DATE: 6/29/2009
PROJECT NAME: Typical Military Mass Notification Spec
ADDRESS:
ADDRESS2:
CITY:
STATE:
ZIP:
PROJECT ENGINEER:
CONTACT PERSON:
PHONE:
FAX:
PROJECT NUMBER:
FILE NAME:

SECTION 13850 (28 31 00)

NETWORKED FIRE ALARM & MASS NOTIFICATION SYSTEM
US ARMY OR AIR FORCE INSTALLATIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Expandable emergency evacuation fire alarm system.

1.2 RELATED SECTIONS

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

1.4 SYSTEM DESCRIPTION

A. A new intelligent reporting, 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):

Limited to only 80 percent of its total capacity during initial installation.

C. Basic Performance:
   1. Network Communications Circuit (NetSOLO) Serving Network Nodes: Wired using single twisted non-shielded 2-conductor cable or connected using approved fiber optic cable between nodes in Class A configuration (NFPA Style 7).
   2. Signaling Line Circuits (SLC) Serving Addressable Devices: Wired Style 6 (Class A).
   3. Initiation Device Circuits (IDC) Serving Non-addressable Devices Connected to Addressable Monitor Modules: Wired Class A (NFPA Style D).
   4. Notification Appliance Circuits (NAC) Serving Strobes and Speakers: Wired Class A (NFPA Style Z).
   5. On Style 6 or 7 (Class A) Configurations: Single ground fault or open circuit on Signaling Line Circuit shall not cause system malfunction, loss of operating power, or ability to report alarm.
   6. Alarm Signals Arriving at INCC COMMAND CENTER: Not be lost following primary power failure until alarm signal is processed and recorded.
   7. Transponders:
      a. Operate in peer-to-peer fashion with other panels and transponders in system.
      b. Each transponder shall store copy 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. Communicated between panels and transponders on single pair of copper wires or fiber optic cables.
      b. To enhance system survivability, ability to operate on loss of INCC Command Center, short or open of entire riser at INCC Command Center shall be demonstrated at 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. Reside in remote transponders with associated audio zones.
      b. SLC modules shall operate in peer-to-peer fashion with all other panels and transponders in system.
      c. On loss of INCC Command Center, each transponder shall continue to communicate with remainder of system, including all SLC functions and audio messages located in all transponders.
      d. Systems that provide a "Degraded" mode of operation upon loss of INCC Command Center or short in riser shall not be acceptable.
   10. Audio Amplifiers and Tone-Generating Equipment: Electrically supervised for normal and abnormal conditions.
   11. Amplifiers: 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.
   12. Speaker NAC Circuits: Arranged such that there is a minimum of 1

speaker circuit per fire alarm zone.

13. Notification Appliance Circuits (NAC), Speaker Circuits, and Control Equipment: Arranged such that loss of any 1 speaker circuit will not cause loss of any other speaker circuit in system.
14. Speaker Circuits:
    a. Electrically supervised for open and short circuit conditions.
    b. If short circuit exists on speaker circuit, it shall not be possible to activate that circuit.
    c. Arranged for 25 VRMS and shall be power limited in accordance with NEC. (20 percent spare capacity for future expansion or increased power output requirements.)
15. Speaker Circuits and Control Equipment:
    a. Arranged such that loss of any 1 speaker circuit will not cause loss of any other speaker circuit in system.
    b. Systems utilizing "bulk" audio configurations shall not be acceptable.
16. Voice Communication:
    a. Connect telephone circuits to speaker circuits to allow voice communication over speaker circuit from telephone handset.
    b. Capable of remote phone-to-phone conversations and party-line communications as required.

D. Basic System Functional Operation: When fire alarm condition is detected and reported by 1 of the system alarm initiating devices, the following functions shall immediately occur:
    1. System Alarm LED's: Flash.
    2. Local Piezo-Electric Signal in Control Panel: Sound at a pulse rate.
    3. 80-Character LCD Display: Indicate all information associated with fire alarm condition, including type of alarm point and its location within protected premises.
    4. Historical Log: Record information associated with fire alarm control panel condition, along with 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: Sound 3 rounds of slow whoop tone followed by voice evacuation message and this scenario repeating or other message as approved by local authority until system is reset.

E. Fire Alarm System Functionality:
    7. Provide complete, electrically supervised distributed, Style 7 networked analog/addressable fire alarm and control system, with analog initiating devices, integral multiple-channel voice evacuation, and fire fighter's phone system.
    8. Fire Alarm System:
        a. Consist of multiple-voice channels with no additional hardware required for total of 4 channels.
        b. Incorporate multiprocessor-based control panels, including model E3 Series including Intelligent Network INCC Command Center(s) (INCC), Intelligent Loop Interface (ILI-MB-E3), Intelligent Network Transponders (INX), communicating over peer-to-peer token ring

network with capacity of up to 64 nodes.

