1.12. TESTS AND DEMONSTRATIONS

A. All systems shall be tested by the Contractor and placed in proper working order prior to demonstrating systems to Owner.

1.13. TRAINING AND DEMONSTRATIONS

A. Prior to acceptance of the telecommunications installation, the Contractor shall provide to the Owner, or their designated representatives, all comprehensive training on essential features and functions of all systems installed, and shall instruct the Owner in the proper operation and maintenance of such systems.
   1. Provide adequate notice to the Owner as to when instruction will be conducted so appropriate personnel can be present.
   2. Prepare the instruction format for a minimum of four Owner Representatives.

B. Equipment training:
   1. Manufacturer's representatives shall provide instruction on each major piece of equipment. The Contractor shall provide instruction on all other equipment.
   2. Training sessions shall use the printed installation, operation and maintenance instruction materials included in the O&M manuals and emphasize preventative maintenance and safe operating procedures.
   3. Training shall be performed by qualified factory trained technicians.
   4. The Contractor shall attend all sessions performed by the manufacturer's representative and shall add to each session any special information relating to the details of installation of the equipment as it might impact the operation and maintenance.
   5. Equipment training shall occur as soon as possible after start up of the equipment and shall include hands-on operation. Training shall be provided for equipment listed in the table below.

C. System training:
   1. Training sessions shall include hands-on demonstrations of system wide start-up, operation in all possible modes, shut-down and emergency procedures.

D. The following are minimum requirements for Owner instruction:

SPEC SECTION	EQUIPMENT	HOURS ON SITE	HOURS OFF SITE			PRESENTED BY	OTHERS PRESENT	REMARKS
28 31 00	Fire Alarm & Detection System	4	0			Manufacturer's Representative	Contractor	1
28 50 00	Access Control System	4	0			Access Control Contractor	Owner	1
28 60 00	Video Surveillance System	4	0			Video Surveillance Contractor	Owner	1
Remarks: 1. Perform complete system test at time of instruction.								

E. The Contractor shall submit a certificate, signed by the Owner stating the date, time and persons instructed and that the instruction has been completed to the Owner's satisfaction. An example of a certificate form is as follows:

CERTIFICATE OF SYSTEM DEMONSTRATION

This document is to certify that the contractor has demonstrated the hereafter listed systems to the Owner's representatives in accordance with the Contract documents and that the instruction has been completed to the Owner's satisfaction.

A. Project:

B. System(s):

C. Contractor's representatives giving instruction and demonstration:

Contractor: _____

NAMES	DATE	HOURS

D. Owner's representatives receiving instruction:

Owner: _____

NAMES	DATE	HOURS

E. Acknowledgment of demonstration:

Contractor's Representative: _____
Signature Date

Owner's Representative: _____
Signature Date

1.14. PERMITS, FEES, ETC.

A. Secure all required permits and pay for all inspections required in connection with the telecommunication systems work. Contractor shall post all bonds and obtain all licenses required by the State, City, County, and Federal Agencies.

1.15. SUBSTITUTIONS

A. Refer to Section 01 25 00 – Substitution Procedures.

B. To obtain approval to use unspecified equipment, Bidding Contractors (not equipment supplier, manufacturers, etc.) shall submit written requests to the Design Professional at least 10 days prior to bid due date. Requests shall clearly describe the equipment for which approval is being requested. Include all data necessary to demonstrate that equipment's capacities, features and performance are equivalent to include a cost comparison between specified equipment and equipment for which approval is being requested. If the equipment is acceptable, the Design Professional will approve it in an addendum. The Design Professional will, under no circumstances, be required to prove that an item proposed for substitution is or is not of equal quality to the specified item.

C. Where substitutions are approved, Contractor assumes all responsibility for physical dimensions and all other resulting changes. This responsibility extends to cover all extra work necessitated by other trades as a result of the substitution.

1.16. APPROVED CONTRACTORS

A. The Contractor shall be a manufacturer certified installer and service provider for the product submitted and installed. A copy of the Contractor’s manufacturer certification must be submitted under this specification section for the Access Control Contractor and the Video Surveillance Contractor if applicable to the project. The Contractor is responsible for professional and installation practices in accordance with the manufacturer requirements and must be authorized to provide a Manufacturer's Product Warranty with their installation.

B. The Contractor pulling the cabling (if different from the prime system Contractor) shall meet the BICSI or IBEW/NECA requirements found in the Division 27 General Provisions.

C. Contractor shall be located within 125 miles of the construction site to establish a potential two hour response time for ongoing customer needs after construction completion.

1.17. ACCEPTABLE MANUFACTURERS

A. In most cases, equipment specifications are based on a specific manufacturer's type, style, dimensional data, catalog number, etc. Listed with the base specification, either in the manual or on the plans are acceptable manufacturers approved to bid products of equal quality. These manufacturers are encouraged to submit to the Design Professional at least 8 days prior to the bid due date drawings and catalog numbers of products to be bid as equals.

B. Manufacturers who do not submit prior to bidding run the risk of having the product rejected at time of shop drawing submittal. Extra costs associated with replacing the rejected product shall be the responsibility of the Contractor and/or the manufacturer.

C. If the Contractor chooses to use a manufacturer listed as an equal, it shall be their responsibility to assure that the manufacturer has complied with the requirements in 'A' above. Contractor shall assume all responsibility for physical dimensions, operating characteristics, and all other resulting changes. This responsibility extends to cover all extra work necessitated by other trades as a result of using the alternate manufacturer.

D. Where a model or catalog number is provided, it may not be inclusive of all product requirements. Refer to additional requirements provided on the plans or in the specifications as required. Similarly, there may be additional requirements included in the model or catalog number that are not specifically stated. These requirements shall also be met.

1.18. QUALITY ASSURANCE

A. The Contractor shall be a company specializing in telecommunication cable and/or accessories with a minimum of five years documented experience in installation of cable and/or accessories similar to those specified below.

1.19. WARRANTY

A. Refer to Divisions 00 and 01 for information on warranties and correction of work within the warranty period.
   1. If a warranty or warranty period are not defined in Division 00 or 01, then the start of all warranty periods shall be the date of Substantial Completion and the length of the warranty shall be for one year.
      a. If construction is phased with distinct and separate Substantial Completion dates for portions of the building and/or systems, separate warranties shall be provided for each of these phased areas and/or systems.

B. Refer to other Division 23 sections for systems, equipment, or material requiring extended warranties beyond one year.

C. The date of systems/equipment startup or equipment/material shipment to the site shall not be considered the notable date with relation to the warranty of that item. All systems, equipment, material, etc., shall have the same start date with respect to the warranty period.

D. Systems, equipment or material put into use to facilitate construction activities (e.g. testing and balancing, commissioning, temporary conditioning, etc.) prior to the start of the warranty period shall not impact the length of the warranty in any way.

1.20. CHANGES IN THE WORK

A. A Contract Change Order is a written order to the Contractor signed by the Owner and Contractor, issued after the execution of the Contract, authorizing a change in the Work or an adjustment in the Contract Sum or the Contract Time. The Contract Sum and the Contract Time may be changed only by Contract Change Order.

B. The Owner, without invalidating the Contract, may order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, with the Contract Sum and the Contract Time being adjusted accordingly. All such changes in the Work shall be authorized by Contract Change Order and shall be performed under the applicable conditions of the Contract Documents.

C. The cost or credit to the Owner resulting from a change in the Work shall be determined by mutual acceptance of a lump sum properly itemized and supported by sufficient substantial data to permit evaluation. Change Orders shall be submitted with each item listed individually with a material cost and labor unit extension. Overhead and profit, as mutually agreed upon between Owner and Contractor shall be added to material and labor cost figures.

D. It shall be the responsibility of the Contractor before proceeding with any change to satisfy themself that the change has been properly authorized on behalf of the Owner.

1.21. COMPLETION

A. Systems, at time of completion, shall be complete, efficiently operating, non-hazardous and ready for normal use by the Owner.

B. When all the work is complete the Contractor shall thoroughly clean all material and equipment installed as a part of this contract and leave all equipment and material in new condition.

