

SECTION 28 31 00  
ADDRESSABLE FIRE ALARM DETECTION SYSTEM

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. The provisions of the General Conditions, Supplementary Conditions, and the Sections included under Division 1, General Requirements, are included as a part of this Section as though bound herein.

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 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. Drawings and specifications 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 (7) 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. Contractor is advised that circuit routing for this system is not necessarily shown on the project drawings. 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. Firestopping is to be performed under Division 7 Section Firestopping.
- D. This Specification describes a fully addressable, common fire alarm system, with remote power supplies, remote voice evacuation panels for various buildings and portables.
- E. 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), National Fire Alarm Code (NFPA 72), ADA, other applicable Codes, and the Contract Documents.

3. 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.
  4. Contractor shall note that the drawings show fire alarm remote panels (FARP) in various locations. FARP's are intended to be equipment (remote control panels, power supplies, voice evacuation panels, addressable modules, power, grounding, and any other equipment or materials) necessary for a remote extension of the fire alarm system. FARP's shall be connected to the campus FACP via a signal line circuit (SLC) and other circuits specifically recommended by the fire alarm manufacturer and required to meet the intent of the project documents. An individual FARP shall provide the necessary circuitry (notification appliance circuits (NAC), initiating device circuits (IDC), DC power circuits required by various devices, etc.) to the fire alarm devices within its coverage area. The FARP shall provide interconnection services between the device circuits in its area of coverage and the FACP just as if those device circuits were directly connected to the FACP.
- 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 a complete addressable analog fire detection system. The system shall include but not be limited to:
1. Main Fire Alarm Control Panel (FACP) including all required power supplies.
  2. Fire Alarm Annunciator Panel (FAAP).
  3. Voice Evacuation System
  4. Manual Pull Stations.
  5. Smoke Detectors.
  6. Duct Detectors.
  7. Heat Detectors.
  8. Voice Evacuation Speakers
  9. Combination Audible/Visual devices (indoor and outdoor weatherproof as indicated on the drawings).
  10. Visual Devices (indoor and outdoor weatherproof as indicated on the drawings).
  11. Remote Fire Alarm Control Panels (Network Nodes).
  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. Modem for remote service capabilities.
  15. "Areas of Rescue Assistance" Equipment (Areas of Rescue Assistance Equipment shall be provided and installed by the Fire Alarm System Installer).
  16. Surge Suppression.
  17. Programming.
  18. Grounding
  19. Firestopping (Firestopping is to be performed under Division 7 Section Firestopping).
  20. Wire and Cable Labeling.

21. Electrical power required to comply with all functions and operations called for in this section of the specifications. Contractor shall provide and install all 120 VAC circuits as required.
  22. Conduit, wire, wire fittings, terminal cabinets with plywood and terminal strips, and all accessories required to provide a complete operating system.
  23. A complete and accurate schematic/drawing of the fire alarm system to be placed adjacent to the fire alarm annunciator panel and the main fire alarm panel.
- B. 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. Gas/Fuel valve shutoff.
  6. Escalator shutdown.
  7. HVAC system control and/or shutdown.
  8. Ventilation system (supply fans, exhaust fans, fan terminal boxes, etc.) control and/or shutdown.
  9. Control of fire, smoke, and/or combination fire/smoke dampers.
  10. Fire suppression and or extinguishing systems.
  11. Monitoring of kitchen hood fire suppression systems.
  12. Control of fire and/or smoke doors, dampers, shutters, etc.
  13. Control of door hold open devices.
  14. Control of time out room door lock devices.
  15. Connection to the internet via a local data drop.
  16. **Muting of classroom audio systems.**
- C. System shall operate as a non-coded, continuous ringing system which will sound all audible devices, evacuation devices, and activate all visual devices until it is manually silenced.
- D. System shall be wired as a Class A system for all circuits.
- E. System is to be a complete analog addressable system except for portables. Portables shall be wired as hard-wired circuits.
- F. All portions of fire alarm system shall be installed in conduit. Conduit and boxes to be installed by Electrical Contractor.
- G. Fire alarm system shall not share a raceway, junction box, enclosure, manhole or device with any other system.
- H. Contractor to advise Owner of requirements for monitoring the fire alarm system by Owner's monitoring company and provide all electrical required for remote monitoring including tie to security cabinet.
- I. Provide and install wiring, equipment, etc. for connection to devices furnished under other divisions of the work.
- J. 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.
- K. Provide and install wiring, equipment, etc. as required to deactivate power to computer power panels and air conditioning equipment by automatic or manual devices as shown on plans.
- L. In buildings, two or more floors not fully sprinkled, provide communication equipment, in accordance with all applicable codes, for Areas of Rescue Assistance.
- M. 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. Fire/smoke air and duct detectors

2. Fire, smoke and/or combination fire/smoke dampers.
  3. Supply/Return fans, Exhaust fans, and/or Fan Terminal Boxes (FTB)
  4. Automatic fire extinguishing systems
  5. Smoke evacuation equipment
  6. Sprinkler and/or Fire Protection system components
  7. Access Control.
- N. 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.
- O. 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.
- P. Provide terminal cabinets sized to house terminal strips and surge suppression equipment.
- Q. 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 telecommunications 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. On all telecommunications lines.
    - d. 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. 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, Article 770, and Article 800)
    - b. NFPA 72 National Fire Alarm Code
    - c. NFPA 101 Code for Safety to Life from Fire in Buildings and Structures
    - 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. 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-Holders with or Without Integral Smoke Detectors
  - g. UL 464 Audible Signal Appliances
  - h. UL 1638 Visual Signaling Appliances – Private Mode Emergency and General Utility Signaling
  - i. UL 1481 Power Supplies for Fire-Protective Signaling Systems
  - j. UL 1480 Speakers for Fire Alarm, Emergency, and Commercial and Professional Use
  - 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 for Surge Protective Devices
  - n. UL 497 Protectors for Paired-Conductor Communications Circuits
  - o. UL 497A Secondary Protectors for Communications Circuits
  - p. UL 497B Protectors for Data Communications and Fire-Alarm Circuits
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. System controls shall be UL listed for Power Limited Applications per NEC 760. All circuits must be marked in accordance with NEC article 760.
  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: 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.
- B. 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 – 2007 Safety Code for Elevators and Escalators including A17.1a-2008 and A17.1b-2009 Addenda.
  4. Local and State Building Codes.
    - a. Florida Building Code – 2010.
    - b. Florida Administrative Code. All applicable chapters including but not limited to:
      - i. Chapter 69A Rules, including but not limited to:
        - a) Ch 69A-3 Fire Prevention - General Provisions
        - b) Ch 69A-46 Fire Protection System Contractors and Systems
        - c) Ch 69A-47 Uniform Fire Safety Standards for Elevators
        - d) Ch 69A-48 Fire Safety Standards for the Fire Alarm Systems
      - ii. Florida Administrative Code 6A-2/SREF (Schools)
    - c. Florida Fire Prevention Code - 2010
    - d. Florida Department of Insurance:

- i. 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.
    - ii. Fire Alarm Rules: The fire alarm system and installation thereof shall comply with the Fire Safety Rules promulgated by the Florida State Fire Marshal.
  - e. Authority Having Jurisdiction:
    - i. General: The system shall comply with all applicable Codes, Ordinances and Standards as interpreted and enforced by the local Authority Having Jurisdiction.
    - ii. Fire Department (AHJ – SJCS D Safety, Fire & Health)
    - iii. Building Official
    - iv. State of Florida: Division of State Fire Marshal.
- C. 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.

