

Part 1 General

1.1 SUMMARY

- .1 This Section covers fire alarm systems, including initiating devices, notification appliances, controls, and supervisory devices.
- .2 Work covered by this section includes the furnishing of labor, equipment, and materials for installation of the fire alarm system as indicated on the drawings and specifications.
- .3 The Fire Alarm System shall consist of all necessary hardware equipment and software programming to perform the following functions:
 - .1 Fire alarm system detection and notification operations.
 - .2 Control and monitoring of elevators, smoke control equipment, door hold-open devices, fire suppression systems, emergency power systems, and other equipment as indicated in the drawings and specifications.

1.2 SCOPE OF WORK

- .1 Provide and install an addressable fire alarm system complete with remote annunciator.

1.3 ACCEPTABLE EQUIPMENT AND SERVICE PROVIDERS

- .1 Manufacturers: The equipment and service described in this specification are those supplied and supported by SimplexGrinnell and represent the base bid for the equipment.
 - .1 Subject to compliance with the requirements of this specification, provide alternate products by one of the following:
 - .1 SimplexGrinnell
 - .2 Siemens
 - .3 Notifier
 - .2 Being listed as an acceptable Manufacturer in no way relieves obligation to provide all equipment and features in accordance with these specifications.
 - .3 The equipment and service provider shall be a nationally recognized company specializing in fire alarm and detection systems. This provider shall employ factory trained and CFAA registered technicians, and shall maintain a service organization within 100 miles of this project location. The equipment and service provider shall have a minimum of 10 years experience in the fire protective signaling systems industry.

1.4 REFERENCES

- .1 Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this section.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .3 Building and Fire Codes (Latest Issue)
 - .1 National Building Code
 - .2 National Fire Code
 - .3 Manitoba Building Code
 - .4 Manitoba Fire Code
 - .5 Canadian Electrical Code

- .6 City of Winnipeg By-Laws (updated)
- .7 Canadian Standards Association
 - .1 CAN/ULC-S524-06 Installation of Fire Alarm Systems
 - .2 CAN/ULC-S527-11, Control Units for Fire Alarm Systems
- .4 Underwriter's Laboratories of Canada (ULC)
 - .1 CAN/ULC-S524-2006, Standard for the Installation of Fire Alarm Systems.
 - .2 CAN/ULC-S525-1999, Audible Signal Device for Fire Alarm Systems.
 - .3 CAN/ULC-S526-2002, Visual Signal Devices for Fire Alarm Systems.
 - .4 CAN/ULC-S527-1999, Control Units.
 - .5 CAN/ULC-S528-1991, Manual Pull Stations for Fire Alarm Systems.CAN/ULC-S529-2002, Smoke Detectors for Fire Alarm Systems.
 - .6 CAN/ULC-S530-M1991, Heat Actuated Fire Detectors for Fire Alarm Systems.
 - .7 CAN/ULC-S531-2002, Standard for Smoke Alarms.
 - .8 CAN/ULC-S536-S537-2004, Burglar and Fire Alarm Systems and Components.
- .5 National Fire Protection Agency
 - .1 NFPA 72-2002, National Fire Alarm Code.
 - .2 NFPA 90A-2002, Installation of Air Conditioning and Ventilating Systems.

1.5 SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Submit Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop Drawings:
 - .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Include:
 - .1 Layout of equipment.
 - .2 Zoning.
 - .3 Complete wiring diagram, including schematics of modules.
- .3 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .2 Instructions: submit manufacturer's installation instructions.
 - .3 Manufacturer's Field Reports: manufacturer's field reports specified.
- .4 Closeout Submittals:
 - .1 Submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals in accordance with ANSI/NFPA 20.
 - .2 Authority of Jurisdiction will delegate authority for review and approval of submittals required by this Section.
 - .3 Submit to Authority of Jurisdiction 2 sets of approved submittals and drawings immediately after approval but no later than 15 working days to prior to final inspection.