C. The Contractor shall clean up and remove from the site all debris, excess material and equipment left during the progress of this contract at job completion.

END OF SECTION 28 00 10

SECTION 28 31 00 - FIRE ALARM AND DETECTION SYSTEM

PART 1 GENERAL

1.1. RELATED DOCUMENTS

A. The requirements of Division 00 - Procurement and Contracting Requirements, Division 01 - General Requirements and Section 28 0010 – Electronic Safety and Security Provisions are applicable to work required of this section.

1.2. QUALITY ASSURANCE

A. The system installation and wiring shall comply with applicable provisions of the current issue of NFPA-72, International Building Code, International Mechanical Code, Wisconsin Enrolled Commercial Building Code, Americans with Disabilities Act, and codes and regulations of local authorities having jurisdiction.

B. NEC Compliance: Comply with NEC as applicable to construction and installation of fire alarm and detection system components and accessories.

C. UL Compliance and Labeling: Provide fire alarm and detection system components which are UL-listed and labeled.

1.3. CODES AND STANDARDS

A. All work shall be done in accordance with the applicable portion of the following codes and standards:
   1. National Fire Protection Association; NFPA 70, NFPA 72, NFPA 80, NFPA 20, NFPA 13
   2. National Electrical Manufacturers Association
   3. Standards of Institute of Electrical and Electronic Engineers
   4. International Building Code
   5. Occupational Safety and Health Act
   6. Wisconsin Enrolled Commercial Building Code
   7. NECA Standards
   8. Americans With Disabilities Act (ADA)
   9. ASME A17.1 State Elevator Code
   10. Regulations of local authorities having jurisdiction.

1.4. SUBMITTALS

A. Submittal data for the fire alarm equipment shall consist of shop drawings outlined in NFPA 72 shop drawing requirements and include but not limited to: block diagrams of layout and operation of the system, full size drawings with device locations and addresses, battery power calculations, audible and visual

device power supply calculations, voltage drop calculations, list of device identification and addresses that will be displayed on the control panel(s), quantities of equipment, catalog cuts showing technical data necessary to evaluate the equipment and other descriptive data necessary to describe fully the equipment proposed.

B. In no instance shall the contract drawings be reproduced for shop drawing submittals.

C. Contractor is responsible for any fees associated with the review and approval of the fire alarm drawings and product data by the Authority Having Jurisdiction (AHJ). Contractor is also responsible for completion of the required fire alarm system submittal form and submittal of the final fire alarm shop drawings to the AHJ.

1.5. RECORD DRAWING REQUIREMENTS

A. Record drawings shall be provided prior to the time of scheduling of the final inspection. They shall include the location of the overcurrent protection that feeds any fire alarm related equipment and shall be clearly marked on the drawings. Include changes made during system testing and acceptance.
   1. The following should be included:
      a. Alarm initiation devices with addresses.
      b. Alarm signal devices with module locations/addresses and circuit numbers.
      c. Door holders and smoke dampers with module location and addressed.
      d. Air handling units with module and relay locations and addresses.
      e. Junction pull boxes.
      f. Layout of conduit with circuit identification.
      g. 120 VAC power sources for control panels, door holders, and fire/smoke dampers.
      h. Emergency release of interlocked doors with mechanical systems
      i. Location of all end of line resistors.
      j. Calculations for voltage drop on circuits, battery, and audio amplifier sizing.

1.6. SYSTEM OPERATION

A. Control of System: By the Fire Alarm Control Panel.

B. System Supervision: Automatically detect and report open circuits, shorts, and grounds of wiring for initiating device, signaling line, and notification-appliance circuits.

C. Priority of Signals: Automatic alarm response functions resulting from an alarm signal from one zone or device are not altered by subsequent alarm, supervisory, or trouble signals. An alarm signal is the highest priority. Supervisory and trouble signals have second- and third-level priority. Higher-priority signals take precedence over signals of lower priority, even when the lower-priority condition occurs first. Annunciate and display all alarm, supervisory, and trouble signals regardless of priority or order received.

D. Noninterference: A signal on one zone shall not prevent the receipt of signals from other zones.

E. System Reset: All zones are manually resettable from the Fire Alarm Control Panel after initiating devices are restored to normal. Equipment that has been by-passed in software shall not change state of condition during a "reset".
   1. Fire Alarm Control Panel shall be reprogrammed so that it can be reset only when a security level access level of 3 or greater is used.

F. Transmission to Remote Alarm Receiving Station: Automatically route alarm, supervisory, and trouble signals to a remote alarm station by means of a digital alarm communicator transmitter and telephone lines.

G. System Alarm Capability during Circuit Fault Conditions: System wiring and circuit arrangement prevent alarm capability reduction when a single ground or open circuit occurs in an initiating device circuit, signal line circuit, or notification-appliance circuit.

H. Loss of primary power at the Fire Alarm Control Panel initiates a trouble signal at the Fire Alarm Control Panel and the annunciator. An emergency power light is illuminated at both locations when the system is operating on the secondary power supply.

I. Basic Alarm Performance Requirements: Unless otherwise indicated, operation of a manual station, automatic alarm operation of a smoke or flame or heat detector, or operation of a sprinkler flow device initiates the following:
   1. Notification-appliance operation.
   2. Identification at the Fire Alarm Control Panel and the remote annunciator of the device originating the alarm.
   3. Transmission of an alarm signal to the remote alarm receiving station.
   4. Release of fire and smoke doors hold open if a detector adjacent to the door is in alarm.
   5. Recall of elevators if the alarm is initiated by a detector located in an associated machine room, hoistway, or elevator lobby.
   6. Shutdown of fans and other air-handling equipment serving the fire zone where alarm was initiated.
   7. Initiation of smoke control sequence(s).

8. Closing of smoke dampers in air ducts of system serving the fire zone where alarm was initiated.
9. Recording of the event in the system memory.

J. Alarm Silencing, System Reset and Indication: Controlled by switches in the Fire Alarm Control Panel and the remote annunciator.
1. Silencing-switch operation halts alarm operation of notification appliances and activates an "alarm silence" light. Display of identity of the alarm zone or device is retained.
2. Subsequent alarm signals from other devices or fire zones reactivate notification appliances until silencing switch is operated again.
3. When alarm-initiating devices return to normal and system reset switch is operated, notification appliances operate again until alarm silence switch is reset.

K. Operating a heat detector in the elevator shaft or elevator machine room shuts down elevator power by operating a shunt trip device in the circuit feeding the elevator.
1. A field-mounted relay actuated by the Fire Alarm Control Panel closes the shunt trip circuit and operates building notification appliances and annunciator.

L. Operating a smoke detector in the elevator shaft, elevator machine room or elevator lobby initiates Phase I Emergency Recall Operation automatically recalling the elevator to the main level of egress or the alternate recall level if the main level elevator lobby smoke detector is in alarm.

M. Smoke detection for zones or detectors with alarm verification initiates the following:
1. Audible and visible indication of an "alarm verification" signal at the Fire Alarm Control Panel.
2. Activation of a listed and approved "alarm verification" sequence at the Fire Alarm Control Panel and the detector.
3. General alarm if the alarm is verified.
4. Cancellation of the Fire Alarm Control Panel indication and system reset if the alarm is not verified.

N. Remote Detector Sensitivity Adjustment: Manipulation of controls at the Fire Alarm Control Panel causes the selection of specific addressable smoke detectors for adjustment, display of their current status and sensitivity settings, and control of changes in those settings. Same controls can be used to program repetitive, scheduled, automated changes in sensitivity of specific detectors. Sensitivity adjustments and sensitivity-adjustment schedule changes are recorded in system memory and are printed out by the system printer.

O. Removal of an alarm-initiating device or a notification appliance initiates the following:
   1. A "trouble" signal indication at the Fire Alarm Control Panel and the annunciator for the device or zone involved.
   2. Transmission of trouble signal to remote alarm receiving station.

