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Product Guide Specification

Specifier Notes: This product guide specification is written according to the Construction Specifications Institute (CSI) 3-Part Format as described in *The Project Resource Manual—CSI Manual of Practice*. The section must be carefully reviewed and edited by the Architect or Engineer to meet the requirements of the project and local building code. Coordinate this section with other specification sections and the Drawings. Delete all “Specifier Notes” when editing this section.

Section numbers and titles are from *MasterFormat* 1995 Edition, with numbers and titles from *MasterFormat* 2004 Edition in parentheses. Delete version not required.

SECTION 13850 (28 31 00)

NETWORKED FIRE ALARM SYSTEM

Specifier Notes: This section covers the Gamewell-FCI E3 Series Expandable Emergency Evacuation Fire Alarm System. Consult Gamewell-FCI for assistance in editing this section for the specific application.

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Expandable emergency evacuation fire alarm system.

1.2 RELATED SECTIONS

Specifier Notes: Edit the following list of related sections as required for the project. List other sections with work directly related to this section.

- A. Section 13800 – Building Automation and Control.
- B. Section 13900 (21 00 00) – Fire Suppression.

- C. Section (27 15 00) – (Communications Horizontal Cabling).

1.3 REFERENCES

Specifier Notes: List standards referenced in this section, complete with designations and titles. This article does not require compliance with standards, but is merely a listing of those used.

- A. Electrical Industries Association (EIA):
 - 1. EIA-232-D – Interface Between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange
 - 2. EIA-485 –

- B. National Fire Protection Association (NFPA):
 - 1. NFPA 12 – Standard on Carbon Dioxide Extinguishing Systems.
 - 2. NFPA 13 – Installation of Sprinkler Systems.
 - 3. NFPA 15 – Standard for Water Spray Fixed Systems for Fire Protection.
 - 4. NFPA 16 – Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems.
 - 5. NFPA 16A – Standard for the Installation of Closed Head Foam-Water Sprinkler Systems.
 - 6. NFPA 70 – National Electrical Code (NEC).
 - 7. NFPA 72 – National Fire Alarm Code.
 - 8. NFPA 90A – Standard for the Installation of Air Conditioning and Ventilating Systems.
 - 9. NFPA 101 – Life Safety Code.
 - 10. NFPA 750 – Standard on Water Mist Fire Protection Systems.
 - 11. NFPA 5000 – Building Construction and Safety Code.

- C. Underwriters Laboratories (UL):
 - 1. UL 268 – Standard for Smoke Detectors for Fire Alarm Signaling Systems.
 - 2. UL 864 – Standard for Control Units and Accessories for Fire Alarm Systems.
 - 3. UL 1971 – Standard for Signaling Devices for the Hearing Impaired.

1.4 SYSTEM DESCRIPTION

- A. A new, Analog Addressable Style 7 networked, fully peer-to-peer, microprocessor-controlled fire detection and emergency voice alarm communication system shall be installed in accordance with the specifications and as indicated on the drawings.

- B. Each Signaling Line Circuit (SLC) and Notification Appliance Circuit (NAC) shall be limited to 80 percent of its total capacity during initial installation.

- C. Basic Performance:
 - 1. Network Communications Circuit (E3 Broadband) Serving Network Nodes: Shall be wired using single, twisted, non-shielded 2-conductor cable, or connected using approved fiber optic cable between nodes in NFPA Style 7 (Class A) configuration.
 - 2. Signaling Line Circuits (SLC) Serving Addressable Devices: Shall be wired NFPA Style 6 (Class A) configuration.
 - 3. Initiation Device Circuits (IDC) Serving Non-addressable Devices Connected to Addressable Monitor Modules: Shall be wired NFPA Style D (Class A) configuration.

4. Notification Appliance Circuits (NAC) Serving Strobes and Speakers: Shall be wired NFPA Style Z (Class A) configuration.
5. On NFPA Style 6 or 7 (Class A) Configurations: A single ground fault or open circuit on a Signaling Line Circuit shall not cause system malfunction, loss of operating power, or ability to report alarm.
6. Alarm signals arriving at the INCC COMMAND CENTER: Shall not be lost following primary power failure until alarm signal is processed and recorded.
7. Transponders:
 - a. Shall operate in peer-to-peer fashion with other panels and transponders in the system.
 - b. Each transponder shall store copies of audio evacuation messages and tones.
 - c. Systems that use centralized message storage and control at main fire alarm control panel shall not be acceptable.
8. Network Node Communications, Audio Evacuation Channels and Fire Phone Communications:
 - a. Communication between panels and transponders shall be on a single pair of twisted, unshielded copper wires or fiber optic cables.
 - b. To enhance system survivability, ability to operate on loss of the INCC Command Center, short or open of the entire riser at INCC Command Center shall be demonstrated at the time of system acceptance testing.
 - c. Systems that are not capable of providing true Style 7 performance for fire fighter's phone communications shall not be acceptable.
9. Signaling Line Circuits (SLC):
 - a. SLC modules shall operate in peer-to-peer fashion with all other panels and transponders in the system.
 - b. Upon loss of the INCC Command Center, each transponder shall continue to communicate with the remainder of system, including all SLC functions and audio messages located in all transponders.
 - c. Systems that provide a "Degraded" mode of operation upon loss of the INCC Command Center or short in the riser shall not be acceptable.
10. Audio Amplifiers and Tone-Generating Equipment: Shall be electrically supervised for normal and abnormal conditions.
11. Amplifiers: Shall be located in transponder cabinets serving no more that 3 floors per transponder to enhance system survivability, reduce required riser wiring, simplify installation, and reduce power losses in length of speaker circuits. Systems employing "bulk" audio configurations shall not be acceptable.
12. Loudspeaker Appliance Circuits: Arranged so that there is a minimum of one (1) speaker circuit per fire alarm zone.
13. Notification Appliance Circuits (NAC), Speaker Circuits, and Control Equipment: Arranged so that loss of any one speaker circuit will not cause loss of any other speaker circuit in the system.
14. Speaker Circuits:
 - a. Electrically supervised for open and short circuit conditions.
 - b. If a short circuit occurs on a speaker circuit, it shall not be possible to activate that circuit.
 - c. Shall be arranged for 25 VRMS and be power limited in accordance with the NEC. They shall have 20 percent spare capacity for future expansion or increased power output requirements.

15. 2-Way Telephone Communication Circuits:
 - a. Shall be supervised for open and short circuit conditions.
 - b. A short circuit condition on a 2-way telephone communication circuit shall result in a trouble condition and not result in a call-in condition.
 16. Voice Communication:
 - a. Telephone circuits shall be connected to speaker circuits to allow voice communication over speaker circuits from a telephone handset.
 - b. The system shall be capable of remote phone-to-phone conversations and party-line communications as required.
- D. Basic System Functional Operation: When a fire alarm condition is detected and reported by any system alarm initiating device, the following functions shall immediately occur:
1. System Alarm LEDs: Shall flash.
 2. Local Piezo-Electric Sounder in the Control Panel: Shall pulse.
 3. 80-Character LCD Display: Indicate all information associated with the fire alarm condition, including the type of alarm and its location within the protected premises.
 4. Historical Log: Shall record information associated with the control panel condition, along with the time and date of occurrence.
 5. System output programs assigned via control-by-event equations to be activated by particular point in alarm shall be executed, and the associated system outputs (alarm notification appliances and/or relays) shall be activated.
 6. Audio Portion of System: Shall sound three (3) rounds of "slow whoop" tone followed by a voice evacuation message. This scenario shall repeat until the system is reset.
- E. Fire Alarm System Functionality:
1. Provide a complete, electrically supervised distributed, NFPA Style 7 networked analog/addressable fire alarm and control system, with analog smoke sensors, addressable initiating devices, integral multiple-channel voice evacuation, and fire fighter's phone system.
 2. Fire Alarm System:
 - a. Shall consist of multiple-voice channels with no additional hardware required for a total of 4 channels.
 - b. Incorporate multiprocessor-based control panels, including model E3 Series, Intelligent Network INCC Command Center(s) (INCC), Intelligent Loop Interface (ILI-MB-E3), Intelligent Network Transponders (INX), communicating over a peer-to-peer token ring network with a capacity of up to 64 nodes.
 3. Each ILI-MB-E3 Node: Shall incorporate two (2) Signaling Line Circuits (SLC), each with the capacity to support up to 159 analog addressable sensors and 159 addressable modules.
 4. Voice, Data, and Fire Fighter's Phone Riser: Shall transmit over a single pair of wires or fiber optic cable.
 5. Each Intelligent Network Transponder: Shall be capable of providing 16 distributed voice messages, fire fighter phones connections, SLC for audio control devices, and integral network interface.
 6. Each Network Node: Shall incorporate Boolean control-by-event programming, including as a minimum AND, OR, NOT, and Timer functions.
 7. Control Panels: Shall have the capability to accept firmware upgrades via connection with a laptop computer, without the necessity of replacing microprocessors.

