

SECTION 280500 – COMMON WORK RESULTS FOR SAFETY AND SECURITY

PART 1 - GENERAL

1.1 RELATED SECTIONS

- A. All division 28 work shall, in addition to all division 1 specification sections, comply with all of the requirements in the following specification sections:

260500 Common Work Results for Electrical
260501 Electrical Demolition
260510 Electrical Submittals
260511 Electrical Work Closeout
260512 Electrical Coordination
260519 Low-Voltage Electrical Power Conductors and Cables.doc
260526 Grounding and Bonding for Electrical Systems
260529 Hangers and Supports for Electrical Systems
260533 Raceway and Boxes for Electrical Systems
260548 Vibration and Seismic Controls for Electrical Systems
260553 Identification for Electrical Systems
262726 Wiring Devices

END OF SECTION 280500

SECTION 283100 - FIRE DETECTION, ALARM, AND MASS NOTIFICATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Fire-alarm control unit.
 - 2. Manual fire-alarm boxes.
 - 3. System smoke detectors.
 - 4. Heat detectors.
 - 5. Notification appliances.
 - 6. Device guards.
 - 7. Remote annunciator.
 - 8. Addressable interface device.
 - 9. Digital alarm communicator transmitter.
 - 10. Voice Evacuation & Mass Notification Panel.
 - 11. Radio alarm transmitter.
 - 12. Network communications.

1.3 DEFINITIONS

- A. EMT: Electrical Metallic Tubing.
- B. FACP: Fire Alarm Control Panel.
- C. HLI: High Level Interface.
- D. NICET: National Institute for Certification in Engineering Technologies.
- E. PC: Personal computer.

1.4 ACTION SUBMITTALS

- A. See submittals section 260510 Electrical Submittals.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.

- B. Installer Qualifications: Installation shall be by personnel certified by NICET as fire-alarm Level III technician.
- C. NFPA Certification: Obtain certification according to NFPA 72 by a UL-listed alarm company.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Source Limitations for Fire-Alarm and Mass Notification System and Components: Components shall be compatible with, and operate as an extension of, existing Brooks Stadium and campus system. Provide system manufacturer's certification that all components provided have been tested as, and will operate as, a system.
- B. The fire alarm system shall be a non-coded, UL-certified addressable fire alarm system, with voice evacuation/mass notification annunciation system.
- C. Automatic sensitivity control of certain smoke detectors.
- D. All components provided shall be UL listed for use with the fire alarm voice evacuation/mass notification annunciation system.
- E. 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. Fire-alarm signal initiation shall be by one or more of the following devices and systems:
 - 1. Manual stations.
 - 2. Heat detectors.
 - 3. Smoke detectors.
 - 4. Duct smoke detectors.
 - 5. Automatic sprinkler system water flow.
 - 6. Pressure switch.
- B. Fire-alarm signal shall initiate the following actions:
 - 1. Continuously operate alarm notification appliances, including voice evacuation notices.
 - 2. Identify alarm and specific initiating device at fire-alarm control unit, connected network control panels, and remote annunciators.
 - 3. Transmit an alarm signal to the remote alarm receiving station at the CCU Department of Public Safety Dispatch Center.
 - 4. Activate voice/alarm communication system.
 - 5. Switch heating, ventilating, and air-conditioning equipment controls to fire-alarm mode.
 - 6. Recall elevators to primary or alternate recall floors.
 - 7. Record events in the system memory.
 - 8. Indicate device in alarm on the remote annunciator.
 - 9. Release automatic door hold opens.
- C. Supervisory signal initiation shall be by one or more of the following devices and actions:

1. Valve supervisory switch.
2. Elevator shunt-trip supervision.
3. Loss of communication with any panel on the network.

D. System trouble signal initiation shall be by one or more of the following devices and actions:

1. Open circuits, shorts, and grounds in designated circuits.
2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
3. Loss of communication with any addressable sensor, input module, relay, control module, remote annunciator, printer interface, or Ethernet module.
4. Loss of primary power at fire-alarm control unit.
5. Ground or a single break in internal circuits of fire-alarm control unit.
6. Abnormal ac voltage at fire-alarm control unit.
7. Break in standby battery circuitry.
8. Failure of battery charging.
9. Abnormal position of any switch at fire-alarm control unit or annunciator.
10. Voice signal amplifier failure.

