

## **1 GENERAL**

### **1.1 RELATED WORK**

- .1 General provisions of Contract, including General and Supplementary Conditions and Division 1 Specifications.
- .2 The requirements of this section apply to Fire and Life Safety Systems specified elsewhere in the specification: Coordinate with Mechanical Divisions for interface to mechanical systems.
- .3 Replace the existing Conventional Fire Alarm system and Fire Alarm devices with a new Conventional Fire Alarm system, including but not limited to the fire alarm controllers, remote annunciator panels, initiating devices, signalling devices, etc.
- .4 Replace all existing signalling devices with horn/strobe type devices.
- .5 Refer to attached existing building Fire Alarm VI report for existing fire Alarm device quantities and locations.
- .6 Provide annunciator panel at Logan Ave entrance
- .7 Provide new CO detection zone

### **1.2 REFERENCES**

- .1 CAN/ULC-S524-06 Installation of Fire Alarm Systems.
- .2 ULC-S525 Audible Signal Appliances, Fire Alarm.
- .3 CAN/ULC-S527 Control Units, Fire Alarm.
- .4 CAN/ULC-S528 Manual Pull Stations, Fire Alarm.
- .5 CAN/ULC-S529 Smoke Detectors, Fire Alarm.
- .6 CAN/ULC-S530 Heat Actuated Fire Detectors, Fire Alarm.
- .7 CAN/ULC-S531 Smoke Alarms.
- .8 CAN/ULC-S536 Inspection and Testing of Fire Alarm Systems.
- .9 CAN/ULC-S537 Verification of Fire Alarm Systems.
- .10 CAN/ULC-S561 Installation and Services for Fire Signal Receiving Centre and

Systems.

- .11 NBC- National Building Code of Canada.
- .12 Manitoba Building Code

### **1.3 DESCRIPTION OF SYSTEM**

- .1 Included in this work:
  - .1 8 zone control panel to carry out fire alarm and protection functions including receiving alarm signals, actuating zone annunciators, initiating alarm, supervising system continuously, performing fire control functions, and initiating trouble signals.
  - .2 Periodic 24 hour automatic background test.
  - .3 Intelligent environmental compensation.
  - .4 History logging system.
  - .5 System degrade operation.
  - .6 Trouble signal devices.
  - .7 Power supply facilities.
  - .8 Manual alarm stations.
  - .9 Automatic alarm initiating devices.
  - .10 Audible signal devices.
  - .11 End of line devices.
  - .12 Visual alarm signal devices.
  - .13 Standby batteries.
  - .14 Auxiliary control.

### **1.4 REQUIREMENTS OF REGULATORY AGENCIES**

- .1 System:

- .1 Subject to approval by local authority having jurisdiction.

## **1.5 SHOP DRAWINGS**

- .1 Submittal to include:
  - .1 Data sheets on all equipment used.
  - .2 Sequence of operation.
  - .3 Layout of equipment.
  - .4 Zoning.
  - .5 Component wiring diagrams.
  - .6 One line riser diagram showing all equipment and size, type and number of all required conductors.

## **1.6 CITY OF WINNIPEG'S MANUAL**

- .1 Provide 3 copies of as-built City Of Winnipeg's manual including the following:
  - .1 System sequence of operation.
  - .2 Operation instructions.
  - .3 Approved data sheets of all the equipment components.
  - .4 As built riser diagram.
  - .5 Hard copy of final system programming including logic functions.
  - .6 Verification report on CFAA forms as filled by CFAA certified technician.

## **1.7 MAINTENANCE**

- .1 Provide one year's free maintenance with two inspections by the manufacturer's CFAA certified technicians during the year. Inspection tests to conform to CAN/ULC-S536.

## **1.8 TRAINING**

- .1 Provide 10 hours of on site lecture and demonstration by fire alarm manufacturer

to train operational personnel in the use and maintenance of the fire alarm system.

