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University of Alberta Fire Alarm System Design Guidelines

1.0 Introduction

The following design guidelines have been prepared jointly by the University of Alberta and Umbra Engineering Ltd. to provide the Registered Design Professional with a brief overview of the general requirements related to the design of fire alarm systems at the University of Alberta campus.

These guidelines are not intended to supplant or supersede any of the requirements prescribed by National, Provincial or Local codes, Standards, Regulations and Ordinances, and by no means relieves the Registered Professional from his or her duties and responsibilities to ensure that the design and installation meets the applicable standards. Neither the University of Alberta nor Umbra Engineering Ltd. assumes any responsibility or liability for the accuracy of any codes, standards or ordinances referenced herein nor their relevance to any particular project.

These guidelines describe a peer-to-peer fire alarm network utilizing multiple Fire Alarm Control Panels networked together with a Central Fire Command Center. It may also be used for a smaller system, which may not warrant the use of a networked fire alarm system, but will require some or all of the features associated with fire alarm systems installed in occupancies described in items 3.2.6 of the Alberta Building Code (ABC), (the Register Design Professional would by carefully editing features which are not required such as fire fighters telephones, voice communication systems etc).

Where, in the opinion of the Registered Professional a particular design installation or component issue is not adequately addressed, it will be his/her responsibility to provide supporting documentation for any modifications or alterations to these documents.

Any modifications and/or additions that may be required to ensure a proper system design shall be brought to the attention of the University of Alberta prior to the tender phase of the project. The University of Alberta and the Registered Professional will jointly resolve any discrepancies, and/or update these documents with a projects’ specific information.

The University of Alberta has adopted strict guidelines for the selection of equipment for fire alarm systems within the Main Campus environment. The University has created a long term plan to manage life cycle costs in the future, create a mass notification network based upon utilizing fire alarm technology and to create a centralized proprietary monitoring center for fire alarm events.

The University has created the FMNET which is a dedicated LAN based Ethernet network to support building automation, security services, video transmission, security response services, elevator voice communications, emergency phone communication, mass notification infrastructure and fire alarm system monitoring.
The fire alarm monitoring is a ULC configured network connecting main buildings on the main campus and is contained within the fiber bundles supporting the FMNET topology. Access to the fiber connections is strictly controlled by the University of Alberta Life Safety Systems Group on campus to ensure the integrity of the fire alarm system connections. A coordination meeting will be required with the University of Alberta Life Safety Systems Group if this project requires additional system node connections to the fire alarm reporting network.

The University of Alberta is standardized on the use of the Simplex 4100 series of Fire Alarm control panel (FACP) platform for all ongoing main campus retrofit and construction projects. A website is available to the University staff that provides long term project pricing and a discount to ensure ongoing life cycle management. This standardization minimizes the training needs of the campus. The University of Alberta Life Safety Systems Group is manufacturer ULC trained on the servicing and reprogramming of the Simplex 2120, 4100, 4100+ and 4100U series of systems.

The campus will be utilizing the capabilities of the Simplex 4100U series to expand the mass notification network within the main campus. This specification is configured to require the addition of conduits to main floor building entry points to extend from the required exit pull stations to a rough in location approximately over the main floor exit doors. At this time it is an empty conduit requirement. A sketch is provided in the specification schedule providing guidance to the design professional regarding this requirement.

These master specifications describe a Peer-to-Peer fire alarm network utilizing multiple Fire Alarm Control Panels networked together with a Central Voice Command Center being utilized for voice applications. This specification may also be used for smaller system, which does not warrant the use of a networked fire alarm system, but would require some or all of the features associated with fire alarm systems installed in occupancies described in items 3.2.6 of the ABC. The fire alarm guide line and master specification should be reviewed prior to commencing schematic design and design development as this guideline and master specification will answer questions on which fire system features are required to be implemented for design.

This guideline describes the sequence of events for suppression systems within University facilities. The electrical design professional is required to coordinate with the Mechanical system designer to ensure that all fire alarm field devices used for suppression, detection, etc. are identified in the design for connection back to the main building FACP. This requirement will limit the need for suppression panels and equipment to be added to a facility to handle suppression release requirements and will reduce the maintenance costs over the life cycle of the systems.

Each project must undergo a drawing review by the U of A Design and Technical Services Group (D&Ts) involving the University of Alberta Life Safety Systems Group established on the main campus prior to any tender. The purpose of the review is to ensure that the minimum standards established in ULC-S524 and the University requirements are being met at the tender stage of
the project. Proper information must be available on the drawings to ensure all necessary elements are present and all requirements are clear to maintain coordination between the University of Alberta Life Safety Systems Group and the University Project Consultant. This design review is solely for the purpose of compliance with the referenced standards and is not an engineering peer review. The University of Alberta Life Safety Systems Group is to be advised of post tender changes to the fire system design to provide feedback to the consultant for impact on life cycle management costs.

With regard to any references in the fire alarm master specification for technical, policy or design related matters the contact in Design and Technical Services is Keith Hollands, P. Eng. Email to keith.hollands@ualberta.ca and to Danielle Zauscher danielle.zauscher@ualberta.ca to receive clarifications.

The standards of acceptance for drawings are attached within this guideline: As a minimum the following deliverables are required for each Design and Technical Services review in conjunction with the University of Alberta Life Safety Systems Group review and are required minimum acceptable deliverables as required by ULC-S 524 for the preparation of drawings:

a) Complete risers diagram showing all devices with programming labels and conduit sizes
b) A complete detail of each panel location showing elevations. New construction projects shall centralize all power supplies within the fire alarm control panel
c) If elevator homing control is utilized within the project a detailed layout of the relay configurations used and a sequence of events to describe the operation of the homing control are needed
d) All conduit layouts shall be shown on the drawings with conduit sizes indicated for the installation

2.0 System Overview

.1 All fire alarm systems at the University of Alberta to be of the microprocessor controlled, intelligent reporting type.

.2 All fire alarm systems are to operate on the single stage principle regardless of Building Code Classifications.

.3 All initiating devices are to be individually addressable with features as listed in the master specifications.

.4 Visual signal appliances are to be installed in all University buildings adjacent to, or incorporated into the required audible device. This is a University requirement.

.5 The fire alarm system is to receive power from a building emergency power supply where available. In addition, the system to be equipped with battery back-up sized as described in the master specifications.
System design is to incorporate digital voice messaging. Verify with the University of Alberta if this feature is required for each particular building. As a minimum, the system is to incorporate future expansion capabilities for such features.

The Registered Design Professional shall include in the contract documents a riser diagram showing interconnection of the Fire Alarm Control Panel (FACP), Fire Command Centre (FCC), Intelligent Network Annunciator (INA) and other network devices, as well as typical connections of devices. Riser diagrams may be of the single line type.

Record drawings are to indicate the device address for each addressable device, connected components, flow switches, heats etc. and their position on the data loop.

Record drawings are to indicate the position on the hardwired circuit for each conventional device including both input and output circuits.

System design shall incorporate dedicated individual conduit systems and risers as follows:

a) Fire fighters telephones
b) Voice communication
c) Visual signal appliances
d) Initiating and monitoring devices
e) Network data communication between FACP, FCC, INA’S
f) Suppression system wiring

The system shall incorporate, as a minimum, one (1) local fire alarm control panel. Where deemed advisable or necessary by the Registered Design Professional, the system may utilize a peer-to-peer network configuration. This approach is suggested for buildings over 8 stories in height (25 – 30 m) or buildings with more than 500 initiating devices.

All controls amplifiers and software programming shall reside in the main FACP, or in the case of a peer-to-peer network system, in the FACP that services the floors and the devices and equipment it controls, monitors or supervises.

The system design shall not utilize field transponders, Field Controlled Power Supplies or other remote power supply means that would locate audio amplifiers, visual signal power supplies, etc. remote from the FCC or NFACP’s. Networked FACP’s may be used for large systems within a single facility. Input circuits for the area of detection and output circuits covering that area of detection must reside in the same networked FACP. The justification for using networked FACP’s shall be based upon cost savings derived from reduction in conductor sizing due to voltage drops, conduit sizing for any project that requires a phased completion plan.
The system design shall incorporate push button type switches to enable individual zone paging and a maximum of one switch to activate all-call paging. The push to talk microphone button is not to provide this functionality.

The system design shall incorporate a means of monitoring the area or stair well pressurization fans and provide positive feedback to the FACP to display fan status.

Refer to the sample master specification in Schedule ‘A’ for more details.

### 3.0 System Configuration

1. The system design shall incorporate a minimum of one paging circuit for each individual floor or 2-hour fire separation.

2. The system design shall incorporate loop isolation modules to prevent a fault in one fire compartment from affecting the system or devices in adjacent compartments.

3. System design to incorporate as a minimum two (2) banks of switches for bypass configuration of the system. Each bypass switch is to be accompanied by an individual yellow LED. The LED is to be illuminated when the associated bypass function is enabled. The tender specifications for the project are to incorporate the basic bypass switches as identified in the sample master specification. Coordinate any additional or unique application switches with the University of Alberta’s facilities personnel.

4. System design to incorporate a minimum of one back-up amplifier per audio channel in each FCC or FACP.

5. System to employ a three (3) channel audio path design and direct wiring from each paging zone to its associated FCC or FACP. The use of a distributed remote controlled system configuration using relay modules, control modules or a combination thereof is not acceptable. All paging zone control to be by switching digital amplifier inputs or outputs located in the FACP or FCC.

6. Where Loop Isolation Modules are employed such modules and wiring shall be arranged such that the data communication loop does not depend on the integrity of the wiring between loop isolator modules for communication with other devices on the system. The loop isolator module shall be used to create a T-tap on the redundant data loop and shall maintain Class A configuration of the vertical riser, even if the loop isolator module has disconnected the devices on its output due to a fault condition.
4.0 Acceptable Abbreviations for use on drawings include:

a) FCC (Fire Command Center)
b) FACP (Fire Alarm Control Panel)
c) INA (Intelligent Network Annunciator)
d) VESDA (Very Early Smoke Detection Apparatus)
e) NAC (Notification Appliance Circuit)
f) FCPS (Field Controlled Power Supply)
g) NFACP (Networked Fire Alarm Control Panel)
h) VCC (Voice Command Center)
i) PG (Passive Graphic)

5.0 Design Particulars

.1 Where environmental conditions or equipment availability prohibit the use of addressable devices, conventional hardwired devices may be utilized. Such devices shall be connected to an addressable monitor module to provide individual device annunciation, or where multiple devices of the same type are utilized in a common space or area, a common monitor module may monitor them. Such devices requiring power to operate shall be supplied directly by the FACP.

.2 Where possible utilize combination audible/visual signal appliances.

.3 Magnetic door holders are to operate on 120 volt AC or 24 volt DC normal power. All door holders in each building must be grouped to minimize the fire alarm relay connections required for release of doors on a fire alarm condition. Power supplies are to be independent of the fire alarm system.

.4 Smoke detectors shall be located in all stairwells, elevator shafts and similar vertical riser spaces throughout the building and as required by codes, municipal regulations etc.

.5 Where space configuration, safety concerns or height inhibits the ease of access and maintenance for devices (such as in atriums, large air plenums, etc.), the design shall utilize air aspiration detection systems.

.6 Where air aspirated detection systems are specified or installed they shall be in conformance with Section 2.9 of this specification. The designer may consider the use of these systems in historical buildings utilizing a capillary tubing network to meet the requirements for smoke detection.

.7 At each exterior entrance only, install of a fire alarm re-entrant speaker is required. These horns shall be connected to the system to provide exterior paging functionality and to sound the "all clear" signal. They will not transmit fire alarm signals as is
required within the building. A design drawing note shall be indicated on the drawings that only bottom entry into all exterior weather proof enclosures is permitted.

.8 At each rooftop where exhaust fans or air handling units (AHU’s) are installed, provide a re-entrant type weather proof speaker horn adjacent to each roof access point. No visual signal device is required at these locations.

.9 Design to include for synchronized strobes only where more than one strobe is visible at any one time. The use of synchronized strobes throughout the facility will unnecessarily increase the size of the power supplies.

.10 Where Sentronic Door-Hold-Open devices are used; connect these devices to the fire alarm system for control by the FACP. Power for these units shall not be supplied from the FACP.

.11 FACP to render inoperative all automatic features on electrically operated doors upon alarm condition.

.12 System design to include manual and automatic initiating and both audible and visual signal appliances in service corridors of air handling units.

.13 Annunciators, FACP’s, FCC’s, etc to be located in interior building walls only to prevent condensation from gathering within the equipment enclosures.

6.0 Communication Devices

.1 Voice Evacuation Speakers to be located throughout the facility to ensure all pages and audible messages are intelligible throughout as stipulated in the applicable codes. Speakers are recommended to be located at maximum 10 meters on centre.

.2 Where in the opinion of the Registered Design Professional the quality or intelligibility of the audio signal is not compromised, audible and visual signal appliances shall be wall mounted wherever possible.

.3 All buildings exceeding three (3) stories in height to be equipped with a three (3) channel voice evacuation system.

.4 Fire fighter telephones shall not be of the party line type. Each telephone shall connect back to the FCC via a dedicated circuit. Fire fighter junction boxes shall not be used as a riser raceway.

.5 Fire fighter telephones shall be located within 3 meters of each stairwell and in the fire fighters elevator lobby at each floor.

.6 Audible signaling appliances in mechanical rooms, loading docks, stairs and similar areas are to be horn type devices for single or dual (bi-directional) operation.
7.0 Installation Requirements

.1 Vertical distributions in a building exceeding two (2) storeys in height shall be examined for installation techniques that would comply with ABC requirements for high buildings. The routing of horizontal conduit paths utilized for vertical fire alarm system risers shall be shown in detail to avoid crossing open atrium areas which could place the conductors at risk in the case of a fire. If a satisfactory routing cannot be determined the owner is to be consulted for direction as to the use of fire rated cabling for the horizontal transition of open areas.

.2 All vertical riser cabling shall be contained in a rated shaft or assembly not containing conductors of other systems, except that the riser may be shared with conductors of the emergency power system. Vertical riser cabling refers to those cables that interconnect devices and components at different floor levels to the FCC and/or FACP’s, regardless of the physical orientation of conduit and cabling once installed in its final position.

.3 The system design shall use minimum 19 mm conduit unless specified otherwise. System design to ensure that conduit fill does not exceed 40% at any point.

.4 Design shall incorporate the following installation requirements:
   a) All wiring to be installed in conduit
   b) All devices to be installed in minimum 100 mm square box with a minimum depth of 55 mm
   c) Wiremold type surface raceways may be utilized for distances of 1.5 meters or less
   d) Wiremold outlet boxes shall not contain more than 50% of the conductors allowed by code

.5 Audible and visual signal appliances shall not share a common output circuit unless devices can be programmed for independent operation of the sounder and strobe.

6. The following cable specifications shall be utilized in coordinating sections of the project specification.
   a) Horn circuits #12 awg - TEW - 105C – 600V – 65 fine stranded – Red & Black
   b) Strobe or Horn/Strobe #12 awg - TEW - 105C – 600V – 65 fine stranded – Yellow & Blue
   c) Speaker circuits #16-2 twisted/shielded -FAS cable – 105C/LVT 60C FT4 (CMR) 300V – Red jacket
   d) Communications circuits #18-2 twisted/shielded-FAS cable-105C/LVT 60C FT4 (CMR) 300V – Red jacket
   e) Fire Phone circuits #18-2 twisted/shielded-FAS cable – 105C/LVT 60C FT4 (CMR) 300V – Red jacket
f) **2 hour rated cable**, CSA type FAS90 - 300V - #16-2 twisted/shielded - Red jacket

7. No device box is to be used as a junction box, only the device wires for that specific device are to be installed in the box the device is mounted on.

### 8.0 Verification Requirements

.1 The Registered Design Professional shall be present to witness the entire fire alarm verification process. During the verification procedure, the Registered Design Professional is to record the tap setting of each audible device and record the dB reading at each audible device measured at a distance of 10 feet using OSHA A sensitivity rating. This rating shall be compared against the ULC rating to ensure the device audibility level is being met. At the conclusion of the verification the Design Professional shall produce check sheets listing the loading of each individual amplifier.

.2 At the completion of the verification, the Registered Design Professional shall present a copy of his verification check sheets for inclusion in the Operation and Maintenance (O & M) Manual.

.3 At time of verification, the Owner will produce, install and enter into the system a bar code to provide individual identification of each device on the system.

