

**WILLCOX UNIFIED SCHOOL DISTRICT NO. 13**  
**MIDDLE SCHOOL CAMPUS FIRE ALARM SYSTEM UPGRADE**

**360 N. BISBEE AVENUE, BISBEE, ARIZONA 85643**

**Job No. 2020-52**

**Building Owner:**

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**Approving Agency(s):**

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**SECTION 13850 (28 31 00)**  
**PROJECT MANUAL - TABLE OF CONTENTS**

**NETWORKED FIRE ALARM SYSTEM**

**TABLE OF CONTENTS**

00 0000 1 TABLE OF CONTENTS

**PART 1 – GENERAL**

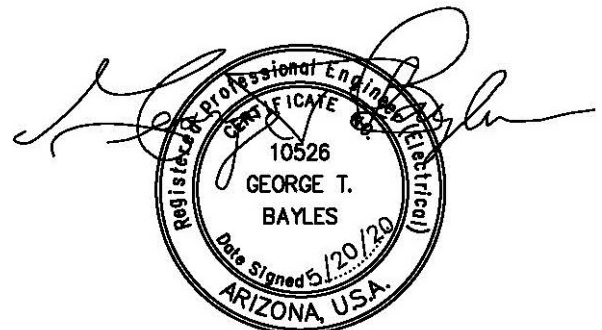
- 1.1 SECTION INCLUDES
- 1.2 FIRE ALARM CONSTRUCTION
- 1.3 SYSTEM DESCRIPTION
- 1.4 SUBMITTALS
- 1.5 QUALITY ASSURANCE
- 1.6 DELIVERY, STORAGE, AND HANDLING
- 1.7 COORDINATION
- 1.8 WARRANTY
- 1.9 DISCREPANCIES IN DOCUMENTS
- 1.10 SUBSTANTIAL COMPLETION
- 1.11 CLOSE OUT DOCUMENTS
- 1.12 PREVENTATIVE MAINTENANCE CRITERIA
- 1.13 CONSTRUCTION ADMINISTRATION
- 1.14 COMMISSIONING

**PART 2 – PRODUCTS**

- 2.1 MANUFACTURER
- 2.2 DISTRIBUTED NETWORKED FIRE ALARM SYSTEM
- 2.3 INTELLIGENT NETWORK COMMAND CENTER HARDWARE
- 2.4 INTELLIGENT NETWORK TRANSPONDER (INX)
- 2.5 SUPPLEMENTAL NOTIFICATION APPLIANCE CIRCUIT
- 2.6 SYSTEM PERIPHERALS
- 2.7 SYSTEM PERIPHERALS

**PART 3 – EXECUTION**

- 3.1 EXAMINATION
- 3.2 INSTALLATIONS
- 3.3 REQUIREMENTS
- 3.4 FIELD QUALITY CONTROL
- 3.5 DEMONSTRATION
- 3.6 TEST AND INSPECTION



EXPIRES 3/31/2023

**END OF TABLE OF CONTENTS**

SECTION 13850 (28 46 00)

NETWORKED FIRE ALARM SYSTEM

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. The general Fire Alarm System specification section 28-46-00 applies to all Fire Alarm systems. The specific Fire Alarm System along with the general fire alarm.

Under this contract provide and install complete, electrically supervised **distributed**, class A, networked analog/addressable fire alarm and control system with analog initiating devices, integral multiple channel voice evacuation and Fire Fighters phone system as described herein.

1.2 FIRE ALARM SYSTEM CONSTRUCTION

- A. Fire Alarm system to be constructed per plans and specifications by a qualified licensed Arizona Contractor, who must comply with all Arizona Registrar of Contractors regulations, rules, laws, and ordinances.
- B. The proposed systems shall be installed by a currently Authorized, trained, and certified Engineered systems distributor of the proposed product to be installed and have a minimum 5 years of experience and licensed in the State of Arizona.
- C. The proposed manufacturer must have a minimum of 2 authorized trained and certified , engineered systems distributors of the product to be used.
- D. All fire alarm systems on the same site location must be of the same manufacturer and be able to communicate with each other through the manufacturers listed communications protocol as one complete system.
- E. The expected life span of the installed equipment shall be a minimum of 10 years from the final date of completion and acceptance by Owner.
- F. All parts used for the installation or repair of the installed system shall be new, free from defects and purchased direct from the manufacturer with full warranty.
- G. No parts shall be purchased, supplied, or installed in any manner from any on-line source or source other than the authorized engineered systems distributor of the product being used.
- H. The Professional Engineer may take into consideration for eligibility of the bidders, the Registrar of Contractors (ROC) record that includes open/discipline/resolved/bankruptcy actions in the last two years in any combination as reported by the ROC.
- I. The contract documents and reviewed submittals shall be on site and accessible at all times.
- J. Contractor shall submit a sample warranty certificate at the time of the request for prior

