1.1 **Addressable Automatic Detection and Protective Signaling System Life Safety System**

1.1.1 **General**

This performance specification provides the minimum requirements for the Automatic Detection and Protective Signaling 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 meet the requirements of this specification and the drawings and is provided by the following manufacturer:

**Harding Instruments and Controls**

Alternate equipment to be supplied will be considered only if it meets all sections of the performance specification. Any deviations of system performance outlined in this specification will only be considered when the following requirements have been met:

Equal or superior to the system operation stated in the specification.

Such evidence shall be submitted to and accepted by the Owner, not less than ten (10) calendar days prior to the scheduled date for submission of bids.

The acceptability of any alternate proposed system shall be the sole decision of the Owner or his authorized representative.

1.1.2 **Scope**

The Contractor shall furnish all labor, services and materials necessary to furnish and install a complete, functional fire alarm system (System). The System shall comply in respects with all applicable codes, rules and regulations. The System shall comply in all respects with the requirements of the specifications, manufacturer's recommendations and Underwriters Laboratories (UL) 9th edition listings.

1.1.3 **Description**

Provide and install a new distributable FxIP Ethernet based automatic fire detection and protective signaling system consisting of:

1. New or existing Ethernet communication system (backbone).
2. IP based distributable modules shall be located as shown on the drawings.
3. LCD annunciator shall be located as shown on the drawings.
4. Manual pull stations shall be located as shown on the drawings.
5. Area smoke detection shall be provided as shown on drawings.
6. Area heat detection shall be provided as shown on drawings.
7. Duct smoke detection shall be provided as shown on the drawings.
8. Monitor the sprinkler system water flow(s) and valve supervisory switch(s).
9. Monitor the stand-alone suppression systems as shown on the drawings.
10. Provide horn/strobe appliances located throughout the building, as shown on the drawings.
11. Provide ADA synchronized visual appliances located throughout the building, as shown on the drawings.
12. Provide magnetic door holders, as shown on drawings.
13. Provide fan shutdown controls as shown on drawings.
14. Provide direct interface to the building automation system.
15. Provide elevator recall functions.
16. Provide connection to a Central Station. The owner shall arrange for two dedicated phone lines to be terminated as directed by the installing contractor.
17. Provide a cost of a one year test and inspection contract as required by NFPA 72.
18. Provide Fire Dept key depository box as manufactured by KNOX COMPANY.

1.2 References

1.2.1 Codes

1.2.1.1 Codes - Fire

The equipment and installation shall comply with the current provisions of the following codes and standards:

**NEED TO GET APPLICABLE ULC REFERENCES/FCC REFERENCES**

NFPA 70 - 2017 National Electric Code®
NFPA 72 – 2017 National Fire Alarm Code®
NFPA 90A - 2015 Air Conditioning Systems
NFPA 92A - 2009 Standard for Smoke-Control Systems Utilizing Barriers and Pressure Differences
NFPA 92B – 2009 Standard for Smoke Management Systems in Malls, Atria, and Large Spaces
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 1971 - Signaling Devices for the Hearing-Impaired.
UL 1481 - Power Supplies for Fire Protective Signaling Systems.
UL 1635 - Digital Alarm Communicator System Units
Americans with Disabilities Act Accessibility Guidelines (ADAAG)
Local requirements
State requirements
Federal Codes and Regulations

1.3 Operations

1.3.1 Sequence of Operations

1.3.1.1 Alarm Operation

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 Virtual Panel Display Module (VPM) and any Standard Display Modules (SDM3-IP).
- The LCD Display shall indicate all applicable information associated with the alarm condition including: zone, device type, device location and time/date.
- Any remote LED’s or remote annunciator LCD/LED’s associated with the alarm zone shall be illuminated.
- The following actions shall occur simultaneously:
  - Activate visual strobes in the effected building
• Transmit signal to the building automation system.
• Transmit signal to the central station.
• Activate Auxiliary Municipal transmit signal directly to the City
• Activate outside beacon.
• Activate automatic smoke control sequences.
• All automatic events programmed to the alarm point shall be executed and the associated outputs activated.
• All stairwell/exit doors shall unlock throughout the building.
• All self-closing fire/smoke doors held open shall be released.
• If applicable, the voice evacuation system will sound the speakers on the floor of incident as well as the floor above and the floor below.

