SECTION 28 31 00
FIRE DETECTION AND ALARM SYSTEM

PART 1 General

1.1 Summary

1.1.1 Summary - Fire
This performance specification provides the minimum requirements for the Life Safety System. The system shall include, but not limited to all equipment, materials, labor, documentation and services necessary to furnish and install a complete, operational system to include but not limited to the following functions:

Fire detection and alarm system

1.1.2 Manufacturer
Acceptable fire alarm system manufacturers include:
Edwards Systems Technology, Inc.
Notifier
SimplexGrinnell
Equals are allowed

1.2 References

1.2.1 Codes

1.2.1.1 Codes - Fire - Security
The equipment and installation shall comply with the current provisions of the following codes and standards:
NFPA 70 - 2008 National Electric Code®
NFPA 72 - 2006 National Fire Alarm Code®
NFPA 90A - 2006 Air Conditioning Systems
NFPA 92A - 2006 Smoke Control Systems
NFPA 92B - 2006 Smoke Management Systems in Malls, Atria, and Large Areas
UL 864 - Control Units for Fire Protective Signaling Systems.
UL 268 - Smoke Detectors for Fire Protective Signaling Systems.
UL 268A - Smoke Detectors for Duct Applications.
UL 217 - Single and Multiple Station Smoke Alarms
UL 228 - Door Closers-Holders, With or Without Integral Smoke Detectors.
UL 464 - Audible Signaling Appliances.
UL 38 - Manually Actuated Signaling Boxes for Use with Fire-Protective Signaling
Systems
UL 346 - Waterflow Indicators for Fire Protective Signaling Systems.
UL 1971 - Signaling Devices for the Hearing-Impaired.
UL 1481 - Power Supplies for Fire Protective Signaling Systems.
UL 1711 - Amplifiers for Fire Protective Signaling Systems.
UL 1635 - Digital Alarm Communicator System Units

Federal Codes and Regulations
Americans with Disabilities Act (ADA)
Factory Mutual (FM) approval
International Standards Organization (ISO)
ISO-9000
ISO-9001

1.2.1.2 Codes – TDLR

**702.1 General.** Fire alarm systems shall have permanently installed audible and visible alarms complying with NFPA 72 (1999 or 2002 edition) (incorporated by reference, see "Referenced Standards" in Chapter 1), except that the maximum allowable sound level of audible notification appliances complying with section 4-3.2.1 of NFPA 72 (1999 edition) shall have a sound level no more than 110 dB at the minimum hearing distance from the audible appliance. In addition, alarms in guest rooms required to provide communication features shall comply with sections 4-3 and 4-4 of NFPA 72 (1999 edition) or sections 7.4 and 7.5 of NFPA 72 (2002 edition).

**224.5 Dispersion.** Guest rooms required to provide mobility features complying with 806.2 and guest rooms required to provide communication features complying with 806.3 shall be dispersed among the various classes of guest rooms, and shall provide choices of types of guest rooms, number of beds, and other amenities comparable to the choices provided to other guests. Where the minimum number of guest rooms required to comply with 806 is not sufficient to allow for complete dispersion, guest rooms shall be dispersed in the following priority: guest room type, number of beds, and amenities. At least one guest room required to provide mobility features complying with 806.2 shall also provide communication features complying with 806.3. Not more than 10 percent of guest rooms required to provide mobility features complying with 806.2 shall be used to satisfy the minimum number of guest rooms required to provide communication features complying with 806.3.

**806.3.1 Alarms.** Where emergency warning systems are provided, alarms complying with 702 shall be provided.

**806.3.2 Notification Devices.** Visible notification devices shall be provided to alert
room occupants of incoming telephone calls and a door knock or bell. Notification devices shall not be connected to visible alarm signal appliances. Telephones shall have volume controls compatible with the telephone system and shall comply with 704.3. Telephones shall be served by an electrical outlet complying with 309 located within 48 inches (1220 mm) of the telephone to facilitate the use of a TTY.

