ADDENDUM NO. 1

PROJECT NAME:	UNL East Stadium Athletic Performance Lab
UNL PROJECT NUMBER:	C049P139
CONSULTANT:	DLR Group
ADDRESS:	1111 Lincoln Mall Suite 201 Lincoln, NE 68508
DATE OF ISSUANCE:	November 16, 2012
DATE OF BID OPENING:	Remains unchanged Tuesday, December 4, 2012 2:00 PM CST

The bid documents dated November 7, 2012 for the above referenced project are amended by this addendum.

NOTICE: This Addendum is issued to all interested prospective bidders as an amendment to the project manual or other parts of the bidding (contract) documents for the above named project. Reference to this Addendum must be included in the Bid proposal. The information contained herein shall be fully incorporated into the contract documents as though originally included therein.

MODIFICATIONS TO THE PROJECT MANUAL:

Item 1;

Add to project manual the specifications listed below which were inadvertently omitted from the first printing:

27 05 00	Common Work Results for Communication
28 0513	Conductors and Cables for Electric Safety and Security
28 31 11	Digital, Addressable Fire-Alarm System

END OF ADDENDUM NO. # 1

SECTION 270500 - COMMON WORK RESULTS FOR COMMUNICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Communications equipment coordination and installation.
2. Raceway and Boxes for Communications.
3. Sleeves for pathways and cables.
4. Sleeve seals.
5. Grout.
6. Common communications installation requirements.

B. This Section includes the following types of system rough-ins:
1. Combination voice/data/video outlets.
2. Wall mounted telephones.
3. TV receptacles.
4. Security equipped doors and frames.
5. Card readers.

C. Related Sections:

1. Division 07 Section "Penetration Firestopping" for firestopping materials and installation at penetrations through walls, ceilings, and other fire-rated elements.
2. Division 08 Section "Door Hardware" for electrified door hardware.
3. Division 08 Section "Hollow Metal Doors and Frames" for framing anchoring and grouting.
4. Division 08 Section "Access Doors and Frames."
5. Division 26 Section "Wiring Devices" for coverplates.
6. Division 26 Section "Raceway and Boxes for Electrical Systems" for raceway and outlet boxes.

1.3 DEFINITIONS

A. EPDM: Ethylene-propylene-diene terpolymer rubber.

B. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

A. Product Data: None.

1.5 COORDINATION

A. Coordinate serving communications utilities entrances and demarcations for each utility to establish voice, data, cable television and fiber optic services.

B. Coordinate installation of low voltage equipment and cabling to insure timely and accurate installation. Provide as-built drawings of rough-in and raceway routings provided under this Section.

C. Coordinate arrangement, mounting, and support of communications equipment:

1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
3. To allow right of way for piping and conduit installed at required slope.
4. So connecting pathways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.

D. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

E. Coordinate location of access panels and doors for communications items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 08 Section "Access Doors and Frames."

F. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

G. Coordinate rough-ins with surrounding surfaces to insure flush installations. Provide extension rings on device boxes to accommodate tack walls and surfaces.

H. Coordinate ducts and sleeves with structural elements.

PART 2 - PRODUCTS

2.1 RACEWAY AND BOXES FOR COMMUNICATIONS

A. All material and associated installation shall be as specified in appropriate Division 26 Sections, “Raceways and Boxes for Electrical Systems.”

2.2 SLEEVES FOR PATHWAYS AND CABLES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

C. Sleeves for Rectangular Openings: Galvanized sheet steel.

1. Minimum Metal Thickness:

a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and no side more than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches (1270 mm) and 1 or more sides equal to, or more than, 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

2.3 SLEEVE SEALS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and pathway or cable.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Advance Products & Systems, Inc.
b. Calpico, Inc.
c. Metraflex Co.
d. Pipeline Seal and Insulator, Inc.

2. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of pathway or cable.
3. Pressure Plates: Stainless steel. Include two for each sealing element.
4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating or Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.4 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR COMMUNICATIONS INSTALLATION