## 1.5 RELATED SECTIONS

- A. All applicable sections of Division 0, Division 01, Divisions 26, 27 and 28.
- 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. School Intercom System With Time Program Clock Modular Administrative Communications System
  - 10. Local Area Sound System
  - 11. Intrusion Detection System
  - 12. Access Control System

## 1.6 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum ten (10) years experience and with service facilities within 50 miles of Project.
- B. Installer:
  - 1. Company specializing in installing the products specified in this section with minimum ten (10) years experience.
  - 2. The Installer shall be currently licensed by the Electrical Contractors Licensing Board as a 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.
- C. 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.
- D. 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 along side fire alarm conductors. Coupling conductors shall be sized according to applicable codes and standards.
- E. To establish the type and operating characteristics of the fire alarm system, the equipment specified herein is used as a guide in determining the functions of the fire alarm system. Other equipment will be considered for approval provided the following is submitted in writing by the system installer to the engineer (See Section Common Work Results on Substitutions):
1. Contractor qualifications (as listed above).
  2. Complete lists, descriptions, and drawings of materials to be used.
  3. A complete drawing showing conduit, conduit sizes, backboxes, number of wires and wire sizes.
  4. A complete riser diagram of Fire Alarm System.
- F. Acceptable Manufacturers:
1. Basis of Design
    - a. Simplex 400-U
  2. Acceptable Substitution:
    - a. Notifier NFS2-3030
    - b. Fire Control Instruments, Inc (FCI) E-3
    - c. Edwards EST-3

## 1.7 SUBMITTALS

- A. Submit in accordance with Division 01 and Section Common Work Results.
- B. In addition to requirements of above, the contractor shall submit:
1. Narrative of operation of System as provided. (Submittal will not be reviewed by the A/E without this narrative.)
  2. Manufacturer's data on all products, including but not limited to:
    - a. Catalog cut sheets.
    - b. Roughing-in diagrams.
    - c. Installation instructions. Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
    - d. Operation and maintenance manuals.
    - e. Typical wiring diagrams and risers.

- f. The contractor shall submit test reports, manufacturers' specifications and any other information necessary to determine compliance with material and equipment specifications described herein.
3. Submit floor plans to locate all devices. Wiring diagrams shall include wire and raceway sizes, fire alarm control panels, riser wiring and associated raceway sizes, wiring details, connections, and terminal identification. All devices shall be identified by the same applied identification symbol as shown on the contract documents.
4. Submit all load calculations and cable/wire sizing for each branch of the individual fire alarm field circuits. Wire sizing calculations to prove maximum three percent (3%) voltage drop at all AC voltages and maximum eight percent (8%) voltage drop at all DC voltages.
5. Battery sizing calculations.
6. Submit a detailed step by step testing procedure for a component-by-component system functional checkout and test.
7. Point to point wiring diagrams and block diagrams of system to be installed. Point to point wiring diagrams may be submitted at time of operation and maintenance manuals in lieu of in submittal brochure. Block diagrams shall be required with submittals.
8. Riser diagrams and floor plans showing conduit runs and number of wires. All devices shall be identified by the same applied identification symbol as shown on the drawings.
9. Surge Suppression
  - a. Surge protective data for 120-volt power source, power circuit, outside signaling circuit, and exterior incoming circuits from other buildings (if any), and outgoing circuits to other buildings (if any).
  - b. Submit Product Data for each type of suppressor:
    - i. Dimensions.
    - ii. Means of mounting.
    - iii. Compliance with UL Standards referenced.
    - iv. Compliance with IEEE Standards referenced.
    - v. Design type (Hybrid, MOV).
    - vi. Size of wire leads.
    - vii. Warrantee.
    - viii. Performance data showing compliance with performance as specified herein.
    - ix. Complete schematic data on each suppressor type indicating component values, part number, conductor sizes, etc.
    - x. Manufacturer's certified test data on each suppressor type.
    - xi. Test data from an independent test laboratory.
10. Name, qualifications, etc. of company providing and installing system.
11. Qualifications of installer. Submit proof installer meets specified requirements.
12. Proof of UL Listing. Indicate the UL listing, the UL classification, and NEC insulation type used for each type of wire to be used in installation of fire alarm and communications system.
13. Manufacturer's drawings showing all dimensions (height, width, and depth) for all cabinets used to house system components. Provide catalog pages, mounting details and specification sheets for all fire alarm system components and rough-in boxes.
14. Submit Florida Registered Firm certificate number.
15. Submit Florida Fire Alarm Contractor's license number.
16. Submit Fire Alarm Technician(s) manufacturer's certification.
17. Detailed drawing of the Fire Alarm Control Panels layout indicating the exact arrangement of all zones, including expansion zones.
18. Coordination Drawing: Coordination CAD drawing of building Fire Command room and equipment layout as shown on drawings, with all panel and rack footprints, using actual manufacturer's dimensions, indicating proper clearances.



19. Network:
  - a. Complete description data indicating UL listing for all network components.
  - b. Complete sequence of operation of all functions of the network.
  - c. A list of every network node address.
  - d. A list of every address of every device connected to a network node that is provided for purposes of alarm initiation, status monitoring, supervised notification appliance circuits, and auxiliary control.
  - e. Complete network wiring diagrams for all components and interfaces to equipment supplied by others.
20. All drawings required herein shall be on AutoCAD Release 2006 or higher.
21. Where required by Authority Having Jurisdiction submit signed and sealed documents as required by Authority Having Jurisdiction. Where Authority Having Jurisdiction requires shop drawings to be signed and sealed by a Registered Engineer, Contractor is required to submit same and include in his bid all costs associated with having a Registered Engineer other than the design Engineer of Record perform signing and sealing.

#### 1.8 PROJECT RECORD DOCUMENTS

- A. Submit in accordance with Division 01, Section Common Work Results and Section Operation and Maintenance Manuals.
- B. In addition to the requirements above, the contractor shall submit:
  1. Updated and revised contract documents to record actual locations (as-installed) of all equipment, devices, initiating devices, signaling appliances, and end-of-line devices.
  2. Record actual type, size, and routing of cables installed.
  3. Record all cable identifications.
  4. Drawings required herein are in addition to those required under "OPERATION AND MAINTENANCE DATA".
  5. All drawings required herein to be on AutoCAD Release 2006 or higher.

