

October 24, 2018
BOARD OF COUNTY COMMISSIONERS
ORANGE COUNTY, FLORIDA
IFB Y19-708-JS ADDENDUM #3

**ORANGE COUNTY CONVENTION CENTER – NORTH/SOUTH BUILDING SMOKE CONTROL SYSTEMS
UPGRADE**

This addendum is intended to be incorporated into the bid documents of the project referenced above. The following items are clarifications, corrections, additions, deletions and/or revisions to and shall take precedence over the original documents. Underlining indicates additions, deletions are indicated by ~~strikethrough~~.

- A. The Bid due date has changed from ~~October 25, 2018~~ to **October 30th, 2018.**
- B. Revised Changes to Drawings and Specifications:

SPECIFICATIONS

Updated in response to received Bid RFIs:

Section 28 31 00

1.3 DESCRIPTION

- A. The Contractor shall furnish and install an addressable fire alarm system extension to match the existing system. The existing system is a Simplex system. All devices shall be addressable. Control shall be microprocessor based and field-programmable. All electronics shall be solid state.
- B. Provide all materials, work, labor, etc. as required to modify (including any programming, battery capacity, etc.) the existing to comply with the operation, etc. noted in these Contract Documents.
- C. ~~Contractor to provide all equipment and programming to the existing fire alarm head end for additional sensors and logic used at each WON door location to prevent damage to door due to pressure differential. (ensure door is completely closed before starting atrium exhaust fans)~~

- C. The following are questions/responses/clarifications:

Question 1: 28 31 00 1.3C Does the existing Simplex Fire Alarm System currently control; the WON doors? Does all of the necessary instrumentation exist to comply with the new sequence requirements (i.e. Relay Modules, Position Switch, etc.)?

Response 1: There are no WON doors in the NS building. The WON Doors have been removed from specification 28 31 00

Question 2: 28 31 00 1.3C Indicates that the fire alarm system shall interface with the lighting system and paging system. Does the existing Simplex fire alarm system currently provide this interface?

Response 2: Only where the existing system currently has this interface shall it be maintained. We are not upgrading these components as part of this project.

Question 3: Drawings 106A-107B Note 1 Existing door controller and associated re-program notes. Are these doors currently controlled by an addressable relay device connected to the existing Simplex fire alarm system?

Response 3: Yes. The reprogramming is associated with the change to the fire smoke control system from the existing BMS system.

Question 4: 28 01 05 1.2 requires testing of the existing fire alarm system and documenting current results. Are we able to get a copy of the latest fire system test and inspection report prior to bid?

Response 4: Due to security reasons this documentation will be provided to the contractor after the bid.

Question 5: Can a complete points list be provided for the existing Simplex fire system prior to bid?

Response 5: Due to security reasons this documentation will be provided to the contractor after the bid.

Question 6: Can an as-built set of drawings be provided for the existing Simplex fire system prior to bid?

Response 6: Due to security reasons this documentation will be provided to the contractor after the bid.

Question 7: Drawing E003 sequencing does not show how the existing doors and fans are being controlled or if they are hardwired to the existing Simplex fire system or the existing JCI building management system.

1. Are there drawings available before the bid that reflect which system currently controls the doors and fans?
2. Are there drawings available before the bid that reflect how the two existing systems communicate between each zone/modes of operation? Is it hardwired or through a common protocol such as BACnet?

Response 7: The doors are currently on the fire system and the fans are controlled by the JCI building management system through hard wire and relays. Due to security reasons the drawings will be provided after the bid.

Question 8: Can an as-built set of drawings be provided for the existing Johnson Control BMS system prior to bid?

Response 8: Due to security reasons this documentation will be provided to the contractor after the bid.

- D. All other terms and conditions of the IFB remain the same.
- E. The Proposer shall acknowledge receipt of this addendum by completing the applicable section in the solicitation or by completion of the acknowledgement information on the addendum. Either form of acknowledgement must be completed and returned not later than the date and time for receipt of the proposal.

Receipt acknowledged by:

Authorized Signature

Date Signed

Title

Name of Firm

SECTION 28 31 00 - ADDRESSABLE FIRE ALARM-DETECTION SYSTEM (EXTENSION OF EXISTING)

PART 1- GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. The work described herein and on the drawings consists of all labor, materials, equipment, and services necessary and required to provide and test an extension of the existing automatic fire detection and alarm system. Any material not specifically mentioned in this specification or not shown on the drawings but required for proper performance and operation shall be provided.
- B. The drawings and specifications herein comply to the best of the Engineer's knowledge with all applicable codes at the time of design. However, it is this Contractor's responsibility to coordinate/verify (prior to bid) the requirements of the Authority Having Jurisdiction over this project and bring any discrepancies to the Engineer's attention at least seven days prior to bid. No changes in contract cost will be acceptable, after the bid, for work and/or equipment required to comply with the authority having jurisdiction.
- C. The Contractor is advised that circuit routing for this system is not necessarily shown on the project drawings. The contractor shall provide and install all raceways, wiring and cabling required for a complete and fully functional system as intended by these specifications. All wiring and/or cabling shall be in conduit. Contractor shall provide and install a properly sized, flush mounted outlet box for every device. Contractor shall size and route raceways to accommodate the proper installation of the system cabling. T-Tapped cabling shall not be acceptable. In locations where raceway and/or conduit is not accessible after completion of the project, conduit shall be routed from device to device or fire rated access panels shall be installed to provide access to junction and pull boxes. Routing of raceway from device to device shall only be acceptable where the wiring scheme of the system, as recommended by the manufacturer, requires cable to pass from device to device. Contractor shall properly terminate each device according to the manufacturer's recommendations. Provide and install firestopping where penetrations are made through rated walls and floors.
- D. The Contractor shall provide and install the fire alarm system (including all equipment, wiring, etc.) in accordance with the manufacturer's recommendations.
 - 1. Installation of devices shall be in accordance with the manufacturer's requirements as well as the requirements of the Contract Documents. Recommendations by the manufacturer for the proper installation of the fire alarm system and its equipment shall not preclude the requirement for the Contractor to comply with the requirements of the Contract Documents.
 - 2. Termination of fire alarm circuits shall be in accordance with the manufacturer's recommendations, applicable requirements of the National Electrical Code (NFPA 70), ADA, other applicable Codes and the Contract Documents.
 - 3. Voice evacuation audio circuits (25V or 70V) shall be run in separate raceways from fire alarm data loops and other system circuits where the potential exists for interference or adverse effect upon the proper operation of the any fire alarm equipment, circuit or the system as a whole.
 - 4. The fire alarm installer shall be responsible for ensuring that prior to bidding the project the Electrical Contractor understands the raceway requirements for the project. Claims by the Contractor after award of the project in regard to additional raceway required either by the fire alarm system manufacturer's recommendations for proper installation of the

- system and its associated equipment, or for compliance with the requirements of the Contract Documents shall not be allowed.
5. The Contractor shall be responsible for providing personnel necessary to accomplish either a fire watch and/or a security watch in unprotected areas during times when the fire alarm system is off-line.
 - a) Where the fire alarm system is inactive in any area due to the work of this project, the contractor shall, as a minimum, provide personnel necessary to observe the status of each fire alarm control panel in the affected area.
 - b) When security functions provided by the fire alarm system are off-line in any area or partial area, the Contractor shall, as a minimum, provide one person at each AOA door until the system is operational. During those times where the off-line time is accidental, the contractor shall station personnel within five minutes of the system going off-line.
- E. This specification describes a fully addressable, common fire alarm system with remote power supplies.
1. All components shall be connected via the Signaling Line Circuit (SLC) to the local NODE.
 2. The installation includes the phasing in of new equipment, and/or conduits and temporary wiring, if required, for the existing system in areas of demolition, and then removal of the existing system.
 3. Any existing conduit that is in place, in good condition and meets this specification may be reused.
 4. All new components must be electrically compatible with the existing FACP and must be interconnected by means of suitable wiring circuits to form a complete functional system when the project is completed.
 5. Existing system must remain active at all times. Provide Fire Watch if system is taken off line at any location as required by applicable codes and the local Authority Having Jurisdiction.
- F. The Owner shall be responsible for any retrofits, installation and design required by the local AHJ to comply with the requirements of the 2010 Florida Fire Prevention Code Section 11.10. This code requirement can only be determined after the construction of the building and may or may not be required by the local AHJ in the area of this project.

1.3 DESCRIPTION

- A. The Contractor shall furnish and install an addressable fire alarm system extension to match the existing system. The existing system is a Simplex system. All devices shall be addressable. Control shall be microprocessor based and field-programmable. All electronics shall be solid state.
- B. Provide all materials, work, labor, etc. as required to modify (including any programming, battery capacity, etc.) the existing to comply with the operation, etc. noted in these Contract Documents.
- C. ~~Contractor to provide all equipment and programming to the existing fire alarm head end for additional sensors and logic used at each WON door location to prevent damage to door due to pressure differential. (ensure door is completely closed before starting atrium exhaust fans)~~
- D. The system extension shall include but not be limited to:
 1. Manual Pull Stations

2. Smoke Detectors
 3. Duct Detectors
 4. Heat Detectors
 5. Combination Audible/Visual devices (indoor and outdoor weatherproof as indicated on the drawings)
 6. Visual Devices (indoor and outdoor weatherproof as indicated on the drawings)
 7. Remote Fire Alarm Control Panels (Network Nodes)
 8. NODE expansion modules
 9. NAC Power supplies
 10. Releasing Appliance Relays
 11. Monitor Modules
 12. Remote Power Supplies (Remote power supplies shall be in a UL Listed assembly and be provided by the same manufacturer as the Fire Alarm Control Panel (FACP)).
 13. "Do not use elevator" warning lights
 14. Surge Suppression
 15. Programming
 16. Fire Fighter Smoke Control Panel
 17. Grounding
 18. Firestopping
 19. Wire and Cable Labeling
 20. Electrical power required to comply with all functions and operations called for in this section of the specifications.
 21. Conduit, wire, wire fittings, terminal cabinets with plywood and terminal strips, and all accessories required to provide a complete operating system.
- E. The Contractor shall furnish and install all equipment (raceways, wire/cable, circuit breakers, modules, relays, etc.) necessary, and as required by applicable code, to accomplish incidental functions of the fire alarm system including but not limited to the following:
1. Elevator recall, control, and/or shutdown
 2. Monitoring of sprinkler system and/or fire protection system flow and tamper switches
 3. Monitoring of sprinkler system and/or fire protection system valve supervisory switches
 4. Monitoring of post indicator valve (PIV) switches
 5. HVAC system control and/or shutdown
 6. Ventilation system (supply fans, exhaust fans, fan terminal boxes, etc.) control and/or shutdown
 7. Control of fire, smoke, and/or combination fire/smoke dampers
 8. Fire suppression and or extinguishing systems
 9. Monitoring of kitchen hood fire suppression systems
 10. Dimming / Relay lighting system override.
 11. Audio / Paging System override.