- .4 Submit following:
 - .1 Manufacturer's Data for:
 - .1 Control panel and modules.
 - .2 Storage batteries.
 - .3 Battery charger.
 - .4 Manual pull stations.
 - .5 Heat detectors.
 - .6 Open-area smoke detectors.
 - .7 Duct smoke detectors.
 - .8 Alarm bells.
 - .9 Alarm horns.
 - .10 Visible appliances.
 - .11 Main annunciator.
 - .12 Remote annunciator panel.
 - .13 Electro-magnetic door holder-releases.
 - .14 Valve tamper switches.
 - .15 Wiring.
 - .16 Ground rods.
 - .17 Conduit.
 - .18 Outlet boxes.
 - .19 Fittings for conduit and outlet boxes.
 - .20 Trouble buzzer.
 - .21 Surge suppression devices.
 - .22 Mark data which describe more than one type of item to indicate which type will be provided.
 - .23 Submit 1 original for each item and clear, legible, first-generation photocopies for remainder of specified copies.
 - .2 System wiring diagrams:
 - .1 Submit complete wiring diagrams of system showing points of connection and terminals used for electrical connections in the system.
 - .2 Show modules, relays, switches and lamps in control panel.
 - .3 Design data: Power Calculations:
 - .1 Submit design calculations new work specified to substantiate that battery capacity exceeds supervisory and alarm power requirements.
 - .2 Show comparison of detector power requirements per zone versus control panel smoke detector power output per zone in both standby and alarm modes.
 - .3 Show comparison of notification appliance circuit alarm power requirements with rated circuit power output.
 - .4 Schedules:
 - .1 Conductor wire marker schedule.
 - .5 Test Reports:
 - .1 Open-area 2-wire smoke detectors.
 - .2 Preliminary testing:
 - .1 Final acceptance testing.

- .2 Submit for inspections and tests specified under Field Quality Control.

1.6 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Installer: company or person specializing in fire alarm system installations with 10-years documented experience approved by manufacturer.
 - .2 Provide services of representative or technician from manufacturer of system, experienced in installation and operation of type of system being provided, to supervise installation, adjustment, preliminary testing, and final testing of system and to provide instruction to project personnel.
 - .3 Extra Materials:
 - .1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
 - .4 Maintenance Service:
 - .1 Provide one year's free maintenance with two inspections by manufacturer during warranty period. Inspection tests to conform to CAN/ULC-S536. Submit inspection report to the Contract Administrator.

1.7 DELIVERY, STORAGE, AND HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle in accordance with manufacturer's instructions.
 - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

Part 2 Products

2.1 SYSTEM DESCRIPTION

- .1 General: Provide a complete, non-coded addressable, microprocessor-based fire alarm system with initiating devices, notification appliances, and monitoring and control devices as indicated on the drawings and as specified herein.
- .2 Power Requirements
 - .1 The control unit shall receive AC power via a dedicated fused disconnect circuit.
 - .2 The system shall be provided with sufficient battery capacity to operate the entire system upon loss of normal AC power in a normal supervisory mode for a period of 24 hours with 30 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.
 - .3 All circuits requiring system-operating power shall be 24 VDC nominal voltage and shall be individually fused at the control unit.
 - .4 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 interface while incoming power is present.
 - .5 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 displayed for the specific fault type.

- .6 The system shall support shutdown operation as defined by CAN/ULC-S527 standard after a Depleted Battery condition occurs.
 - .7 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.
 - .8 Loss of primary power shall sound a trouble signal at the FACP. FACP shall indicate when the system is operating on an alternate power supply.
- .3 Software: The fire alarm system shall allow for loading and editing instructions and operating sequences as necessary.
- .1 The system shall be capable of on-site programming to accommodate system expansion and facilitate changes in operation.
 - .2 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.
 - .3 Panels shall be capable of full system operation during new site-specific configuration download, master exec downloads, and slave exec downloads.
 - .4 Panels shall automatically store all program changes to the panel's non-volatile memory each time a new program is downloaded. Panels shall be capable of storing the active site-specific configuration program and no less than 9 previous revisions in reserve. A compare utility program shall also be available to authorized users to compare any two of the saved programs. The compare utility shall provide a deviation report highlighting the changes between the two compared programs.
 - .5 Panels shall provide electronic file storage with a means to retrieve a record copy of the site-specific software and up to 9 previous revisions. Sufficient file storage shall be provided for other related system documentation such as record drawings, record of completion, owner's manuals, testing and maintenance records, etc.
 - .6 The media used to store the record copy of site-specific software and other related system documentation shall be electrically supervised. If the media is removed a trouble shall be reported on the fire alarm control panel.
- .4 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.
- .5 Recording of Events: The system shall be capable of recording 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 shall differentiate alarm signals from all other printed indications.
- .6 Wiring/Signal Transmission:
- .1 Transmission shall be hard-wired using separate individual circuits for each zone of alarm operation, as required or addressable signal transmission, dedicated to fire alarm service only.
 - .2 System connections for in out circuits shall be Class A, Style A, data communication links shall be Class A, Style 6 and signaling circuits shall be Class A, Style Z.
 - .3 Circuit Supervision: Circuit faults shall be indicated by a trouble signal at the FACP. Provide a distinctive indicating audible tone and alphanumeric annunciation.
- .7 Supplemental Notification and Remote User Access (Fire Panel Internet Interface)
- .1 Fire Alarm Control Panel (FACP) shall have the capability to provide supplemental notification and remote user access to the FACP using Ethernet and TCP/IP communications protocol compatible with IEEE Standard 802.3.
 - .2 A standard RJ-45 Ethernet connection shall connect to The City's Ethernet network. Provisions for that connection must be provided at each fire alarm control panel as part of the contract.