#### 1.9 OPERATION AND MAINTENANCE DATA

- A. Submit in accordance with Section Common Work Results and Section Operation and Maintenance Manuals.
- B. In addition to the requirements of Sections above, the contractor's O & M Manuals shall include:
  1. A complete as-installed equipment list, listed by room, with manufacturers' names, model numbers, serial numbers, and quantities of each item.
  2. A complete and correct system schematic, showing detailed connections for all parts of the system, including wire numbers, terminal block numbers and layouts, and other designations and coding's (point-to-point wiring diagrams). System performance measurements shall be documented as noted elsewhere in this specification.
  3. Riser diagrams showing as-installed conduit with pull boxes, outlet boxes, physical cable layouts, part numbers of cable types used, and number of circuits in each conduit.
  4. Repair parts list for each and every major equipment item furnished.
  5. Service manuals for each and every major equipment item furnished.
  6. Manufacturer's warranties and operating instructions for each and every equipment item furnished. Include a copy of the certificate of warranty, signed by both parties.
  7. Technical Systems Operations Manual, custom-written by the Contractor, for the purpose of instructing the Owner's operating personnel in the detailed step-by-step operation of the system and preventive maintenance procedures. This manual shall include descriptions of the system components and their relationship to system function. This manual shall be bound separately and labeled appropriately.

8. Surge Suppression
    - a. O & M data to include:
      - i. All accepted shop drawings, product data, and/or cutsheets.
      - ii. Installation, connection, and maintenance information on each type of surge suppression.
      - iii. Procedure and/or timetable for recommended periodic inspection of devices to determine continued usefulness.
  9. Complete equipment rack layouts showing locations of all rack mounted equipment items.
  10. CAD floor plans, prepared at a scale of not less than 1/16" = 1'-0" showing detectors, speaker locations and orientation, rack locations, and all other related device locations.
  11. The Contractor/Installer shall videotape the entire training session(s) and submit the video tape with the Operational Manual.
- C. Drawings required herein are in addition to those required under Project Record Documents.
1. All drawings required herein shall be on AutoCAD Release 2006 or higher.

#### 1.10 WARRANTY

- A. Contractor shall warrant the equipment to be new and free from defects in material and workmanship, and will, within one year from date of Final Completion, 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. Contractor shall guarantee all wiring and raceways to be free from inherent mechanical or electrical defects for one (1) year from date of Final Completion.
- C. Surge Suppression:
  1. All surge suppression devices shall be warranted to be 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 speaker/strobe 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 substantial completion date. At least two weeks prior to substantial completion system shall be fully operational. After system is operational SJCS D 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 weeks notice any additional audible/visual signals that have been determined to be required during said inspection from the balance of the (20) twenty additional devices noted above. There shall be at no costs for these added devices provided the total does not exceed the balance remaining of the (20) 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 Final 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.
- B. Provide annual testing and inspection of fire alarm system at end of first year in accordance with NFPA 72. Correct any deficiencies found at no cost to the Owner. Affix fire alarm tag to panel.

#### 1.13 MAINTENANCE MATERIALS

- A. Provide six (6) keys of each type.
- B. Provide three (3) of each type of automatic smoke detector without base.
- C. Provide three (3) of each type of surge suppression device.

#### 1.14 PROGRAMMING

- A. Contractor shall provide all programming (one (1) original copy on disk or CD ROM of the programming software as provided by the manufacturer) EPROM burners, specialty hardware (excluding generic computer), all access codes and copyrighted software needed for adding, deleting, and changing devices in the program, for the Owner's use.

#### 1.15 OWNER'S INSTRUCTION

- A. Provide instruction to the Owner's designated personnel upon completion of the system installation. Instruction shall include a functional training session on fire alarm control panel operation and instruction on peripheral device operation, including what are normal indications and alarm indications of each type of new/added device. Video record all training sessions and deliver (4) copies of tapes to Owner (for use in future training).
- B. Contractor shall include in his bid all expenses to send two SJCSO representatives to the "End-User Certification Factory Training Course," at the manufacturer's factory. The course shall be specifically designed to allow SJCSO representatives the skills they need to successfully design, input, and modify, a database that will control the Fire Alarm System. The course shall also provide the skills to install, service and maintain the Fire Alarm System; Factory training for SJCSO Representative shall be completed prior to substantial completion of the project. Training shall provide instructions, licensed software, access codes, documentation program material, non-assignable and non-exclusive license for in-house use of the licensed software, and any other requirement to allow SJCSO the capability to add, delete or change devices in the program for the Fire Alarm/Detection system.

## 1.16 SYSTEM OPERATION

- A. System operation shall meet the operation requirements of all codes and regulatory requirements.
- B. Upon activation of the Fire Alarm System by a manual station, smoke detector, or any other new or existing automatic device the following shall take place:
  - 1. Energize all alarm signaling devices.
  - 2. Sound all audible (horn or speaker) alarms and flash visual signals throughout the campus.
  - 3. Alert proprietary system.
  - 4. Cause alarm to be displayed on the annunciator section of the control panel.
  - 5. Cause alarm to be displayed on remote annunciator
  - 6. Close all doors or fire shutters, held open by automatic release devices throughout the facility, (coordinate with architect and door hardware supplier, provide all electrical required).
  - 7. Unlock all electrically locked time-out or access control doors (coordinate with the architect and door hardware supplier, provide all electrical required).
  - 8. Shut down all air handlers, exhaust fans supplying or exhausting air, and fan terminal boxes (FTB).
  - 9. Shut all fire and/or smoke dampers in ducts associated with the air handling units and exhaust fans which are shut down.
  - 10. Transmit signals to the building elevator control panel to initiate return to the main floor or alternate floor.
  - 11. Transmit signals to the building automation system to tell system that the fire alarm system has taken control of respective mechanical system.
  - 12. Send a signal to all dimming and lighting relay/control systems. Fire alarm signal shall initiate dimming system controls to drive all dimmed circuits to immediate full-on output. Fire alarm signal shall initiate lighting relay/control system to turn on all emergency lighting circuits.
  - 13. Send a signal to all non-fire alarm sound reinforcement systems (i.e. Cafeteria, Gymnasium, Multi-Purpose Room, Theater, etc.). Fire alarm signals shall override all other sound systems. Alarm notification signals shall take precedence over all other signals. Operation of other sound systems shall resume after fire alarm system clears alarm.
  - 14. Activate the system dialer and transmit the signal to the monitoring contractor, to notify the local Fire Department.
- C. Elevator: Smoke detectors associated with elevator lobbies, hoistways and machine rooms shall be types accepted by the Florida State Fire Marshal under FAC Chapter 69A-47 Uniform Fire Safety Standards for Elevators. Elevator recall shall be initiated ONLY by elevator lobby, hoistways and machine room smoke detectors. In addition to those functions outlined in "B" above, elevator detector(s) shall initiate the following functions.
  - 1. Operation of any one Elevator Lobby or Hoistway Product of Combustion Detectors associated with a single bank of elevators shall signal the elevator controls to commence required procedures for that bank of elevators. Refer to Division 14 for required procedures, floor(s) of recall, and alternate floor(s) of recall.
  - 2. Operation of any elevator machine room Product of Combustion Detector that is part of this Fire Alarm System shall signal the elevator controls to commence required procedures for that bank of elevators. Refer to Division 14 for required procedures.
  - 3. Activation of the smoke detector(s) in a machine room or hoistway shall cause a suitable warning light to flash. The light is to be located adjacent to the "Phase One" recall switch or elevator hall button at the designated and alternate fire department access level.
  - 4. Fire Alarm system shall monitor shunt trip voltage per NFPA 72.

