

PART 1 - GENERAL

1.1 SUMMARY

- A. This specification covers the requirements for the materials, installation, programming and re-configuration of the existing Addressable Fire Alarm System.
- B. Furnish labor, equipment and materials to provide a complete addressable fire alarm system. System shall include initiating devices, notification appliances, control devices and monitoring as indicated on the drawings and as specified herein.

1.2 REFERENCES

- A. The equipment and installation shall comply with the current provisions of the following Codes and Standards:
 - 1. National Electric Code, Article 760.
 - 2. National Fire Protection Association Standards:
 - NFPA 72 National Fire Alarm Code
 - NFPA 101 Life Safety Code
 - 3. Local and State Building Codes.
 - 4. Local Authorities Having Jurisdiction.
 - 5. ULC, CSFM, BSA
 - 6. Underwriters Laboratories Inc.
- B. The system and all components shall be listed by Underwriters Laboratories Inc. for use in fire protective signaling system under the following standards as applicable:

UL 864/UOJZ, APOU	Control Units for Fire Protective Signaling Systems
UL 268	Smoke Detectors for Fire Protective Signaling Systems.
UL 268A	Smoke Detectors for Duct Applications.
UL 217	Smoke Detectors Single Station.
UL 521	Heat Detectors for Fire Protective Signaling Systems.
UL 228	Door Holders for Fire Protective Signaling Systems.
UL 464	Audible Signaling Appliances.
UL 1638	Visual Signaling Appliances.
UL 38	Manually Activated Signaling Boxes.
UL 346	Waterflow Indicators for Fire Protective Signaling Systems.
UL 1971	Standard for Signaling Devices for the Hearing Impaired.

UL 1481	Power Supplies for Fire Protective Signaling Systems.
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- C. Americans with Disabilities Act (ADA).
- D. International Standards Organization (ISO).
 - 1. ISO-9000.
 - 2. ISO-9001.

1.3 SUBMITTALS

- A. Provide submittals for products in accordance with Section 260000 - Electrical General Requirements and Division 1.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A factory authorized installer is to perform the work of this section.

1.5 WARRANTY AND SERVICE

- A. Warrant all components, parts and assemblies against defects in materials and workmanship for a period of 12 months from date of final completion. Warranty service shall be provided by a trained specialist of the equipment manufacturer. The specialist shall be based in a fully-staffed branch office located within a reasonable distance from the job site.
- B. Service availability: The supplier shall have sufficient stock on hand and have a fully equipped service organization capable of guaranteeing response time within 2 hours of service calls, 24 hours a day, 7 days a week to service completed systems.

PART 2 - PRODUCTS

2.1 GENERAL

- A. The existing building fire alarm system is the EST QuickStart.
- B. Equipment furnished for this project shall be new. Components and systems shall be designed for uninterrupted duty. Equipment, materials, accessories, devices, and other facilities covered by this specification or noted on contract drawings and installation specifications shall be the best suited for the intended use.
- C. Equipment provided shall be of a single manufacturer to insure absolute compatibility between the appliances and the control panel(s), and to insure that the application of the appliances are done in accordance with the single manufacturers' instructions.

Southcentral Foundation Fireweed Building Renovation

- D. If any equipment or device connected to the fire alarm system is provided by a different manufacturer, then that equipment shall be recognized as compatible by both manufacturers, and listed as such by Underwriters Laboratories.

2.2 ADDRESSABLE DETECTORS

A. General:

- 1. Each addressable detector shall include a sensor base containing a microprocessor control unit for scanning the sensor, analyzing the sensor output and communicating the sensor status to the FACP and a separate sensor containing the actual sensing instrumentation.

B. Sensor Bases

1. Standard Detector Mounting Base:

- a. Bases shall be listed for ceiling or wall mounting.
- b. Each sensor base shall contain a magnetically actuated test switch to provide for easy alarm testing at the sensor location.
- c. Each sensor base shall include a communication transmitter and receiver having a unique identification and capability for status reporting to the FACP. Device address shall be located in sensor base to eliminate false addressing when replacing sensors.

2. Detector Mounting Base with Unsupervised Wired Connection:

- a. Mounting bases with unsupervised wired connection shall have all the features of the standard sensor base and include a connection for a remote LED alarm indicator or unsupervised relay.

3. Supervised Relay Mounting Bases:

- a. Supervised relay mounting bases shall have all the features of the standard sensor base and include a two or four wire connection for supervised relay.
- b. In addition to supervised relay connection, supervised relay mounting bases shall have a wired connection for Remote LED Alarm Indicator or Unsupervised Relay.