A. General:

1. Comply with NECA 1.
2. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
3. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
4. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both communications equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
5. Right of Way: Give to piping systems installed at a required slope.
6. Provide rough-ins as specified herein at each location where the corresponding symbol is indicated on the Drawings.
7. Recessed communications raceways shall be routed directly up from the location indicated on Drawings with a sweep bend above the APC of the room served, unless noted otherwise. Raceways shall not be routed underground unless indicated on the Drawings.
8. Mounting heights shall be as indicated in the Mounting Height Schedule unless otherwise indicated on the Drawings.
9. Provide all raceways with protective insulation bushings at raceway terminations and with continuous pull strings. All raceways shall be installed with sweep bends.
10. Ream junction, pullbox and outlet assembly knock-outs to maintain raceways inside diameter through to box interior.
11. Provide junction/pull boxes where indicated or required. Any pull/junction box shall not be used to change raceway routing direction. Directional changes shall be provided only with sweep bent raceway.
12. Coordinate floorbox communications raceway routing with floorbox dividers to separate Class I and Class II wiring within the box.
13. Install underslab raceway stub-ups at locations indicated on Drawing and within 2 inches of finished wall surface for exposed stub-ups. Trim raceways 6 inches above finished floor and label with location served.
14. Provide a blank coverplate for each rough-in not utilized by date of substantial completion. Including all outlet locations along divided surface raceways. See Division 26 Section “Wiring Devices” for coverplate specification.

3.2 OUTLET ROUGH-INS

A. Combination Voice/Data/Video Outlets:

1. See drawing details.

B. TV Outlets:

1. Provide flush 4-11/16 inch square steel box with a double-gang plaster ring for wall-mounted TV devices.
2. Provide two (2) 1-inch raceway stubbed up into nearest accessible ceiling space from each backbox. Include bushings at all raceway terminations.
3. Provide ¾-inch plywood backing inside walls in an area approximately 24 inches square around device backboxes.

C. Card readers:

1. Provide flush single-gang box with single-gang extension ring at locations indicated.
2. Provide one concealed ¾-inch raceway stubbed out to nearest accessible ceiling. Include bushings at all raceway terminations.
3. Coordinate installation with finished surfaces for flush installation.
4. If co-located with door pushbutton, raceways may be combined.

3.3 SLEEVE INSTALLATION FOR COMMUNICATIONS PENETRATIONS

A. General:

1. Communications penetrations occur when pathways, cables, wireways, or cable trays penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
2. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
3. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
4. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
5. Cut sleeves to length for mounting flush with both surfaces of walls.
6. Extend sleeves installed in floors 6 inches (152 mm) above finished floor level.
7. Seal space outside of sleeves with grout for penetrations of concrete and masonry

    a. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.

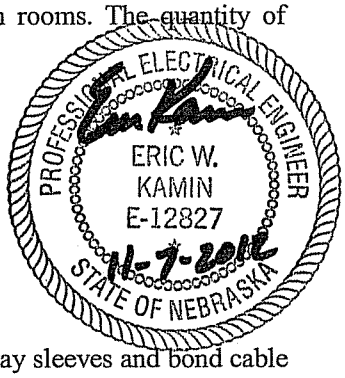
8. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and pathway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."
9. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pathway and cable penetrations. Install sleeves and seal pathway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."
10. Where sleeves penetrate a wall with one side having exposed structure, sleeves shall be placed above the elevation of the bottom of steel. Where a roof deck elevation change occurs, sleeve height shall vary and be install above the elevation of bottom of steel on both sides of wall.

B. Sleeves: Provide communication sleeves where needed to provide a route from each system rough-in to the nearest communication closet and as noted below. Provide additional sleeves for intercom cabling. These sleeves not shown on drawings. Each group of sleeves shall be located to minimize the length of cabling to serve the associated devices in each room or area. Provide the quantity and size of sleeves as defined below and as indicated in locations specified on Drawing:

1. Rooms with five or less system device rough-ins: Two (2) 2-inch sleeves.
2. Rooms with six to ten systems device rough-ins: Three (3) 2-inch sleeves.
3. Rooms with eleven to fifteen system device rough-ins: Four (4) 2-inch sleeves.

C. Cable Tray Sleeves: Provide EMT sleeves with bushings where shown on drawings or cable tray passes thru rated walls or provides access into communication rooms. The quantity of sleeves shall be as follows or as indicated on the drawings:

1. 6-inch wide cable tray: Three (3) 3-inch sleeves.
2. 12-inch wide cable tray: Four (4) 4-inch sleeves.
3. 18-inch wide cable tray: Five (5) 4-inch sleeves.
4. 24-inch wide cable tray: Seven (7) 4-inch sleeves.



3.4 GROUNDING AND BONDING

A. Install number 6 AWG green insulated ground conductor thru cable tray sleeves and bond cable tray sections.

B. For sleeves extending beyond the depth of a single wall, bond cable tray sleeves to cable tray using number 6 AWG conductor.