- D. System supervisory faults, such as shorts, opens, and grounds in conductors, operating power failure, or faults within supervised devices, shall place the system in the trouble mode, which causes the following system operations:
  - 1. Visual and audible trouble signal indicated by zone at the fire alarm control panel.
  - 2. Visual and audible trouble signal indicated at remote annunciator panel.
  - 3. Trouble signals transmitted to central station.
  - 4. Manual acknowledgement function at fire alarm control panel shall silence audible trouble signal; visual signal shall be displayed until initiating failure or circuit trouble is cleared.
- E. 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.
- F. Lamp Test: manual lamp test function causes alarm indication at each lamp on the fire alarm control panel and the remote annunciator.
- G. When the fire alarm system is activated as a drill, all incidental functions shall be exercised including notification of the fire department.
- H. 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.
- I. 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.
- J. 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.)

#### 1.17 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. Each device shall be individually annunciated/addressable.
- 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 administration building
    - b. One (or more) circuit(s) for exterior horns
    - c. One (or more) circuit(s) for each building with voice evacuation
    - d. One (or more) circuit(s) for remainder of campus.
  - 2. Breakdown circuits as required for load and distances involved.

### PART 2 – PRODUCTS

#### 2.1 GENERAL EQUIPMENT AND MATERIAL REQUIREMENTS

- 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.

## 2.2 RACEWAYS

- A. General:
  - 1. All raceways (conduit, wireways, pullboxes, outlet boxes, etc.) shall comply with applicable requirements of sections within Division 26 of these specifications.
  - 2. All raceways (conduit, wireways, pull boxes, outlet boxes, etc.) shall comply with all requirements of the manufacturer of the fire alarm system.
- B. Conduit: Comply with Section Conduit except as noted below:
  - 1. Pull Cords: Install pull cords in all raceways 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 TERMINATION CABINETS

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

## 2.4 "SYSTEMS" AND "LOCAL" GROUND BUS

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

## 2.5 FIRE ALARM CONTROL PANEL (FACP)

- A. General:
  - 1. Fire alarm control panel shall be of dead front construction and be modular in design. Control panel shall be capable of future expansion and shall provide active signal initiating as noted on drawings (or as herein) specified with zones as noted on drawings (or as herein specified). Control panel shall provide provisions for future expansion. Fire alarm control panel shall be semi-flush mounted (unless otherwise noted on drawings) and located as shown on the drawings.
- B. System Capability:
  - 1. Communication with addressable devices: The system must provide communication with all initiating and control devices individually. All of these devices are to be individually annunciated at the control panel. Annunciation shall include "Alarm", "Trouble", "Open", "Short", "Ground", "Device Fail" or "Incorrect Device" conditions for each point.
  - 2. All addressable devices are to have the capability of being disabled or enabled individually.
  - 3. Each Signal Line Circuit (SLC) two-wire loop shall be capable of addressing a minimum of ninety-nine (99) addressable devices and ninety-eight (98) monitor or control modules.
  - 4. Identification of Addressable Devices: Each addressable device must be uniquely identified by an address code entered on each device at time of installation. The use of jumpers to set address will not be acceptable due to the potential of vibration and poor contact.
  - 5. Wiring Type, Distances, Survivability and Configurations: The system must allow up to 2,500 feet wire length to the furthest addressable device. Style 4 Signaling Line Circuit (as defined by NFPA-72) communications will be provided.
  - 6. System shall be capable of addressable devices and conventional devices within the same system.
  - 7. All system circuits shall be inherently power limited per NEC 760.

8. System shall be capable of communication with a minimum of fifteen (15) remote module locations.
- C. Master Controller:
1. Master controller shall be an integral part of the control panel and be microprocessor-based.
  2. Master controller shall store all programming in non-volatile memory.
  3. Master controller shall have an event log capable of storing a minimum of two hundred fifty-five (255) events in non-volatile memory.
  4. Master controller shall include an eighty (80) character Liquid Crystal Display.
  5. Master controller shall include, as a minimum, switches to accomplish Alarm/Trouble Acknowledge, Alarm Silence, Trouble Silence and System Reset.
  6. Master controller shall include, as a minimum, LED's to indicate System Alarm, System Trouble, Supervisory Alarm and System Silence.
  7. Master controller shall support connection of serial remote annunciators.
  8. Master controller shall provide a minimum of two (2) notification appliance circuits (Class A or B, Style Z or Y).
  9. Master controller shall be capable of being expanded as necessary to accommodate all required modules.
- D. Notification Appliance Circuits:
1. Notification Appliance Circuits Module shall provide fully supervised style Z or Y (Class A or B) indicating circuits. These circuits shall be supervised, provide power or audio to horns, strobes, and speakers. Horns and strobes with polarity reversing loops containing up to 1.75 amperes of 24 Volt notification devices. Speaker circuits with 25 or 70 Vrms containing up to a 40 Watts speaker load.
  2. Module shall be provided with plugable contact wiring terminal strips for ease of installation and service. The terminal strips shall be UL listed for 12 AWG wiring.
- E. Power Supply:
1. Power supply for the panel and all fire alarm peripheral shall be integral to the control panel. Power supply shall provide all control panel and peripheral power needs as well as 3.0 amperes of unregulated 24 VDC power for external audio-visual devices. Audio-visual power may be increased as needed by adding additional modular expansion power suppliers. All power supplies shall be designed to meet UL and NFPA requirements for power-limited operation on all external signaling lines, including initiating circuits and indicating circuits.
  2. All power supplies shall be provided by the same manufacturer as the fire alarm control panel (FACP). Power supplies provided by manufacturers other than the manufacturer of the fire alarm control panel (FACP) shall not be acceptable.
  3. Circuit breakers or other over-current protection on all power outputs.
  4. Input power shall be 120 VAC, 60 Hz. Power supply shall provide internal batteries and charger. Internal battery capacity shall be as required.
  5. Battery pack shall provide maximum normal operating and supervisory power for:
    - a. 24 hours per NFPA 72
    - b. Provide low maintenance gel cell type batteries with sufficient ampere-hour rating to meet the above NFPA Standard and to operate all alarm signals for a duration of 15 minutes at the end of the required period of time.
- F. Modem:
1. A modem shall be provided as an integral and redundant (secondary) part of the fire alarm control panel (FACP). The modem shall provide the Owner with the ability to accomplish the following functions:
    - a. View device sensitivity information.
    - b. View system activity in real time.
    - c. Access and view the system history log.
  2. Modem shall not allow changes to system programming.