- approval or substitution.
- K. Contractor shall carry liability insurance in the amount of \$2 million per occurrence, \$5 million aggregate, and shall submit evidence of coverage with their quote.
  - L. Contractor shall carry umbrella liability insurance in the amount of \$5 million per occurrence and shall submit evidence with their quote.
  - M. Contractor shall carry performance and payment bonds for all projects that are \$100,000.00 or more in construction.
  - N. Bid bonds are required on all bid/quote for projects that are \$100,000.00 or more in construction costs.
  - O. The contractor shall submit a schedule of completion within 5 business days of receiving the notice to proceed on the construction contract.

### 1.3 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 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.
  - 2. Signaling Line Circuits (SLC) Serving Addressable Devices: Wired Class A.
  - 3. Initiation Device Circuits (IDC) Serving Non-addressable Devices Connected to Addressable Monitor Modules: Wired Class A.
  - 4. Notification Appliance Circuits (NAC) Serving Strobes, Horns and Speakers: Wired Class A.
  - 5. On 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 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 twisted 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 Class A 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 than 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 or 70 VRMS and shall be power limited in accordance with NEC
  - d. 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. 2-Way Telephone Communication Circuits:
- a. Shall communicate digitally over the network between transponders.
  - b. Supervised for open and short circuit conditions.
  - c. Short circuit condition on 2-way telephone communications circuit shall result in trouble condition and not result in call-in condition.
17. 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 alarms initiating devices, the following functions shall immediately occur:
1. System Alarm LEDs: 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. History Log shall have capacity for recording up to 4,100 events.

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.
  - a. Close Fire Doors
  - b. Shot down air handlers as required by code
  - c. Notify the Central Station or Municipal Tie.
6. Strobes flash synchronized continuously.
7. Audio Portion of System: Sound alert tone followed by pre-recorded message determined by event and this scenario repeating or other message as approved by local authority until system is reset.
8. Building command center will indicate on the graphic user interface the initiating device that is in alarm condition.

E. Fire Alarm System Functionality:

1. Provide complete, electrically supervised distributed, Class A networked analog/addressable fire alarm and control system, with analog initiating devices, integral multiple-channel voice evacuation, and fire fighter's phone system.
2. 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 & S3 Series modules includes 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 standard capacity of up to 64 nodes expandable to 122.
3. Each ILI-MB-E3 Node: Incorporate 2 Signaling Line Circuits (SLC), with capacity to support in Velocity ® mode up to 159 analog addressable detectors and 159 addressable modules per ILI-MB-E3 SLC.
4. Voice, Data, and Fire Fighter's Phone Riser: Transmit over single pair of wires or fiber optic cable.
5. 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.
6. Each Network Node: Incorporate Boolean control-by-event programming, including as a minimum AND, OR, NOT, and Timer functions.
7. Control Panels: Capability to accept firmware upgrades via connection with laptop computer, without requirement of replacing microchips.
8. Network:
  - a. Based on peer-to-peer token ring technology operating at 625 K baud, using Class A configuration.
  - b. Capability of using twisted-pair wiring, pair of fiber optic Multi-mode cable strands up to 200 microns or Single-mode optimized for 9/125 microns, or any combination, to maximize flexibility in system configuration.
9. 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 or touchscreen display without additional equipment.
10. 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.
11. Each Control Panel: Capability of storing its entire program and allow installer to activate only devices that are 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.
13. Have the capacity for multiple pre-recorded messages (at least sixteen (16), but more if required by local AHJ) and address a list of subjects.
- a. Fire evacuation and relocation
  - b. Intruder or hostile person sighted within or around the building grounds
  - c. Directions to occupants to take cover within building
  - d. Emergency weather conditions appropriate for local area
  - e. All Clear