1.3.3.1.3 Supervisory Operation

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

• The internal audible device shall sound at the control panel or command center.
• The VPM/SDM3-IP 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 (if installed).
• 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 (if installed).

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 VPM Display and SDM3-IP Displays (if installed).
• Display the event on the graphical workstation and display a pictorial image (if installed).
• The VPM/SDM3-IP display shall indicate all applicable information associated with the trouble condition including; zone, device type, device location and time/date.
• 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 (if installed).

Sequence of operations is intended as a guideline and may not reflect every possible operation required.

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 60 hours and capable of operating the system for fifteen (15) 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
1.3.4.3 Display
The display interfaces (VPM/SDM3-IP) 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 intermixed 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, water flow switches, valve supervisory switches, fire pump functions, and air pressure supervisory switches shall be Class B (Style "B") or Class A (Style "D").

1.3.4.5 Notification Appliance Circuits
All notification appliance circuits shall be Class A (Style "Z"). All notification appliance circuits shall have a minimum circuit output rating of: 3 amps @ 24 VDC; The notification circuits shall be power limited. Non-power limited circuits are not acceptable.

1.3.4.6 Signaling Line Circuits
The signaling line circuit connecting to addressable/analog devices including, detectors, monitor modules, control modules and isolation modules shall be Class A (style 6 or7). Signaling line circuits used for notification circuits Shall be Class A.

OR

The signaling line circuit connecting to addressable/analog devices including, detectors, monitor modules, control modules, isolation modules, and notification circuits shall be Class B.

1.3.4.7 Network Wiring
The system supplied under this specification shall utilize node to node, direct wired multi-priority peer-to-peer IP/Ethernet based network operations. The system shall utilize independently addressed smoke detectors, heat detectors and input/output modules as described in this specification. The Ethernet based network shall consist of multiple intelligent IP-addressed nodes performing active functions, which are capable of making all local decisions and generating network tasks to other nodes in the event of node failure or communications failure between nodes.

Shall be wired such that 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. Individual modules isolated completely from the system shall still be capable processing local alarm events.

1.3.4.8 Network Nodes
The network nodes shall maintain their own IP address and be capable of a simple connection to the Cat5 Ethernet communication loop and shall be capable of the following:

Remotely locatable ALM3-IP Signaling line circuits for communications with analog/addressable devices, as required.
Remotely locatable ALM3-IP Notification Appliance Circuits, as required.
Remotely locatable combination ALM3-IP SLC/NAC circuits
Remotely locatable VPM/SDM3-IP display/control modules
Remotely locatable ACM3-IP graphic annunciator/relay driver modules
Power supplied by system power supply OR integral power supply(s) with secondary stand-by power.
Auxiliary function circuits and operations, as required.

1.3.4.9 DACT
The system shall provide off premise communications capability (DACT) for transmitting system events to multiple Central Monitoring Station (CMS) receivers. The system shall provide an individual CMS account for each tenant, and send the required signals to the one or more CMS(s) and account(s) specified by each tenant. In the event of a module failure during a fire alarm condition, the DACT degrade mode shall transmit a general fire alarm signal to the CMS.

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 three (3) complete sets of documentation within immediately 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.

Product Data Sheets
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.

The engineered systems distributor (ESD) must be licensed in the state of project location. 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 integrated life safety system. 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 Automatic Detection and Protective Signaling 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.

All drawings shall be provided in standard .DXF format.

A filled out Record of Completion similar to NFPA 72, 2010 edition figure 10.6.2.3 It is further intended that upon completion of this work, the Owner be provided with:

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 UL listings, and is/are in proper working order. Contractor shall use "Fire Alarm System Certification and Description" as required by Section 10.1.1 of NFPA 72 - 2007 edition.

1.5 Quality Assurance

1.5.1 Qualifications of Contractor

1.5.1.1
The contractor shall have successfully installed similar system fire detection, evacuation voice and visual signaling control components 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.

1.5.2 Pre-installation
1.5.2.1 Pre-Installation Requirements

- Secure permits and approvals prior to installation
- Submittal approval prior to installation (By Owner or Owners Representative)

1.6 Delivery, Storage and Handling

1.6.1 Receiving and Handling
The Contractor shall be responsible for all receiving, handling, and storage of his materials at the job site. Use of loading docks, service driveways, and freight elevators shall be coordinated with the GC.