## **1.9 SEQUENCE OF OPERATION**

- .1 Single Stage Operation: Operation of any alarm initiating device to:
  - .1 Cause audible signal devices to sound throughout building continuously and visual signalling devices to operate.
  - .2 Transmit signal to fire department or central station.
  - .3 Cause zone of alarm device to indicate on local LCD display, remote LCD display and logging printer including time, date and device type as well as all resulting automatic events.
  - .4 Cause air conditioning and ventilating fans to shut down or to function so as to provide required control of smoke movement.
  - .5 Cause fire doors and smoke control doors, if normally held open to close automatically.

## **2 PRODUCTS**

### **2.1 MATERIALS**

- .1 The system and components must be supplied by one manufacturer of established reputation and experience who must have produced similar apparatus for a period of at least five (5) years and who must be able to refer to similar installations rendering satisfactory service. All references to model numbers and other pertinent information herein is intended to establish minimum standards of performance, quality and construction, and is based upon equipment designed and manufactured by Cerberus Pyrotronics.
- .2 Any equipment proposed as equal to that specified herein must conform to the standards herein. In addition, the contractor must obtain the Contract Administrator's or City Of Winnipeg's approval in writing ten (10) working days prior to bidding other than as specified.
- .3 The manufacturer's name, model numbers, and three copies of working drawings and engineering data sheets shall be submitted for approval along with a cross reference listing, item by item, of the specification for compliance.
- .4 Approval of other manufacturer's does not relieve the contractor from meeting the specification requirements.

- .5 Acceptable manufacturers: Simplex, Edwards, Notifier, Mircom (by Fire-Tech) or approved equal.
- .6 Approved manufacturers shall have in their employ factory trained employees for all sales, installation, programming, testing, verification, inspection, service, etc. Fire alarm manufacturers using outside agencies or distributors for these functions will not be accepted.

## **2.2 SYSTEM DESCRIPTION**

- .1 The control panel shall be modular in construction with multi tasking microprocessor-based technology, distributed processing, and include a watchdog circuit per individual module processor to monitor the proper operation of every system processor. Systems with one watchdog circuit for all the modules are not considered equal. All components must be housed in an approved enclosure, behind a cylinder locked, removable hinge door with a viewing window. Opening of the panel door must not expose live components or wiring. The door must be easily removable without tools to prevent any obstruction to the operator during fire alarm management procedures or during system maintenance procedures.
- .2 The base system board must provide 8 conventional zones and minimum of 4 signal circuits of 1.5 A each, one alarm relay, one trouble relay, one programmable relay, a communication network port, an alphanumeric LCD annunciator driver port, an auxiliary power limited 24 VDC supply, a communication active LED, a programming port, a digitally controlled battery supervision circuit and charger.
- .3 The system must be fully field programmable. Perform any required logical sequence for fan and damper control. Provide 20 software timers accurate to one second for any required timing functions. The timers may be individually programmed from one second to four hours.
- .4 The system software must fully integrate all of the system functions including annunciation, alarm management sequence, fan and damper control.
- .5 The control panel shall have a two line by forty character backlit supertwist (for any required viewing angle) alphanumeric LCD display.
- .6 Detection line circuit monitoring shall be provided by a Conventional Zone Module Model. Each circuit shall be capable of Class "A" or Class "B" wiring. Each zone shall accommodate up to thirty (30) ionization or photoelectric detectors, flame and beam detectors, as well as any quantity of shorting type contact devices.
- .7 An output circuit for operation of DC audible devices, or city tie, shall be

provided by Controllable Signal Module Model. This module shall be capable of operating with either Class "A" or Class "B" wiring, and shall be operable by the control panel. The module shall be supervised by the control unit for open and shorted circuits. Open and short circuits shall report trouble only and respond with circuit identification. The module shall contain two (2) programmable open collector outputs capable of sourcing 250 ma at 40 VDC for relay or LED activation.