- .3 The means of providing supplemental email and SMS text messaging notification shall be agency listed for specific interfaces and for the purpose described in this section. The use of non-listed external third party products and interfaces is not acceptable.
- .4 The fire panel internet interface shall be capable of sending automated notification of discrete system events via email and SMS text messaging to up to 50 individual user accounts and via email to up to 5 distribution lists.
- .5 Each user account and distribution list shall be capable of being configurable for the specific type of events to be received. Each account shall be configurable to receive notification upon any combination of the following types of events:
 - .1 Fire Alarm,
 - .2 Priority 2,
 - .3 Supervisory,
 - .4 Trouble,
 - .5 Custom Action Messages,
 - .6 Fire Panel Internet Interface Security Violations
- .6 Each user account and distribution list shall be capable of being configurable for the specific content to be received. Each account shall be configurable to receive any combination of the following message content:
 - .1 Summary,
 - .2 Event Information,
 - .3 Message,
 - .4 Emergency Contacts,
 - .5 Host Fire Alarm Control Panel Information
- .7 Each user account and distribution list shall be capable of being configurable for the type of Fire Alarm Control Panel Logs and Reports to be received. Each account shall be configurable to receive any combination of the following Logs and Reports via email:
 - .1 Alarm Log,
 - .2 Trouble Log,
 - .3 Analog Sensor Status Report,
 - .4 Analog Sensor Service Report,
 - .5 Almost Dirty, Dirty and Excessively Dirty Sensor Report,
 - .6 CO Analog Sensor Service Report,
 - .7 Addressable Appliance Candela Report,
 - .8 Addressable Appliance Status Report
- .8 Each user account and distribution list shall be capable of receiving email distribution of Fire Alarm Control Panel Logs and Reports On-Demand or automatically on a Pre-Determined schedule. Receipt of Logs and Reports shall be capable of being scheduled as follows:
 - .1 Weekly, or
 - .2 Bi-weekly, or
 - .3 Monthly
- .9 The Fire Alarm Control Panel Logs and Reports shall be sent in CSV file format which can be imported into common database applications for viewing, sorting, and customization.
 - .1 Each user account shall be capable of being configured to receive system events via email and/or SMS text messaging.
 - .2 Each distribution list shall be capable of supporting up to 20 email address recipients.