1.6.2 Storage
The GC will provide the Contractor with a lockable storage space for the Contractor's use during this project. The Contractor shall be responsible for the security of this space.

Overnight storage of materials is limited to the assigned storage area. Materials brought to the work area shall be installed the same day, or returned to the assigned storage area unless previously approved by the GC.

1.6.3 Rubbish
The Contractor shall remove rubbish and debris resulting from his work on a daily basis. Rubbish not removed by the Contractor will be removed by the GC and back-charged to the Contractor.

Removal of debris and rubbish from the premises shall be coordinated with the GC.

1.7 Project Conditions

1.7.1 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.

1.8 Warranty and Maintenance

1.8.1 Spare Parts

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

- Automatic detection devices - Two (2) percent of the installed quantity of each type.
- Manual fire alarm stations - Two (2) percent of the installed quantity of each type.
- Audible and visible devices - One (1) percent of the installed quantity of each type, but no less than two (2) devices.
- Keys - A minimum of three (3) sets of keys shall be provided and appropriately identified.

1.8.2 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.

The System Supplier shall maintain a service organization with adequate spare parts stock within 75 miles of the installation. Any defects that render the system inoperative shall be repaired within 24 hours of the owner notifying the contractor.

1.9 Training

1.9.1 Training
The System Supplier shall schedule and present a minimum of 4 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.

2.1 Equipment Requirements

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.

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

As Built Engineered Systems, Inc. products constitute the minimum type and quality of equipment to be installed.

All cabinet 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 system is designed and installed. The system supplied under this specification shall be an IP-Based Fire Control Network consisting of a series of IP-addressable control modules installed on an Ethernet network that can be distributed throughout a facility or group of buildings. The system shall utilize independently addressed, intelligent microprocessor-based smoke detectors, heat detectors, and modules as described in this specification.

2.2 Panel Components & Functions

2.2.1 General

2.2.1.1 General - Fire
The base system shall be an Ethernet based IP Fire Series fire control system. The architecture of an IP Fire Series fire control network is comprised of a series of IP based distributable modules connected on an Ethernet communication system (backbone).

These modules include alternate configurations of analog loop and NAC circuit modules (ALM3-IP-xy), virtual and standard display modules (SDM3-IP), annunciator control modules (ACM3-IP) and other specialized modules. The system shall be listed and approved for the application standard(s) as listed under the General section.
A single Virtual Panel Module (VPM) can interact with up to 50 distributable modules of any type in any configuration. As modules are attached to the network, they obtain their IP address assignments from the VPM. Once connected, Standard Display Modules SDM's provide identical features as the VPM.

The system shall be designed as such that interactions between any application can be configured, and modified using software provided by a single supplier. The collection of modules connected on the Ethernet backbone form a distributed fire control panel. Operational priority shall assure that fire detection, protective signaling, smoke control and other alarm functions take precedence among the activities coordinated by the distributed control panel.

The system shall be able (1) field programmable by the use of any standard USB capable keyboard (wired or wireless) connected to the USB ports located on all display modules, and/or (2) via the PC-based Administrator programming software by (a) direct connection to any switch on the Fire Alarm Ethernet Network (backbone) or, (b) by direct download from a PC or laptop computer to any Type 2.0 USB Mass storage device and upload to the FxIP Fire control system.

The control panel shall include the following capacities:

- Support up to 252 input/output devices per Analog Loop Module (ALM3-IP)
- Support from 1 to any combination up to 49 analog loops modules (ALM3-IP) which means a total capacity of 12,348 addressable devices/ detectors.
- Support from 2 up to 98 NAC circuits each rated at 3A VDC each.
- Support multiple digital dialers, line reversal and municipal systems
- Support multiple communication ports and protocols
- Support up to 3000 chronological events on each attached IP module

The fire control network shall include the following features:

- IP/Ethernet communication between system modules/functions
- Distributed modules on Ethernet backbone collectively form the fire control panel
- From 2 to 50 modules on an individual system
- Ability to automatically generate sub-networks on communication breaks
- The ability to automatically synchronize system status across the network on the restoral of communication breaks
- The ability to backup/restore configurations of any/all system modules to a USB Mass Storage device
- The ability to maintain drift-compensation values on detectors
- The ability to program control-by-event across the network using Group or Zone programming
- The ability to program control-by-event across the network using Boolean Logic programming
- The ability to conduct walk-test by device or Group/Zone
- The ability to conduct by-pass by device or Group/Zone
- The ability to set programmable Signal Silence Timeout or Signal Silence Restart
- The ability to auto-program SLC's
- The ability to produce segregated output routines when multi-sensors are in an alarm condition based on whether the alarm condition was generated by the thermal element or the smoke chamber
- The ability to provide programmable soft keys on VPM and SDM3-IP display
modules