12. Control of fire and/or smoke doors, dampers, shutters, etc.
- F. The system shall operate as a non-coded, continuous ringing system which will sound all audible devices and activate all visual devices until it is manually silenced. When system is silenced by silence switch in control panel, audible alarm is to silence, but visual alarm devices are to continue to operate.
 - G. The system shall be wired as a Class B system for all circuits.
 - H. The system is to be a complete analog addressable system.
 - I. All portions of fire alarm system shall be installed in conduit. Conduit and boxes to be installed by electrical contractor.
 - J. The fire alarm system shall not share a raceway, junction box, enclosure, manhole or device with any other system.
 - K. Provide and install wiring, equipment, etc. for connection to devices furnished under other divisions of the work.
 - L. Provide and install wiring, equipment, etc. as required to deactivate power in the elevator rooms by heat detectors via shunt trip breakers and arm sprinkler pre-action system.
 - M. Provide and install wiring, equipment, etc. as required to provide complete control of existing precaution sprinkler systems via protected area heat detectors and arm sprinkler pre-action system via releasing appliance relay.
 - N. Although they may not be indicated on the fire alarm system diagram and/or drawings, all required control and interlock wiring between the fire alarm system and building equipment shall be provided hereunder, Controls are required to/for/from:
 - 1. Override of Lighting Control / Dimming System
 - 2. Override of Sound System
 - 3. Fire/smoke air and duct detectors
 - 4. Fire, smoke and/or combination fire/smoke dampers
 - 5. Supply/return fans, exhaust fans, and/or fan terminal boxes (FTB)
 - 6. Automatic fire extinguishing systems
 - 7. Sprinkler and/or fire protection system components
 - O. Provide wiring for post indicator valve alarms, in each instance in which these are provided under work of other trades, connected to fire alarm system.
 - P. Provide and install all relays (electric-electric, electric-pneumatic, and/or pneumatic-electric) as required for a complete and operational fire alarm system, complying with all applicable codes and all requirements, and coordinated with all divisions of these specifications.
 - Q. Provide terminal cabinets sized to house terminal strips and surge suppression equipment.
 - R. Surge Suppression
 - 1. The Contractor shall have equipment installed on the ac voltage supply and other lines taking care to arrest damaging electrical transient and spikes, which can cause damage to the microprocessor components of the system. Central office telephone lines shall have equipment installed to arrest high voltages from electrical and/or lightning from entering the system and causing damage.
 - 2. Provide and install all materials, labor and auxiliaries required to furnish and install complete surge suppression for the protection of building fire alarm system from the

effects of induced transient voltage surge and lightning discharge as indicated on drawings or specified in this section.

3. Provide surge suppression equipment at the following locations:
 - a) On each conductor pair and cable sheath entering or leaving a building.
 - b) On each conductor associated with fire protection (sprinkler) system fire alarm connections.
 - c) In other locations where equipment sensitivity to surges and transients requires additional protection beyond that inherent to the design of the equipment. Where equipment being protected has internal surge suppression equipment, the surge protection equipment herein specified is required to be installed in addition to internal equipment protection.

1.4 STANDARDS, CODES, REFERENCES, AND REGULATORY REQUIREMENTS

A. The equipment and installation shall comply with the current or applicable provisions of the following standards:

1. ANSI S3.41 American National Standard Audible Emergency Evacuation Signal
2. National Fire Protection Association Standards:
 - a) NFPA 70 National Electrical Code (including but not limited to Article 760, Fire Alarm Systems)
 - b) NFPA 72 National Fire Alarm Code
 - c) NFPA 101 Life Safety Code
 - d) NFPA 90A Installation of Air Conditioning and Ventilating Systems
 - e) NFPA 96 Ventilation Control and Fire Protection of Commercial Cooking Operations
3. Underwriters Laboratories Inc. The system and all components shall be listed by Underwriters Laboratories Inc. for use in fire protective signaling system under the following standards as applicable:
 - a) UL 864 (Category UOJZ) APOU Control Units and Accessories for Fire Alarm Systems. All Control Equipment shall be listed under UL category UOJZ.
 - b) UL 268 Smoke Detectors for Fire Alarm Systems
 - c) UL 268A Smoke Detectors for Duct Application
 - d) UL 217 Smoke Detectors Single and Multiple Station Smoke Alarms
 - e) UL 521 Heat Detectors for Fire Protective Signaling Systems
 - f) UL 228 Door Closers With or Without Integral Smoke Detectors
 - g) UL 464 Audible Signal Appliances
 - h) UL 1638 Visual Signaling Appliances
 - i) UL 1481 Power Supplies for Fire-Protective Signaling Systems
 - j) UL 1480 Speakers
 - k) UL 1424 Cables for Power-Limited Fire-Alarm Circuits
 - l) UL 1971 Signaling Devices for the Hearing Impaired
 - m) UL 1449 3rd Edition - Standard for Safety Surge Protective Devices
 - n) UL 497, UL 497A, UL 497B

4. All fire alarm equipment, including accessories to the system and including all wires and cable unless otherwise noted, shall be listed by the Underwriters' Laboratories product directory called Fire Protection Equipment and/or the Electrical Construction Materials List.
 5. Each item of the fire alarm system shall be listed and classified by UL and FM as suitable for purpose specified and indicated.
 6. The system controls shall be UL listed for Power Limited Applications per NEC. All circuits must be marked in accordance with NEC.
 7. All equipment supplied as part of the Fire Alarm System shall be provided by a single manufacturer and shall comprise a complete UL Listed Fire Alarm System.
 8. IEEE: The fire alarm system includes solid state electronic components. Therefore, the equipment manufacturer shall provide certification that all such equipment is internally protected from, or can withstand, power line surge voltages and currents as specified in Table 1, Location Category A High Exposure of ANSI/IEEE Standard C62.41-1991.
- C. The equipment and installation shall comply with the current or applicable provisions of the following codes and laws:
1. Americans with Disabilities Act (ADA): The fire alarm system shall comply with ADA, Public Law 101-336, 1990. The system shall comply with ADA Accessibility Guidelines (ADAAG).
 2. Federal Register - Rules and Regulations - Non-discrimination on the basis of Disability by Public Accommodations and in Commercial Facilities.
 3. ASME/ANSI A17.1 – Safety Code for Elevators and Escalators (2004)
 4. Local and State Building Codes.
 - a) Florida Administrative Code. All applicable chapters including but not limited to:
 1. Chapter 69A Rules, including but not limited to:
 - (a) Ch 69A-3 Fire Prevention - General Provisions
 - (b) Ch 69A-43 (Florida Handicap Code - Lodging)
 - (c) Ch 69A-46 Fire Protection System Contractors and Systems
 - (d) Ch 69A-47 Uniform Fire Safety Standards for Elevators
 - (e) Ch 69A-48 Fire Safety Standards for the Fire Alarm Systems
 2. Florida Administrative Codes 33-8 (Jails)
 - b) Florida Department of Insurance:
 1. Insurance Code: The fire alarm system and installation thereof shall comply with the State of Florida Department of Insurance rules. The requirements of the Florida State Department of Insurance shall be as promulgated by the Division of State Fire Marshal.
 2. Fire Alarm Rules: The fire alarm system and installation thereof shall comply with the Fire Safety Rules promulgated by the Florida State Fire Marshal.
 - c) Authority Having Jurisdiction:
 1. General: The system shall comply with all applicable Codes, Ordinances and Standards as interpreted and enforced by the local authority having jurisdiction.

D. Surge Suppression

1. Equipment Certification: When available by any one manufacturer, all surge suppression equipment shall be listed by Underwriters Laboratories, shall bear the UL seal and be marked in accordance with referenced standard. Such surge suppression equipment shall be UL listed and labeled for intended use.
 2. Comply with all standards and guides as listed under "References" above.
- E. Systems not capable of complete network interface operations as described in this specification shall supply a complete local area or wide area network with CRT/terminals at each location and shall obtain UL site certification and acceptance prior to the completion date. Certification shall not delay final system acceptance.

1.5 RELATED SECTIONS

- A. All applicable sections of Division 0, Division 1, and Division 26.
- B. Applicable sections of these specifications with regard to, but not limited to:
1. Doors
 2. Exhaust hoods
 3. Elevators
 4. Standpipe and fire hose systems
 5. Sprinkler systems
 6. Extinguishing systems
 7. Ductwork accessories: smoke dampers
 8. Building control systems
 9. Area lighting control / Dimmer system

1.6 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum 10 years' experience and with service facilities within 50 miles of Project.
- B. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum 10 years' experience and with service facilities capable of providing a maximum response time of 2 hours.
- C. Installer:
1. Company specializing in installing the products specified in this section with minimum 10 years' experience.
 2. The Installer shall be currently licensed as a Florida Certified Alarm System Contractor I (EF).
 3. The installing Contractor shall be a direct sales division of, or the authorized and designated distributor for, a fire alarm system manufacturer.
 4. Installing Contractor shall maintain a local staff of specialists, including a Fire Alarm Planning Superintendent, for planning, installation, and service.
 5. The Installing Contractor shall maintain an office within fifty 50 miles of the project with capability to provide emergency service 7-days-a-week, 24 hour days. The installing Contractor shall have been actively engaged in the business of selling, installing and servicing fire alarm systems for at least ten 10 consecutive years going back from date of bid.

6. The Installing Contractor shall maintain an office with capability to provide emergency service 7 days a week, 24 hour days, with a maximum response time of 2 hours. The Installing Contractor shall have been actively engaged in the business of selling, installing and servicing fire alarm systems for at least 10 consecutive years going back from date of bid.

D. Surge Suppression

1. All surge suppression devices shall be manufactured by a company normally engaged in the design, development, and manufacture of such devices for electronics/communications systems equipment.
2. The surge suppressor manufacturer shall offer technical assistance through support by a factory representative and local stocking distributor.
3. Verify proper clearances, space, etc. is available for surge suppressor.

E. Coordination/Project Conditions

1. Verify proper grounding is in place.
2. In installations where the electrical contractor does not provide a counterpoise system in conjunction with the underground raceway system, the fire alarm contractor shall provide a coupling conductor within the fire alarm underground raceway system to run alongside fire alarm conductors. Coupling conductors shall be sized according to applicable codes and standards.

- F. The work specified herein is an extension of the existing system and as such all equipment shall match existing. In the event that the existing equipment is no longer available other equipment will be considered for acceptance provided the following is submitted in writing by the system installer to the Engineer (See Division 1 requirements):

1. Certified letter from the manufacturer specifically stating the following:
 - a) Part numbers and descriptions of each item that is no longer manufactured.
 - b) Manufacturer name (if not the same as the original manufacturer), part numbers and descriptions of items that are certified by the manufacturer to be compatible with the existing system.
 - c) A detailed listing of specific differences, including both advantages and disadvantages, between the original item and the proposed substitution.
2. Contractor qualifications (as listed above).
3. Complete lists, descriptions and drawings of materials to be used.
4. A complete drawing showing conduit, conduit sizes, backboxes, number of wires and wire sizes.
5. A complete riser diagram of Fire Alarm System.