4. In-Duct Mounting

- a. Where a smoke detector is required to be directly inserted into a low velocity duct, 4000 ft/min maximum air flow, 3 ft (0.91m) high x 3 ft (0.91m) wide maximum size, provide in-duct mounting base.
- b. Detector housing shall have visible LED indicator showing power and alarm status.

C. Sensors:

- 1. Fixed Temperature/Rate of Rise Heat Detector:

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- a. Fixed temperature/rate of rise heat detectors shall have a nominal fixed temperature alarm point rating of 135°F (57°C) and a rate-of-rise alarm point of 15°F (9°C) per minute. The heat detector shall be rated for ceiling installation at a minimum of 60 ft (18.3m) spacing on center.
- b. Simplex 4098-9714 Photoelectric Sensor.
2. Multi-sensor Detector:
 - a. Multi-sensor detectors shall include photoelectric and fixed temperature/rate of rise sensors within the same device. Sensing characteristics shall be the same as described for each standalone sensor detailed above.
- D. Duct Smoke Detector Housing:
 1. Provide smoke detector duct housing assemblies to accept a standard, relay or isolator detector mounting base and sensor. The housing shall protect the measuring chamber from damage and insects. The housing shall utilize an air exhaust tube and an air sampling inlet tube that extends into the duct air stream up to ten feet. Provide drilling templates and gaskets to facilitate locating and mounting the housing.
 2. Provide remote status/alarm LEDs and Remote Test Stations as shown on the plans or as required by the AHJ.

2.3 ADDRESSABLE MODULES

- A. General:
 1. Modules shall be capable of monitoring or controlling one or more system components that are not otherwise equipped for addressable communication. Modules shall be used for monitoring of waterflow, valve tamper, non-addressable devices, and for control of AHU systems.
 2. Addressable Modules shall be capable of mounting in a standard North American single gang box. Modules include cover plates to allow surface or flush mounting. Modules will receive their operating power from the signaling line circuit or a separate two wire pair running from an appropriate power supply, as required.
 3. Modules shall have a diagnostic LED visible on the finished cover plate. The LED shall flash to confirm communication.
 4. Modules shall be suitable for operation in the following environment:
 - a. Temperature: 32°F to 120°F (0°C to 49°C).
 - b. Humidity: 0-93% RH, non-condensing.
- B. Provide module styles and quantities as necessary to meet the design requirements:
 1. Individual Addressable Modules (IAM):
 2. Zone Adaptor Modules (ZAM)

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2.4 ADDRESSABLE MANUAL FIRE ALARM STATION

- A. The manual fire alarm station shall have a diagnostic LED visible from the front of the station without removing the cover. The led shall flash to indicate communication and go solid to indicate that the station has been activated.
- B. Manual fire alarm stations shall be suitable for operation in the following environment:
 - 1. Temperature: 32°F to 120°F (0°C to 49°C).
 - 2. Humidity: 0-93% RH, non-condensing.

2.5 NOTIFICATION APPLIANCES

- A. General:
 - 1. Strobe appliances or combination appliances with strobes shall be capable of providing the “Equivalent Facilitation” which is allowed under the Americans with Disabilities Act Accessibilities Guidelines (ADA(AG)), and shall be UL 1971, and ULC S526 Listed.
- B. Strobes:
 - 1. Strobes shall have white housing and shall mount in a standard North American single gang box.
 - 2. Strobes shall provide synchronized flash outputs. It shall be possible to field select strobe output of 15cd, 30cd, 75cd, or 110cd.
- C. Horn/Strobes:
 - 1. Horn/strobes shall have white housing and shall mount in a standard North American single gang box.
 - 2. Strobes shall provide synchronized flash outputs. It shall be possible to field select strobe output of 15cd, 30cd, 75cd, or 110cd.
 - 3. Horn shall have an audible output of 84 dBA at 10 ft. when measured in reverberation room per UL-464.
 - 4. Horn audible output shall be in a synchronized temporal pattern.

2.6 ANCILLARY DEVICES

- A. Multi Voltage Control Relays:
 - 1. Provide remote control relays connected to supervised ancillary circuits for control of fans, dampers, door releases, etc. Relay contact ratings shall be SPDT or DPDT and rated for 10 amperes at 115 Vac. A single relay may be energized from a voltage source of 24 Vdc, 24 Vac, 115 Vac, or 230 Vac. A red LED shall indicate the relay is energized. A metal enclosure shall be provided.