1.3 System Description

1.3.1 General

1.3.1.1 General Fire

The Contractor shall furnish all labor, services and materials necessary to furnish and install a complete, functional integrated life safety fire system. The System shall comply in all respects with all pertinent codes, rules, regulations and laws of the local jurisdiction. The System shall comply in all respects with the requirements of the specifications, manufacturer's recommendations and Underwriters Laboratories Inc. (ULI) listings.

It is further intended that upon completion of this work, the Owner be provided with:

Complete information and drawings describing and depicting the entire system(s) as installed, including all information necessary for maintaining, troubleshooting, and/or expanding the system(s) at a future date.

Complete documentation of system(s) testing.

Certification that the entire system(s) has/have been inspected and tested, is/are installed entirely in accordance with the applicable codes, standards, manufacturer's recommendations and ULI listings, and is/are in proper working order. Contractor shall use "Fire Alarm System Certification and Description" as required by Section 1-6.2 of NFPA 72 - 2006 edition.

1.3.2 Description

1.3.2.1 Description - Fire

The intent of this specification is to provide a complete Fire Alarm System in Compliance with applicable codes and standards.

Consisting of but not limited to the following:

LCD annunciator shall be located as shown on the drawings (as required)

Provide a multi-channel one-way voice communication system. (If required by Codes listed in 1.2.1 of this Specification)
Manual pull stations shall be located at all exits as required
Area smoke detection shall be as required by code.
Area heat detection shall be provided as required.
Duct smoke detection shall be provided as required.
Monitor the sprinkler system waterflow(s) and valve supervisory switch(s).
Provide audible appliances located throughout the building,
Provide synchronized visual appliances located throughout the building,
Magnetic door holders shall be located as shown on drawings.
Provide fan shutdown controls.
Provide elevator recall functions for primary and alternate floors and elevator power shunt trip activation.
Provide connection to a central station. The owner shall arrange for two dedicated phone lines to be terminated as directed by the installing contractor.

1.3.3 Operations

1.3.3.1 Sequence of Operations

1.3.3.1.1 General - Audio

Upon alarm activation of any area smoke detector, heat detector, manual pull station, sprinkler water-flow, the following functions shall automatically occur:

The internal audible device shall sound at the control panel or command center.
Display the alarm event on the FACP.
The LCD Display shall indicate all applicable information associated with the alarm condition including: zone, device type, device location and time/date.

Any remote or local annunciator LCD/LED's associated with the alarm zone shall be illuminated.
Activate visual strobes immediately.
An alert tone shall be sounded.
Transmit signal to the building automation system.
Transmit signal to the central station with point identification.
All automatic events programmed to the alarm point shall be executed and the associated outputs activated.

1.3.3.1.2 Duct Smoke Activation - Supervisory

The supervisory activation of any duct smoke detector, the following functions shall automatically occur:

The internal audible device shall sound at the control panel or command center.
Display the event on the FACP.
The LCD display shall indicate all applicable information associated with the supervisory condition including; zone, device type, device location and time/date. Any remote or local annunciator LED's associated with the alarm zone shall be illuminated.
Transmit signal to the central station with point identification.
Shutdown the local air handling unit.

1.3.3.1.3 Supervisory Operation

Upon supervisory activation of any sprinkler valve supervisory switch, fire pump off-normal, clean agent fire suppression system trouble, the following functions shall automatically occur:

The internal audible device shall sound at the control panel or command center.
Display the event on the FACP.
The LCD display shall indicate all applicable information associated with the supervisory condition including; zone, device type, device location and time/date. All system activity/events shall be documented on the system printer.
Any remote or local annunciator LCD/LED's associated with the supervisory zone shall be illuminated.
Transmit signal to the central station with point identification.

1.3.3.1.4 Trouble Operation

Upon activation of a trouble condition or signal from any device on the system, the following functions shall automatically occur:

The internal audible device shall sound at the control panel or command center.
Display the event on the FACP.
The LCD keypad display shall indicate all applicable information associated with the trouble condition including; zone, device type, device location and time/date. All system activity/events shall be documented on the system printer.
Any remote or local annunciator LCD/LED's associated with the trouble zone shall be illuminated.
Transmit signal to the central station with point identification.