1.7 SUBMITTALS

- A. Submit in accordance with Section 26 05 00 Common Work Results for Electrical and Section 27 05 07 Submittals.

1.8 PROJECT RECORD DOCUMENTS

- A. Submit in accordance with Section 26 05 00 Common Work Results for Electrical and Section 27 01 00 Operation and Maintenance Manuals.

1.9 O & M MANUALS

- A. Submit in accordance with Section 26 05 00 Common Work Results for Electrical and Section 27 01 00 Operation and Maintenance Manuals.

1.10 WARRANTY

- A. The contractor shall warrant the equipment to be new and free from defects in material and workmanship, and will, within one year from date of acceptance by owner, repair or replace any equipment found to be defective.
 - 1. No charges shall be made by the installer for any labor, equipment, or transportation during this period to maintain functions.
 - 2. Respond to trouble call within twenty-four (24) hours after receipt of such a call.
- B. The contractor shall guarantee all wiring and raceways to be free from inherent mechanical or electrical defects for one (1) year from date of final acceptance of the system.
- C. Surge Suppression
 - 1. All surge suppression devices shall be warranted free from defects in materials and workmanship for a period of five (5) years.
 - 2. Any suppressor, which shows evidence of failure or incorrect operation during the warranty period, shall be repaired or replaced by the manufacturer and installer at no cost to the owner.
 - 3. Equipment that is damaged by surges during warrantee period shall be replaced at no expense to Owner.

1.11 ADDITIONAL DEVICES FOR JURISDICTIONAL COMPLIANCE

- A. Prior to bid, Contractor shall review plans and specifications carefully for compliance with all codes, and in particular the ADA requirements and NFPA 72. Contractor shall include in bid price any devices required to provide a fully compliant system. Said additional devices shall be shown on shop drawings submitted by Contractor.
- B. In addition to the above-mentioned devices, Contractor shall include in his bid price the cost of installing twenty additional audible/visual notification devices (over and above those shown on drawings, required by specifications, or determined by system installed to be required) whose location/need may not become apparent until just prior to substantial completion date. At least two weeks prior to substantial completion system shall be fully operational. After system is operational, Owner's safety representative and the system installer shall review the placement of and coverage provided by visual and audible signals throughout the facility for compliance with all codes, and in particular the ADA requirements and NFPA 72. System installer shall provide the additional devices at locations where the Architect/Engineer requests for complete coverage. The additional devices shall be installed and fully operational prior to date of Substantial Completion.
- C. After the project has had its first annual safety inspection, the system installer shall install within one week's notice any additional audible/visual signals that have been determined to be required during said inspection from the balance of the twenty additional devices noted above. There shall be no cost for these added devices provided the total does not exceed the balance remaining of the twenty devices noted above. The final balance of the twenty additional devices included in bid price shall be turned over to the Owner as spare material after any fire alarm issues identified during the first annual safety inspection are resolved.

1.12 MAINTENANCE SERVICE

- A. Furnish service and maintenance of fire alarm system for one (1) year from date of Substantial Completion.

1. No charge shall be made by the installer and/or contractor for any labor, equipment, or transportation during this period to maintain functions.
2. Respond to trouble call within twenty-four (24) hours after receipt of such call.

1.13 SYSTEM OPERATION

A. Network communication:

1. Network node communication shall be through a token ring configuration.
2. A single open, ground or short on the network communication loop shall not degrade network communications. Token shall be passed in opposite direction to maintain communications throughout all network nodes. At the same time the status of the communication link shall be reported.
3. If a group of nodes becomes isolated from the rest of the network due to multiple fault conditions, that group shall automatically form a sub-network with all common interaction of monitoring and control remaining intact. The network shall be notified with the exact details of the lost communications.
4. Fiber optics communication shall be provided as an option via a fiber optics modem. Modem shall multiplex audio signals and digital communication via full duplex transmission over a single fiber optic cable, either single mode or multi-mode.
5. The communication method shall be NFPA 72 style 7.

B. Required Functions: The following are required system functions and operating features:

1. Priority of Signals: Fire alarm events have highest priority. Subsequent alarm events are queued in the order received and do not affect existing alarm conditions. Priority Two, Supervisory and Trouble events have second-, third-, and fourth-level priority respectively. Signals of a higher-level priority take precedence over signals of lower priority even though the lower-priority condition occurred first. Annunciate all events regardless of priority or order received.
2. Noninterfering: An event on one zone does not prevent the receipt of signals from any other zone. All zones are manually resettable from the FACP after the initiating device or devices are restored to normal. The activation of an addressable device does not prevent the receipt of signals from subsequent addressable device activations.
3. Transmission to Remote Central Station: Automatically route alarm, supervisory, and trouble signals to a remote central station service transmitter provided under another contract.
4. Annunciation: Operation of alarm and supervisory initiating devices shall be annunciated at the FACP and the remote annunciator, indicating the location and type of device.
5. Selective Alarm: A system alarm shall include:
 - a) Indication of alarm condition at the FACP and the annunciator(s).
 - b) Identification of the device /zone that is the source of the alarm at the FACP and the annunciator(s).
 - c) Operation of audible and visible notification devices on the fire floor, floor above and floor below until silenced at FACP.
 - d) Selectively closing doors normally held open by magnetic door holders on the fire floor, floor above and floor below.
 - e) Unlocking designated doors.
 - f) Shutting down supply and return fans serving zone where alarm is initiated.

- g) Closing smoke dampers on system serving zone where alarm is initiated.
 - h) Initiation of smoke control sequence through the building temperature control system.
 - i) Notifying the local fire department.
 - j) Initiation of elevator recall in accordance with ASME/ANSI A17.1, when specified detectors or sensors are activated.
6. Supervisory Operations: Upon activation of a supervisory device such as fire pump power failure, low air pressure switch, and tamper switch, the system shall operate as follows:
- a) Activate the system supervisory service audible signal and illuminate the LED at the control unit and the remote annunciator.
 - b) Pressing the Supervisory Acknowledge Key will silence the supervisory audible signal while maintaining the Supervisory LED "on" indicating off-normal condition.
 - c) Record the event in the FACP historical log.
 - d) Transmission of supervisory signal to remote central station.
 - e) Restoring the condition shall cause the Supervisory LED to clear and restore the system to normal.
7. Alarm Silencing: If the "Alarm Silence" button is pressed, all audible alarm signals shall cease operation.
8. System Reset
- a) The "System Reset" button shall be used to return the system to its normal state. Display messages shall provide operator assurance of the sequential steps ("IN PROGRESS", "RESET COMPLETED") as they occur. The system shall verify all circuits or devices are restored prior to resetting the system to avoid the potential for re-alarmed the system. The display message shall indicate "ALARM PRESENT, SYSTEM RESET ABORTED."
 - b) Should an alarm condition continue, the system will remain in an alarmed state
9. A manual evacuation (drill) switch shall be provided to operate the notification appliances without causing other control circuits to be activated.
10. WALKTEST: The system shall have the capacity of 8 programmable passcode protected one person testing groups, such that only a portion of the system need be disabled during testing. The actuation of the "enable one person test" program at the control unit shall activate the "One Person Testing" mode of the system as follows:
- a) The city circuit connection and any suppression release circuits shall be bypassed for the testing group.
 - b) Control relay functions associated to one of the 8 testing groups shall be bypassed.
 - c) The control unit shall indicate a trouble condition.
 - d) The alarm activation of any initiation device in the testing group shall cause the audible notification appliances assigned only to that group to sound a code to identify the device or zone.
 - e) The unit shall automatically reset itself after signaling is complete.
 - f) Any opening of an initiating or notification appliance circuit wiring shall cause the audible signals to sound for 4 seconds indicating the trouble condition.

- C. Analog Smoke Sensors:
1. Monitoring: FACP shall individually monitor sensors for calibration, sensitivity, and alarm condition, and shall individually adjust for sensitivity. The control unit shall determine the condition of each sensor by comparing the sensor value to the stored values.
 2. Environmental Compensation: The FACP shall maintain a moving average of the sensor's smoke chamber value to automatically compensate for dust, dirt, and other conditions that could affect detection operations.
 3. Programmable Sensitivity: Photoelectric Smoke Sensors shall have 7 selectable sensitivity levels ranging from 0.2% to 3.7%, programmed and monitored from the FACP.
 4. Sensitivity Testing Reports: The FACP shall provide sensor reports that meet NFPA 72 calibrated test method requirements. The reports shall be viewed on a CRT Display or printed for annual recording and logging of the calibration maintenance schedule.
 5. The FACP shall automatically indicate when an individual sensor needs cleaning. The system shall provide a means to automatically indicate when a sensor requires cleaning. When a sensor's average value reaches a predetermined value, (3) progressive levels of reporting are provided. The first level shall indicate if a sensor is close to a trouble reporting condition and will be indicated on the FACP as "ALMOST DIRTY." This condition provides a means to alert maintenance staff of a sensor approaching dirty without creating a trouble in the system. If this indicator is ignored and the second level is reached, a "DIRTY SENSOR" condition shall be indicated at the FACP and subsequently a system trouble is reported to the Central Monitoring Station. The sensor base LED shall glow steady giving a visible indication at the sensor location. The "DIRTY SENSOR" condition shall not affect the sensitivity level required to alarm the sensor. If a "DIRTY SENSOR" is left unattended, and its average value increases to a third predetermined value, an "EXCESSIVELY DIRTY SENSOR" trouble condition shall be indicated at the control unit.
 6. The FACP shall continuously perform an automatic self-test on each sensor which will check sensor electronics and ensure the accuracy of the values being transmitted. Any sensor that fails this test shall indicate a "SELF TEST ABNORMAL" trouble condition.
 7. Multi-Sensors shall combine photoelectric smoke sensing and heat sensing technologies. An alarm shall be determined by either smoke detection, with selectable sensitivity from 0.2 to 3.7 %/ft obscuration; or heat detection, selectable as fixed temperature or fixed with selectable rate-of-rise; or based on an analysis of the combination of smoke and heat activity.
 8. Programmable bases. It shall be possible to program relay and sounder bases to operate independently of their associated sensor.
 9. Magnet test activation of smoke sensors shall be distinguished by its label and history log entry as being activated by a magnet.
- D. Smoke Detectors: A maintenance and testing service providing the following shall be included with the base bid:
1. Biannual sensitivity reading and logging for each smoke sensor.
 2. Scheduled biannual threshold adjustments to maintain proper sensitivity for each smoke sensor.
 3. Threshold adjustment to any smoke sensor that has alarmed the system without the presence of particles of combustion.
 4. Scheduled biannual cleaning or replacement of each smoke detector or sensor within the system.