3.5 SLEEVE-SEAL INSTALLATION

A. Install to seal exterior wall penetrations.

B. Use type and number of sealing elements recommended by manufacturer for pathway or cable material and size. Position pathway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pathway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.6 FIRESTOPPING

A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for communications installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

END OF SECTION 270500

SECTION 280513 - CONDUCTORS AND CABLES FOR ELECTRONIC SAFETY AND SECURITY

PART 1 - GENERAL

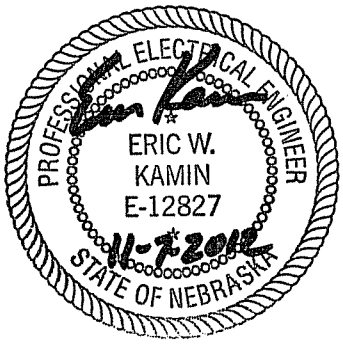
1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Fire alarm wire and cable.
2. Identification products.



1.3 DEFINITIONS

A. BICSI: Building Industry Consulting Service International.

B. EMI: Electromagnetic interference.

C. IDC: Insulation displacement connector.

D. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.

E. Open Cabling: Passing telecommunications cabling through open space (e.g., between the studs of a wall cavity).

F. RCDD: Registered Communications Distribution Designer.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified layout technician, installation supervisor, and field inspector.

B. Source quality-control reports.

C. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: An NRTL.

1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

1.7 FIELD CONDITIONS

A. Do not install conductors and cables that are wet, moisture damaged, or mold damaged.

1. Indications that wire and cables are wet or moisture damaged include, but are not limited to, discoloration and sagging of factory packing materials.

B. Environmental Limitations: Do not deliver or install UTP, optical fiber, and coaxial cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 50 or less.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 CONTROL-CIRCUIT CONDUCTORS

A. Class 1 Control Circuits: Stranded copper, Type THHN-THWN, complying with UL 83, in raceway Type XHHN, complying with UL 44, in raceway.

B. Class 2 Control Circuits: Stranded copper, Type THHN-THWN, complying with UL 83, in raceway, power-limited cable, complying with UL 83, concealed in building finishes and Type XHHN, complying with UL 44, in raceway.

C. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type TW or TF, complying with UL 83.

2.3 FIRE ALARM WIRE AND CABLE

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Belden.
2. Genesis Cable Products; Honeywell International, Inc.
3. West Penn Wire.
4. Windy City Wire

B. General Wire and Cable Requirements: NRTL listed and labeled as complying with NFPA 70, Article 760. Color Red.

C. Signaling Line Circuits: Twisted, shielded pair, not less than No. 18 AWG.

1. Circuit Integrity Cable: Twisted shielded pair, NFPA 70, Article 760, Classification CI, for power-limited fire alarm signal service Type FPL. NRTL listed and labeled as complying with UL 1424 and UL 2196 for a 2-hour rating.

D. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation.

1. Low-Voltage Circuits: No. 16 AWG, minimum.
2. Line-Voltage Circuits: No. 12 AWG, minimum.

2.4 IDENTIFICATION PRODUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Brady Worldwide, Inc.
2. Hellermann Tyton North America.
3. Kroy LLC.
4. Panduit Corp.

B. Comply with UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

C. Comply with requirements in Section 260553 "Identification for Electrical Systems."

2.5 SOURCE QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to evaluate cables.

B. Factory test UTP cables according to TIA/EIA-568-C.

C. Cable will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for installation of supports for cables.

3.2 WIRING METHOD

A. Install wiring in metal pathways and wireways, except above accessible ceilings. Fire alarm system shall be completely installed in metal raceways. Utilize red colored raceway for fire alarm cabling.

1. Minimum conduit size shall be 3/4 inch (21 mm). Control and data transmission wiring shall not share conduit with other building wiring systems.
2. Comply with requirements in Section 260533 "Raceways and Boxes for Electrical Systems."
3. Utilize “Unenclosed wiring methods” for above accessible ceiling installation.

B. Wiring within Enclosures:

1. Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.
2. Install lacing bars and distribution spools.
3. Separate power-limited and non-power-limited conductors as recommended in writing by manufacturer.
4. Install conductors parallel with or at right angles to sides and back of enclosure.
5. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with intrusion system to terminal blocks.
6. Mark each terminal according to system's wiring diagrams.
7. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Comply with NECA 1.

B. Conductors: Size according to system manufacturer's written instructions unless otherwise indicated.

C. Unenclosed wiring methods:

1. Comply with TIA/EIA-568-C.
2. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches (760 mm) within enclosures and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.