9. Each ILI-MB-E3 Node: Incorporate 2 Signaling Line Circuits (SLC), with capacity to support up to 99 analog addressable detectors and 98 addressable modules per SLC.
10. Voice, Data, and Fire Fighter's Phone Riser: Transmit over single pair of wires or fiber optic cable.
11. Each Intelligent Network Transponder: Capable of providing 16 distributed voice messages, fire fighter phones connections, SLC loop for audio control devices, and integral network interface.
12. Each Network Node: Incorporate Boolean control-by-event programming, including as a minimum AND, OR, NOT, and Timer functions.
13. Control Panels: Capability to accept firmware upgrades via connection with laptop computer, without requirement of replacing microchips.
14. 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.
15. Each Network Node:
    a. Capability of being programmed off-line using Windows-based software supplied by fire alarm system manufacturer. Capability of being downloaded by connecting laptop computer into any other node in system. Systems that require system software to be downloaded to each transponder at each transponder location shall not be acceptable.
    b. Capability of being grouped with any number of additional nodes to produce a "Region", allowing that group of nodes to act as 1, while retaining peer-to-peer functionality. Systems utilizing "Master/Slave" configurations shall not be acceptable.
    c. Capability of annunciating all events within its "Region" or annunciating all events from entire network, on front panel LCD without additional equipment
16. Each SLC Network Node: Capability of having integral DACT (digital alarm communicator transmitter) that can report events in either its region, or entire network to single central station monitoring account.
17. Each ILI-MB-E3 Panel: Capability of storing its entire program, and allow installer to activate only devices that are installed during construction, without further downloading of system.
18. Password Protection: Each system shall be provided with 4 levels of password protection with up to 16 passwords.
19. Have the capacity for multiple pre-recorded messages (at least sixteen (16), but more if required by the DOD installation). Pre-recorded messages shall be passed in the English language and, for OCONUS locations, also in the predominant language(s) used by the host nation. Pre-recorded messages, if used, should address at least these subjects:
    • Bomb threat or actual bomb within/around the building
    • Intruder/hostile person sighted within/around the building
    • Directions to occupants to take cover within the building

- Evacuation of the building using exits other than the normal main entrance/exit (since the front entrance/exit is often a location targeted by terrorists)
- Emergency weather conditions appropriate for the local area
- “All Clear” message
- A test message intended for verifying functionality of the system

1.5 SUBMITTALS

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: 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: Lists each section of equipment submittal.
   3. Scope of Work Narrative: Detail indented scope of work.
   4. Sequence of Operations: 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: Indicate for each component of system the following:
      a. Quantity.
      b. Model number.
      c. Description.
   6. SLC Circuit Schedule: 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: 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:
    a. Provide 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. Prepare using AutoCAD.
    d. Prepare 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: 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 sheet that details exterior and interior views of control panel and clearly shows associated wiring information.
5. Annunciator Panels: Provide sheet that details exterior and interior views of annunciator panels and clearly shows associated wiring information.

E. Certification: Submit with equipment submittals and shop drawings, letter of certification from major equipment manufacturer, indicating proposed engineered system distributor is an authorized representative of 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, but revised to reflect changes made during construction.
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:

    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.
l. UFC 4-021-01 (United Facilities Criteria)

B. 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.

C. 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 SYSTEM DESIGN

A. The individual building MNS shall be designed under the supervision of a ***registered professional engineer*** with a minimum of four years of current work experience in fire protection, electrical, and communication-electronics engineering areas specific to individual building MNS. Alternately, the individual building MNS may be designed by an ***engineering technologist verified by NICET as certified at Level IV*** in low voltage electronic-communications

systems or at Level IV in fire alarm systems, plus this engineering technologist shall possess a minimum of four years current work experience specific to individual building MNS communications-electronics. Alternately, the individual building MNS may be designed by an engineering technologist that possesses a minimum of ten years of documented current work experience specific to individual building MNS communications-electronics. The individual's name, signature, and professional engineer number or NICET certification number (when applicable) shall be included on all final design documents. Failure to provide the designers information at the time of the bid shall result in the bid being deemed unqualified and unresponsive..

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 from Gamewell 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 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 specification with each copy of the submittals that has had each paragraph marked as either compliant or non-compliant along with a letter from engineering manager or product manager at 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. 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).

B. System Cabinet:
   1. Surface or semi-flush mounted with texture finish.
   2. Consist of back box, inner door, and door.
   3. Available in at least 3 sizes to best fit project configuration.
   4. Houses 1 or more PM-9 Power Supply Modules, INI-VG Intelligent Network Interface Voice Gateway, 1 or more ILI-MB-E3 assemblies, and other optional modules 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 modules 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:

   1. Sufficient capacity to provide power for entire system upon loss of normal AC power for a period of 24 hours with 60 minutes of alarm signaling at end of this 24-hour period, as required by NFPA 72 and in accordance with the United Facilities Criteria Chapter 5-5.5.

E. Intelligent Network Interface Voice Gateway INCC Command Center (INI-VGC): INI-VG shall be a multi-function board interchangeable in both INCC and INX. Functions of board shall have the following features as a minimum:
   1. Microprocessor: INI-VGC shall have Digital Signal Processor (DSP).