3. Modem shall operate at a minimum speed of 9600 baud.
  4. Modem shall provide an RJ-11 connector for connection to a telephone line (POTS).
  5. Fire alarm contractor shall coordinate with the Premise Distribution System (PDS) contractor and/or the telecommunications system contractor for interconnection to a telecommunications line. Telecommunications interconnection wiring up to the modem shall be provided by the PDS or telecommunications contractor.
  6. The modem shall mount inside the fire alarm control panel (FACP).
- G. Wall Mount Equipment Enclosure:
1. The control panel, and all associated equipment, shall be housed in an enclosure designed for mounting directly to a wall or vertical surface. The back box and door shall be constructed of 16-gauge steel with provisions for electrical conduit connections into the sides and top. The door shall provide a key lock and shall include a glass or other transparent opening for viewing of all indicators.
  2. The enclosure(s) shall be of sufficient size to house all equipment required for this project. All equipment shall be mounted in the enclosure(s) as designed by the manufacturer. Provide enclosures in quantities as required to provide a complete, UL Listed Fire Alarm system.

## 2.6 REMOTE ANNUNCIATOR

- A. Fire Alarm Annunciator Panel (FAAP) shall be a serial annunciator panel and must be capable of being mounted in a remote location.
- B. Annunciator shall be modular using low current circuitry. The annunciator shall be capable of operating on nominal 24 Vdc and be battery backed up.
- C. Annunciator modules shall be capable of activating local or remote LED's, relays, or graphic panels.
- D. All switches shall be a point in the system and be capable of controlling any system output or functions. All LED's and outputs shall be capable of being controlled by any change of state in the system or as a result of a time control sequence or logic function. LED's and switches shall be able to be clearly marked by the end user.
- E. Modular components of the annunciator shall be mounted in a recessed cabinet with hinged door and a lexan window with keylock.

## 2.7 VOICE EVACUATION SYSTEM

- A. The voice evacuation system shall provide 50- or 100-Watt signal power and 50- or 100-Watts voice power as required and shall be UL listed.
- B. All speaker circuits shall be field selectable for 25 or 70 Vrms operation and shall be power limited. Non-power limited circuits are not acceptable.
- C. The voice evacuation system shall be microprocessor based, and shall contain an integral microphone, 50- or 100-Watt audio amplifier (as required), tone generator, digital message repeater, 120 VAC power supply, and battery charger.
- D. The voice evacuation message/signal shall be broadcast until the Fire Alarm Control Panel (FACP) is reset, or until fire emergency personnel interrupt the broadcast with a manual page. On reset system shall automatically return to standby (normal operating) condition.
- E. A secondary message shall be provided that can be triggered by the closure of a contact from either the FACP or from any normally open contact device.
- F. Remote paging microphone(s) will be supported by the system through a supervised circuit. Remote microphone(s) may be mounted up to 5,000 ft. (1,524 m) away from the voice evacuation panel.



## 2.8 MANUAL STATION (NON-BREAK GLASS)

- A. Manual fire alarm station shall be non-code, non break glass type providing noncoded signals and operating with a double action motion. Upon actuation, they shall not be restorable to normal except by use of a key. The key shall also allow stations to be tested nondestructively. The stations shall be constructed of metal, with operating directions provided on the cover in highlighted, embossed lettering. The words "FIRE ALARM" shall appear on the door in embossed letters one-half inch high or larger. Mount at 48" above finished floor to top and in accordance with NFPA and handicap standards. Manual stations shall be UL listed. Unit shall be equipped with an addressable interface module. Stations constructed of plastic will not be acceptable.

## 2.9 PHOTOELECTRIC SMOKE DETECTOR

- A. The contractor shall furnish and install Analog addressable photoelectric smoke detectors, as called for on drawings. The combination detector head, and twist-lock base shall be UL-listed compatible with a UL-listed fire alarm panel.
- B. Smoke detector shall have a flashing, status-indicating LED for visual supervision. When the detector is actuated, the flashing LED will latch on steady and at full brilliance. The detector may be reset by actuating the control panel reset switch.
- C. Sensitivity of the detector shall be monitored without removal of the detector head. Metering test points shall be accessible on the exterior of the detector head. Field adjustment of the sensitivity shall be possible when conditions require a change.
- D. Vandal-resistant, security locking feature shall be used in those areas as indicated on the drawings. Locking feature shall be field removable when not required.
- E. It shall be possible to perform a functional test of the detector without the need of generating smoke. Test method must simulate effects of products of combustion in the chamber to ensure testing of all detector circuits.
- F. To facilitate installation, detector shall be non-polarized. By using a furnished wire jumper, it shall be possible to check circuit loop continuity prior to installing the detector head.
- G. Voltage and RF transient suppression techniques shall be employed to minimize false alarm potential. A gated alarm output shall be used for additional detector stability.

## 2.10 DUCT MOUNTED SMOKE DETECTOR

- A. Duct Mounted Smoke Detector for the fire and smoke detection system shall be a high velocity rated Analog addressable series smoke detector intended for use with ventilation and conditioning ducts.
- B. Detector shall provide detection of combustion gases and smoke in air conditioning ducts in compliance with NFPA 90A. Detector shall be UL-listed specifically for the use in air handling systems.
- C. Detector shall operate at air velocities ranging from 300 feet per minute to 4000 feet per minute without requiring compensation for operation at specific air velocities. Sampling tubes of proper length shall be provided and installed to match duct width at the installed location.
- D. Whether shown on drawings or not, a remote alarm indicator/test station shall be provided for each duct mounted smoke detector to annunciate smoke detector operation remotely. Mount unit in ceiling or wall near respective remote smoke detectors (in an occupied space).
- E. Detector shall be zoned so that when either the supply or the return detector senses smoke it will cause a supervisory/trouble indication at the main fire alarm panel and immediately shut down the air handler. The duct mounted detectors are NOT to cause a general alarm to sound.

