

SECTION 283100 – FIRE ALARM AND MASS NOTIFICATION SYSTEM

PART 1 - GENERAL

1.1 SCOPE

- A. The Contractor shall furnish and install a complete low voltage, automatic and manual fire alarm system as specified herein and indicated on the drawings.
- B. The system shall include a central control panel, power supply, signal initiating devices, audible and visual alarm devices, a conduit and wiring system and all necessary accessories required to provide a complete operating system.
- C. The system shall be completely addressable.
- D. The system shall be dual listed for Fire Alarm and Mass Notification.
- E. The system shall comply with the applicable provisions of the National Fire Protection Association Standard Number 72 (National Fire Alarm Code) for fire alarm systems; N.E.C. Article 760; and meet all requirements of the local authorities having jurisdiction.
- F. The system shall be provided by a local service organization located within 50 miles of the job site.

1.2 DESCRIPTION OF SYSTEM

- A. Conduit, outlet boxes, cabinets, devices and wiring installation for complete fire detection and alarm system.
- B. Each and every item of the Fire Alarm System shall be listed as a product of a SINGLE fire alarm system manufacturer under the appropriate category by Underwriter's Laboratories, Inc. (UL), and shall bear the "UL" label. All control equipment shall be listed under UL category UOBZ as a single control unit. Partial listing shall not be acceptable. System controls shall be UL listed for Power Limited Applications per N.E.C. Article 760. All circuits shall be marked in accordance with N.E.C. 760-23.
- C. Wiring shown is diagrammatic to define system and is not intended to show every wire. Review drawings prior to bidding and inform Contractor of any additional wiring necessary for installation of systems. Wiring shall comply with pathway survivability requirements defined in NFPA 72. Include cost of all wiring in bid.
- D. After completion of work, submit one set of record mylar sepias with items for Owner described above. Typical type drawings will not be accepted.
- E. Manufacturer's trained technical representative shall supervise installation, connections and tests. The authority having jurisdiction shall be notified prior to installation or alteration of equipment or wiring. Before acceptance, manufacturer's representative will test and certify in writing that system is installed and functioning properly as intended by drawings and specifications. Test includes operation of all devices in entire system.
- F. Guarantee entire system in writing for one year from date of acceptance by Owner. Guarantee will cover completely all components, equipment, wiring, etc. Repair any defects found in the system within the guarantee period without cost to owner.

- G. Submit with bid a guaranteed price for complete maintenance and service of system for one year beginning at expiration of guarantee period. Price shall be guaranteed for acceptance by Owner until date of substantial completion of system.

1.3 SUBMITTALS

- A. Submit complete shop drawings of system for review per minimum requirements of NFPA 72 and local AHJ including the following:
 - B. Product data cutsheets for all propose equipment with complete descriptive information on each item of equipment including UL listing for all system components
 - C. Fire alarm NICET designer information and fire alarm contractor permit information
 - D. Legend, notes, sheet index, wiring schedule
 - E. To-scale floor plans showing all devices and room names
 - F. Terminal-to-terminal connection diagrams for system components and associated equipment interfaces. Identify color code and terminal numbers on shop drawings.
 - G. System input/output matrix
 - H. Unique device identification numbers
 - I. Conduit diagrams
 - J. Battery calculations and voltage drop calculations
 - K. Typical device installation details
 - L. Any other information required by Architect to describe system.

1.4 SYSTEM OPERATION

- A. Actuation of any alarm initiating device shall cause all audible alarm signals to sound, all visual indicating appliances to flash, activate an alarm LED and local tone-alert at control panel/annunciator, cause an LCD read-out of point in alarm including type of alarm (smoke detector, manual station, etc.), provide a signal to the mechanical controls to shut down or re-route air handling systems according to established plans. This shall include a suitable addressable relay at each air handling unit to shut down all air handlers in a given zone when system goes into alarm.
- B. The general alarm devices may be silenced by authorized personnel only, by entering a locked cabinet and operating the proper silencing switch. A subsequent zone alarm shall reactivate the signals. Operation of the silencing switch shall be indicated by a trouble light and audible signal.
- C. Operation of any sprinkler monitoring switch, power failure, opens, grounds, or any disarrangement of the system wiring or components shall be indicated by a visual and audible trouble signal. The audible trouble signal may be silenced; however, the trouble LED shall remain lit until the system has been returned to normal operating condition.
- D. Analog Smoke Sensor Operation
 - 1. The smoke sensor shall be a smoke density measuring device having no self contained alarm set-point. The alarm decision for each sensor shall be determined by the control

