SECTION 283111 – EXPANSION OF DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

PART 1 - GENERAL:

1.1 SCOPE:

A. Provide a fully functional, code compliant, commissioned and tested addition to the existing “Simplex” addressable fire alarm network which utilizes digital voice audible notification. Provide a new network node serving the new building “Zone” beyond the two hour wall separation.

B. All new devices shall be 100% compatible with the existing system and shall be of the same manufacturer mane/brand. Ensure that after the new devices are commissioned that the entire system has a minimum of 15 minutes of alarm back-up power after a 24 hour loss of primary AC power.

C. All initiation devices shall be of the addressable type and fully compliant with the control panel being installed. Any system initiation devices that are not addressable such as high temp heat detectors shall be monitored by a supervised addressable input module.

D. The notification devices shall be connected to a class “B” notification circuit.

E. The system shall utilize speakers, strobes, and speaker/strobes for occupant notification of alarm conditions. Ensure that a minimum of 15db above ambient sounds levels is achieved in every space.

F. Provide additional remote power supplies with battery back-up (24 hours of standby and 15 minutes of alarm) as needed for driving notification devices.

G. Provide a ceiling mounted photoelectric smoke detector above each fire alarm panel, fire alarm power supply, and annunciator.

H. Addressable monitor modules shall be utilized for monitoring all sprinkler tamper switches, flow switches, low air switches, and post indicator valves (Coordinate closely with the Fire Protection Contractor).

I. Addressable relay modules will be incorporated for interfacing with elevator controllers, HVAC units, and other systems.

J. Manual pull stations will be installed within 5’-0” of each exterior door. Pull stations shall be single action “push pull” style. Break glass style stations will not be allowed.

K. Ceiling mounted smoke and/or heat detectors will be included to provide detection as required by code or by room hazard.

L. Supply and return duct mounted smoke detectors shall be installed on any HVAC unit that meets or exceeds 2000cfm. Additionally, duct mounted smoke detectors shall be installed at each smoke damper and shall be configured to close the damper upon detection of smoke. Coordinate closely with the mechanical plans and the mechanical contractor.

1.2 SUMMARY

A. Section Includes:

1. Fire-alarm control panel.
2. Addressable Manual fire-alarm boxes.
3. Addressable smoke detectors.
4. Addressable Heat detectors.
5. Notification appliances.
6. Remote annunciator.
7. Addressable monitor device.
8. Addressable relay device
9. Digital alarm communicator transmitter (integral to the FACP).

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product, including furnished options and accessories.

B. Shop Drawings: For fire-alarm system.

1. Comply with recommendations and requirements in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
2. Include plans, elevations, sections, details, and attachments to other work.
3. Include details of equipment assemblies. Indicate dimensions, weights, loads, clearances required, method of field assembly, components, and locations. Indicate conductor sizes, indicate termination locations and requirements, and distinguish between factory and field wiring.
4. Detail assembly and support requirements.
5. Include voltage drop calculations for notification-appliance circuits.
6. Include battery-size calculations.
7. Include riser diagram indicating each device connected to the system in the order that they are installed.
8. Include statement from manufacturer that all equipment and components have been tested as a system and meet all requirements in this specification and in NFPA 72.
9. Include performance parameters and installation details for each device.
10. Verify that each duct detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
11. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale; coordinate location of duct smoke detectors and access to them.

    a. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators.
    b. Show field wiring required for HVAC unit shutdown on alarm.
    c. Locate detectors according to manufacturer's written recommendations.

12. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits and point-to-point wiring diagrams.

C. General Submittal Requirements:

1. Submittals shall be approved by authorities having jurisdiction prior to submitting them to Architect. As part of the submittal supply the AHJ review notes and include the corrections/alteration on the system plans.

2. Shop Drawings shall be prepared by persons with the following qualifications:

    a. Trained and certified by manufacturer in fire-alarm system design.
    b. NICET-certified, fire-alarm technician; Level III minimum.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

    a. Comply with the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
    b. Provide "Fire Alarm and Emergency Communications System Record of Completion Documents" according to the "Completion Documents" Article in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
    c. Complete “as-built” wiring diagrams showing connections and circuit routes between all devices and equipment as installed.
    d. Riser diagram indicating all devices connected to the system in the order that they appear on each circuit.
    e. Record copy of site-specific software on a CD provided to the owner for archiving.
    f. Provide "Inspection and Testing Form" according to the "Inspection, Testing and Maintenance" chapter in NFPA 72, and include the following:

        1) List of all equipment/devices tested.
        2) Frequency of testing of installed components.
        3) Frequency of inspection of installed components.
        4) Requirements and recommendations related to results of maintenance.
        5) Manufacturer's user training manuals.

    g. Manufacturer's required maintenance related to system warranty requirements.
    h. Abbreviated operating instructions for mounting at fire-alarm control unit and each annunciator unit. Instructions should be formatted on an 8.5x11 sheet.