Microprocessor shall monitor all system events and perform all system programs, for all control-by-event (CBE) functions. 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: Operate at 625 K baud configurable with any combination of wire and/or fiber topologies. Interface shall communicate with up to 64 nodes in peer-to-peer fashion.
3. Fire Fighter Phone Riser: INI-VG shall generate local phone riser for use with AOM-TEL phone modules for connection to fire fighter phone stations and/or for connection of local phone when used as INCC Command Center, including phone circuits. INI-VG shall mix its local phone riser to 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: INI-VGC shall incorporate latest in digital signaling processing technology with supporting Boolean logic including AND, OR, NOT, TIME DELAY functions.
5. Microphone Input: On-board and allow for addition of local microphone when used as INCC Command Center, including speaker circuit control.
6. Signal Processing: 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 INCC shall be transmitted over single pair of twisted unshielded wire or fiber optic pair.
7. Field Programmable: INCC shall be capable of being fully programmed or modified by Field Configuration Program (FCP), to be downloaded via portable computer from any node in system.
8. Control-by-Event Programming (CBE): 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: System shall have capability of adding remote INCC Command Centers or re-locating INCC Command Centers utilizing only single pair of twisted unshielded wire or fiber optic pair for all functions.
10. RS-485 Serial Output: System shall incorporate RS-485 bus via ribbon harness for connection of modules inside same cabinet, and via 4-wire quick connector for connection of modules up to 3,000 feet from cabinet.
11. Riser Wiring: All data, voice, and fire fighter phone riser shall transmit over 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 remainder of network.
12. Style 7 Network: All communication between control panels and transponders shall be through supervised Style 7 token passing network. In event of 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 single short, open, or ground of either system data, live voice, pre-recorded channels, or phone risers, the function of each of these items shall continue to operate. "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 capability of being mounted locally or remotely. Provides audible and visual annunciation of all alarms and trouble signals. Provide dedicated LED's 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. Display shall be liquid crystal type (LCD), clearly visible in dark and under all light conditions.
   3. Panel shall contain 4 functional keys:
      a. Alarm Acknowledge.
      b. Trouble Acknowledge.
      c. Signal Silence.
      d. System Reset/Lamp Test.
   4. Panel shall contain 3 configuration buttons:
      a. Menu/Back.
      b. Back Space/Edit.
      c. OK/Enter.
   5. Panel shall have 12-key telephone-style keypad to permit selection of functions.

G. Intelligent Loop Interface (ILI-MB-E3): System shall be of multiprocessor design to allow maximum flexibility of capabilities and operation. Intelligent Loop Interface shall be capable of mounting in stand-alone enclosure or integrated with Intelligent Network INCC Command Center (INCC) as specified.
   1. Field Programmable: System shall be capable of being programmed by Field Configuration Program (FCP), allowing programming to be downloaded via portable computer from any node on network.
   2. RS-232C Serial Output: Supervised RS-232C serial port shall be provided to operate remote printers and/or video terminals, accept downloaded program from portable computer, or provide 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 RS-485 bus via ribbon harness for connection of modules inside same cabinet, and via 4-wire quick connector for connection of modules up to 3,000 feet from cabinet. 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 own programming, log functions, Central Processor Unit, and control-by-event (CBE) programming. If any loop becomes disabled, each remaining loop driver shall continue to communicate with remainder of network and maintain normal operation. "Degrade" configurations under these conditions shall not be acceptable.

5. Control-by-Event (CBE) Program: 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 detector alarm verification shall be standard option while allowing other devices such as manual stations and sprinkler flow to create 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 control panel until operated device is returned to normal and control panel is manually reset. When used for sprinkler flow, "SIGNAL SILENCE" switch may be bypassed, if required by AHJ.
8. Electrically Supervised:
    a. Each SLC and NAC circuit shall be electrically supervised for opens, shorts, and ground faults. Occurrence of fault shall activate system trouble circuitry, but shall not interfere with proper operation of other circuits.
    b. Yellow "SYSTEM TROUBLE" LED's shall light and 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. Trouble signal shall be acknowledged by operating "TROUBLE ACKNOWLEDGE" switch. This shall silence sounder. If subsequent trouble conditions occur, trouble circuitry shall resound. During alarm, all trouble signals shall be suppressed with exception of lighting yellow "SYSTEM TROUBLE" LED's.
9. Drift Compensation - Analog Smoke Sensors: System software shall automatically adjust each analog smoke sensor approximately once each week 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. Test shall be recognized functional test of each photocell (analog photoelectric sensors) and ionization chamber (analog ionization sensors) as required annually by NFPA 72. Failure of sensor shall activate system trouble circuitry, display "Test Failed" indication, and identify individual device that failed.

11. Off-Premises Connection:

    a. Fire Alarm System: Connect via leased telephone lines to central station or remote station.

12. Remote Station Option: Fire department shall be consulted regarding authorized remote station serving municipality. 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 fire alarm system by Owner's telephone contractor under separate contract. Owner will be responsible for phone company costs.