- The ability to provide day/night sensitivity settings across the network/by detector.
- The ability to provide coded signaling on attached SLC’s and/or NAC expanders
- Ability to download all network applications and programming data from the configuration computer to the FxIP Fire system from a USB Mass Storage Device
- Ability to download all network applications and programming from the configuration computer to the FxIP Fire Series from single location on the system
- Ability to access all programming menus without the PC based configuration tool for on-site field-programming.
- The ability to provide Positive Alarm Sequence (PAS)
- Provide XPERT programming cards for analog/addressable detector bases to ensure that system control-by-event functions related to specific detector addresses remain in place.
- Provide single or multiple VPM/SDM3-IP operator display interfaces that shall annunciate system status and provide system wide command and control functions.
- Provide an internal audible signal with different programmable patterns to distinguish between alarm, supervisory, trouble and monitor conditions.
- Provide discreet system control switches for reset, alarm silence, panel silence, drill, previous message, next message and details.
- Ability to report at all operator interfaces
- Ability to re-sound the sounder when smoke has cleared the chamber of each detection device after an alarm has been initiated
- The ability to log the time between the detector initiation from an alarm condition and the point at which the smoke has cleared the detector chamber and store the information in the history log
- Provide system reports that provide detailed description of the status of system parameters for corrective action or for preventative maintenance programs and for system documentation.
- Provide an authorized operator with the ability to operate or modify system functions like system time, date, passwords, and restart the system.
- Provide an authorized operator to perform test functions within the installed system.
- Quarter VGA Graphical Display
- System Normal Indicator
- System Common Alarm Indicator
- System Common Trouble Indicator
- System Common Supervisory Indicator
- System Ground Fault Indicator
- System Disabled Point(s) Indicator
- System Reset Switch with Indicator
- System Alarm Silence Switch with Indicator
- System Trouble Silence Switch with Indicator
- System Message Queue Scroll Switches.
- Soft Keys and/or programmatic access to Enable/Disable System and Functions

The system 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.
2.2.4 DACT Dialer
The system shall provide off premise communications capability using a digital alarm communications transmitter (DACT) for sending system events to multiple central monitoring station (CMS) receivers. The system shall provide the CMS(s) with point identification of system events using Contact ID or SIA DCS protocols. The system shall provide an individual CMS account for each tenant, and send the required signals to the one or more CMS(s) and account(s) specified by each tenant. In the event of a panel CPU failure during a fire alarm condition, the DACT degrade mode shall transmit a general fire alarm signal to the CMS.

2.2.5 Power Supply
System power supply(s) shall provide multiple power limited 24 VDC output circuits as required by the panel.

Upon failure of normal (AC) power, the affected portion(s) of the system shall automatically switch over to secondary power without losing any system functions.

Each system power supply shall be individually supervised. Power supply trouble signals shall identify the specific supply and the nature of the trouble condition.

All standby batteries shall be continuously monitored by the power supply. Low battery and disconnection of battery power supply conditions shall immediately annunciated as battery trouble and identify the specific power supply affected.

All system power supplies shall be capable of recharging their associated batteries, from a fully discharged condition to a capacity sufficient to allow the system to perform consistent with the requirements of this section, in 48 hours maximum.

All AC power connections shall be to the building's designated emergency electrical power circuit and shall meet the requirements of NFPA 72 - The AC power circuit shall be installed in conduit raceway. The power circuit disconnect means shall be clearly labeled FIRE ALARM CIRCUIT CONTROL and shall have a red marking. The location of the circuit disconnect shall be labeled permanently inside the each control panel the disconnect serves..
2.3 Graphic & Smoke Control Annunciators (If applicable)

2.3.1 Firefighters Smoke Control Station
Provide a graphic Firefighter's Smoke Control Station (FSCS) at the location(s) shown on the drawings. The FSCS shall provide a graphic representation of the facility HVAC system and stairwell pressurization system. Fan override and control switches and fan/damper status LEDs shall be provided as indicated on the shop drawings. The following system controls and indicators shall be provided on the FSCS: Power ON, Trouble, and Signal Silenced LEDs; System Reset, Silence, Trouble Silence, and Drill push buttons.