5. Semi-annual functional testing of each smoke detector or sensor using the manufacturers calibrated test tool.
 6. Written documentation of all testing, cleaning, replacing, threshold adjustment, and sensitivity reading for each smoke detector or sensor device within the system.
 7. The initial service included in the bid price shall provide the above listed procedures for a period of five years after owner acceptance of the system.
- E. Audible Alarm Notification: By voice evacuation and tone signals on loudspeakers in areas as indicated on drawings.
1. Automatic Voice Evacuation Sequence:
 - a) The audio alarm signal shall consist of an alarm tone for a maximum of five seconds followed by an automatic digital voice message. At the end of the voice message, the alarm tone shall resume. This sequence shall sound continuously until the "Alarm Silence" switch is activated.
 - b) All audio operations shall be activated by the system software so that any required future changes can be facilitated by authorized personnel without any component rewiring or hardware additions.
- F. Speaker: Speaker notification appliances shall be listed to UL 1480.
1. The speaker shall operate on a standard 25VRMS or 70.7VRMS NAC using twisted/shielded wire.
 2. The following taps are available: 0.25W, 0.50W, 1.0W and 2.0W. At the 1.0W tap, the speaker has minimum UL rated sound pressure level of 84dBA at 10 feet.
 3. The speaker shall have a frequency response of 400 to 4000 Hz for Fire Alarm and 125 to 12kHz for General Signaling.
- G. Manual Voice Paging
1. The system shall be configured to allow voice paging. Upon activation of any speaker manual control switch, the alarm tone shall be sounded over all speakers in that group.
 2. The control panel operator shall be able to make announcements via the push-to-talk paging microphone over the pre-selected speakers.
 3. Facility for total building paging shall be accomplished by the means of an "All Call" switch.
- H. Fire Suppression Monitoring:
1. Water flow: Activation of a water flow switch shall initiate general alarm operations.
 2. Sprinkler valve tamper switch: The activation of any valve tamper switch shall activate system supervisory operations.
 3. WSO: Water flow switch and sprinkler valve tamper switch shall be capable of existing on the same initiating zone. Activation of either device shall distinctly report which device is in alarm on the initiating zone.
- I. Power Requirements
1. The control unit shall receive AC power via a dedicated fused disconnect circuit.
 2. The system shall be provided with sufficient battery capacity to operate the entire system upon loss of normal AC power in a normal supervisory mode for a period of 24 hours with 15 minutes of alarm operation at the end of this period. The system shall automatically transfer to battery standby upon power failure. All battery charging and recharging operations shall be automatic.

3. All circuits requiring system-operating power shall be 24 VDC and shall be individually fused at the control unit.
4. The incoming power to the system shall be supervised so that any power failure will be indicated at the control unit. A green "power on" LED shall be displayed continuously at the user interface while incoming power is present.
5. The system batteries shall be supervised so that a low battery or a depleted battery condition, or disconnection of the battery shall be indicated at the control unit and displayed for the specific fault type.
6. The system shall support NAC Lockout feature to prevent subsequent activation of Notification Appliance Circuits after a Depleted Battery condition occurs in order to make use of battery reserve for front panel annunciation and control.
7. The system shall support 100% of addressable devices in alarm or operated at the same time, under both primary (AC) and secondary (battery) power conditions.
8. Loss of primary power shall sound a trouble signal at the FACP. FACP shall indicate when the system is operating on an alternate power supply.
- J. Alarm Reset: The system shall remain in the alarm mode until manually reset with a key accessible reset function. The system shall reset only if the initiating circuits are cleared.
- K. Lamp Test: manual lamp test function causes alarm indication at each lamp on the fire alarm control panel and the remote annunciator.
- L. When the fire alarm system is activated as a drill, all incidental functions shall be exercised including notification of the fire department.
- M. Where required by codes or Authority Having Jurisdiction:
 1. When system is silenced by silence switch in control panel, audible alarm is to silence but visual alarm devices are to continue to operate.
- N. The fire sprinkler valve tamper switch, when closed, shall annunciate a supervision signal at the fire alarm control panel and annunciator panels, if any. This supervision signal shall not cause a general alarm.
- O. Operation of auxiliary contacts in control panel to shut all smoke dampers in ducts associated with air handling units and exhaust fans which are shut down. (These shall not be controlled from detector unit contacts.)

1.14 ZONING

A. Alarm Zones.

1. Regardless of the number of zones shown on drawings, the minimum alarm zones required are:
 - a) One per building, per floor for pull stations.
 - b) One per building, per floor for automatic devices.
 - c) One for each duct smoke detector.
 - d) Zones as required by NFPA and FBC.

B. Notification Zones.

1. Regardless of the number of zones shown on drawings the minimum notification zones (horns and strobe lights) required are:
 - a) One (or more) circuit(s) for Catwalk Level
 - b) One (or more) circuit(s) for A Hall Ceiling Devices

- c) One (or more) circuit(s) for A Hall Wall Devices
 - d) One (or more) circuit(s) for remainder of (Scope Area).
2. Breakdown circuits as required for load and distances involved.

PART 2- PRODUCTS

2.1 GENERAL EQUIPMENT AND MATERIAL REQUIREMENTS

- A. All specified and indicated equipment on the construction documents is approved by the following manufactures.**
- 1. **Edwards Systems Technologies (EST)**
 - 2. **Siemens Building Technologies, Inc. Fire Safety Division.**
 - 3. **Simplex-Grinnell LP, A Tyco International Company.**
 - 4. **Honeywell**
- B. Any interfaces between smoke control system and existing installed fire alarm system components shall be seamless and without excessive markup for required interface components.**
- C. ~~A-~~All equipment shall be new and unused. All components and systems shall be designed for uninterrupted duty. All equipment, materials, accessories, devices, and other facilities covered by this specification or noted on the contract drawings shall be the best suited for the intended use and shall be provided by a single manufacturer.**
- D. ~~B-~~ Provide all equipment to match existing equipment required to perform all functions and/or features included in this section of the specifications although not specifically noted or specified herein.**
- E. ~~C-~~ Modify/rework existing system and reprogram existing system as required for extension to new devices and/or as required for proper operation of system with new devices, adding new zone modules, adding surge suppression, adding power supply and battery capacity to meet regulatory requirements with new devices, etc.**

2.2 RACEWAYS

- A. General:**
- 1. All raceways (conduit, wire ways, pull boxes, outlet boxes, etc.) shall comply with applicable requirements of sections within Division 26 of these specifications.
 - 2. All raceways (conduit, wire ways, pull boxes, outlet boxes, etc.) shall comply with all requirements of the manufacturer of the fire alarm system.
- B. Conduit: Comply with Section 27 except as noted below:**
- 1. Pull Cords: Install pull cords in all raceway runs that are installed without cable.
 - 2. Size: Minimum size shall be 3/4" conduit.
- C. Boxes:**
- 1. All outlet boxes, junction boxes, pull boxes, etc. shall comply with applicable section of these specifications.
 - 2. Boxes shall be sized as required by the fire alarm system manufacturer and NEC for cables and/or device installed.

2.3 FIRE ALARM CONTROL PANEL (NODE)

- A. General: Comply with UL 864, "Control Units for Fire-Protective Signaling Systems."**

- B. Provide (2) single pole 20A 120V circuit breaker in local emergency panel to each NODE location. (1) to be for NODE / TRSP panels and (1) for NAC's
- C. The following FACP hardware shall be provided:
1. Power Limited base panel with red cabinet and door, 120 VAC input power.
 2. 2,000 point capacity where (1) point equals (1) monitor (input) or (1) control (output).
 3. 2,000 points of Network Annunciation at FACP Display when applied as a Network Node
 4. 2000 points of annunciation where one (1) point of annunciation equals:
 - a) 1 LED driver output on a graphic driver or 1 switch input on a graphic switch input module.
 - b) 1 LED on panel or 1 switch on panel.
 5. From all battery charging circuits in the system provide battery voltage and ammeter readouts on the FCP LCD Display.
 6. Municipal City Circuit Connection with Disconnect switch, 24VDC Remote Station (reverse polarity), local energy, shunt master box, or a form "C" contact output.
 7. One Auxiliary electronically resettable fused 2A @24VDC Output, with programmable disconnect operation for 4-wire detector reset.
 8. One Auxiliary Relay, SPDT 2A @32VDC, programmable as a trouble relay, either as normally energized or de-energized, or as an auxiliary control.
 9. Where required provide Intelligent Remote Battery Charger for charging up to 110Ah batteries.
 10. Power Supplies with integral intelligent Notification Appliance Circuit Class B for system expansion.
 11. Four (4) form "C" Auxiliary Relay Circuits (Form C contacts rated 2A @ 24VDC, resistive), operation is programmable for trouble, alarm, supervisory of other fire response functions. Relays shall be capable of switching up to ½ A @ 120VAC, inductive.
 12. The FACP shall support (6) RS-232-C ports and one service port.
 13. Remote Unit Interface: supervised serial communication channel for control and monitoring of remotely located annunciators and I/O panels.
 14. Modular Network Communications Card.
 15. Programmable DACT for either Common Event Reporting or per Point Reporting.
 16. Service Port Modem for dial in passcode access to all fire control panel information.
- D. Voice Alarm: Provide an emergency communication system, integral with the FACP, including voice alarm system components, microphones, amplifiers, and tone generators. Features include:
1. Amplifiers comply with UL 1711, "Amplifiers for Fire Protective Signaling Systems." Amplifiers shall provide an onboard local mode temporal coded horn tone as a default backup tone. Test switches on the amplifier shall be provided to test and observe amplifier backup switchover. Each amplifier shall communicate to the host panel amplifier and NAC circuit voltage and current levels for display on the user interface.
 2. Dual alarm channels permit simultaneous transmission of different announcements to different zones or floors automatically or by use of the central control microphone. All

announcements are made over dedicated, supervised communication lines. All risers shall support Class B wiring for each audio channel.

3. Eight channel digitally multiplexed audio for systems that require more than two channels of simultaneous audio. Up to 8 channels of audio shall be multiplexed on either a style 4 or style 7 twisted pair.
4. Emergency voice communication audio controller module shall provide up to 32 minutes of message memory for digitally stored messages. Provide supervised connections for master microphone and up to 5 remote microphones.
5. Status annunciator indicating the status of the various voice alarm speaker zones and the status of fire fighter telephone two-way communication zones.
6. Distributed Module Operation: FACP shall be capable of allowing remote location of the following modules; interface of such modules shall be through a Style 4 (Class B) supervised serial communications channel (SLC):
 7. Amplifiers, voice and telephone control circuits
 8. Addressable Signaling Line Circuits
 9. Initiating Device Circuits
 10. Notification Appliance Circuits
 11. Auxiliary Control Circuits
 12. Graphic Annunciator LED/Switch Control Modules
- E. Cabinet: Lockable steel enclosure. Arrange unit so all operations required for testing or for normal care and maintenance of the system are performed from the front of the enclosure. If more than a single unit is required to form a complete control unit, provide exactly matching modular unit enclosures.
- F. Alphanumeric Display and System Controls: Panel shall include an 80 character LCD display to indicate alarm, supervisory, and component status messages and shall include a keypad for use in entering and executing control commands.

2.4 TERMINATION CABINETS

- A. Terminal cabinets are to comply with applicable sections of these specifications.