3. Do not install bruised, kinked, scored, deformed, or abraded cable. Remove and discard cable if damaged during installation and replace it with new cable.
4. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
5. Maintain pull strings in all underground raceways after installation of communications cabling.
6. Within Cable trays, cable shall be separated from other cabling, bundled and tie wrapped with Velcro type ties to the tray every 10 feet. Cables shall exit out the top of cable trays and be supported within 24 inches of exiting cable tray.
7. Pull cables without exceeding cable manufacturer's recommended pulling tensions.
8. Pull cables simultaneously if more than one is being installed in same raceway.
9. Use pulling compound or lubricant if necessary. Use compounds that will not damage conductor or insulation.
10. Provide minimum service loop as specified, coiled and secured with Velcro type fasteners above accessible ceilings at each device location.
11. Do not route cables through or over structural members at roof deck level, fasten J-hooks for cables to side or bottom of structural member.
12. Suspend cable not in a wireway or pathway a maximum of 8 inches (200 mm) below structural members by cable supports not more than 60 inches (1524 mm) apart.
13. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.
14. Install J-hooks between conduit stub-ups, sleeves and cable tray network for cable support to industry standard. Attach J-hooks to structural elements. Do not attach supports to roof, deck or other building systems. Install J-hook supports for cables not in cable trays at intervals not to exceed 4 feet on center.
15. Install cables within dedicated raceway sleeves for wall penetrations.
16. Install cables parallel and perpendicular to surfaces or exposed structural members, and follow surface contours.

D. Separation from EMI Sources:

1. Comply with BICSI TDMM and TIA-569-B recommendations for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:

    a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches (127 mm).
    b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches (300 mm).
    c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches (600 mm).

3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:

    a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches (64 mm).

b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches (150 mm).
c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches (300 mm).

4. Separation between cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:

a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches (75 mm).
c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches (150 mm).

5. Separation between Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches (1200 mm).
6. Separation between Cables and Fluorescent Fixtures: A minimum of 5 inches (127 mm).

3.4 FIRE ALARM WIRING INSTALLATION

A. Comply with NECA 1 and NFPA 72.

B. Wiring Method: Install wiring in metal raceway according to Section 260533 "Raceways and Boxes for Electrical Systems."

1. Fire alarm circuits and equipment control wiring associated with the fire alarm system shall be installed in a dedicated raceway system. This system shall not be used for any other wire or cable.

C. Wiring Method:

1. Cables and raceways used for fire alarm circuits, and equipment control wiring associated with the fire alarm system, may not contain any other wire or cable.
2. Fire-Rated Cables: Use of 2-hour, fire-rated fire alarm cables, NFPA 70.

D. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by 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.

E. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes, cabinets, or equipment enclosures where circuit connections are made.

F. Color-Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and another 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.

3.5 POWER AND CONTROL-CIRCUIT CONDUCTORS

A. 120-V Power Wiring: Install according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables" unless otherwise indicated.

B. Minimum Conductor Sizes:

1. Class 1 remote-control and signal circuits, No. 14 AWG.
2. Class 2 low-energy, remote-control and signal circuits, No. 16 AWG.
3. Class 3 low-energy, remote-control, alarm and signal circuits, No. 12 AWG.

3.6 CONNECTIONS

A. Comply with requirements in Section 283111 "Digital, Addressable Fire-Alarm System” for connecting, terminating, and identifying wires and cables.

3.7 FIRESTOPPING

A. Comply with requirements in Section 078413 "Penetration Firestopping."

B. Comply with TIA-569-B, "Firestopping" Annex A.

C. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.8 GROUNDING

A. For communications wiring, comply with J-STD-607-A and with BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.

B. For low-voltage wiring and cabling, comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."

3.9 IDENTIFICATION

A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.10 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform the following tests and inspections:

1. Visually inspect UTP cable jacket materials for NRTL certification markings. Inspect cabling terminations to confirm color-coding for pin assignments, and inspect cabling connections to confirm compliance with TIA/EIA-568-C.
2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
3. Test UTP cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross connection.

    a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-C. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.

D. Document data for each measurement. Print data for submittals in a summary report that is formatted using Table 10.1 in BICSI TDMM as a guide, or transfer the data from the instrument to the computer, save as text files, print, and submit.

E. End-to-end cabling will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

END OF SECTION 280513

SECTION 283111 - DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Manual fire-alarm boxes.
2. System smoke detectors.
3. Notification appliances.
4. Remote Device Location-Indicating Lights.
5. Addressable interface device.