1.3.3.1.5 Monitor Activation

Upon activation of any device connected to a monitor circuit, the following functions shall automatically occur:

Any remote or local annunciator LCD/LED's associated with the status zone shall be illuminated.
1.3.4 System Configuration

1.3.4.1 General - Fire
1.3.4.2 The system supplied under this specification shall utilize node to node, direct wired, multi-priority peer-to-peer network operations. The system shall utilize independently addressed, smoke detectors, heat detectors, input/output modules, and intrusion detection as described in this specification. The peer-to-peer network shall contain multiple nodes consisting of the command center, main controller, remote control panels, LCD/LED annunciation nodes, and workstations. Each node is an equal, active functional member of the network, which is capable of making all local decisions and generating network tasks to other nodes in the event of node failure or communications failure between nodes.

All life safety system equipment shall be arranged and programmed to provide an integrated system for the early detection of fire, the notification of building occupants, the automatic summoning of the local fire department, the override of the HVAC system operation, and the activation of other auxiliary systems to inhibit the spread of smoke and fire, and to facilitate the safe evacuation of building occupants. In all operating modes, the processing of fire alarms shall have the highest priority.

Devices shall be listed for fire applications.

1.3.4.2 Power Supply
Standby power supply shall be an electrical battery with capacity to operate the system under maximum supervisory load for 24 hours and capable of operating the system for five 5 minutes of evacuation alarm on all devices, operating at maximum load. The system shall include a charging circuit to automatically maintain the electrical charge of the battery. The system shall automatically adjust the charging of the battery to compensate for temperature.

1.3.4.3 Display
The main display interface shall show the first and most recent highest priority system events without any operator intervention. All system events shall be directed to one of four message queues. Messages of different types shall never intermix to eliminate operator confusion. A "Details" switch shall provide additional information about any device highlighted by the operator.

1.3.4.4 Initiating Device Circuits
Initiating device circuits monitoring manual fire alarm stations, smoke and heat detectors, waterflow switches, valve supervisory switches, fire pump functions, and air pressure supervisory switches shall be Class B.
1.3.4.5 Notification Appliance Circuits
All notification appliance circuits shall be Class B (Style "Y"). All notification appliance circuits shall have a minimum circuit output rating of: 2 amps @ 24 vdc; 50 watts @ 25V audio, and 35 watts @ 70V audio. The notification circuits shall be power limited. Non-power limited circuits are not acceptable.

1.3.4.6 Signaling Line Circuits
When a signaling line circuit covers more than one fire/smoke compartment, a wire-to-wire short shall not affect the operation of the circuit from the other fire/smoke compartments. The signaling line circuit connecting network panel/nodes, annunciators, command centers, shall be Class B (style 4). The media shall be copper except where fiber optic cable is specified on the drawings.

The signaling line circuit connecting to addressable/analog devices including, detectors, monitor modules, control modules, isolation modules, intrusion detection modules and notification circuit modules shall be Class B (style 4).

The signaling line circuit connecting to the audio communications (pre-amp signal), amplifiers, and nodes shall be Class B (style 4). The circuit shall be power limited.

The signaling line circuit connecting to the two-way communications circuit (riser) shall be Class B (style 4).

1.3.4.7 Network Wiring
The system supplied under this specification shall utilize node to node, direct wired multi-priority peer-to-peer network operations. The system shall utilize independently addressed, smoke detectors, heat detectors and input/output modules and intrusion detection as described in this specification. The peer-to-peer network shall contain multiple nodes consisting of the command center, main controller, remote control panels, LCD/LED annunciation nodes, and workstations. Each node is an equal, active functional node of the network, which is capable of making all local decisions and generating network tasks to other nodes in the event of node failure or communications failure between nodes.