2.5 "SYSTEMS" AND "LOCAL" GROUND BUS

- A. Bus to comply with applicable sections of these specifications.

2.6 EMERGENCY POWER SUPPLY

- A. General: Components include battery, charger, and an automatic transfer switch.
- B. Battery: Sealed lead-acid or nickel cadmium type. Provide sufficient capacity to operate the complete alarm system in normal or supervisory (non-alarm) mode for a period of 24 hours. Following this period of operation on battery power, the battery shall have sufficient capacity to operate all components of the system, including all alarm indicating devices in alarm or supervisory mode for a period of 15 minutes.

2.7 ADDRESSABLE MANUAL PULL STATIONS

- A. Description: Addressable single- or double-action type, red LEXAN, with molded, raised-letter operating instructions of contrasting color. Station will mechanically latch upon operation and remain so until manually reset by opening with a key common with the control units.
- B. Protective Shield: Where required provide a tamperproof, clear LEXAN shield and red frame that easily fits over manual pull stations. When shield is lifted to gain access to the station, a

battery powered piercing warning horn shall be activated. The horn shall be silenced by lowering and realigning the shield. The horn shall provide 85dB at 10 feet and shall be powered by a 9 VDC battery.

2.8 SMOKE SENSORS

- A. General: Comply with UL 268, "Smoke Detectors for Fire Protective Signaling Systems." Include the following features:
1. Factory Nameplate: Serial number and type identification.
 2. Operating Voltage: 24 VDC, nominal.
 3. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore normal operation.
 4. Plug-In Arrangement: Sensor and associated electronic components are mounted in a module that connects to a fixed base with a twist-locking plug connection. Base shall provide break-off plastic tab that can be removed to engage the head/base locking mechanism. No special tools shall be required to remove head once it has been locked. Removal of the detector head shall interrupt the supervisory circuit of the fire alarm detection loop and cause a trouble signal at the control unit.
 5. Quick Connect Arrangement: Photoelectric sensor and electronics in a single piece construction which shall twist-lock onto a mounting base that attaches to a standard electrical box.
 6. Each sensor base shall contain an LED that will flash each time it is scanned by the Control Unit (once every 4 seconds). In alarm condition, the sensor base LED shall be on steady.
 7. Each sensor base shall contain a magnetically actuated test switch to provide for easy alarm testing at the sensor location.
 8. Each sensor shall be scanned by the Control Unit for its type identification to prevent inadvertent substitution of another sensor type. Upon detection of a "wrong device", the control unit shall operate with the installed device at the default alarm settings for that sensor; 2.5% obscuration for photoelectric sensor, 135-deg F and 15-deg F rate-of-rise for the heat sensor, but shall indicate a "Wrong Device" trouble condition.
 9. The sensor's electronics shall be immune from false alarms caused by EMI and RFI.
 10. Sensors include a communication transmitter and receiver in the mounting base having a unique identification and capability for status reporting to the FACP. Sensor address shall be located in base to eliminate false addressing when replacing sensors.
 11. Removal of the sensor head for cleaning shall not require the setting of addresses.
- B. Type: Smoke sensors shall be of the photoelectric or combination photoelectric / heat type. Where acceptable per manufacturer specifications, ionization type sensors may be used.
- C. Bases: Relay output, sounder and isolator bases shall be supported alternatives to the standard base.
- D. Duct Smoke Sensor: Photoelectric type, with sampling tube of design and dimensions as recommended by the manufacturer for the specific duct size and installation conditions where applied. Sensor includes relay as required for fan shutdown.
1. Environmental compensation, programmable sensitivity settings, status testing, and monitoring of sensor dirt accumulation for the duct sensor shall be provided by the FACP.
 2. The Duct Housing shall provide a supervised relay driver circuit for driving up to 15 relays with a single "Form C" contact rated at 7A@ 28VDC or 10A@ 120VAC. This auxiliary

relay output shall be fully programmable. Relay shall be mounted within 3 feet of HVAC control circuit.

3. Duct Housing shall provide a relay control trouble indicator Yellow LED.
4. Compact Duct Housing shall have a transparent cover to monitor for the presence of smoke. Cover shall secure to housing by means of four (4) captive fastening screws.
5. Duct Housing shall provide two (2) Test Ports for measuring airflow and for testing. These ports will allow aerosol injection in order to test the activation of the duct smoke sensor.
6. Duct Housing shall provide a magnetic test area and Red sensor status LED.
7. For maintenance purposes, it shall be possible to clean the duct housing sampling tubes by accessing them through the duct housing front cover.
8. Each duct sensor shall have a Remote Test Station with an alarm LED and test switch.
9. Where indicated provide NEMA 4X weatherproof duct housing enclosure shall provide for the circulation of conditioned air around the internally mounted addressable duct sensor housing to maintain the sensor housing at its rated temperature range. The housing shall be UL Listed to Standard 268A.

2.9 HEAT SENSORS

- A. Thermal Sensor: Combination fixed-temperature and rate-of-rise unit with plug-in base and alarm indication lamp; 135-deg F fixed-temperature setting except as indicated.
- B. Thermal sensor shall be of the epoxy encapsulated electronic design. It shall be thermistor based, rate-compensated, self-restoring and shall not be affected by thermal lag.
- C. Sensor fixed temperature sensing shall be independent of rate-of-rise sensing and] programmable to operate at 135-deg F or 155-deg F. Sensor rate-of-rise temperature detection shall be selectable at the FACP for either 15-deg F or 20-deg F per minute.
- D. Sensor shall have the capability to be programmed as a utility monitoring device to monitor for temperature extremes in the range from 32-deg F to 155-deg F.

2.10 ADDRESSABLE CIRCUIT INTERFACE MODULES

- A. Addressable Circuit Interface Modules: Arrange to monitor one or more system components that are not otherwise equipped for addressable communication. Modules shall be used for monitoring of water flow, valve tamper, non-addressable devices, and for control of evacuation indicating appliances and AHU systems.
- B. Addressable Circuit Interface Modules will be capable of mounting in a standard electric outlet box. Modules will include cover plates to allow surface or flush mounting. Modules will receive their operating power from the signaling line or a separate two wire pair running from an appropriate power supply as required.
- C. Provide all required addressable modules required, whether shown on drawings or not, for control and monitoring equipment per NFPA.
- D. There shall be the following types of modules:
 1. Type 1: Monitor Circuit Interface Module:
 - a) For conventional 2-wire smoke detector and/or contact device monitoring with Class B or Class A wiring supervision. The supervision of the zone wiring will be Class B. This module will communicate status (normal, alarm, trouble) to the FACP.
 - b) For conventional 4-wire smoke detector with Class B wiring supervision. The module will provide detector reset capability and over-current power protection for

the 4-wire detector. This module will communicate status (normal, alarm, trouble) to the FACP.

2. Type 2: Line Powered Monitor Circuit Interface Module
 - a) This type of module is an individually addressable module that has both its power and its communications supplied by the two wire multiplexing signaling line circuit. It provides location specific addressability to an initiating device by monitoring normally open dry contacts. This module shall have the capability of communicating four zone status conditions (normal, alarm, current limited, trouble) to the FACP.
 - b) This module shall provide location specific addressability for up to five initiating devices by monitoring normally closed or normally open dry contact security devices. The module shall communicate four zone status conditions (open, normal, abnormal, and short). The two-wire signaling line circuit shall supply power and communications to the module.
3. Type 3: Single Address Multi-Point Interface Modules
 - a) This multipoint module shall provide location specific addressability for four initiating circuits and control two output relays from a single address. Inputs shall provide supervised monitoring of normally open, dry contacts and be capable of communicating four zone status conditions (normal, open, current limited, and short). The input circuits and output relay operation shall be controlled independently and disabled separately.
 - b) This dual point module shall provide a supervised multi-state input and a relay output, using a single address. The input shall provide supervised monitoring of two normally open, dry contacts with a single point and be capable of communicating four zone status conditions (normal, open, current limited, and short). The two-wire signaling line circuit shall supply power and communications to the module.
 - c) This dual point module shall monitor an unsupervised normally open, dry contact with one point and control an output relay with the other point, using a single address. The two-wire signaling line circuit shall supply power and communications to the module.
4. Type 4: Line Powered Control Circuit Interface Module
 - a) This module shall provide control and status tracking of a Form "C" contact. The two-wire signaling line circuit shall supply power and communications to the module.
5. Type 5: 4-20 mA Analog Monitor Circuit Interface Module
 - a) This module shall communicate the status of a compatible 4-20 mA sensor to the FACP. The FACP shall annunciate up to three threshold levels, each with custom action message; display and archive actual sensor analog levels; and permit sensor calibration date recording.
 - b) All Circuit Interface Modules shall be supervised and uniquely identified by the control unit. Module identification shall be transmitted to the control unit for processing according to the program instructions. Modules shall have an on-board LED to provide an indication that the module is powered and communicating with the FACP. The LEDs shall provide a troubleshooting aid since the LED blinks on poll whenever the peripheral is powered and communicating.

2.11 MAGNETIC DOOR HOLDERS

- A. Description: Units shall be listed to UL 228. Units are equipped for wall or floor mounting as indicated and are complete with matching door plate. Unit shall operate from a 120VAC, a 24VAC or a 24VDC source, and develops a minimum of 25 lbs. holding force.
- B. Material and Finish: Match door hardware.

2.12 STANDARD ALARM NOTIFICATION APPLIANCES

- A. Horn: Piezoelectric type horn shall be listed to UL 464. The horn shall have a minimum sound pressure level of 85 dBA @ 24VDC. The horn shall mount directly to a standard single gang, double gang or 4" square electrical box, without the use of special adapter or trim rings.
- B. Visible/Only: Strobe shall be listed to UL 1971. The V/O shall consist of a xenon flash tube and associated lens/reflector system. The V/O enclosure shall mount directly to standard single gang, double gang or 4" square electrical box, without the use of special adapters or trim rings. V/O appliances shall be provided with different minimum flash intensities of 15cd, 75cd and 110cd. Provide a label inside the strobe lens to indicate the listed candela rating of the specific Visible/Only appliance.
- C. Audible/Visible: Combination Audible/Visible (A/V) Notification Appliances shall be listed to UL 1971 and UL 464. The strobe light shall consist of a xenon flash tube and associated lens/reflector system. Provide a label inside the strobe lens to indicate the listed candela rating of the specific strobe. The horn shall have a minimum sound pressure level of 85 dBA @ 24VDC. The audible/visible enclosure shall mount directly to standard single gang, double gang or 4" square electrical box, without the use of special adapters or trim rings.
- D. Speaker/Visible: Combination Speaker/Visible (S/V) units combine the speaker and visible functions into a common housing. The S/V shall be listed to UL 1971 and UL 1480.
 - 1. Twisted/shielded wire is required for speaker connections on a standard 25VRMS or 70.7VRMS NAC using and UTP conductors, having a minimum of 3 twists per foot is required for addressable strobe connections.
 - 2. The following taps are available: 0.25W, 0.50W, 1.0W and 2.0W. At the 1.0W tap, the speaker has minimum UL rated sound pressure level of 84dBA at 10 feet.
 - 3. The S/V shall have a frequency response of 400 to 4000 Hz for Fire Alarm and 125 to 12kHz for General Signaling.
 - 4. The S/V installs directly to a 4" square, 1 1/2 in. deep electrical box with 1 1/2" extension
- E. Speaker: Speaker notification appliances shall be listed to UL 1480.
 - 1. The speaker shall operate on a standard 25VRMS or 70.7VRMS NAC using twisted / shielded wire.
 - 2. The following taps are available: 0.25W, 0.50W, 1.0W and 2.0W. At the 1.0W tap, the speaker has minimum UL rated sound pressure level of 84dBA at 10 feet.
 - 3. The S/V shall have a frequency response of 400 to 4000 Hz for Fire Alarm and 125 to 12kHz for General Signaling.
 - 4. The S/V installs directly to a 4" square, 1 1/2 in. deep electrical box with 1 1/2" extension
- F. Notification Appliance Circuit provides synchronization of strobes at a rate of 1Hz and operates horns with a Temporal Code Pattern operation. The circuit shall provide the capability to silence the audible signals, while the strobes continue to flash, over a single pair of wires. The capability to synchronize multiple notification appliance circuits shall be provided.
- G. Accessories: The contractor shall furnish the necessary accessories.