2.4 Field Mounted System Components

2.4.1 Fire Initiating Devices

2.4.1.1 Duct Detector Housing
Provide smoke detector duct housing assemblies to mount a Duct rated XP Series 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 and remote test stations shall be provided.

Duct detectors shall be DXP-AD2-P (model SL-DAA-P) photoelectric 2 wire, DXP-AD2-I (model SL-DAA-N) photoelectric 2 wire, DXP-AD4R-P (model SL-DA4R-P) photoelectric 4 wire with relay and DXP-AD4R-I (model SL-DA4R-N) ionization 4 wire with relay or approved equals.

2.4.1.2 Smoke Detector – Photoelectric DET2004 and DET3004
Provide intelligent photoelectric smoke detectors at the locations shown on the drawings. Both types of photoelectric detectors provide unique addressing information and custom user text. Each smoke detector shall be capable of transmitting pre-alarm and alarm signals in addition to the normal, trouble and need cleaning information. Each smoke detector is addressed using the patented XPERT programming card which mechanically secures the detector address in the detector base. In addition, The FxIP Fire control shall have the ability to set the sensitivity levels of the individual DET3004 detectors on the circuit. Each DET3004 smoke detector may be individually programmed to operate at any one of five sensitivity settings. It shall be possible to automatically change the sensitivity of individual DET3004 intelligent detector for the day and night periods. Each DET3004 detector microprocessor shall be self-compensating and contain an environmental compensation algorithm that identifies and sets ambient environmental thresholds.

Photoelectric detectors shall be DET2004 or DET3004 or approved equal.

2.4.1.2 Smoke Detector – Ionization DET2002 and DET3002
Provide intelligent ionization smoke detectors to detect hot burning fires at the locations shown on the drawings. Both types of ionization detectors provide unique addressing information and custom user text. Each smoke detector shall be capable of transmitting pre-alarm and alarm signals in addition to the normal, trouble and need cleaning information. Each smoke detector is addressed using the patented XPERT programming card which mechanically secures the detector address in the detector base. In addition, the FxIP Fire control shall have the
ability to set the sensitivity levels of the individual DET3002 detectors on the circuit. Each DET3002 smoke detector may be individually programmed to operate at any one of five sensitivity settings. It shall be possible to automatically change the sensitivity of individual DET3002 intelligent detector for the day and night periods. Each DET3002 detector microprocessor shall be self-compensating and contain an environmental compensation algorithm that identifies and sets ambient environmental thresholds.

Ionization detectors shall be DET2002 or each DET3002 or approved equal.

2.4.1.1.2 Heat Detector DET2001 and DET3001
Provide intelligent heat detectors at the locations shown on the drawings. Both types of heat detectors provide unique addressing information and custom user text. Each heat detector shall can transmit pre-alarm and alarm signals in addition to the normal, trouble and need cleaning information. Each heat detector is addressed using the patented XPERT programming card which mechanically secures the detector address in the detector base. The XP-T alarm and pre-alarm thresholds are programmable in 1 degree increments from The FxIP Fire control. The FxIP Fire control shall also have the ability to set the sensitivity levels of the individual DISC-T detectors on the circuit. Each DET3001 heat detector may be individually programmed to operate at any one of five heat-threshold settings in combination with rate-of-rise detection features. It shall be possible to automatically change the threshold/rate-of-rise settings of individual DET3001 heat detectors for the day and night periods.

Heat detectors shall be DET2001 or DET3001 or approved equal.