When a network is wired in a Class B configuration, a single break or short on the network wiring isolates the system into two groups of panels. Each group continues to function as a peer-to-peer network working with their combined databases. When wired using a Class A configuration, a single break or short on the network wiring causes the system to isolate the fault, and network communication continues uninterrupted, without any loss of function. Should multiple wiring faults occur, the network re-configures into many sub-networks and continues to respond to alarm events from every panel that can transmit and receive network messages.
1.3.4.8 Network Nodes
The remote control panel(s) (network nodes) shall meet the same requirements as described in control panel section.

1.4 Submittals

1.4.1 Project
The contractor shall purchase no equipment for the system specified herein until the owner has approved the project submittals in their entirety and has returned them to the contractor. It is the responsibility of the contractor to meet the entire intent and functional performance detailed in these specifications. Approved submittals shall only allow the contractor to proceed with the installation and shall not be construed to mean that the contractor has satisfied the requirements of these specifications. The contractor shall submit seven (7) complete sets of documentation within 30 calendar days after award of purchase order.

Each submittal shall include a cover letter providing a list of each variation that the submittal may have from the requirements of the contract documents. In addition the Contractor shall provide specific notation on each shop drawing, sample, catalog cut, data sheet, installation manual, etc. submitted for review and approval, of each such variation.

All drawings and diagrams shall include the contractor's title block, complete with drawing title, contractor's name, address, date including revisions, and preparer's and reviewer's initials.

Product Data
Data sheets with the printed logo or trademark of the manufacturer for all equipment. Indicated in the documentation will be the type, size, rating, style, and catalog number for all items proposed to meet the system performance detailed in this specification. The proposed equipment shall be subject to the approval of the Architect/Engineer.

Shop Drawings
A complete set of shop drawings shall be supplied. The shop drawings shall be reproduced electronically in digital format. This package shall include but not be limited to:

Control panel wiring and interconnection schematics.
Complete point to point wiring diagrams.
Riser diagrams.
Complete floor plan drawing locating all system devices and 1/8’ = 1’-0 scale plan and elevation of all equipment in the Fire Command Station. Including showing the
placement of each individual item of fire alarm, security, and access control equipment as well as raceway size and routing, junction boxes, and conductor size, quantity, and color in each raceway.

Detailed system operational description. Any Specification differences and deviations shall be clearly noted and marked.

Complete system bill of material.

All drawings shall be reviewed and signed off by an individual having a minimum of a NICET certification in fire protection engineering technology, subfield of fire alarm systems.

Samples
A sample of each smoke detector, intelligent modules, horn, strobes, card reader controller, card reader, and door locking mechanism shall be provided to the contractor for their familiarization.

Quality Assurance/Control Submittals
Installer's Certification

The engineered systems distributor must be licensed in the state of project location and have been incorporated in the business in that state for a minimum of 5 years. Submit a copy of the system supplier's training certification issued by the manufacturer of the integrated life safety system, and a copy of the installing technician's NICET certification.

System Calculations
Complete calculations shall be provided which show the electrical load on the following system components:
Each system power supply, including stand-alone booster supplies.
Each standby power supply (batteries).
Each notification appliance circuit.
Each auxiliary control circuit that draws power from any system power supply.

1.4.2 Close Out

Two (2) copies of the following documents shall be delivered to the building owner's representative at the time of system acceptance. The close out submittals shall include:

Project specific operating manuals covering the installed life safety system devices. The manual shall contain a detailed narrative description of the system architecture, inputs, notification signaling, auxiliary functions, annunciation, sequence of operations, expansion capability, application considerations and limitations. Manufacturer's data sheets and installation manuals/instructions for all equipment supplied. A generic or typical owner's instruction and operation manual shall not be acceptable to fulfill this requirement.
As-Built drawings consisting of: a scaled plan of each building showing the placement of each individual item of the Life Safety System equipment as well as raceway size and routing, junction boxes, and conductor size, quantity, and color in each raceway. All drawings must reflect point to point wiring, device address and programmed characteristics as verified in the presence of the engineer and/or the end user unless device addressing is electronically generated, and automatically graphically self-documented by the system.