2.13 NAC Power Extender

- A. The IDNet NAC Power Extender panel shall be a stand-alone panel capable of powering a minimum of 4 notification appliance circuits. Notification appliance circuits shall be Class B Style Y rated at 2 amps each. Panel shall provide capability to be expanded to 8 notification appliance circuits.
- B. The internal power supply & battery charger shall be capable of charging up 12.7 Ah batteries internally mounted or 18Ah batteries mounted in an external cabinet.
- C. The NAC extender panel may be mounted close to the host control panel or can be remotely located. The IDNET Addressable NAC Extender Panel when connected to an addressable panel shall connect to the host panel via an IDNet communications channel. Via the IDNET channel each output NAC can be individually controlled for general alarm or selective area notification.
- D. For IDNet connected NAC extender panels up to five panels can be connected on a single IDNet channel.
- E. When connected to a conventional (non-addressable panel) one or two standard notification appliance circuits from the main control panel may be used to activate all the circuits on the NAC power extender panel.
- F. Alarms from the host fire panel shall signal the NAC power extender panel to activate. The panel shall monitor itself and each of its NACs for trouble conditions and shall report trouble conditions to the host panel.

2.14 WEATHERPROOF COVER (FOR AUDIBLE AND/OR VISUAL DEVICES)

- A. Constructed of clear polycarbonate.
- B. For flush or surface mount devices.
- C. Provide slotted version for audible/visual devices.
 - 1. Maximum of 5 dB loss.
 - 2. Provide with brass weep hole.
- D. Provide unslotted version for visual only devices.
 - 1. Maximum of 3 candela light intensity loss up to 110 candela light source.
 - 2. Provide without weep hole.
- E. Provide with weather gasket.
- F. Spacers for additional depth as required.
- G. Provide with tamper proof screws.
- H. Design criteria:
 - 1. Safety Technology International, Inc. #1220 (audible/visual) or #1221 (visual) series.

2.15 SURGE SUPPRESSION

- A. Non-Addressable Initiation Devices:
 - 1. Plug-in replacement modular design with associated female wiring connector.
 - 2. UL 497B listed and labeled.
 - 3. Multi-stage hybrid protection circuit.
 - 4. Fail short/fail safe.
 - 5. Surge Capacity: 10KA with 8 x 20 μ s waveform, 500A per line with 10 x 700 μ s waveform.

6. Clamp Voltage: 150% of circuit peak operating voltage with 100 amp 10 x 700 μ s waveform.
 7. Maximum Continuous Operating Voltage: 125% of peak operating voltage, minimum.
 8. Capacitance: 1500 pf.
 9. Manufacturer:
 - a) EDCO #PC642C series with #PCBIB base.
- B. Addressable Initiation Devices and Data Loops:
1. Plug-in replacement modular design with associated female wiring connector.
 2. UL 497B listed and labeled.
 3. Multi-stage hybrid protection circuit.
 4. Fail short/fail safe.
 5. Surge Capacity: 10KA with 8 x 20 μ s waveform, 500A per line with 10 x 700 μ s waveform.
 6. Clamp Voltage: 150% of circuit peak operating voltage with 100 amp 10 x 700 μ s waveform.
 7. Maximum Continuous Operating Voltage: 125% of peak operating voltage, minimum.
 8. Capacitance: 50 pf.
 9. Manufacturer:
 - a) EDCO #PC642C-LC series with #PCBIB base.
- C. Horn, Strobe, Control Power (Low Voltage):
1. Plug-in replacement modular design with associated female wiring connector.
 2. UL 497B listed and labeled.
 3. Multi-stage hybrid protection circuit.
 4. Fail short/fail safe.
 5. Surge Capacity: 5KA with 8 x 20 μ s waveform.
 6. Clamp Voltage: 150% of circuit peak operating voltage with 100 amp 10 x 700 μ s waveform.
 7. Maximum Continuous Operating Voltage: 125% of peak operating voltage, minimum.
 8. Series Resistance: 0.2 ohms total per pair.
 9. Manufacturer:
 - a) EDCO #P164 series (1 pair); #P264 series (2 pair), each with #SD12-PC base.
- D. Power Circuit (120 volt):
1. UL 1449 listed.
 2. Provide power connection to all panels requiring 120V power. Connect to local existing emergency branch 120V panel. Provide new CB matching existing type and AIC rating in existing space.
 3. 15 amp, 120V rated.
 4. Suppressors shall be tested per IEEE, C62.41-1991 for Categories A and B.
 5. Normal mode (L-N), and common mode (L+N-G) protection.

6. Internal fusing.
 7. Hybrid design.
 8. Indicators for normal operation and failure indication.
 9. Enclosure:
 - a) Fire retardant high impact, phenolic or plastic housing or metal enclosure.
 10. Clamping voltage UL 1449, Line to Neutral, Category B Impulse At (3KA, 8 x 20 μ s): 385V @ 120V.
 11. Maximum Surge Capacity: 20,000 amps.
 12. Maximum Continuous Operating Voltage: 115% of line voltage.
 13. Provide hardwire connection or add 15 amp receptacle device to hardwired devices to match equipment being protected and maintain UL listing.
 14. Provide additional 15 amp in-line fusing as required to comply with UL and the N.E.C. when connected to a 20 amp, 120V circuit.
 15. Manufacturers:
 - a) Leviton #51020-WM (hardwired).
 - b) EDCO #HSP-121BL2.
- E. Telephone Line Circuits
1. Must be UL 497 listed and labeled for primary protection.
 2. Multi-stage hybrid protection circuit.
 3. Plug-in replaceable modular design or individually mounted units.
 4. Fail short/fail safe.
 5. Surge capacity: 500 amp with 10 x 700 μ s waveform.
 6. Clamp voltage: 150% of circuit peak operating voltage with 100 amp 10 x 700 μ s waveform.
 7. Maximum continuous operating voltage: 125% of peak operating voltage, minimum.
 8. Manufacturers:
 - a) EDCO #COHP(FS).
- F. Terminations
1. Provide terminals sized for circuits required on project.
 2. Where surge suppression modules are for mounting on 'M' block assembly, provide M block assembly complete with grounding system that mates with surge suppression equipment.
- G. Terminal Cabinets
1. Provide terminal cabinets for all terminations and surge suppression equipment including 120V ac power surge suppressor as required in Section 16691. Size terminal cabinets as required to facilitate installation of terminations and surge suppression in a neat and workmanlike manner.
 2. Manufacturers:
 1. Space Age Terminal Cabinet

- (a) Provide with white lettering on face
- (b) Provide with all required accessories (ie. Terminal strips, back panel, and locks)

2.16 CABLE

- A. Contractor shall provide and install cable as required by the manufacturer, as specified elsewhere in these specifications, and to provide a complete, fully operational, UL Listed fire alarm system.
- B. Fire alarm system cables installed in exterior and/or underground raceways shall comply with the applicable sections of NEC Article 800.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The Contractor is advised that circuit routing for this system is not necessarily shown on the project drawings. The contractor shall provide and install all raceways, wiring and cabling required for a complete and fully functional system as intended by these specifications. All wiring and/or cabling shall be in conduit. Contractor shall provide and install a properly sized, flush mounted outlet box for every device. Contractor shall size and route raceways to accommodate the proper installation of the system cabling. T-Tapped cabling shall not be acceptable. In locations where raceway and/or conduit is not accessible after completion of the project, conduit shall be routed from device to device or fire rated access panels shall be installed to provide access to junction and pull boxes. Routing of raceway from device to device shall only be acceptable where the wiring scheme of the system, as recommended by the manufacturer, requires cable to pass from device to device. Contractor shall properly terminate each device according to the manufacturer's recommendations. Provide and install fire stopping where penetrations are made through rated walls and floors.
- B. Make final connections between new or modified components and the existing fire detection and alarm system.
- C. Provide any programming required at the fire alarm control panels, remote panels or firework computers. This includes programming in support of outages, planned or unplanned, of the system.
- D. Test and certify the completed system in accordance with all regulatory requirements.
- E. Update the system as-built drawings, CAD files and bitmaps.
- F. Locate, install, and test fire alarm and detection systems in accordance with the equipment manufacturer's written instructions, and the latest editions of the NFPA, the National Electrical Contractors Association publication "Standard of Installation" and all applicable codes and standards referenced in this specification.
- G. Modify/rework existing system as required for extension to new devices and/or as required for proper operation of entire system, adding new zone modules, surge suppression, power supply and battery capacity or new devices to meet regulatory requirements.
- H. Rework/modify/reprogram existing fire alarm control panel and remote control panels to accept and reflect all changes made by alterations as specified.
- I. Modify/update the existing fire alarm as-built (mylars and blue-line) drawings and CAD files to reflect modifications, additions, etc., made by this project. Provide blue-line sets of changes for approved and company with all additional requirements as outlined in specifications.