- panel. The control panel shall determine the condition of each sensor by comparing the sensor value to stored values.
2. The control panel shall maintain a moving average of the sensors smoke chamber value. Systems that do not automatically maintain a constant smoke obscuration sensitivity for each sensor by compensating for environmental factors and are deemed unacceptable.
 3. The system shall automatically indicate when an individual sensor needs cleaning. When a sensor's average value reaches a predetermined value, a "Dirty Sensor" trouble condition shall be audibly and visually indicated at the control panel for the individual sensor. Additionally, the LED on the sensor base shall glow steady giving a visible indication at the sensor location.
 4. If a "Dirty Sensor" is left unattended, and its average value increases to a second predetermined value, an "Excessively Dirty Sensor" trouble condition shall be indicated at the control panel for the individual sensor.
 5. The control panel shall automatically perform a daily self-test on each sensor. Checking the electronics in the sensor's base ensures the accuracy of the values being transmitted to the control panel. A sensor which fails the self-test will cause a "Self Test Abnormal" trouble condition at the control panel. A sensor self-test which must be manually initiated by the operator shall not be acceptable.

1.5 SYSTEM FEATURES

A. The fire alarm system shall include the following features as a minimum:

1. Supervision of all field wiring.
2. Microprocessor based solid state modular construction.
3. Ground fault detection and ground fault isolating & supervising circuitry.
4. 80 character LCD display to indicate alarms, supervisory service conditions and troubles.
5. Simultaneous test of all LED's and LCD's from a central point.
6. "Dead Front" design control panel/annunciator with field programmable LED alarm, status and trouble indicators, and all control switches located behind a locked tempered glass door.
7. Fully automatic battery charger and lead alkaline batteries. Batteries shall have capacity to maintain system operation for 24 hours in normal supervisory mode and shall have sufficient capacity remaining to operate in alarm mode for 15 minutes at conclusion of supervisory period. Batteries shall be supervised for connection to the system and for low voltage threshold. Ammeter and voltmeter shall be provided to indicate battery voltage and charging current.
8. Two (2) sets of 2 amp form C auxiliary alarm contacts fused with feedback.
9. One (1) set of 2 amp form C auxiliary trouble contacts.
10. Standard with 127 addressable points (expandable to 508 points) and four input/output (I/O) circuits (expandable to 20 circuits).
11. Basic four (4) amp power supply (expandable as required).
12. 600 event historical logging.
13. System shall be field programmable for offsite monitoring by remote station reverse polarity, local energy master box or shunt master box types.
14. System shall be field programmable for signal circuit type of operation; march time code, temporal code, selective code, zone code, general alarm, time limit cutout and alarm silence inhibit.
15. System shall be field programmable for waterflow/sprinkler supervisory operation on distinct zones as required.
16. Transient suppression protection shall be provided on the system power supply and on the municipal protection circuit to comply with UL 864 requirements. Additionally, surge suppression shall be provided within the control panel on all circuits that extend outside the building (including to roof-mounted HVAC units).
17. Supervised remote annunciator connection circuit.
18. System shall incorporate an alarm/trouble walk test.