13. Network Annunciator Option: Each ILI-MB-E3 and associated display shall provide option of being configured as network annunciator. Options for annunciation shall default as regional annunciator with capability of selecting global annunciation to provide system-wide protection and Acknowledge, Silence, and Reset capabilities.
14. Redundant History Log: Each ILI-MB-E3 shall contain 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 INCC Command Center followed by extraction of history log from any loop driver location, including INCC Command Center or Transponder.
15. LED's 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.
16. 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.
17. Microprocessor: Loop interface shall incorporate 32-bit RISC processor. Isolated "watchdog" circuit shall monitor microprocessor and upon failure shall activate system trouble circuits on display. Microprocessor shall access 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.
18. Auto Programming: System shall provide for all SLC devices on any SLC loop to be pre-programmed into system. Upon activation of auto programming, only devices that are present shall activate. This allows for system to be commissioned in phases without need of additional downloads.
19. Environmental Drift Compensation: System shall provide for setting Environmental Drift Compensation by device. When detector accumulates dust in chamber and reaches unacceptable level but yet still below allowed limit, control panel shall indicate maintenance alert warning. When detector accumulates dust in chamber above allowed limit, control panel shall indicate maintenance urgent warning.
20. NON-FIRE Alarm Module Reporting: 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 message at panel LDC. Activation of NON-FIRE point shall activate

control by event logic, but shall not cause indication on control panel.

21. 1-Man Walk Test:
    a. System shall provide both basic and advanced walk test for testing entire fire alarm system. Basic walk test shall allow single operator to run audible tests on panel. All logic equation automation shall be suspended during test and while annunciators can be enabled for test, all shall default to disabled state. During 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 input. 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. Test feature is intended to provide for certain random spot testing of system and is not intended to comply with requirements of testing fire alarm systems in accordance with NFPA 72, as it is impossible to test all functions and verify items such as annunciation with only 1 person.
22. Signaling Line Circuits: Each ILI-MB-E3 module shall provide communication with analog/addressable (initiation/control) devices via 2 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. Unique 40-character identifier shall be available for each device. Devices shall be of the Velocity series with capability to poll 10 devices at a time with a maximum polling time of 2 seconds when both SLC's are fully loaded.
23. Notification Appliance Circuits: 2 independent NAC circuits shall be provided on ILI-MB, polarized and rated at 2 amperes DC per circuit, individually 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.
24. Alarm Dry Contacts: Provide alarm dry contacts (Form C) rated 2 amps at 30 VDC (resistive) and transfer whenever system alarm occurs.
25. Supervisory Dry Contacts: Provide supervisory dry contacts (Form C) rated 2 amps at 30 VDC (resistive) and transfer whenever system supervisory condition occurs.
26. Trouble Dry Contacts: Provide trouble dry contacts (Form C) rated 2 amps at 30 VDC (resistive) and transfer whenever system trouble occurs.

2.4 INTELLIGENT NETWORK TRANSPONDER (INX)

A. System shall be of multiprocessor design to allow maximum flexibility of capabilities and operation. INX shall receive, transmit, and regenerate voice, fire fighter phones, and data over single pair of wire or fiber optic cable.

B. INX shall provide full multi-channel distributed voice messaging, with integrated switching amplification, and SLC and extended phone riser. INX shall communicate with network system in true peer-to-peer fashion operating at 625 K baud over any combination of fiber or wire media. INX shall consist of the

following units and components.

C. System Cabinet: System cabinet shall be surface or semi-flush mounted with texture finish and shall consist of 4 parts, back box, back plate, inner door, and outer door. System cabinet houses INI-VG, PM-9 power supply, up to 4 - AM50, microphone, and related circuitry**.**

D. Intelligent Network Interface Voice Gateway (INI-VGX): INI-VG shall be a multi-function board interchangeable in both INCC and INX. Functions of board 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. Interface shall communicate with up to 64 total INCC, INX, and 7100 control panels in peer-to-peer fashion.
   2. Fire Fighter Phone Riser: INI-VG shall generate local phone riser for use with AOM-TEL phone modules for connection to fire fighter phone. INI-VG shall mix its local phone riser to network in true Style 7 fashion.
   3. Signaling Line Circuit (SLC): INI-VGX shall generate local SLC to communicate with and control up to 16 AOM-TEL modules and 32 AOM-2S or AOM-MUX 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: INI-VGX shall incorporate latest in digital signaling processing technology with supporting Boolean logic including AND, OR, NOT, TIME DELAY functions.
   6. Voice Generation: INI-VGX shall incorporate all processing to allow for 16 distinct pre-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): PM-9 power supply shall supply all power necessary under normal and emergency conditions. Power supply shall provide capacity to charge up to 55 amp-hour batteries while under full load. Technology used shall be of power-saving switching configuration, eliminating need of stepping transformer.

F. Audio Amplifier (AM-50): Include as a minimum, the following features:
   1. 50-watt switching audio amplifier, requiring no transformer when used in 25 VRMS mode.
   2. 2 individually addressable speaker 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 INI-VG, and paging from locally or from INCC Command Center.
   5. Back-up amplification configurable so 1 AM-50 can perform back-up or 3, or perform 1-to-1 back-up if configured to do so in programming.
   6. Status LED’s to indicate normal operation and trouble condition.

2.5 SUPPLEMENTAL NOTIFICATION APPLIANCE CIRCUIT (SNAC)

A. SNAC shall be Model HP-FF8 offering up to 8.0 amps (6.0 amps continuous) of regulated 24-volt power. SNAC shall include the following features:
   1. Integral Charger: Charge 7.0 amp-hour batteries and support 60-hour standby.
   2. 2 Input Triggers. Input trigger shall be Notification Appliance Circuit (from fire alarm control panel) or relay.
   3. Surface-mount back box.
   4. Ability to delay AC fail delay in accordance with applicable NFPA requirements.
   5. Power limited circuitry in accordance with applicable UL standards.