Southcentral Foundation Fireweed Building Renovation

2.7 ELECTROMAGNETIC DOOR HOLDERS

- A. Provide electromagnetic door holders with the following features.
 - 1. Flush mounted wall units or floor units as required by door and application.
 - 2. Silent operation.
 - 3. Minimum 20 lbf (89 N) holding force.
 - 4. 120V 60Hz operation.
 - 5. Finish shall be chrome.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The entire system shall be installed in a workmanlike manner in accordance with approved manufacturer's manuals and wiring diagrams. Furnish all conduit, wiring, outlet boxes, junction boxes, cabinets and similar devices necessary for the complete installation. All wiring shall be of the type recommended by the NEC, approved by local authorities having jurisdiction for the purpose.
- B. All penetration of floor slabs and fire walls shall be fire stopped in accordance with all local fire codes.
- C. All wiring shall be in metal raceways shared by no other system. Raceways shall be installed in accordance with Section 260533 – Raceways and Boxes for Electrical Systems.
- D. Field devices shall be installed in accordance with Section 260533 – Raceways and Boxes for Electrical Systems. Paint boxes and covers red.
- E. Install Conductors in accordance with Section 260519 – Low Voltage Electrical Power Conductors and Cables. All wires shall be landed on device terminals, or terminal strips or blocks, and shall be labeled and numbered at their terminations. All wiring shall be installed in a neat and workmanlike manner. Bundles of wiring shall be secured with self-locking nylon cable ties, not tape.
- F. Coordinate exact mounting locations with the reflected ceiling plans. Coordinate exact mounting heights with architectural elevations.
 - 1. Where field conditions (such as conflicts with other features, obstructions that violate the placement rules of the applicable Fire Code, and the like) make it necessary to relocate detectors from the positions shown on the plans, such relocations shall be made in strict accordance with the applicable Fire Code, and shall be made at no additional cost to the Owner.
 - 2. As far as possible within the rules of the applicable Fire Code, the final placement of exposed detectors shall present a uniform appearance.
- G. Adjust each detector in accordance with manufacturer's recommendations for the specific location and circumstance.

Southcentral Foundation Fireweed Building Renovation

- H. Coordinate installation of duct-mounted detectors with Division 23. Duct detectors shall be located in accordance with NFPA 72 and manufacturer's recommendation to the greatest extent practical. Proposed duct detector locations shall be submitted for approval prior to installation of any equipment. Submit duct detector differential pressure measurements to verify proper operation of duct detectors.
- I. Control relays shall be located within 3 feet of the device or circuit controlled in accordance with NFPA 72.
- J. Fire/Smoke Dampers: Coordinate connections to fire/smoke dampers with Division 23. See Section 200000 - Mechanical General Requirements. See Division 23 drawings for locations.

3.2 FIRE ALARM SYSTEM SEQUENCE OF OPERATION

- A. The system shall identify any off normal condition and log each condition into the system database as an event.
 - 1. The system shall automatically display on the control panel Liquid Crystal Display the first event of the highest priority by type. The priorities and types shall be alarm, supervisory, trouble, and monitor.
 - 2. The system shall have a Queue operation, and shall not require event acknowledgment by the system operator. The system shall have a labeled color coded indicator for each type of event; alarm - red, supervisory - yellow, trouble - yellow, monitor - green. When an unseen event exists for a given type, the indicator shall flash. When all events of a given type have been displayed, the indicator shall change from flashing to steady.
 - 3. For each event, the display shall include the current time, the total number of events, the type of event, the time the event occurred.
 - 4. The user shall be able to review each event by simply selecting scrolling keys (up-down) for each event type.
 - 5. New alarm, supervisory, or trouble events shall sound an silenceable audible signal at the control panel.
- B. Operation of any alarm initiating device shall automatically:
 - 1. Update the control/display as described above.
 - 2. Sound all alarm signals throughout the building at the evacuation rate.
 - 3. Turn on all strobe lights throughout the building.
 - 4. Turn on a red alarm zone LED at the fire alarm control panel.
 - 5. Operate the alarm relay contacts to initiate the transmission of an alarm to a central station agency via leased telephone lines.
 - 6. Operate control relay contacts to shut down air supply fans. Shutdowns shall be hardwired from the Fire Alarm System (i.e., not implemented via building automation controls) and immediate acting, and shall not be overridden by Hand-Off-Auto switches or other controls.
 - 7. Operate control relay contacts to de-energize smoke/fire dampers to close dampers. Dampers shall typically be interlocked with their associated air handler unit so the dampers close whenever the air handler is de-energized.

Southcentral Foundation Fireweed Building Renovation

8. Separate Alarm and trouble conditions shall be transmitted to the Building Automation System (BAS) and Building Security System. Common alarm, common trouble and common sprinkler alarm conditions shall be monitored by the BCS and Security Systems. Provide separate sets of outputs for the BCS and Security Panels.

C. Activation of a sprinkler supervisory initiating device shall:

1. Update the control/display as described above.
2. Turn on a yellow zone LED at the fire alarm control panel.
3. Operate the supervisory relay contacts to initiate the transmission of a supervisory condition to a central station agency via telephone lines.