19. Resident non-volatile programmable operating system memory for all operating requirements.
- B. Control panel shall be furnished with one-way voice communication and tone generating capabilities.
 1. A central audio control shall be provided for the necessary alarm message/tone generation, main and remote microphone connections and mixer/pre-amplifier circuits. Continuous supervision shall be provided. Audio outputs shall have individual gain control.
 2. A hand held, push-to-talk microphone shall be provided recessed within a protective panel mounted enclosure. The microphone shall be a dynamic communication type with a frequency range of 200HZ to 4000Hz and shall be equipped with a self-winding five foot coiled cable. An LED indicator shall be provided to indicate microphone push-to-talk button has been pressed and speaker circuits are ready for transmission. Microphone shall be supervised from disconnection.
 3. An audio control switch module shall be furnished to provide manual switches to the audio functions. Switches and associated LED indicators shall be supervised for disarrangement or failure.
 4. Audio power amplifiers shall be furnished with self-contained filtered 24VDC power supply, transformer and amplifier monitor circuits. Amplifiers shall provide a 25VRMS output with a frequency response of 120 Hz to 12KHz. Provide a sufficient quantity of amplifiers to operate all system speakers simultaneously plus ten (10) percent space capacity. Amplifiers shall be sized to accommodate all speakers tapped at two watts. Provide one (1) back-up amplifier capable of automatically replacing any failed amplifier.
 5. Speaker circuits shall be supplied which are capable of supplying audio signals at 25VRMS supplied by the system amplifiers. Supervision for open, short or ground fault conditions shall be provided. Individual and distinct trouble indications shall be provided for each fault.
 6. Digitized tones for alarm or auxiliary requirements shall be provided.
 7. A remote microphone/annunciator (LCD type) command location as shown on plans shall be provided to duplicate the manual voice transmission capability of the fire alarm control panel.
 8. The system shall be configured to allow selective voice paging. If any manual control switches are activated, the control panel operator shall be able to make announcements via the paging microphone over the pre-selected speakers. Facility for total building evacuation and paging shall be provided to allow for activation of speakers. This shall be accomplished by an "All Call" switch.

PART 2 - PRODUCTS

2.1 FIRE ALARM CONTROL PANELS/ANNUNCIATORS

- A. Furnish and install Simplex type 4020-9101 fire alarm control panel(s) with options and accessories as required.

2.2 MANUAL ALARM STATIONS

- A. Manual alarm stations shall be Simplex addressable type 4099-9002 break glass (double-action). The station body shall be so constructed that chips and scratches will not expose metal. All stations shall be master keyed with the control equipment. When actuated, the "Pull Lever" shall remain at right angle to the station body until reset.
- B. Boxes:

1. Recessed, two-gang outlet boxes with Simplex type 2099-9813 red, semi-flush trim plates shall be used where possible.
2. Where surface-mount outlet boxes are required, boxes shall be red, cast aluminum Simplex type 2975-9022.

2.3 PHOTOELECTRIC SMOKE SENSOR

- A. The smoke sensors shall be of the photoelectric addressable Simplex type 4098-9714 and shall communicate actual smoke chamber values to the system control panel. The smoke sensors shall operate on the light scatter principle. For maximum maintenance free service and low power requirement, light source for detection chamber and visual alarm indication shall be solid state photodiode.
- B. Each sensor base shall be visually and electrically supervised.
- C. The sensors shall be listed to UL Standard 268 and shall be documented compatible with the control equipment to which they are connected. The sensors shall be listed for both ceiling and wall mount applications.
- D. Each sensor base shall contain integral addressable electronics and an LED that will flash each time it is scanned by the control panel (once every 4 seconds). The control panel shall be responsible for drift compensation. When the control panel determines that a sensor is in an alarm or a trouble condition, the control panel shall command the LED on that sensor's base to turn on steady indicating the abnormal condition. Sensors which do not provide a visible indication of an abnormal condition at the sensor location shall not be acceptable. Sensor bases shall be compatible with detachable photoelectric, ionization and heat sensors so that these various sensor types can be easily interchanged to meet specific location requirements. Sensor base shall be addressable type as required.
- E. Where required, sensor bases shall be provided with a relay driver output and supervised relay, which are to be controlled either automatically or manually from the control panel.
- F. Each sensor base shall be scanned by the control panel for its type identification to prevent inadvertent substitution of the wrong sensor type. The control panel shall operate with the installed device but shall initiate a "Wrong Device" trouble condition until the proper type is installed or the programmed sensor type is changed.
- G. Each sensor shall contain a magnetically actuated test switch to provide for easy alarm testing at the sensor location.
- H. The sensor's electronics shall be immune from false alarms caused by EMI and RFI.
- I. Cover all smoke detection devices with plastic bags immediately after installation to maintain cleanliness, if field conditions so require.
- J. Provide a U.L. listed sensor guard for sensors in areas subject to tampering. The guard shall be suitable for ceiling or sidewall mounting and hinged for easy access. The guard shall be securely mounted with tamper-proof screws.