2.6 SYSTEM PERIPHERALS

A. Addressable Devices - General:
   1. Provide address-setting means using rotary-decimal switches.
   2. Use simple to install and maintain decade-type (numbered 0 to 9) address switches by using standard screwdriver to rotate 2 dials on device to set address. Devices which use binary address set via dipswitch packages, handheld device programmer, or other special tools for setting device address shall not be acceptable.
   3. Detectors: Analog and addressable. Connect to fire alarm control panel's Signaling Line Circuits.
   4. Addressable Thermal and Smoke Detectors: Provide 2 status LED's. Both LED's shall flash under normal conditions, indicating detector is operational and in regular communication with control panel, and both LED's shall be placed into steady illumination by control panel, indicating alarm condition has been detected. If required, flashing mode operation of detector LED's can be programmed off via fire control panel program.
   5. Fire Alarm Control Panel: Permit detector sensitivity adjustment through field programming of system. Sensitivity can be automatically adjusted by panel on time-of-day basis.
   6. Using software in INCC Command Center, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. Detectors shall be listed by UL as meeting calibrated sensitivity test requirements of NFPA 72, Chapter 7.
   7. Detectors shall be ceiling-mounted and shall include 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. Sounder base rated at 85 dBA minimum.
      c. Form-C relay base rated 30 VDC, 2.0 A.
      d. Isolator base.
   9. Detectors shall provide test means whereby they will simulate alarm condition and report that condition to control panel. Such test shall be initiated at detector itself by activating magnetic switch or initiated remotely on command from control panel.
   10. Detectors shall store internal identifying type code that control panel shall use to identify type of device (ION, PHOTO, THERMAL).

B. Addressable Manual Stations (MS-7AF):

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 restored to normal except by key reset.
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 panel representing state of manual switch and addressable communication module status.

C. Intelligent Thermal Detectors (ATD-RL2F): Intelligent addressable devices rated at 135 degrees F (58 degrees C) and have 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. Intelligent Photoelectric Smoke Detectors (ASD-PL2F): Use photoelectric (light-scattering) principal to measure smoke density and shall, on command from control panel, send data to panel representing analog level of smoke density.

E. Intelligent Laser Detectors (ASD-LS): Sensor device designed to use laser diode similar to way photoelectric sensor uses LED's inside of sensing chamber. Detector design shall allow wide sensitivity window, with no less than 0.2 to 4 percent per foot obscuration. Detector shall be used as indicated in special application clean-room-type environments only.

F. Intelligent Duct Smoke Detectors (ADPF):
1. In-Duct Smoke Detector Housing: Use on-board intelligent photoelectric detector, which provides continuous analog monitoring and alarm verification from panel.
2. When sufficient smoke is sensed, alarm signal is 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 duct system.
3. Duct Smoke Detectors Mounted Above Ceiling or Otherwise Obstructed from Normal View: Provide with remote alarm indicator.
4. Each Detector: Install in either supply side or return side duct in accordance with local mechanical code.

G. Addressable Dry Contact Monitor Modules (AMM-2F):
1. Provide to connect 1 supervised IDC zone of conventional alarm initiating devices (any N.O. dry contact device) to 1 of the fire alarm control panel SLC's.
2. Mount in standard deep electrical box.
3. IDC Zone: Suitable for Style B operation.

H. Addressable Dry Contact Monitor Modules (AMM-4F):
1. Provide to connect 1 supervised IDC zone of conventional alarm initiating devices (any N.O. dry contact device) to 1 of the fire alarm control panel

SLC's.
2. Mount in 4-inch (102-mm) square, 2-1/8-inch (54-mm) deep electrical box.
3. IDC Zone: Suitable for Style D or Style B operation.
4. LED's: Flash under normal conditions, indicating monitor module is operational and in regular communication with control panel.

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

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

K. Addressable Control Modules (AOM-2SF):
1. Provide to supervise and control operation of 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 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 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 NAC's shall be energized at same time on same pair of wires.
4. Audio/Visual Power: Provide by separate supervised power circuit from main fire alarm control panel or from supervised, UL-listed remote power supply.

L. Addressable Control Modules (MMO-6SF):
1. Provide to supervise and control operation of 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 factory-supplied BB-2 or BB-6 enclosure.
3. LED's: Flash under normal conditions, indicating monitor module is operational and in regular communication with 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. Relay coil shall be magnetically latched to reduce wiring connection requirements and

to ensure 100 percent of all auxiliary relay or NAC's shall be energized at same time on same pair of wires.

5. Audio/Visual Power: Provide by separate supervised power circuit from main fire alarm control panel or from supervised, UL-listed remote power supply.

M. Addressable Relay Modules (AOM-2RF):
   1. Available for HVAC control and other building functions. Relay shall have 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. Relay coil shall be magnetically latched to reduce wiring connection requirements and to ensure 100 percent of all auxiliary relay or NAC's shall be energized at same time on same pair of wires.
   2. Mount in standard 4-inch (101.6-mm) square, 2-1/8-inch (54-mm) deep electrical box or to surface-mounted back box.