- .10 The means to provide email notification shall be compatible with SMTP mail servers, ISP email services, and Internet email services. Communication with the email server shall be verified at selectable intervals of 5 to 30 minutes.
 - .11 Email operation shall be capable of being disabled for service by the system administrator.
 - .12 An email log shall be accessible to authorized users. The email log shall display the 25 most recent email notifications sent.
 - .13 The fire panel internet interface for supplemental notification and remote user access shall support:
 - .1 Secure HTTPS/SSL encrypted connections,
 - .2 Up to 50 individual password protected user accounts,
 - .3 Dynamic and Static IP addressing,
 - .4 IP Address Blocking,
 - .5 Restricted number of log-in attempts before lock-out configurable from 1 to 20,
 - .6 Lock-out duration after unsuccessful log-in attempts configurable from 0 to 24 hours,
 - .7 Email notification to Administrators of unsuccessful log-in attempts,
 - .8 Automatic lock-out reset upon a new event,
 - .9 Automatic inactivity logout configurable from 10 minutes to 24 hours,
 - .10 Firmware updates over ethernet,
 - .11 Set-up and configuration via Local Service Port or via Remote Services over LAN/WAN connection
 - .14 Authorized users shall be capable of accessing the fire alarm panel using a compatible web browser (Internet Explorer 6.0 or higher) and a secure HTTPS/SSL encrypted connection.
 - .15 The fire panel internet interface shall support concurrent connections for up to 5 users plus 1 administrator.
 - .16 Authorized users with remote access shall be capable of:
 - .1 Viewing the fire panel internet interface web home page
 - .1 The fire panel internet interface home page shall display system status information and provide links to detailed status information and fire alarm panel reports and history logs
 - .2 The web browser on the user's computer shall automatically refresh system status information upon a new event
 - .1 Systems that require a manual refresh to acquire updated system status information shall not be accepted
 - .2 Viewing the fire alarm panel detailed card status information
 - .3 Viewing the fire alarm panel detailed point status information
 - .4 Viewing the fire alarm panel reports and history logs
 - .5 Viewing the fire panel internet interface email log
 - .6 Viewing system summary information
 - .7 Accessing Custom Hypertext Links
 - .17 The fire panel internet interface home page shall support customization to display the following information:
 - .1 Customer Name and Address,
 - .2 Fire Panel Location or Building Name,
 - .3 Up to 10 Custom Hypertext Links with Text Descriptions
- .8 Remote Services Access:

- .1 Fire Alarm Control Panel (FACP) shall have the capability to provide a remote service access feature using Ethernet and TCP/IP communications protocol compatible with IEEE Standard 802.3. The Remote Access feature shall provide automatic notification of system faults and remote diagnostics of system status for responding technicians prior to arrival on Site.
- .2 A standard RJ-45 Ethernet connection shall connect to The City's Ethernet network. Provisions for that connection must be provided at each fire alarm control panel as part of the contract.
- .3 The Ethernet access feature shall be agency listed for specific interfaces and for the purpose described in this section. The use of non-listed external third party interfaces is not acceptable.
- .4 The internet remote access service function shall provide automated real time off-Site reporting of discrete system events to a remote service support center with details of internal FACP fault conditions allowing a pre-site visit analysis of repair requirements.
- .5 Existing FACP controls shall be capable of retrofitting the Remote Service module as a plug-in upgrade feature.
- .6 The remote service network shall work on the customers Ethernet infrastructure and be Fire-Wall friendly for two-way communications for off-site reporting. The feature shall be compatible with existing proxy servers and firewalls shall not require any special changes or modifications.
- .7 The remote service system shall be able to connect to the remote service center without the need for a VPN account or similar tunnel.
- .8 The remote service system shall be a non Windows based application to protect against conventional virus attacks.
- .9 The remote service system shall support a secure connection with strong encryption, 128 bit or better, and an optional secondary encryption method if required.
- .10 The remote service system shall be compatible with virtual LANS (VLAN).
- .11 The remote service system shall work on an outbound communication premise (panel calls home) in order to eliminate the possibility of any inbound connection into the network (from trusted or non trusted sites).
- .12 The remote service system shall provide an audit trail of all events and service connections.
- .13 The Remote Service connection will provide access for panel software downloads and uploads for archiving job specific programs back at the enterprise server.
- .14 The supplier shall provide a service contract for the Remote Service program that provides the following requirements:
 - .1 24/7 recording of FACP service activity.
 - .2 Off-site diagnostics by a technical specialist to provide repair and parts guidance to the service technician prior to a site visit.
- .9 Required Functions: The following are required system functions and operating features:
 - .1 Priority of Signals: Fire alarm events have highest priority. Subsequent alarm events are queued in the order received and do not affect existing alarm conditions. Priority Two, Supervisory and Trouble events have second-, third-, and fourth-level priority, respectively. Signals of a higher-level priority take precedence over signals of lower priority even though the lower-priority condition occurred first. Annunciate all events regardless of priority or order received.
 - .2 Noninterfering: 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.