P. Fire Alarm Control Panel Alphanumeric Display: Plain-English-language descriptions of alarm, supervisory, and trouble events; and addresses and locations of alarm-initiating or supervisory devices originating the report. Display monitoring actions, system and component status, system commands, programming information, and data from the system's historical memory.
   1. The upper line of the display shall indicate the zone in alarm according to the zone schedule on drawings.
   2. The lower line of the display shall indicate the address of the device in alarm.

Q. LED Lights:
   1. Only fire alarm zone lights and "device type" lights shall annunciate with a red LED. Device type, address and exact location shall annunciate on the digital readout.
   2. Any by-pass, disable, or trouble condition shall annunciate with an amber LED, a trouble sounder and annunciate on the digital readout. A "trouble pending" control module shall be included.

1.7. EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. Contractor shall provide the following spare parts in quantities shown, with a minimum of 1/item:

Quantity	Type of Device Present
5%	Smoke detectors and heat detectors
5%	Smoke and heat detector bases
5%	Monitor Modules
5%	Control Modules
1%	Duct detectors with housing and sample tubes
1%	Horn/strobe Units wall and ceiling variants
1%	Horn units wall and ceiling variants
1%	Strobes wall and ceiling variants
1%	Manual Pull Stations

5 Units - Keys & Tools for access to locked and/or tamper proof components

1.8. WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract

Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Special Warranty: A written warranty, signed by Contractor and manufacturer, agreeing to replace components that do not meet requirements or that fall within the specified warranty period.
   1. Warranty Period: One year from date of Final Acceptance. Full warranty applies throughout the warranty period.

PART 2 - PRODUCTS

2.1. ACCEPTABLE MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide fire alarm and detection systems of one of the following:
   1. Edwards – EST Series to match other County facilities
   2. The equipment supplier shall provide the services of a factory trained representative. They shall supervise the system installation and final connections to the equipment and provide testing to assure that the system is in proper operating condition.

2.2. FIRE ALARM AND DETECTION SYSTEMS

A. General: Provide fire alarm and detection system products of types, sizes, and capacities indicated, which comply with manufacturer's standard design, materials, components; construct in accordance with published product information, and as required for complete installation. Provide fire alarm and detection systems for applications indicated, with the sequence of operations, components and function features indicated.

B. Materials and Equipment:
   1. Wiring System Materials: Provide basic wiring materials which comply with Division 26 Specifications; types to be selected by Installer.
      a. Junction and Pull Boxes:
         1) Junction and pull boxes shall be clearly marked. This shall be done by painting the covers red, and properly labeling them.
         2) All junction and pull boxes located at or above 8'0" from the floor shall be a minimum size of 4-11/16".
         3) No box extensions shall be permitted on new work.
         4) All junction boxes shall be readily accessible.
         5) No splicing in device mounting boxes.

C. Manufacturer's Equipment: Provide manufacturer's standard construction equipment for material noted below:
   1. Central Fire Alarm Control Panel.

a. Cabinet: Front lockable steel enclosure with a 14 gauge door and 16 gauge cabinet body, minimum. Arrange interior components so operations required for testing or for normal maintenance of the system are performed from the front of the enclosure. If more than one unit is required to form a complete control panel, fabricate with matching modular unit enclosure to accommodate components and to allow ample gutter space for field wiring and interconnecting panels.
    1) Identify each enclosure with an engraved, red, laminated, phenolic-resin nameplate with lettering not less than 1 inch high. Identify individual components and modules within cabinets with permanent labels.
    2) Mounting: Surface.
    3) Keys: Common to all system components.

b. Storage:
    1) The system stores and logs alarm and trouble events. Each recorded event includes the time and date of the event's occurrence.
    2) The system has the capability of recalling alarms, detector verifications, trouble conditions, acknowledgments, and silencing and reset activities in chronological order for the purpose of recreating an event history.
    3) Memory: Battery protected random access memory.
    4) Alarm Log: 300 events. Trouble Log: 300 events.
    5) Available Reports:
        a) Alarm, trouble and test conditions including the time and date of each occurrence.
        b) Status of each device in the system including detector sensitivity and verification tally.
        c) Detector trending.

c. Alarm and Supervisory Systems: Separate and independent in the Fire Alarm Control Panel. Alarm-initiating zone boards consist of plug-in cards. Construction requiring removal of field wiring for module replacement is unacceptable.
    1) Initiating Device Capacity: Adequate for quantity of devices indicated on drawings plus 10 percent.
        a) Quantity of Simultaneous Alarms: Unlimited.
    2) Maintenance Alert: Automatically warns of a contaminated detector prior to false alarm.
    3) One additional signal line circuit (SLC) for future.

d. Control Modules: Include types and capacities required to perform all functions of fire alarm systems. Each circuit shall have 10 percent spare capacity.

e. Indications: Local, visible, and audible signals announce alarm, supervisory, and trouble conditions. Each type of audible alarm has

a different sound.

f. Resetting Controls: Prevent the resetting of alarm, supervisory, or trouble signals while the alarm or trouble condition still exists.

g. Alphanumeric Display and System Controls: Arranged for interface between human operator at the Fire Alarm Control Panel and addressable system components, including annunciation, supervision, and control. Bypass switches shall provide specific alphanumeric display on the LCD annunciator.
   1) Display: A minimum of 80 characters; alarm, supervisory, and component status messages; and indicate control commands to be entered into the system for control of smoke detector sensitivity and other parameters.
   2) Keypad: Arranged to permit entry and execution of programming, display, and control commands.
   3) Bypass Switches: Activation of a bypass switch allows system testing without operation of the bypassed circuit. A trouble condition is generated upon operation of a bypass switch. Provide bypass switches for the following:
      a) Remote monitoring station notification.
      b) Audio circuit.
      c) Visual circuit.
      d) Smoke dampers.
      e) Pressurization fans.
      f) Elevator recall.
      g) Fire doors.
   4) Control Switches: Switches allow manual control or testing of the following:
      a) Smoke removal system.
      b) Alarm Test. Operation of switch simulates an alarm condition in the same manner as if a manual station was operated. Notification of the fire department or central monitoring station is bypassed.

h. Programming:
   1) System Memory: Non-volatile, programmable.
   2) Loading or editing of special instructions and operating sequences allowed as required.
   3) Capable of on-site programming to accommodate and facilitate expansion, building parameter changes, or changes as required by local codes.
   4) Provisions for disabling and enabling all addressable devices, and all monitoring, signaling and control circuits individually for maintenance and testing purposes.
   5) Provisions for distinctly different evacuation tone for disaster warning purposes.
   6) Smoke sensor sensitivity:

a) Automatic sensitivity adjustment of each sensor based on time of day and day of week.
b) Multiple sensitivity settings per sensor.
c) Pre-alarm or two-stage function to provide an indication when a sensor reaches 50 percent of its alarm threshold.

7) Contractor shall provide a detailed device description label that includes Room Name, Room Number, and Location in Building for common room name (i.e. Mech Room by main storage).

i. Control Switches:

	Access Level
City disconnect with digital readout (for both alarms and troubles)	Level 3
Audio bypass with digital readout	Level 3
Visual circuit bypass with digital readout	Level 3
Smoke damper bypass with digital readout	Level 1
Elevator bypass	Level 1
Fire door bypass	Level 1
Activation of elevator smoke damper	Level 1

j. Provide air handler shutdown by specific unit or by fire zone (i.e. floor). Switch cannot be activated unless one or more of the following conditions occur:
1) Fire Alarm Control Panel is in access level 3.
2) Panel is in alarm condition.

k. Fire alarm control panel power shall be supplied by dedicated circuit(s).

2. Manual Pull Stations
a. Description: Fabricated of metal, and finished in red with molded, raised-letter operating instructions of contrasting color.
1) Double-action mechanism requires two actions, such as a push and a pull, to initiate an alarm.
2) Station Reset: Key or wrench operated; double pole, double throw; switch rated for the voltage and current at which it operates.
3) Integral Addressable Module: Arranged to communicate manual-station status (normal, alarm, or trouble) to the Fire Alarm Control Panel.
4) When surface-mounting pull stations, fire alarm equipment provider shall provide back boxes to match pull stations.