N. Addressable Relay Modules (MMO-6RF):
   1. Available for HVAC control and other building functions. Relay shall be Form C and rated for a minimum of 2.0 amps resistive or 1.0 amps inductive. Relay coil shall be magnetically latched to reduce wiring connection requirements and to ensure 100 percent of all auxiliary relay or NAC's shall be energized at same time on same pair of wires.
   2. Mount in factory-supplied BB-2 or BB-6 enclosure.
   3. LED's: Flash under normal conditions, indicating monitor module is operational and in regular communication with control panel.

O. Isolator Modules (M500X):
   1. Provide to automatically isolate wire-to-wire short circuits on SLC Class A or Class B branch. Isolator module shall limit number of modules or detectors that may be rendered inoperative by short-circuit fault on SLC loop segment or branch. At least 1 isolator module shall be provided for each floor or protected zone of building. No more than 25 devices shall be connected to 1 isolator module.
   2. If wire-to-wire short occurs, isolator module shall automatically open-circuit (disconnect) SLC. When short-circuit condition is corrected, isolator module shall automatically reconnect isolated section.
   3. Does not require address-setting, and its operations shall be totally automatic. Not necessary to replace or reset isolator module after normal operation.
   4. Mount in standard 4-inch (101.6-mm) deep electrical box or in surface-mounted back box.
   5. Single LED: Flash to indicate isolator is operational and illuminate steadily to indicate short-circuit condition has been detected and isolated.

P. 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: Speakers shall be spaced to maintain a minimum of 15 dB above ambient noise levels.
   3. Frequency Response: Minimum of 200 Hz to 10,000 Hz @ 0 dB (+/- 5 dB).
   4. Back of Each Speaker: Sealed to protect speaker cone from damage and

dust.

Q. Speaker/Strobes:
1. Operate on 25 VRMS or with field-selectable output taps from 0.5 to 2.0 watt
2. Speakers in Corridors and Public Spaces: Speakers shall be spaced to maintain a minimum of 15 dB above ambient noise levels.
3. Frequency Response: Minimum of 200 Hz to 10,000 Hz @ 0 dB (+/- 5 dB)
4. Back of Each Speaker: Sealed to protect speaker cone from damage and dust.
5. Audibility: NFPA 72.
6. Maximum Pulse Duration: 0.2 second.
7. Strobe Intensity: UL 1971.
8. Flash Rate: UL 1971.
9. Strobe Candela Rating: Determine by positioning selector switch on back of device. Clear/white strobes activated by the fire alarm system shall not operate during those periods when the amber strobes are in operation, but otherwise shall operate continuously until the fire alarm system is reset.

Provide speakers mounted on the exterior of the building to provide notification of any areas commonly used by building occupants. These include courtyards, covered break areas, designated smoking areas, and sidewalks leading from the building's exit doors to a public street or from parking areas for a distance up to 5 m (16 ft) from the building. Use speakers with directional characteristics that transmit minimal

R. Amber Mass Notification Strobes

Provide amber-colored strobes marked with the word "ALERT" to alert the hearing impaired. Provide these strobes in addition to existing clear strobes provided for the building fire alarm system. Amber strobes activated in conjunction with the delivery of a pre-recorded voice message shall operate continuously until message termination. Amber strobes activated in conjunction with the delivery of a live voice message shall operate during the message and for not less than 15 seconds after the message ends.

S. Speakers and strobes for Classified Areas

Provide speakers and installation methods compliant with Director of Central Intelligence Directive (DCID) 6/9 for areas classified as sensitive, compartmented information facilities (SCIF). These area will reuire a dedicated Network node with fiber in and out of the SCIF designated areas. Copper will not be allowed.

T. Local Operators Control (LOC)

Provide a Local Operators Control as indicated on the plans. The Local Operators Control shall consist on a local microphone or handset that allows paging to the Mass Notification system and shall contain a minimum of sixteen (16) programmable switches, which can be field programmed to select speaker

zones and/or type of digital message to be activated as required by the Fire Marshall. The Local Operators Control shall be a networkable unit that requires no special or additional wiring to the MNS Panel. Systems that require dedicated wire to be run back to the MNS panel will not be acceptable. The MNS Local Operators Control shall be completely supervised and have the option for installing a Network Graphic Annunciator adjacent to the switches to provide complete system status from any LOC.

The Local Operators Console shall be installed in a small, wall mounted and non lockable cabinet. The Local Operators Console shall also supervise all internal components and report the following conditions to the Fire Alarm/Mass Notification System:

- Microphone Missing
- Switch Status
- On-Line/Off-Line

The Local Operators Consoles shall be located so that an authorized person will not travel more than 200 ft. horizontally or to travel to other floors to reach an LOC location. The Local Operators Console will have a status light to indicate when an operator has taken control and that console is active. If there are multiple LOC's, the system shall be capable of programming only one (1) LOC to be active at a time to avoid conflicting paging and messages. The LOC shall be able to indicate its status and shall can only by overridden by the Master Command Panel.

The LOC shall have a programmed switch designated to shut down all heating, ventilating, and air conditioning (HVAC) equipment in the facility in accordance with the requirements of UFC 4-010-01.The switch also shall have a status indicator for the HVAC status to indicate whether it is running or "shutdown". The switch shall control a remote relay(s) on the fire alarm network to control each fan or air handlers in the building.