2.4.1.1.2 Multisensor DET2005 and DET3005
Provide multisensor detectors at the locations shown on the drawings. Both types of multisensor detectors provide unique addressing information and custom user text. Each multisensor shall can transmit pre-alarm and alarm signals in addition to the normal, trouble and need cleaning information. Each multisensor is addressed using the patented XPERT programming card which mechanically secures the detector address in the detector base. The DET2005 uses advanced algorithms to send a blended signal of heat and smoke readings to determine ambient/pre-alarm/alarm conditions. The FxIP Fire control shall have the ability to set the sensitivity levels of the individual DET3005 detectors on the circuit. The DET3005 multisensor is capable of generating a separate local output upon activation of the smoke sensor (only) and/or a general alarm condition upon activation of the heat sensor (at any time) depending on whether the integral heat element or the integral smoke detector was activated. Each DET3005 multisensor may be individually programmed to operate at any one of five sensitivity settings including smoke only/heat only. It shall be possible to automatically change the sensitivity of individual intelligent DET3005 multisensors for the day and night periods. Each DET3005 multisensor microprocessor shall be self-compensating (for the smoke detector portion only) and contain an environmental compensation algorithm that identifies and sets ambient environmental thresholds.

Multisensors shall be DET2005 or DET3005 or approved equal.

2.4.1.3 Manual Station, Double Action XX-42SK1
Provide an intelligent double action, single stage fire alarm stations at the locations shown on the drawings. The fire alarm station shall be of metal construction and incorporate an internal toggle switch. The station shall be finished in red with "PUSH PULL" and "FIRE" prominently displayed at the top of the device. The manual station shall be suitable for mounting on North American
2 ½ (64mm) deep 1-gang boxes and 1 ½ (38mm) deep 4 square boxes with 1-gang covers.

Pull Stations shall be XX-42SK1 or approved equal.

2.4.2 Notification Appliances

2.4.2.1 Horns

The notification appliance shall be a Wheelock MIZ-24S audible appliance or approved equal. The Notification Appliance shall be electronic and shall have field selectable settings for Temporal (Code 3) or continuous horn and support coded systems operation. The anechoic sound pressure measurement on Temporal (Code 3) setting shall be 87 dBA minimum at 24VDC. The anechoic sound pressure measurement on Continuous Horn setting shall be 87 dBA minimum at 24 VDC. Operating voltages shall be 24 VDC using filtered power or unfiltered power supply (full-wave-rectified). All models shall have provision for standard reverse polarity type supervision and IN/OUT wiring using terminals that accept #12 to #18 AWG wiring. The appliances shall be mounted indoors and mount on standard single-gang electrical back boxes requiring no additional trim plates or adapters.

The horns shall be the MIZ-24S audible appliance or approved equal.

2.4.2.2 Strobes

The visual notification appliances shall be Wheelock Series RSS Strobe Appliances or approved equals. The Series RSS shall meet and be listed for UL Standard 1971 (Emergency Devices for the Hearing-Impaired) for Indoor Fire Protection Service. The strobe shall be listed for indoor use and shall meet the requirements of FCC Part 15 Class B. The strobe appliances shall produce a flash rate of one (1) flash per second over the Regulated Voltage Range and shall incorporate a Xenon flashtube enclosed in a rugged Lexan® lens. All inputs shall be listed as compatible with the FxIP Fire control system. When Strobe Plates are to be installed, they shall be the Wheelock Series RSSP Strobe Plate and shall have the same electronic circuitry as the Wheelock Series RSS.

The Series RSS Strobe shall be of low current design. Where Multi-Candela appliances are specified, the strobe intensity shall have field selectable settings and shall be rated per UL Standard 1971 at 15/30/75/110cd or 135/185cd for wall mount and 15/30/75/95cd or 115/177cd for ceiling mount. The selector switch for selecting the candela shall be tamper resistant. The 15/75 candela strobe shall be specified when 15 candela UL Standard 1971 Listing with 75 candela on axis is required (e.g. ADA compliance).

When synchronization is required, the FxIP Fire control provides the patented Wheelock Sync Protocol built-in to its operating system to properly synchronize the Wheelock appliances. The Wheelock PS-24-8MC and PS-12/24-8CP Power Supplies also support strobe synchronization with the built-in Patented Sync Protocol. The strobes shall not drift out of synchronization at any time during operation. If the FxIP Fire control NAC circuit or Power Supply fails to operate, (i.e., contacts remain closed), the strobe shall revert to a non-synchronized flash rate. The strobes shall be designed for indoor surface of flush mounting.

The Series RSS Strobe Appliances shall incorporate a Patented, Integral Strobe
Mounting Plate that shall allow mounting to single-gang, double-gang, 4-inch square, 100mm European type back boxes, or the SHBB Surface back box. If required, an NATP (Notification Appliance Trim plate) shall be provided. An attaching cover plate shall be provided to give the appliance an attractive appearance. The appliance shall not have any mounting holes or screw heads visible when the installation is completed.