- .3 Transmission to an approved Supervising Station: Automatically route alarm, supervisory, and trouble signals to an approved supervising station service provider, under another contract.
- .4 Annunciation: Operation of alarm and supervisory initiating devices shall be annunciated at the FACP and the remote annunciator, indicating the type of device, the operational state of the device (i.e. alarm, trouble or supervisory) and shall display the custom label associated with the device.
- .5 Selective Alarm: A system alarm shall include:
 - .1 Indication of alarm condition at the FACP and the annunciator(s).
 - .2 Identification of the device /zone that is the source of the alarm at the FACP and the annunciator(s).
 - .3 Operation of audible and visible notification appliances until silenced at FACP.
 - .4 Selectively closing doors normally held open by magnetic door holders on the fire floor, floor above and floor below.
 - .5 Unlocking designated doors.
 - .6 Shutting down supply and return fans serving zone where alarm is initiated.
 - .7 Closing smoke dampers on system serving zone where alarm is initiated.
 - .8 Initiation of smoke control sequence.
 - .9 Transmission of signal to the supervising station.
 - .10 Initiation of elevator Phase I functions (recall, shunt trip, illumination of indicator in cab, etc.) in accordance with CSA standard B44, Safety Code for Elevators and Escalators, when specified detectors or sensors are activated, as appropriate.
- .6 Supervisory Operations: Upon activation of a supervisory device such as a fire pump power failure, low air pressure switch, and tamper switch, the system shall operate as follows:
 - .1 Activate the system supervisory service audible signal and illuminate the LED at the control unit and the remote annunciator.
 - .2 Pressing the Supervisory Acknowledge Key will silence the supervisory audible signal while maintaining the Supervisory LED "on" indicating off-normal condition.
 - .3 Record the event in the FACP historical log.
 - .4 Transmission of supervisory signal to the supervising station.
 - .5 Restoring the condition shall cause the Supervisory LED to clear and restore the system to normal.
- .7 Alarm Silencing: If the "Alarm Silence" button is pressed, all audible and visible alarm signals shall cease operation.
- .8 Priority Two Operations: Upon activation of a priority two condition such as , the system shall operate as follows:
 - .1 Activate the system priority two audible signal and illuminate the LED at the control unit and the remote annunciator.
 - .2 Pressing the Priority 2 Acknowledge Key will silence the audible signal while maintaining the Priority 2 LED "on" indicating off-normal condition.
 - .3 Record the event in the FACP historical log.
 - .4 Transmission of priority two signal to the supervising station.
 - .5 Restoring the condition shall cause the Priority 2 LED to clear and restore the system to normal.
- .9 System Reset

- .1 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 ("IN PROGRESS", "RESET COMPLETED") as they occur. The system shall verify all circuits or devices are restored prior to resetting the system to avoid the potential for re-alarmed the system. The display message shall indicate "ALARM PRESENT, SYSTEM RESET ABORTED."
- .2 Should an alarm condition continue, the system will remain in an alarmed state.
- .10 A manual evacuation (drill) switch shall be provided to operate the notification appliances without causing other control circuits to be activated.
- .11 WALKTEST: The system shall have the capacity of 8 programmable passcode protected one person testing groups, such that only a portion of the system need be disabled during testing. The actuation of the "enable one person test" program at the control unit shall activate the "One Person Testing" mode of the system as follows:
 - .1 The city circuit connection and any suppression release circuits shall be bypassed for the testing group.
 - .2 Control relay functions associated with one of the 8 testing groups shall be bypassed.
 - .3 The control unit shall indicate a trouble condition.
 - .4 The alarm activation of any initiating device in the testing group shall cause the audible notification appliances assigned only to that group to sound a code to identify the device or zone.
 - .5 The unit shall automatically reset itself after signaling is complete.
 - .6 Any opening of an initiating device or notification appliance circuit wiring shall cause the audible signals to sound for 4 seconds indicating the trouble condition.
- .12 Install Mode: The system shall provide the capability to group all non-verified points and devices into a single "Install Mode" trouble condition allowing an operator to clearly identify event activations from verified points and devices in occupied areas.
 - .1 It shall be possible to individually remove points from Install Mode as required for phased system verification.
 - .2 It shall be possible to retrieve an Install Mode report listing that includes a list of all points assigned to the Install Mode. Panels not having an install mode shall be reprogrammed to remove any non-verified points and devices.
- .10 Integrated Systems
 - .1 Security Integration
 - .1 The FA System shall provide the means to be integrated directly to a Software House C•Cure 9000 or 800 Security Management System (SMS) via a software interface for the purpose of communicating fire alarm events directly to the security system.
 - .2 Communication between the FA System and SMS shall be accomplished using Computer Port Protocol (CPP).
 - .1 The FA and the C•Cure SMS shall be connected via a local or network serial port server based RS-232 serial port connection.
 - .3 The CPP shall consist of a bi-directional serial protocol capable of accessing most of the Fire Alarm Control panel (FACP) diagnostic features.
 - .4 The interface shall provide the means to communicate the following information to the C•Cure SMS:
 - .1 Device/Point status changes (e.g., Fire, Trouble, Disabled)