- J. Provide all work required for a complete system including complete system testing and checkout. All components shall be properly mounted and wired. The installation of this system shall comply with the directions and recommendations of authorized factory representatives.
- K. Provide wiring, cabling, raceways, and electrical boxes in accordance with manufacturer's written instructions.
- L. Components shall be electrically "burned-in" by operating the component at full power for a period as recommended by the manufacturer.
- M. Installation shall be done in a neat workmanlike fashion by a firm regularly engaged in fire alarm installation and service.
- N. The installation and inspection of all fire detection and fire alarm devices and systems shall be performed by, or under the direct on-site supervision of, a licensed fire alarm technician or a fire alarm planning superintendent who shall certify the work upon completion of the activity. The certifying licensee shall be present for the final test prior to certification.
- O. Installation plans and wiring diagrams shall bear the signature and license number of the licensed Fire Alarm Planning Superintendent, the date of installation and the name, address, and certificate of registration number of the registered firm.
- P. After completion of the installation of the system, the licensee shall complete a NFPA installation certificate. The installation certificate format shall be furnished by the State Fire Marshal. When an installation certificate form has been completed, legible copies shall be distributed as directed by the State Fire Marshal.
- Q. After an installation has been complete, affix a Fire Alarm Tag to the control panel. The Fire Alarm Tag is in addition to the installation certificate. Protect the Fire Alarm Tag from vandalism by applying pressure sensitive label; do not use a "tie on" tag. It shall be as required in the Fire Safety Rules as promulgated by the Florida State Fire Marshal.
- R. Power supplies are to be loaded to a maximum of 75% of their capacity. Provide additional power supplies where required to comply with this maximum loading requirement.
- S. As-built plans and wiring diagrams shall bear the signature and license number of the licensed fire alarm planning superintendent, the date of installation and the name, address, and certificate of-registration number of the registered firm.
- T. All components shall be completely wired. System shall be fully operable when main power service has failed and the Emergency Standby Generator has assumed emergency system loads. This shall require that any devices, which required 120 volt power shall receive, supply from an emergency 120 volt source.
- U. Installation of detectors:
 - 1. All ceiling mounted detectors shall be installed in accordance with the requirements of NFPA 72.
 - 2. All concealed detectors shall be provided with a remote indicating lamp and test switch installed in an occupied space (corridor, etc.) on wall or on the ceiling grid indicating the type of detector and the zone to which it is connected. Label shall be red with white lettering.
 - 3. Duct detectors shall be installed in accordance with NFPA 90A. All brackets and hardware shall be provided as required to install detector housing in correct position. All detector housings shall be sealed as required to prevent air leakage between duct and housing. Sampling tubes of proper length shall be provided and installed to match duct width at the installed location.

3.2 RACEWAYS AND BOXES

- A. Provide dedicated raceway with applicable boxes for all fire alarm wiring in accordance with applicable sections of these specifications.
- B. All initiating, indicating and auxiliary control devices shall be mounted on UL listed outlet boxes.

3.3 WIRE/CABLE

- A. Conductor: 98% conductivity, solid copper or stranded copper. If stranded conductors are used, then a compression lug shall be installed at every end. Wrapping twisted strands at terminal block screw is not acceptable. As an acceptable equivalent, stranded conductors without crimp lugs may be terminated into terminal strips of box-lug connectors.
- B. Insulation: A type accepted by NEC for the application. Individual conductors shall be Type THHN/THWN. All cable shall be UL listed for fire-protective signaling application. Communication, Class 3 or Multi-Purpose cables shall not be substituted for FP cable types.
- C. Size: All conductors shall be sized as prescribed by the system manufacturer, with following minimums:
 - 1. Multiplex Signaling Line Circuit: AWG #14, shielded twisted pair cable.
 - 2. Initiating Circuits, Hard-Wired Devices: AWG #14, THHN/THWN conductors.
 - 3. Notification Circuits: AWG #14, THHN/THWN conductors.
 - 4. Initiating Circuits, Addressable Devices: AWG #14, shielded twisted pair cable.
 - 5. Provide larger conductors where required to maintain voltage drop or signal strength within acceptable limits.
- D. The above wire sizes shall be increased to size as required to comply with authority having jurisdiction or as required for voltage drop, load, etc. E. Color Coded:
 - 1. Wiring shall be color coded as required to match existing system.
 - 2. Permanent wire materials shall be used to identify all splices and terminations for each circuit at all junction boxes, outlet boxes, and terminations.
- E. UL:
 - 1. General: Fire-protective signaling cable shall be UL listed as non-power limited or power limited as needed to match the output of the fire alarm equipment.
 - 2. Non-Power Limited: Fire protective signaling circuits classified as non-power limited shall use cable listed under UL Electrical Construction Materials Directory. Category HNHT, "NON-POWER LIMITED FIRE-PROTECTIVE SIGNALING CABLE". all such cable shall have fire resistance, listing and markings as described in NEC 760.176. Minimum cable marking shall be NPLF.
 - 3. Power Limited: Fire protective signaling circuits classified as power limited shall use cable listed under UL Category HNIR, "POWER LIMITED FIRE-PROTECTIVE SIGNALING CABLE". All such circuits shall be durably marked where plainly visible at terminations to indicate that it is a power-limited fire protective signaling circuit. Refer to paragraph titled "Fire Resistance of Cables" for additional requirements.
 - 4. Fire Resistance of Cables: Power-limited fire-protective signaling circuit cables shall be UL listed as described in NEC 760.179. All such cable shall bear a cable marking that includes a Type designation as given in NEC Table 760.179(I). Provide Type FPL.
- F. Connections of Installation Wiring:
 - 1. Connections to Equipment: In accordance with NFPA for monitoring integrity and with the equipment manufacturer's instructions.

2. Connections of installation wiring to alarm initiating devices and alarm indicating appliances shall be monitored for integrity.
3. Interconnecting means shall be arranged so that a single break or single ground fault will not cause an alarm signal.
4. Apply a compression lug, similar to T&B Sta-Kon Terminal, to all stranded conductors at terminations or use box-lug terminal strips.
5. There shall be no wire splices. All wiring shall be continuous, uncut between devices and terminal blocks.

G. Rated Enclosures:

1. All vertical fire alarm wiring traversing more than one level shall be routed in rated enclosures. In addition, all horizontal wiring serving devices location on floors other than where wiring originates shall be routed in 2-inch concrete encasement, suitable rated building construction, or 2-hour wrap application enclosure accepted by local authority having jurisdiction.

3.4 MANUAL PULL STATIONS

- A. Install at 48 inches to top above finished floor.
- B. All manual stations shall be in unobstructed locations.
- C. Install to comply with NFPA, ADA, and all handicap/accessibility code requirements.
- D. Provide, install, and connect additional pull stations (from that shown on drawings) as required to comply with above requirements.

3.5 AUDIBLE SIGNAL DEVICES, VISUAL SIGNAL DEVICES OR COMBINATION AUDIBLE/VISUAL SIGNAL DEVICES

- A. Shall comply with NFPA, the Americans with Disabilities Act and other applicable handicap/accessibility codes including but not limited to the following:
 1. Wall mounted devices shall have their bottom edge at heights above the finished floor of not less than 80 inches and no greater than 96 inches.
 2. In general, no place in any room or space required to have a visual signal appliance shall be more than 50 ft. (15 m) from the signal (in the horizontal plane). In large rooms and spaces exceeding 100 ft. (30 m) across, without obstructions 6 ft. (2 m) above the finished floor, such as auditoriums, devices may be placed around the perimeter, spaced a maximum 100 ft. (30 m) apart, in lieu of suspending appliances from the ceiling. Placement of visual devices shall not be less than the requirements as specified by NFPA 72.
 3. No place in common corridors or hallways in which visual alarm signaling appliances are required shall be more than 50 ft. (15 m) from the signal. Placement of visual devices shall not be less than the requirements as specified by NFPA 72.

3.6 END-OF-LINE DEVICE

- A. Mount end-of-line device box with last device or separate box adjacent to last device in circuit.

3.7 AUXILIARY CONTROL RELAYS

- A. An auxiliary fire alarm relay used to control an emergency control device, e.g. motor controller for HVAC system fan or elevator controller shall be located within 3 ft. of the emergency control device.

- B. The installation wiring between the system panel and the auxiliary fire alarm relay shall be monitored for integrity.
- C. Auxiliary control relays shall be listed for use with fire alarm systems.

3.8 SPRINKLER FLOW SWITCHES

- A. Coordinate the electrical and operating characteristics of the flow switches with the fire alarm panel.
- B. Run conduit and wiring to the flow switches, and connect them so as to provide an operable supervised sprinkler alarm system per NFPA standards, and state and local codes.
- C. Provide all electrical including zones as required by Authority Having Jurisdiction and codes.

3.9 SPRINKLER VALVE SUPERVISORY SWITCHES

- A. Coordinate the electrical and operating characteristics of the supervisory switches with the fire alarm panel.
- B. Run conduit and wiring to the supervisory switches, and connect them so as to provide an operable supervised sprinkler alarm system per NFPA standards, and state and local codes.
- C. Provide all electrical including zones as required by authority having jurisdiction and codes.

3.10 INSTALLATION OF DETECTORS

- A. All ceiling mounted detectors shall be installed in accordance with the requirements of NFPA 72.
- B. All concealed detectors shall be provided with a remote indicating lamp installed in an occupied space (corridor, etc.) on wall or on the ceiling grid indicating the type of detector and the zone to which it is connected. Label shall be red with white lettering.
- C. Label each device with point number.

3.11 INSTALLATION OF DUCT DETECTORS

- A. Comply with all applicable codes and standards including but not limited to:
 - 1. NEMA Guide for Proper Use of Smoke Detectors in Duct Applications
 - 2. Full requirements of detector UL listing.
 - 3. NFPA 90.
 - 4. Refer to Part 1 – General for additional standards.
- B. Location: To permit proper sampling of the air within a duct, locate supply air duct detectors downstream from fans, filters, humidifiers, and heating/cooling elements (if codes permit). Locate supply or return air duct detectors at least six duct widths (diameters) from any opening, detector, bend, or branch connection. When physical parameters or codes make it impossible to meet the six width requirement, locate the detector as far as possible from the obstacle.
- C. All brackets and hardware shall be provided as required to install detector housing in correct position. All detector housings shall be sealed as required to prevent air leakage between duct and housing.
- D. All concealed detectors shall be provided with a remote indicating lamp installation in an occupied space (corridor, etc.) on wall or on the ceiling grid indicating the type of detector and the zone to which it is connected. Label shall be red with white lettering.

3.12 MAIN FIRE ALARM CONTROL PANEL AND ASSOCIATED EQUIPMENT

- A. Install all programming and software changes to existing fire alarm control panel to provide a complete and operational extension of the existing system as specified.

- B. All functions/operations/performance specified are to match the same functions/operations/performance of the existing fire alarm system.
- C. All color graphic AutoCAD bit maps shall be updated and tested.