E. System Supervisory Signal Actions:

1. Initiate notification appliances.
2. Identify specific device initiating the event at fire-alarm control unit, connected network control panels, and remote annunciators.
3. After a time delay of 200 seconds, transmit a trouble or supervisory signal to the remote alarm receiving station.
4. Transmit system status to building management system.
5. Display system status on graphic annunciator.

2.3 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Fire-alarm control unit and raceways shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

2.4 FIRE-ALARM CONTROL UNIT

A. Existing fire alarm control panel is Edwards EST III.

B. Existing Voice Evacuation/Mass Notification System is Eaton ACU with Waves over IP connected to the CCU Department of Public Safety Dispatch Center's ALERiTY System.

1. The system shall be capable of broadcasting messages via the public address system, fire alarm notification appliances, and via textual visual appliances.
2. Refer to drawings for additional information.

C. General Requirements for Fire-Alarm Control Unit:

1. Field-programmable, microprocessor-based, modular, power-limited design with electronic modules, complying with UL 864.

- a. System software and programs shall be held in nonvolatile flash, electrically erasable, programmable, read-only memory, retaining the information through failure of primary and secondary power supplies.
 - b. Include a real-time clock for time annotation of events on the event recorder and printer.
 - c. Provide communication between the FACP and remote circuit interface panels, annunciators, and displays.
 - d. The FACP shall be listed for connection to a central-station signaling system service.
 - e. Provide nonvolatile memory for system database, logic, and operating system and event history. The system shall require no manual input to initialize in the event of a complete power down condition. The FACP shall provide a minimum 500-event history log.
 - f. Provide UL listed interface unit capable of displaying text messages from voice evacuation/mass notification captioning system.
2. Addressable Initiation Device Circuits: The FACP shall indicate which communication zones have been silenced and shall provide selective silencing of alarm notification appliance by building communication zone.
 3. Addressable Control Circuits for Operation of Notification Appliances and Mechanical Equipment: The FACP shall be listed for releasing service.
- D. Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.
1. Annunciator and Display: Liquid-crystal type, 80 characters, minimum.
 2. Keypad: Arranged to permit entry and execution of programming, display, and control commands.
- E. Initiating-Device, Notification-Appliance, and Signaling-Line Circuits:
1. Pathway Class Designations: NFPA 72, Class B.
 2. Pathway Survivability: Level 1.
 3. Install no more than 50 addressable devices on each signaling-line circuit.
- F. Smoke-Alarm Verification:
1. Initiate audible and visible indication of an "alarm-verification" signal at fire-alarm control unit.
 2. Activate an approved "alarm-verification" sequence at fire-alarm control unit and detector.
 3. Sound general alarm if the alarm is verified.
 4. Cancel fire-alarm control unit indication and system reset if the alarm is not verified.
- G. Notification-Appliance Circuit:
1. Audible appliances shall sound in a three-pulse temporal pattern, as defined in NFPA 72.
 2. Visual alarm appliances shall flash in synchronization where multiple appliances are in the same field of view, as defined in NFPA 72.
- H. Elevator Recall:
1. Elevator recall shall be initiated only by one of the following alarm-initiating devices:
 - a. Elevator lobby detectors except the lobby detector on the designated floor.
 - 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 if lobby detectors located on the designated recall floors are activated.
 3. Heat Detectors in the elevator shaft and elevator machine room shall shut down the elevator via shunt trip circuit breaker.
- I. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to CCU's remote central alarm station.
 - J. Voice/Alarm Signaling Service:
 1. Amplifiers shall comply with UL 1711.
 - a. Programmable tone and message sequence selection.
 - b. Programmed with CCU's standard eight (8) pre-recorded messages.
 - c. Generate tones to be sequenced with audio messages of type recommended by NFPA 72 and that are compatible with tone patterns of notification-appliance circuits of fire-alarm control unit.
 - K. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory signals, supervisory and digital alarm communicator transmitters and digital alarm radio transmitters shall be powered by 24-V dc source.
 1. Alarm current draw of entire fire-alarm and mass notification system shall not exceed 80 percent of the power-supply module rating.
 - L. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.
 1. Batteries: Sealed lead-acid or nickel cadmium.
 - M. Battery Booster Panel and Amplifier Booster Panel: Provide one battery booster panel and one amplifier booster panel, at minimum, on every floor. Provide 25% spare capacity in the amplifier booster panel and the battery booster panel. Calculations shall assume that the speakers are at their maximum tap settings and strobes are at their designed candela level.
 - N. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

2.5 MANUAL FIRE-ALARM BOXES

- A. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.
 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 switch.