3. Smoke Detectors
a. General: Include the following features:
1) Operating Voltage: 24-V dc, nominal.
2) Self-Restoring: Detectors do not require resetting or

readjustment after actuation to restore them to normal operation.

3) Plug-in Arrangement: Detector and associated electronic components are mounted in a module that connects in a tamper-resistant manner to a fixed base with a twist-locking plug connection. Terminals in the fixed base accept building wiring.

4) Sensitivity: Can be tested and adjusted in-place after installation.

5) Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the Fire Alarm Control Panel.

6) Remote Controllability: Unless otherwise indicated, detectors are analog addressable type, individually monitored at the Fire Alarm Control Panel for calibration, sensitivity, and alarm condition, and individually adjustable for sensitivity from the Fire Alarm Control Panel.

b. Photoelectric Smoke Detectors: Include the following features:

1) Sensor: LED or infrared light source with matching silicon-cell receiver.

2) Detector Sensitivity: Between 2.5 and 3.5 percent/foot smoke obscuration when tested according to UL 268A.

3) Magnetically actuated test switch.

4) Integral Thermal Detector: Fixed-temperature type with 135 deg F setting.

c. Duct Smoke Detector: Photoelectric type.

1) Sampling Tube: Design and dimensions as recommended by the manufacturer for the specific duct size, air velocity, and installation conditions where applied.

2) Relay Fan Shutdown: Rated to interrupt fan motor-control circuit.

3) Remote Test Switch: Mount near mechanical room door or suitable maintenance type space on stainless steel cover plate. Include floor plan with protective cover to indicate location of corresponding duct smoke detector.

4. Other Detectors

a. Heat Detector, Combination Type: Actuated by either a fixed temperature or rate of rise of temperature.

1) Analog temperature measuring device with setpoint (rating) set by Fire Alarm Control Panel.

2) Mounting: Plug-in base, interchangeable with smoke detector bases, where available.

3) Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the Fire Alarm Control Panel.

5. Notification Appliances
    a. Description: Equip for mounting as indicated and have screw terminals for system connections.
        1) Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly.
    b. Visible Alarm Devices: Xenon strobe lights listed under UL 1971 with clear or nominal white polycarbonate lens. Mount lens on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- high letters on the lens.
        1) Rated Light Output: Field selectable 15 through 110 candela minimum per UL 1971 for ADA use unless otherwise indicated on drawing or required to meet NFPA 72 criteria.
        2) Strobe Leads: Factory connected to screw terminals.
        3) Synchronized operation.
        4) Mounting:
            a) Ceiling: Flush with white baffle.
            b) Wall: Surface with red or white housing.
            c) Include skirt for surface mounted devices which do not conceal a standard 4-inch junction box.
    c. Alarm Horns:
        1) Minimum sound pressure 87dB at 10’
        2) Separate in/out wiring for signal circuit
        3) Mounting:
            a) Ceiling: Flush with white baffle.
            b) Wall: Surface with red housing.
            c) Include skirt for surface mounted devices which do not conceal a standard 4-inch junction box.
    d. Fire Suppression System Horn/Strobe
        1) Weather resistant 24VDC combination audible/visual device to be located above the fire department connection.
        2) Wall mounted.
        3) Minimum sound pressure 86dB at 10' with 1 watt tap
        4) Rated light output: 75 candela.
6. Magnetic Door Holders
    a. Description: Units equipped for wall or floor mounting as indicated and are complete with matching door plate.
        1) Electromagnet: Requires no more than 3 W to develop 25-lbf holding force.
        2) Wall-Mounted Units: Surface mounted, unless otherwise indicated.
        3) Contact Plate: Adjustable.
        4) Armature Plate: Door mounted, adjustable 95 deg. horizontal, 5 deg. Vertical.
        5) Rating: 24-Vdc.

b. Material and Finish: Match door hardware.
c. Existing Units: Where existing units are shown for reconnection, provide necessary relays to operate at 24V dc.
d. Mount units high on door.

7. Remote Annunciator
   a. Description: LCD (liquid crystal display) duplicate annunciator functions of the Fire Alarm Control Panel for alarm supervisory, and trouble indications. Also duplicate manual switching functions of the Fire Alarm Control Panel including, acknowledging, silencing, reset, and test. Lockable steel enclosure keyed to match.
      1) Mounting: Surface cabinet.
   b. Display Type and Functional Performance: Alphanumeric display same as the Fire Alarm Control Panel. Controls with associated LEDs permit acknowledging, silencing, resetting, and testing functions for alarm, supervisory, and trouble signals identical to those in the Fire Alarm Control Panel.
   c. Provide LCD back box where surface mounting is necessary.
8. Signal Circuit Remote Power Supply
   a. General: Filtered, regulated, power limited with trouble indication; with emergency power supply.
   b. Cabinet Lockable steel, surface-mounted enclosure, keyed to match, Fire Alarm Control Panel.
9. Battery Power Supply
   a. General: Components include valve-regulated, recombinant lead acid battery; charger; and an automatic transfer switch.
      1) Battery Nominal Life Expectancy: 4 years as a minimum.
   b. Battery Capacity: Comply with NFPA 72 for supplying a minimum of 24 hours of operation in normal condition, followed by no less than 15 minutes in full alarm for a system operating without a backup generator.
   c. Battery Charger: Solid-state, fully automatic, variable-charging-rate type. Provide capacity for 150 percent of the connected system load while maintaining batteries at full charge. If batteries are fully discharged, the charger recharges them completely within four hours. Charger output is supervised as part of system power supply supervision.
   d. Integral Automatic Transfer Switch: Transfers the load to the battery without loss of signals or status indications when normal power fails.
10. Addressable Interface Devices
   a. Monitor Module: Microelectronic module listed for use in providing a multiplex system address for listed fire and sprinkler alarm-initiating devices with normally open contacts; allows individual monitoring of non-addressable points.
   b. Control Module: Microelectronic module listed for use in

providing a multiplex system address to relays for system control functions.

1) Relay: 24 VDC coil with red LED when in the "alarm" state; contacts rated 10A, 115 VAC, minimum; suitable for control function required.

11. Digital Alarm Communicator Transmitter
    a. Listed and labeled under UL 864 and NFPA 72.
    b. Cellular/IP Communicator:
        1) The cellular communicator connects directly to the primary and secondary analog UL Listed Fire Alarm Control Panel telephone ports.
        2) The Communicator will communicate to GSM networks in the area including 2G, 3G and 4G. The multi-GSM platform technology automatically detects and chooses the best network in the area based on signal strength and immediately self-adjusts for operation.
        3) Supports both dynamic (DHCP) or Public and Private Static IP addressing.
        4) Communicates over any type of customer-provided Ethernet 10/100 Base network connection (LAN or WAN), DSL modem or cable modem.
        5) Data transmits over standard contact-ID protocol is secured with the industry's advanced encryption standard (AES 256 bit).
        6) Dual path communications: Uses Internet or GSM as primary.
        7) Provide with programming tools as required.
        8) Diagnostic LEDs: Signal strength and status indications.
        9) IP and GSM tested every day.
        10) All circuits shall be power-limited, per UL864 requirements.
12. Fire Alarm Documentation Cabinet
    a. Provide fire alarm documentation cabinet in accordance with NFPA-72 Cabinet to be labeled "SYSTEM RECORD DOCUMENTS". Space Age Systems SRD ACE-11 or equal.

PART 3 - EXECUTION

3.1. GENERAL

A. Contractor/Installer shall meet with Owner prior to performing any work on existing/new system(s). Meeting shall determine existing building system functions and approach Contractor/Installer will take to remove the existing system and determine Contractor's/Installer's plan to install new system which includes raceway runs, typical wiring practices, and device and equipment

installation, also to provide Contractor/Installer with Owner’s expectations.

B. The locations and spacing of alarm initiating devices and strobes indicated on the drawings are approximate. The equipment supplier shall verify device requirements and spacing and shall add devices as required to satisfy governing authorities. It shall be the responsibility of the equipment supplier or their representative to determine the type of detector required by local authorities for each type of installation.