.4 During the verification process, the Registered Design Professional shall ensure that all devices have been installed in compliance with all applicable codes and standards. Where the installation does not comply, the Registered Design Professional shall instruct the installer to correct the situation, issue a change order to add required devices or provide a written explanation as to the reason for non-compliance. The letter must meet the approval of the authority having jurisdiction.

.5 This design procedure is to be utilized for new building construction containing future tenant improvement areas or for use in buildings that will require partial verifications to occur in order to meet construction schedules. The engineer of record is responsible to maintain the University of Alberta standards during the design process. The design shall consider possible audio requirements, future circuit loading capacity for both automatic and manual devices, battery calculations for emergency power sources, and the future addition of visual appliances. The design is to minimize the use of active smoke detectors if permitted by the governing design codes. All sprinkler detection devices are to remain active in future tenant improvement areas.

.6 Final verification field produced hand written documents shall be scanned and submitted with the O&M manuals. A reproduction copy of the hand written documents shall be produced in Excel format for submission to the University of Alberta Life Safety Systems Group to ensure annual inspection service is maintained.
9.0 System Interfaces

.1 System design to utilize interposing relays for the switching of ancillary devices and equipment operating on voltages greater than 24 volts AC or DC with a maximum rating of 12 watts. Under no condition shall the fire alarm components be used to directly control such devices.

.2 System design to ensure that communication or signals between two non-fire alarm systems such as elevators and emergency generators must travel by direct connection between such systems. System design is not to use the fire alarm system to act as carrier of status or other signal between non-related systems.

.3 Fire alarm system to monitor generator status for "generator run" and "generator trouble." Generator trouble status to include "switch-in-off" position status and low fuel warning.

10.0 Aspirating Air Detection Systems

.1 Aspirated air detection systems shall be considered for applications involving open air atrium buildings where traditional smoke detection devices are ineffective above thirty feet or historical locations requiring retrofitting that require the preservation of architectural elements.

.2 Interfacing to the fire alarm system shall be accomplished by input modules interface for alarm and trouble connection and relay output for resetting the detector if applicable (different manufacturers have different requirements).

.3 Considerations shall be given to locate the detectors in a location for accessibility for maintenance to the data connection port. In the absence of this requirement a remote data connection port shall be installed that is accessible for a laptop connection to the onboard configuration software utility.

.4 Smoke particulate transportation times shall be designed and tested for a maximum of 60 seconds. System testing for verification purposes shall include the confirmation that each sampling point is functional and transportation time does not exceed the 60 seconds until initial detection of the particulate. The end cap of the sampling network shall serve as the primary test port for transportation time testing. Sufficient particulate shall be injected to the end cap location to initiate a full alarm condition in less than 60 seconds to satisfy the requirements of owner.

.5 The use of capillary tubing and fixed sample points shall be based upon the ceiling type encountered in the area of detection. In finished ceiling areas the use of capillary tubing and fixed sample points is required.
.6 The sampling tube network shall conform to ULC requirements for identification and this shall be noted and identified in the final verification reporting documents delivered to the owner.

.7 The use of aspirating detection systems can be considered for use as an early warning type systems in areas that require enhanced life safety, the preservation of equipment or contents. If this application type is used in the design, the inclusion of the Xtralis laser based smoke detection systems shall be considered for use as an equal for spot application early warning usage.

.8 Locate VESDA controller(s) so that safety harnesses and the need to tie off are not required to access controller for filter maintenance.

END OF GUIDELINES
PART 1 GENERAL

1.1 Related Work

SPEC NOTE: The listed sections are suggested only. They are to be modified as required for each particular project. Verify all relevant sections have been included/coordinated when the specifications have been completed, particularly in the architectural and mechanical sections.

.1 General Electrical Provisions Section XXX
.2 Demonstration of Complete Electrical System Section XXX
.3 Operations and Maintenance Manuals Section XXX
.4 Spare Parts and Maintenance Materials Section XXX
.5 Identification Section XXX
.6 Conduit Section XXX
.7 Wire and Cable Section XXX
.8 Aspirating Detection Systems Section XXX
.9 Mechanical Equipment Controls Section XXX
.10 Motor Control Centers Section XXX
.11 Controls (Verify Sections reference with Mechanical Designers) Section XXX
.12 Doors and Door Hardware (Verify Sections reference with Architecture) Section XXX
.13 Sprinkler System Section XXX

1.2 Summary

.1 This section of the specification includes the furnishing, installation, connection and testing of microprocessor controlled, intelligent reporting fire alarm network equipment required to form a complete, operating, coordinated system. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, Fire Alarm Control Panels (FACP), auxiliary control devices, annunciators, and wiring as shown on the drawings and specified herein.

.2 The system shall be a proprietary Simplex 4100U series Fire Alarm System required for the direct connection to the University Life Safety Network on the main campus. Remote campuses shall be open to all manufacturers to provide services.

.3 The facility shall have an emergency voice alarm communication system. (SPEC NOTE: for Voice Messaging Systems only - Comment: The Custom voice message may have to be created within a given frequency range to prevent undesired consequences)
adversely affecting clinical animal labs. Careful editing will be required if custom message used).

SPEC NOTE: The University has pre configured message for general use available from the University of Alberta Life Safety Systems Group on Campus. Select the message to be used in consultation with the life safety team. (A Custom digitized pre-recorded voice message shall notify occupants that a fire condition has been reported. The message shall provide the occupants with emergency instructions. Emergency manual voice override shall be provided.)

.4 This Section covers mass notification system interconnections to the fire alarm system, including provisions for notification appliances, voice communication controls, and ancillary data connections to future notification appliances.

.5 Work covered by this section includes furnishing: of labor, equipment, and materials for the installation of the fire alarm system as indicated on the drawings and specifications.

.6 The Fire Alarm System shall consist of all necessary hardware, equipment, wiring and software programming to perform the following functions:

a) Requirements for mass notification conduit installation only (See Schedule B)
b) Fire alarm and detection operations required by code
c) Control and monitoring of elevators, smoke control equipment, door hold-open devices, fire suppression systems, emergency power systems, and other equipment as indicated on the drawings and specifications and as required by codes and regulations

SPEC NOTE: This procedure is to be utilized for existing buildings undergoing tenant improvement modifications and not for a new construction project. Remove this line prior to printing specification.

.7 The contractor shall employ the fire alarm system base building manufacturer for the premises to replace all existing smoke detectors involved in the tenant improvement construction area with heat detectors compatible with the fire alarm system prior to the commencement of any construction. The required heat detectors shall be furnished by the electrical contractor as part of the tender process. Smoke detectors located in stairwells shall not be changed to heat detectors under any circumstances as stairwells are to be considered as egress paths for non affected floors.

The electrical contractor shall coordinate through the University of Alberta project manager the fire alarm system shutdown notifications required 72 hours before the modification from smoke detectors to heat detectors is scheduled with the manufacturer.

When the prime contractor has obtained a dust free environment and prior to the pre-verification procedure required by these specifications; the electrical contractor shall employee the base building fire alarm system manufacturer to modify the fire alarm
system programming to restore the tenant improvement construction area to the
engineer of records final design requirements.

SPEC NOTE: This procedure is to be utilized for existing buildings undergoing minor tenant
improvement modifications and not for a new construction project. Before selecting this specification
notice the engineer of record is to coordinate through the University of Alberta project manager to
arrange these services. Remove this line prior to printing specification.

.8 The construction area involved in this tenant improvement has had smoke detectors on
the premises changed to heat detectors by the University of Alberta Life Safety Systems
Group in order to reduce false alarm notifications during the construction period. The
electrical contractor is required to maintain these system devices during the
construction period.

When the prime contractor has obtained a dust free environment and prior to the pre-
verification procedure required by these specifications; the electrical contractor shall
employee the base building fire alarm system manufacturer to modify the fire alarm
system programming to restore the tenant improvement construction area to the
engineer of records final design requirements.

1.3 Regulatory Requirements

.1 Installations are subject to approval, inspection and testing by the AHJ representing the
Owner and/or Fire Marshall prior to final acceptance being granted.

.2 All equipment to be listed by Underwriters Laboratories of Canada, compatible for
forming an integrated fire alarm system to be cross listed for releasing suppression
systems.

.3 Installation to comply with ABC, AFC and the standard for the Installation of Fire Alarm
Systems, CAN/ULC-S524 and the Canadian Electrical Code, latest editions as well as
complying with the latest edition of the following standards:

a) ULC S525 Audible signal devices for fire alarm systems
b) CAN/ULC S526 Visual signal devices for fire alarm systems
c) CAN/ULC S527 Control units, fire alarm
d) CAN/ULC S528 Manual pull stations
e) CAN/ULC S529 (R1995) Smoke detectors, fire alarm
f) CAN/ULC S530 Heat activated fire detectors, fire alarm
g) ORD C386 Flame detectors
h) CAN/ULC S533 (R1995) Egress door securing and releasing devices
i) CAN/ULC S548 Alarm initiating and supervising devices for water type
extinguishing systems
.4 Verification and testing of the new system shall conform to requirements of Verification of Fire Alarm Systems, CAN/ULC-S537 latest edition and meet the requirements of the Alberta Building code.

.5 Drawings and general provisions of the Contract, including General, Supplementary Conditions and Specification Sections, apply to this section.

.6 The work covered by this section is to be coordinated with related work as specified elsewhere in the specifications. Requirements of the following sections apply:

- [Division][Section] [XX]: “Basic Electrical Materials and Methods”
- [Division][Section] [XX]: “Wiring Methods”
- [Division][Section] [XX]: “Fire Suppression”
- [Division][Section] [XX]: “Fire Protection”
- [Division][Section] [XX]: “HVAC Systems”
- [Division][Section] [XX]: “Building Automation and Control”
- [Division][Section] [XX]: “Security Access and Surveillance”
- [Division][Section] [XX]: “Security Access Systems”
- [Division][Section] [XX]: “Intrusion Detection Systems”

**DESIGNER NOTE:** Identifying applicable codes and standards is imperative to each project design. Determine the relevant adopted codes and standards, including the edition of each. Edit the above section to include specific codes and standards, which apply (i.e. 1997 Uniform Building Code, and date/revision number, etc). Delete the inappropriate sections. Delete this note after selection is made.

1.4 System Description

.1 Equipment to be ULC approved as of the time of tender.

.2 All elements for the system to be electrically supervised as required by ULC and as specified herein.

.3 System operations shall not require personnel with special computer operation skills. User operating language to be based on English type commands.

.4 The system shall be completely addressable and shall use remote monitor and control modules to interface with conventional monitor or alarm devices on the floor areas for devices such as heat detectors, sprinkler tamper switches, pressure and flow switches, and for devices such as solenoid valves. System to be fully addressable, zoned, annunciated, non-coded, single stage, microprocessor based, employing multiplexing for data acquisition, utilizing end devices, distribution and control. System shall be complete with all necessary hardware, software and memory, specifically tailored for the installation.
.5 General: Provide a complete, networked, non-coded, addressable, microprocessor-based fire alarm/ mass notification system with initiating devices, notification appliances, and monitoring and control devices as indicated on the drawings and as specified herein.

.6 Software: The fire alarm system shall allow for loading and editing instructions and operating sequences as necessary. The system shall be capable of uploading to memory and downloading while the system is in operation. A second set of operating software shall be resident in the control panel as a backup in the case primary operating software becomes corrupted. In addition, the system shall be capable of on-site programming to accommodate system expansion and facilitate changes in operation. All software operations shall be stored in a non-volatile programmable memory within the fire alarm control unit. Loss of primary and secondary power shall not erase the instructions stored in memory.

.7 History Logs: The system shall provide a means to recall alarms and trouble conditions in chronological order for the purpose of recreating an event history. A separate alarm and trouble log shall be provided.

.8 Recording of Events: Record all alarm, supervisory, and trouble events by means of system printer. The printout shall include the type of signal (alarm, supervisory, or trouble) the device identification, date and time of the occurrence. The printout is required to differentiate alarm signals from all other printed indications.

.9 Wiring/Signal Transmission:

a) Transmission shall be [hard-wired, using separate individual circuits for each zone of alarm operation as required] [addressable signal transmission, dedicated to fire alarm service only]

b) System connections for initiating (signaling) circuits shall be [Class A][Class B] and notification appliance circuits shall be [Class A] [Class B]

c) Circuit Supervision: Circuit faults shall be indicated by a trouble signal at the FACP and remote annunciators. Provide a distinctive indicating audible tone and alphanumeric annunciation, in addition to activation of the common system trouble LED

d) Supervisory Devices shall be programmed to activate the supervisory LED and the trouble audible

.10 Remote Accesses:

a) A personal computer or technician’s laptop, configured with terminal emulation information gathering

b) All remote access means are to be agency listed for specific interfaces and for the purpose
Required Functions: The following are required system functions and operating features:

a) Priorities of Signals: Fire alarm has highest priority and mass notification events have second highest priority. Subsequent alarm events are queued in the order received and do not affect existing alarm conditions. Priority levels three and four: Supervisory and Trouble events have third and fourth-level priority respectively. Signals of a higher-level priority take precedence over signals of lower priority even where the lower-priority condition occurred first. Annunciate all events regardless of priority or order received.

b) Non-interfering: [An event on one zone does not prevent the receipt of signals from any other zone. All zones are manually resettable from the FACP after the initiating device or devices are restored to normal.] [The activation of an addressable device does not prevent the receipt of signals from subsequent addressable device activations.]

c) Transmission to Remote Central Monitoring Station: Automatically route alarm, supervisory, and trouble signals to a remote central station service transmitter provided under a separate contract to the University. All panel equipment required to interface to the central station will be supplied by this contract.

d) Annunciation: Operation of alarm and supervisory initiating devices shall be annunciated at the FACP [and the remote annunciator,] indicating the location and type of device.

e) General Alarms: A system general alarm shall include:

   i) Indication of alarm condition at the FACP [and the annunciator(s)]
   ii) Identification of the [device][zone] that is the source of the alarm at the FACP [and the annunciator(s)]
   iii) Operation of audible and visible notification devices throughout the building until silenced at FACP
   iv) [Closing doors normally held open by magnetic door holders]
   v) [Activating stairwell pressurization fans]
   vi) [Shutting down supply and return fans serving zone where alarm is initiated]
   vii) [Closing smoke dampers on system serving zone where alarm is initiated]
   viii) [Initiation of smoke control sequence through the building automation system (BAS)]
   ix) Notifying the local fire department
   x) Initiation of elevator recall in accordance with AEDARSA, when specified [detectors] [sensors] are activated
Deactivating designated access control system
(electromagnetic/electric) lock system(s)

Deactivating designated electrically operated/motorized door system(s)

Supervisory Operations: Upon activation of a supervisory device such as fire pump power failure, low air pressure switch, and tamper switch etc., the system shall operate as follows:

i) Activate the system supervisory service audible signal and illuminate the LED at the control unit and the graphic annunciator

ii) Pressing the Supervisory Acknowledge Key will silence the supervisory audible signal while maintaining the Supervisory LED "on" indicating off-normal condition

iii) Record the event in the FACP history log

iv) Transmission of supervisory signal to remote central station

v) Restoring the condition shall restore the system to normal and cause the supervisory LED to turn off

vi) Record the event in the FACP history log

Alarm Silencing: If the "Alarm Silence" button is pressed, only audible alarm signals shall cease operation. Visual signals shall continue operation until system is reset.

System Reset

i) The "System Reset" button shall be used to return the system to its normal state. Display messages shall provide operator assurance of the sequential steps as they occur. The system shall verify all circuits or devices are restored prior to resetting the system to avoid the potential for re-alarming the system

ii) Should an alarm condition continue, the system will remain in an alarmed state

Drill: A manual evacuation (drill) switch shall be provided to operate the notification appliances without causing other control circuits and auxiliary relays, suppression systems, etc. to be activated.