2.4 PHOTOELECTRIC DUCT DETECTOR

- A. The detector shall be an addressable, non-polarized 24VDC, Simplex type 4098-9755, which is compatible with the Fire Alarm Control Panel and obtains its operating power from the supervisory current in the fire alarm detection loop. It shall be of the same analog type as the ceiling smoke detectors. Detectors shall be of the solid state photoelectric type and shall operate on the light scattering, photodiode principle. To minimize nuisance alarms, detectors

shall have an insect screen and be designed to ignore invisible airborne particles or smoke densities that are below the factory set alarm point. No radioactive material shall be used.

- B. The detector head shall be directly interchangeable with an ionization detector type. The 24VDC detector may be reset by actuating the control panel reset switch.
- C. Detector construction shall have a mounting base with a twist-lock detecting head that is lockable. The locking feature must be field removable when not required. Contact between the base and head shall be of the bifurcated type utilizing spring type, self-wiping contacts. Removal of the detector head shall interrupt the supervisory circuit of the fire alarm detection loop and cause a trouble signal at the control panel.
- D. Sampling tubes sized to match duct size as recommended by equipment manufacturer shall be provided with duct detectors as required.
- E. Detector design shall provide compatibility with other normally open fire alarm detection loop devices (heat detectors, pull stations, etc.). It shall be possible to alarm the duct housing by using a test switch. For maintenance purposes, it shall be possible to clean the duct housing sampling tubes by accessing them through the duct housings front cover.
- F. To minimize false alarms, voltage and RF transient suppression techniques shall be employed as-well-as smoke signal verification circuit and an insect screen.
- G. Separate auxiliary SPDT relays for fan shutdown shall be provided with each duct detector for fan shutdown, smoke evacuation or other purposes as indicated on plans.
- H. Remote key operated test stations with LED alarm indicators shall be installed in an accessible, inconspicuous location for each duct detector.
- I. Duct detectors shall be installed for the equipment as indicated on plans as follows (locations shown on plans are diagrammatical only):
 - 1. A minimum of six duct widths downstream from bends or inlets to avoid air turbulence.
 - 2. On the downstream side of filters to detect fires in the filters.
 - 3. In return ducts, ahead of mixing areas.
 - 4. Upstream of air humidifier and cooling coil.
 - 5. With accessibility for test and service.
- J. The following duct detector locations shall be avoided:
 - 1. Where dampers closed for comfort control would interfere with airflow.
 - 2. Next to outside air inlets (unless the intent is to monitor smoke entry from that area).
 - 3. In return air damper branch ducts and mixing areas where airflow may be restricted.
- K. Where duct detectors are installed in exterior or wet locations, weatherproof duct housing enclosures shall be provided to protect the detectors. Enclosures shall be located to be in shaded areas rather than direct sunlight. Entire installation shall be as directed by the equipment manufacturer.

2.5 HEAT SENSORS

- A. Heat sensors shall be U.L. listed, addressable Simplex type 4098-9733. They shall provide rate-of-rise temperature sensing, fixed temperature sensing (135 degrees F) and utility temperature sensing (32 degrees F to 155 degrees F range).
- B. Each sensor base shall be visually and electrically supervised.