8. Network:
 - a. Based on peer-to-peer token ring technology operating at 625 K baud, using Style 7 configuration.
 - b. Capability of using twisted-pair wiring, pair of fiber optic cable strands up to 200 microns, or both, to maximize flexibility in system configuration.
9. Each Network Node:
 - a. Shall have the capability of being programmed off-line using Windows™-based software supplied by the fire alarm system manufacturer. It shall have the capability of being downloaded by connecting a laptop computer into any other node in system. Systems that require system software to be downloaded to individual transponders shall not be acceptable.
 - b. Shall have the capability of being grouped with any number of additional nodes to produce a “Region”, allowing that group of nodes to act as one, while retaining peer-to-peer functionality. Systems utilizing “Master/Slave” configurations shall not be acceptable.
 - c. Shall have the capability of annunciating all events either within its “Region” or from the entire network on the front panel LCD display without additional equipment
10. Each SLC Network Node: Shall be capable of having an integral DACT (digital alarm communicator transmitter) that can report events in either its region, or entire network to a single central station monitoring account.
11. Each ILI-MB-E3 Panel: Shall be capable of storing its entire program, and shall allow the installer to activate only devices installed during construction, without further downloading of system.
12. Password Protection: Each system shall be provided with 4 levels of password protection with up to 16 passwords.

1.5 SUBMITTALS

Specifier Notes: Edit the Submittals article as required for the project.

- A. Comply with Section 01330 (01 33 00) – Submittal Procedures.
- B. Include sufficient information, clearly presented, to determine compliance with the specifications and the Drawings.
- C. Equipment Submittals:
 1. Cover Page: Shall indicate the following:
 - a. Project name and address.
 - b. Engineered systems distributor’s name and other contact information.
 - c. Installing contractor’s name and other contact information.
 - d. Date of equipment submittals. Indicate on revised submittals the original submittal date and revised submittal date.
 2. Table of Contents: Shall list each section of equipment submittal.
 3. Scope of Work Narrative: Shall detail indented scope of work.
 4. Sequence of Operations: Shall use matrix or written text format, detailing activation of each type of device and associated resulting activation of the following:
 - a. Control panel.
 - b. Annunciator panels.
 - c. Notification appliances.

- d. Building fire safety functions, including elevator recall, elevator power shutdown, door lock release, door holder release, HVAC unit shutdown, smoke evacuation system activation, and stair pressurization fan activation.
 5. Bill of Material: Shall indicate for each component of system the following:
 - a. Quantity.
 - b. Model number.
 - c. Description.
 6. SLC Schedule: Shall provide detail address and associated description of each addressable device. Clearly provide information that indicates number of both active and spare addresses.
 7. Battery Calculations: Show load of each of, and total of, components of system along with standby and alarm times that calculations are based on. Show calculated spare capacity and size of intended battery.
- D. Shop Drawings:
1. Cover Page: Shall indicate the following:
 - a. Project name and address.
 - b. Engineered systems distributor's name and other contact information.
 - c. Installing contractor's name and other contact information.
 - d. Date of equipment submittals. Indicate on revised submittals the original submittal date and revised submittal date.
 2. Floor Plans shall:
 - a. Provide a separate floor plan for each floor.
 - b. If a floor plan must be split using match lines to fit on the page, provide match lines and match line references that refer to sheet number that shows area on opposite side of match line.
 - c. Be prepared using AutoCAD™.
 - d. Be prepared to scale 1/8 inch = 1'-0", unless otherwise required by the Architect or Engineer.
 - e. Show equipment and device locations.
 - f. Show wiring information in point-to-point format.
 - g. Show conduit routing, if required by the AHJ.
 3. Title Block: Shall provide on each sheet and include, at a minimum, the following:
 - a. Project name.
 - b. Project address.
 - c. Sheet name.
 - d. Sheet number.
 - e. Scale of drawing.
 - f. Date of drawing.
 - g. Revision dates, if applicable.
 4. Control Panel: Provide a drawing that details exterior and interior views of control panel and clearly shows associated wiring information.
 5. Annunciator Panels: Provide a drawing that details exterior and interior views of annunciator panels and clearly shows associated wiring information.
- E. Certification: Submit with equipment submittals and shop drawings, a letter of certification from the major equipment manufacturer, indicating that the proposed engineered system distributor is an authorized representative of the major equipment manufacturer.

- F. Project Record Drawings:
 - 1. Submit complete project record drawings within 14 calendar days after acceptance test.
 - 2. Project record drawings shall be similar to shop drawings, but revised to reflect changes made during construction.

- G. Operation and Maintenance Manuals:
 - 1. Submit complete operation and maintenance manuals within 14 calendar days after acceptance test.
 - 2. Operation and maintenance manuals shall be similar to equipment submittals
 - 3. Include factory's standard installation and operating instructions.

1.6 QUALITY ASSURANCE

- A. Codes and Standards:
 - 1. NFPA: System shall comply with the following NFPA codes and standards:

Specifier Notes: Edit the following list of NFPA codes and standards as required for the project.

- a. NFPA 12.
 - b. NFPA 13.
 - c. NFPA 15.
 - d. NFPA 16.
 - e. NFPA 16A.
 - f. NFPA 70.
 - g. NFPA 72.
 - h. NFPA 90A.
 - i. NFPA 101.
 - j. NFPA 750.
 - k. NFPA 5000.
 - 2. ADA: System shall conform to American with Disabilities Act (ADA).

- B. To ensure reliability and complete compatibility, all items of the fire alarm system, including control panels, power supplies, initiating devices, and notification appliances, shall be listed by an NRTL (Nationally Recognized Testing Laboratory) as defined by OSHA, and shall bear the laboratory label.

- C. Fire Alarm Control Panel Equipment: Shall be Listed under ANSI-UL Standard 864, 9th Edition.

- D. Equipment, Programming, and Installation Supervision:
 - 1. Provide services of approved Platinum Level engineered systems distributor of Gamewell-FCI for equipment, programming, and installation supervision.
 - 2. Provide proof of factory training within 14 calendar days of award of the Contract.

- E. Software Modifications:
 - 1. Provide services of Platinum Level Gamewell-FCI factory-trained and authorized technician to perform system software modifications, upgrades, or changes.
 - 2. Provide use of all hardware, software, programming tools, and documentation necessary to modify fire alarm system software on-site.
 - 3. Modification includes addition and deletion of devices, circuits, zones, and changes to system operation and custom label changes for devices or zones.

4. System structure and software shall place no limit on type or extent of software modifications on-site.
5. Modification of software shall not require power-down of system or loss of system fire protection while modifications are being made.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Storage: Store materials in clean, dry area indoors in accordance with manufacturer's instructions.
- C. Handling: Protect materials from damage during handling and installation.

1.8 COORDINATION

Specifier Notes: Edit the following sentence as required.

- A. Coordinate the Work of this section with the Work of other sections, including sprinkler systems as specified in Section _____, elevators as specified in Section _____, HVAC systems as specified in Section _____, and security/door locking systems as specified in Section _____ .

1.9 WARRANTY

- A. Warranty Period for System Equipment: 1 year from date of final acceptance.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Gamewell-FCI, Honeywell Fire Systems, 12 Clintonville Road, Northford, Connecticut 06472. Phone (203) 484-7161. Fax (203) 484-7118. Website: www.gamewell-fci.com.
- B. References to manufacturer's model numbers and other information is intended to establish minimum standards of performance, function, and quality. Equivalent equipment may be substituted for the specified equipment, as long as minimum standards are met. No other manufacturers, other than Gamewell-FCI, FCI, and Gamewell will be considered for use on this project.
- C. Substitute equipment proposed as equal to equipment specified shall meet or exceed requirements of this section. For equipment other than the Gamewell-FCI E3 Series Expandable Emergency Evacuation Fire Alarm System, provide proof that such substitute equipment equals or exceeds features, functions, performance, and quality of specified equipment. This proof shall be provided by submission of a copy of a specification with each copy of the submittals that has had each paragraph marked as either compliant or non-compliant along with a letter from an engineering manager or product manager at the factory that certifies information presented as either compliant or non-compliant, including a detailed

explanation of each paragraph identified as non-compliant. In order to ensure that the Owner is provided with a system that incorporates required survivability features, this letter shall also specifically certify that the system is capable of complying with the test requirements of this section.