The Series RSSP Multi-Candela or single candela Strobe Plate shall mount to either a standard 4-inch square back box for flush mounting, or the Wheelock SBL2 back box for surface mounting.

All notification appliances shall be backward compatible.

The strobes shall be the Series RSS strobe appliances or approved equals.

### 2.4.2.3 Horn Strobes

The audible/visual notification appliances shall be Wheelock Series NS Horn Strobe appliances and Series NH Horn appliances or approved equals. The Series NS appliances shall meet and be listed for UL Standard 1971 (Emergency Devices for the Hearing-Impaired for Indoor Fire Protection Service). The Series NH Horn shall be UL Listed under Standard 464 (Fire Protective Signaling). The horn strobe shall be listed for indoor use and shall meet the requirements of FCC Part 15 Class B. All inputs shall be compatible with standard reverse polarity supervision of circuit wiring by the Fire Alarm Control Panel (FACP).

The audible portion of the appliance shall have a minimum of two (2) field selectable settings for dBA levels (90 and 95 dBA) and shall have a choice of continuous or temporal (Code 3) audible outputs. The strobe portion of the appliance shall produce a flash rate of one (1) flash per second over the Regulated Voltage Range and shall incorporate a Xenon flash tube enclosed in a rugged Lexan lens. The Series NS shall be of low current design. Where wall mount, Multi-Candela appliances are specified, the strobe intensity shall have field selectable settings and shall be rated per UL Standard 1971 for 15/30/75/110 candela. The selector switch for selecting the candela setting shall be tamper resistant. The 15/75 candela strobe shall be specified when 15 candela UL Standard 1971 Listing with 75 candela on-axis is required (e.g. ADA compliance).

When synchronization is required, the FxIP Fire control provides the patented Wheelock Sync Protocol built-in to its operating system to properly synchronize the Wheelock appliances. The Wheelock PS-24-8MC and PS-12/24-8CP Power Supplies also support strobe synchronization with the built-in Patented Sync Protocol. The strobes shall not drift out of synchronization at any time during operation. If the FxIP Fire control NAC circuit or Power Supply fails to operate, (i.e., contacts remain closed), the strobe shall revert to a non-synchronized flash rate. The strobes shall be designed for indoor surface of flush mounting.

The Series NS Horn Strobes and NH horn shall incorporate a Patented Universal Mounting Plate that shall allow mounting to a single-gang, double-gang, 4-inch square, 100mm European type back boxes, or the SHBB surface back box. If required, an NATP (Notification Appliance Trim Plate) shall be provided.

All notification appliances shall be backward compatible.

The horn strobes shall be the Series NS, MT, AMT or AS horn strobe/horn appliances or approved equals.
2.4.2.4 Speakers

2.4.2.4.1 Low Profile Speakers and Speaker Strobes
The speaker appliances shall be Wheelock Series E Speakers and the speaker strobe appliances shall be Wheelock Series E Speaker Strobes or approved equals. The speakers shall be UL Listed under Standard 1480 for Fire Protective Service and speakers equipped with strobes shall be listed under UL Standard 1971 for Emergency Devices for the Hearing-Impaired. In addition, the strobes shall be certified to meet the requirements of FCC Part 15, Class B.

All speakers shall be designed for a field selectable input of either 25 or 70 VRMS, with selectable power taps from 1/8 watt to 2 watts. All models shall have listed sound output of up to 87 dB at 10 feet and a listed frequency response of 400 to 4000 Hz. The speaker shall also incorporate a sealed back construction. All inputs shall employ terminals that accept #12 to #18 AWG wire sizes. The strobe portion of the appliance shall produce a flash rate of one (1) flash per second over the Regulated Voltage Range and shall incorporate a Xenon flash tube enclosed in a rugged Lexan® lens. The strobe shall be of low current design. Where Multi-Candela Speaker Strobes are specified, the strobe intensity shall have field selectable settings and shall be rated per UL Standard 1971 at 15/30/75/95cd or 135/185cd for wall mount and 15/30/75/95cd or 115/177cd for ceiling mount. The selector switch for selecting the candela shall be tamper resistant. The 15/75 candela strobe shall be specified when 15 candela UL Standard 1971 Listing with 75 candela on-axis is required (e.g. ADA compliance).