2.7.1 SYSTEM OPERATION

The fire alarm system shall operate as follows:

A. Corridor Smoke Detectors shall perform the following:
    a. Activate a tone with fire message on the floor where the smoke detector is located
    b. Activate a tone and digital message on the floor above and the floor below the device that activated the alarm.
    c. The fire alarm system shall play a slow whoop tone for 10 seconds followed by a digital message with instructions for the occupants followed by 10 seconds of slow whoop tone. The message shall be cycled three times. Upon completion of three cycles, the system will sound a continuous slow whoop tone on the affected floors.
    d. Activate any fans and damper requires for the control of smoke in the affected area.

e. Display the Device location on the Fire Alarm Panel and all remote annunciators
f. Send a signal to the Central Station

B. Elevator Lobby Smoke Detectors shall do the following:
   a. Everything as indicated by the Corridor Smoke Detectors
   b. Recall the Elevators to the Main Level.
   c. In the event of the Lobby Smoke Detectors in alarm being located on the Main Level, the Elevators will be recalled to an designated alternate floor.

C. Manual Pull Station shall perform the following:
   a. Everything as indicated by the Corridor Smoke Detectors

D. Duct Smoke Detectors shall perform the following:
   a. Everything as indicated by the Corridor Smoke Detectors
   b. Shut down the associated Air Handler

E. Atrium Beam Detectors shall perform the following:
   a. Activate a tone with fire message in the atrium area where the beam smoke detector is located
   b. Shut down the associated Air Handler
   c. Activate the Atrium Exhaust Fan

F. Heat Detectors in the Mechanical Rooms shall do the following:
   a. Activate a tone with fire message on the floor where the smoke detector is located
   b. Activate a tone and digital message on the floor above and the floor below the device that activated the alarm.
   c. The fire alarm system shall play a slow whoop tone for 10 seconds followed by a digital message with instructions for the occupants followed by 10 seconds of slow whoop tone. The message shall be cycled three times. Upon completion of three cycles, the system will sound a continuous slow whoop tone on the affected floors.
   d. Activate any fans and damper requires for the control of smoke in the affected area.
   e. Display the Device location on the Fire Alarm Panel and all remote annunciators
   f. Send a signal to the Central Station

G. BEQ/BOQ Sleeping Units Smoke/Heat Detectors (Acclimate) shall perform the following:
   a. An alarm from the smoke detector shall sound a supervisory signal at the Fire Alarm Control Panel
   b. Sound the associated sounder in the base of the smoke detector in that guestroom or dwelling unit. If multiple sounders are in the unit, then all sounders within the unit will sound.
   c. Indicate the location of the smoke detector on the fire alarm control panel
   d. If the detector receives and alarm from the heat detector the unit shall sound a general alarm and perform the same functions as the Corridor Smoke Detector

H. Water Flow Switch Activation shall perform the following:
    a. Activate a tone with fire message on the floor where the smoke detector is located
    b. Activate a tone and digital message on the floor above and the floor below the device that activated the alarm.
    c. The fire alarm system shall play a slow whoop tone for 10 seconds followed by a digital message with instructions for the occupants followed by 10 seconds of slow whoop tone. The message shall be cycled three times. Upon completion of three cycles, the system will sound a continuous slow whoop tone on the affected floors.
    d. Activate any fans and damper requires for the control of smoke in the affected area.
    e. Display the Device location on the Fire Alarm Panel and all remote annunciators
    f. Send a signal to the Central Station

I. Tamper Switch Activation shall perform the following:
    a. Sound a supervisory signal at the Fire Alarm Control Panel
    b. Indicate the location of the valve tamper switch on the fire alarm control panel
    c. Send a Supervisory signal to the Central Station

J. Fire Pump shall be monitored for the following faults:
    a. Fire Pump Running
    b. Fire Pump AC failure
    c. Fire Pump Phase Reversal

K. Mass Notification Event
    Provide a supervisory signal if the MNS is used to override fire alarm audible messages and visible signals during simultaneous fire and terrorist events. The supervisory signal shall be annunciated at the FACP and any remote fire alarm annunciators, and be transmitted to the fire department. The visual annunciation of the separate supervisory signal shall be distinctly labeled or otherwise clearly identified.

L. Interface to Base Wide (Giant Voice) System

    The system shall interface with the Base Wide Mass Notification System via the RTU (Remote Terminal Unit) which will provide the control panel with a line level audio input (1 Volt Peak to Peak) along with one or several contact closures for initiating different digital voice messages. The interface shall also include a serial port for future intelligent interface to the Fire/Alarm Mass Notification System for bi-directional Communications and to allow the reporting at device level all Alarms, Trouble and Supervisory events. The interface shall be programmed to operate so that all Mass Notification events that are received from the Base Wide System shall take precedence over the Fire Alarm System. If the Local Building system has a fire event in progress and a Mass Notification event is received from the Base Wise System, the fire alarm event shall immediately terminate with all strobes and speakers to return to normal condition and the panel will respond to the Mass Notification event by initiating all amber

strobes and either playing a “live” voice message from the Bass Wide System or initiate a digital message as directed by the event

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas and surfaces to receive fire alarm system.
   1. Notify Architect, AHJ or Contracting Officer 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 detectors before system programming and test period. If construction is ongoing during this period, take measures to protect smoke detectors 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 WIRING

System wiring shall be as follows:

1. SLC Loops shall be West Penn D990 (Low Cap) or equal
2. NAC Circuits and Speaker Circuits shall be West Penn 991
3. Room Smoke Detectors with Sounder Bases shall use West Penn D982 or equal.
4. Network wiring between Nodes shall be West Penn D990 or equal
5. Network wiring between Towers shall be fiber optic cable
   a. Multimode
   b. 62.5 micron
   c. Standard ST Connectors

DO **NOT** USE SHIELDED WIRE ON ANY SLC LOOPS. SHIELDED WIRE MAY BE USED ON NAC CIRCUITS AND SPEAKER CIRCUITS FOR LONG WIRE RUNS.