B. Related Sections:

1. Division 26 “Identification for Electrical Systems”
2. Division 26 “Raceway and Boxes for Electrical Systems”
3. Division 27 “Common Work Results for Communications”

C. This Section includes expanding an existing fire alarm system. The existing fire alarm control panel is a Siemens model XLSV.

D. Included in this Section is the required activation of smoke and fire smoke dampers per the International Building Code. Method shall vary by location and be compliant with Section 716. 3.2.1.

E. Included in this Section is the connection of the fire alarm system to common ducted mechanical units for shutdown upon activation of duct mounted detection on supplying mechanical unit.

F. Provide all control panels, power supplies, alarm initiating devices, alarm signaling devices, conduit, wire, fittings and all auxiliary accessories required to provide a complete and operating system.

G. The work of this Section shall be performed by one supplying contractor who takes responsibility for the testing, Field Quality Control and overall completion of the work specified in the Contract Documents including submittals to authorities having jurisdiction.

1.3 DEFINITIONS

A. FACP: Fire Alarm Control Panel.

B. LED: Light-emitting diode.

C. NICET: National Institute for Certification in Engineering Technologies.

1.4 SYSTEM DESCRIPTION

A. Noncoded, fully addressable, UL-certified with automatic sensitivity control of smoke detectors and multiplexed signal transmission, dedicated to fire-alarm service only.

B. Audible Alarm Indication: By sounding of voice alarm message signals on loudspeakers for annunciation in areas specified.

C. Visual Alarm Indication: By xenon-strobe-type units. Units visible from a common point shall be synchronized.

1.5 SUBMITTALS

A. General Submittal Requirements:

1. Submittals shall be approved by authorities having jurisdiction prior to submitting them to Architect.
2. Shop Drawings shall be prepared by persons with the following qualifications:

    a. Trained and certified by manufacturer in fire-alarm system design.
    b. NICET-certified fire-alarm technician, Level III minimum.
    c. Licensed or certified by authorities having jurisdiction.

3. The fire alarm system shall be submitted as one package with the following included:

B. Product Data: For each type of product indicated. Where more than one model or option of product is presented on data sheet, provided model and all options shall be clearly identified. Product data sheet order shall match materials list.

C. Shop Drawings: For fire-alarm system. Include plans, elevations, sections, details, and attachments to other work.

1. Comply with recommendations in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72.
2. Complete materials list indicating quantity, model number and description of each item. Model numbers shall match factory listed model on product data sheets.
3. Include voltage drop calculations for notification appliance circuits.
4. Include battery-size calculations for all panels.

5. Include performance parameters and installation details for each detector, verifying that each detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
6. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale and coordinating installation of duct smoke detectors and access to them. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators. Locate detectors according to manufacturer's written recommendations.
7. Include voice/alarm signaling-service equipment rack or console layout, grounding schematic, amplifier power calculation, and single-line connection diagram.
8. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits. Include candela ratings and voice/alarm wattage tap settings on drawings. Submitted plans shall match scale of original contract plans provided by Architect/Engineer.
9. Provide a physical layout diagram of FACP showing location of each sub assembly within the FACP. Label sub assemblies with model number and indicate function or purpose.
10. Terminal connection diagram of the fire alarm control panel showing all wiring connection points including typical field wiring circuit diagrams.

D. Qualification Data: For qualified Installer.

E. A complete step-by-step description of the operation of the system.

F. Submit a owner signed copy of delivery receipt for materials as specified in Extra Materials section below with quantity, description and line item listing of products.

G. Field quality-control reports.

H. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

1. Comply with the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
2. Provide "Record of Completion Documents" according to NFPA 72 article "Permanent Records" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter.
3. Record copy of site-specific software.
4. Provide "Maintenance, Inspection and Testing Records" according to NFPA 72 article of the same name and include the following:

    a. Frequency of testing of installed components.
    b. Frequency of inspection of installed components.
    c. Requirements and recommendations related to results of maintenance.
    d. Manufacturer's user training manuals.

5. Manufacturer's required maintenance related to system warranty requirements.
6. Abbreviated operating instructions for mounting at fire-alarm control unit.
7. Copy of NFPA 25.