2.6 SYSTEM SMOKE DETECTORS

- A. General Requirements for System Smoke Detectors:

1. Comply with UL 268; operating at 24-V dc, nominal.
2. Detectors shall be two-wire type.
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 building wiring.
5. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
6. Integral Visual-Indicating Light: LED type, indicating detector has operated and power-on status.

B. 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.
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.
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. Relay Fan Shutdown: Fully programmable relay rated to interrupt fan motor-control circuit.
7. Test and reset keys shall be provided for all duct mounted smoke detectors. Install the test and reset units 48" AFF and label unit or damper served.

2.7 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 of 135 deg F (57 deg C) or a rate of rise that exceeds 15 deg F (8 deg C) per minute unless otherwise indicated.

1. Mounting: 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.

2.8 NOTIFICATION APPLIANCES

A. General Requirements for Notification Appliances: Any location that requires a strobe for the alarm notification shall be installed as a combination speaker strobe device.

- B. General Requirements for Notification Appliances: Individually address, connected to notification-appliance signal circuits, zoned as indicated, 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.
- C. Visible Notification Appliances: LED strobe lights complying with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "ALERT" is engraved in minimum 1-inch-high letters on the lens.
 - 1. Rated Light Output:
 - a. 15/30/75/110 cd, selectable in the field.
 - 2. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
 - 3. Flashing shall be in a temporal pattern, synchronized with other units.
 - 4. Strobe Leads: Factory connected to screw terminals.
 - 5. Mounting Faceplate: Factory finished, white.
 - 6. Provide voltage drop calculations that show 1.5db or less power loss on the speaker circuits.
- D. Voice/Tone Notification Appliances:
 - 1. Comply with UL 1480.
 - 2. Speakers for Voice Notification: Locate speakers for voice notification to provide the intelligibility requirements of the "Notification Appliances" and "Emergency Communications Systems" chapters in NFPA 72.
 - 3. High-Range Units: Rated 2 to 15 W.
 - 4. Low-Range Units: Rated 1 to 2 W.
 - 5. Mounting: Semi-recessed.
 - 6. Matching Transformers: Tap range matched to acoustical environment of speaker location.

2.9 REMOTE ANNUNCIATOR

- A. Description: Annunciator functions shall match those of fire-alarm control unit for alarm, supervisory, and trouble indications. Manual switching functions shall match those of fire-alarm control unit, including acknowledging, silencing, resetting, and testing.
 - 1. Mounting: Recessed cabinet with locked enclosure and viewing window, NEMA 250, Type 1. Cabinet shall have manufacturer's standard light gray finish, or, pending approval of CCU's Fire Marshal may be painted to match the surrounding wall finish color. Coordinate exact mounting location and cabinet color with CCU Fire Marshal prior to installation.
 - 2. The remote microphone station shall be installed in the same recessed locked enclosure as the remote annunciator panel.
 - 3. Turnover six (6) keys to Owner at Substantial Completion.
- B. Display Type and Functional Performance: Alphanumeric display and LED indicating lights shall match those of fire-alarm control unit. Provide controls to acknowledge, silence, reset, and test functions for alarm, supervisory, and trouble signals.

2.10 ADDRESSABLE INTERFACE DEVICE

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.
3. Listed for controlling HVAC fan motor controllers.

B. Monitor Module: Microelectronic module providing a system address for alarm-initiating devices for wired applications with normally open contacts.

C. Integral Relay: Capable of providing a direct signal to elevator controller to initiate elevator recall or to circuit-breaker shunt trip for power shutdown.

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.