2.2 DISTRIBUTED NETWORKED FIRE ALARM SYSTEM

- A. Distributed Networked Fire Alarm System: Gamewell-FCI E3 Series Expandable Emergency Evacuation Fire Alarm System.

2.3 INTELLIGENT NETWORK INCC COMMAND CENTER HARDWARE

- A. Intelligent Network INCC Command Center (INCC): Supply user interface, including LCD or touch-screen 1/4 VGA display Intelligent Loop Interface Modules (ILI-MB-E3), manual switching, phone, and microphone inputs to the network. The INCC shall consist of the following units and components:
1. System Cabinet (B-, C-, or D-Size Cabinet) with associated inner door.
 2. Power Supply Module (PM-9) with batteries.
 3. Intelligent Network Interface Voice Gateway INCC Command Center (INI-VGC).
 4. 80-Character LCD Display (LCD-E3).
 5. Intelligent Loop Main Board Interface (ILI-MB-E3).
 6. Optional Intelligent Loop Supplemental Interface (ILI-S-E3).
 7. Optional DACT (DACT-E3).
 8. Optional RS-485 Repeater (RPT-E3).
 9. Optional 1/4 VGA touch-screen display (NGA).
 10. Optional Auxiliary Switch Module (ASM-16).
 11. Optional Microphone Assembly (INCC-MIC).
 12. Optional Telephone Assembly (INCC-TEL).
 13. Optional SLC Expansion Assembly (ILI-S-E3)
- B. System Cabinet:
1. Surface or semi-flush mounted with texture finish.
 2. Consists of back box, inner door, and door.
 3. Available in a minimum of three sizes to best fit project configuration.
 4. Houses one or more PM-9 Power Supply Modules, INI-VG Intelligent Network Interface Voice Gateway, one or more ILI-MB-E3 assemblies, and other optional assemblies as specified.
 5. Construction: Dead-front steel construction with inner door to conceal internal circuitry and wiring.
 6. Wiring Gutter Space: A minimum of 1-inch wiring gutter space behind mounting plate.
 7. Wiring: Terminated on removable terminal blocks to allow field servicing of assemblies without disrupting system wiring.
- C. Power Supply Module (PM-9): Use latest technologies to provide power to INCC and incorporate the following features:
1. Power-saving switching technology using no step-down transformers.
 2. 9-amp continuous-rated output to supply up to all power necessary under normal and emergency conditions for INCC Command Center Modules.
 3. Integral battery charger with capacity to charge up to 55 amp-hour batteries while under full load.

D. Batteries:

Specifier Notes: Include **one** of the following **three** sentences.

1. Shall have sufficient capacity to provide power for the entire system upon loss of normal AC power for a period of 24 hours with 15 minutes of alarm signaling at end of this 24-hour period, as required by NFPA 72, Protected Premises (Local) Systems.
 2. Shall have sufficient capacity to provide power for the entire system upon loss of normal AC power for a period of 60 hours with 15 minutes of alarm signaling at end of this 60-hour period, as required by NFPA 72, Auxiliary Systems.
 3. Shall have sufficient capacity to provide power for the entire system upon loss of normal AC power for a period of 90 hours with 15 minutes of alarm signaling at end of this 90-hour period, as required by Factory Mutual Global for Deluge/Preaction Systems.
- E. Intelligent Network Interface Voice Gateway INCC Command Center (INI-VGC): The INI-VG shall be a multi-function board interchangeable in both INCC and INX. Functions of the board shall include the following features as a minimum:
1. Microprocessor: The INI-VGC shall have a Digital Signal Processor (DSP). The microprocessor shall monitor all system events and perform all system programs for all control-by-event (CBE) functions. The system program shall not be lost upon failure of both primary and secondary power. Programming shall supporting Boolean logic including AND, OR, NOT, TIMING functions for maximum flexibility.
 2. Network Interface: Shall operate at 625 K baud configurable with any combination of wire and/or fiber topologies. The interface shall communicate with up to 64 nodes in peer-to-peer fashion.
 3. Fire Fighter Phone Riser: The INI-VG shall generate a local phone riser for use with AOM-TELF phone modules for connection to fire fighter phone stations and/or for connection of local phone when used as an INCC Command Center, including phone circuits. The INI-VG shall mix its local phone riser to the network in true Style 7 fashion. Systems not capable of true Style 7 communications for fire fighter's phone risers shall not be acceptable.
 4. Advanced Processing: The INI-VGC shall incorporate the latest in digital signaling processing technology with supporting Boolean logic including AND, OR, NOT, TIME DELAY functions.
 5. Microphone Input: Shall be integral and allow for the addition of a local microphone when used as the INCC Command Center, including speaker circuit control.
 6. Signal Processing: The INCC shall use advanced Digital Signal Processing (DSP) technology to allow maximum flexibility of digital audio and control capabilities and operation. Signals to and from the INCC shall be transmitted over a single pair of twisted unshielded wire or fiber optic pair.
 7. Field Programmable: The INCC shall be capable of being fully programmed or modified by a Field Configuration Program (FCP), to be downloaded via portable computer from any node in the system.
 8. Control-by-Event Programming (CBE): The INCC shall be capable of programming using Boolean logic including AND, OR, NOT, COUNT, TIMING, and CALENDAR functions to provide complete programming flexibility.
 9. Remote INCC Command Center Options: The System shall have the capability of adding remote INCC Command Centers or re-locating INCC Command Centers using only a single pair of twisted unshielded wire or fiber optic cable for all functions.

10. RS-485 Serial Output: The system shall incorporate an RS-485 bus via ribbon harness for connection of assemblies inside the same cabinet, and via 4-wire quick connector for connection of assemblies up to 3,000 feet from the cabinet.
11. Riser Wiring: All data, voice, and fire fighter phone risers shall transmit over a single pair of twisted unshielded wire or fiber optic pair for all functions configured in Style 7 format. Any short or open in data, voice, or phone sections shall not affect transmission over the remainder of the network.
12. Style 7 Network: All communication between control panels and transponders shall be via supervised Style 7 token-passing network. In event of a single short, open, or ground, all system communication shall operate as normal and report fault. This protection shall incorporate all data, voice, and fire fighter phone transmissions. Upon a single short, open, or ground of either system data, live voice, recorded channels, or phone risers, these items shall continue to function. "Degrade" functionality shall not be acceptable. This shall be demonstrated at system acceptance.

F. LCD Display Module (LCD-E3):

1. LCD Display: 80-character RS-485 based textual annunciator with the capability of being mounted locally or remotely. Provides audible and visual annunciation of all alarm and trouble signals. Provide dedicated LEDs for:
 - a. AC Power On: Green.
 - b. Alarm: Red.
 - c. Supervisory: Yellow.
 - d. System Trouble: Yellow.
 - e. Power Fault: Yellow.
 - f. Ground Fault: Yellow.
 - g. System Silenced: Yellow.
2. 80-Character Alphanumeric Display: Provide status of all analog/addressable sensors, monitor and control modules. The display shall be of the liquid crystal type (LCD), clearly visible in the dark and under all light conditions.
3. The panel shall contain 4 functional keys:
 - a. Alarm Acknowledge.
 - b. Trouble Acknowledge.
 - c. Signal Silence.
 - d. System Reset/Lamp Test.
4. The panel shall contain 3 configuration buttons:
 - a. Menu/Back.
 - b. Back Space/Edit.
 - c. OK/Enter.
5. The panel shall have a 12-key telephone-style keypad to permit selection of functions.

G. The Intelligent Loop Interface (ILI-MB-E3): The System shall be of multiprocessor design to allow maximum flexibility of capabilities and operation. The Intelligent Loop Interface shall be capable of mounting in a stand-alone enclosure or integrated with the Intelligent Network INCC Command Center (INCC) as specified.