Power Requirements

i) The control unit shall receive 120 VAC power via a dedicated fused disconnect circuit(s) or identified red circuit breakers

ii) The system shall be provided with sufficient battery capacity to operate the entire system upon loss of normal 120 VAC power in a normal supervisory mode for a period of 24 hours with thirty minutes of alarm operation at the end of this period. The system shall automatically
transfer to battery standby upon power failure. All battery charging and recharging operations shall be automatic. Panel will automatically transfer back to AC upon restoration of utility power

iii) All circuits requiring system-operating power shall be 24 VDC and shall be individually fused at the control unit

iv) The incoming power to the system shall be supervised so that any power failure will be indicated at the control unit. A green "power on" LED shall be displayed continuously at the user interfaces while incoming utility power is present

v) The system batteries shall be supervised so that a low battery or a depleted battery condition, or disconnection of the battery shall be indicated at the control unit and text displayed for the specific fault type

vi) The system shall be provided with NAC Lockout feature to prevent subsequent activation of Notification Appliance Circuits after a Depleted Battery condition occurs in order to make use of battery reserve for front panel annunciation and control

vii) The system shall support 100% of addressable devices in alarm or operated at the same time, under both primary (AC) and secondary (battery) power conditions

viii) Loss of primary power (normal 120VAC utility) shall sound a trouble signal at the FACP. FACP shall indicate when the system is operating on an alternate power supply

ix) Loss of primary power (normal 120VAC utility) shall not interfere with the operation of suppression systems connected to the main fire alarm control panel

1.5 Shop Drawings

.1 Shop drawings to be submitted as outlined herein and to contain all elements within one complete submission. Submissions shall be supplied for review in the order indicated below.

.2 Shop drawings to include a complete material list with manufacturer, style, model number and quantity. Cable types and sizes to be included in material list.

.3 Shop drawings to include manufacturer’s specification sheets with photographic depiction of all system components. Specification and descriptive data to include dimension, weight, appearance, connection provisions, materials, metal gauges, operating specifications, characteristics, features and controls.

.4 Shop drawings to include the following:

a) Equipment panel elevations for each panel or panel group. Elevations to indicate component layouts, cable routing and terminal blocks
b) Detailed drawings of all control panels and annunciator panels indicating material, finish component models, housing requirements and mounting details

c) Complete engineering drawings of all custom made components indicating all materials, gauges, finishes and wiring diagrams

d) Complete system block diagrams indicating all components, interconnection and cabling

e) Complete power calculation for connected load with reserve capacity shown

f) Complete detailed system circuit and riser diagrams indicating:

i) Main control panel

ii) Alarm devices

iii) Main graphic annunciator

iv) Alphanumeric annunciators

v) Auxiliary interconnections

vi) Component layout

vii) Identification schedules

viii) Zone wiring designations

ix) Panel interconnect wiring

x) Preliminary detailed wiring connections and wire designations

xi) Preliminary VESDA Aspire calculations

g) Complete wiring diagrams showing terminal identification, cable type and cable designation. No material or equipment to be delivered to the jobsite prior to final approval of shop drawings unless otherwise agreed to by and documented in writing by the Owner

h) Shop drawings packages, failing the review process for completeness, will be returned to the system installer reviewed and annotated. A second complete submission will be reviewed for acceptance at no cost to the University. Failure of the second shop drawing submission for incompleteness and/or non-compliance will result in all future submissions being subjected to a cost recovery by the consultant and the University for subsequent reviews.

.5 Provide factory data sheets for the following:

a) Main panel, annunciator panels, and control units, indicating:

i) All materials

ii) Finishes

iii) Proposed labeling

b) All system devices indicating:

i) Typical wiring connections

ii) Installation instructions
iii) Control settings
iv) Component limitations
v) Application and coverage information

6 Riser diagrams and detail drawings to be submitted in AutoCAD format. At completion of the project, update all riser diagrams and provide Owner with full size hardcopy printed from PDF format as well as an electronic AutoCAD copy of all as built information.

7 General - Submit the following: [according to Conditions of Contract]:

a) Product data sheets for system components, selected using boxes, underlines and/or arrows to indicate the specific products, features, or functions required to meet this specification. Alternate or as-equal products submitted under this contract must provide a detailed line-by-line comparison of how the submitted product meets, exceeds, or does not comply with this specification
b) Wiring diagrams from manufacturer
c) Shop drawings showing system details including location of FACP, all other devices, circuiting and details of graphic annunciator per project drawings
d) System Power and battery charts with performance graphs and voltage drop calculations to assure that the system will operate per the prescribed backup time periods and under all voltage conditions per ULC and NFPA standards
e) System operation description including method of operation and supervision for all fire alarm panels and major equipment components for each type of circuit and sequence of operations for all manually and automatically initiated system inputs and outputs. A list of all input and output points in the system shall be provided with a label indicating location or use of initiating detection circuit, notification appliance circuit, relay, and auxiliary control circuits, etc.
f) Operating instructions for FACP [and any suppression systems on the premises]
g) Provide a preliminary training agenda showing training content as per section 1.11 of this specification

8 Submissions to Authority Having Jurisdiction: In addition to routine submission of the above material, make an identical submission to the Authority Having Jurisdiction. Include copies of shop drawings as required to depict component locations to facilitate review. Upon receipt of comments from the Authority, make resubmissions if required to make clarifications or revisions to obtain approval. All submissions are to include copies to the University Design and Technical Services Group.

1.6 Approvals

.1 Alternate systems will not be entertained. Only listed manufacturers will be allowed for this project.
.2 System Programmer Qualifications: A factory authorized programmer is to be utilized to perform all programming requirements of the system(s).

.3 Each and every item of the Fire Alarm System shall be listed as a product supplied by a single fire alarm system manufacturer and cross listed under the appropriate category by Underwriters Laboratories of Canada, Inc. (ULC), and shall bear the "ULC" label.

1.7 Spare Parts and Maintenance Materials

[Designers Note: Contact the University of Alberta project manager before including this specification section. Projects will be evaluated for cost savings based upon the existing university stock of spares.]

.1 Spare parts and maintenance materials required:

  a) Two (2) smoke detectors of each type
  b) One (1) heat detectors of each type
  c) One (1) duct detector head
  d) Two (2) speakers
  e) One (1) visual signal appliance
  f) Two (2) control modules
  g) Two (2) monitor modules
  h) Two (2) manual stations
  i) Two (2) speaker/strobe appliances
  j) Two (2) weather proof speakers

.2 General: Furnish extra materials, packaged with protective covering for storage, and identified with labels clearly describing contents as follows:

Break Rods for Manual Stations: Furnish quantity equal to 15 percent of the number of manual stations installed; minimum of 6 rods.

Strobe Units: Furnish quantity equal to 10 percent of the number of units installed, but not less than one.

Smoke Detectors, Fire Detectors, and Flame Detectors: Furnish quantity equal to 10 percent of the number of units of each type installed but not less than one of each type.

Detector Bases: Furnish quantity equal to 2 percent of the number of units of each type installed but not less than one of each type.

1.8 Operating and Maintenance Manuals

[SPEC NOTE: The information specified herein is to be harmonized with and incorporated into the greater body of the O & M Manuals for multidiscipline projects. Modify this section to provide the required content.]
.1 Operating and Maintenance manuals to be furnished as specified. Operating instructions include all items related to section [XXXX] [and] [XXXX] as follows:

a) Each manual to be bound in a separate permanent hard cover [3-ring][Post] binder and to contain a title page, table of contents, statement of guarantee including termination date and name of person to be called in event of equipment failure

b) Individual factory issued manuals containing all technical information on each piece of equipment installed. In the event such manuals are not available from the factory, system installer to establish same and compile within the manual to the satisfaction of the Owner

c) Each manual to contain a system parts list, a parts list for individual components, detailed schematics and recommended maintenance procedures. Advertising brochures or standardized operational instructions shall not be considered as technical manuals

d) Engineering drawings depicting layout and interconnection of all system components and "as-built" conduit layout

e) All reviewed shop and circuit drawings, wiring schedules and single line block drawings etc. required by the project specifications in PDF format

f) Copy of all manufacturers and registered professional's verification checks sheets scanned in PDF format

g) Copy of signed and sealed Fire Alarm Verification Certificate scanned in PDF format

h) Copy of ABC schedules signed by registered Design Professional

.2 Complete final system print-out of all software programming.

.3 A complete detailed description of the fire alarm system including, but not necessarily limited to:

a) Description of each device, its function and its operation

b) Detailed sequence of operation [including suppression system operation]

c) Interface with other systems such as fan shutdowns, door hardware, security and control systems, mechanical system. For large systems this information to be presented in ladder logic or flowcharts

.4 Copies of record drawings depicting each device, device address, and its wiring sequence on a data or signal loops. Manuals to be organized by means of Mylar Tabs as follows:

a) Tab 1: Warranty list of contractors, vendors and suppliers

b) Tab 2: System description and sequence of operation

c) Tab 3: Shop Drawings

d) Tab 4: Components
e) Tab 5: Drawings - Provide hard copies and AutoCadd copies on disk
f) Tab 6: Verification check sheets
g) Tab 7: Certificates
h) Tab 8: Software programming Final Print Out hardcopy

.5 All log sheets, maintenance tables preventative maintenance sheets intended to be completed by the Owner are to be completely interactive allowing the Owner to complete all pertinent information and save, print or modify these forms as required.

.6 [Provide hardcopies of all material presented during the training seminars as required by section 1.11 of this specification.]

.7 The above information to be captured electronically on CD or DVD in PDF format and be included in the O&M manuals. In addition to the specified hardcopies required by section [XXXX] and section [XXXX] provide electronic copies of all final drawing files in AutoCAD format. Electronic copies to be produced on a CD/DVD in the latest version of AutoCAD. CD/DVD to be reproducible by owner as required for use. Electronic copy to provide MS Word or Excel index that describes each files contents to allow a quick and easy identification to the different AutoCAD files.

1.9 General Requirements

.1 System to be complete with all necessary components to provide functions required, whether or not each and every item is necessarily mentioned. All components to be production proven models. Custom designed units will only be considered for those items that are not currently available on commercial market.

.2 Selection of system to be made on basis of quality and suitability of equipment, service facilities available, experience, and capabilities.

.3 Before proceeding with installation, submit to the Owner for approval a complete detailed proposal as outlined in paragraph 1.5, Shop Drawings and elsewhere in this specification and per project requirements.

.4 Installer to provide all backboards, conduit, standard size pull boxes, junction boxes, device boxes and terminal panels where required to provide a complete conduit system.

.5 Vendor to supply all systems specific cabinets, enclosures, back boxes, junction boxes, device boxes, terminal panels, etc. to Installer for installation.

.6 If a particular system requires more or larger conduit, boxes or panels than that shown on the drawings, allow for such changes in tender price. No extras will be allowed for additional conduit or increased conduit size, boxes or panel size required to accommodate any particular make of system.
.7 Under no circumstances will the installing contractor be allowed to reduce conduit and panel sizes or revise layouts established in the reviewed shop drawings and as indicated in the documents defining contract scope without prior written approval of the Owner.

.8 All wiring is to be installed in conduit.

.9 Selection of type of cable to be at discretion of system installer but the system must meet the minimum standards defined in this specification, all code requirements and when complete, must perform to the complete satisfaction of the Owner. All wiring to be terminated in terminal panels, junction boxes, etc. on suitable terminal strips, and is to be neatly installed, laced and tagged where required.

1.10 Warranty/Service

.1 Guarantee:

a) System installer to include with his base tender price a guarantee stating:

i) Service to be provided on system within 4 hours of call origination during the 12 month warranty period

ii) Full warranty on new system to be provided for a period of 12 months.

iii) During warranty period the system installer, at his expense, is to repair and replace all such defective work and other related work to the new system damaged which fails or becomes defective during the term of the warranty, provided that such failure is not caused by improper usage or physical damage by the owner, public or environmental damage

iv) Should the system installer fail to comply with Sub-item 1.1, work will be performed by others at system [installer’s] [vendor’s] expense

v) Warranty date to commence from date of final acceptance of this work by the University

vi) Warranty service to be performed within a reasonable time frame. Repair shall be completed in no less than 3 calendar days, costs for fire watch beyond this period will be passed back to the system [installer] [vendor]

.2 Maintenance Service Contract: Provide maintenance of fire alarm systems and equipment for a period of 12 months, using factory-authorized service representatives.

.3 Basic Services: Systematic, routine maintenance visits on a [quarterly] [semi-annual] basis at times scheduled with the Owner. In addition, respond to service calls within 24 hours of notification of system trouble. Adjust and replace defective parts and components with original manufacturer’s replacement parts, components, and supplies.
Additional Services: Perform services within the above 12-month period not classified as routine maintenance or as warranty work when authorized in writing. Compensation for additional services must be agreed upon in writing prior to performing services.

Renewal of Maintenance Service Contract: No later than 60 days prior to the expiration of the maintenance services contract, deliver to the Owner a proposal to provide contract maintenance and repair services for an additional one-year term. Owner will be under no obligation to accept maintenance service contract renewal proposal.

[SPEC NOTE: Verify extended service contract with project manager at the time of design].

1.11 Training

[SPEC NOTE: Verify extend of training with U of A Facilities prior to tender. In some instances (i.e. small projects) training may be omitted or reduced for cost savings].

System installer to conduct training program for designated maintenance and operating personnel. Program to include but not be limited to the following:

a) Operation: designated personnel to be trained to accomplish and understand all aspects of system operation

b) Maintenance: designated personnel to be trained to perform routine maintenance on the system

Training period schedule to be as established by this specification. Training periods to take place after system verification and prior to building occupancy.

Allow minimum [1][2][3] training seminars of one full day for each.

Provide copies of factory produced generic training videos during training seminar.

Provide hard copies of printed materials for all training seminar participants.

1.12 Tests and Adjustments

Upon completion of system installation, tests to be conducted by the system installer to determine system conformity to requirements of the specification.

Tests to be conducted in presence of the [Owner’s commissioning agent] [Owner’s representative] [Consultant] [Registered Professional responsible for the verification]. Any member of the testing team may suspend or discontinue tests at any time performance is considered unsatisfactory. Resumption of testing to cover the previously untested elements and any completed elements at the discretion of the Registered Professional.
.3 All equipment by [system installer][system vendor] or wiring provided by system installer which tests prove to be defective or operating improperly is to be corrected or replaced promptly at no additional cost to the Owner.

.4 See other sections of this specification for additional details on testing and acceptance procedures.

1.13 Bar Code Device Identification

.1 Bar Code Device Identification. The Owner uses a Bar Code type scanning system to assist in the inventory maintenance and annual testing of the system. The system installer and the system manufacturer are to provide the Owner cooperation and necessary labor throughout the project with the implementation of this tagging system.

.2 At 50% [system][installation] completion provide the Owner with a complete listing of all conventional and addressable devices on the system including, but not limited to smoke detections, pull stations, heat detectors, isolators, sprinkler devices, speakers, strobes, annunciators, door holders, control relays, etc. in the format of a Microsoft Excel spread sheet. Spread sheet to list each individual device, device location and device address where applicable. Excel base file will be provided by the Owner to the installer. A hard copy of the file can be found in Schedule "_" that follows this specification.

.3 During the verification process the Owner's representative will program each device into the bar code identifying system, produce the bar code label, and provide label to the contractor for installation on the device as directed by the Owner.

1.14 System Supervision

.1 Fire alarm pull stations, detectors, sprinkler circuits, pre-action sprinkler circuits, and annunciation network lines to be fully supervised utilizing a Data Communication Link Style A (DCLA).

.2 Communication lines between CPU, field control panel panels and fire command centre to be fully supervised utilizing a Class A Data Communication Link Style R (Redundant) (DCLR).

.3 The complete system is to be supervised against failure of operating power, open circuits, and ground faults. Supervision is to be maintained on all circuits even in the event of a power failure, when the system is on battery standby. Any of the above shall cause trouble buzzer to sound at the main control panel and at the annunciator(s) and also light a common trouble lamp in the same panels. Trouble on the system is to produce a tone distinct from the tone of the alarm signals. System to incorporate a silencing switch in the main control panel and at the main graphic annunciator, which when operated, silences the trouble signal but causes the trouble lamp to remain
illuminated until the trouble is cleared and the system returned to normal. Upon return to normal, trouble signal lamp shall be automatically reset to normal.

1.15 System Operation

.1 The system response time shall be limited to a maximum 5 seconds from the time any field device is initiated to activation of output devices.

.2 Operation of any fire alarm signal initiating device to automatically perform the following functions:

a) Activate visual signal appliances throughout the building

b) Provide visual annunciation at fire command stations and related field annunciator(s) of alarmed zone [and device]

SPEC NOTE: (Include where applicable) Place areas of refuge in refuge mode as described by the mechanical specifications.

x) Place areas of refuge in refuge mode as described in the mechanical specifications

SPEC NOTE: select one of the following two options for activation of the signal circuits.

(OPTION #1 for non voice based messaging systems)

.X Activate signal devices throughout the building in a temporal pattern for not less than one minute.

.X Signals may be silenced after one minute of signal sounding throughout the building.