C. Install the fire alarm system in accordance with approved manufacturer's wiring diagrams. Furnish all conduit, wiring, outlet boxes, junction boxes, cabinets, and similar devices necessary for a complete installation. Boxes shall be installed in accessible spaces without requiring the removal of light fixtures or any other equipment.

D. Coordinate system programming with the authority having jurisdiction.

E. Provide 120 volt power to annunciator panels and remote signal circuit power supplies.

F. Paint the fire alarm power supply disconnect red and label "Fire Alarm Circuit Control". Provide locking means.

G. Coordinate the installation of equipment and devices that pertain to the work of other trades with the appropriate contractors.

H. Provide switch and fuse stat's (type SOU) installed within the Fire Alarm Control Panel disconnect 120 VAC power and separately all battery power.

I. Coordinate the installation of equipment and devices that pertain to the work of other trades with the appropriate contractors.
   1. Provide connections to 120V smoke dampers provided by the mechanical contractor. Install 120V indicator lights provided with the dampers and wire to position switches.
      a. Provide dedicated 120 volt circuits for smoke dampers.
   2. Provide shut-down relays to initiate HVAC shut down. Locations indicated on the fire alarm drawings are diagrammatic. Coordinate relay installation and HVAC unit shut-down with temperature controls contractor.
   3. Provide monitoring of fire suppression system. Coordinate installation with the Fire Suppression System installer.
      a. Activation of water flow shall initiate general alarm.
      b. Activation of water flow shall initiate the dedicated combination horn and visual device located above the fire department connection. This device shall not initiate under any alarm other

than water flow.

c. Activation of valve tamper switches shall initiate a supervisory alarm.

d. Provide monitoring of fire pump in accordance with NFPA 20.

4. Provide monitoring and control of elevator in accordance with ASME A17.1, International Building Code and State Elevator Code. Coordinate installation with the elevator installer.

a. Provide primary and secondary recall signals.

b. Monitor shunt-trip control power.

c. Provide shunt-trip signal in accordance with ASME A17.1. Provide timed delay of shunt-trip signal to allow elevator to be recalled. Coordinate length of time delay with elevator vendor.

3.2. DEVICE INSTALLATION

A. Provide devices as indicated on drawings and as required to perform specified functions.

B. Initiating Devices:

1. Smoke Detectors:

a. Cover all smoke detection devices immediately after installation to maintain cleanliness.

b. Install within five feet of each door held open by the fire alarm system.

c. Where adjacent to an air shaft, supply diffuser or return grille, install smoke detector 36 inches minimum from the edge of the diffuser or grille.

d. Provide a smoke detector within 10 feet of each remote power supply panel.

2. Duct Detectors:

a. Provide duct type smoke detectors in the return ductwork as indicated.

b. Locate duct smoke detector within 5’ of fire dampers where a detector is indicated to be installed in a duct with a smoke.

c. Provide a remote alarm LED indicator for each duct smoke detector which is not readily visible or which is located above a ceiling or on a roof. Mount in an easily accessible and readily visible location. Label with the name of the unit served by the detector. Indicate whether the detector is installed in the supply or return ductwork.

d. Provide a labeled test switch with LED indicator for each duct smoke detector. Install switch at a height between 48 inches and 72 inches above finished floor.

3. Provide heat detectors in areas where smoke detectors would be subject to false alarm.

4. Program address for each device as directed by Owner or stated elsewhere in specification.
5. Program device output text by address and geographic location.
6. Provide an addressable interface module for each non-addressable device.
7. Provide an addressable interface module for each non-addressable initiating device.

C. Signaling Devices:
1. Where plans indicate a signaling device installed adjacent to a manual station, install the signaling device on the wall directly above the manual station.
2. Provide a minimum of two weatherproof audible signaling devices of the same type as other signaling devices provided with the system. The audible signaling devices will be located by the fire department connection to each building. Owner will determine the exact locations. Mount the devices on the exterior of the building. Provide a separate circuit for exterior audible signaling devices.
3. In sprinkled buildings, provide a 24VDC system audible/visual device above the fire department connection. Coordinate location with division 21. Provide manual bypass from the Fire Alarm Control Panel.
4. Set taps for toilet room speakers at 1/4 watt where toilet room is under 1000 square feet.
5. Signaling devices shall be completely deactivated by pressing "signal silence".
6. Audibles shall be placed so that they can be heard a minimum of 15 decibels above the ambient decibel level in all locations.

D. Control Devices:
1. All devices controlled by the Fire Alarm Control Panel (i.e. dampers, doors, elevators, etc.) shall be operated by the use of "control modules" and not by relay type device on detector bases. No auxiliary equipment shall be directly connected to LMX control modules. Control modules shall activate a 24VDC relay with LED when in the "alarm".
2. Elevators: Verify recall requirements with local codes, authorities, and installers prior to system programming. Provide control modules and relays as required.
3. Provide a control module and relay for each door or group of doors to be held open.
4. Provide control modules and relays as required to implement the required control sequences.
5. Provide control modules and relays for remote indication of alarm and trouble conditions.
6. Provide monitor module(s) where conventional non-addressable heat detectors and similar devices are installed.

E. Door Holders:

1. Mount at the top of each door to be held open unless otherwise indicated.
2. Mount the magnet on the wall and the contact plate on the door. Provide extensions as necessary to assure proper mating between the magnet and contact plate. Magnet is to maintain hold of door under normal conditions.
3. Adjust so the door is held parallel to the wall on which the magnet is mounted.
4. Electromagnetic door holders which are indicated to be integral with a door closer shall be furnished by the Design Professional. Provide wiring so the door holders are normally energized from the fire alarm power supply.

F. Cabinets:
1. Mount Fire Alarm Control Panel and remote cabinets a maximum of 72 inches above finished floor to the top of the cabinet. Provide a 4-inch space between adjacent cabinets.

3.3. WIRING INSTALLATION

A. Wiring Method: Use Class B wiring for communication between fire alarm panel equipment and Class B for field mounted devices. Install wiring in metal raceway according to Division 26, Section 26 0533 - Raceways and Boxes for Electrical Systems. Conceal raceway except in unfinished spaces and as indicated.

B. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by the manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors. Do not install spare conductors in conduits or junction boxes.

C. Cable Taps: All cables in the fire alarm control panel, junction boxes, and pull boxes shall be clearly marked in English (i.e. SLC 1, 3rd Floor Speakers, etc.). Label all junction box covers to indicate circuits and/or devices enclosed. Label inside cover of all junction boxes in finished areas. Label outside cover of all junction boxes in unfinished/concealed areas.

D. Color-Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and a different color-code for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire alarm system junction boxes and covers red and provide circuit labels on inside of cover.

E. Wiring to Remote Alarm Transmitting Device: 1-inch conduit between the Fire Alarm Control Panel and the transmitter. Install number of conductors and electrical supervision for connecting wiring as needed to suit monitoring function.

F. Install end-of-line resistors at the farthest device from panel or module in a separate junction box clearly marked "End-of-Line Resistor.

G. Conductors (minimum size and color) and raceways shall be provided as listed below, unless otherwise recommended by the system manufacturer or required by the authority having jurisdiction:

1.	120VAC	#12AWG		
2.	Initiating circuits	#18 tw/sh pair	White(+)	Black(-)
3.	Audible signaling circuits			
	a. Horns/bells	#14AWG	Red(+)	Black(-)
	b. Speakers	#14 tw/sh pair	Red(+)	Black(-)
4.	Module power	#14AWG	Violet(+)	Blue(-)
5.	Resettable module power	#14AWG	Yellow(+)	Gray(-)
6.	Visual signaling circuits	#14AWG	Red(+)	Black(-)
7.	Door holder/smoke dampers	#14AWG	Brown(+)	White(-)
8.	Control circuits	#14 AWG		

H. Conduit fill and box fill never to exceed 50%.

I. No spare conductors shall be installed in conduits or junction boxes.

J. 3M #130C rubber tape (or approved equal) shall be used to insulate grounding shields.

K. All junction and pull boxes located at or above 8'-0" from the floor shall be a minimum size of 4- 11/16" square by 2-1/8" deep.