- .8 For control of air handling units and elevators there shall be provided a Controllable Relay Module Model. The module shall be operable by the control unit. It shall contain four independent relays, fitted with form "C" contacts, rated at 2 amps 28VDC/120 VAC resistive. All relays shall be supervised for coil open or shorted conditions.
- .9 The system shall require no manual input to initialize in the event of a complete power down condition. It shall return to an on line state as an operating system performing all programmed functions upon power restoration. Systems requiring battery backed-up memory devices shall not be acceptable.
- .10 Selectable history event logging up to 800 events, shall be stored in flash memory and displayed, printed or downloaded by classification for selective event reports.
- .11 The system shall support intelligent analog smoke detection, conventional smoke detection, manual station, water flow, supervisory, security, and status monitoring devices. The system shall also support amplifiers, voice/visual circuits, and a firefighter's telephone system.
- .12 The panel must be capable of measuring the sensitivity of connected intelligent analog ionization and photoelectric smoke detectors.
  - .1 The measurements shall be discrete voltage readings, accurate to .01 VDC. The readings shall be dynamic, providing a constant display of voltage shifts when in the sensitivity voltage list mode.
  - .2 The control panel shall provide a display and a printed list of these sensitivity measurements as a permanent record of the required sensitivity testing.
  - .3 When programmed, any system connected, ionization or light refraction style smoke detector shall be capable of automatic sensitivity drift compensation up or down. This adjustment shall keep the relationship between the sensing chamber voltage and the programmed alarm threshold voltage constant throughout the life of the detector to prevent false indications or failure to alarm in the presence of smoke.

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- .4 The control panel shall place each detector in the system in an alarm condition, transparent to the system user, every twenty four hours as a dynamic check of the accuracy of the alarm threshold setting. Upon reception of the alarm report, the system detector shall be restored to its pretest state.
  - .5 The system shall be capable of monitoring the state of detectors and display a message when a detector is approaching the limits of adjustment as a result of contaminants. A second message shall be displayed when the detector reaches the limits of adjustment due to these contaminants.
  - .6 The system shall be capable of recognizing that a detector has been cleaned, initiating a series of tests to determine if the cleaning was successful and display a detector cleaned message, readjusting that detectors normal sensitivity setting reference.
- .13 The system shall recognize initiating of an alarm and indicate the alarm condition in a degrade mode of operation, in the event of processor failure or the loss of system communications to the circuit interface panels.
    - .1 Each circuit interface panel shall be capable of operation in its own degrade mode. In this mode, the system shall receive an alarm from any intelligent analog or conventional initiating device. It shall activate local indicating appliances and remote or auxiliary connect circuits.
    - .2 The system shall indicate a trouble condition during degrade mode operation and shall give a visual indication of an alarm condition.
    - .3 Detector operation in the degrade mode shall continue at the alarm threshold previously programmed. Systems returning detectors to a common default value in degrade mode shall not be acceptable.
  - .14 The system shall be capable of reporting alarms from devices whether programmed or not. Alarm reports from these devices shall activate indicating appliance circuits.
  - .15 The system shall perform time based control functions including automatic changes of specified smoke detector sensitivity settings.
    - .1 Time based functions shall be controlled by specifying time periods or actual dates. It also shall provide the ability to control these functions on an exception basis using a holiday schedule.
  - .16 The system shall provide a one person field test of either the complete system or a specified area, maintaining full function of areas not under test.

- .1 Field test shall be usable in a silent or audible mode. When in the audible mode, the signals shall audibly annunciate alarms, troubles and device types.
- .2 All field test activity shall be logged to the system printer and historical memory.
- .17 The system shall be provided with eight levels of password protection with up to forty passwords.
- .18 Provide a cost savings software verification Compare program. The program shall instruct the technician as to what software changes have been made from one software revision to another and what points require verification and be ULC approved.
- .19 The system must be capable of reading and displaying at the control panel the sensitivity of remote intelligent/analog ionization and photoelectric detection devices. Individual intelligent/analog detection device alarm threshold must be adjustable from the control panel.
- .20 The detection system must remain 100% operational and capable of responding to an alarm condition while in either routine operator maintenance mode or during programming by the manufacturer.
- .21 Dynamic supervision of system electronics, wiring, detection devices and software must be provided by the control system. Failure of system hardware or wiring must be indicated by type and location on the alphanumeric display.
- .22 The control mode must permit the arming and disarming of individual detection or output devices. Status of these devices must be displayed upon command from the control panel
- .23 The address, type of device and sensitivity setting of each addressable device must be field settable by a simple programming device and stored in the addressable device in non-volatile memory. Loss of both A/C power and batteries in the control panel will not affect the system device programming.
- .24 The system must be programmed in the field only via laptop computer. Burning of EPROMs is not acceptable. System programming must be password protected. The final system program must be available on hard copy and included in the City Of Winnipeg's manuals.
- .25 The printer and/or alphanumeric display must be capable of listing upon request:

- .1 Alarms and troubles with time, date and location.
- .2 Status of output functions.
- .3 Sensitivity of intelligent /analog smoke detectors.
- .4 Detection device number, type and location.
- .5 Status of remote relays.
- .6 Acknowledgement time and date.
- .7 Signal silence time and date.
- .8 Reset time and date.
- .9 Battery voltage, A/C voltage and battery charge current.
- .26 The system must be capable of:
  - .1 Counting the number of intelligent/analog devices within a "zone" which are in alarm.
  - .2 Counting "zones" which are in alarm.
  - .3 Counting the number of intelligent/analog detectors which are in alarm on the system.
  - .4 Differentiating among types of intelligent/analog detectors such as smoke detectors, manual stations, water-flow switches, thermal detectors, cross zoning, etc.

## **2.3 POWER SUPPLY**

- .1 120 VAC, 60 Hz input, 24 VDC output standby power from gel cell batteries sized as per NBC-95 requirements.
- .2 System to include system power supplies, including necessary transformers rectifiers, regulators, filters and surge protection required for system operation, with the capacity to power the system in a worst case condition with all devices in alarm and all local indicating appliances active without exceeding the listed ratings. The system devices shall display normal and alarm conditions consistently whether operating from normal power or reserve (standby) power.

## **2.4 DEVICES**

- .1 Manual alarm stations must be pull down lever, semi-flush or surface type, bilingual single stage addressable.
- .2 Automatic Detectors - General:
  - .1 All intelligent/analog and non-addressable ionization/photoelectric smoke detectors, thermal detectors and pull stations, remote zone module and programmable remote relays must be capable of being intermixed on the same addressable loop. All intelligent/analog detectors must be individually identifiable from the control panel and must be capable of being selected for environmental compensation via software. Non-addressable detectors must be identifiable by zone.
  - .2 All addressable and non-addressable ionization smoke detectors, photoelectric smoke detectors and rate of compensation thermal detectors must mount in a plug-in, twist-lock base with screw terminals for field wiring. Pig-tails or in-line connectors must not be permitted. A concealed locking mechanism requiring a special unlocking tool must be available to prevent unauthorized removal.
  - .3 All intelligent/analog devices must be electronically programmed on site during installation. No mechanical means such as dipswitches, rotary dials or programming pins shall be used. All of the programmed information shall be capable of display, printout and modification from the control panel.
  - .4 Remote relays located on detector bases or double gang outlets throughout the building must be controlled in the same manner as panel mounted relays and must not require a separate address.
- .3 Heat detectors:
  - .1 Fixed temperature non restorable.
  - .2 Provide rate of compensation addressable type heat detectors which mount in same bases as smoke detectors. Each to have an alarm indicating light.
- .4 Smoke detectors:
  - .1 The intelligent/analog ionization smoke detector must contain two ionization chambers and solid state alarm indicator alarm lamp. The reference chamber must compensate against sensitivity changes due to changes in environmental temperature, humidity and barometric pressure. Each must contain its own microcomputer capable of storing all of the devices programmed information provide discreet sensitivity and

transmitting same in digital format to the control panel.