(OPTION #2 for voice messaging based systems)

The following signals to be activated:

.X Activate the signal appliances throughout the building on a temporal pattern.

.X Following three cycles of temporal pattern following this with four cycles of the custom voice message.

.X Stairwell located audible devices and strobes should only be activated by stairwell smoke detectors.

SPEC NOTE: add for health care facilities only.

.X Provide visual indication to local smoke annunciation panel indicating location of room in alarm.

SPEC NOTE: items below apply to all facility types. Edit as required.

.X Disconnect power supply to electromagnetic door holders associated with smoke doors, [Optional] [on a zoned and adjacent zone basis].

.X Release all magnetic locks [except as required to ensure public safety, example, Bio Hazard Containment facilities].

.X Unlock electrically driven retraction devices on all automatic and power assisted doors.

.X Home all elevators to primary floor of egress. In the event that a fire condition exists at the primary floor, home elevators to alternate egress floor.

.X Activate resound signal into operation after acknowledgement has been initiated at the fire command station, and/or at local field panels.

.X Provide fan shutdowns to mechanical equipment as required by ABC, AFC, Mechanical Design, etc. Specific requirements are to be determined during construction period.

1.16 System Operation Pre-Action Sprinkler (And Chemical Discharge Systems)

SPEC NOTE: Use this article is dictated by project conditions. Delete those items that are not applicable for proper protection by pre-action sprinkler, ensure two automatic device minimum per room. These devices should be shown clearly on the drawings. Confirm with Mechanical Designer if the system(s) will be a single interlock or a dual interlock. The building fire alarm panel will be required to function as the releasing panel without local panels being added.

.1 Pre-action Sprinkler [and Chemical Discharge] Systems are located as outlined on the drawings. All wiring, initiating, coil supervision modules, maintenance isolation switch, and other monitoring devices in association with these systems shall be supplied and installed by the installation Contractor. Alarm valves, solenoid valves and pressure switches shall be supplied and installed by Mechanical Designer and connected by installing Contractor. Wiring to pre-action solenoid valves shall be fully supervised. Activation of low pressure monitoring switches and/or tamper valves shall cause a supervisory signal to appear on the system. Activation of the alarm low-low pressure switch shall cause a system alarm condition to be initiated on the system. It is also required that activation of a device within the pre-action area will also activate local pre discharge identified audible and visual devices for that area along with building signals so that local personnel are advised of the pending discharge. Lamacoid labeling is to be located at the entrance(s) to these protected areas to advise occupants of the presence of a suppression system.

.2 Sequence of operation shall be as follows: (single interlock only)

a) Multi room protection:
   i) Activation of any of the manual or automatic initiating devices located in the protected area(s) will cause the building alarm to sound, initiate
the sequence of operation as described in the mechanical specification
and activate the pre-action solenoid valve

ii) Activation of a manual station located within the protected area will
initiate the normal fire alarm sequence of operation, it will cause the
building alarm to sound, and activate the pre-action solenoid valve

b) Single room protection: (single interlock only)

i) Activation of the first products-of-combustion detector will cause the
building alarm to sound and the sequence of operation as described in
the mechanical specification to be initiated

ii) Activation of the second products-of-combustion detector and/or any
thermal detector will cause the building alarm to sound and the
sequence of operation as described in the mechanical specification to
be initiated and the pre-action solenoid valve to be actuated

iii) Activation of a manual pull station within the area will initiate and cause
building alarm to sound and the sequence of operation as described in
the mechanical specification to be initiated and shall activate the pre-
action solenoid valve

c) Multi room protection: (dual interlock system)

Activation of any of the automatic initiating devices located in the protected
area will cause the building alarm to sound. The activation of a second
automatic device will initiate the sequence of operation as described in the
mechanical specification. Water will not be released into the mechanical piping
system until the sprinkler head is opened and a low-low air pressure signal is
received to indicate an open sprinkler head and activate the release solenoid

d) Multi room protection: (dual interlock system) (Class 1 Div 1 Area)

Activation of a VESDA or a flame detector in the same protected area will cause
the building alarm to sound. The activation of a second automatic device will
initiate the sequence of operation as described in the mechanical specification.
Water will not be released into the mechanical piping system until the sprinkler
head is opened and a low-low air pressure signal is received to indicate an open
sprinkler head and activate the release solenoid

e) Sequence of operation for dry chemical systems (non Class 1 Div 1 areas) shall
be as follows:

i) Activation of the VESDA will cause the building alarm to sound and the
sequence of operation as described in the mechanical specification to
be initiated
ii) Activation of any of the smoke detectors will cause the building alarm to sound and sequence of operation as described in the mechanical specification to be initiated. The solenoid valve controlling the discharge sequence of chemical is to be activated, and activate the pre and post discharge audible and visual device located inside and outside of the room.

iii) Activation of a manual pull station within the area will initiate and cause the building alarm to sound and the sequence of operation as described in the mechanical specification to be initiated and shall activate the discharge sequence.

f) Sequence of operation for dry chemical systems (Class 1 Div 1 areas) shall be as follows:

i) Activation of a VESDA detector will cause the building alarm to sound and the sequence of operation as described in the mechanical specification to be initiated.

ii) Activation of any of the flame detectors will cause the building alarm to sound and sequence of operation as described in the mechanical specification to be initiated. The solenoid valve controlling the discharge sequence of chemical is to be activated, and activate the pre and post discharge audible and visual device inside and outside of the room.

iii) Activation of a manual pull station within the area will initiate and cause the building alarm to sound and the sequence of operation as described in the mechanical specification to be initiated and shall activate the discharge sequence.

g) Installing contractor to verify the boundaries of each pre-action sprinkler system with Mechanical Designer once sprinkler shop drawings have been approved and to advise consultants of any areas where coverage by initiating devices is deemed inadequate.

1.17 Special Operations

*SPEC NOTE: (Confirm requirements with University of Alberta)*

.1 Stairwell alarms to sound and strobes to be activated only when a particular stairwell smoke detector in the stairwell is activated.

.2 When a fire condition has been detected in the elevator shafts or the elevator machine room(s), home all elevators and inhibit further operations, including firefighters’ elevators under both automatic and manual (key switch operated control modes).
1.18 Source of Supply

Complete fire alarm system shall be supplied by a single manufacturer, except for specialty devices including: horns, strobes, beam detectors, flame detectors and explosion proof rated detectors. Aspirated air detection shall be supplied by the system vendor and certified for integration into their system for meeting ULC requirements.

1.19 Coordination

.1 Coordinate installation of fire alarm system with:
   a) Mechanical equipment controls with Mechanical Trades
   b) Sprinkler flow and gate valves with Fire Protection specialty/ Mechanical Trades
   c) Specialty designed fire suppression or agent based system(s) with Fire Protection specialty/ Mechanical Trades
   d) Elevator controls with Vertical/Horizontal Transport Trades
   e) Other related work such as door hardware, etc. with Architectural Trades
   f) Emergency generator supervision with Electrical Trades
      i) Engine start control circuit
      ii) Engine start power circuit
      iii) Battery charger trouble circuit
      iv) Low fuel warning indicator
   g) Transfer switch(es) to indicate when on emergency power
   h) Fire pump minimum requirements per NFPA 20 as required by the ABC

.2 Coordinate with the above noted work as required to provide a complete, integrated, functional system with annunciation of required signals to a present at the main FACP and all field located primary annunciators.

1.20 System Communications

.1 Communications loops that run from the main CPU and between all field panels, annunciation panels, networked FACP’s and network annunciators are to be configured using/for Redundant Data Communication Link (DCLR). DCLR is the FACP data communication systems ability to receive and transmit a signal regardless if a trouble condition (short circuit, single open, wire to wire open, open and ground) is present on the system loop(s).

.2 Remote panel operations are to be such that any failure of any field panel or network FACP does not disable the communications trunk for the remaining panels.

.3 Communication to be carried on multiplexed digital data link between main CPU and field panels and networked control panels. This applies to both audio and network data paths.
.4 Network data paths shall be termination free between system connection points. Connections within a building shall be fiber or wire, connections between buildings shall be fiber only.

1.21 System Maintenance and Testing Facility

.1 Provide required hardware/software such that system alarm zones can be temporarily disabled by site personnel to enable annual testing of system devices. A trouble signal would be present during testing but system ULC approval will be unaffected. All bypass and auxiliary functions are to be operated by means of a membrane type on/off switch located at the main fire alarm control panel. Use of keypad for bypass auxiliary functions is not acceptable. Auxiliary functions include but are not necessarily limited to:

**Switch Bank 1 - access code required to activate all switches**

1. Switch 1 - All smoke detectors in the system will be bypassed
2. Switch 2 - All sprinkler zones in the system will be bypassed
3. Switch 3 - All duct detectors in the system will be bypassed
4. Switch 4 - All audible /strokes in the system will be bypass -only one trouble will be reported
5. Switch 5 - Remote monitoring station will be bypassed -only one trouble will be reported
6. Switch 6 - Aspirating smoke detection system(s) will be bypassed -only one trouble will be reported [note - this may be added to Switch 1]
7. Switch 7 - Beam detection system will be bypassed -only one trouble will be reported [note - this may be added to Switch 1]
8. Switch 8 - Spare [may be utilized for building specific applications such as suppression.]

**Switch Bank 2 - no access code required**

9. Switch 9 - All door holders in the system will be bypassed with only one trouble report
10. Switch 10 - All elevator recall functions will be bypassed with only one trouble report
11. Switch 11 - All security door unlock schemes in the system will be bypassed with only one trouble report
12. Switch 12 - Remote annunciator bypass - operating this switch will prevent annunciators from operating and causing noise disruption to public during annual testing and issue a trouble signal
13. Switch 13 - alarm inhibit bypass - causes the system to ignore its one minute alarm silence and system reset inhibit function and issue a trouble signal
14. Switch 14 - All air or fan system shutdowns in the system will be bypassed
15. Switch 15 - Spare
16. Switch 16 - Spare

**SPEC NOTE:** Additional switch banks shall be added by the registered design professional to facilitate annual testing requirements that adequately minimize the impact to the building or facility.

## PART 2 PRODUCTS

### 2.1 Product Manufacturers

**SPEC NOTE:** Review of the fire alarm guidelines is necessary to ensure connectivity to a specific campus fire alarm network. Minor system modifications or tenant improvement situations to existing systems will preclude some system vendors, edit accordingly to reflect the project functional requirements in conjunction with the University of Alberta (D&TS) design and technical services group.

.1 Preapproved system manufacturers:  
(Spec note: make desired selections)

a) [Chubb Edwards]  
b) [Siemens]  
c) [Notifier]  
d) [Simplex]

[Non preapproved system manufacturers may submit for product approval up to two weeks prior to the engineer of record for system approval.]

.2 All system manufacturers including named preapproved manufacturers must meet all performance aspects of system specifications.

.3 The system to be capable of onsite programming to accommodate and facilitate expansion, building parameter changes or changes required by the Owner and/or local codes. System programming to be software based. The software shall have the ability to do logic programming for custom relay and signal control.

.4 To accommodate and facilitate scope changes, initiation circuits shall be individually configurable, on site, to provide either ALARM/TROUBLE operation, alarm only, trouble only, current limited alarm, no alarm, normally closed device monitoring, a non-latching circuit, or an alarm verification circuit.

.5 Control panel to have a chronological display of multiple events for trouble shooting and system history.

.6 Control panel to have dedicated:

a) alarm LED with acknowledge switch  
b) supervisory LED with acknowledge switch  
c) trouble LED with acknowledge switch  

.7 The control panel to have the capability of annunciating a trouble reminder audibly and visually. This feature is to be programmable at specific time intervals, thus reminding the Owner that a trouble has been silenced and should be serviced.
The System shall be complete with minimum four (4) levels of password protection. Password for levels 1, 2 and 3 to be custom selected for Owner use and field programmable. Password for level 4 is to be reserved for manufacturer’s activities use only.

The system shall come complete with monitor and control points indicated in the documents plus 25% spare capacity (detection, monitor and control) per addressable loop. Each control panel to be complete with expansion capability for a further spare 25% loop capacity above the design requirements.

The system shall be complete with LCD readout and numerical keypad at the main control panel to facilitate system programming.

System to be complete with the following capabilities:

a) Connection to the University of Alberta [main campus Simplex Life Safety Network] [main campus remote monitor center]
b) Battery voltage and ammeter readouts from the LCD Display
c) Remote monitoring center circuit connection with a by-pass switch with a form C contact output(s)
d) One Auxiliary electronically resettable fused 2A @24VDC Output
e) One Auxiliary Relay, SPDT 2A @32VDC, programmable as a trouble relay, either as normally energized or de-energized, or as an auxiliary control
f) Three (3) Class B or A (Style Y/Z) Notification Appliance Circuits (NAC; rated 3A@24VDC, resistive)
g) Four (4) form “C” Auxiliary Relay Circuits (Form C contacts rated 2A @ 24VDC, resistive), operation is programmable for trouble, alarm, supervisory of other fire response functions. [Relays shall be capable of switching up to ½ A @ 120VAC, inductive]
h) The FACP shall support five (5) RS-232-C ports and one service port
i) Remote Unit Interface: supervised serial communication channel for control and monitoring of remotely located annunciators and I/O panels

The Manufacturer shall be a nationally recognized company specializing in fire alarm and detection systems. This organization shall employ factory trained technicians, and shall maintain a service organization within [150] kilometers of the University of Alberta. The Manufacturer and service organization shall have a minimum of [10] years experience in the fire protective signaling systems industry.

2.2 Fire Alarm Control Panels (FACP) [SPEC NOTE: Edit section to reflect either a networked FACP or a single FACP in the facility]

Each [networked] FACP shall contain a microprocessor-based Central Processing Unit (CPU). The [networked] FACP shall communicate with and control the following types of equipment used to make up the system: intelligent detectors, addressable modules,
control panels, [remote operator terminals -SPEC NOTE: applies to main campus only], annunciators, emergency voice, pre-action, suppression, communication systems, and other system controlled devices.

Each FACP [on the network] shall perform the following functions:

a) Supervise and monitor all intelligent/addressable detectors and monitor modules connected to the system for normal, trouble and alarm conditions
b) Supervise all initiating signaling and notification circuits throughout the facility by way of connection to control panels
c) Detect the activation of any initiating device and the location of the alarm condition. Operate all notification appliances and auxiliary devices as required
d) Each [networked] FACP shall contain an Integral [network] Annunciator

SPEC NOTE: (Verify requirement for network version of annunciator – remove “network” if system is not peer to peer.)

.2 General [networked] FACP Operations:

a) Each [network] FACP node shall include a full featured operator interface control and annunciation panel which shall include a backlit Liquid Crystal Display (LCD), individual, color coded system status LEDs, and an alphanumeric keypad for field programming and control of the node
b) All programming or editing of the existing programming in the system shall be achieved without special equipment or interrupting the alarm monitoring functions of the fire alarm control panel
c) Each [network] FACP shall be equipped with its own custom digital voice messaging system and tone generators. Loss of communication with the FCC will not result in loss of automatic voice messaging capabilities
d) Each [network] FACP node shall be capable of providing the following features. (SPEC NOTE: Node network panels are only to be used when there are over 300 addressable points on a system and when cost savings are realized over using a single FACP system)

SPEC NOTE: select options required to meet the project needs.

   i) Block Acknowledge for Trouble Conditions
   ii) Rate Charger Control
   iii) Control-By-Time (Delay, Pulse, time of day, etc.)
   iv) Automatic Day/Night Sensitivity Adjust (high/low)
   v) Environmental Drift Compensation
   vi) Smoke Detector Pre-alarm Indication at Control Panel
   vii) NFPA 72 Smoke Detector Sensitivity Test
   viii) System Status Reports
   ix) Alarm Verification, by device, with tally
x) Non-Fire Alarm Module Reporting
xi) Automatic NFPA 72 Detector Test
xii) Upload/Download System Database to PC Computer
xiii) Smoke Detector Maintenance Alert
xiv) On-line or Off-line programming

.3 FACCP Central Processing Unit (CPU)

Spec note: This article is written for a peer-to-peer network system. Careful editing by the RDP is required where such system is not employed.

a) Each FACCP network node shall include a central processing unit. The CPU shall communicate with, monitor, and control all other modules within the control panel. Removal, disconnection or failure of any control panel module shall be detected and reported to the system display by the CPU

b) Each central processing unit shall contain and execute all control-by-event interlocks for specific local and network actions to be taken if an alarm condition is detected by the system. Control-by-event programs shall be held in non-volatile programmable memory, and shall not be lost even if system primary and secondary power failure occurs

c) The central processing unit shall also provide a real-time clock for time annotation of all system displays. The time-of-day and date shall not be lost if system primary and secondary power supplies fail

.4 Enclosures

a) Control panels shall be housed in ULC-listed cabinets suitable for surface or semi-flush mounting. Cabinets shall be corrosion protected, given a rust-resistant prime coat, and custom color factory finish

b) The back box and door shall be constructed of 1.5 mm thick steel with provisions for electrical conduit connections into the sides and top. If more than a single unit is required to form a complete control unit, provide exactly matching modular unit enclosures

c) The door shall provide a key lock to match the University of Alberta master keying system and include a transparent opening for viewing all indicators. Locks will be provided by the owner for installation by contractor

d) The control unit shall be modular in structure for ease of installation, maintenance, and future expansion

.5 FACCP nodes shall be designed so that it permits continued local operation of remote control panels under both normal and abnormal network communication loop conditions. This shall be obtained by having control panels operate as local control panels upon loss of network communication.
FACP nodes shall be modular in construction to allow ease of servicing. Each CPU and control panel shall be capable of being programmed on site without requiring the use of any external programming equipment. Laptop computers may be utilized for programming purposes.