L. No box extensions shall be permitted on new work.

M. All fire alarm devices, junction and pull boxes shall be installed so they are accessible without removing light fixtures, equipment, conduits, junction boxes or other items.

N. No splicing will be allowed in device mounting boxes.

O. "End of Line Resistors" shall be located at the device that is farthest away from the panel or module.

P. All devices being controlled by the fire alarm control panel (i.e. dampers, doors, etc.) shall be operated by the use of control modules and not by relay type devices

in detector bases. No auxiliary equipment shall be directly connected to an addressable control module. Each control module shall activate a 24 vdc relay with LED when in the "alarm" state.

Q. Back boxes shall be provided by equipment supplier for any surface-mounted pull stations or signaling devices.

R. T-taps may be used for signaling line circuits if manufacturer's recommendations are followed.

3.4. IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals according to Division 26, Section Identification for Electrical Systems.

B. Install instructions frame in a location visible from the Fire Alarm Control Panel.

C. Paint power-supply disconnect switch or breaker serving all fire alarm equipment red and label "FIRE ALARM". Provide handle lock to lock circuit breakers in the closed position.

D. Affix the name and telephone number of the local service organization to the inside of the door of the Fire Alarm Control Panel and each remote cabinet.

E. Label each control module to indicate the equipment controlled.

F. Maintain wiring color codes throughout the system.

G. All labels shall be on the inside of the cover.

3.5. GROUNDING

A. Ground cable shields and equipment according to system manufacturer's written instructions to eliminate shock hazard and to minimize, to the greatest extent possible, ground loops, common-mode returns, noise pickup, cross talk, and other impairments.

B. Ground equipment and conductor and cable shields. For audio circuits, minimize, to the greatest extent possible, ground loops, common-mode returns, noise pickup, cross talk, and other impairments. Provide 5-ohm ground at main equipment location. Measure, record, and report ground resistance.

3.6. ACCEPTANCE TESTING

A. Manufacturer's Field Service: Engage a factory-authorized service representative

to inspect field-assembled components and connections and to supervise pretesting, testing, and adjustment of the system. Report results in writing.

B. Electrical Contractor shall be responsible for performing a “Pre-Test” of the Fire Alarm System and preparing/ completing "Test Log".
   1. All equipment shall be installed prior to completing "Pre-Test".
   2. Scope of the Pre-Test is to:
      a. “Align, adjust, and balance the system.”
      b. Confirm compliance with the drawings and specifications.
      c. Install, test and check for operation of 100% of all fire alarm equipment and items being controlled by the fire alarm system.
   3. Manufacturer’s representative is to be involved in the pre-test.
   4. Perform a thorough cleaning of the fire alarm system so each detector’s chamber value reads less than 50%.
   5. At completion of the pre-test, the fire alarm system is to be complete and ready for owner acceptance.
   6. Complete a “Test Log”, a written record of inspections, tests, and detailed test results.

C. In preparation for the final test, Contractor shall:
   1. Submit a “Test Log” and test forms from NFPA 72 and include a print out proving detector chamber values of less than 50% for all detectors.
   2. Provide a letter certifying pre-test compliance and a list of witnesses.
   3. Provide an up to date and complete printout of software at the time of final inspection and after any and all corrections or changes.
   4. Coordinate with Owner to record automatic messages for fire alarm conditions.

D. Contractor shall perform a Final “Minimum System Test” per NFPA 72.
   1. Contractor shall test all equipment per minimum system testing requirements and maintain a "Test Log".
   2. Contractor to have sufficient personnel to conduct the test efficiently.
   3. Upon completion of the Final Test Contractor will submit the Test Log.
   4. Owner’s representative has the authority to void the Final Test if it is proven during the Final Test that the Fire Alarm system installation is not complete.
      a. Voiding the Final Test will require Contractor to schedule another Final Test.
   5. Upon approval of Final Test, successful owner training and submittal of completed “As- Built” drawings and O&M manuals, Owner will provide Contractor with acceptance of new Fire Alarm System.
      a. Owner acceptance does not constitute “Project Closeout” or completion of “Final Punch List”
      b. Owner acceptance only relieves Contractor of testing requirements, it does not relieve Contractor of other contract requirements.
      c. Final Testing does not constitute Owner training.

d. Owner acceptance provides approval to activate the new Fire Alarm System as the primary system.

6. Contractor shall perform final test in the presence of manufacturer's representative, Owner's representatives, and necessary local code authorities.

E. Minimum System Tests' test the system according to procedures outlined in NFPA 72. Minimum required tests are as follows:

1. Verify the absence of unwanted voltages between circuit conductors and ground.
2. Test all conductors for short circuits using an insulation-testing device.
3. With each circuit pair, short circuit at the far end of the circuit and measure the circuit resistance with an ohm meter. Record the circuit resistance of each circuit on record drawings.
4. Verify that the control unit is in the normal condition as detailed in the manufacturer's operation and maintenance manual.
5. Test initiating and indicating circuits for proper signal transmission under open circuit conditions. One connection each should be opened at not less than 10 percent of initiating and indicating devices. Observe proper signal transmission according to class of wiring used.
6. Test each initiating and indicating device for alarm operation and proper response at the control unit. Test smoke detectors with actual products of combustion.
7. Test the system for all specified functions according to the approved operation and maintenance manual. Systematically initiate specified functional performance items at each station, including making all possible alarm and monitoring initiations and using all communications options. For each item, observe related performance at all devices required to be affected by the item under all system sequences. Observe indicating lights, displays, signal tones, and annunciator indications. Observe all voice audio for routing, clarity, quality, freedom from noise and distortion, and proper volume level.
8. Test Both Primary and Secondary Power: Verify by test that the secondary power system is capable of operating the system for the period and in the manner specified.
9. Retesting: Correct deficiencies indicated by tests and completely retest work affected by such deficiencies. Verify by the system test that the total system meets Specifications and complies with applicable standards.
10. Report of Tests and Inspections: Provide a written record of inspections, tests, and detailed test results in the form of a test log. Submit log on the satisfactory completion of test

F. The manufacturer's authorized representative shall perform a 100% quality inspection of the final installation and in the presence of Contractor, Owner's Representative and local code and fire authorities, shall perform a complete

finished test of all aspects of the system. A system certification verifying the proper system operation shall be required prior to acceptance.

G. Audible sound level measurements shall be conducted throughout the entire building, and all spaces with the evacuation system off and sounding.

3.7. CLEANING AND ADJUSTING

A. Cleaning: Remove paint splatters and other spots, dirt, and debris. Touch up scratches and marred finish to match original finish. Clean unit internally using methods and materials recommended by manufacturer. Provide detector cleaning report proving a maximum chamber value of 50% for all detectors.

3.8. DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel as specified below:
   1. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, adjusting, and maintaining equipment and schedules. Provide a minimum of 4 hours training.
   2. Provide a minimum of 2 hours of software program training.
   3. Training Aid: Use the approved final version of the operation and maintenance manual as a training aid.
   4. Schedule training with Owner, with at least seven days advance notice.

3.9. MAINTENANCE

A. Occupancy Adjustments: When requested within one year of date of Substantial Completion, provide on-site assistance in adjusting sound levels, controls, and sensitivities to suit actual occupied conditions. Provide up to three requested visits to Project site for this purpose.

B. Provide a maintenance contract from the local service organization beginning on the date of Substantial Completion and remaining in force throughout the warranty period. Include required NFPA testing at times scheduled by Owner.

C. Provide Owner with a proposal from the local service organization for a one-year maintenance contract beginning at the end of the warranty period.

END OF SECTION 28 31 00

SECTION 28 50 00 - ACCESS CONTROL SYSTEM

PART 1 GENERAL

1.1. RELATED DOCUMENTS

A. The requirements of Division 00 – Procurement, Contracting and Warranty Requirements, Division 01 - General Requirements and Section 28 00 10 – Electronic Safety and Security Provisions are applicable to work required of this section.