- .2 It must be possible to furnish the intelligent detectors with a relay base whose relay may be made to follow the activation of the detector or may be programmed to follow any system function desired. The use of the relay base must not reduce the number of available addresses on the addressable loop.
- .5 Duct Mounted Smoke Detectors:
  - .1 The air duct detector must operate on a cross-sectional air sampling principle to overcome stratification and the skin effect. The air duct detector must consist of a standard intelligent/analog or non-addressable detector mounted in an air duct sampling assembly and sampling tube that protrudes across the duct of the ventilating system.
- .6 Intelligent Interface Modules:
  - .1 Provide intelligent interface modules incorporating a custom microprocessor based integrated circuit for connection of normally open or normally closed contact type devices such as water flow switches, tamper switches and OS and Y valves. Provide one for “flow” and one for “supervisory” for each sprinkler zone, confirm with sprinkler supplier.
- .7 Audible/Visual Signalling:
  - .1 Bells (where applicable): polarized 24 VDC, flush or surface mounted, 250 mm, with integrated strobe lights. Strobe light shall be 110cd minimum.
  - .2 Horn (where applicable): polarized 24 VDC, flush or surface mounted, with integrated strobe lights. Strobe light shall be 110cd minimum.
- .8 End of Line Devices:
  - .1 Provide high impact plastic red end of line plates with screw terminations as required for all conventional circuits.

### **3 EXECUTION**

#### **3.1 INSTALLATION**

- .1 Install systems in accordance with CAN/ULC-S524-06 and according to the manufacturer's requirements.

- .2 Install main control panel(s) and connect to AC emergency power supply.
- .3 Locate and install manual alarm stations and connect to alarm circuit wiring.
- .4 Locate and install detectors and connect to alarm circuit wiring. Do not mount detectors within 1m radius of air outlets. Maintain at least 600mm radius clear space on ceiling, below and around detectors. Locate duct type detectors in straight portions of ducts.
- .5 Connect alarm circuits to main control panel.
- .6 Locate and install signal and/or visual signal devices and connect to signalling circuits. Alternate circuits for adjacent audible devices.
- .7 Connect signalling circuits to main control panel.
- .8 Install end-of-line devices.
- .9 Install remote annunciator panel(s) and connect to annunciator circuit wiring.
- .10 Locate and install door releasing devices.
- .11 Locate and install remote relay units to control fan shutdown.
- .12 Connect sprinkler system alarm and supervisory switches to control panel.
- .13 Arrange for and make connection for Central Reporting tie-in through. Local Tel lines. The interconnection wiring from the fire alarm control unit/transponder to the fire signal receiving centre shall comply with CAN/ULC-S561 and CAN/ULC-S524-06.

### **3.2 FIELD QUALITY**

- .1 The manufacturer or his authorized representative must perform tests in accordance with CAN/ULC-S537.
- .2 The verifying technician must bear approval of CFAA (Canadian Fire Alarm Association).
- .3 Provide a complete verification report on CFAA forms.

**END OF SECTION**

### FIRE ALARM VERIFICATION

The following document shall be dated, signed and forwarded to Tower Engineering by E.C. and G.C. upon final completion and verification of installed, fully operational Fire Alarm system as outlined in drawings and electrical specifications (including verifications/reports/certificate noted below).

This **Fire Alarm Verification** document must be submitted to Tower Engineering **PRIOR** to submitting request for 'Substantial Completion'.

Company Name: _____ Date: _____ (Electrical Contractor)
Printed Name: _____ Signature: _____ I hereby verify that the fire alarm system as noted above is complete and has been verified on above noted date.
Attach copy of fire alarm ' <b>VI Inspection Report</b> ' (including actual water flow test, fan shutdown and central reporting) and fire alarm ' <b>certificate</b> ' from fire alarm manufacturer.

Company Name: _____ Date: _____ (General Contractor)
Printed Name: _____ Signature: _____ I hereby verify that the fire alarm system as noted above is complete and has been verified on above noted date.

Witnessing Engineer _____ Date: _____ (Firm name)
Printed Name: _____ Signature: _____ I hereby verify that the fire alarm system as noted above is complete and has been verified on above noted date. Attach copy of sealed ' <b>Witnessing Engineer's Verification Report</b> '

Tower Consultant (Representative to sign at time of witnessing) _____ Date: _____
Printed Name: _____ Signature: _____ I hereby verify that the fire alarm system as noted above is complete and has been verified on above noted date.

The above does not constitute a waiver of any of the contract document requirements.