D. Control Module:

1. Operate notification devices.
2. Operate solenoids for use in sprinkler service.

2.11 DIGITAL ALARM COMMUNICATOR TRANSMITTER – FIRE ALARM SYSTEM

A. Digital alarm communicator transmitter shall be compatible with the existing remote CCU central station and shall comply with UL 632.

B. Functional Performance: Unit shall receive an alarm, supervisory, or trouble signal from fire-alarm control unit and automatically capture two telephone line(s) and dial a preset number for CCU's existing remote central receiving station at the CCU Department of Public Safety Dispatch Center. When contact is made with central station(s), signals shall be transmitted. If service on either line is interrupted for longer than 45 seconds, transmitter shall initiate a local trouble signal and transmit the signal indicating loss of telephone line to the remote alarm receiving station over the remaining line. Transmitter shall automatically report telephone service restoration to the central station. If service is lost on both telephone lines, transmitter shall initiate the local trouble signal.

C. Local functions and display at the digital alarm communicator transmitter shall include the following:

1. Verification that both telephone lines are available.
2. Programming device.
3. LED display.
4. Manual test report function and manual transmission clear indication.
5. Communications failure with the central station or fire-alarm control unit.

D. Digital data transmission shall include the following:

1. Address of the alarm-initiating device.
2. Address of the supervisory signal.
3. Address of the trouble-initiating device.
4. Loss of ac supply.
5. Loss of power.
6. Low battery.

7. Abnormal test signal.
8. Communication bus failure.

- E. Secondary Power: Integral rechargeable battery and automatic charger.
- F. Self-Test: Conducted automatically every 24 hours with report transmitted to central station.

2.12 VOICE EVACUATION AND MASS NOTIFICATION PANEL

- A. Existing Voice evacuation and mass notification panel shall be UL listed and comply with NFPA 72 and UL 2572 for interconnection to PA system for message broadcasting.
- B. Functional Performance: The operation of any automatic fire detector, sprinkler water flow device or manual fire alarm pull station shall automatically sound an alert tone followed by voice instructions for general building evacuation. The signal shall be broadcast throughout the building to all paging zones from the voice evacuation and mass notification panel until the fire alarm control panel is reset, or until the fire emergency personnel interrupt the broadcast with a manual page. On reset the system shall automatically return to normal operating condition. The system shall be configured to allow paging over the Public Address (PA) speakers and fire alarm system notification appliances. The manual live page shall be provided via a remote microphone station located adjacent to the remote fire alarm annunciator panel. The interconnection to the PA system shall be via a Waves Over IP Communicator (IPC 8000).
- C. Normal Power Input: 120-V ac.
- D. Secondary Power: This system shall be provided with sufficient battery capacity to operate the entire system upon loss of normal AC power in a normal supervisory mode for a period of 24 hours with 15 minutes of alarm operation at the end of this period. The system shall automatically transfer to battery standby upon power failure. All battery charging and re-charging operations shall be automatic.

2.13 RADIO ALARM TRANSMITTER & IPC COMMUNICATOR – MASS NOTIFICATION SYSTEM

- A. Transmitter shall comply with NFPA 1221 and 47 CFR 90.
- B. Description: Manufacturer's standard commercial product; factory assembled, wired, and tested; ready for installation and operation.
 1. Packaging: A single, modular, NEMA 250, Type 1 metal enclosure with a tamper-resistant flush tumbler lock.
 2. Normal Power Input: 120-V ac.
 3. Secondary Power: Integral-sealed, rechargeable, 12-V battery and charger. Comply with NFPA 72 requirements for battery capacity; submit calculations.
 4. Alarm Interface Devices: Circuit boards, modules, and other auxiliary devices, integral to the transmitter, matching fire-alarm and other system outputs to message-generating inputs of the transmitter that produce required message transmissions.
- C. Functional Performance: The IP communicator shall receive a signal from CCU's ALERiTY mass notification system via the radio alarm transmitter and/or Ethernet network connection and transmit audible and visual messages to the building's Fire Alarm System Notification devices via the Voice Evacuation and Mass Notification Panel (VECP). Transmitted messages shall include CCU's standard eight (8) pre-recorded messages. The message priority shall be as follows:

1. The in-building mass notification system is allowed to override a fire alarm evacuation notification for the brief time that the mass notification signal is broadcast. Once the mass notification signal is complete the fire alarm signal will continue.
2. The mass notification system will only be used when there is an imminent threat to life and safety.
3. If at any time a first responder needs to communicate with the building occupants the local microphone in the building will override all fire alarm and mass notification signals. Once the local microphone is no longer in use, the building fire alarm and/or mass notification system will continue to alarm.
4. If the building uses the mass notification system for paging or music or non-mass notification signals these signals shall not override any fire alarm, mass notification or local microphone signal.

2.14 NETWORK COMMUNICATIONS

- A. Provide network communications for the voice evacuation and mass notification system according to the manufacturer's written requirements.
- B. Provide network communications pathway per manufacturer's written requirements and requirements in NFPA 72 and NFPA 70.
- C. Provide integration gateway using BACnet or Modbus for connection to building automation system.

2.15 DEVICE GUARDS

- A. Description: Welded wire mesh of size and shape for the manual station, smoke detector, gong, or other device requiring protection.
 1. Factory fabricated and furnished by device manufacturer.
 2. Finish: Paint of color to match the protected device.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the Work.
 1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment and wiring are installed, before installation begins.
- B. Examine roughing-in for electrical connections to verify actual locations of connections before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EQUIPMENT INSTALLATION

- A. Comply with NFPA 72 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."
 - 1. Devices placed in service before all other trades have completed cleanup shall be replaced.
 - 2. Devices installed but not yet placed in service shall be protected from construction dust, debris, dirt, moisture, and damage according to manufacturer's written storage instructions.
- B. Equipment Mounting:
 - 1. Comply with requirements for seismic-restraint devices specified in Section 260548 "Vibration and Seismic Controls for Electrical Systems."
- C. Install wall-mounted equipment, with tops of cabinets not more than 78 inches above the finished floor.
 - 1. Comply with requirements for seismic-restraint devices specified in Section 260548 "Vibration and Seismic Controls for Electrical Systems."
- D. Install a cover on each smoke detector that is not placed in service during construction. Cover shall remain in place except during system testing. Remove cover prior to system turnover.
- E. Duct Smoke Detectors: Comply with NFPA 72 and IMC 2012. Install sampling tubes so they extend the full width of duct. Tubes more than 36 inches long shall be supported at both ends.
 - 1. Do not install smoke detector in duct smoke-detector housing during construction. Install detector only during system testing and prior to system turnover.
- F. Elevator Shafts: Coordinate temperature rating and location with sprinkler rating and location. Do not install smoke detectors in sprinklered elevator shafts.
- G. Remote Status and Alarm Indicators: Install in a visible location near each smoke detector, sprinkler water-flow switch, and valve-tamper switch that is not readily visible from normal viewing position.
- H. Audible Alarm-Indicating Devices: Install not less than 6 inches below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille. Install all devices at the same height unless otherwise indicated.
- I. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches below the ceiling. Install all devices at the same height unless otherwise indicated.
- J. Device Location-Indicating Lights: Locate in public space near the device they monitor.
- K. Program the mass notification and voice evacuation panel with CCU's standard 8 pre-recorded messages.
- L. All circuit breakers supplying power to the fire alarm voice evacuation and mass notification annunciation system shall be painted red and locked in the on position.
- M. Provide TVSS surge protection for the incoming power and for all devices that leave the building (AHU interfaces, antennas, duct mounted smoke detectors, exterior strobes/horns).

3.3 PATHWAYS

- A. All pathways shall be installed in EMT.
- B. The conduit system shall be painted red enamel, or be red anodized conduit, or shall have red covered junction boxes. In areas with exposed conduit in finished spaces, pending approval of the CCU Fire Marshal, the conduit and junction boxes can be painted to match the exposed ceiling spaces if the junction boxes are labeled "Fire Alarm."