1.2. DESCRIPTION OF WORK

A. The work included under this specification consists of furnishing all labor, equipment, materials, and supplies and performing all operations necessary to complete the installation of this access control in compliance with the specifications and drawings. Contractor will provide and install all the required material to form a complete system.

1.3. CODES AND STANDARDS

A. All work shall be done in accordance with the applicable portion of the following codes and standards:
   1. National Electrical Code
   2. Local Electrical Code
   3. National Fire Protection Association
   4. National Electrical Manufacturers Association
   5. Standards of Institute of Electrical and Electronic Engineers
   6. Applicable Building Codes
   7. Occupational Safety and Health Act
   8. Wisconsin Administrative Codes
   9. ANSI TIA-526-7 Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant
   10. ANSI TIA-526-14-C Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant
   11. ANSI TIA-568-C.0 Generic Telecommunications Cabling for Customer Premises
   12. ANSI TIA-568-C.1 Commercial Building Telecommunications Cabling Standard Part 1: General Requirements
   13. ANSI TIA-568-C.2 Balanced Twisted-Pair Telecommunications Cabling and Components Standards
   14. ANSI TIA-568-C.3 Optical Fiber Cabling Components Standard
   15. ANSI TIA-568-C.4 Broadband Coaxial Cabling and Components Standard
   16. ANSI TIA-569-D Telecommunications Pathways and Spaces
   17. ANSI TIA-570-C Residential Telecommunications Infrastructure Standard

18. ANSI TIA-598-D Optical Fiber Cable Color Coding
19. ANSI TIA-606-B Administration Standard for Commercial Telecommunications Infrastructure
20. ANSI TIA-607-B Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
21. ANSI TIA-758-B Customer-owned Outside Plant Telecommunications Infrastructure Standard
22. National Fire Protection Agency (NFPA - 70), National Electrical Code (NEC)

1.4. SUBMITTALS

A. Submittal data for access control cabling and components shall consist of:
   1. Catalog cuts showing technical data necessary to evaluate the materials.
   2. One-line diagrams depicting intended signal flow throughout.
   3. Floor Plans depicting locations of access control components, with identifying labels.

1.5. WORK BY OTHERS

A. Unless noted otherwise, the building's Electrical Contractor will provide field device backboxes as needed, and conduit paths for use by Access Control Contractor. In general, the following is provided:
   1. Available space on Telecom Room plywood wall to surface mount head end equipment as required with telecommunications room ground bus bar available for grounding.

1.6. FIRESTOPPING

A. Contractor shall be responsible for firestopping all conduit sleeves and cable tray where required to maintain integrity of fire and/or smoke walls. Contractor shall see architectural drawings for walls that require fire rating.

1.7. ACCEPTABLE ACCESS CONTROL CONTRACTORS

A. The following contractors are pre-approved to bid this job:
   1. Access Control Contractor shall be a manufacturer authorized Dealer, verifiable by the manufacturer's representative. The Access Control Contractor shall also provide as a submittal documentation that they have been and continue to be an established manufacturer authorized dealer in good standing for a minimum of six continuous months before the project bid date. Bidding the project without certifications and attempting to acquire certifications after the bid is not acceptable.
   2. Contractor shall be located within 125 miles of the construction site to establish a potential two-hour response time for ongoing customer needs

after construction completion.

PART 2 - PRODUCTS

2.1. ACCESS CONTROL CABLING AND COMPONENTS

A. Acceptable Access Control System Manufacturers:
   1. Lenel

B. Acceptable Access Control System Components:
   1. Card Readers
      a. HID
   2. Access Control Cable
      a. CSC WESSCO
      b. Belden
      c. Approved equal
   3. Access Control Lock Out Button
      a. STI: SS2-4-3-2-ZA-EN
         1) Button Labeling Shall be “LOCK OUT”
   4. Access Control Buzz Open Button
      a. Bosch: ISC-PB1-100
      b. Approved equal
   5. Access Control Request to Exit
      a. Bosch Surface Mounted, DS160 PIR REX
   6. Local Audible Alarm Sounder
      a. Floyd Bell Inc.: MB-V09-530-Q(M). With cover plate. Kyle: SPCX688-T
   7. Access Control Power Supply and Battery Backup
      a. Same as Access Control System
      b. Altronix
      c. LifeSafety Power
   8. Access Control Door Controller
      a. Same as Access Control System
      b. Mercury Security

C. Additional Access Control Requirements:
   1. The Access Control Contractor shall install and configure all local access control panels in the identified telecommunication rooms on the construction plans. Unless noted otherwise.
   2. The Access Control Contractor shall program all security system databases hardware configurations.
   3. The Access Control system shall be integrated in with the existing Sauk county-wide access control system.
   4. The Access Control Contractor shall test and certify all access control communication and operation in accordance with the specifications and

manufactures recommendations.

5. The Access Control Contractor shall provide and install all cabling necessary for a complete and operational system consider all access control system devices called out on the plans (door contacts of all types, card readers, request to exit devices either internal to door hardware or surface mounted, and electrified door hardware of all types).
    a. Access control cabling shall be home run to the main system hardware, no splicing.
6. Any door identified on the plans that has any of the system components {door contacts (sometimes called position switches) of all types, card readers, request to exit devices, electrified door hardware of all types} shall be considered an access control system door.
7. Any door that is considered an access control system door shall have door contacts that can ensure the door is in the closed position and that the door is latched unless specifically noted otherwise. Both sides of a contact shall have a dedicated alarm point in the system.
8. If an electric strike is being provided with a latch bolt monitoring contact internal to the strike, a door slab contact shall still be provided to monitor the position of the slab. It shall be the Access Control Contractors responsibility to:
    a. Verify that a suitable latch bolt monitoring contact is being specified in the door hardware or point out that what is specified is not compatible with the access control product being provided or the system requirements placed upon the Contractor.
    b. Provide and install a door slab contact which, when these two are used together, accomplish the requirements of knowing that the door slab is physically closed, and the door hardware is engaged therefore ensuring a secured doorway.
9. The Access Control Contractor shall provide door controllers for all access control doors on the project that require a controller.
10. The Access Control Contractor shall provide and install all devices not specifically identified on the plans which are required for a complete and operational system for all access control system doors.
11. The Access Control Contractor shall provide and install one client software package on an Owner provided computer.
12. The Access Control Contractor shall provide training to all Client operators and or managers identified by the Client.
13. ADA door operation: Doors that are part of the access control system and have ADA electric openers shall be subject to the following hardware/software requirements.
    a. The Access Control Contractor shall provide and install the necessary physical equipment and/or programming or other soft services necessary to meet these requirements.
    b. The card reader shall be near the ADA button (whether on the building wall or on a bollard or equivalent).

c. During times when the system is scheduled to have the door of interest unlocked, pressing the ADA button (no card presentation required) shall physically open the door (and retract the latch as necessary). The access control system shall only unlock door trims during the unlocked door schedule (the latch shall remain engaged so the door cannot be opened by the wind or by people without using the door hardware). The Access Control Contractor shall coordinate with door hardware provided.

d. During times when the system is scheduled to have the door of interest locked, pressing the ADA button without a valid card presentation shall not activate any electric door hardware or electric opening devices.

e. During times when the system is scheduled to have the door of interest locked, pressing the ADA button after a valid card presentation shall activate any electric door hardware necessary to unlatch the door and activate the electric opening device(s).

1) The valid card presentation shall only allow activation of these electrical systems for a limited amount of time after the card presentation.

2) At no time shall a valid card presentation automatically activate the electric door opening device.

3) Pressing the ADA button to have the door electrically open shall always be required, subject to the requirements listed above.

14. The Access Control head end (all cabinets if multiple) shall be furnished and installed with a minimum 7ah of battery backup serving no more than 8 doors each (i.e. if one panel serves 16 doors, then two 7ah batteries are required minimum). A battery backed power supply of the same manufacturer as the access control system shall be used if available, otherwise see this spec. 2.01 B.8 for an acceptable manufacturer to use.