B. Software and Firmware Operational Documentation:

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

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Installation personnel shall be trained by the system manufacturer for installation of units required for this project.

B. Technician/Programmer Qualifications: Programming and testing shall be by personnel certified by NICET as fire-alarm Level III technician.

1.6 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace fire-alarm system equipment and components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two (2) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Provide a fully functional, code compliant, commissioned and tested addition to the existing addressable fire alarm system which utilizes digital voice audible notification. All devices and panels shall be supplied by SimplexGrinnell.

B. All new devices shall be 100% compatible with the existing system and shall be of the same manufacturer name/brand (Simplex). Ensure that after the new devices are commissioned that the entire system has a minimum of 15 minutes of alarm back-up power after a 24 hour loss of primary AC power.

C. All components provided shall be listed for use with the selected system.

D. Electrical components, devices, and accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 SYSTEMS OPERATIONAL DESCRIPTION

A. This is an addition to an existing system, therefore, the sequence of operation for the addition shall match the AHJ approved and site standard sequence of operation for the existing site fire alarm system. The existing system is currently divided into building “Zones” with independent operational characteristics.

1. Activation of only one alarm initiation device within a building zone will cause a general alarm condition within that zone only and for a trouble condition to be indicated on all other building zones.
2. Upon receipt of two alarm initiation devices activated within a building zone a structure wide general alarm will be initiated.
3. Verify exact building zone separation lines with the architectural drawings.

2.3 FIRE-ALARM CONTROL UNIT

A. General Requirements for Fire-Alarm Control Panel (FACP):

1. Field-programmable, microprocessor-based, modular, power-limited design with electronic modules, complying with UL 864. The control panel shall be supplied with all cards required for connection to the existing network as a new network node. Provide all programming required for integration into the network including graphical map updates.
2. Provide addressable circuits or capacity for all initiating devices plus 25% spare.
3. Provide notification circuits for all audible and visual notification devices plus 25% spare capacity on each circuit.
4. Indicate which programmed devices have been disabled.

5. Allow silencing of the audible notification devices while leaving the visual notification devices operational.
6. Provide secondary power source (battery back-up) of sufficient capacity to sustain the entire system for 24 hours of stand-by operation and 15 minutes of general alarm operation following a loss of primary AC power circuits.
7. Provide standard digital fire alarm evacuation message, a severe weather warning message, a lockdown message, and a shelter in place message in addition to a microphone for live voice message override.

B. Alphanumeric display and system controls: Arranged for interface between human operator at fire-alarm control panel or annunciator panel and system components including notification and supervision. Display alarm, supervisory, trouble, and component status messages and the programming and control menu.

1. FACP display and annunciator: Liquid-crystal type, 40 characters, minimum.
2. FACP keypad: Arranged to permit entry and execution of programming, display, and control commands.
3. Provide a dedicated labeled switch for activating each of the digital voice messages.

C. Pathway Class Designations: Initiating-Device, Notification-Appliance, and Signaling-Line Circuits:

1. Signaling line Circuits: NFPA 72, style “4” minimum.
2. Notification appliance Circuits: NFPA 72 class “B” minimum.
3. Initiating device (monitor modules to contacts): NFPA 72 class “B” minimum

D. Notification-Appliance Circuit:

1. Audible signals shall remain active until the silence switch is pressed or until the alarm condition is reset. Contractor to verify desired operation with the local authority having jurisdiction.
2. Visual alarm appliances shall flash in synchronization where multiple appliances are in the same field of view, as defined in NFPA 72. Visual signals shall remain active until alarm conditions are reset. Contractor to verify desired operation with the local authority having jurisdiction.

E. Elevator Recall:

1. Elevator recall shall be initiated only by one of the following alarm-initiating devices:

   a. Smoke detectors in the elevator lobbies.
   b. Smoke detector in elevator machine room.
   c. Smoke detectors in elevator hoistway.

2. Elevator controller shall be programmed to move the cars to the alternate recall floor (second floor) if lobby detectors located on the primary recall floor (first floor) is activated.
3. Water-flow alarm connected to sprinkler in an elevator shaft and elevator machine room shall shut down elevators associated with the location without time delay in addition to heat detectors in the hoistway or machine room.

F. Door Controls: Door hold-open devices that are controlled by smoke detectors at doors in smoke-barrier walls shall be connected to fire-alarm system. Release any electrically secured doors in the path of egress upon general alarm.