#### 1.4 SUBMITTALS

- A. Comply with Submittal Procedures as listed below.  
Include sufficient information, clearly presented, to determine compliance with the specifications and the Drawings.
- B. 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 intended 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 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.
- C. 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 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 system manufacturer, indicating proposed engineered system distributor is an authorized representative of fire alarm system equipment manufacturer and is an Elite Distributor of the product line proposed with a minimum of 10 years of experience installing fire alarm systems in Arizona schools.  
Submit a copy of the engineered system distributors UL Listing for Fire Alarm Installations.
- 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.

## 1.5 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.

#### 2. ADA: System shall conform to American with Disabilities Act (ADA).

B. To ensure reliability and complete compatibility, all items of fire alarm system, including control panels, power supplies, initiating devices, and notification appliances, shall be listed by Underwriters Laboratories Inc. (UL) and shall bear "UL" label.

C. Alarm Control Panel Equipment: UL-listed under UL 864 Ninth Edition and UL 2572.

#### D. Equipment, Programming, and Installation Supervision:

- 1. Provide services of approved Elite engineered systems distributor of fire alarm 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 factory-trained and authorized technician to perform system software modifications, upgrades, or changes on Voice Evacuation Systems.
- 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.

## 1.6 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.

#### 1.7 COORDINATION

- A. Coordinate the Work of this section with all other Work of other systems, including monitoring of the sprinkler systems, HVAC systems, and security/door access control locking systems. Coordinate the third-party testing of the HVAC systems for shutdowns.

#### 1.8 WARRANTY

- A. All Fire Alarm Systems shall have at least a 2 year, no dollar limit (NDL), labor and material manufacturer product warranty. Manufacturers Currently Authorized Distributor agrees to repair and replace components of the Fire Alarm System that fail in materials or Workmanship within specified warranty period.
- B. The Fire Alarm system manufacturers Currently Authorized Distributor shall certify that the Installation is compliant with all manufacturer requirements upon issuance of warranty.
- C. The installing contractor shall provide a minimum 2-year materials and labor warranty for The complete installation compliant with the State of Arizona Registrar of Contractors.

#### 1.09 DISCREPANCIES IN THE DOCUMENTS

- A. Prioritization for resolving discrepancies in the contract documents are resolved as follows:
  - 1. Specifications
  - 2. Dimensions
  - 3. Notations
  - 4. Drawings
- B. In the event of discrepancies within the specifications, the most stringent requirements Shall apply.

#### 1.10 SUBSTANTIAL COMPLETION

- A. The Professional Registrant shall issue a Substantial Completion Form to establish the start date of the warranty period. This form may be the American Institute of Architects (AIA) form, or another equal form that is approved by the SFB staff.

#### 1.11 CLOSEOUT DOCUMENTS

- A. The closeout documents must be submitted in an electronic (".pdf" format) with one Bound hard copy to the School District and the SFB, and shall include at least the following:
  - 1. A complete set of "as-Built" documents describing location of all installed items and

elements.

2. The contractor shall track all modifications to the original design and record those modifications in the record drawings for the project. The contractor shall provide those record drawings that include a complete and accurate description of work done that deviates from the requirements of the contract documents and the exact locations of all concealed work to the Professional registrant at project completion.
3. The as-built drawings shall be provided in the form of hard copy and an electronic "pdf" format to the School District and the SFB as part of the close out documentation.
4. The warranty signed by the Installing Currently Authorized Distributor with the start date of the warranty.
5. The written field records of all inspections, testing, construction administration and quality assurance / quality control site visits conducted during the installation of the system.
6. An "AS BUILT DOCUMENT" Cabinet shall be supplied and installed by the Main Fire Alarm Control Cabinet, or another location acceptable to the Fire Marshal. If the Fire Alarm AS BUILT cabinet is not in the same location as the fire alarm panels, its location shall be identified at the FACP. The cabinet shall contain a copy of the latest Stamped "AS BUILT" drawings for the project including the systems Operating and Maintenance manuals. In accordance with NFPA 72, a copy of the installed program on a USB drive permanently affixed to the cabinet shall also be included. The Cabinet should contain a tamper switch connected to the fire alarm system panel to generate a trouble/supervisory signal if the cabinet is opened.