3.4 CONNECTIONS

- A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Section 087100 "Door Hardware." Connect hardware and devices to fire-alarm system.
 - 1. Verify that hardware and devices are listed for use with installed fire-alarm system before making connections.
- B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 36 inches (910 mm) from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.
 - 1. Smoke dampers in air ducts of designated HVAC duct systems.
 - 2. Electronically locked doors and access gates.
 - 3. Alarm-initiating connection to elevator recall system and components.
 - 4. Alarm-initiating connection to activate emergency shutoffs for gas and fuel supplies.
 - 5. Supervisory connections at valve supervisory switches.
 - 6. Supervisory connections at elevator shunt-trip breaker.
 - 7. Data communication circuits for connection to building management system.
 - 8. Data communication circuits for connection to mass notification system.
 - 9. Supervisory connections at fire-pump power failure including a dead-phase or phase-reversal condition.
 - 10. Supervisory connections at fire-pump engine control panel.

3.5 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- B. Install framed instructions in a location visible from fire-alarm control unit.

3.6 GROUNDING

- A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.
- B. Ground shielded cables at the control panel location only. Insulate shield at device location.

3.7 FIELD QUALITY CONTROL

- A. Field tests shall be witnessed by authorities having jurisdiction.

- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform tests and inspections.
- D. Perform the following tests and inspections:
 - 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 the "Completion Documents, Preparation" table in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
 - 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. Audible Appliance Testing:
 - a. The fire alarm contractor shall contractor with an independent testing agency to conduct a STI/STIPA test per NFPA 72-2013 Annex D. The testing shall be a quantitative test that uses a signal generator and a testing device that provides a speech intelligibility score for each Acoustically Distinguishable Space (ADS).
 - b. Submit a testing plan identifying the proposed ADS's to the Architect/Engineer and CCU Fire Marshal on a marked up floor plan for review and approval prior to testing.
 - c. Perform a pre-test of the system during construction and prior to substantial completion. This test will be an unoccupied test. Adjust speaker taps to improve intelligibility and audibility of the system prior to completing the pre-test.
 - d. Perform a final test of the system post construction completion and during normal building occupied hours.
 - e. Submit all test reports to the Architect/Engineer and CCU Fire Marshal.
 - 4. Test visible appliances for the public operating mode according to manufacturer's written instructions.
 - 5. 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.
- E. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.
- F. Fire-alarm system will be considered defective if it does not pass tests and inspections.
- G. Prepare test and inspection reports.
- H. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.
- I. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

3.8 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of manufacturer's designated service organization. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
 - 1. Include visual inspections according to the "Visual Inspection Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - 2. Perform tests in the "Test Methods" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - 3. Perform tests per the "Testing Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.

3.9 SOFTWARE SERVICE AGREEMENT

- A. Comply with UL 864.
- B. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for two years.
- C. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system and new or revised licenses for using software.
 - 1. Upgrade Notice: At least 30 days to allow Owner to schedule access to system and to upgrade computer equipment if necessary.

3.10 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system.
 - 1. Training Duration: Four (4) hours, minimum.
 - 2. Schedule training with the Owner at least seven (7) days in advance.

END OF SECTION 283111

SECTION 283200 – TWO-WAY COMMUNICATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Two-way Communications vandal resistant and ADA-compliant hands-free speakerphone communications system with Two-way Communication Command unit Master Station.
 2. Equipment furnished under the terms of this specification shall be the standard product of a single manufacturer.

1.2 SUBMITTALS

1. Refer to section 260510

1.3 QUALITY ASSURANCE

- A. The Contractor shall be authorized by the Manufacturer to install the equipment provided.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable manufacturers, contingent upon compliance with the contract documents, are as listed below. Bidders shall carefully review the requirements listed in the technical specifications and only submit products that are equal or better. Equal products by other manufacturers are acceptable providing substitutions are submitted in accordance with requirements listed in the “Instructions to Bidders” and “Supplemental Instructions to Bidders” (AIA A701 and modified by the OSE 00201) and approved by the A/E. Bidders shall carefully review the front end documents (A701/OSE 00201) and submit all information required to allow the A/E the ability to make a fully informed decision
1. Cornell
 2. Aiphone
 3. Rath