1. Field Programmable: The system shall be capable of being programmed by Field Configuration Program (FCP), allowing programming to be downloaded via portable computer from any node on the network.

2. RS-232C Serial Output: A supervised RS-232C serial port shall be provided to operate remote printers and/or video terminals, accept downloaded program from portable computer, or provide an 80-column readout of all alarms, troubles, location descriptions, time, and date. Communication shall be standard ASCII code operating from 1,200 to 115,200 baud rate.
3. RS-485 Serial Output: Each ILI-MB-E3 shall incorporate an RS-485 bus via ribbon harness for connection of modules inside the same cabinet, and via 4-wire quick connector for connection of modules up to 3,000 feet from cabinet. The RS-485 bus shall support up to 16 ASM-16 auxiliary switch modules, 6 LCD-E3 main annunciators, and 5 LCD-7100 annunciators.
4. Peer-to-Peer Panel Configuration: All Loop Interface Modules shall incorporate their own programming, log functions, Central Processor Unit, and control-by-event (CBE) programming. If any circuit becomes disabled, each remaining circuit shall continue to communicate with the remainder of the network and maintain normal operation. "Degrade" configurations under these conditions shall not be acceptable.
5. Control-by-Event (CBE) Program: The ILI-MB-E3 shall be capable of programming using Boolean logic including AND, OR, NOT, and TIMING functions to provide complete programming flexibility.
6. Alarm Verification: Smoke sensor alarm verification shall be a standard option while allowing other devices such as manual stations and sprinkler flow switches to create an immediate alarm. This feature shall be selectable for smoke sensors that are installed in environments prone to nuisance or unwanted alarms.
7. Alarm Signals: All alarm signals shall be automatically latched or "locked in" at the control panel until the operated device is returned to normal and the control panel is manually reset. When used for sprinkler flow, the "SIGNAL SILENCE" switch may be bypassed, if required by the AHJ.
8. Electrically Supervised:
 - a. Each SLC and NAC circuit shall be electrically supervised for opens, shorts, and ground faults. Occurrence of a fault shall activate the system trouble circuitry, but shall not interfere with the proper operation of other circuits.
 - b. Yellow "SYSTEM TROUBLE" LEDs shall light and the system audible sounder shall steadily sound when trouble is detected in system. Failure of power, open or short circuits on SLC or NAC circuits, disarrangement in system wiring, failure of microprocessor or any identification module, or system ground faults shall activate this trouble circuit. The trouble signal shall be acknowledged by operating the "TROUBLE ACKNOWLEDGE" switch. This shall silence the sounder. If subsequent trouble conditions occur, the trouble signal shall resound. During alarm, all trouble signals shall be suppressed with the exception of lighting the yellow "SYSTEM TROUBLE" LEDs.
9. Drift Compensation – Analog Smoke Sensors: System software shall automatically adjust each analog smoke sensor approximately once weekly for changes in sensitivity due to effects of component aging or environment, including dust. Each sensor shall maintain its actual sensitivity under adverse conditions to respond to alarm conditions while ignoring factors which generally contribute to nuisance alarms. System trouble circuitry shall activate, display "DIRTY DETECTOR" and "VERY DIRTY DETECTOR" indications and identify individual unit that requires maintenance.
10. Analog Smoke Sensor Test: System software shall automatically test each analog smoke sensor a minimum of 3 times daily. The test shall be a recognized functional test of each photocell (analog photoelectronic sensors) and ionization chamber (analog ionization sensors) as required annually by NFPA 72. Failure of a sensor shall activate the system

trouble circuitry, display a "Test Failed" indication, and identify the individual device that failed.

11. Off-Premises Connection:

Specifier Notes: Include **one** of the following **three** paragraphs.

- a. Fire Alarm System: Connect via leased telephone lines to a central station or remote station.
- b. Fire Alarm System: Connect to a local energy city master box.
- c. Fire Alarm System: Connect via Digital Alarm Communicator Transmitter (DACT) and telephone lines to a central station or remote station. The panel shall contain a disconnect switch to allow testing of the system without notifying the fire department.

Specifier Notes: Include **one** of the following **three** paragraphs.

12. Remote Station Option: The fire department shall be consulted regarding the authorized remote station serving the municipality. The fire alarm system shall transmit alarm, supervisory, and trouble signals with alarm having priority over supervisory and trouble signals. Required phone lines shall be provided and installed between incoming telephone service and the fire alarm system by the owner's telephone contractor under separate contract. The owner will be responsible for phone company costs.
13. Local Energy City Master Box Option: The fire alarm system shall be connected to a local energy city master box. The city master box shall be coded and timed in accordance with requirements of the fire department. The box shall be surface or flush mounted and located as specified by the building engineer and fire department.
14. Central Station Option: The fire alarm control panel shall provide an integral Digital Alarm Communicator Transmitter (DACT) for signaling to a central station. The DACT shall contain a "Dialer-Runaway" feature preventing unnecessary transmissions as result of intermittent faults in system and shall be Carrier Access Code (CAC) compliant, accepting up to 20-digit central station telephone numbers. The fire department shall be consulted as to authorized central station companies serving municipality. The fire alarm system shall transmit both alarm and trouble signals, with alarm having priority over the trouble signal. The contractor shall be responsible for all installation charges and the owner will be responsible for line lease charges.
15. Network Annunciator Option: Each ILI-MB-E3 and associated display shall provide the option of being configured as network annunciator. Options for annunciation shall default as a regional annunciator with the capability of selecting global annunciation to provide system-wide protection and Acknowledge, Silence, and Reset capabilities.
16. Redundant History Log: Each ILI-MB-E3 shall contain a full 4100 event history log supporting local and network functions. If a main processor or network node is lost, the entire log shall be accessible at any other Loop Interface board. This shall be demonstrated by removing power from the INCC Command Center followed by extraction of the history log from any circuit location, including the INCC Command Center or transponder.
17. LEDs Indicator and Outputs: Each ILI-MB-E3 Loop Interface shall incorporate as a minimum the following diagnostic LED indicators:
 - a. Power: Green.
 - b. Alarm: Red.

- c. Supervisory: Yellow.
 - d. General Trouble: Yellow.
 - e. Ground Fault: Yellow.
 - f. Transmit: Green.
 - g. Receive: Green.
18. Auxiliary Power Outputs: Each ILI-MB-E3 Loop Interface shall provide the following supply outputs:
- a. 24 VDC non-resettable, 1 amp. maximum, power limited.
 - b. 24 VDC resettable, 1 amp. maximum, power limited.
19. Microprocessor: The ILI-MB-E3 shall incorporate a 32-bit RISC processor. An isolated “watchdog” circuit shall monitor the microprocessor and upon failure shall activate system trouble circuits on display. The microprocessor shall access the system program for all control-by-event (CBE) functions. System program shall not be lost upon failure of both primary and secondary power. Programming shall support Boolean logic including AND, OR, NOT, TIME DELAY functions for maximum flexibility.
20. Auto Programming: The system shall provide for all devices on any SLC to be pre-programmed into the system. Upon activation of auto programming, only devices that are present shall activate. This allows for the system to be commissioned in phases without need of additional downloads.
21. Environmental Drift Compensation: The system shall provide for setting Environmental Drift Compensation by device. When the sensor accumulates dust in its’ chamber and reaches an unacceptable level, but is yet below the allowed limit, the control panel shall indicate a maintenance alert warning. When the sensor accumulates dust in the chamber above the allowed limit, the control panel shall indicate an urgent maintenance warning.
22. NON-FIRE Alarm Module Reporting: A non-reporting type ID shall be available for use for energy management or other non-fire situations. NON-FIRE point operation shall not affect control panel operation nor shall it display a message at the panel display. Activation of a NON-FIRE point shall activate the control by event logic, but shall not cause indication on the control panel.
23. One- Man Walk Test:
- a. The system shall provide both basic and advanced walk tests for testing the entire fire alarm system. The basic walk test shall allow a single operator to perform audible tests on the panel. All logic equation automation shall be suspended during the test and while annunciators can be enabled for test, all shall default to a disabled state. During the advanced walk test, field-supplied output point programming shall react to input stimuli, such as CBE and logic equations. When points are activated in advanced test mode, each initiating event shall latch. The advanced test shall be audible and shall be used for pull station verification, magnet activated tests on input devices, input and output device, and wiring operation/verification.
 - b. The test feature is intended to provide for certain random spot testing of the system and is not intended to comply with requirements of testing the fire alarm system in accordance with NFPA 72, as it is impossible to test all functions and verify items such as annunciation with only one person.
24. Signaling Line Circuits: Each ILI-MB-E3 sub-assembly shall provide communication with analog/addressable (initiation/control) devices via two signaling line circuits. Each signaling line circuit shall be capable of being wired Class B, Style 4 or Class A, Style 6. Circuits shall be capable of operating in NFPA Style 7 configuration when equipped with isolator modules between each module type device and isolator sensor bases. Each circuit shall communicate with a maximum of 159 analog sensors and 159 addressable monitor/control devices. A unique 40-character identifier shall be available for each

device. Devices shall be of the Velociti™ series with the capability of polling 10 devices at a time with a maximum polling time of 2 seconds when both SLCs are fully loaded.