#### 1.12 PREVENTATIVE MAINTENANCE CRITERIA

- A. In order to maintain the Fire Alarm System, The School District shall, after the warranty period expires, maintain a system test and inspection contract in accordance with NFPA 72. Any required repairs shall be promptly executed by a currently authorized engineered Systems distributor of the installed system. Follow all manufacturers recommended Preventative maintenance in the O & M manual.
- B. Each inspection must document noticed deficiencies and be promptly repaired. Submit written report of any deficiencies.

#### 1.13 CONSTRUCTION ADMINISTRATION

- A. The Professional Registrant must perform construction administration to ensure construction is in compliance with the design intent of the drawings and specifications, which will require at least a weekly site visit to ensure conformance of material installation with the Design intent of the plans. All visits are to be billed per trip and coordinated in writing 5 days prior.

#### 1.14 COMMISSIONING

Section 13850 (28 46 00)

Networked Fire Alarm System

01 1000 - 9

- A. At the completion of the project the system shall be Commissioned in accordance with current edition of NFPA 3, Standard for Commissioning Fire Protection and Life Safety Systems. And the current edition of NFPA 4 Standard for Integral Fire Protection and Life Safety Testing. Together with the current edition of NFPA 72.
- B. At the completion of the installation, the Professional Engineer shall be in attendance for The final acceptance tests with the Fire Marshall.
- C. If the Fire Alarm system is interfaced with any other system, i.e. Fire Sprinkler, HVAC Shut Down, Kitchen Hood Systems control, Smoke Evacuation, etc. The Professional Engineer shall arrange for and the District shall pay for the representatives To be present to witness and accept their interface is operating correctly.
- D. If the installed system is required to shut down any air handlers, the District shall contract with an independent Mechanical Engineer to carry Air Handler shut down certifications and provide copies to the Fire Marshal.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. References to manufacturer's model numbers and other information are not cited in these specifications. All nationally recognized testing laboratory listed, engineered network fire alarm voice evacuation systems meeting the requirements of these specification for this project and complying with all characteristics of the performance specification will be considered.

### 2.2 DISTRIBUTED NETWORKED FIRE ALARM SYSTEM

- A. Distributed Networked Fire Alarm System: install expandable Emergency Evacuation Fire Alarm System.

### 2.3 INTELLIGENT NETWORK INCC COMMAND CENTER HARDWARE

- A. Intelligent Network Command Center: Supply user interface, including LCD or touchscreen 1/4 VGA display Intelligent Loop Interface Modules , manual switching, phone, and microphone inputs to the network. Command center 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 (with batteries).
  - 3. Intelligent Network Interface Voice Gateway.
  - 4. 80-Character LCD Display.
  - 5. Intelligent Loop Main Board Interface.
  - 6. Optional Intelligent Loop Supplemental Interface.
  - 7. DACT.
  - 8. Optional LED Driver Module.
  - 9. Microphone Assembly.
  - 10. 50 watt dual channel amplifiers.
  - 11. Optional Addressable Node Expander.

- B. System Cabinet:
1. Surface or semi-flush mounted with texture finish to replace existing location.
  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 Power Supply Modules, Intelligent Network Interface Voice Gateway, 1 or more assemblies, and other optional modules as specified.
  5. Construction: Dead-front steel construction with inner door to conceal internal cicuity 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 Modul: Use latest technologies to provide system power, incorporates 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 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 60 hours with 15 minutes of alarm signaling at end of this 60-hour period, as required by NFPA 72, Auxiliary Systems.
- E. Intelligent Network Interface Voice Gateway Command Center : shall be a multi-function board interchangeable in both command center and INX. Functions of board shall have the following features as a minimum:
1. 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 support 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 122 nodes in peer-to-peer fashion.
  3. Advanced Processing: INI-VG shall incorporate latest in digital signaling processing technology with supporting Boolean logic including AND, OR, NOT, TIMING, COUNT, SCHEDULE functions.
  4. Microphone Input: On-board and allow for addition of local microphone when used as Command Center, including speaker circuit control.
  5. Signal Processing: shall use advanced Digital Signal Processing (DSP) technology to allow maximum flexibility of digital audio and control capabilities and operation. Signals to and from command center shall be transmitted over single pair of twisted unshielded wire or fiber optic pair.
  6. Field Programmable: 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.
  7. Control-by-Event Programming (CBE): shall be capable of programming using Boolean logic including AND, OR, NOT, COUNT, TIMING, and SCHEDULE functions to provide complete programming flexibility.