All drawings shall be provided in standard .DXF format. A vellum plot of each sheet shall also be provided.

The application program listing for the system as installed at the time of acceptance by the building owner and/or local AHJ (disk, hard copy printout, and all required passwords).

Provide the name, address and telephone of the authorized factory representative.

A filled out Record of Completion similar to NFPA 72, 2006 edition.

1.5 Quality Assurance

1.5.1 Qualifications of Contractor

1.5.1.1 The contractor shall have successfully installed similar fire detection, evacuation voice and visual signaling control components and equipment on a previous project of comparable size and complexity. The owner reserves the right to reject any control components for which evidence of a successful prior installation performed by the contractor cannot be provided.

The contractor shall have in-house engineering and project management capability consistent with the requirements of this project. Qualified and approved representatives of the system manufacturer shall perform the detailed engineering design of central and remote control equipment. Qualified and approved representatives of the system manufacturer shall produce all panel and equipment drawings and submittals, operating manuals. The contractor is responsible for retaining qualified and approved representative(s) of those system manufacturers specified for detailed system design and documentation, coordination of system installation requirements, and final system testing and commissioning in accordance with these specifications.

1.6 Project Conditions
1.6.1 Project Conditions
It shall be the Contractor's responsibility to inspect the job site and become familiar with the conditions under which the work will be performed. Inspection of the building may be made by appointment with the Owner.

1.7 Warranty and Maintenance

1.7.1 Spare Parts

1.7.1.1 Spare Parts
The Contractor shall supply the following spare parts:

Automatic detection devices - Two (2) percent of the installed quantity of each type shall be provided.

Manual fire alarm stations - Two (2) percent of the installed quantity of each type.

Glass rods or panels for break glass manual fire alarm stations (if used) - Ten (10) percent of the installed quantity, but no less than two devices shall be provided.

Audible and visible devices - One (1) percent of the installed quantity of each type, but not less than two (2) devices shall be provided.

Keys - A minimum of three (3) sets of keys shall be provided and appropriately identified.

1.7.2 Warranty
The contractor shall warranty all materials, installation and workmanship for one (1) year from date of acceptance, unless otherwise specified. A copy of the manufacturer's warranty shall be provided with close-out documentation and included with the operation and installation manuals.

1.8 Training

1.8.1 Training
The System Supplier shall schedule and present a minimum of 8 hours of documented formalized instruction for the building owner, detailing the proper operation of the installed System.

The instruction shall be presented in an organized and professional manner by a person factory trained in the operation and maintenance of the equipment and who is also thoroughly familiar with the installation.
The instruction shall cover the schedule of maintenance required by NFPA 72 and any additional maintenance recommended by the system manufacturer.

Instruction shall be made available to the Local Municipal Fire Department if requested by the Local Authority Having Jurisdiction.

PART 2 Products

2.1 Manufacturer

2.1.1 Fire
The manufacturer of the system equipment shall be regularly involved in the design, manufacture, and distribution of all products specified in this document. These processes shall be monitored under a quality assurance program that meets the ISO 9000 requirements.

All System components shall be the cataloged products of a single supplier. All products shall be listed by the manufacturer for their intended purpose.

Fire-Lite products constitute the type of equipment to be installed.

All control panel assemblies and connected field appliances shall be both designed and manufactured by the same company, and shall be tested and cross-listed as to ensure that a fully functioning is designed and installed.

2.2 Panel Components & Functions

2.2.1 General

2.2.1.1 General - Fire
The existing control panel is a Fire-Lite Model MS9600 Intelligent Addressable control panel. The existing panel shall be replaced and returned to the owner. Any existing devices that are not compatible with the new system shall be replaced and returned to the owner. The new system shall be as follows:

The control panel(s) shall be a multi-processor based networked system designed specifically for fire applications. The control panel shall be listed and approved for the application standard(s) as listed under the General section.