I. Software and Firmware Operational Documentation:

1. Program Software Backup: On compact disk, complete with data files.
2. Device address list.

J. The Contractor shall furnish to the Owner, upon final acceptance of the system, two (2) initial and two (2) final sets of written operating and maintenance instructions which shall include copies of all designated approved shop drawings, wiring diagrams, layout drawings, and installation and operating instructions. The manual shall contain procedures to follow for testing, troubleshooting, resetting the system, and other functions normal to, and inherent in, the fire alarm and detection system. The final fire alarm drawings shall be in CAD format on disk. The Contractor shall furnish the final alarm programming data on disk. The final fire alarm inspection report shall include a total count of all devices and be placed in the fire alarm panel. Programming and prints shall use actual room numbers designated by the Owner and not architectural drawing numbers. Fire alarm panel shall be programmed back to factory defaults for password codes after warranty.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project. This organization shall have a minimum of ten (10) years experience servicing fire alarm systems and provide twenty-four (24) hour emergency service.

B. Installer Qualifications: Installation shall be directly supervised by personnel certified by NICET as fire-alarm Level II technician.

C. Source Limitations for Fire-Alarm System and Components: Obtain fire-alarm system from single source from single manufacturer.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application. Fire alarm control panel shall be UL 9th Edition listed.

E. Compliance with Local Requirements: Comply with the applicable building code, local ordinances, and regulations, and the requirements of the authorities having jurisdiction.

F. All control equipment shall have transient protection to comply with UL 864 requirements. Where fire alarm circuits leave the building, additional transient protection shall be provided for each circuit. Devices shall be UL listed under Standard #497B (Isolated Loop Circuit Protectors).

G. Provide 10 percent additional spare capacity on each detection, auxiliary device, annunciation and notification circuit. Each addressable loop shall have the spare capacity for each class of device (detection and auxiliary modules) to allow the addition of devices without adding homerun cabling or hardware to the FACP.

H. Comply with Americans with Disabilities Act.

I. Comply with ANSI B117.1 for elevator operation.

1.7 WARRANTY

A. The Contractor shall warrant the completed fire alarm system wiring and equipment, material and workmanship to be free from inherent mechanical and electrical defects for a period of one (1) year from the date of the completed and certified test or from the date of the first beneficial use.

B. Upon satisfactory completion of all tests, the manufacturer's representative shall present to the Owner a proposal to provide inspections and testing of the system in compliance with the requirements of the state and local fire codes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Install devices UL Listed as compatible with existing system.

2.2 SYSTEMS OPERATIONAL DESCRIPTION

A. System operation shall match the existing system.

2.3 FIRE-ALARM CONTROL UNIT

A. Existing Fire Alarm Control Unit is a Siemens model XLSV.

2.4 SUPPLEMENTARY NOTIFICATION APPLIANCE CIRCUIT PANELS

A. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Notification appliances shall be powered by 24-V dc source.

1. Alarm current draw of each notification appliance circuit shall not exceed 85 percent of the power supply circuit rating.

B. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.

C. Units shall be activated and monitored by addressable modules connected to fire alarm control panel. Connection to FACP notification circuits shall not be permitted.

2.5 MANUAL FIRE-ALARM BOXES

A. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.

1. Double-action mechanism requiring two actions to initiate an alarm, pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
2. Station Reset: Key switch only.

2.6 SYSTEM SMOKE DETECTORS

A. General Requirements for System Smoke Detectors:

1. Comply with UL 268; operating at 24-V dc, nominal.
2. Detectors shall be two-wire type.
3. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
4. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
5. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
6. Integral Visual-Indicating Light: LED type indicating detector has operated and power-on status.
7. Remote Control: Unless otherwise indicated, detectors shall be analog-addressable type, individually monitored at fire-alarm control unit for calibration, sensitivity, and alarm condition and individually adjustable for sensitivity by fire-alarm control unit.

    a. Rate-of-rise temperature characteristic shall be selectable at fire-alarm control unit for 15 or 20 deg F (8 or 11 deg C) per minute.
    b. Fixed-temperature sensing shall be independent of rate-of-rise sensing and shall be settable at fire-alarm control unit to operate at 135 or 155 deg F (57 or 68 deg C).
    c. Provide multiple levels of detection sensitivity for each sensor.

8. Relays associated with smoke detectors for door hold-open or damper release shall be addressable type for control from the FACP and with the auxiliary switches.

B. Photoelectric Smoke Detectors:

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:

    a. Primary status.
    b. Device type.

c. Present average value.
d. Present sensitivity selected.
e. Sensor range (normal, dirty, etc.).

3. Each sensor shall have multiple levels of detection sensitivity.

C. Duct Smoke Detectors: Photoelectric type complying with UL 268A.

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:

a. Primary status.
b. Device type.
c. Present average value.
d. Present sensitivity selected.
e. Sensor range (normal, dirty, etc.).