The CPU and associated equipment are to be protected so that they will not be affected by voltage surges or line transients including RFI and EMI.

Each control panel and peripheral device connected to the FACP node CPU shall be continuously scanned for proper operation. Data transmissions between network nodes, FACP CPUs, control panels, and peripheral devices shall be reliable and error free. The transmission scheme used shall employ dual transmission or other equivalent error checking techniques. Failure of any control panel or peripheral device to respond to an interrogation shall be annunciated as a trouble condition.

A copy of the custom software is to be stored on disk and submitted to the University of Alberta Life Safety Systems Group upon completion of verification.

FACP Power Supplies

a) Main power supplies shall operate on 120 VAC, 60 Hz, and shall provide all necessary power for the FACP.
   
i) The supply shall provide a ground detection circuit, capable of detecting ground faults

b) Signal Power Supply - Power Supply: to ULC S527 and as follows:
   
Rectifier and Battery Charger:
   
i) Designed to automatically maintain battery bank fully charged
   ii) Sized to recharge batteries in 24 hours minimum
   iii) Designed to operate system when batteries are disconnected
   iv) Temperature compensated
   v) Provide battery connection supervision. – Battery Bank: Gel-cell type

c) Capacity: Designed to operate system under supervisory load condition for 24 hours and then have sufficient power to provide [60] minutes of continuous voice communication without recharging. Sizing of the power supplies shall be based on the following:
   
i) Calculated load of connected devices, strobes, speakers, bells, etc.
   ii) [Spare capacity of amplifiers]
   iii) Additional 25% capacity - Mounting integral with each fire alarm control panel
.11 System Circuit Supervision

a) Each FACP node shall supervise all circuits to intelligent devices, control panels, annunciators and peripheral equipment and annunciate loss of communications with these devices. The FACP CPU shall continuously scan the above devices for proper system operation and upon loss of response from a device shall sound an audible trouble, indicate which device or devices are not responding and print the information on the printer

b) Sprinkler system valves, standpipe control valves, PIV, and main gate valves shall be supervised for off-normal position

c) All speaker and emergency phone circuits shall be supervised for opens and shorts

d) Control panels that lose communication with the Fire Command Centre (FCC) CPU shall sound an audible trouble and light an LED indicating loss of communications

e) Control panel Circuit Supervision: Control panels shall be designed such that they continuously scan all of their initiating and notification circuits. With normal communications between the FACPs, the control panels shall transmit initiating and notification circuit trouble conditions to the FCC for audible annunciation and printout. With or without communication with the FCC node, the FACPs shall supervise their circuits and annunciate any initiating circuit and notification circuit failures on LCDs located in the FACP

SPEC NOTE: SECTION 12, 13 and 14 below are not applicable to all buildings, Edit as required

.12 Audio Amplifiers

a) Audio Amplifiers will provide audio power @ 70 Volts RMS for distribution to speaker circuits

b) Multiple audio amplifiers are to be mounted in the FACP’s associated with the circuits they serve

c) Adjustment of the correct audio level for the amplifier shall not require any special tools or test equipment

d) Includes audio input and amplified output supervision, back up input, and automatic switch over function, (if primary amplifier should fail)

e) Provide a minimum of one (1) back-up amplifier per channel for each FACP. Upon be switched over to the back-up amplifier for that channel. Failure of any amplifier in the system will not degrade the system performance in anyway
SPEC NOTE: this is to be used for full occupancy design only, where designing shell space for future occupancy, designer to modify these amounts as necessary.) Audio amplifiers shall be minimally sized for the greater of 10 watt or 25% spare capacity. Base capacity shall be calculated utilizing the following tap settings, based on the devices shown on the drawings:

a) Speakers 1 watt each  
b) Horns 4 watts each

.13 Audio Message Generator (Pre-recorded Voice)

a) Each initiating zone or intelligent device shall interface with an emergency voice communication system capable of transmitting a prerecorded custom Female voice message to all speakers in the building (except stairwells). The exact wording of the voice message shall be: Temporal alarm pattern repeated three times followed by "Your Attention Please - A fire emergency has been detected in this facility. Please evacuate the facility in an orderly manner using the stairwells only". Repeat pattern continuously

b) Actuation of any alarm-initiating device shall cause the custom prerecorded message to sound over the speakers. The message shall be repeated four (4) times. (Voice 4 times)

c) A built-in microphone located at the FCC shall be provided to allow paging through speaker circuits

d) Each FACP shall contain a remote microphone and facility All Call button to serve as a back up to the main FCC

.14 Tone Generator

a) Tone Generators to be capable of producing several distinct tones for use as alert and alarm signals via the distributed speaker system

b) All alarm signals to be generated according to a temporal signal pattern consisting of a 3-pulse phase followed by an off-phase

.15 Field Programming

a) The system shall be programmable, configurable and expandable in the field without the need for special tools or electronic equipment and shall not require field replacement of electronic integrated circuits

b) All local FACP node programming shall be accomplished through the FACP keyboard or through the video display terminal

c) All field defined programs shall be stored in non-volatile memory
Specific System Operations

a) Smoke Detector Sensitivity Adjust: Means shall be provided for adjusting the sensitivity of any or all analog intelligent detectors in the FACP node from each system keypad. Sensitivity range shall be within allowed ULC limits.

b) Alarm Verification: Each of the intelligent addressable products of combustion detectors in the system may be independently selected and enabled for alarm verification. Each FACP shall keep a count of the number of times each detector has entered the verification cycle. These counters may be displayed and reset by the proper operator commands.

c) System Point Operations

i) All devices connected to the FACP node may be enabled or disabled through the local keypad.

ii) Any FACP node output point may be turned on or off from the local system keypad.

d) Point Read: The FACP node shall be able to display the following point status diagnostic functions without the need for peripheral equipment. Each point will be annunciated for the parameters listed:

i) Device Status

ii) Device Type

iii) Custom Device Label

iv) Software Zone Label

v) Device Zone Assignments

vi) Detector Analog Value

vii) All Program Parameters

e) System Status Reports: Upon command from a password-authorized operator of the system, a status report will be generated, and printed, listing all local FACP system status. FACP printer port to be capable of printing a current smoke detector sensitivity reading per ULC-S-524.

f) System History Recording and Reporting: Each FACP node shall contain a history buffer that shall be capable of storing a minimum of 400 system events. Each local activation will be stored and time and date stamped with the actual time of the activation, until an operator requests that the contents be either displayed or printed. The contents of the history buffer may be manually reviewed, one event at a time, and the actual number of activations may also be displayed and or printed. The history buffer shall use non-volatile memory. Systems which use volatile memory for history storage are not acceptable.
g) Automatic Detector Maintenance Alert: Each FACP node shall automatically interrogate each intelligent system detector and shall analyze the detector responses over a period of time

h) If any intelligent detector in the system responds with a reading that is below or above normal limits, then the system will enter the trouble mode, and the particular intelligent detector will be annunciated on the system display, network display and printed on the optional system printer. This feature shall in no way inhibit the receipt of alarm conditions in the system, nor shall it require any special hardware, special tools or computer expertise to perform.

2.3 Fire Command Centre (FCC)

**SPEC NOTE:**

.1 *For high building the FCC must be separated from all other FACP’s or voice command centers by a one (1) hour fire separation. (ULC S524-4.3)*

.2 *High buildings shall have an annunciator and a paging microphone in an alternative location. (U/C S524-4.3.6)*

.1 The Fire Command Centre shall be housed in an enclosure similar in appearance to the FACP as described in 2.2.4.

.2 Where a FACP is provided as part of the FCC, the FACP shall meet all requirements as outlined in 2.2, Fire Alarm Control Panels.

.3 The building’s Annunciator Panel shall form an integral part of the FCC.

.4 The Fire Command Center (FCC) shall contain all equipment required for all audio control, telephone system control, signaling and supervisory functions. This shall include speaker zone indication and control telephone circuit indication and control, digital voice units, microphone and main telephone handset, as well as building graphic annunciators as specified.

a) Function: The FCC equipment shall perform the following functions:

i) Operate as a supervised two channel emergency voice communication system

ii) *(Spec Note: use only where fire fighter telephones are used)* Operate as a two-way emergency telephone system control center

iii) Audibly and visually annunciate the active and paging condition of every speaker circuit (2 LED’s per building zone- Red and Green), visual signal appliance (LCD troubles per circuit), and telephone circuit (1 Green LED per phone)
iv) Audibly and visually annunciate any trouble condition of tone generators and digital voice units required for normal operation of the system

v) Provide all-call activities through activation of a single control switch. All call activity to be prohibited for the first 60 seconds following alarm initiation

vi) Provide an individual switch for each paging zone to enable individual zone paging. Speaker circuits can be grouped to form zones as identified on the drawings

vii) Provide automatic, custom digitally-recorded voice messages and tones (field-programmed through the microphone). Paging functions to be prohibited for the first 60 seconds following alarm initiation

.5 Bypass switches are to lock out the panel even if the fire alarm input devices are locked in alarm and the panel is reset prematurely.

.6 The FCC shall be modular in construction. It shall be capable of being field programmed without requiring the return of any components to the manufacturer and without requiring use of external computers or other programming equipment.

.7 The FCC and associated equipment shall be protected against unusually high voltage surges or line transients.

.8 The audio message generator shall have the following controls as a minimum and indicators to allow for proper operator understanding and control:
   a) All Call LED
   b) On-Line LED
   c) All Call Switch

.9 Speaker Circuit Control Switches/Indicators
   a) The speaker circuit control switches shall be incorporated as an integral part of the FCC
   b) The speaker circuit control switches/indicators shall include visual indication of active and paging status for each speaker circuit in the system
   c) The speaker circuit control panel shall include switches to manually activate or deactivate each speaker circuit in the system
   d) The speaker circuit control panel shall include switches for manual evacuation of all speaker circuits in the system
   e) The FCC shall contain number of switches to operate each circuit plus 10% spare capacity (minimum of two)

.10 The FCC LCD display shall annunciate a minimum of 8 fire alarm zones at the same time.
2.4 Transponders

**SPEC NOTE:** Use only as permitted, at owner’s discretion. Use FACPS for peer to peer network. Use transponders for degrade mode stand-alone operation. Verify their use with University of Alberta Facilities. Transponders shall be listed as an independent, local fire alarm control unit as well as being listed as a critical component in a multiplex fire alarm system. Control panels shall be located where shown on the plans. Initiating devices and notification circuits located in the same physical area of a building must be controlled by the same transponder.

The transponder shall serve as the interface between initiating fire devices, controlled signaling devices, and each FACP node. The supervised multiplex communication port shall be an integral part of the transponder.

.1 Each transponder shall be powered from a local power supply, and shall provide all power necessary for its own operation, including standby power.

.2 Transponders shall communicate with, and be controlled by, the host FACP via a 2-wire communications loop. The communications loop shall operate as a Data Communications Link Style R (DCLR). Initiating devices and notification circuits located in the same physical area of a building must be controlled by the same transponder (ULC Standard).

.3 Transponders shall be used to house amplifiers, batteries and power supplies to allow true distributed processing and amplification and addressable initiating loops with up to 250 devices.

.4 Each transponder shall have the following indicators and operator controls:

  a) Alarm Acknowledge/Reset Switch
  b) Power LED
  c) System alarm LED
  d) System trouble LED
  e) Local piezoelectric signal
  f) LCD display
  g) Green on/off LED per notification appliance circuit or relay

.5 Each transponder will be capable of expansion of up to 24 field circuits of the following types in any mix:

  a) Initiating Device Circuits (IDC): IDCs may be added to the control panel in groups of 8 Class B, or 4 Class A circuits. Each circuit shall be capable of monitoring up to 30 compatible 2-wire smoke detectors, and/or any number of contact type initiating devices
  b) Auxiliary Control Relay Outputs: Auxiliary relay outputs may be added to the control panel in groups of eight individually controlled single Form-C circuits, or four dual Form-C circuits. All Auxiliary circuits shall be rated 2 A. @ 30 VDC
c) Fire alarm speaker circuits: Fire alarm speaker circuits may be added to the control panel in groups of up to 3 circuits

2.5 Network Monitoring Devices

.1 Network Announcer

a) An Intelligent Network Annunciator (INA) shall be provided to display all system intelligent points. The INA shall be capable of displaying all information for all possible points on the network. Network display devices which are only capable of displaying a subset of network points shall not be suitable substitutes. Network annunciators will be used on multiple building fire alarm systems only. They are not to be used on single building systems

b) The INA shall include a minimum of 80 characters, backlit by a long life solid state LCD display. The network display shall mount in all of the network node fire alarm control panels

c) The INA shall have a history buffer capable of storing a minimum of 400 events in non volatile memory

d) The INA shall include two optically isolated, 2400 baud, industry standard EIA-232 ports for supporting ULC listed printers and CRT's. These peripheral devices shall print or display network activity

e) The INA shall include five control switches for system wide control of signal Silence, Reset, Activate Signals (Drill), and Lamp Test (local). A means by which the controls switches are "locked out", such as a key, shall be available

f) The INA shall include long life LEDs to display Power, Fire Alarm, Security Alarm, System Trouble, Supervisory, Signals Silenced, and CPU Failure

g) The INA shall include two software assignable passwords, up to four digits in length

h) For time keeping purposes the INA shall include a time of day clock

2.6 Remote LCD Annunciator

.1 Provide [1] [2] [3] [4] remote LCD annunciator(s) with the same "look and feel" as the FACP operator interface. The Remote LCD Annunciator shall use the same Primary Acknowledge, Silence, and Reset Keys, Status LEDs and LCD Display as the FACP. Annunciator shall be provided with four (4) programmable control switches and associated LEDs. Under normal conditions the LCD shall display a "SYSTEM IS NORMAL" message and the current time and date. Should an abnormal condition be detected the appropriate LED (Alarm, Supervisory or Trouble) shall flash. The unit audible signal shall pulse for alarm conditions and sound steady for trouble and supervisory conditions. The LCD shall display the following information relative to the abnormal condition of a point in the system:

a) 40 character custom location label
b) Type of device (e.g., smoke, pull station, water flow)
c) Point status (e.g., alarm, trouble)

Operator keys shall be key switch enabled to prevent unauthorized use. The key shall only be removable in the disabled position. Acknowledge, Silence and Reset operation shall be the same as the FACP.

### 2.7 System Components – Conventional Hardwired

Surface and flush speaker boxes are to be supplied by the manufacturer and are to be 6” X 6” square (wall mount) or 6” X 6” round (ceiling mount). Four inch square boxes are not to be used to mount speakers, speaker/strobes combination units, reentrant speakers or electronic sounders.