3.4 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. System Testing:
   1. Conduct 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 proper supervisory alarm at INCC Command Center.
   3. Verify activation of flow switches.
   4. Open initiating device circuits and verify that trouble signal actuates.
   5. Open signaling line circuits and verify that trouble signal actuates.
   6. Open and short notification appliance circuits and verify that trouble signal actuates.
   7. Ground initiating device circuits and verify response of trouble signals.
   8. Ground signaling line circuits and verify response of trouble signals.
   9. Ground notification appliance circuits and verify response of trouble signals.
   10. Check alert tone and prerecorded voice message to alarm notification devices.
   11. Check installation, supervision, and operation of intelligent smoke detectors.
   12. Introduce on system each of the alarm conditions that system is required to detect. Verify proper receipt and proper processing of signal at INCC Command Center and correct activation of control points.
   13. Consult manufacturer's manual to determine proper testing procedures when 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 installation shall be considered completed and acceptable by AHJ, a complete test using as a minimum, the following scenarios shall be performed and witnessed by representative approved by Engineer. Monitoring company and/or fire department shall be notified before final test in accordance with local requirements.
   2. Contractor's job foreman, in presence of representative of manufacturer, representative of Owner, and fire department shall operate every installed device to verify proper operation and correct annunciation at control panel.
   3. Open signaling line circuits and notification appliance circuits in at least 2 locations to verify presence of supervision.
   4. Completely disconnect INCC Command Center from rest of network, including Voice INCC Command Center. Activate initiating device from

transponder. All speaker circuits activated from each transponder shall transmit the correct evacuation or alert message. These messages shall be same messages transmitted with INCC Command Center activated. Default tones or messages shall not be acceptable.

5. Completely disconnect INCC Command Center from rest of network. Activate initiating device. All control outputs supported by transponder SLC circuits shall operate under project programming mode. Default or degrade mode programming shall not be acceptable.
6. Fire fighter phone riser shall be directly shorted between INCC Command Center and first transponder, followed by test of fire phones between INCC Command Center and farthest transponder. Phones shall operate in normal fashion.
7. All audio risers shall be directly shorted between INCC Command Center and first audio transponder, followed by activation of alarm initiating device. Correct pre-recorded messages shall transmit 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 Contractor's job foreman and representatives of manufacturer and Owner, a notarized letter co-signed by each attesting to satisfactory completion of said testing shall be forwarded to Owner and fire department.
9. Leave 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.

D. System Test & Certification

All field devices shall be tested and certified to be in proper working condition. All devices shall be tested for alarm and supervisory and the status of each test recorded on the “System Certification Test Report”. The Mass Notification portion of the system shall be tested with the Base Wide System to insure that it receives the audio signal properly and plays the proper messages over the building speakers. If there is no Base Wide System installed, the contractor shall certify that the system is programmed to receive a signal from a future base Wide MNS System and programmed to respond in the correct sequence for MNS.

E. Speaker Intelligibility Testing

The speakers and sound levels shall be tested by the contractor to insure that the system meets the intelligibility standards for Fire Alarm and Mass Notification Systems. The sound from the speakers shall be a minimum of 15dB above the ambient noise levels throughout the facility. Testing shall be done with a Sound Level Meter or an Audio Analyzer. Contractor shall record the ambient and alarm sound levels as part of the “System Certification Test Report”. Also, the contractor shall test the intelligibility of the speakers throughout the facility to insure that the intelligibility meets the requirements of the UFC 4-021-01. The test shall be performed with a Audio Intelligibility Analyzer such as a Goldline DSP-30B or the Quest Technologies Sound Pro SE/DL. The sound levels shall be tested at ear level throughout the facility and the results included in the “System Certification Test Report”. The minimum Intelligibility score shall be a .8 CIS (Common Intelligibility Score) or .7 STI (Speech Transmission Index). The mean value of at least three readings shall be used to compute the intelligibility score at each test location.

In areas that fail to meet the Intelligibility requirements, the contractor will add a sufficient number of speakers and retest the area until the intelligibility requirements are satisfied. In high ambient noise areas or in areas where it is deemed impractical to meet the intelligibility levels, the AHJ has the authority to waive the testing in this area.

Areas of the building where occupants are not expected to be normally present are permitted to have a CIS score less than 0.8 if personnel can determine that a voice signal is being broadcast and they must walk no more than 15 m (50 ft) to a location with a CIS score of at least 0.8.

3.5 DEMONSTRATION

A. Provide instruction as required for operating fire alarm system.

B. Provide hands-on demonstrations of operation of fire alarm system components and functions.

END OF SECTION