The control panel shall include all required hardware, software and site specific system programming to provide a complete and operational system. The control panel(s) shall be designed such that interactions between any applications can be configured, and modified using software provided by a single supplier. The control
panel(s) operational priority shall assure that life safety takes precedence among the activities coordinated by the control panel.

The control panel shall include the following capacities:
Support up to 2500 analog/addressable points.
Support network connections up to 63 other control panels and annunciators.
Support multiple digital dialers and modems
Support multiple communication ports and protocols
Support up to 1740 chronological events.

The network of control panels shall include the following features:
Ability to download all network applications and firmware from the configuration computer from a single location on the system.
Provide electronic addressing of analog/addressable devices.
Provide an operator interface control/display that shall annunciate, command and control system functions.
Provide an internal audible signal with different programmable patterns to distinguish between alarm, supervisory, trouble and monitor conditions.
Provide a discrete system control switch provided for reset, alarm silence, panel silence, drill switch, previous message switch, next message switch and details switch.
Provide system reports that provide detailed description of the status of system parameters for corrective action or for preventative maintenance programs. Reports shall be displayed by the operator interface or capable of being printed on a printer.
Provide an authorized operator with the ability to operate or modify system functions like system time, date, passwords, holiday dates, restart the system and clear control panel event history file.
Provide an authorized operator to perform test functions within the installed system.

The control panel shall contain a standby power supply that automatically supplies electrical energy to the system upon primary power supply failure. The system shall include a charging circuit to automatically maintain the electrical charge of the battery.

Remote power supplies will need to be added for the Notification Appliance Circuits (NACs) at the Gymnasium, Band Hall, and Main Classroom Building.

2.3 Field Mounted System Components

2.3.1 Fire Initiating Devices

2.3.1.1 Smoke Detectors & Accessories

2.3.1.1.1 Analog Addressable Smoke -- General
Each analog addressable smoke detector's sensitivity shall be capable of being programmed individually as: most sensitive, more sensitive, normal, and less sensitive or least sensitive. In addition to the five sensitivity levels the detector shall provide a pre-alarm sensitivity setting, which shall be settable in 5% increments of the detector's alarm sensitivity value.

An alternate alarm sensitivity level shall be provided for each detector, which can be set to any of the five (5) sensitivity settings manually or automatically using a time of day event. In addition to the five alternate sensitivity levels the detector shall provide an alternate pre-alarm sensitivity setting, which shall be settable in 5% increments of the detector's alternate alarm sensitivity value.

The detector shall be able to differentiate between a long drift above the pre-alarm threshold and fast rise above the threshold.

The detector's sensing element reference point shall automatically adjust, compensating for background environmental conditions such as dust, temperature, and pressure. Periodically, the sensing element real-time analog value shall be compared against its reference value. The detector shall provide a maintenance alert signal that 75% to 99% compensation has been used. The detector shall provide a dirty fault signal that 100% or greater compensation has been used.

The system shall allow for changing of detector types for service replacement purposes without the need to reprogram the system. The replacement detector type shall automatically continue to operate with the same programmed sensitivity levels and functions as the detector it replaced. System shall display an off-normal condition until the proper detector type has been installed or change in the application program profile has been made.

2.3.1.1.2 Duct Detector Housing
Provide smoke detector duct housing assemblies to mount an analog/addressable detector along with a standard, relay or isolator detector mounting base. The housing shall also protect the measuring chamber from damage and insects. The housing shall utilize an air exhaust tube and an air sampling inlet tube that extends into the duct air stream up to ten feet. Drilling templates and gaskets to facilitate locating and mounting the housing shall also be provided. Remote alarm LED indicators shall be provided where required.