!.1 Electronic Sounders

a) Electronic sounders shall operate on 24 VDC nominal

b) Electronic sounders shall be field programmable without the use of special tools, to provide slow whoop, continuous, or interrupted tones with an output sound level of at least 90 dBA measured at 10 feet (3 meters) from the device.

c) Shall be flush or surface mounted as show on plans

!.2 Speakers

a) All speakers shall operate on 70 VRMS with field selectable output taps from 0.5 to 2.0 Watts

b) Speakers in corridors and public spaces shall produce a nominal sound output of 87 dBA at 10 feet (3 m) at 1 watt tap setting

c) Frequency response shall be a minimum of 400 HZ to 4000 HZ

d) The back of each speaker shall be sealed to protect the speaker cone from damage and dust

!.3 Speaker/Strobes

a) All speakers shall operate on 70 VRMS with field selectable output taps from 0.5 to 2.0 watts

b) Speakers in corridors and public spaces shall produce a nominal sound output of 87 dBA at 10 feet (3 m) utilizing a 1 watt tap

c) Frequency response shall be a minimum of 400 HZ to 4000 HZ

d) The back of each speaker shall be sealed to protect the speaker cone from damage and dust

e) An integral 15, 30, 75 or 110 candela synchronized strobe (see strobe specification) shall be provided

!.4 Re-entrant Speaker/Strobes
a) All speakers shall operate on 70 VRMS with field selectable output taps from 2.0 to 15.0 watts
b) Speakers in mechanical spaces shall produce a nominal sound output of 96 dBA at 10 feet (3 m) utilizing a 4 watt tap
c) Speakers in parkade and other spaces shall produce a nominal sound output of 93 dBA at 10 feet (3 m) utilizing a 2 watt tap
d) An integral 15, 30, 75 or 110 candela synchronized strobe (see strobe specification) shall be provided
e) Provide separate weather proof ULC Listed Beacon strobes for exterior applications

.5 In-suite Signaling Appliance
a) In-suite signaling appliances to be complete with the following features:
   i) Produce 90 dBA sound level at 10 feet
   ii) Signal Silence switch
   iii) Ten minute re-activation timer
   iv) 24 VDC operation

b) In-suite signaling appliances shall be fully supervised for shorts, opens and ground faults through the in suite isolation module and FACP

c) Each suite shall have a 15 cd strobe installed being supplied from a supervised isolator located exterior to the suite

.6 Firefighters' Handsets
a) Units to consist of telephone handset flush or surface mounted in a steel cabinet. Glass in framed lockable door to be finished in red enamel and have "Local Fire Emergency Phone" stenciled in red 12 mm high letters

b) Handsets to be regular utility type constructed of durable high impact plastic. Units to use standard replacement carbon transmitter and dynamic receiver. Handsets to be colored red and to be complete with cable connection

c) All circuits to be isolated from ground, i.e., common ground return talk or signaling circuits shall not be employed

d) Telephone circuits to be supervised for grounds and opens. Call-in LEDs per phone shall be provided at the FCC to indicate a call is originated from any of the field telephones

e) Utilize flush mounted units throughout except in unfinished service area

.7 Strobe lights shall be ULC listed to the most recent current accepted standard.

a) Visual component
   i) Where more than one strobe is visible in an area, strobes to be synchronized
ii) Output – 15 candelas. (Spec note: 110 CANDELA minimum in sleeping areas and noisy environments such as mechanical rooms)

iii) Clear Lexan® lens with white collar labeled “fire”. Lens to be properly oriented for wall or ceiling mounting

iv) Visual signal appliances shall be connected to a dedicated supervised output circuit in the fire alarm control panel

v) Wall mounted strobes to have lenses orientated in a vertical direction. Visible from two or three sides

vi) Ceiling mounted strobes to have lenses oriented in a horizontal direction visible from two or three sides

.8 Duct Smoke Detectors

a) Duct smoke detectors shall be a 24 VDC type with visual alarm. Each detector shall be installed in the composite supply air ducts(s), with properly sized air sampling tubes (SPEC NOTE: indicate proper number of duct detectors on the drawings. Determine exact # as per CAN ULC S524. For areas where duct configuration makes it difficult to comply with ULC S524 consider the use of air aspiration devices)

b) Where duct detectors are installed above ceilings, remote LED indicators are to be installed. Duct Smoke Detector: Photoelectric type, with sampling tube of design and dimensions as recommended by the manufacturer for the specific duct size and installation conditions

c) Duct Smoke detector shall be photoelectric type, with sampling tube of design and dimension as recommended by the manufacturer for the specific duct size and installation conditions

d) Compact Duct Housing shall have a transparent cover to monitor for the presence of smoke. Cover shall secure to housing by means of four (4) captive fastening screws

e) Duct Housing shall provide two (2) Test Ports for measuring airflow and for testing. These ports will allow aerosol injection in order to test the activation of the duct smoke detector

f) For maintenance purposes, it shall be possible to clean the duct housing sampling tubes by accessing them through the duct housing front cover

g) [Each duct detector shall have a Remote Test Station with an alarm LED and test switch if located above a finished ceiling space]

h) [The Duct Housing shall provide a supervised relay driver circuit for driving [up to 15 relays with a single “Form C” contact rated at 7A@ 28VDC or 10A@ 120VAC] [OR] [an auxiliary alarm relay with two "Form C" contacts rated at 1A@ 28VDC or ½A@ 120 VAC resistive.] This auxiliary relay operates when the detector reaches its alarm threshold. Mount relay within 3 feet of HVAC control circuit]

i) [Duct Housing shall provide a relay control trouble indicator Yellow LED]
.9 Projected Beam Detectors

SPEC NOTE: Location of detector is to be approved by the University of Alberta, Life Safety Systems Group

a) The projected beam type shall be a 4-wire 24 VDC device
b) The detector shall be listed to ULC specifications and shall consist of a separate transmitter and receiver capable of being powered separately or together
c) The detector shall operate in either a short range 10m to 33m or long range 33m to 110m mode
d) The temperature range of the device shall be -30 degrees C to 56 degrees C
e) The detector shall feature a bank of four alignment LEDs on both the receiver and the transmitter that are used to ensure proper alignment of unit without special tools
f) Beam detector shall feature automatic gain control, which will compensate for gradual signal deterioration from dirt accumulation on lenses
g) The unit shall be both ceiling and wall mountable
h) The detector shall have the ability to be tested using calibrated test filters or magnet activated remote test station

.10 Heat Detectors

a) Construction – nylon
b) Ambient temperature 0°C to 38°C
c) Ambient Humidity – 10% to 95% R.H
d) Detectors to operate on the dual thermistor principle
e) Plug-in type base and head
f) Built-in LED for alarm indication
g) Shielded electronics to limit noise interference
h) Rate of rise to be automatic reset type at 8 degrees C per minute
i) Fixed temperature element to be automatic reset type

.11 Heat Detectors – High Temperature

a) Construction – nylon
b) Ambient temperature 0°C to 88°C
c) Ambient Humidity – 10% to 95% R.H
d) Detectors to operate on the dual thermistor principle
e) Plug-in type base and head
f) Built-in LED for alarm indication
g) Shielded electronics to limit noise interference
h) Rate of rise to be automatic reset type at 8 degrees C per minute
i) Fixed temperature element to be automatic reset type
.12 Ultraviolet Flame Detectors:

Open-area ultraviolet type to be designed to operate on 24 volt DC complete with encapsulated electronic circuitry and to operate on the Geiger Mueller principle. Spectral sensitivity range shall be between 1600 to 3000 angstrom, with peak response at approximately 2100 angstrom. Detector shall be capable of responding to a 12 inch diameter gasoline fire within 6 seconds when viewed head-on from a distance of 30 feet. Normal ambient light conditions such as sunlight, incandescent or fluorescent lighting shall not affect operation of the detector. Units shall be ULC approved. Explosion-proof units require classification suitable for area in which they are being installed. Units shall be complete with remote LED indicating detector activation. Exact placement of detectors shall be verified on site in conjunction with the Consultant and the Manufacturer.

Flame Detector: Ultraviolet / Infrared type with solid-state amplifier-switching circuit set for 3-second delay unless otherwise indicated.

.13 Alarm Notification Appliances

a) Audible Alarm Notification: By speakers in areas as indicated on drawings
b) Wheelock’s Series E Low Profile Speakers and Speaker strobes are with dual voltage (25/70 VRMS) capability and field selectable taps from 1/8 to 2 watt. Each model to has a built-in level adjustment feature and an aesthetic two (2) screw grille cover
c) The Series E Speaker Strobe models incorporate Low Current draw and the Series RSS Non-Sync/Sync Strobes
d) Strobe options for wall mount models include 15/75 and 185cd or Wheelock’s patented Multi-Candela strobe with field selectable candela settings of: 15, 30, 75 or 110cd
e) Ceiling mount models are available in 15, 30, 75, 100, 150, and 177cd intensities

.14 Supervised Horn Loudspeakers

a) Wheelock’s Series STH-15S supervised horn loudspeakers equipped with a compression driver providing up to 15 watts RMS power handling capability, superior intelligibility and dispersion to achieve maximum sound projection and penetration
b) Horns to have weather-resistant metal construction and re-entrant acoustic path. The mounting bracket is to allow directional sound dispersion via vertical and horizontal positioning
c) All models to include a built-in 25/70/100 V transformer featuring a screwdriver adjustable, 7-position watt/impedance selection switch. Wiring terminals to be protected with a vandal-resistant adapter cover for control equipment utilizing cable or conduit
d) A built-in, 5 mfd capacitor to be provided on both models for line supervision
e) The supervised horn loudspeaker shall be an STH-15S/STH-15SR or approved alternate. The horn shall be weather resistant and constructed of heavy gauge, treated aluminum. The horn shall be able to operate within any ambient temperature environment ranging from 66 degrees C (150°F) to -35 degrees C (-30°F). The horn shall be a double re-entrant type with a 15 watt RMS audio power rated compression driver producing a UL rated 102 dB measured at 15 watts at 10 feet. The horn shall have an impedance selection via a 7 position switch of 5000, 2500, 1300, 666, 333, 89 & 45. Power taps shall be available at 2.0, 4.0, 7.5 & 15 watts for the 100 volt line, .9, 1.8, 3.8, 7.5 & 15 watts for the 70 volt line and .94, 1.8, 7.5 & 15 watts for the 25 volt line. Each power tap shall have a 3dB incremental rating. The frequency response range shall be 400 - 5000 Hz at 8 ohms. The horn shall have a dispersion of 70 degrees. The horn assembly shall be furnished with a mounting bracket that allows adjustment on either a vertical or horizontal plane with a single locking pin and include provisions for mounting, banding or strapping. Wiring terminals shall be fully enclosed and a vandal-resistant adapter cover shall provide connection protection for cable or conduit. The horn shall be 7.875" W x 8.75" H x 9.313" D (200 x 222 x 237 mm). The horn shall be finished in gray (STH-15S) or red (STH-15SR) baked epoxy.

.15 Cluster Speakers

a) The Cluster Speaker shall be the STH-4MSR, STH-4R or STH-3MSR, STH-3R or STH-2MSR, STH-2R or approved alternate. The Cluster Speaker shall consist of: four (4) STH-15SR supervised horns for the STH-4MSR, STH-4R or three (3) STH-15SR supervised horns for the STH-3MSR, STH-3R or two (2) STH-15SR supervised horns for the STH-2MSR, STH-2R or equivalent. The Series STH-MSR Cluster speakers shall also consist of one (1) supervised 100 candela DC-MAX-C strobe or approved alternate.

b) The Cluster Speaker shall comply with UL Standard 1480, NFPA 72, NFPA 101 and OSHA 1910.165. The Cluster Speakers with strobe shall also comply with UL Standard 1638.

c) The STH-15SR horns shall be supervised horns measuring 7.87"W x 8.75"H x 9.32"D and prefabricated on the sides of a 10" x 10" x 6" steel enclosure.

d) The DC-MAX-C strobe shall be 6.2" diameter and prefabricated in the center of the cover of a 10" x 10" x 6" steel enclosure, for series STH-MSR.

e) Mounting of the Cluster Speaker shall be accomplished by using the four pre-drilled holes in the enclosure or by drilling new holes in order to be compatible with other mounting conditions.

f) The SHMP-R shall be a 4" x 4" UL listed adapter plate with pre-drilled holes for mounting the STH-15SR to a Series RSSP plate.

.16 Weatherproof Cluster Speakers
a) The Cluster Speaker shall be the STH-4M30WC or approved equal. The Cluster Speaker shall consist of: four (4) STH-30 horns and one (1) supervised 100 candela DC-MAX-C strobe or equivalent

b) Each STH-4M30WC shall be capable of producing 125 dBA @ 1 watt, 1 meter
c) The Cluster Speaker shall comply with OSHA 1910.165 and UL Standard 1638
d) The STH-30 horns shall measure 10"W x 10.5"L and shall be prefabricated on the sides of a 3.50" x 15.50" x 6.25" NEMA 4X fiberglass enclosure
e) The DC-MAX-C strobe shall measure 6.2" in diameter and be 5" in height, and shall be prefabricated in the center of the cover of a 13.50" W x 15.50" L x 6.25" H NEMA 4X fiberglass enclosure
f) Mounting of the Cluster Speaker shall be accomplished by using the four predrilled holes in the enclosure
g) The STH-4M30WC shall weigh approximately 45 lbs
h) The STH-4M30WC shall measure approximately 36.5"W x 34.5"L x 11"H
i) Series E Single & Multi-Candela Speakers & Speaker Strobe

.17 Low Profile Speakers

a) Low Profile Speakers and Speaker Strobes are to be designed for high efficiency sound output, with dual voltage (25/70 VRMS) capability and field selectable taps from 1/8 to 2 watts. Each model to have a built-in level adjustment feature and an aesthetic two (2) screw grille cover

b) Strobe options for wall mount models include 15/75 and 185cd or Wheelock’s patented Multi-Candela strobe with field selectable candela settings of: 15, 30, 75 or 110cd
c) Ceiling mounted models to be available in 15, 30, 75, 100, 150, and 177cd intensities
d) Speaker Strobes to use a Xenon flashtube with solid state circuitry enclosed in a rugged Lexan® lens to provide maximum reliability for effective visual signaling. All inputs to be supervised and employ IN/OUT wiring terminals for fast installation using #12 to #18 AWG wiring
e) The speaker appliances shall be Series E Speakers and the speaker strobe appliances shall be Wheelock Series E Speaker Strobes or approved alternate
f) 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 flashtube enclosed in a rugged Lexan® lens. The strobe shall be of low current design. Where wall mount, Multi-Candela Speaker Strobes are specified, the strobe intensity shall have a minimum of four (4) field selectable settings
and shall be rated per CAN-ULC-S526-07-EN Standard for: 15, 30, 75 or 110 candelas. The selector switch for selecting the candela shall be tamper resistant and not accessible from the front of the appliance. For standard ceiling mount applications, the strobe intensity shall be 15, 30, 75, or 100 candela. The finish of the Series E strobes and strobe speakers shall be white or red.

For high intensity wall mount strobe applications furnish 185cd speaker strobe appliances. For high intensity ceiling mount applications provide 150cd or 177cd strobe speaker appliances as shown on the plans. 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. All speaker and speaker strobe appliances shall be backward compatible.