- C. The sensors shall be listed to UL Standard 268 and shall be documented compatible with the control equipment to which they are connected. The sensors shall be listed for both ceiling and wall mount applications.
- D. Each sensor base shall contain integral addressable electronics and an LED that will flash each time it is scanned by the control panel (once every 4 seconds). The control panel shall be responsible for drift compensation. When the control panel determines that a sensor is in an alarm or a trouble condition, the control panel shall command the LED on that sensor's base to turn on steady indicating the abnormal condition. Sensors which do not provide a visible indication of an abnormal condition at the sensor location shall not be acceptable. Sensor bases shall be compatible with detachable photoelectric, ionization and heat sensors so that these various sensor types can be easily interchanged to meet specific location requirements. Sensor base shall be addressable type as required.
- E. Where required, sensor bases shall be provided with a relay driver output and supervised relay, which are to be controlled either automatically or manually from the control panel.
- F. Each sensor base shall be scanned by the control panel for its type identification to prevent inadvertent substitution of the wrong sensor type. The control panel shall operate with the installed device but shall initiate a "Wrong Device" trouble condition until the proper type is installed or the programmed sensor type is changed.
- G. Each sensor shall contain a magnetically actuated test switch to provide for easy alarm testing at the sensor location.
- H. The sensor's electronics shall be immune from false alarms caused by EMI and RFI.
- I. Heat sensor shall be automatically restorable.

2.6 MAGNETIC DOOR HOLDERS

- A. Provide Simplex type 2088 series magnetic door holders as required where shown on plans.

2.7 ALARM SIGNALS (AUDIBLE)

- A. Speakers:
 - 1. Alarm speakers shall be Simplex type 4902-9805. The speakers shall be polarized and shall be operated by 25VRMS. Each speaker assembly shall include separate wire leads for in/out wiring for each leg of the associated signal circuit. T-tapping of signal device conductors to signal circuit conductors shall NOT be accepted. Where speakers are shown as a combination audible-visual assembly, they shall be mounted as a combination unit in a single back box (4906 series). Speakers shall be capable of producing 88dB and shall be tapped for 2 watt connection.
- B. Devices required to be surface mounted shall be furnished with Simplex type 2975-9145 surface mounting box and 4905-9903 adaptor plate.
- C. Devices installed in areas subject to mechanical damage (ie. gymnasiums) shall be furnished with suitable wire guards as indicated on plans.

2.8 ALARM SIGNALS (VISUALS)

- A. Visual Flashing Lamps (Xenon Strobe):
 - 1. Furnish and install per plans and specs Simplex type 4904 series visible appliance for fire alarm system notification. The appliance shall be 1HZ synchronized (15cd, 30cd, 110cd)

with polar distribution or 75 cd illumination as required by the Americans with Disabilities Act (ADA). The appliance shall be U.L. listed to Standard 1971 and have a circumpolar light output allowing mounting in either vertical or horizontal positions or on the ceiling.

2. The light unit shall be of ABS polycarbonate and the lens of high grade, optical quality LEXAN. For optimized light distribution, the xenon flash tube shall be installed perpendicular to the appliance's back plane. A special compound reflector shall be utilized to maximize and best distribute the light pattern in key axis directions.
3. The effect of the illuminated visible appliance shall be observable in a circumpolar pattern. The visible appliance shall be labeled with the word "FIRE" in a contrasting color and the height of each character shall be a minimum of 5/8 inches. In its quiescent state, the word "ALERT" shall be visible.
4. Mounting heights of visual appliances shall in all respects comply with the Americans with Disabilities Act.
5. Visual indicating appliances shall be Simplex type 4904 series and comprised of a Xenon flashtube and be entirely solid state. These devices shall be U.L. listed and be capable of either ceiling or wall mounting. The LEXAN lens shall be pyramidal in shape to allow better visibility. Visual units shall be of the stand alone type.