3. Each sensor shall have multiple levels of detection sensitivity.
4. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
5. Relays associated with duct smoke detectors for mechanical unit shutdown or damper release shall be addressable type for control from the FACP thru the auxiliary switches.
6. Relay Fan Shutdown: Rated to interrupt fan motor-control circuit.
7. Provide a remote indicator and test station for each duct detector located greater than 6 feet above finished floor.

2.7 NOTIFICATION APPLIANCES

A. General Requirements for Notification Appliances: Connected to notification appliance signal circuits, equipped for mounting as indicated and with screw terminals for system connections.

1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated and with screw terminals for system connections.

B. Visible Notification Appliances: Xenon strobe lights comply with UL 1971, with clear polycarbonate lens mounted on the faceplate. The word "FIRE" is engraved in minimum 1-inch- (25-mm-) high letters on the lens.

1. Rated Light Output:

a. 15/30/75/110 cd, selectable in the field.
b. Set candela value as indicated on the Drawings with rating visible from the exterior of the device.

2. Include 177 candela devices in sleeping areas and as indicated.
3. Provide ceiling mounted devices as indicated.

4. Provide weatherproof visual device where indicated.

    a. Device to be Wheelock, Inc. #RSSWP series or approved equal

5. Mounting: Wall mounted unless otherwise indicated.
6. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
7. Flashing shall be in a temporal pattern, synchronized with other units.
8. Strobe Leads: Factory connected to screw terminals.
9. Mounting Faceplate: Factory finished, white.

C. Voice/Tone Notification Appliances:

1. Appliances shall comply with UL 1480 and shall be listed and labeled by an NRTL.
2. High-Range Units: Rated 2 to 15 W.
3. Low-Range Units: Rated 1/4 to 2 W.
4. Mounting: semirecessed.
5. Matching Transformers: Tap range matched to acoustical environment of speaker location.
6. Sound Output: 84 dBA (UL 464, 24VAC) minimum. Unit shall have an integral switch to select high or low dBA level (low setting reduces output by 6dBA).
7. Combination devices consist of factory-combined, audible and visual alarm units in a single mounting assembly.
8. Ceiling mounted units shall be red and have a round, semi-recessed housing for ceiling installation. The word "FIRE" is engraved in minimum 1-inch (25-mm) high white letters on the face.
9. Provide Speaker only units where indicated.
10. Provide high output horns with 15W rated output where indicated on drawings.

2.8 REMOTE DEVICE LOCATION-INDICATING LIGHTS.

A. Description: An LED-indicating light in the vicinity of each sprinkler water-flow switch and valve tamper switches denotes the associated individual device is in an abnormal or trouble mode. Lamp is flush mounted in a single gang wall plate. A red, laminated, phenolic-resin identification plate at the indicating light identifies, in engraved white letters, the room where the valve is located or the protected spaces downstream from the water-flow switch. Monitor modules shall have an individual LED indicator for each flow switch.

B. Description: An LED-indicating light in the vicinity of a duct detector located above an accessible ceiling or as indicated on the drawings. The LED indicates when the associated device is in an alarm or trouble mode. Lamp is flush mounted in ceiling tile below detector if applicable, otherwise wall mounted. Provide with magnetic test switch and label with unit and area served.

2.9 ADDRESSABLE INTERFACE DEVICE

A. Description: Microelectronic monitor module, NRTL listed for use in providing a system address for alarm-initiating devices for wired applications.

B. Monitor Modules: Addressable module to connect one (1) supervised initiating device to a signaling line circuit of the fire alarm control panel.

C. Control Modules: Addressable module to supervise and control the operation of one (1) conventional notification appliance circuit.

D. Relay Modules: Addressable module capable of providing direct signal to devices and systems for control via the fire alarm control panel. Relays shall be Form-C style with rated contacts of 2 Amp resistive load and 1 Amp inductive load.

PART 3 - EXECUTION

3.1 WIRING METHOD

A. Install system completely within metal raceways. Comply with Section “Cables and Conductors for electronic safety and security.”