## 2.11 PROJECTED BEAM SMOKE DETECTOR

- A. Contractor shall furnish and install Projected Beam smoke detectors, as called for on drawings. Detector shall include both the emitter and the receiver and be UL-listed compatible with a UL-listed fire alarm panel. Detector shall provide a Form A dry contact for alarm and Form B contact for trouble.
- B. Smoke detector shall have a status-indicating red LED for visual supervision. When the detector is actuated, the LED will illuminate on steady and at full brilliance. Detector may be reset by actuating the control panel reset switch.
- C. Detector shall have a range of 35 feet to 320 feet. Detector shall be field adjustable to one of the obscuration settings of 25%, 50% or 70% per span. These settings shall be capable of being verified with calibrated filters.
- D. Projected Beam smoke detector shall possess circuitry that automatically compensates for normal ambient changes in the intensity of the emitted beam strength. The microprocessor shall provide compensation for a change in received signal value, over time, caused by contamination of the optics. When this compensating capability reaches a limit, the microprocessor automatically generates a trouble signal.
- E. Projected beam smoke detector shall also signal a trouble condition if the beam has a blockage of 90% for more than twenty (20) seconds and automatically reset to normal when the blockage is removed.
- F. It shall be possible to perform a functional test of the detector without the need of generating smoke. The test method must simulate effects of products of combustion in the chamber to ensure testing of all detector circuits.
- G. To facilitate installation, the detector shall employ signal strength indicating LED. Alignment is facilitated by turning an alignment adjustment wheel and monitoring the relative signal strength based upon which LED is lit. The detector shall be installed in accordance with the instructions provided with every unit and the listed Installation, Operation and Maintenance Manual, and the applicable NFPA standards.
- H. Projected Beam smoke detector shall include an Addressable Monitor module and a Power Supervisory relay.
- I. Voltage and RF transient suppression techniques shall be internal circuitry of the detector to minimize false alarm potential.

## 2.12 HEAT DETECTORS

- A. Contractor shall furnish and install Analog addressable heat detectors, as called for on drawings. Combination detector head and twist-lock base shall be UL-listed compatible with a UL-listed fire alarm panel.
- B. Heat detector shall have a flashing, status-indicating LED for visual supervision. When the detector is actuated, the flashing LED will latch on steady and at full brilliance. Detector may be reset by actuating the control panel reset switch.
- C. Fixed temperature automatic heat detectors shall be rated at 135°F (unless otherwise noted or required due to ambient conditions, i.e., Kiln Room). Fixed temperature element shall use dual thermistor technology. Detectors shall have a smooth ceiling rating of 900 square feet. When required, detectors shall be equipped with two Form 'A' contacts with rating of 3 amps at 6 to 125 volts A.C. and 1 amp at 6 to 28 volts DC.
- D. Detectors shall be installed in accordance with appropriate articles of National Fire Protection Association and the spacing rating assigned by the Underwriters Laboratories and located as shown on the drawings. Automatic heat detectors shall be Underwriters Laboratories and Factory Mutual approved.

- E. Where indicated on the drawings, the Contractor shall provide heat detectors rated, by the manufacturer, as explosion proof. If not an integral part of the heat detector assembly, the addressable module shall be located outside the area protected by the explosion proof heat detector (but interior to the building) in an accessible area. If the addressable module is located above a gypsum board ceiling the Contractor shall provide a fire rated access panel.

#### 2.13 ADDRESSABLE MODULE

- A. Analog addressable device shall be furnished as required to monitor fire alarm or supervisory initiating devices or control auxiliary functions. Each module shall contain address switches to assign a unique input point for programming or control by the system.

#### 2.14 RELAYS

- A. Relays required for control (i.e., Air Handler shutdown, Supply Fan shutdown, Exhaust Fan shutdown, Fan Terminal Box shutdown, Door Lock release, Fire Shutter release, Smoke Damper closure, Fire Damper closure, Smoke/Fire Damper closure, or any other interface required by these specifications or applicable codes) shall be UL Listed relays suitable for use in Fire Alarm systems.
- B. Per NFPA, relays used for control of other systems shall be located within 3 feet of the device to be controlled.
- C. Relays shall be analog addressable devices powered and controlled from the fire alarm system. Each relay shall contain address switches to assign a unique input point for programming or control by the system.
- D. Each relay shall provide at least one set of Form "C" dry relay contacts.

#### 2.15 AUDIBLE NOTIFICATION DEVICES

- A. Audible notification devices shall be wall mounted at each location designated on the drawings and/or as specified herein.
- B. The audible notification device shall include screw terminals for in-out field wiring. The device shall surface mount to a standard 4-inch sq. x 2 -1/8-inch backbox.
- C. The audible notification devices shall be UL listed for fire protective service and shall provide 24 VDC inputs and sound output of not less than 75 dBA at 10 feet, or more than 120 dBA at the minimum hearing distance from the audible appliance.
  - 1. Audible notification device shall be compliant with ANSI S3.41 for signal character conformance.
- D. Audible notification devices located on the exterior of a building, or in a damp or wet location, shall be a weatherproof version and rated, by the manufacturer, for use in wet locations.

#### 2.16 AUDIBLE/VISUAL NOTIFICATION DEVICES

- A. Audible/visual notification devices shall be wall mounted at each location designated on the drawings and/or as specified herein.
- B. Audible/visual notification device shall include screw terminals for in-out field wiring. The device shall surface mount to a standard 4-inch sq. x 2 -1/8-inch backbox.
- C. Audible portion of the audible/visual notification devices shall be UL listed for fire protective service and shall provide 24 VDC inputs and sound output of not less than 75 dBA at 10 feet, or more than 120 dBA at the minimum hearing distance from the audible appliance.
  - 1. Audible portion of the audible/visual notification device shall be compliant with ANSI S3.41 for signal character conformance.

- D. Audible portion of audible/visual notification devices located on the exterior of a building, or in a damp or wet location, shall be a weatherproof version and rated, by the manufacturer, for use in wet locations.
- E. Visual portion of the audible/visual notification devices shall comply with the Americans with Disabilities Act which includes the following:
  - 1. Lamp shall be a xenon strobe type or equivalent.
  - 2. Color shall be clear or nominal white (i.e., unfiltered, or clear filtered white light).
  - 3. Maximum pulse duration shall be two-tenths of one second (0.2 sec) with a maximum duty cycle of 40 percent. Pulse duration is defined as the time interval between initial and final points of 10 percent of maximum signal.
  - 4. Intensity shall be a minimum of 75 candela. Use of visual devices rated at 15/75, 15 or 30 candelas shall not be acceptable.
  - 5. Flash rate shall be a minimum of 1 Hz and a maximum of 3 Hz.
  - 6. More than two visible notification appliances in the same room or adjacent space within the field of view must flash in synchronization. This requirement shall not preclude synchronization of appliances that are not within the same field of view.
- F. A suitable polycarbonate cover shall be provided to protect devices at locations where they may be subject to damage such as Gymnasiums.