25. Notification Appliance Circuits: Two (2) independent NACs shall be provided on the ILLI-MB-E3. They shall be polarized and rated at 2 amperes DC per circuit, over-current protected and supervised for opens, grounds, and short circuits. They shall be capable of being wired Class B, Style Y or Class A, Style Z.
 26. Alarm Dry Contacts: Provide alarm dry contacts (Form C) rated 2 amps at 30 VDC (resistive) that transfer whenever a system alarm occurs.
 27. Supervisory Dry Contacts: Provide supervisory dry contacts (Form C) rated 2 amps at 30 VDC (resistive) that transfer whenever a system supervisory condition occurs.
 28. Trouble Dry Contacts: Provide trouble dry contacts (Form C) rated 2 amps at 30 VDC (resistive) that transfer whenever a system trouble occurs.
- H. The Auxiliary Switch Module (ASM-16) shall have the following features:
1. 16 programmable push-button switches.
 2. Each push-button switch shall have three associated status LEDs (red, yellow, and green), configurable to indicate any combination of functions.
 3. Flexible switch configurations to allow flexible set-up of phone, speaker, and auxiliary function circuits.
 4. An insertable label to identify the function of each switch and LED combination.
 5. Specialty modules that only perform a single task such as speaker, phone, or auxiliary shall not be acceptable.
- I. The Telephone Assembly: Shall include the following items:
1. A mounting cabinet which occupies 2 module locations on the inner door of the INCC.
 2. A standard phone operating on piezo effect with integral 6-foot cord.
 3. An interconnect cable for connection of the phone to the Command Center.
- J. The Microphone Assembly: Shall include the following items:
1. A mounting cabinet which occupies one module location on the inner door of the INCC.
 2. An interconnect cable for connection of the microphone to the INI-VG.
 3. A noise canceling microphone with push-to-talk button.
- K. RPT-E3: Provide capability to communicate with up to 16 ASM-16 assemblies locally, up to 3,000 feet from the INCC Command Center.
- L. Network Repeater Module:
1. The Intelligent Network Interface shall provide interconnection and protection of remote INCC Command Centers and Transponders. The repeater shall regenerate and condition token-passing, 625 K baud signal between units. The repeater shall be available in wire, fiber, or wire/fiber configurations as determined by field conditions.
 2. Fiber configurations shall use "ST"-type connectors and be able to operate with up to 200-micron multi-mode fiber, but optimize for 62.5/125. The interface shall have a jumper to allow selection of ground detection of wiring when used in the wire mode. The interface shall have integral LEDs to display the current status of the assembly.
- M. The Network Graphic Annunciator (NGA): Shall be a networkable, 1/4 VGA, touch-screen annunciator with the following characteristics:
1. Custom Graphics: The panel shall permit uploading of custom bit-mapped graphic to the display screen. The graphic shall display when all systems are normal.

2. Intuitive Functions: In alarm or trouble condition, the annunciator shall display only information pertaining to the event, including control switches.
 - a. Trouble Condition: The display shall indicate the cause of the trouble. The only controls available to the operator shall be the Acknowledge and Reset functions.
 - b. Alarm Condition: The display shall indicate the cause of the alarm. The only controls available to the operator shall be the Acknowledge, Silence, and Reset functions.

2.4 INTELLIGENT NETWORK TRANSPONDER (INX)

- A. The system shall be of multiprocessor design to allow maximum flexibility of capabilities and operation. The INX shall receive, transmit, and regenerate voice, fire fighter phones, and data over a single pair of wire or fiber optic cable.
- B. The INX shall provide full multi-channel distributed voice messaging, with integrated switching amplification, SLC and extended phone riser. The INX shall communicate with the network system in true peer-to-peer fashion operating at 625 K baud over any combination of fiber or wire media. It shall consist of the following units and components:
- C. System Cabinet: The System cabinet shall have texture finish and be surface or semi-flush mounted. It shall consist of 4 parts: back box, back plate, inner door, and outer door. The System cabinet houses an INI-VG, PM-9 power supply, up to four (4) AM50 amplifiers, microphone, and related circuitry
- D. Intelligent Network Interface Voice Gateway (INI-VGX): The INI-VG shall be a multi-function sub-assembly interchangeable in both the INCC and INX. Functions of the sub-assembly shall include the following features as a minimum:
 1. Network interface operating at 625 K baud configurable with any combination of wire and/or fiber topologies. The interface shall communicate with up to 64 total INCC, INX, and Model 7100 control panels in peer-to-peer fashion.
 2. Fire Fighter Phone Riser: The INI-VG shall generate a local phone riser for use with AOM-TELF phone modules for connection to fire fighter phones. The INI-VG shall interface its local phone riser to network in true Style 7 fashion.
 3. Signaling Line Circuit (SLC): The INI-VGX shall generate a local SLC to communicate with and control up to 16 AOM-TELF modules and 32 AOM-2SF or AOM-MUXF circuits for fire phone interfacing and additional split-speaker circuits.
 4. RS-485: Provide capability to communicate with up to 16 ASM-16 modules, when used in INX mode up to 3,000 feet.
 5. Advanced Processing: The INI-VGX shall incorporate the latest in digital signaling processing technology with supporting Boolean logic including AND, OR, NOT, TIME DELAY functions.
 6. Voice Generation: The INI-VGX shall incorporate all processing to allow for 16 distinct recorded messages used in priority fashion with message 1 as highest priority. Total length for 1 to 16 messages shall be up to 3 minutes.
- E. Power Supply Module (PM-9): The PM-9 power supply shall supply all necessary power under both normal and emergency conditions. The power supply shall provide capacity to charge up to 55 amp-hour batteries while under full load. The technology used shall be of power-saving switching configuration, eliminating the need of a stepping transformer.

- F. Audio Amplifier (AM-50) shall include as a minimum, the following features:
1. 50-watt switching audio amplifier, requiring no transformer when used in 25-watt mode.
 2. Two (2) individually addressable loudspeaker appliance circuits, each with capability of handling part or all of 50-watt supplied power.
 3. Power shall be 24 VDC supplied via terminal block from local PM-9 power supply.
 4. Ability to select from 1 of 16 pre-programmed messages in the INI-VG, and paging either from locally or from INCC Command Center.
 5. Back-up amplification configurable so one AM-50 can perform back-up, or perform 1-to-1 back-up if configured to do so in programming.
 6. Status LEDs to indicate normal operation and trouble condition.

2.5 PRINTERS

- A. Printers: Shall be UL Listed as an EDP device, of the automatic type, printing code, time, date, location, category, and condition.
1. Provide hard-copy printout of all changes in status of system and time-stamp such printouts with the current time-of-day and date.
 2. Standard carriage with 80 characters per line.
 3. Use standard pin-feed paper.
 4. Housed in a separate enclosure suitable for placement on desktop or table.
 5. Communicate with the control using an interface complying with EIA-232-D.
 6. Power: 120 VAC at 60 Hz.

2.6 SUPPLEMENTAL NOTIFICATION APPLIANCE CIRCUIT (SNAC)

<p>Specifier Notes: Specify Model SNAC-6 or SNAC-9.</p>

- A. SNAC shall be Model [SNAC-6] [SNAC-9] offering [up to 6.0 amperes (4.0 amp. continuous)] [9.0 amp. (6.0 amp. continuous)] of regulated 24-volt power. The SNAC shall include the following features:
1. Integral Charger: Charge 7.0 amp-hour batteries and support 60-hour standby.
 2. 2 Input Triggers. The input trigger shall be a Notification Appliance Circuit (from the fire alarm control panel) or a relay.
 3. Surface-mount back box.
 4. Ability to delay AC failure signal in accordance with applicable NFPA requirements.
 5. Power limited circuitry in accordance with applicable UL standards.