2.2 COMMUNICATIONS EQUIPMENT

- A. System overview:
1. The communication system consists of Area Station’s with battery back-up (12 hours of full operation & standby upon loss of power) and programmable automatic dialer & a Master Station.
- B. Call Station:
1. Initiate call when button is pressed.
 2. When not answered on site after a preprogrammed time has elapsed, the main panel with call off site to an emergency number specified by the AHJ.
 3. The station shall initiate an alarm at the control panel when the button is pressed.
 4. Face plate shall be stainless steel.
 5. Greater than or equal to 1.5” diameter button:
 - a. Capable of being activated from any angle with a minimum of effort.
 - b. No other hardware shall protrude from the station as high as the pushbutton.
 6. LED indicator confirms transmission of the “HELP REQUESTED” SIGNAL.
 7. Dual audio and visual alarms for the hearing and visually impaired.

- C. Command Unit (master)
 - 1. Stainless Steel
 - 2. Surface Mounted
 - 3. Handset for Talk/ Listen
 - 4. Indication of area from which rescue assistance is being requested.
 - 5. Talk & Hold buttons for each area
 - 6. Power Led (red)
 - 7. Battery Back-up w\ light
 - 8. Green Led to indicate outgoing call initiated from any area station
 - 9. Override button to cancel any outgoing call
 - 10. Audio alert signaling for outgoing call from the area station

2.3 WIRING

- A. System wiring shall be in accordance with good engineering practices as established by the EIA and NEC.
- B. Wiring shall meet all established state and local electrical codes. All wiring shall test free from shorts and grounded as specified.
- C. All cable shall be as recommended by the manufacturer or an approved equivalent.

2.4 BASIC SYSTEM OPERATION

- A. When in use the system shall provide two-way audio communications between the call stations and the base station, and a called outside party. Communication at the Call Station shall be hands-free after initial contact from the Base station or called party, the Base Station will use an ADA compliant volume control handset.
- B. When an emergency call is placed by the Call Station, it provides the following indications at the Base Station to assure the caller that the call is being processed. After pressing the “PUSH FOR HELP” call button:
 - 1. Audio and visual confirmation:
 - a. A “HELP REQUESTED” LED shall illuminate.
 - b. An alarm shall sound.
- C. The Base Station allows Emergency Personnel to check status of each Call Station and to talk with each Call Station on an individual basis or all of them together
- D. A lighted green LED labeled “RESCUE SERVICES” indicates that an emergency is in progress.
- E. If an emergency call is in progress, by lifting the handset on the Base Station unit you can automatically join the conversation .At this point you can place any or all Call Stations on hold by pushing the hold button corresponding to that unit, which will leave them talking to the called party. Or you can disconnect the called party by pressing the “DISCONNECT TO CALL SERVICES” button, which will leave you talking to the Call Station.
- F. If there is no emergency call in progress you can call into any or all Call Station by pressing the corresponding talk button to that unit.
- G. By hanging up the Base Station you disconnect from the conversation while leaving the Call Station continuing any ongoing conversation with the called party.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Complete system shall be installed in strict accordance with manufacturer's written instructions.
- B. Mounting height:
 - 1. Area Station: call button centered 3'-6" AFF. (or approved local code)
 - 2. Base Station: top call button 3'-6" AFF. (or approved local code)
- C. Wiring:
 - 1. All wiring shall be in conduit and shall be concealed.

3.2 INSPECTION AND TEST UPON COMPLETION

- A. System field wiring diagrams shall be provided to the Contractor by the system Manufacturer prior to installation.
- B. Upon completion of the installation:
 - 1. Four (4) copies of complete operational instructions shall be furnished, complete with record drawings. Instructions shall include part numbers and name, address, and telephone number of parts source.
 - 2. Contractor shall provide to the Engineer a signed statement that the system has been wired and tested, and functions properly according to the specifications.
- C. Nothing herein contained shall be construed to relieve the Contractor from furnishing a complete and acceptable electrical wiring system in all its categories. The Engineer will reject any materials or labor which are or may become detrimental to the accomplishment of the intentions of these specifications.

3.3 IN SERVICE TRAINING

- A. The Contractor shall furnish training with the system. This session shall be broken into segments that will facilitate the training of individuals in operating the Master Station as well as the Area Station. Operating manuals and users guides shall be provided at the time of the training.

END OF SECTION 283200