G. Remote Smoke-Detector Sensitivity Adjustment: Controls shall select specific addressable smoke detectors for adjustment, display their current status and sensitivity settings, and change those settings. Allow controls to be used to program repetitive, time-scheduled, and automated changes in sensitivity of specific detector groups. Record sensitivity adjustments and sensitivity-adjustment schedule changes in system historical log.

H. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals for each addressable point or monitored point on the system (point reporting) to an approved central station monitoring service. Include the first years monitoring service contract fees in the base bid. The system supplier shall coordinate with the owner for identification of contact names and numbers for the monitoring system contract.

I. Primary Power: 24 VDC obtained from 120 VAC service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory signals supervisory and digital alarm communicator transmitters shall be powered by 24 VDC source. Primary 120 VAC feeds shall be dedicated 20 A circuits with a lockable breaker and labeled as “Fire Alarm System” in red text.

1. Alarm current draw of entire fire-alarm system shall not exceed eighty percent (80%) of the power-supply module rating.

J. Secondary Power: 24 VDC supply system with batteries, automatic battery charger, and automatic transfer switch. Provide secondary power source (battery back-up) of sufficient capacity to sustain the entire system for 24 hours of stand-by operation and 15 minutes of general alarm operation following a loss of primary AC power circuits.

2.4 MANUAL FIRE-ALARM BOXES

A. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38.

1. Single-action mechanism, pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
2. Station Reset: Key operated switch.
3. Provided within 5’-0” of each exterior door.

2.5 SYSTEM SMOKE DETECTORS

A. General Requirements for System Smoke Detectors:

1. Comply with UL 268; operating at 24 VDC, nominal.
2. Detectors shall be two wire types.
3. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
4. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to system wiring.
5. Self-Restoring: Detectors do not require resetting or re-adjustment after actuation to restore them to normal operation.
6. Integral Visual-Indicating Light: LED type, indicating detector has operated and power-on status.

7. Remote Control: Unless otherwise indicated, detectors shall be digital-addressable type, individually monitored at fire-alarm control unit for calibration, sensitivity, and alarm condition and individually adjustable for sensitivity by fire-alarm control unit.

    a. Multiple levels of detection sensitivity for each sensor.
    b. Sensitivity levels based on time of day.

B. Photoelectric Smoke Detectors:

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

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

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

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

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

3. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with the supplied detector for smoke detection in HVAC system ducts shall be used for any duct mounted smoke detector which is required to be external to the building.
4. Each sensor shall have multiple levels of detection sensitivity.
5. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
6. Provide a fully programmable addressable relay for each HVAC unit requiring shutdown upon activation of a general alarm condition. The relay should be mounted within 3’-0” of the HVAC unit’s controller.
7. Each duct mounted smoke detector shall be provided with a remote station including a status LED and a key test switch. The remote station shall be mounted near the detector but in a location that does not require a ladder or special equipment to access.

2.6 HEAT DETECTORS

A. General Requirements for Heat Detectors: Comply with UL 521.

1. Temperature sensors shall test for and communicate the sensitivity range of the device.

B. Heat Detector, Combination Type: Actuated by either a fixed temperature or a rate of rise.

1. Mounting: Adapter plate for outlet box mounting or twist-lock base interchangeable with smoke-detector bases.
2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

C. Heat Detector, Fixed-Temperature Type: Actuated by temperature that exceeds a fixed set temperature.

1. Mounting: Adapter plate for outlet box mounting or twist-lock base interchangeable with smoke-detector bases.
2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

2.7 NOTIFICATION APPLIANCES

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

1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated, and with screw terminals for system connections.
2. Special Note: Addressable notification devices shall not be utilized and will not be accepted on this project.

B. Speakers: 24 VDC; with provision for housing the operating mechanism behind a grille. Comply with UL 464. All speakers shall be tapped at two watts and adjusted down as needed. Minimum output shall be 85db measured at 10 feet.

C. Visible Notification Appliances: Xenon strobe lights complying with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch high letters on the lens or housing.

1. Mounting: Wall mounted unless otherwise indicated.
2. Flashing shall be synchronized with other units.
3. Strobe Leads: Factory connected to screw terminals.
4. Mounting Faceplate: Factory finished in red with white lettering.

2.8 REMOTE ANNUNCIATOR

A. Description: Annunciator functions shall match those of fire-alarm control panel for alarm, supervisory, and trouble indications. Manual switching functions shall match those of fire-alarm control panel, including acknowledging, silencing, resetting, and testing. Include a remote microphone matching the functions of the FACP.

1. Mounting: Flush cabinet/box, NEMA 250, Type 1.

B. Display Type and Functional Performance: Alphanumeric display and LED indicating lights shall match those of fire-alarm control panel. Provide controls to acknowledge, silence, reset, and test functions for alarm, supervisory, and trouble signals.