2.7 SYSTEM PERIPHERALS

- A. Addressable Devices – General:
1. Provide address-setting means using rotary-decimal switches.
 2. Shall be equipped with decade-type address switches that operate by using a standard screwdriver to rotate 2 dials to set the address. Devices which use a binary address set via DIPswitch, handheld device programmer, or other special tools for setting the device address shall not be acceptable.
 3. Smoke Sensors: Analog and addressable. Connect to fire alarm control panel's Signaling Line Circuits.
 4. Addressable Thermal Sensors: Provide 2 status LEDs. Both LEDs shall flash under normal conditions, indicating sensor is operational and in regular communication with control panel, and both LEDs shall be lit steadily by the control panel, indicating that an

alarm condition has been detected. If required, the flashing mode operation of sensor LEDs can be programmed off via fire control panel program.

5. Fire Alarm Control Panel: Permit sensor sensitivity adjustment through field programming of the system. Sensitivity can be automatically adjusted by the panel on a time-of-day basis.
 6. Using software in the INCC Command Center, sensors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. Sensors shall be listed as meeting calibrated sensitivity test requirements of NFPA 72, Chapter 7.
 7. Sensors shall be ceiling or wall-mounted and shall include a separate twist-lock base with tamper-proof feature.
 8. Following bases and auxiliary functions shall be available:
 - a. Standard base with remote LED output.
 - b. Base with sounder rated at 85 dBA minimum.
 - c. Form-C relay base rated 30 VDC, 2.0 A.
 - d. Isolator base.
 9. Sensors shall provide test means whereby they will simulate alarm condition and report that condition to the control panel. Such test shall be initiated at the sensor itself by activating a magnetic switch or initiated remotely on command from the control panel.
 10. Sensors shall store the internal identifying type code that the control panel shall use to identify the type of device (ION, PHOTO, THERMAL).
- B. Addressable Manual Stations (MS-7AF, MS-95-S):
1. Manual Fire Alarm Stations: Non-code, non-break glass type, equipped with key lock so they may be tested without operating handle.
 2. Operated Station: Visually apparent, as operated, at a minimum distance of 100 feet (30.5 m) from front or side.
 3. Stations shall be designed so after actual activation, they cannot be reset to normal except by key.
 4. Manual stations shall be constructed of Lexan with clearly visible operating instructions provided on cover. The word FIRE shall appear on front of stations in raised letters, 1.75 inches (44 mm) or larger.
 5. Addressable manual stations shall, on command from control panel, send data to the panel representing the state of the manual switch and addressable communication module status.
- C. Addressable Thermal Sensors (ATD-RL2F): Sensors with a thermal set point of 135 degrees F (58 degrees C) and have a rate-of-rise element rated at 15 degrees F (9.4 degrees C) per minute. Connect via 2 wires to fire alarm control panel signaling line circuit.
- D. Analog Addressable Photoelectric Smoke Sensors (ASD-PL2F): Use photoelectric (light-scattering) principle to measure smoke density and shall, on command from control panel, send data to the panel representing the analog level of smoke density.
- E. Analog Addressable Ionization Smoke Sensors (ASD-IL2F): Use dual-chamber ionization principle to measure products of combustion and shall, on command from the control panel, send data to the panel representing the analog level of products of combustion.

- F. Analog Addressable Multi-Criteria Acclimating Sensors (MCS-ACCLIMATE2F):
1. It shall be an addressable device designed to monitor both photoelectronic and thermal technologies in single-sensing device. It shall include an ability to adapt to its environment by using an integral microprocessor to determine its environment and choose appropriate sensing settings. It shall allow a wide sensitivity window, with no less than 1 to 4 percent per foot obscuration. It shall use advanced electronics that react to slow smoldering fires and thermal properties within a single sensing device.
 2. Microprocessor: Shall be capable of selecting appropriate sensitivity levels based on the environment type it is in, such as office, manufacturing, or kitchen, and then have ability to automatically change setting as the environment changes, such as when walls are moved or as occupancy changes.
 3. The multi-criteria detection device shall include the ability to combine the signal of a thermal sensor with the signal of a photoelectronic sensor to react speedily in event of a fire situation. It shall have an inherent ability to distinguish between a fire condition and a false alarm condition by examining the characteristics of both thermal and smoke sensing chambers and compare them to a database of actual fire and deceptive phenomena.
- G. Analog Addressable Laser Sensors (ASD-LS): A sensing device that uses a laser diode similar to the manner in which a photoelectronic sensor uses LEDs inside the sensing chamber. The sensor design shall allow a wide sensitivity window, with no less than 0.2 to 4 percent per foot obscuration. The sensor shall be used as indicated in special application clean-room-type environments only.
- H. Analog Addressable Duct Smoke Sensors (ADPF):
1. In-Duct Smoke Sensor Housing: Shall use an integral analog addressable photoelectric sensor, which provides continuous analog monitoring and alarm verification from the panel.
 2. When sufficient smoke is sensed, an alarm signal shall be initiated and appropriate action taken to shut down or change over air handling systems to help prevent rapid distribution of toxic smoke and fire gases throughout areas served by the duct system.
 3. Duct smoke sensors mounted above the ceiling or otherwise obstructed from normal view shall be provided with a remote alarm indicator.
 4. Each sensor: Install in either the supply side or return side duct in accordance with the appropriate codes.
- I. Addressable Dry Contact Monitor Modules (AMM-2F):
1. Provide to connect one (1) supervised IDC zone of conventional alarm initiating devices (any N.O. dry contact device) to the fire alarm control panel SLC.
 2. Mount in a standard deep electrical box.
 3. IDC Zone: Suitable for Style B (Class B) operation.
- J. Addressable Dry Contact Monitor Modules (AMM-4F):
1. Provide to connect one (1) supervised IDC zone of conventional alarm initiating devices (any N.O. dry contact device) to the fire alarm control panel SLC.
 2. Mount in a 4-inch (102-mm) square, 2-1/8-inch (54-mm) deep electrical box.
 3. IDC Zone: Suitable for Style D (Class A) or Style B (Class B) operation.
 4. LEDs: Shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.

- K. Addressable Dry Contact Monitor Modules (AMM-2IF):
 - 1. Provide to connect two (2) supervised IDC zones of conventional alarm initiating devices (any N.O. dry contact device) to the fire alarm control panel SLC
 - 2. Mount in a 4-inch (101.6-mm) square, 2-1/8-inch (54-mm) deep electrical box.
 - 3. IDC Zones: Suitable for Style B (Class B) operation.
 - 4. LEDs: Shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with control panel.

- L. Addressable Dry Contact Monitor Modules (MMI-10F):
 - 1. Provide to connect 10 supervised Style B (Class B) IDC zones or 5 supervised Style D (Class A) zones of conventional alarm initiating devices (any N.O. dry contact device) to the fire alarm control panel SLC.
 - 2. Mount in factory-supplied BB-2 or BB-6 enclosure.
 - 3. LEDs: Shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with control panel.

- M. 2-Wire Detector Monitor Modules (AMM-4SF):
 - 1. Provide to connect one (1) supervised IDC zone of conventional 2-wire smoke detectors or alarm initiating devices (any N.O. dry contact device).
 - 2. Mount in 4-inch (101.6-mm) square, 2-1/8-inch (54-mm) deep electrical box or to optional surface-mounted back box.
 - 3. IDC Zone: Wired for Style D (Class A) or Style B (Class B) operation.
 - 4. LEDs: Shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with control panel.

- N. 2-Wire Detector Monitor Modules (MMI-6SF):
 - 1. Provide to connect six (6) supervised Style B (Class B) IDC zones of conventional 2-wire smoke detectors or alarm initiating devices (any N.O. dry contact device).
 - 2. Mount in a factory-supplied BB-2 or BB-6 enclosure.
 - 3. LEDs: Shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with control panel.