- .2 Panel event status (e.g. Number of Unacknowledged Fire Alarms, Card Failure Troubles, etc.)
- .3 Panel health status (e.g., AC power, battery status)
- .5 Interface software shall include a data acquisition function that provides the following:
 - .1 Establishes and maintains a supervised serial link
 - .2 Extraction of the point database from the FACP
 - .3 Merges the FACP database into the C•Cure SMS database
- .6 The software interface shall not allow system control functionality from the C•Cure SMS to the FA System.
- .7 The installation, programming and maintenance of the FA/C•Cure integration software interface shall be conducted by factory trained certified technicians.
- .2 Building Automation and Control Network (BACnet) Integration
 - .1 The fire alarm control unit shall be capable of providing a one-way communications interface between the fire alarm control unit and an industry-standard Building Automation and Control Network (BACnet) using ASHRAE® BACnet® IP (internet protocol) compliant with ANSI/ASHRAE Standard 135.
 - .2 The BACnet communications module shall be agency listed to ULC Standard S527.
 - .3 The fire alarm control unit shall be capable of communicating up to 1000 status changes to the building automation system.
 - .4 MS/TP Master and MS/TP Slave data link layer options communicating at baud rates up to 76,800 bps shall be supported.
 - .5 The interface shall be capable of supporting ANSI X3.4, ISO 10656 (ICS-4), ISO 10656 (UCS-2), ISO 8859-1, or IBM/Microsoft DBCS character sets.
 - .6 A standard RJ-45 Ethernet connection to the Building Automation System Ethernet network shall be provided at the fire alarm control unit as part of the contract.
 - .7 Systems using relay interfaces shall not be accepted.
- .11 Analog Smoke Sensors:
 - .1 Monitoring: FACP shall individually monitor sensors for calibration, sensitivity, and alarm condition, and shall individually adjust for sensitivity. The control unit shall determine the condition of each sensor by comparing the sensor value to the stored values.
 - .2 Environmental Compensation: The FACP shall maintain a moving average of the sensor's smoke chamber value to automatically compensate for dust, dirt, and other conditions that could affect detection operations.
 - .3 Programmable Sensitivity: Photoelectric Smoke Sensors shall have 7 selectable sensitivity levels ranging from 0.2% to 3.7%, programmed and monitored from the FACP.
 - .4
 - .1 Reports shall be capable of being printed for annual recording and logging of the calibration maintenance schedule.
 - .2 Where required, reports shall be accessible remotely through:
 - .1 A Fire Panel Internet Interface using Ethernet and TCP/IP communications protocol compatible with IEEE Standard 802.3. The Fire Panel Internet Interface shall be capable of automatically scheduling email reports to individual user accounts on a weekly, bi-weekly, or monthly schedule.

- .2 A PC Annunciator using an RS232-C connection to the FACP or a PC Annunciator Client using a TCP/IP communications protocol connection to the PC Annunciator server compatible with IEEE Standard 802.3.
- .5 The FACP shall automatically indicate when an individual sensor needs cleaning. The system shall provide a means to automatically indicate when a sensor requires cleaning. When a sensor's average value reaches a predetermined value, (3) progressive levels of reporting are provided. The first level shall indicate if a sensor is close to a trouble reporting condition and will be indicated on the FACP as "ALMOST DIRTY." This condition provides a means to alert maintenance staff of a sensor approaching dirty without creating a trouble in the system. If this indicator is ignored and the second level is reached, a "DIRTY SENSOR" condition shall be indicated at the FACP and subsequently a system trouble is reported to the Supervising Station. The sensor base LED shall glow steady giving a visible indication at the sensor location. The "DIRTY SENSOR" condition shall not affect the sensitivity level required to alarm the sensor. If a "DIRTY SENSOR" is left unattended, and its average value increases to a third predetermined value, an "EXCESSIVELY DIRTY SENSOR" trouble condition shall be indicated at the control unit.
- .6 The FACP shall continuously perform an automatic self-test on each sensor that will check sensor electronics and ensure the accuracy of the values being transmitted. Any sensor that fails this test shall indicate a "SELF TEST ABNORMAL" trouble condition.
- .7 Multi-Sensors shall combine photoelectric smoke sensing and heat sensing technologies. An alarm shall be determined by either smoke detection, with selectable sensitivity from 0.2 to 3.7 %/ft obscuration; or heat detection, selectable as fixed temperature or fixed with selectable rate-of-rise; or based on an analysis of the combination of smoke and heat activity.
- .8 Programmable bases. It shall be possible to program relay and sounder bases to operate independently of their associated sensor.
- .9 Magnet test activation of smoke sensors shall be distinguished by its label and history log entry as being activated by a magnet.