.18 Vandal Resistant Speakers and Speaker Strobes

a) The speaker appliances shall be Wheelock Series ET-1010 or ET-1080 vandal resistant speakers and speaker strobes or approved alternate. The speakers shall be ULC Listed under CAN/ULC-S541-07-EN Speakers for Fire Alarm Systems and speakers equipped with strobes shall be listed under CAN/ULC-S526-07-EN Visible Signal Devices for Fire Alarm Systems. All speakers shall include both 25 and 70 volt VRMS inputs with field selectable power taps from 1/8 to 8 watts with listed sound output up to 96 dB for speakers or speaker strobes. Strobes shall be listed for 20-31 VDC input using filtered power or unfiltered power supply VRMS. All models shall have provisions for standard reverse polarity type supervision and IN/OUT field wiring using terminals that accept #12 to #18 AWG wiring. The speaker shall be constructed of a vandal resistant die cast metal.

b) Combination speaker strobe appliances shall incorporate a Xenon flashtube enclosed in a rugged Lexan® lens or approved alternate with solid state circuitry. Strobe shall meet CAN-ULC-S526-07-EN – Visible Signal Devices for Fire Alarm Systems and produce a flash rate of one (1) flash per second minimum over the listed input voltage (20VDC-31VDC) range. The strobe intensity shall be rated per CAN-ULC-S526-07-EN – Visible Signal Devices for Fire Alarm Systems.

c) Synchronized strobe versions (e.g., models utilizing type SL and SLM Strobes) shall incorporate circuitry for synchronized strobe flash and shall be designed for compatibility with Wheelock SM and DSM Sync Modules. Wheelock Sync Modules and Synchronized Strobes shall be designed as a system for continuous activation of the strobes, should the Sync Module contacts fail in the passive.
state (i.e., contacts remain closed) the strobes shall revert to a non-synchronized rate of 1 flash per second (default mode)

d) The combination speaker strobe appliances may be installed indoors and surface or flush mounted. They shall mount to standard electrical hardware requiring no additional trim plate or adapter. All appliances shall be vandal resistant die cast metal finished in a texture red or white color

.19 Weatherproof Speaker Strobe

The Weatherproof Low Profile Speaker Strobe shall be Wheelock Series ET70WP-2475W-FR or approved equal. The Series ET70WP-2475W-FR shall meet and be listed for CAN-ULC-S526-07-EN – Visible Signal Devices for Fire Alarm Systems (Visual Signal Devices for Fire Alarm Systems) for Indoor/Outdoor use, Fire Protective Service and CAN-ULC-S541-07-EN – Speakers for Fire Alarm Systems. The strobe portion of the ET70WP-2475W shall produce a flash rate of 30-62 flashes per minute over the Regulated Voltage Range of 16 to 33 VDC and shall incorporate a Xenon flash tube enclosed in a rugged Lexan® lens to provide maximum visibility and reliability for effective visible signaling. The strobe shall be rated at 75cd and shall operate over an extended temperature range of -31°F to 150°F (-35°C to 66°C) and 180cd at 77°F (25°C) and be listed for a maximum humidity of 95% RH. For outdoor applications the ET70WP-2475W-FR shall be wall mounted to a weatherproof back box (IOB). The speakers shall be designed for multiple power requirements with a high dBA output at each power tap. The low profile model shall offer a choice of field selectable taps, 1/8W to 8W for either 25.0 VRMS or 70.0 VRMS audio systems. The low profile design shall incorporate a high efficiency speaker for maximum output at minimum power across a frequency range of 400Hz to 4000Hz and features a sealed back construction for extra protection and improved audibility. When synchronization of the strobe 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 or MP Power Supply with built-in Patented Sync Protocol. If the sync module or sync protocol in the Power Supply shall fail to operate (i.e., contacts remain closed), the strobe shall revert to a non-synchronized flash rate.

.20 Ceiling Speakers

Ceiling Speaker Specifications: 8” (eight inch) Supervised Ceiling Speaker shall be mounted to a round white epoxy painted metal 12” grille with either a 70 volt (S70W) multi-tap transformer or a 25 volt (S25W) multi-tap transformer. The wattage taps shall range from ¼ watts to 5 watts. The speaker cone shall be flame retardant. The frequency response shall be 60 Hz – 12 kHz +/- 2.4 dB, reverberant shall be 400 - 4 kHz +/- 2.4 dB. The sensitivity shall be 78 dB @ 10 feet with ¼ watts of source power input, 81 dB @ 10 feet with ½ watt of source power input, 84 dB @ 10 feet with 1 watt of source power input, 87 dB @ 10 feet with 2 watts of source power input, and 90 dB @ 10 feet with 5 watts of source power input. The magnet weight shall be 10 oz. and shall
be made of barium ferrite ceramic. The speaker resonance shall be 121 Hz. The speaker impedance shall be 8 ohms. The voice coil diameter shall be 1".

Speaker Back Box Specifications: The CBB-8 Speaker back box is required to meet requirements for ULC Listing. The inside dimensions shall be 9 5/8" in diameter. The mounting centers shall be 11 ¼". The flange diameter shall be 12 15/16". The depth shall be 4 ¾". The back box shall contain four mounting straps, and there shall be 4 knockouts with dimensions of ½" to ¾". The back box shall be 22 gauge coated steel.

2.8 System Components – Intelligent Addressable Devices – General

.1 Detectors shall be intelligent (analog) and addressable, and shall connect with two terminals to the FACP initiating data circuit.

.2 Addressable smoke and thermal detectors, and monitor modules, control modules, and supervisory modules shall provide alarm and power/polling LED indication. LEDs shall flash under normal conditions, indicating that the detector is operational and in regular communication with the control panel, and LEDs shall be placed into steady illumination by the control panel, indicating that an alarm condition has been detected.

.3 The fire alarm control panel shall permit detector sensitivity adjustment through field programming. Sensitivity shall be automatically adjusted by the panel on a time-of-day basis.

.4 Using software in the FACP, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. The detectors shall be listed by ULC as meeting the calibrated sensitivity test requirements of ULCS 527.

.6 Detectors shall report an indication of an analog value reaching 100% of the alarm threshold.

.7 Addressable detector bases to meet or exceed following technical requirements:
   a) Field programmable
   b) Supervised, including removal of specified plug-in detector devices
   c) Designed to accept ionization, photo-electric and heat detectors
   d) Designed for remote LED output and base mounted LED
   e) Operation on system data loop
   f) Ambient temperature 0 to 90°C
   g) Ambient humidity: 0 – 93%
   h) Compatible with the main fire alarm system

8. Intelligent Products-Of-Combustion Detectors
a) Photo-electronic products-of-combustion (POC) sensors complete with addressable base shall be provided in all areas except electrical rooms where ionization type detectors are to be utilized. Units to be unaffected by changes in environmental temperature, humidity and pressure. Surface mounted, screw connection separate field wiring base, indicator lamp, provision for remote mounting, design and function based on dual chamber principle.
b) POC sensors shall communicate actual chamber values to system control panel. Sensors shall not have a self contained sensitivity setting, sensitivity setting to be determined at control panel. In all areas initially, alarm set point will be set at 1% obscurity during evening hours and 3.7% obscurity during daytime hours.
c) The control panel shall be programmed to automatically compensate for environmental changes at the remote sensors. Where the smoke detector chamber is contaminated with dust, or other particles, the control panel must still alarm at the prescribed alarm set point.
d) The POC sensor shall be stable withstanding air-gusts up to 10 m/sec velocity. The detector shall have a 30 mesh insect screen and have a completely sealed back to prevent entry of dust, moisture and air turbulence. The electronics of the unit shall be totally shielded to protect against false alarms due to EMI and RFI. The detector head shall be easily disassembled to facilitate cleaning. All wiring to the smoke detector shall be wired to the base only, thus when removing the head for maintenance or cleaning no wiring is disturbed. The detector head shall contain an LED which shall glow continuously to indicate alarm, or a sensor trouble condition. The detector head shall contain a locking screw to prevent unauthorized removal of the head from the base.
e) Ceiling units to be attractive design, easy to clean, chamber accessible without special tools, chamber to be provided with antistatic protection, overall tapered geometry with no flare-outs to collect dust. Chamber port open 360°.
f) Where units are mounted in the ceiling space, provide remote pilot lamp complete with Lamacoid identification.
g) Provide terminals and output for individual annunciation as required.
h) Duct mounting POC detectors to be complete with addressable module, duct casting, sampling tubes for installation in air systems and pilot lamp.

9. Intelligent Ionization Smoke Detectors

The detectors shall use the dual-chamber ionization principal to measure products of combustion and shall, on command from the control panel, send data to the panel representing the analog level of products of combustion.

10. Intelligent Heat Detectors

Heat detectors shall be intelligent addressable devices rated at 135 degrees Fahrenheit (57 degrees Celsius) and have a programmable rate-of-rise element rated at 15 degrees
Fahrenheit (9.4 degrees Celsius) per minute. It shall connect via two wires to the fire alarm control panel signaling line circuit.

a) The detectors shall be ceiling-mount and shall include a separate twist-lock base with tamper proof feature

b) The detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated at the detector itself (by activating a magnetic switch) or initiated remotely on command from the control panel. Use of the magnetic switch will not be acceptable for the initial verification procedure

c) Detectors will operate in an analog fashion, where the detector simply measures its designed environment variable and transmits an analog value to the FACP based on real-time measured values. The FACP software, not the detector, shall make the alarm/normal decision, thereby allowing the sensitivity of each detector to be set in the FACP program and allowing the system operator to view the current analog value of each detector

11. Addressable Dry Contact Monitor Modules

a) Addressable monitor modules shall be provided to connect a conventional alarm initiating device N.O. dry contact to the fire alarm control panel

b) The monitor module shall mount in a 4-inch square (100 mm square), 2-1/8 inch (54 mm) deep electrical box

c) The zone shall be suitable for Class A or B operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel

d) Addressable Dry Contact Monitor Modules to meet or exceed the following technical requirements:

i) Compatible with main fire alarm system

ii) Field programmed

iii) Individually identifiable

iv) Supervised

v) Supervises and controls N.O. contact devices on supervised slave line. Supervision in Class B format with end-of-line resistor

vi) Operating Voltage: 24 volts

vii) Slave Line Resistance: 50 ohms maximum

viii) Ambient Temperature: 0°C – 40°C

ix) Ambient Humidity: 0 – 93%

x) Complete with Lamacoid identification on cover identifying address and device monitored

12. Two Wire Detector Monitor Module
13. Addressable Control Modules

a) Addressable control modules shall be provided control the operation of fan shutdown and other auxiliary control functions with the control module set to operate as a dry contract relay

b) The control module shall mount in a standard 4-inch square (101.6 mm square), 2-1/8 inch (54 mm) deep electrical box, or to a surface mounted back box

c) The control module may be wired for Class A or B operation with up to 1 amp of inductive operation, or as a dry contact (Form-C) relay. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to insure that 100% of all auxiliary relay may be energized at the same time on the same pair of wires

d) Audio/visual power shall be provided by a separate supervised power circuit from the main fire alarm control panel or from a supervised, ULC listed remote power supply

e) The control module shall be suitable for pilot duty applications and rated for a minimum of 0.5 amps at 30 VDC

f) Control modules shall come with a built in barrier between contact wires and addressable loop wires

g) Addressable Control Modules to meet or exceed with following technical requirements:

i) Compatible with main fire alarm system

ii) Field programmed

iii) Individually identifiable

iv) Supervised

v) May be operated by any one or group of identifiable devices

vi) May be operated from control centre or automatically by system

vii) Contact rating: .5 amperes 120 volts AC, .5 amperes at 30 volt DC, with one (1) set of Form C contacts

viii) Ambient Temperature: 0°C – 40°C

ix) Ambient Humidity: 0 – 93%
x) Complete with Lamacoid identification on cover identifying address and device controlled

14. Isolator Modules

a) Isolator modules shall be provided to automatically isolate wire-to-wire short circuits on a DCLA or DCLB branch. The isolator module shall limit the number of modules or detectors that may be rendered inoperative by a short circuit fault on the DCL segment or branch. Isolator modules shall be provided as indicated on the drawings.

b) If a wire-to-wire short occurs, the isolator module shall automatically open-circuit (disconnect) the DCL. When the short circuit condition is corrected, the isolator module shall automatically reconnect the isolated section.

c) It shall not be necessary to replace or reset an isolator module after its normal operation.

d) The isolator module shall come complete with a mounting plate and cover.

e) The Isolator shall mount directly to a minimum 2 1/8" deep, standard 4" square (100mm square) electrical box, without the use of special adapter or trim rings. Power and communications shall be supplied by the Addressable Controller channel SLC; dual port design shall accept communications and power from either port and shall automatically isolate one port from the other when a short circuit occurs. The following functionality shall be included in the Isolator module:

i) Report faults to the host FACP.

ii) On-board Yellow LED provides module status.

iii) After the wiring fault is repaired, the Isolator modules shall test the lines and automatically restore the connection.

15. Addressable Manual Fire Alarm Stations

a) Manual Fire Alarm Stations are as follows:

i) Type: Addressable [Single] [Double] action type.

ii) Construction: Metal or Lexan®.

iii) Mounting: Flush or Surface as shown on drawings.

iv) Features: Glass surface minimum 50 x 50 mm.

v) Ambient temperature: 0°C to 40°C.

vi) Ambient humidity: 0 - 93%.

b) Manual fire alarm stations to be mounted in a manufacturer supplied wall box where surface mounted. Weather proof where required by site conditions.

c) Manual pull stations are to have an electronic device address mechanically fastened to the back of the pull station, except in explosion proof applications.

d) Station will mechanically latch upon operation and remain so until manually reset by opening with a key common with the control units.
e) **Protective Shield:** Provide a tamperproof, clear Lexan® shield and red frame that easily fits over manual pull stations. When shield is lifted to gain access to the station, a battery powered piercing warning horn shall be activated. The horn shall be silenced by lowering and realigning the shield. The horn shall provide 85dB at 10 feet and shall be powered by a 9 VDC battery.

16. **Addressable Notification Appliances**

Addressable Notification Appliances: The Contractor shall furnish and install Addressable Notification Appliances and accessories to operate on compatible signaling line circuits (SLC).

a) Addressable Notification appliance operation shall provide power, separate control and supervision of horns and strobes over a single pair of wires. The controlling channel (SLC) digitally communicates with each appliance and receives a response to verify the appliance's presence on the channel. The channel provides a digital command to control appliance operation. SLC channel wiring shall be unshielded twisted pair (UTP), with a capacitance rating of less than 60pf/ft and a minimum 3 twists (turns) per foot.

b) Up to 63 appliances can be supported on a single channel.

c) Each Addressable notification appliance shall contain an electronic module and a selectable address setting (in addition to its notification appliance circuit) to allow it to occupy a unique location on the channel. This on-board module shall also allow the channel to perform appliance diagnostics that assist with installation and subsequent test operations. A visible LED on each appliance shall provide verification of communications and shall flash with the appliances address setting when locally requested using a magnetic test tool.

e) **Addressable Controller:** Addressable Controller shall supervise Channel (SLC) wiring, communicate with and control addressable notification appliances. Audible (horn) appliances shall have a High/Low Setting, programmable from the [addressable controller per channel][host FACP per appliance].

f) **Horn:** The horn shall have a minimum sound pressure level of [88][83] dBA @ 24VDC. The horn shall mount directly to a standard single gang, double gang or 4” square electrical box, without the use of special adapter or trim rings. Appliances shall be wired with UTP conductors, having a minimum of 3 twists per foot.

g) **Visible/Only:** Addressable strobe shall be listed to CAN-ULC-S526-07-EN - Visible Signal Devices for Fire Alarm Systems, Including Accessories. The V/O shall consist of a xenon flash tube and associated lens/reflector system. The V/O enclosure shall mount directly to standard single gang, double gang or 4” square electrical box, without the use of special adapters or trim rings. Appliances shall be wired with UTP conductors, having a minimum of 3 twists per foot. V/O appliances shall be provided with different minimum flash intensities of 15cd,
75cd and 110cd. Provide a label inside the strobe lens to indicate the listed candela rating of the specific appliance.

h) Audible/Visible: Addressable combination Audible/Visible (A/V) Notification Appliances shall be listed to CAN-ULC-S526-07-EN and CAN-ULC-S525-07-EN. The strobe light shall consist of a xenon flash tube and associated lens/reflector system. Provide a label inside the strobe lens to indicate the listed candela rating of the specific strobe. The horn shall have a minimum sound pressure level of [85][80] dbA @ 24VDC. The audible/visible enclosure shall mount directly to standard single gang, double gang or 4” square electrical box, without the use of special adapters or trim rings. Appliances shall be wired with UTP conductors, having a minimum of 3 twists per foot. The appliance shall be capable of two-wire synchronization with one of the following options:

i) Synchronized Strobe with Horn on steady
ii) Synchronized Strobe with Temporal Code Pattern on Horn
iii) Synchronized Strobe with March Time cadence on Horn
iv) Synchronized Strobe firing to NAC sync signal with Horn silenced

.17 Ancillary Components

a) Magnetic Door Holders

Description: Units are equipped for wall or floor mounting as indicated and are complete with matching door plate. Unit shall operate from a [120VAC][24VAC][24VDC] source, and develops a minimum of 25 lbs. holding force.

[Material and Finish: Match door hardware.]

b) Emergency Power Supply

General: Components include battery, charger, and an automatic transfer switch.