2.9 REMOTE MICROPHONE/ANNUNCIATOR

- A. Where shown on the plans, provide and install an LCD annunciator. The annunciator(s) shall have a stainless steel finish and shall provide the same functionality as the main control panel front panel display. The annunciator shall communicate to the control panel over one twisted shielded pair of wire and operating power shall be 24VDC and be fused at the control panel. Point-wired annunciators will not be considered as equal.
- B. The serial annunciator shall provide a common alarm and trouble circuit consisting of:
 1. Control push-button switches – for alarm silence, trouble silence, system reset and manual evacuation duplicating the control panel switches. A key "enable" switch shall be provided to activate or deactivate the control switches.
 2. Tone Alert – Duplicates the control panel tone alert during alarm and trouble conditions.
 3. System trouble LED.
 4. Power on LED.
- C. To accommodate and facilitate job site changes the control switches shall have the capability to be programmed on site to provide for manual switch input operation other than their standard purpose.

2.10 SPRINKLER FLOW SWITCHES

- A. Sprinkler flow switches and supervisory switches are provided under another section of these specifications. This contractor shall be responsible for electrical connection of these devices to the fire alarm system.

2.11 SMOKE DAMPERS

- A. Smoke dampers are provided under another section. This contractor shall be responsible for supplying a source of power and connecting them to the fire alarm system to close on alarm.

2.12 SYSTEM RECORD DOCUMENT CABINET

- A. Furnish and install a documentation cabinet at the system control unit or other approved location. All final record documentation shall be stored in the cabinet. Cabinet shall be labeled as "SYSTEM RECORD DOCUMENTS". Cabinet shall include a 4 gigabyte digital flash drive

interface with USB connector loaded with a digital copy of all system documentation including shop drawings and product data.

2.13 OFF SITE MONITORING

- A. Furnish all material and labor to accomplish and coordinate with local company or fire department as necessary for off site monitoring of the Fire Alarm System. Transmission method(s) shall be as required by applicable codes and Authority Having Jurisdiction (AHJ). Off site monitoring shall be in operation prior to final acceptance. Exact type of off site monitoring (basic reporting or advanced reporting as described below) shall be provided by the contractor per the owner's direction.
- B. Furnish and install serial digital alarm communicating transmitter (DACT), capable of reporting specific alarm points to the central station. DACT shall be universal in that it can be utilized to either provide basic reporting (alarm, trouble, supervisory conditions) or more advanced reporting (point-to-point reporting of specific alarm conditions) DACT shall be mounted integral to or beside fire alarm control panel.

2.14 FIRE ALARM CABLING

- 1. All fire alarm cabling shall:
 - a. Have red outer insulation/jacket with ripcord.
 - b. Be listed and labeled for the intended use in Fire Alarm systems.
 - c. Where Level 2 or Level 3 pathway survivability is required by NFPA 72, cabling shall be 2-hour fire rated circuit integrity (CI) type.
 - d. Be manufactured by West Penn, Allied, Belden or Superior Essex.

2.15 FIRE ALARM SYSTEM MANUFACTURER

- A. All equipment shall be listed by UL. All panels and peripheral devices shall be the standard equipment of a single manufacturer and shall display the manufacturer's name on each component. Manufacturer's numbers specified in this section are those of Simplex Time Recorder Company to denote type, quality, material and desired operating features to be furnished.
- B. Equipment shall be as manufactured by Simplex, Notifier or EST.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Provide and install the system in accordance with the plans and specifications, all applicable codes and the manufacturer's recommendations.
- B. The contractor shall provide 120VAC power to all remote booster power supplies, control panels, transponder cabinets or other similar items as required. Where the project is provided with emergency power from an emergency generator, all power supplies shall be connected to an emergency source. Dedicated branch circuit(s) shall be provided to supply primary power to the fire alarm system. The associated branch circuit breakers shall be furnished with lock-on hardware and shall be identified with red marking as a fire alarm circuit. The location of the circuit disconnecting means shall be permanently identified at the fire alarm control unit.