- O. Addressable Control Modules (AOM-2SF):
 - 1. Provide to supervise and control operation of one conventional NAC of compatible, 24-VDC powered, polarized audio/visual notification appliances or UL-listed polarized relays for fan shutdown and other auxiliary control functions.
 - 2. Mount in a standard 4-inch (101.6-mm) square, 2-1/8-inch (54-mm) deep electrical box or to surface-mounted back box.
 - 3. Control Module NAC: Wire for Style Z or Style Y (Class A/B) with a capacity of up to 1 amp of inductive signal or 2 amps of resistive signal operation. Relay coil shall be magnetically latched to reduce wiring connection requirements and to ensure 100 percent of all auxiliary relay or NACs shall be energized simultaneously on the same pair of wires.
 - 4. Audio/Visual Power: Provide by separate supervised power circuit from the main fire alarm control panel or from a supervised, Listed for Fire remote power supply.

- P. Addressable Control Modules (MMO-6SF):
 - 1. Provide to supervise and control operation of one (1) conventional NAC of compatible, 24-VDC powered, polarized audio/visual notification appliances or UL-listed polarized relays for fan shutdown and other auxiliary control functions.
 - 2. Mount in a factory-supplied BB-2 or BB-6 enclosure.

3. LEDs: Shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.
4. Control module NAC: Wire for Style Z or Style Y (Class A/B) with up to 1 amp of inductive signal or 2 amps of resistive signal operation. The relay coil shall be magnetically latched to reduce wiring connection requirements and to ensure 100 percent of all auxiliary relay or NACs shall be energized at same time on same pair of wires.
5. Audio/Visual Power: Provide by separate supervised power circuit from the main fire alarm control panel or from a supervised, Listed for Fire remote power supply.

Q. Addressable Relay Modules (AOM-2RF):

1. Available for HVAC control and other building functions. The relay shall have two (2) Form C sets of contacts that operate in tandem and are rated for a minimum of 2.0 amps resistive, or 1.0 amps inductive. The relay coil shall be magnetically latched to reduce wiring connection requirements and to ensure 100 percent of all auxiliary relay or NACs shall be energized simultaneously on the same pair of wires.
2. Mount in a standard 4-inch (101.6-mm) square, 2-1/8-inch (54-mm) deep electrical box or in a surface-mounted back box.

R. Addressable Relay Modules (MMO-6RF):

1. Available for HVAC control and other building functions. The relay shall be Form C and rated for a minimum of 2.0 amps resistive or 1.0 amp inductive. The relay coil shall be magnetically latched to reduce wiring connection requirements and to ensure 100 percent of all auxiliary relay or NACs shall be energized simultaneously on the same pair of wires.
2. Mount in a factory-supplied BB-2 or BB-6 enclosure.
3. LEDs: Shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.

S. Isolator Modules (M500X):

1. Provide to automatically isolate wire-to-wire short circuits on Style 6 (Class A) or Style 4 (Class B) SLCs. The isolator module shall limit the number of modules or sensors that may be rendered inoperative by short-circuit fault on an SLC segment or branch. At least one isolator module shall be provided for each floor or protected zone of the building. No more than 25 devices shall be connected to one isolator module.
2. If a wire-to-wire short circuit occurs, the isolator module shall automatically open (disconnect) the SLC. When the short-circuit condition is corrected, the isolator module shall automatically reconnect the isolated section.
3. The module shall not require address-setting, and its operations shall be totally automatic. It shall not be necessary to replace or reset the isolator module after normal operation.
4. Mount in a standard 4-inch (101.6-mm) deep electrical box or in surface-mounted back box.
5. Single LED: Shall flash to indicate that the isolator is operational and light steadily to indicate that the short-circuit condition has been detected and isolated.

T. Conventional Heat Detectors:

1. Shall be of the combination rate-of-rise and fixed temperature type rated at 135 degrees F (57.2 degrees C) for areas where ambient temperatures do not exceed 100 degrees F (37.7 degrees C), and 200 degrees F (93.3 degrees C) for areas where temperature does not exceed 150 degrees F (65.5 degrees C).
2. Low profile, ceiling-mount type with positive indication of activation.

3. Rate-of-Rise Element: Air chamber, flexible metal diaphragm, and factory-calibrated, moisture-proof, trouble-free vent, and shall operate when rate of temperature rise exceeds 15 degrees F (9.4 degrees C) per minute.
4. Fixed-Temperature Element: Fusible-alloy retainer and actuator shaft.
5. Smooth Ceiling Rating: 2,500 square feet (762 m²).

U. Conventional Photoelectronic Area Smoke Detectors:

1. Shall be of the 24-VDC, 2-wire, ceiling-mounted, light-scattering type using an LED light source.
2. Each detector shall have a built-in test switch and output for a remote LED.
3. Provide on twist-lock base.
4. A calibrated sensitivity and performance test may be performed on the detector without need for generation of smoke. The test method shall test all detector circuits.
5. Visual Indication of Alarm: Provide by dual-latching LEDs on the detector, visible from ground level over 360 degrees. LEDs shall flash every 10 seconds, indicating that power is applied to the detector.
6. Detector shall not alarm or go into trouble condition when exposed to air velocities of up to 3,000 feet (914.4 m) per minute.
7. Detector Screen and Cover Assembly: Easily removable for field cleaning of detector chamber.
8. Field-Wire Connections: Made to base through use of clamping plate and screw.

V. Conventional Ionization-Type Smoke Detectors:

1. Shall be of the 24-VDC, 2-wire, ceiling-mounted, type using a dual uni-polar chamber.
2. Each detector shall have a built-in test switch and output for a remote LED.
3. Provide on twist-lock base.
4. It shall be possible to perform a calibrated sensitivity and performance test on the detector without need for the generation of smoke.
5. Visual Indication of Alarm: Provide by dual-latching LEDs over 360 degrees, on the detector, visible from ground level. LEDs shall flash every 10 seconds, indicating that power is applied to the detector.
6. The detector shall not alarm or go into trouble condition when exposed to air velocities of up to 1,200 feet (365.76 m) per minute.
7. Detector Screen and Cover Assembly: Easily removable for field cleaning of detector chamber.
8. Field-Wire Connections: Made to base through use of clamping plate and screw.

W. Projected Beam Detectors:

1. The detectors shall be 4-wire, 24-VDC devices.
2. The beam detector shall have a separate transmitter and receiver capable of being powered separately or together.
3. It shall operate in either short-range (30 feet to 100 feet) or long-range (100 feet to 330 feet) mode.
4. Operating ambient temperature range: Minus 22 degrees F to 131 degrees F.
5. The detector shall have a bank of 4 alignment LEDs on both receiver and transmitter to facilitate proper alignment of the unit without special tools.
6. It shall have an automatic gain control to compensate for gradual signal deterioration from dirt accumulation on lenses.
7. It shall be ceiling and wall mountable.

8. It shall have the ability to be tested using calibrated test filters or a magnet-activated remote test station.
- X. Sprinkler Waterflow Switches (provided and installed by the sprinkler contractor):
1. Shall be of the integral, mechanical, non-coded, non-accumulative retard type.
 2. Alarm transmission delay time shall be readily adjustable from 0 to 60 seconds. Initial settings shall be 30 to 45 seconds.
 3. The switches shall be by a single manufacturer and of the same series.
 4. Where possible, locate waterflow switches a minimum of 1 foot from the fitting which changes direction of flow and a minimum of 3 feet from the valve.
- Y. Sprinkler and Standpipe Valve Supervisory Switches (provided and installed by the sprinkler contractor):
1. Each sprinkler system water supply riser control valve, zone control valve, and standpipe system riser control valve shall be equipped with a supervisory switch. Standpipe hose valves, test valves, and drain valves shall not be equipped with supervisory switches.
 2. PIV (Post Indicator Valve) or Main Gate Valves: Equip with supervisory switch.
 3. Mount not to interfere with normal operation of valve and adjust to operate within 2 revolutions toward closed position of valve control, or when stem has moved no more than one-fifth of distance from normal position.
 4. Contain in weatherproof housing, which shall provide 3/4-inch (19-mm) conduit entrance and incorporate necessary facilities for attachment to valves.
 5. Switch housing finish: Red baked enamel.
 6. Entire installed assembly: Tamper proof and arranged to cause switch operation if housing cover is removed or if unit is removed from mounting.
- Z. Graphic Annunciator (Uses ANU-48 Serial Driver Module):
1. Shall communicate with the fire alarm control panel via an EIA-485 (multi-drop) 2-wire communication circuit. Up to 16 annunciator drivers, each configured up to 48 points, may be connected per ILI-MB-E3 or INI-VGC.
 2. The EIA-485 Repeater shall be available to extend the EIA-485 wire distance in 3,000-foot (914.4-m) increments.
 3. The ANU-48 remote annunciator output module shall provide interface to an approved UL-listed graphic-style annunciator and shall provide all of the features specified.
- AA. LCD Display Annunciator:
1. Furnish and install as indicated on the drawings a remote serial annunciator, Model LCD-7100. The annunciator shall provide an 80-character display, which shall duplicate all information on basic system display, including any network nodes its host panel is annunciating, with exception of menus. Contains the following function keys:
 - a. Alarm Acknowledge.
 - b. Trouble Acknowledge.
 - c. Signal Silence.
 - d. System Reset/Lamp Test.
 - e. System Drill Test.
 2. Key Lock: Enables switches only when placed in the "ON" position, with exception of Trouble Acknowledge, which is used to silence the local trouble audible sounder. Annunciator shall contain the following LEDs:
 - a. Alarm.
 - b. Supervisory.