8. Remote Command Center Options: System shall have capability of adding remote INCC Command Centers or re-locating Command Centers utilizing only single pair of twisted unshielded wire or fiber optic pair for all functions.
9. 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.
10. 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 Class A format. Any short or open in data, voice, or phone sections shall not affect transmission over remainder of network.
11. Class A 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 :

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 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. 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: 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 Command Center 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 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 output 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: shall be capable of programming using Boolean logic including AND, OR, NOT, TIMING, COUNT, SCHEDULE 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" LEDs 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 re-sound. During alarm, all trouble signals shall be suppressed with exception of lighting yellow "SYSTEM TROUBLE" LEDs.
  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 photo-cell (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 Digital Alarm Communicator Transmitter (DACT) and telephone lines to central station or remote station.

12. Central Station Option: Fire alarm control panel shall provide integral Digital Alarm Communicator Transmitter (DACT) for signaling to central station. DACT shall contain "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. Fire department shall be consulted as to authorized central station companies serving municipality. Fire alarm system shall transmit both alarm and trouble signals, with alarm having priority over trouble signal. Contractor shall be responsible for all installation charges and Owner will be responsible for line lease charges.
13. Network Annunciator Option: Each annunciator 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 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. LEDs Indicator and Outputs: Each 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 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 "watch-dog" 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, 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 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 SLCs are fully loaded.
  - 23. Notification Appliance Circuits: 2 independent NAC circuits shall be provided on 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.
- H. Auxiliary Switch Module:
    - 1. Each ASM-16 has 16 programmable push-button switches.
    - 2. Each push-button switch has 3 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 function of each switch and LEDs combination.
    - 5. Provide capability to communicate with up to 16 ASM-16 modules locally, up to 3,000 feet from INCC Command Center.
    - 6. Specialty modules that only perform 1 task such as speaker, phone, or auxiliary shall not be acceptable.
  - I. Network Repeater Module:
    - 1. Intelligent Network Interface shall provide interconnection and protection of remote INCC Command Centers and Transponders. Repeater shall regenerate and condition token passing, 625 K baud signal between units. Repeater shall be available in wire, or wire/fiber configurations as determined by field conditions.
    - 2. Interface shall have jumper to allow selection of ground detection of wiring when used in wire mode. Interface shall have integral LEDs to display current status of board.
    - 3. Fiber configurations shall use:

- a. Multi-Mode ST-type connectors with a maximum attenuation of 8db with 62.5/125-micron cable.
- b. Single-Mode LC-style connector with a maximum attenuation of 30db with 9/125-micron cable.
- c. Microphone Assembly: Include the following items:
  1. Mounting cabinet which occupies 1 module location on inner door of INCC.
  2. Interconnect cable for connection of microphone to INI-VG.
  3. 1 noise canceling microphone with push-to-talk button.

#### 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, power supply, up to 4 - AM50, microphone, and related circuitry.
- D. Intelligent Network Interface Voice Gateway (INI-VG): 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 122 total control panels in peer-to-peer fashion.
  2. Signaling Line Circuit (SLC): INI-VG 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.
  3. RS-485: Provide capability to communicate with up to 16 modules, when used in INX mode up to 3,000 feet.
  4. Advanced Processing: INI-VG shall incorporate latest in digital signaling processing technology with supporting Boolean logic including AND, OR, NOT, TIME DELAY functions.
  5. Voice Generation: INI-VG 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 : 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:
    - a. AM-50-25 amplifier produces 25V<sub>RMS</sub> at 50 watts digital audio output.
    - b. AM-50-70.7 amplifier produces 70V<sub>RMS</sub> at 50 watts digital audio output.
  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 LEDs to indicate normal operation and trouble condition.