- C. All wiring shall be installed in strict compliance with all the provisions of NEC - Article 760 Parts I and III, Power-Limited Fire Protective Signaling Circuits or if required may be reclassified as non-power limited and wired in accordance with NEC-Article 760 Parts I and II.
- D. All wiring shall be installed in strict compliance with pathway survivability requirements of applicable codes including NFPA 72.
- E. Upon completion, the contractor shall so certify in writing to the owner and general contractor.
- F. Front surface of all junction box covers in concealed areas (such as above lay-in ceilings) or within mechanical/electrical rooms (and other similar areas where appearance of boxes is not an issue) shall be sprayed red and labeled "Fire Alarm" or "F/A". Covers in exposed areas shall be labeled "F/A" on interior of front cover. Wiring color code shall be maintained throughout the installation.
- G. All fire alarm wiring shall be installed in conduit. Conduit shall be sized per manufacturer's recommendations, but in no case shall conduit be smaller than 3/4".
- H. Installation of equipment and devices that pertain to other work in the contract shall be closely coordinated with the appropriate subcontractors.
- I. All raceways shall be concealed unless specifically shown or approved otherwise.
- J. The contractor shall clean all dirt and debris from the inside and the outside of the fire alarm equipment after completion of the installation.
- K. Install System Record Document cabinet adjacent to control panel unless alternate location is approved.
- L. The manufacturer's authorized representative shall provide on-site supervision of installation and shall provide all system setup and programming services.
- M. The manufacturer's authorized representative shall have as a minimum, a NICET LEVEL III certification. The fire alarm contractor shall have a technician with a minimum Nicet Level III certification working in a position of responsibility. All technicians working for the certified contractor shall have a minimum Nicet Level II certification. Any fire alarm contractor wishing to bid on the fire alarm work shall show evidence of certifications at the pre-bid conference.
- N. The fire alarm contractor shall be licensed as a certified fire alarm contractor by the state in which the work is to be performed in compliance with all requirements of state fire marshal or other AHJ's as applicable.
- O. The drawing/specifications included herein are to indicate contract intent only. The Fire Alarm contractor shall provide final design documents to include plans specifying exact device types/locations, circuitry, battery calculations, circuit/voltage drop calculations, etc. in accordance with all applicable code requirements. These final design documents shall be prepared under the supervision of an engineer licensed in the state where the work is to be performed, engaged/employed by the Fire Alarm contractor, and must bear the engineer's licensure seal with signature and date.

3.2 TESTING

- A. The completed fire alarm system shall be fully tested in accordance with NFPA-72H by the contractor in the presence of the owner's representative and the Local Fire Marshal. Upon completion of a successful test, the contractor shall so certify in writing to the owner and general contractor, and shall submit final testing results with O&M documentation..

- B. The contractor shall test and demonstrate proper operation of all smoke detection equipment and associated HVAC controls to the satisfaction of the authority-having-jurisdiction and fire marshal.

3.3 WARRANTY

- A. The contractor shall warrant the completed fire alarm system wiring and equipment to be free from inherent mechanical and electrical defects for a period of one (1) year from the date of the completed and certified test or from the date of first beneficial use.
- B. The equipment manufacturer shall make available to the owner a maintenance contract proposal to provide a minimum of two (2) inspections and tests per year in compliance with NFPA-72H guidelines.

3.4 CERTIFICATION & ACCEPTANCE

- A. A factory trained representative of the manufacturer shall supervise final testing of the system in accordance with N.F.P.A. Standard 72H-1984 in the presence of a representative of the authority having jurisdiction. Manufacturer's representative shall be NICET trained and shall have a level III NICET certificate. It shall be subject to the approval and acceptance of the responsible engineer. On completion of the acceptance tests, the Owner or his representative shall be instructed in the operation and testing of the system.
- B. The fire alarm system shall be free from defects in workmanship and materials, under normal use and service, for a period of one year from the date of acceptance or beneficial occupancy whichever is earlier. Any equipment shown to be defective in workmanship or material shall be repaired, replaced, or adjusted free of charge.
- C. The equipment manufacturer shall be represented by a local service organization, and the name of this organization shall be furnished to the Architect and Owner. The service organization shall be located within 50 miles of the job site. The service organization shall furnish, gratis to the Owner, a one year maintenance warranty contract, effective from the date of final acceptance.

END OF SECTION 283100