- c. System Trouble.
- d. Power Fault.
- e. System Silenced.
3. Mount on a standard 3-gang surface or flush electrical box.
4. Each ILI-MB-E3: Accommodates up to 5 remote LCD-7100 annunciators which can be located up to 3,000 feet from control panel.

BB. Portable Emergency Telephone Handset Jacks:

1. Flush mount on stainless steel plates as indicated on the drawings.
2. Listed or approved for emergency telephone system application.
3. Insertion of a remote handset plug into a jack shall send a signal to the INCC Command Center which shall audibly and visually indicate on-line condition and sound a ring indication in handset.
4. 2-Way Emergency Telephone System: Shall support a minimum of five (5) handsets on line without degradation of signal
5. Cabinet: Provide in fire control room to house 10 portable handsets.

CC. Fixed Emergency Telephone Handsets:

1. Telephone Cabinets:
 - a. Shall be painted red and clearly labeled as an emergency telephone.
 - b. Locate as indicated on the drawings.
 - c. The key shall be the same as for the INCC Command Center, INX Transponders, and manual stations.
2. Handset Cradle: Shall have a cam-operated microswitch connection so that the act of lifting the handset off the cradle shall send a signal to the INCC Command Center which shall audibly and visually indicate an on-line (off-hook) condition. Open blade finder contacts shall not be acceptable.
3. 2-Way Emergency Telephone System: Shall supports a maximum of five 5 handsets on line (off hook) without degradation of signal.

DD. Speakers:

1. Operate on 25 VRMS or with field-selectable output taps from 0.5 to 2.0 watts.
2. Speakers in corridors and public spaces shall produce a nominal sound output of 84 dBA at 10 feet (3 m).
3. Frequency Response: Minimum of 400 Hz to 4,000 Hz.
4. The back of each speaker shall be sealed to protect speaker cone from damage and dust.

EE. Strobes:

1. Shall comply with the ADA and UL Standard 1971.
2. Maximum Pulse Duration: 0.2 second.
3. Strobe Intensity: Per UL 1971.
4. Flash Rate: Per UL 1971.
5. Strobe Candela Rating: Selectable by positioning the selector switch on the back of the device.

FF. Speaker/Strobes:

1. Shall operate on 25 VRMS or with field-selectable output taps from 0.5 to 2.0 watt
2. Speakers in corridors and public spaces shall produce a nominal sound output of 84 dBA at 10 feet (3 m).
3. Frequency Response: Minimum of 400 Hz to 4,000 Hz.

4. The back of each speaker shall be sealed to protect the speaker cone from damage and dust.
5. Audibility: Per NFPA 72.
6. Maximum Pulse Duration: 0.2 second.
7. Strobe Intensity: Per UL 1971.
8. Flash Rate: Per UL 1971.
9. Strobe Candela Rating: Selectable by positioning selector switch on the back of the device.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine areas and surfaces to receive the fire alarm system.
 1. Notify the Architect of conditions that would adversely affect installation or subsequent use.
 2. Do not begin installation until unacceptable conditions are corrected.

3.2 INSTALLATION

- A. Install fire alarm system in accordance with NFPA 72, NFPA 70, state and local codes, manufacturer's instructions, and as indicated on the drawings.
- B. Conceal conduit, junction boxes, and conduit supports and hangers in finished areas. Conceal or expose conduit, junction boxes, and conduit supports and hangers in unfinished areas.
- C. Do not install smoke sensors before the system programming and test period. If construction is ongoing during this period, take measures to protect the smoke sensors from contamination and physical damage.
- D. Flush-mount fire detection and alarm system devices, control panels, and remote annunciators in finished areas. Flush-mount or surface-mount fire detection and alarm system devices, control panels, and remote annunciators in unfinished areas.
- E. Ensure manual stations are suitable for surface mounting or semi-flush mounting as indicated on the drawings. Install not less than 42 inches, nor more than 48 inches, above finished floor measured to operating handle.

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services: Provide service of competent, factory-trained technician authorized by manufacturer to technically supervise and participate during pre-testing and acceptance testing of system.
- B. Testing:
 1. Conduct a complete visual inspection of control panel connections and test wiring for short circuits, ground faults, continuity, and insulation before energizing cables and wires.
 2. Close each sprinkler system control valve and verify the proper supervisory alarm at the INCC Command Center.

3. Verify activation of all flow switches.
4. Open all initiating device circuits and verify that the trouble signal actuates.
5. Open all signaling line circuits and verify that the trouble signal actuates.
6. Open and short all notification appliance circuits and verify that the trouble signal actuates.
7. Ground all initiating device circuits and verify the response of trouble signals.
8. Ground all signaling line circuits and verify the response of trouble signals.
9. Ground all notification appliance circuits and verify the response of trouble signals.
10. Check the alert tone and recorded voice message for audibility on notification appliances.
11. Check installation, supervision, and operation of analog addressable smoke sensors.
12. Introduce on the system each of the alarm conditions that the system is required to detect. Verify proper receipt and proper processing of the signal at the INCC Command Center and correct activation of control points.
13. Consult manufacturer's manual to determine proper testing procedures when the system is equipped with optional features. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality, and similar.

C. Acceptance Testing:

1. Before the installation shall be considered completed and acceptable by the AHJ, a complete test using as a minimum, the following scenarios shall be performed and witnessed by representative approved by the Engineer. The monitoring company and/or fire department shall be notified before the final test in accordance with local requirements.
2. Contractor's job foreman, in presence of the representative of the manufacturer, representative of the Owner, and fire department shall operate every installed device to verify proper operation and correct annunciation at the control panel.
3. Open signaling line circuits and notification appliance circuits in at least 2 locations to verify presence of supervision.
4. Completely disconnect the INCC Command Center from the rest of the network, including the voice INCC Command Center. Activate an initiating device from the transponder. All speaker circuits activated from each transponder shall transmit the correct evacuation or alert message. These messages shall be the same messages transmitted with the INCC Command Center activated. Default tones or messages shall not be acceptable.
5. Completely disconnect the INCC Command Center from the rest of the network. Activate the initiating devices. All control outputs supported by transponder SLC circuits shall operate under the project programming mode. Default or degrade mode programming shall not be acceptable.
6. The fire fighter phone riser shall be directly shorted between the INCC Command Center and first transponder, followed by a test of fire phones between the INCC Command Center and the farthest transponder. The phones shall operate in normal fashion.
7. All audio risers shall be directly shorted between the INCC Command Center and first audio transponder, followed by activation of an alarm initiating device. Correct recorded messages shall issue from all speakers, including evacuation and alert channels. Default or degrade messages shall not be acceptable.
8. When testing has been completed to satisfaction of both the Contractor's job foreman and representatives of the manufacturer and owner, a notarized letter co-signed by each attesting to the satisfactory completion of said testing shall be forwarded to the owner and fire department.
9. Leave the fire alarm system in proper working order and, without additional expense to owner, replace defective materials and equipment provided within 1 year (365 days) from date of final acceptance by the owner.

3.4 DEMONSTRATION

- A. Provide instruction as required for operating the fire alarm system.
- B. Provide hands-on demonstrations of operation of the fire alarm system components and functions.

END OF SECTION