Battery: Sealed lead-acid. Provide sufficient capacity to operate the complete alarm system in normal or supervisory (non-alarm) mode for a period of [24][48][60][90] hours. Following this period of operation on battery power, the battery shall have sufficient capacity to operate all components of the system, including all alarm indicating devices in alarm or supervisory mode for a period of [30][60] minutes.
2.9 Aspirating Smoke Detection System

.1 Manufacturer

Aspirating Smoke Detection System: Acceptable Manufacturer Vision System-VESDA 15-17 Normandy Road Clayton 3168 Australia - Telephone +613 9544 8411

.2 Detector Assembly

a) The detector, filter, aspirator and relay outputs to be enclosed and arranged in such a way that air drawn from the fire zone by way of the sampling tube into the housing passes through the dual stage filters and the detector by the aspirator

b) The detector is to have up to three independent field programmable smoke alarm thresholds across its sensitivity range with adjustable time delays for each threshold between 0-60 seconds

c) The detector must also be capable of transmitting a fault via relay

d) The detector is to have a single inlet pipe, which must contain a flow sensor. Both minor and urgent flow faults for both high and low are to be reported

e) The filter must be a two stage disposable filter cartridge. The first stage is to be capable of filtering particles in excess of 20 microns for the air sample. The second stage to be ultra fine removing more than 99% of contaminants of three microns or larger this is to provide a clean air barrier around the detector’s optics and this will increase the service life of the detector

f) The aspirator to be a purpose designed rotary vane air pump. It shall be capable of supporting a single pipe run of 150 ft., or two or three pipe runs, with a transport time of less than 60 seconds or as appropriate codes dictate

g) The assembly shall contain relays for alarm and fault conditions. The relays are to be software programmable and rated at not less than 2 amps. They must also be capable of being latching or non-latching

h) Connection to the main system shall be by addressable input devices. Alarm and trouble shall be reported to the main FACP. An addressable reset relay shall be utilized and programmed to provide a reset signal to the VESDA detector if necessary

.3 Power Supply and Batteries

The system is to be powered from a 24V DC supply within the fire alarm system. Power calculations are required at the time of shop drawing approval.

.4 Sample Pipe Design

a) Sampling Pipe
i) The sampling pipes are to be smooth bore with an internal diameter of between 21 and 27mm. Normally pipe with an outside diameter of 25 and an internal diameter of 21mm should be used.

ii) All joints in the sampling tube to are to be airtight and made by using solvent cement except at the entry to the smoke detector.

iii) The pipe is to be identified as aspirating smoke detector pipe along its entire length and at regular intervals according to local codes and manufacturer’s recommendations.

iv) All pipes are to be supported at not more than 1200 mm centers. Piping shall be installed in accordance with standard conduit installation practices. Tye wraps are not acceptable.

v) The far end of the pipes should be fitted with an end cap and drilled with a hole appropriately sized to achieve the performance as specified by the fire alarm system vendor.

b) Sampling Holes

Sampling holes shall be at least 2 mm in diameter and shall be separated by not more than 6 m intervals along the entire length of the pipe. These intervals and the sampling hole diameter may vary according to Aspire design calculations.

c) Installation

i) Air Sampling Pipe Network Calculations:

Air sampling pipe network calculations to be provided by a sampling aspiration modeling program such as ASPIRE. Pipe calculations are to be supplied with the proposed pipe layout design. A three dimensional drawing, in AutoCAD format, shall be provided for each VESDA utilized on the project.

ii) Transport Time:

The manufacturers recommended transport time (time taken for the smoke to enter the pipe and reach the detector) for the least favorable sampling point is 60 seconds or less. The maximum transport time must not exceed the local codes.

iii) Balance Percentage

The sample point balance for the pipe shall not be less than 70% as indicated by ASPIRE. That is, the volume if air drawn from the last sampling point shall not be less than 70% of the average volume from other holes.

iv) Share Percentage

The sample hole share for the pipe shall not be less than 70% as indicated by ASPIRE. That is, the sum volume of air drawn through the sampling holes must always be greater than 70% of the total volume entering the pipe.
d) Commissioning Tests
i) The fire alarm system supplier is to provide all necessary instrumentation, equipment, materials and labour
ii) The fire alarm supplier is to record all tests and system calibrations and a copy of these results to be included in the verification documents

e) Commissioning
i) Introduce smoke into the detector assembly to provide a basic function test. Introduce smoke to all sample points on the piping network to show none are obstructed
ii) Introduce smoke to the least favorable sampling point is each sampling pipe. When this is done the maximum transport time should not exceed 60 seconds
iii) Activate the appropriate fire alarm zones and confirm the system is fully operational. Provide the commissioning and verification reports accordingly

2.10 Passive Building Annunciator Panel

.1 Flush mounted cabinet of code gauge metal construction, complete with separate back box, matching the FCC in appearance.

.2 Front panel door frames constructed of painted welded steel containing a clear Lexan® window mounted from rear of door frame.

.3 Door to be complete with hinges, lock and keys. Keys to be matched to the University of Alberta master system as directed by the University of Alberta Life Safety Systems (LSS) Group.

.4 Graphic display to consist of a plastic laminated subpanel, hinge mounted to interior of the back box.

.5 Graphic display to include each floor, floor zones exits, exit corridors, and a “You Are Here” sign, with the proper orientation on the graphic panel with respect to its mounting location.

.6 Graphic display panel to have art work applied to separate Mylar film inserted on white Lexan® background surface to allow for future changes without replacement of total panel.

.7 Paint finish and colors to match area decor as selected by the University of Alberta Life Safety Systems Group.

.8 Allow for green borders for sprinkler zones.
.9 Viewing area of graphic annunciator to be minimum \( \text{SPEC NOTE: indicate required size} \) \[ \text{__________} \text{mm} \times \text{[__________]} \text{mm}. \]

.10 Allow for 20 different colors in the graphic design. The graphic shall have a ULC listing.

2.11 End of Line Resistor Assemblies (EOLS)

End of line resistor assembly: single gang stainless steel plate with a terminal strip on the back, resistor, red on white Lamacoid label on the front identifying the zone and device. End of line boxes are to be covered with an appropriate plate i.e. Do not use a flush mount plate to cover a surface box. Covers must not extend beyond the flat surface of the plates.

Part 3 EXECUTION

3.1 Installation, General

Install system components and all associated devices in accordance with applicable ULC Standards and manufacturer’s recommendations. Installation personnel shall be supervised by persons who are qualified and experienced in the installation, inspection, and testing of fire alarm systems. Installing contractor shall be responsible for retaining referenced supervisory personnel under the scope of services. Examples of qualified personnel shall include, but not be limited to, the following:

a) Factory trained and certified personnel
b) Canadian Fire Alarm Association (CFAA) certified personnel
c) Personnel licensed or certified by provincial or local authority
d) Trained and qualified personnel employed by an organization listed by a national testing laboratory for the servicing of fire alarm systems

3.2 Equipment Installation

.1 Furnish and install a complete Fire Alarm System as described herein and as shown on the plans. Include sufficient material and equipment including but not limited to: control unit(s), annunciator(s), manual stations, automatic fire detectors, smoke detectors, audible and visible notification appliances, wiring, terminations, electrical boxes, and all other necessary material for a complete operating system.

.2 Existing Fire Alarm Equipment: Shall be maintained fully operational until the new equipment has been tested and accepted. [Equipment Removal: After acceptance of the new fire alarm system, disconnect and remove the existing fire alarm equipment and restore damaged surfaces. Package operational fire alarm and detection equipment that has been removed and deliver to the Owner. Remove from the site and legally dispose of the remainder of the existing material.][Provide certificate of disposal for ionization based smoke detectors that can’t be deposited in the local land fill]
3.3 **Wiring Installation**

.1 **System Wiring:** Wire and cable shall be a type listed for its intended use by an approval agency acceptable to the Authority Having Jurisdiction (AHJ) and shall be installed in accordance with the appropriate articles from the current edition of the Canadian Electrical Code adopted into provincial legislation.

.2 **Contractor shall obtain from the Fire Alarm System Manufacturer written instruction regarding the appropriate wire/cable to be used for above and below grade areas (as applicable) to this installation. No deviation from the written instruction shall be made by the Contractor without the prior written approval of the Fire Alarm System Manufacturer.**

.3 **Color Coding:** Color-code fire alarm conductors differently from the normal building power wiring. Use one color code for alarm initiating device circuits wiring and a different color code for supervisory circuits. Color-code notification appliance circuits differently from alarm-initiating circuits. Paint fire alarm system junction boxes and covers red.

.4 **Risers:** Install at least 2 vertical cable risers to serve the fire alarm system. Separate risers in close proximity to each other, in accordance with applicable building code and Canadian Electrical Code, with a minimum [2-hour rated cable assembly][2-hour rated shaft or enclosure][2-hour rated stairwell in a fully sprinklered building], so the loss of one riser does not prevent the receipt or transmission of signal from other floors or zones.

.5 **Wiring to remote monitoring station:** 1-inch conduit between the FACP and the central station transmitter connection as indicated. Install number of conductors and electrical supervision for connecting wiring as required to suit central monitoring function. Final connections to terminals in central station transmitter are made under a separate contract to the University.

3.4 **Field Quality Control**

.1 **Manufacturer's Field Services:** Provide services of a factory-authorized service representative to supervise the field assembly and connection of components and for the activation of pretesting, testing, and adjustment of the system.
Service personnel shall be qualified and experienced in the inspection, testing, and maintenance of fire alarm systems. Examples of qualified personnel shall be permitted to include, but shall not be limited to, individuals with the following qualifications:

a) Factory trained and certified
b) Canadian Fire Alarm Association (CFAA) certified personnel
c) Personnel licensed or certified by provincial or local authority
d) Trained and qualified personnel employed by an organization listed by a national testing laboratory for the servicing of fire alarm systems

Pretesting: Determine, through pretesting, the conformance of the system to the requirements of the Drawings and Specifications. Correct deficiencies observed in pretesting. Replace malfunctioning or damaged components and wiring with new and retest until satisfactory performance and conditions are achieved.

Final Requirements: Provide a 10-day minimum notice in writing to the Owners Representative when the system is ready for verification acceptance testing.

Minimum System Tests: Test the system according to the procedures outlined in CAN/ULC-S537 Verification of Fire Alarm Systems and as required to demonstrate full functionality and compliance with design requirements codes and provincial regulations.

Retesting: Correct deficiencies indicated by tests and completely retest work affected by such deficiencies. Verify by the system re-test that the total system meets the Specifications and complies with design requirements codes and provincial regulations.

Reports of Tests and Inspections: Provide a written record of inspections, tests, and detailed test results in the form of a test log.

Final Test, Certificate of substantial Completion, Certificate of Occupancy and Verification Report: Test the system as required by the Authority Having Jurisdiction in order to obtain a certificate of substantial completion, a certificate of occupancy and the Fire Alarm Verification Certificate.

3.5 Cleaning and Adjusting

Cleaning: Remove paint splatters and other spots, dirt, and debris. Clean unit internally using methods and materials recommended by manufacturer.

Occupancy Adjustments: Whenever requested within one year of date of Substantial Completion, provide on-site assistance in adjusting sound levels and adjusting controls and sensitivities to suit actual occupied conditions. Provide up to three visits to the site for this purpose.
3.6 Training

.1 Provide the services of a factory-authorized service representative to demonstrate the system and train Owner's maintenance personnel as specified below. Train Owner's maintenance personnel in the procedures and schedules involved in operating, troubleshooting, servicing, and preventive maintaining of the system. Provide a minimum of [Review selection for training in 1.11.3 of this specification and match requirement] hours' training.

Schedule training with the Owner in writing at least seven days in advance. Provide agenda and materials prior to notification for approval.

3.7 Connection to Work Supplied and Installed Under Other Sections

.1 Provide outputs for control of auxiliary equipment supplied and installed under other Sections.

a) Door hardware: Architectural Trades
b) Supply and return air fan control: Fire Protection Specialty/Mechanical Trades
c) Smoke control: switch 120 volt emergency power circuits through eight (8) sets of NO and NC dry relay contacts
d) Sprinkler flow, tamper switches and pressure switches: Mechanical Trades
e) Solenoid valves; Mechanical Trades
f) Elevator connections
g) Electric Lock System

.2 Provide monitor modules for the following auxiliary equipment supplied and installed under other Sections.

a) Sprinkler Trouble and Flow Switches: Mechanical Trades
b) Sprinkler Check Valve: Mechanical Trades
c) Provide an individual alarm monitor module for each sprinkler flow switch, tamper switch, or alarm pressure switch in the system. Provide an individual monitor module for each supervisory device such as gate valve, pressure switches, etc. These monitor modules to indicate a latching supervisory alarm when the supervisory devices are operated. Mount modules a minimum of 2 m away from a water source
d) Provide supervisory monitor modules for each of the following:
   i) Generator run; to indicate system power supply from generator source
   ii) Generator trouble; to indicate any of the generator pre-alarm, alarm/shutdown conditions. This module to also monitor “switch in off”, low fuel level, etc.
   iii) Fire pump run
   iv) Fire pump trouble
Where monitor modules on the sprinkler system are mounted in public areas they shall be mounted high enough to be out of public reach. Minimum 7’10” or 2380 mm to the bottom of device

3.8 Protection of Completed Work

Protect equipment in areas of construction to prevent the entry of dust, paint and any other foreign matter into the devices or panels. During the renovations of occupied buildings, the method of protection cannot interfere with the system operation without indicating troubles at the FACP.

3.9 Start-Up

Comply with applicable starting requirements of Section [XXXXX].

3.10 Demonstration and Instruction

Comply with requirements of Section [XXXXX].

3.11 Pre-Verification

.1 Fire Alarm System/Fire Suppression System

a) Prior to requesting verification of the Fire Alarm System by the Owner, Electrical Trades and the Fire Alarm System/Fire Suppression System manufacturer's technical staff shall:

b) Inspect system in conjunction with the manufacturer to ensure that fire alarm system is correctly installed, connected and fully operational in accordance with requirements of the Contract Documents and Manufacturers recommendations. This shall include all auxiliary equipment connected to fire alarm system such as elevators, central station tie-in, fan shut-down, sprinklers, door hold-open devices, etc.

c) Ensure that any subsequent work remaining to be performed on the above-noted items will not invalidate examinations and tests performed during verification procedure

d) Ensure that operation and maintenance data has been submitted

e) Ensure that spare parts and maintenance materials have been delivered

.2 Certify to the [(Choose One) Construction Manager] [(Owner)] in writing that above prerequisites have been fulfilled and specifying known exceptions in the form of a list of items to be completed or corrected, prior to proceeding with verification. This includes the passive graphics which are to be on site and installed.

.3 The Verification Agent will proceed with verification, or advise [(Choose One) Construction Manager] [(Owner)] that prerequisites are not adequately fulfilled. This
includes a hard copy of the panel program and is to be supplied before the verification proceeds.

.4 Fire Alarm Verification:

a) Assist and cooperate with the Verification Agent in verification procedure.

i) Provide the following equipment:
   Velometer – Artificial Smoke – Rate of Rise Heat Detector Tester –
   Minimum of four portable communication devices

ii) Do not proceed with the verification unless the following parties are present at all times during verification procedures:
   (1) Electrical Contractor
   (2) Fire Alarm System Manufacturer’s Representative /Consultant - Verification representative
   (3) Owners representative must be present for verification

iii) Disassemble and reassemble system components
iv) Disconnect and reconnect wiring
v) Perform required field adjustments
vi) Repair defective work and replace defective components

.5 Perform all other work on system required by verification procedure.

3.12 Performance Verification

.1 The owner will retain the services of a verification agent to direct verification of the fire alarm system in accordance with:

a) CAN/ULC-5537-2004 “Verification of Fire Alarm System Installations” or latest version of ULC standard
b) Requirements of authority having jurisdiction

OR

.2 The contractor is to include all engineering fees for the verification in the bid price. The fire alarm system is to be verified in accordance with:

a) CAN/ULC-5537-2004 “Verification of Fire Alarm System Installations” or latest version of ULC standard
b) Requirements of authority having jurisdiction

.3 Owner will install barcode system and associated labels at time of system verification.

3.13 False Alarm Tolerance Policy

.1 The electrical contractor is to obtain fire alarm system printouts for the premises prior to undertaking any construction work on the site, costs to obtain this report are to be
carried by the electrical contractor. These programming printouts are to include a contamination of device report and to be turned over to the engineer of record immediately following printing.

.2 Upon completion of the required installation of/or modifications to the fire alarm system the electrical contractor shall obtain a new programming printout including a contamination report before requesting verification from the engineer of record. Any devices found to have a contamination deviation greater than 5% shall be replaced by the electrical contractor at no cost to the University. All such effected devices shall be replaced prior to commencement of the formal verification.

.3 A zero false alarm tolerant policy is in effect at the University. Failure to ensure new and or existing field devices remain undamaged and contamination free that results in a response from the local fire authority will result in a back charge to the project in the amount of $1,800.00 to cover the costs associated with this local fire authority response. The University of Alberta project manager assigned to this project has the discretion to waive this fee under extenuating circumstances.

END OF SECTION [XXXXX]

END OF SCHEDULE A