15. The Access Control Contractor shall provide twenty-five (25) fobs and twenty-five (25) cards to the County for future use.

16. Doors with card reader access shall have their readers physically labeled, with identifier matching the Submitted floor plan identifier. Affix label to the side of the card reader, as opposed to the face of the reader.

17. Doors with door contacts only shall have the top of the door frame physically labeled, with identifier matching the Submitted floor plan identifier. Affix label to the side of the door frame, as opposed to the face of the frame.

18. All cable connections to the access control door controller(s) shall be labeled as to which reader/door they are connecting, using identifier matching the Submitted floor plan identifier.

PART 3 - EXECUTION

3.1. INSTALLATION

A. Install systems cables and auxiliary materials as indicated in accordance with access control manufacturer's written instructions, and recognized industry practices.
   1. Contractor shall use hook and loop type fasteners on all security cable. Tie wraps shall not be used.

B. Identify all cables as to field location.
   1. Provide manufacturer’s standard vinyl-cloth self-adhesive cable/conductor markers of wrap-around type; either pre-numbered plastic-coated type or write-on type with clear plastic self-adhesive cover flap; numbered to show cable identification. Install within 6" of cable end.

C. After completion, all cables shall be thoroughly tested.
   1. Contractor shall provide all instruments for testing the cables.
   2. Contractor shall demonstrate in the presence of Owner's representative that the access control is complete and operational.
   3. Contractor shall complete and submit the Certificate of System Demonstration.

D. After completion, comprehensive As-Builts will be created and provided to Owner within 14 days.
   1. Two hard copies shall be provided to Owner detailing the entire access control after installation. Each field position shall be labeled and cross referenced to the appropriate head end position for ease of troubleshooting.

3.2. COMMISSIONING

A. The Contractor shall coordinate a date/time with the Engineer after the system is fully operational, but before final payment, for the Contractor to provide a full system demonstration. This shall include all aspects of system operation that the user might encounter.

END OF SECTION 28 50 00

SECTION 28 60 00 - VIDEO SURVEILLANCE

PART 1 - GENERAL

1.1. RELATED DOCUMENTS

A. The requirements of Division 00 – Procurement, Contracting and Warranty Requirements, Division 01 - General Requirements and Section 28 0010 – Electronic Safety and Security Provisions are applicable to work required of this section.

1.2. DESCRIPTION OF WORK

A. The work included under this specification consists of furnishing all labor, equipment, materials, and supplies and performing all operations necessary to complete the installation of this surveillance system in compliance with the specifications and drawings. Contractor will provide and install all the required material to form a complete system whether specifically addressed in the technical specifications or not.

1.3. SUBMITTALS

A. Submittals for all Manufacturer and Contractor certifications (noted below) shall be submitted first.

B. Submittal data for surveillance cabling and components shall consist of catalog cuts showing technical data necessary to evaluate the materials.

1.4. WORK BY OTHERS

A. Unless noted otherwise, the building's Electrical Contractor will provide field device back-boxes as needed, and conduit paths for use by surveillance Video Surveillance Contractor. In general, the following is provided:
   1. Grounded 19" data rack in Telecom Room by Telecom Contractor to mount head end equipment to.
   2. Available space on Telecom Room wall for power supply.

1.5. FIRESTOPPING

A. Contractor shall be responsible for firestopping all conduit sleeves and cable tray where required to maintain integrity of fire and/or smoke walls. Contractor shall see architectural drawings for walls that require fire rating.

1.6. ACCEPTABLE VIDEO SURVEILLANCE CONTRACTORS

A. The following contractors are pre-approved to bid this job:
   1. Video Surveillance Contractor shall be a certified dealer of the Acceptable Manufacturer in this spec, section 2.1. A. Shall be in good standing for a minimum of six continuous months before the project bid date. This shall include factory trained and certified technicians in house for the installation of this project (six months experience applies here also). The dated dealer certification document and the dated technician training certificate are each required submittal items.
   2. Video Surveillance Contractor shall be a certified camera dealer of the Acceptable Manufacturer in this spec, section 2.1.C. Shall be in good standing for a minimum of six continuous months before the project bid date. This shall include factory trained and certified technicians in house for the installation of this project (six months experience applies here also. The dated dealer document and the dated technician training certificate are each required submittal items.
   3. The four or more submittal items (if multiple technicians) noted above are all criteria which determine if the Contractor is authorized to enter the project and begin work. No project work shall be authorized until these submittals are reviewed with a favorable response. Product data submittals are a separate submittal package and shall only be reviewed after the above items are resolved.
   4. Contractor shall be located within 125 miles of the construction site to establish a potential two-hour response time for ongoing customer needs after construction completion.

PART 2 - PRODUCTS

2.1. VIDEO SURVEILLANCE CABLING AND COMPONENTS

A. Acceptable Video Management System Manufacturers:
   1. Panasonic Video Insight

B. Acceptable Video Management Storage Servers:
   1. Panasonic i-Pro

C. Acceptable Video Surveillance Camera Manufacturers:
   1. Axis

D. Additional Video Surveillance Requirements:
   1. All power and video cables shall be home-run, no splicing.
   2. The Client has existing Panasonic Video Insight video management software.
   3. The Contractor shall provide new video storage for this project.
   4. Total required video storage is calculated on:
      a. Minimum video compression: H.264

b. Maximum resolution for selected cameras
c. Minimum Frames Per Second: 10 FPS
d. Percentage of motion: 70%
e. Hours of active video: 24 hours
f. Duration of video storage: 180 days
g. Required storage space for future growth: 20%

5. The Contractor shall furnish and install the required amount of video storage based off the criteria for calculations stated in the spec, section 2.1. D.
6. Contractor shall provide licensing for 5 (five) client workstations.
7. Contractor shall coordinate with the Client regarding establishing access to the client workstations for individual users.
8. The Contractor shall program all camera names into the system per Owner direction.
9. The Contractor shall coordinate with Owner's network administrator in the integration of cameras and VMS into the Owner's network. Including, but not limited to, the following areas:
   a. IP addressing
   b. Hostnames (as necessary)
   c. Port settings to allow video traffic to traverse firewalls.
   d. PoE requirements
   e. Video bandwidth requirements
   f. VLAN integration (as necessary)
   g. VPN integration (as necessary)
10. The Contractor shall furnish camera licenses for all cameras provided on the project, and program all the associated camera license keys into the software to make the cameras operational.
11. 3 years of software and license updates to all cameras, VMS client software, and VMS server software.
12. The field of views indicated on the construction plans are for general aiming direction only. During the warranty period the Client may request one follow up visit to make any camera view changes that the Client desires.

PART 3 - EXECUTION

3.1. INSTALLATION

A. Install surveillance systems cables and auxiliary materials as indicated in accordance with manufacturer's written instructions, and recognized industry practices.
   1. Contractor shall use hook and loop type fasteners on all security cable. Tie wraps shall not be used.

B. Identify all cables as to field location.

1. Provide manufacturer’s standard vinyl-cloth self-adhesive cable/conductor markers of wrap-around type; either pre-numbered plastic-coated type or write-on type with clear plastic self-adhesive cover flap; numbered to show cable identification. Install within 6" of cable end.

C. After completion, all cables shall be thoroughly tested.
   1. Contractor shall provide all instruments for testing the cables.
   2. Contractor shall demonstrate in the presence of Owner's representative that the surveillance system is complete and operational.
   3. Contractor shall complete and submit the Certificate of System Demonstration.

D. After completion, comprehensive As-Builts will be created and provided to Owner within 14 days.
   1. Two hard copies shall be provided to Owner detailing the entire security system after installation. Each field position shall be labeled, and cross referenced to the appropriate head end position for ease of troubleshooting.

3.2. COMMISSIONING

A. The Contractor shall coordinate a date/time with the Engineer after the system is fully operational, but before final payment, for the Contractor to provide a full system demonstration. This shall include all aspects of system operation that the user might encounter.

END OF SECTION 28 60 00