When synchronization is required, the strobe portion of the appliance shall be compatible with Wheelock’s SM, DSM sync modules or Wheelock’s PS-12/24-8CP and PS-12/24-8MP Power Supplies with built-in Patented Sync Protocol. The strobes shall not drift out of synchronization at any time during operation. If the sync module or Power Supply fails to operate, (i.e., contacts remain closed), the strobe shall revert to a non-synchronized flash rate.

The speaker and speaker strobe appliances shall be designed for indoor surface or flush mounting. The speaker and speaker strobe shall incorporate a speaker mounting plate with a grille cover which is secured with two screws for a level, aesthetic finish and shall mount to standard electrical hardware requiring no additional trim plate or adapter.

The finish of the Series E speakers and strobe speakers shall be white, red, or nickel plate. All speaker and speaker strobe appliances shall be backward compatible.

The low-profile wall mount speaker/strobes shall be the E Series Speakers and Speaker Strobes or approved equals.

2.4.3 Initiation & Control Modules

Provide intelligent monitor modules. The Monitor Module shall be factory set to support one (1) supervised circuit to monitor of one or more volt-free contacts situated on a Class A or B circuit.
- IOM2001 non-priority switch monitor micro-module, terminals
- IOM2004 non-priority interrupt switch monitor mounted on a 4” wall plate
- IOM 2005 uses priority interrupt switch monitor mounted on a 4” wall plate
• IOM 2008 uses priority interrupt, mini-module switch monitor with flying leads
• IOM 2009 non-priority interrupt, mini-module switch monitor with flying leads

The switch monitor module shall be suitable for mounting on 4” square boxes (IOM2004, IOM2005) or single gang enclosures (IOM2008, IOM 2009) or internal to cabinet (IOM2001).


2.4.3.2 Dual Input Module IOM2003
Provide intelligent dual input modules. The Input Module shall provide one (2) supervised Class A/B input circuits with priority interrupt. The module shall be suitable for mounting on 4” square boxes.

Dual Input Modules shall be IOM2003 or approved equal.

2.4.3.3 Output Control Module IOM2011
Provide intelligent control relay modules. The Output Control Module shall provide one form "C" dry relay with dual contacts rated at 2 amps @ 24 VDC to control external appliances or equipment shutdown. The position of the relay contact shall be confirmed by the system firmware. The control relay module shall be suitable for mounting on 4” square boxes.

Output Control Modules shall be IOM2011 or approved equal.

2.4.3.4 Input Output Module (Need Low Voltage IOM) IOM2010
Provide intelligent input/output modules. The Low Voltage Input Output Module shall be factory set to monitor either the condition of one or more volt-free contacts situated on a Class A or B circuit or the 12/24V input voltage from an Open Collector type input. The output shall be a volt-free relay output rated at 2A @ 30VDC. The output side of the module may be fired automatically by input signal or programmatically via the control-by-event routines in the FxIP Fire control system. The module shall be suitable for mounting on 4” square boxes.

Input Output Modules shall be IOM2011, IOMLowVoltageVersion or approved equal.

2.4.3.5 Sounder Control Module IOM2007
Provide intelligent sounder control modules. Sounder Control Modules provide a means to remotely locate a fully supervised circuit for the operation of signal appliance such as horns, strobes horn/strobes and speaker circuits. The IOM2007 shall be capable of group activation to initiate output circuits simultaneously. The module shall be suitable for mounting on 4” square boxes.

Sounder Control Modules shall be IOM2007 or approved equal.

2.4.3.6 Isolator Module ISO2001, ISO2002, Need IsolatingBase
Provide line isolation. The IOM2001 (Isolator) and IOM2002 (Isolator base) provide intelligent fault isolator modules capable of isolating and removing a fault from the data circuit while allowing the remaining data loop to continue operating. The IsolatingBase is a standard detector base with the isolating circuitry built in. The IsolatingBase accepts any intelligent Harding detector. All modules shall be suitable for mounting on 3” octagonal boxes (4” octagonal or 4” square boxes may be used with proper UL listed mounting brackets).
Isolator Modules shall be ISO2001, ISO2002 and Isolating Base or approved equal.
PART 3 Field Quality Control

3.1 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.

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 testing for the system.

All fire alarm testing shall be in accordance with National Fire Alarm Code, NFPA 72 – 2017 requirements.

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.