3.2 EQUIPMENT INSTALLATION

A. Comply with NFPA 72 for installation of fire-alarm equipment.

B. Install wall-mounted equipment, with tops of cabinets not more than 72 inches (1830 mm) above the finished floor.

C. Smoke- or Heat-Detector Spacing:

1. Comply with NFPA 72, "Smoke-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for smoke-detector spacing.
2. Locate ceiling-mounted detectors not less than 4 inches (100 mm) from a side wall to the near edge.
3. Wall Mounted: Locate detectors at least 4 inches (100 mm), but not more than 12 inches (300 mm), below the ceiling.
4. HVAC: Locate detectors not closer than 3 feet (1 m) from air-supply diffuser or return-air opening.
5. Lighting Fixtures: Locate detectors not closer than 12 inches (300 mm) from any part of a lighting fixture.

D. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct. Support both ends of sampling tubes per manufacture’s recommendations.

E. Remote Status and Alarm Indicators: Install near each smoke detector and each sprinkler water-flow switch and valve-tamper switch that is not readily visible from normal viewing position.

F. Audible Alarm-Indicating Devices: Install not less than 6 inches (150 mm) below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille. Combine audible and visual alarms at the same location into a single unit.

G. Visible Alarm-Indicating Devices: Install at least 6 inches (150 mm) below the ceiling. Install synchronization module in circuits of devices visible from a common point.

H. Remote Device Location-Indicating Lights: Locate in easily accessible space with mechanical rooms or within accessible ceiling below equipment served.

I. Fire-Alarm Control Unit: Surface mounted, with tops of cabinets not more than 72 inches (1830 mm) above the finished floor.

J. Fire Alarm Power Circuit Breakers: Provide red breaker or with red lockable handle or cover with FIRE ALARM indicated for each fire alarm panel or power supply panel. Identify circuit in red on panel cover. Identify electrical circuit and location of disconnect with engraved label on front of each fire alarm panel.

K. Provide detection in all areas where remote power, control and communication devices are located.

L. Water-Flow Detectors and Valve Supervisory Switches: Connect discrete monitor for each sprinkler valve flow switch to be supervised. Connect monitor for valve tamper switches located at fire riser.

M. Post Indicator Valve: Connect transient voltage surge suppression on PIV monitor switch and discretely monitor switch position.

N. Duct Detectors shall be furnished, installed and connected by Division 28. Comply with NFPA 72 and NFPA 90A.

O. Install relay modules at each controlled door for door hold-open release on local detector alarm and auxiliary control switches.

P. Install interface to building elevator controls for recall, notification, power monitoring and shutdown.

Q. Smoke and Fire/Smoke Dampers: Provided by Division 23 and associated duct detectors provided under Division 28. Devices wired under Division 26. Provide interlock relay control wiring to interface Fire Alarm system to damper motors. Coordinate power and control wire routine to shut dampers.

R. Install weatherproof exterior devices as indicated.

S. Installer shall limit the quantity of devices on Notification Appliance Circuits to maintain a minimum of 10 percent spare capacity.

T. Connect addressable relay module at each sound system to initiate muting of system during activation of fire alarm system.

3.3 CONNECTIONS

A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Division 08 Section "Door Hardware." Connect hardware and devices to fire-alarm system.

1. Verify that hardware and devices are NRTL listed for use with fire-alarm system in this Section before making connections.

B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 3 feet (1 m) from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.

1. Smoke dampers in air ducts of designated air-conditioning duct systems.
2. Alarm-initiating connection to elevator recall system and components.

3.4 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

B. Install framed instructions in a location visible from fire-alarm control unit and remote annunciators.

C. Label each device with system address. Label shall be machine printed, clear or white adhesive tape with high contrast lettering of sufficient size to be easily readable without the use of a ladder.

D. Identify modules and relays as to purpose or unit served.

3.5 GROUNDING

A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.

3.6 FIELD QUALITY CONTROL

A. Field tests shall be witnessed by-authorities having jurisdiction and the Owner’s representative.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

D. Tests and Inspections:

1. Visual Inspection: Conduct visual inspection prior to testing.

   a. Inspection shall be based on completed Record Drawings and system documentation that is required by NFPA 72 in its "Completion Documents, Preparation" Table in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter.
   b. Comply with "Visual Inspection Frequencies" Table in the "Inspection" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.

2. System Testing: Comply with "Test Methods" Table in the "Testing" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
3. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
4. Test audible appliances for the private operating mode according to manufacturer's written instructions.
5. Test visible appliances for the public operating mode according to manufacturer's written instructions.
6. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.

E. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.

F. Fire-alarm system will be considered defective if it does not pass tests and inspections.

G. Prepare test and inspection reports.

H. Annual Test and Inspection: At the conclusion of the warranty period, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections. Return all passwords and access restrictions to factory defaults.

END OF SECTION 283111