3.13 DOOR ELECTRIC LOCK AND HOLD-OPEN POWER SYSTEMS

- A. General: Provide 24V-dc low voltage power to all building doors with openers, hold-open devices, closers or electric locks. Refer to Architectural door hardware schedule for doors that may have electric holders or locks. Low voltage power supplies for door hardware shall be furnished separately from the fire alarm system. The fire alarm system shall only provide the unlocking or release control signals and auxiliary control relays at power supplies, in order to reduce power draw on fire alarm system power supplies and batteries.
- B. Low Voltage Power: Provide a low voltage transformer on each floor having doors with electric hardware. Transformer shall be 120-24V ac, sized as required to handle load served. Mount in a NEMA 1 enclosure above accessible corridor ceiling outside the first door closest to fire alarm riser. Provide transformer primary fusing to comply with NEC. Provide a 24V ac-24V dc rectifier on the secondary side of the transformer. Provide dedicated branch circuit from closest 120V normal power panel. Provide necessary interposing auxiliary control relay(s) to accept unlocking/release and restore signals from the fire alarm system.
- C. Wiring: Electric hardware shall be connected for fail-safe operation. Upon loss of normal power hardware shall unlock without unlatching. Hold-open doors shall release for closure. Restoration of hardware power shall be automatic after the fire alarm system unlock control is reset. Provide all wiring necessary to connect transformer. Provide all low voltage wiring to connect electric locks. Extend wiring down hinge side of stair door jam through hinge plate into door and through door to electric lock mechanism.
- D. Fire Alarm Unlocking Control: All door hardware circuits shall be controlled by fire alarm system. Upon receipt of signal from fire alarm system all door holders shall release and stair/egress door electric locks power system shall be disabled allowing all locks to unlock (without unlatching). Signal to activate shall be automatic fire alarm signal or manual command initiated in the building Fire Control Room. Manual unlock override command shall be through override system. Reference paragraph entitled "FIRE DEPARTMENT OVERRIDE CONTROL PANEL". Provide pilot light and 3-position override switch. ON position (illuminated red pilot light) shall initiate failsafe operation. OFF position shall restore low voltage power. Provide separate override switch for door openers associated with Atrium Smoke Exhaust System.
- E. Mount outlet box for electric door holder to withstand 80 pounds (36.4 kg) pulling force.

3.14 ELEVATORS

- A. Operation of elevators under fire or other emergency conditions - elevators having a travel distance of 25 feet or more shall conform to the requirements of ANSI A17.1, Safety Code for Elevators and Escalators, 2004 Edition, Rule 2.27.3, as incorporated herein by reference.
- B. When an automatic sprinkler system is required to be installed throughout a building for complete fire protection coverage, the provisions of ANSI A17.1, Rule 2.8.2, which is incorporated herein by reference, shall be applicable. When an automatic sprinkler system is required to be installed, the automatic sprinkler system shall be a pre-action sprinkler system and the pre-action sprinkler shall be installed in the elevator machine room and elevator hoistway. An accepted fixed temperature (135 degrees F.) heat detector shall be installed in the elevator machine room, elevator pit, and elevator hoistway as an integral part of the pre-action sprinkler system to automatically disconnect the main power supply to the affected elevator(s) prior to the application

of water. The main power supply shall not be self-resetting. The activation of sprinklers outside of the hoistway or machine room shall not disconnect the main power supply. The sprinkler

head located in the elevator machine room and elevator hoistway shall have an activation temperature greater than the accepted fixed temperature heat detector.

- C. Provide detectors with auxiliary relay complete with tie into elevator controller as required by all codes, or provide separate zone.

3.15 CABLE IDENTIFICATION

- A. Provide and install permanent cable markers on all cables/wire lines, telephone lines, etc. at terminal strips, terminal cabinets and at main equipment.

3.16 SURGE PROTECTION

A. General

1. Provide, install and connect new surge suppression equipment as specified herein, including protection of equipment power source, cable/wire entering or leaving building housing, main fire alarm system equipment, ground lugs, #6 copper ground wire in 3/4" c. to existing main building service ground.
2. Extreme care shall be taken by contractor to assure a properly surge protected system.
3. Surge protection equipment must be selected by contractor to match the equipment being protected including wire sizes, operating volts, amps, and circuit impedance.
4. Installation of surge protection equipment and its grounding must be per manufacturer's recommendations to assure short and proper ground paths.

B. Equipment Selection

1. Contractor to coordinate with suppliers and installers of all equipment being protected and provide surge suppression equipment which meets these specifications on respective equipment, wires, etc.

C. Equipment Installation

1. Install surge suppression equipment per manufacturer's recommendation at each wire terminal as noted under Part 1.
2. Install in surge suppression equipment terminal cabinets, etc. as required to facilitate installation of surge protection equipment and terminal points. Increase size of terminal cabinets (from that shown on drawings) to size required to facilitate installation of surge suppression equipment and terminal blocks.
3. Locate surge suppression equipment in terminal cabinet nearest main equipment cabinet (FACP).
4. Coordinate with Section 16691 contractor to assure that surge suppression for 120V ac power circuit and surge suppression required by this section are all installed in same terminal cabinet and bonded together.

D. Ground Installation

1. Ground Bus Connections.
 - a) Provide "local" ground bus in each terminal cabinet housing surge protection equipment (with lugs, etc. as required).
 - b) Bond "local" ground bus to terminal cabinet with minimum #6 copper wire.
 - c) Connect terminal cabinet "local" ground bus to "systems" ground bus installed per 16170 with minimum #6 copper insulated wire (unless otherwise noted) in conduit.

- d) Note that "systems" ground bar is also to be used for power transformation ground (480V to 208V) where applicable.
2. Surge suppression equipment grounding.
- a) Connect each surge suppressor to local ground bus in terminal cabinet with wire sized as recommended by manufacturer. Where "M" block type terminations/surge Suppressors are used, bond ground rail to local ground bar with wire as recommended by manufacturer.
 - b) Coordinate with Section 16691 contractor to assure that 120V ac power source/supply surge suppressor is also grounded to same local ground bus as surge suppressors provided in this section for same system (i.e. fire alarm, intercom, television, etc.).
3. Conductors.
- a) Conductors shall meet requirements of Section 16123. Minimum size to be #12 THWN.
 - b) Bends in excess of 90 degrees in any grounding conductor shall not be permitted. A radius of 6 inches or greater shall be maintained on all bends.
 - c) Do not bundle unprotected conductors with protected conductors.
 - d) Conductors shall be kept as short as possible.
 - e) Conductors shall be secured at 12" intervals with an accepted copper clamp.
 - f) Grounding conductors shall be properly connected to the building service ground by accepted clamps.
4. Grounding Connectors
- a) Connectors, splicers, and other fittings used to interconnect grounding conductors, bond to equipment or grounding bars, shall be accepted by NEC or UL for the purpose.
 - b) All connectors and fittings shall be of the Nicopress crimp or compression set screw type.
 - c) Special treatment to fittings, lugs, or other connectors of dissimilar material shall be applied to prevent electro-galvanic action.
5. Telephone Circuits
- a) Systems utilizing telephone company pairs as a transmission medium shall be provided with a suppressor conforming to device in Part 2 of this specification.
 - b) Suppressors shall be installed at each point where interface is made to telephone company pairs.
 - c) In cases where a modem or other device is used to interface with the telephone circuit the following procedure shall apply:
 - 1. Where the modem or coupling device is furnished by the telephone company the suppressors shall be installed on the system side of the modem or coupling device.
 - 2. Where the modem or coupling device is furnished by the system contractor, the suppressor shall be installed on the telephone line side of the modem or coupling device.

3.17 EXISTING CONDITIONS

- A. Existing fire alarm control panel and all associated electrical in area of renovation is to be removed, complete.
- B. All existing fire alarm wiring and conduit in area of renovation is to be removed complete.
- C. Contractor shall investigate existing conditions prior to bid.
 - 1. Existing exposed structure may require additional smoke detectors per NFPA. Visit and carefully examine site prior to bid and include additional detectors in base bid.

3.18 CONDUIT/BOX IDENTIFICATION

- A. Contractor shall identify fire alarm conduit and boxes with red paint in exposed locations. Identify conduit in concealed locations with 4" mark of red paint every 4'-0" OC.

3.19 DEMONSTRATION

- A. When system is complete it shall be demonstrated to owner's representative who shall be given complete instructions, spare parts, manuals and maintenance information.

3.20 SYSTEM TESTING

- A. Prior to certification of the fire alarm system the contractor shall accomplish a complete test of the fire alarm system in accordance with NFPA 72, Chapter 10, paragraph 10.4 Testing.
- B. Perform a complete, functional, component by component test of the entire fire alarm and detection system. This is a one-time test. Provide a detailed step by step testing procedure, which is unique to this project, reflecting the type of system and the number and location of all components.
- C. Demonstrate the proper operation of each component as follows with a one-time test:
 - 1. Ionization, photoelectric, and duct smoke detectors: activate the detector with a "false smoke" product which has been specifically formulated for testing smoke detection systems.
 - 2. Heat detectors: activate the detector by utilizing the detector check button.
 - 3. Pull Stations: activate the station by operating the station in its normal mode.
 - 4. Audible and Visual Alarms: verify proper operation when the system is put into the alarm mode.
 - 5. Sprinkler Flow Switches: open the sprinkler system's inspection test valve. Verify that the flow switch sends an alarm signal within the allowed time corresponding to the switch's time delay setting.
 - 6. Fire Alarm Panels: functionally check-out and test the panel per the manufacturer's written instructions. Demonstrate the proper operation of each modular component. Demonstrate automatic power change to batteries and back to building power upon a drop in voltage below the voltage threshold as specified by the panel manufacturer.
- D. Demonstrate the supervisory function at each device loop circuit, and at all single component wiring runs such as for the sprinkler valve supervisory switches.

3.21 CERTIFICATION

- A. After completion of the installation of the system, the licensee shall complete a NFPA Inspection and Testing form. The Inspection and Testing form format shall be as indicated in NFPA 72, Chapter 10, Figure 10.6.2.3 Inspection and Testing form. When an Inspection and Testing form

has been completed, legible copies shall be distributed as directed by the Authority Having Jurisdiction.

- B. After an installation has been complete, affix a Fire Alarm Tag to the control panel. The Fire Alarm Tag is in addition to the Inspection and Testing form. Protect the Fire Alarm Tag from vandalism by applying pressure sensitive label; do not use a "tie-on" tag. It shall be as required in the Fire Safety Rules.

3.22 FINAL DRAWINGS

- A. As-built drawings shall be given to the Owner's representative, at time of instruction, in addition to those to be supplied as general requirements of the job.

3.23 AUTHORITY HAVING JURISDICTION

- A. The drawings and specifications herein comply to the best of the Engineer's knowledge with all applicable codes at time of design. However, it is this contractor's responsibility to coordinate/verify (prior to bid) the requirements of the authority having jurisdiction over this project and bring any discrepancies to the Engineer's attention at least seven days prior to bid. No changes in contract cost will be acceptable after the bid for work/equipment required to comply with the Authority Having Jurisdiction.

3.24 COMMISSIONING

- A. The smoke control system shall be commissioned to ensure installation quality, proper function, and overall performance.
- B. Commissioning shall be performed after system and component testing has been completed by the installing contractor(s).
- C. The Engineer of Record, installing contractors, and facility staff shall participate in commissioning activities including meetings, scheduling, developing test protocols, and performing functional testing.
- D. Functional testing shall demonstrate that revised smoke control components operate as a system and as intended per the new sequence of operations.
- E. Functional testing shall also demonstrate that any components removed from smoke control service have been modified to meet their new requirements.
- F. Functional testing shall be completed in phases to accommodate construction schedules, coordinate with facility staff, and simplify the commissioning process.

END OF SECTION