#### 2.17 VISUAL NOTIFICATION DEVICES

- A. Visual notification devices shall be wall mounted at each location designated on the drawings and/or as specified herein. Visual notification devices shall be of the flashing type in compliance with Americans with Disabilities Act.
- B. Visual notification devices shall comply with the Americans with Disabilities Act which includes the following:
  - 1. Lamp shall be a xenon strobe type or equivalent.
  - 2. Color shall be clear or nominal white (i.e., unfiltered, or clear filtered white light).
  - 3. Maximum pulse duration shall be two-tenths of one second (0.2 sec) with a maximum duty cycle of 40 percent. Pulse duration is defined as the time interval between initial and final points of 10 percent of maximum signal.
  - 4. Intensity shall be a minimum of 75 candela. The use of visual devices rated at 15/75, 15 or 30 candelas shall not be acceptable.
  - 5. Flash rate shall be a minimum of 1 Hz and a maximum of 3 Hz.
  - 6. Fire alarm system strobes within same room shall flash in synchronization as required by NFPA.
  - 7. More than two visible notification appliances in the same room or adjacent space within the field of view must flash in synchronization. This requirement shall not preclude synchronization of appliances that are not within the same field of view.
- C. A suitable polycarbonate cover shall be provided to protect devices at locations where they may be subject to damage such as Gymnasiums.

#### 2.18 VOICE EVACUATION SPEAKER/VISUAL NOTIFICATION DEVICES

- A. Speaker/visual notification devices shall be wall/ceiling mounted at each location designated on the drawings and/or as specified herein.
- B. Audible/visual notification device shall include screw terminals for in-out field wiring. The device shall surface mount to a standard 4-inch sq. x 2 -1/8-inch backbox.
- C. Speaker portion of the speaker/visual notification devices shall be UL listed for fire protective service and shall provide 25 VMS or 70VMS inputs and sound output of not less than 85 dBA at 10 feet.

1. Speaker shall be field configurable with taps at  $\frac{1}{4}$ ,  $\frac{1}{2}$ , 1, or 2 watts.
  2. Speaker shall have a frequency response: 250 to 5000 Hz.
  3. Speaker shall have a sealed back construction.
  4. Speaker shall include a DC blocking capacitor to allow electrical supervision of the audio distribution circuit.
  5. Speaker installation shall meet all UL 1480 standards for Fire Alarm.
- D. Visual portion of the audible/visual notification devices shall comply with the Americans with Disabilities Act which includes the following:
1. Lamp shall be a xenon strobe type or equivalent.
  2. Color shall be clear or nominal white (i.e., unfiltered, or clear filtered white light).
  3. Maximum pulse duration shall be two-tenths of one second (0.2 sec) with a maximum duty cycle of 40 percent. Pulse duration is defined as the time interval between initial and final points of 10 percent of maximum signal.
  4. Intensity shall be a minimum of 75 candela. Use of visual devices rated at 15/75, 15 or 30 candelas shall not be acceptable.
  5. Flash rate shall be a minimum of 1 Hz and a maximum of 3 Hz.
- E. More than two visible notification appliances in the same room or adjacent space within the field of view must flash in synchronization. This requirement shall not preclude synchronization of appliances that are not within the same field of view.
- F. A suitable polycarbonate cover shall be provided to protect devices at locations where they may be subject to damage such as Gymnasiums.

#### 2.19 ELEVATOR WARNING LIGHT WITH FLASHER

- A. Provide complete, indicating light with flasher per FAC 69A-47. Install label as required.

#### 2.20 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 un-slotted 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.

#### 2.21 PULL STATION SECURITY COVER

- A. Provide where pull station devices are required to be protected as indicated on the drawings.
- B. Shall be UL Listed.
- C. Constructed of clear polycarbonate.
- D. Provide with battery operated warning horn.
- E. For flush or surface mount devices.
- F. Provide with weather gasket.
- G. Spacers for additional depth as required.

- H. Provide with tamper proof screws.
- I. Design criteria:
  - 1. Safety Technology International, Inc. #1100 Series.

## 2.22 DOOR HOLDERS

- A. Electromagnetic door holder/releases shall be installed on each door as detailed on the drawings and/or as specified herein. Holder/releases shall consist of wall mounted and floor mounted electromagnets and a door mounted armature with an adjustable contact plate. Electromagnets shall have a force of attraction of 24 pounds when energized and less than 3 pounds residual power disconnected. Armature contact plates shall have a horizontal adjustment of 25 degrees. The holding force of holder/releases shall be totally electromagnetic and without the use of mechanical linkage or other moving parts, and they shall normally be energized, and a release accomplished, by interrupting the circuit. Electromagnetic holder/releases shall be controlled by either automatic or manual alarm. Operating voltage shall be 24-volt DC.
- B. Electromagnetic door holder/releases, where required, to be supplied and installed by the Contractor and wired into fire alarm system by systems contractor. Electromagnetic holder/releases shall be controlled by either automatic or manual alarm. Operating voltage shall be 24-volt DC.

## 2.23 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  $\mu$ s waveform, 500A per line with 10 x 700  $\mu$ s waveform.
  - 6. Clamp Voltage: 150% of circuit peak operating voltage with 100-amp 10 x 700  $\mu$ 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  $\mu$ s waveform, 500A per line with 10 x 700  $\mu$ s waveform.
  - 6. Clamp Voltage: 150% of circuit peak operating voltage with 100-amp 10 x 700  $\mu$ 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.

St. Johns County School District  
K-8 School "OO"

4. Fail short/fail safe.
  5. Surge Capacity: 5KA with 8 x 20  $\mu$ s waveform.
  6. Clamp Voltage: 150% of circuit peak operating voltage with 100-amp 10 x 700  $\mu$ 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. 15 amp, 120V rated.
  3. Suppressors shall be tested per IEEE, C62.41-1991 for Categories A and B.
  4. Normal mode (L-N), and common mode (L+N-G) protection.
  5. Internal fusing.
  6. Hybrid design.
  7. Indicators for normal operation and failure indication.
  8. Enclosure:
    - a. Fire retardant high impact, phenolic or plastic housing or metal enclosure.
  9. Clamping voltage UL 1449, Line to Neutral, Category B Impulse At (3KA, 8 x 20  $\mu$ s): 385V @ 120V.
  10. Maximum Surge Capacity: 20,000 amps.
  11. Maximum Continuous Operating Voltage: 115% of line voltage.
  12. Provide hardwire connection or add 15-amp receptacle device to hardwired devices to match equipment being protected and maintain UL listing.
  13. Provide additional 15 amp in-line fusing as required to comply with UL and the NEC when connected to a 20 amp, 120V circuit.
  14. Manufacturers:
    - a. Leviton #51020-WM (hardwired).
    - b. EDCO #HSP-121BL2.
- E. 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.
- F. Terminal Cabinets:
1. Provide terminal cabinets for all terminations and surge suppression equipment including 120VAC power surge suppressor as required in Section Surge Protection Devices. Size terminal cabinets as required to facilitate installation of terminations and surge suppression in a neat and workmanlike manner.
  2. Terminal cabinet to meet specifications in Section Cabinets and Enclosures unless specifically manufactured for use.
  3. Manufacturers:
    - a. Interior.
      - i. Square "D"
      - ii. Hoffman
      - iii. BUD
    - b. Exterior.
      - i. Hoffman
      - ii. BUD
      - iii. Carlon