2.2 CONVENTIONAL NOTIFICATION

.1 STANDARD ALARM NOTIFICATION APPLIANCES

- .1 Horn: Piezoelectric type horn shall be listed to UL 464. The horn shall have a minimum sound pressure level of 85 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.
- .2 Visible/Only: Strobe shall be listed to UL 1971. 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. 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 Visible/Only appliance.
- .3 Audible/Visible: Combination Audible/Visible (A/V) Notification Appliances shall be listed to UL 1971 and UL 464. 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 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.
- .4 Notification Appliance Circuit provides synchronization of strobes at a rate of 1Hz and operates horns with a Temporal Code Pattern operation. The circuit shall provide the capability to silence the audible signals, while the strobes continue to

flash, over a single pair of wires. The capability to synchronize multiple notification appliance circuits shall be provided.

- .5 Accessories: The Contractor shall furnish any necessary accessories.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 INSTALLATION

- .1 Install systems in accordance with CAN/ULC-S524
- .2 Install main control panel and connect to ac power supply.
- .3 Panel to be compatible with existing fire alarm system panel and interconnected as required to provide annunciation in both directions.
- .4 Locate and install manual alarm stations and connect to alarm circuit wiring.
- .5 Locate and install detectors and connect to alarm circuit wiring. Do not mount detectors within 1 m of air outlets. Maintain at least 600 mm radius clear space on ceiling, below and around detectors. Locate duct type detectors in straight portions of ducts.
- .6 Connect alarm circuits to main control panel.
- .7 Locate and install horn/strobes and connect to signalling circuits.
- .8 Connect signalling circuits to main control panel.
- .9 Install end-of-line devices at end of alarm and signalling circuits.
- .10 Install remote annunciator panel and connect to annunciator circuit wiring.
- .11 Locate and install door releasing devices.
- .12 Locate and install remote relay units to control fan shut down. Sprinkler system: wire alarm and supervisory switches and connect to control panel.

3.3 FIELD QUALITY CONTROL

- .1 Site Tests:
- .1 Perform tests in accordance with Section 26 05 01 - Common Work Results - for Electrical and CAN/ULC-S537.
- .2 Fire alarm system:
- .1 Test each device and alarm circuit to ensure manual stations, thermal and smoke detectors and sprinkler systems transmit alarm to control panel and general alarm.
- .2 Check annunciator panel to ensure zones are shown correctly.
- .3 Simulate grounds and breaks on alarm and signalling circuits to ensure proper operation of system.

- .4 Class B circuits.
 - .1 Test each conductor on circuits for capability of providing alarm signal on line side of single open-circuit fault condition imposed at electrically most remote device on circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.
 - .2 Test each conductor on circuits for capability of providing alarm signal during ground-fault condition imposed at electrically most remote device on circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.
 - .5 Audibility levels of alarm system to be confirmed post occupancy. A proper audiometric report shall be prepared with a calibrated instrument.
- .2 Manufacturer's Field Services:
- .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
 - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
 - .3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

3.4 TRAINING

- .1 Arrange and pay for on-site lectures and demonstrations by fire alarm equipment manufacturer to train operational personnel in use and maintenance of fire alarm system.
- .2 Provide the services of a factory-authorized service representative to demonstrate the system and train The City's maintenance personnel, custodian, etc. as follows;
 - .1 Train personnel in the procedures and schedules involved in operating, trouble shooting, servicing, and preventative maintenance of the system. Provide a minimum of 8 hours training.
 - .2 Schedule training with the Contract Administrator at least seven days in advance.
 - .3 Provide a type-written instruction sheet in point form indicating simple steps to accessing the system, re-setting & bypassing devices via by-pass switches & individual devices.

END OF SECTION