D. Fire alarm system wiring shall be electrically supervised to automatically detect and report trouble conditions to the fire alarm control panel. Any opens, grounds or disarrangement of system wiring and shorts across alarm bell/strobe wiring shall automatically:

1. Update the control/display as described above.
2. Operate the trouble relay contacts to initiate the transmission of a trouble alarm to a central station agency via telephone lines.

3.3 DOOR UNLOCKING DEVICES

- A. Any device or system intended to effect the locking/unlocking of emergency exits shall be connected to the building fire alarm system. These exits shall unlock upon receipt of any fire alarm signal.
- B. All emergency exits connected in accordance with the paragraph above shall unlock upon loss of the primary power to the fire alarm system. The secondary power supply shall not be utilized to maintain these doors in locked condition.

3.4 PROTECTION OF FIRE ALARM CONTROL UNITS

- A. Provide automatic smoke detection at the location of each fire alarm control unit(s) including fire alarm control panels, remote power supplies and remote battery supplies.

3.5 INTERCONNECTIONS TO OTHER SYSTEMS

- A. Provide input modules for monitoring of med gas storage room emergency shutdown buttons. Provide sufficient modules to give each shutdown button an individual address. Provide control modules to perform automatic shutdown of med gas storage rooms HVAC system upon activation of shutdown buttons and annunciation of non-fire alarm sounder/strobe at med gas storage rooms.

Southcentral Foundation Fireweed Building Renovation

3.6 REMOTE DETECTOR INDICATORS

- A. Provide remote LED indicators for all duct mounted smoke detectors where the detector is mounted where the LED alarm indicator is not easily visible. Provide a descriptive label in accordance with Section 260553 – Identification of Electrical Systems.

3.7 TESTING AND REPORTS

- A. Upon completion of the system installation, an Approved representative of the system manufacturer shall conduct a thorough test of the system and all related devices and components of the system, and submit a written report of the findings to the Contracting Agency. For devices, circuits, and equipment installed or modified as part of the project testing shall include, at the least, verification of the following:
 - 1. The functional operation of each resettable initiating device (manual fire alarm boxes, detectors, etc.) and circuits.
 - 2. The functional operation of each and every alarm device and circuit.
 - 3. The functional operation of each monitored device circuit.
 - 4. The functional operation of each control and output circuit.
 - 5. The supervision function of each Initiating, Indicating, Monitoring, Control and Supply Circuit.
 - 6. Central Station automatic signaling.
 - 7. Proper initiation and execution of mechanical systems control sequences.
 - 8. Verify that wire size, power supply, number of devices on a circuit, etc. are suitable to support 100% of devices being in alarm or operated simultaneously. Test shall include the following as a minimum:
 - a. Place all detectors and monitor modules in alarm. Each shall display its address and alarm condition. At least the first ten devices on each circuit shall also have their alarm LEDs lighted, where applicable.
 - b. Operate all control modules for the alarm or operated condition. Each module shall display its address and condition.
 - c. Reset all alarmed and operated devices. The panel shall display the address of any off-normal devices.
 - 9. Test a representative number of detectors for alarm verification by momentarily testing for alarm. The detectors shall not initiate an alarm. Then test by placing the detectors in alarm such that it remains in alarm for the selected verification time. The detector shall initiate an alarm.
 - 10. Test a representative number of detector for trouble by removing the detector from its base. The address and trouble condition for each shall be displayed. Insert a different type of detector into the base. The address and trouble condition shall be displayed. The detector shall return to normal only when the proper detector type is reinserted into the base.
 - 11. Print out the English-language descriptor, currently sensed value, prealarm threshold value, alarm threshold value and status of each sensor in the system. Also print out the

Southcentral Foundation Fireweed Building Renovation

English-language descriptor and status of each module in the system. The printout shall also include the date and time.

3.8 TRAINING

- A. After the system provided in this Section is completely installed and operational, and at a time chosen by the Owner, provide the Owner's system operators and maintenance personnel and representatives of the local Fire Department with a total of four (4) hours of instruction on the operation, maintenance, and troubleshooting of all equipment provided under this Section.
- B. Training sessions shall be presented by a fully qualified, trained representative of the equipment manufacturer, who is thoroughly knowledgeable on the specific installation. Separate sessions shall be given for operation personnel (i.e.: facility staff and Fire Department) and maintenance personnel, with the length and content of the sessions tailored to the respective groups.
- C. Provide an additional one (1) hour of follow-up instruction for review and clarification at a later time mutually agreed on with the Owner, if the Owner deems it necessary.

END OF SECTION 283100