## 2.24 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 interior, exterior and/or underground raceways shall comply with the applicable sections of NEC Articles 760, 770 and 800.
- C. Zip and zip type cables (e.g., West Penn 970, 971, 972, 974 or similarly constructed cables from other manufacturers) shall not be acceptable.
- D. Wiring color code shall be as follows:
  - 1. Horns/Strobes                      Black/Red
  - 2. Door Holders                        White
  - 3. A.H.S.D.                              Purple
  - 4. Gas Shut-Off Pull Stations        Orange
  - 5. Addressable                         Twisted Pair Data Wire
  - 6. Hard-Wired                         Brown/Blue
  - 7. Speaker                               Twisted Pair Audio Wire

## 2.25 WATERFLOW DETECTOR

- A. Water flow switch to be supplied and installed by the mechanical contractor and wired in to Fire Alarm System by systems contractor. Zone as shown on zone schedule.

## 2.26 SPRINKLER SUPERVISORY SWITCHES

- A. Supervisory Switch to be supplied and installed by mechanical contractor and wired in to Fire Alarm System by systems contractor. Zone as shown on zone schedule.

## PART 3- EXECUTION

### 3.1 INSTALLATION

- A. 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. Firestopping where penetrations are made through rated walls and floors shall be required. Firestopping is to be performed under Division 7 Section Firestopping.
- B. Locate, install, and test fire alarm and detection systems in accordance with the equipment manufacturer's written instructions, and the latest editions of the National Electrical Code, the National Electrical Contractor's Association publication "Standard of Installation" and all applicable codes and standards referenced in this specification.



- C. 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.
- D. Provide wiring, cabling, raceways, and electrical boxes in accordance with manufacturer's written instructions.
- E. Components shall be electrically "burned-in" by operating the component at full power for a period as recommended by the manufacturer.
- F. Installation shall be done in a neat workmanlike fashion by a firm regularly engaged in Fire Alarm Installation and Service.
- G. 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.
- H. 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.
- I. 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.
- J. 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.
- C. Provide supporting devices per Section Conduit.
- D. Identify raceways and boxes per Section Identification for Electrical Systems.

### 3.3 WIRE/CABLE

- A. Conductor: 98% conductivity, stranded copper with maximum of 19 strands. Stranded conductors shall have a compression lug installed at every end. Wrapping twisted strands at terminal block screw is not acceptable. As an acceptable equivalent, stranded conductors without crimp-on lugs may be terminated into terminal strips of box-lug connectors. SLC loops may utilize solid conductors.
- B. Insulation: A type accepted by NEC for the application. 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. All multi-conductor cables shall have individually insulated conductors with an overall outer jacket.

- C. Size: All conductors shall be sized as prescribed by the system manufacturer, with following minimums:
  - 1. Multiplex Signaling Line Circuit: AWG #14, solid twisted pair.
  - 2. Notification Circuits, Devices: AWG #14 THHN/THWN stranded conductors.
  - 3. Initiating Circuits, Hard-Wired Devices: AWG #14 THHN/THWN stranded conductors.
  - 4. Initiating Circuits, Addressable Devices: AWG #16 twisted pair.
  - 5. Speaker Notification Circuits: AWG #16 twisted pair.
  - 6. Provide larger conductors where required to maintain voltage drop or signal strength within acceptable limits.
  - 7. Multiplex signal line circuits and addressable circuits shall be either shielded or unshielded based on equipment manufacturer's recommendations for specific application.
- 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.
- F. 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 760.179(I). Provide Type FPL.
- G. 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.
- H. 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 located 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, 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 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 N.E.C. 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 fail-safe 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.

### 3.11 GAS/FUEL SHUT-OFFS

- A. Whether shown on drawings or not provide gas/fuel shut-off systems for each and every gas/fuel supply as required by the applicable codes and standards.

### 3.12 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, 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 hoist way. An accepted fixed

temperature (135 degrees F.) heat detector shall be installed in the elevator machine room, elevator pit, and elevator hoist way 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 hoist way or machine room shall not disconnect the main power supply. The sprinkler head located in the elevator machine room and elevator hoist way shall have an activation temperature greater than the accepted fixed temperature heat detector.

- C. In addition to the requirements of ANSI A17.1, Rule 2.27.3.2.1, an accepted smoke detector(s) shall be installed in the elevator hoist way, and the machine room meeting the requirements of Rule 69A-47.008. The activation of the smoke detector(s) in the machine room or the elevator hoist way shall cause a suitable warning light to flash. The light is to be located adjacent to the "phase one" recall switch required by ANSI A17.1 Rule 2.27.3.1 (2004) or elevator hall button. The warning light shall be red, and a minimum diameter of 1/8 inch. A sign shall be incorporated with or adjacent to the light and contain the following wording "DO NOT USE ELEVATOR". The minimum size for the letters on the sign shall be 1/8 inch. Provide supervised fire alarm system wiring and power to elevator warning lights. Lights shall function per elevator bank. Provide and install light at first floor and alternate floor as directed by Authority Having Jurisdiction.
- D. Provide detectors with auxiliary relay complete with tie into elevator controller as required by all codes or provide separate zone.

### 3.13 CABLE IDENTIFICATION

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

### 3.14 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 Surge Suppression Equipment Contractor to assure that surge suppression for 120VAC 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 Section Grounding and Bonding 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 Surge Protection Devices Contractor to assure that 120VAC 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 Building Wire and Cable. 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, splices, 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.

### 3.15 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.

### 3.16 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.

### 3.17 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, Test Methods.
- B. Perform a complete, functional, component by component test of the entire fire alarm and detection system. 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. Perform a sensitivity test of all smoke detectors and duct detectors. Perform a calibration/test of heat sensors.
- D. Demonstrate the proper operation of each component as follows:
  - 1. 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, Speaker, 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.
- E. Demonstrate the supervisory function at each device loop circuit, and at all single component wiring runs such as for the sprinkler valve supervisory switches.

### 3.18 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, 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 completion of the installation and testing provide NFPA 72, Record of Completion Form to the Owner.
- C. 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.

### 3.19 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.

### 3.20 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 7 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.

END OF SECTION