## 2.5 SUPPLEMENTAL NOTIFICATION APPLIANCE CIRCUIT (HPFF)

- A. Supplemental Notification Appliance Circuit (HPFF) shall be Model HPFF8 or HPFF12 offering up to 8.0 to 12.0 amps (8 to 12 amps continuous) of regulated 24-volt power. HPFF shall include the following features:
  - 1. Integral Charger: Charge up to 18.0 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.
  - 6. Operates as sync follower or a sync generator.

## 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 LEDs. Both LEDs shall flash under normal conditions, indicating detector is operational and in regular communication with control panel, and both LEDs shall be placed into steady illumination by control panel, indicating alarm condition has been detected. If required, flashing mode operation of detector LEDs 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 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 :

Section 13850 (28 46 00)

Networked Fire Alarm System

01 1000 - 17

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: 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 : 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. Addressable Projected Beam Detectors :
1. Single-ended, reflective design.
  2. Six user-selectable sensitivity levels.
  3. Operates in a range from 16 feet to 328 feet.
  4. Temperature Range of Device: Minus 22 degrees F to 131 degrees F.
  5. Beam Detector: Automatic gain control to compensate for gradual signal deterioration from dirt accumulation on lenses.
  6. UL Listed.
  7. Ability to be tested using calibrated test filters or magnet-activated remote test station.
- F. 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 SLCs.
  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. LEDs: Flash under normal conditions, indicating monitor module is operational and in regular communication with control panel.
- G. 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 SLCs.
  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. LEDs: Flash under normal conditions, indicating monitor module is operational and in regular communication with control panel.
- H. Addressable Dry Contact Monitor Modules :
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 SLCs.
  2. Mount in factory-supplied enclosure.
  3. LEDs: Flash under normal conditions, indicating monitor module is operational and in regular communication with control panel.
- I. Addressable Control Modules :
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 NACs 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.

J. Addressable Relay Modules :

1. Provide two isolated sets of Form-C contacts, which operate as a double pole double throw switch. The module shall allow the control panel to switch these contacts on command. The module shall not provide supervision for the notification appliance circuit (NAC). Module shall have both normally open and normally closed connections available for field wiring.

2. 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 NACs shall be energized at same time on same pair of wires.

3. Mount in standard 4-inch (101.6-mm) square, 2-1/8-inch (54-mm) deep electrical box or to surface-mounted back box.

4. LEDs: Flash under normal conditions, indicating monitor module is operational and in regular communication with control panel.

K. Addressable Relay Modules:

1. Provide six isolated sets of Form-C contacts, which operate as a double-pole double-throw switch. The module shall allow the control panel to switch these contacts on command. The module shall not provide supervision for the notification appliance circuit (NAC). Module shall have both normally open and normally closed connections available for field wiring.

2. 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 NACs shall be energized at same time on same pair of wires.

3. Mount in factory-supplied MBB-2 or MBB-6 enclosure.

4. LEDs: Flash under normal conditions, indicating monitor module is operational and in regular communication with control panel.

2.7 SYSTEM PERIPHERALS

A. 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: Produce nominal sound output of 84 dBA at 10 feet (3 m).

3. Frequency Response: Minimum of 400 Hz to 4,000 Hz.

4. Back of Each Speaker: Sealed to protect speaker cone from damage and dust.

B. Strobes:

1. Compliance: ADA and UL 1971.

2. Maximum Pulse Duration: 0.2 second.

3. Strobe Intensity: UL 1971.

4. Flash Rate: UL 1971.

5. Strobe Candela Rating: Determine by positioning selector switch on back of device.

- C. 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: Produce nominal sound output of 84 dBA at 10 feet (3 m).
  - 3. Frequency Response: Minimum of 400 Hz to 4,000 Hz.
  - 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.

### PART 3 EXECUTION

#### 3.1 EXAMINATION

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

#### 3.2 SYSTEM INSTALLATIONS

- 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 REQUIREMENTS

- A. Demolition requirements to be included in the design documents
  - 1. HCM oversight must be completed by an independent third party and contracted by the School District.
- B. Fire Alarm System components
  - 1. If existing conduit exists on the Fire Alarm System, the design information must Delineate the scope of work on the existing conduit.
  - 2. If existing conduit is to remain, the contractor must take precautions not to damage any of the existing conduit and wires in any way during the demolition of existing Fire Alarm System materials. Any damage to components that are intended to remain shall be the responsibility of the contractor.