2.3.1.1.3 Smoke Detector - Photoelectric
Provide analog/addressable photoelectric smoke detectors at the locations shown on the drawings. The detector shall have the ability to set the sensitivity and alarm verification of each of the individual detectors on the circuit. It shall be
possible to automatically change the sensitivity of individual analog/addressable detectors for the day and night periods. Each smoke detector shall be capable of transmitting pre-alarm and alarm signals in addition to the normal, trouble and need cleaning information. It shall be possible to program control panel activity to each level. Each smoke detector may be individually programmed to operate at any one of five (5) sensitivity settings. Each detector microprocessor shall contain an environmental compensation algorithm that identifies and sets ambient environmental thresholds approximately six times an hour. The microprocessor shall monitor the environmental compensation value and alert the system operator when the detector approaches 75% and 100% of the allowable environmental compensation value.

2.3.1.3 Detector Bases

2.3.1.3.1 Detector Base - Standard
Provide standard detector mounting bases suitable for mounting on either North American 1-gang, 3½ or 4 inch octagon box and 4 inch square box, or European BESA or 1-gang box. The base shall contain no electronics and support all series detector types.

2.3.1.4 Manual Stations

2.3.1.4.1 Manual Station - Double Action Single Stage
Provide analog/addressable double action, single stage fire alarm stations at the locations shown on the drawings. The fire alarm station shall be of polycarbonate construction and incorporate an internal toggle switch. A locked test feature shall be provided. The station shall be finished in red with silver "PULL IN CASE OF FIRE" lettering. The manual station shall be suitable for mounting on North American 2½ (64mm) deep 1-gang boxes and 1½ (38mm) deep 4 square boxes with 1-gang covers. All manual stations shall be provided with protective covers to prevent nuisance alarms. Protective covers shall sound an alarm at a minimum of 95 dB at one foot when lifted off manual station. Protective covers shall be a product of STI.

2.3.2 Notification Appliances

2.3.2.1 Horn-Strobes

2.3.2.1.1 Low Profile Horn-Strobes
Provide low profile wall mount horn/strobes at the locations shown on the drawings. The horn/strobe shall provide an audible output of 110 dBA at 10 ft. when measured in reverberation room per UL-464. Strobes shall provide synchronized flash outputs. The strobe output shall be determined as required by
its specific location and application from a family of 15cd, 30cd, 60cd, 75cd & 110cd devices. The horn shall have a selectable steady or synchronized temporal output. In and out screw terminals shall be provided for wiring. Low profile horn/strobes shall mount in a North American 1-gang box.

2.3.2.2 Strobes

2.3.2.2.1 Low Profile Strobes
Provide low profile wall mounted strobes at the locations shown on the drawings. In and out screw terminals shall be provided for wiring. Strobes shall provide synchronized flash outputs. Strobe output shall be determined as required by its specific location and application from a family of 15cd, 30cd, 60cd, 75cd, or 110cd devices. Low profile strobes shall mount in a North American 1-gang box.

PART 3 Execution

3.1 Field Quality Control

3.1.1 Test & Inspection
All intelligent analog addressable devices shall be tested for current address, sensitivity, and user defined message.

All wiring shall be tested for continuity, shorts, and grounds before the system is activated.
The Fire Alarm Contractor shall install all required wire. All required conduit and back boxes shall be provided and installed by others.

All test equipment, instruments, tools and labor required to conduct the tests shall be made available by the installing contractor.

The system including all its sequence of operations shall be demonstrated to the Owner, his representative, and the local fire inspector. In the event the system does not operate properly, the test shall be terminated. Corrections shall be made and the testing procedure shall be repeated until it is acceptable to the Owner, his representatives and the fire inspector.

At the final test and inspection, a factory trained representative of the system manufacturer shall demonstrate that the system functions properly in accordance with these specifications. The representative shall provide technical supervision, and participate during all of the testing for the system.

All fire alarm testing shall be in accordance with National Fire Alarm Code, NFPA 72 - 2006, Chapter 10.
A letter from the Contractor certifying that the system is installed entirely in accordance with the system manufacturer's recommendations and within the limitations of the required listings and approvals, that all system hardware and software has been visually inspected and functionally tested by a manufacturer's certified representative, and that the system is in proper working order.

END OF SECTION