1. Provide standard digital fire alarm evacuation message, a severe weather warning message, a lockdown message, and a shelter in place message in addition to a microphone for live voice message override.
2. Provide activation buttons for the standard digital fire alarm evacuation message, a severe weather warning message, a lockdown message, and a shelter in place message in addition to a microphone for live voice message override.

2.9 ADDRESSABLE INTERFACE DEVICES

A. General:

1. Include address-setting means on the module.
2. Store an internal identifying code for control panel use to identify the module type.

B. Addressable Monitor Module: Microelectronic module providing a system address for alarm initiating devices for wired applications with normally open contacts. Monitor modules shall supervise the conductors between itself and the monitored contact.

C. Addressable Integral Relay: Capable of providing a direct signal to elevator controller to initiate elevator recall, to circuit-breaker shunt trip for power shutdown, for access control door interface, or for shutdown of HVAC units.

1. Allow the control panel to switch the relay contacts on command.
2. Have a minimum of two normally open and two normally closed contacts available for field wiring.
3. Be mounted within 3’-0” of the device that it is controlling.

2.10 DIGITAL ALARM COMMUNICATOR TRANSMITTER

A. Utilize the existing site fire alarm system’s AHJ approved network monitoring system and standard operating procedure.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

A. Comply with NFPA 72, NFPA 101, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install all electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems." and NEC requirements

B. Install wall-mounted panels, with tops of cabinets not more than 78 inches above the finished floor.

C. Manual Fire-Alarm Boxes:

1. Install manual fire-alarm pull station in the normal path of egress within 60 inches of the exit doorway.
2. Mount manual fire-alarm pull station on a background of a contrasting color.
3. The operable part of manual fire-alarm pull station shall be between 42 inches and 48 inches above floor level. All pull stations shall be mounted at the same height unless otherwise indicated.

D. Smoke- or Heat-Detector Spacing: Comply with NFPA 72.

E. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct. Tubes more than 36 inches long shall be supported at both ends.

F. Elevator Shafts: Coordinate heat detector temperature rating and location with sprinkler rating and location. Mount heat detectors within eighteen inches (18”) of the sprinkler head. If multiple heads are mounted in the top of shaft, bottom of shaft, or elevator equipment room provide a heat detector adjacent to each.

G. Remote Status and Alarm Indicators: Install in a visible location near each duct smoke detector.

H. Audible Alarm-Indicating Devices: Install not less than six inches (6”) below the ceiling. Install speakers on flush-mounted back boxes with the device-operating mechanism concealed behind a grille. Install all devices at the same height unless otherwise indicated. As part of the base bid include ten (10) additional speaker units which shall be installed upon request of the fire marshal at the time of acceptance testing.

I. Visible Alarm-Indicating Devices: Install so that lens is 80” AFF or at least 6 inches below the ceiling. Install all devices at the same height unless otherwise indicated. . As part of the base bid include 5 additional strobe units which shall be installed upon request of the fire marshal at the time of acceptance testing.

3.2 PATHWAYS

A. All fire alarm circuit pathways shall be in EMT conduit.

B. Exposed EMT shall be red or painted red enamel.

C. All fire alarm system related junction boxes shall have red covers.

D. The minimum conduit size shall be ¾”. Conduit fill shall not exceed the requirements of NEC.

3.3 CONNECTIONS

A. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 36 inches from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.

1. Electronically locked doors.
2. Alarm-initiating connection to elevator recall system and components.
3. Supervisory connections at valve supervisory switches.
4. Supervisory connections at low-air-pressure switch of each dry-pipe sprinkler system.

5. Supervisory connections at elevator shunt-trip breaker.
6. HVAC units that shutdown upon activation of a general alarm condition.

3.4 IDENTIFICATION

A. Install framed instructions in a location visible from fire-alarm control panel and annunciator panel or update existing site maps. Coordinate with the owner or their representative for an acceptable mounting location.

3.5 GROUNDING

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

B. Ground shielded cables at the control panel location only. Insulate shield at device location and maintain shield continuity through each junction box or splice point.

3.6 FIELD QUALITY CONTROL

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

B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Visual Inspection: Conduct visual inspection prior to testing.
    a. Inspection shall be based on completed record drawings and system documentation that is required by NFPA 72 in its "Completion Documents, Preparation" table in the "Documentation" section of the "Fundamentals" chapter.
    b. Comply with the "Visual Inspection Frequencies" table in the "Inspection" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.
2. System Testing: Comply with the "Test Methods" table in the "Testing" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
3. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" section of the "Fundamentals" chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.

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

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

E. Prepare test and inspection reports.

3.7 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system. Provide a minimum of two (2) classes lasting at least two (2) hours each for the Owner’s representatives.

END OF SECTION 283111