3. The design documents shall define "unforeseen" as something that could not be seen or otherwise anticipated.
- C. Where flush mounted devices have been removed from the wall or ceiling that were mounted on standard electrical junction boxes, the boxes may be left in place and covered with a standard electrical stainless-steel blank plate. Surface mounted boxes and conduit shall be removed, made safe and comply with NEC standard practices.
- D. New system installation requirements
1. The installing contractor must be certified / approved by manufacturer of the system being installed and must have a minimum of five (5) years of experience installing a similar system.
  2. Certification(s) for all potential Fire Alarm System (including prior approvals) shall be included in the bid / quote documents that are submitted. This section shall also apply if substitutions are being made after the award of any Fire Alarm System project.
  3. The Fire Alarm System shall be designed and installed to provide sustained performance for a minimum of 10 years.
  4. The manufacturer's Currently Authorized Distributor shall submit an "Intent to Warrant" document and that document shall be included in the bid / quote Submission.
- E. All Fire Alarm System mounted equipment and accessories have to meet the Fire Alarm System manufacturer's requirement for clearance, heights, etc. If existing Fire Alarm System mounted equipment does not meet those requirements, it must be mounted to be compliant with the Fire Alarm System manufacturer's requirements.

### 3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services: Provide service of competent, CSA certified, factory-trained voice evacuation technician authorized by factory to technically supervise and participate during pre-testing and acceptance testing of voice evacuation systems.
- B. 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 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 the Engineer of Record. 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 a CSA & fire alarm system factory trained and certified technician, representative of the Owner, and the Authority Having Jurisdiction/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. 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.
7. When testing has been completed to satisfaction of both the Engineer of Record and representatives of the Owner, a notarized letter co-signed by each attesting to satisfactory completion of said testing shall be forwarded to Owner and AHJ.
8. Third Party Testing of the Air Handler Unit (AHU) shutdown shall be performed by a third party. The cost for the testing is the responsibility of the fire alarm contractor and shall be included in the total cost of the project
9. Leave fire alarm system in proper working order and, without additional expense to Owner, replace defective materials and equipment provided within 2 year (730 days) from date of final acceptance by the owner. 3 additional years of manufacture warranty (for a grand total of 1,825 days from the date of final acceptance) on defective materials and equipment provided shall be the responsibility of the system distributor. Labor cost is not included in the additional 3 years of manufacture warranty.



### 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.
- C. Awarded Systems Contractor agrees to provide ONSITE Quarterly training on the operation of the fire alarm system for a period of 5 years as the Wilcox Unified School District Staff requires at no additional cost to the District.

### 3.6 TEST AND INSPECTION

- A. Awarded Systems Contractor shall be required to provide annual testing and inspection of the fire alarm system at Wilcox Middle School, annually for 2 years beginning one year after final completion date. Replace any defective parts free of charge for a period of five years. The first Two years of the warranty labor is to be included.

END OF SECTION

**Sample of Submittal Review Mark**

<b>Firm Name</b> Address, City & State	
<b>SHOP DRAWING / SUBMITTAL REVIEW</b>	
<input type="checkbox"/>	<b>FURNISH AS SUBMITTED</b>
<input type="checkbox"/>	<b>FURNISH AS CORRECTED</b>
<input type="checkbox"/>	<b>REVISED &amp; RESUBMIT</b>
<input type="checkbox"/>	<b>REJECTED, FURNISH AS SPECIFIED</b>
<p>Corrections or comments made on the shop drawings or submittal during this review does not relive the contractor from compliance with requirements of the drawings and specifications. This check is only for review of general conformance with the design concept of the project and general compliance with the information given in the contract documents. The contractor is responsible for confirming and correlating all quantities and dimensions, coordinating that work in a safe and satisfactory manner. Work is to confirm to all local, state, national codes and standards, and laws.</p>	
<b>Reviewed By:</b>	<b>Date:</b>