Part 1 General

1.1 SUMMARY

.1 The existing fire alarm system is a Notifier Fire Alarm System. Electrical Contractor shall ensure that all new fire alarm devices that will be installed in the building additions/extensions shall be compatible with the existing fire alarm system.

.2 This Section covers fire alarm systems, including initiating devices, controls, ancillary devices and supervisory devices.

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

.4 The fire alarm system shall consist of all necessary hardware equipment and software programming to perform the following functions:

.1 Fire alarm and detection operations

.2 Control and monitoring of door release devices, and other equipment as indicated in the drawings and specifications.

1.2 RELATED WORK SPECIFIED IN OTHER SECTIONS

.1	Common Work Results	Section 26 05 00
.2	Wires and Cables (0 – 1000V)	Section 26 05 21

1.3 REGULATORY REQUIREMENTS

.1 Installation subject to approval, inspection and test of Departmental Representative and Fire Marshall for final acceptance.

.2 All equipment shall be listed by Canadian Standards Association or nationally recognized fire test laboratory, compatible to form an integrated fire alarm system.

.3 System to be provided and installed in accordance with CSA Standard CAN/ULC4-S524-06.

1.4 MANUFACTURER

.1 Acceptable manufacturer as listed:

.1 Notifier.

.2 Being listed as an acceptable manufacturer in no way relieves obligations to provide all equipment and features in accordance with these specifications.

.3 It shall be the company's responsibility, providing the quotation, to ensure that the product manufacturers provide to the Departmental Representative in writing prior to 10 days of bid closing, that their products meet specifications. Written confirmation to be fully itemized line by line list for every aspect of all equipment. A copy of the manufactures brochures will not be accepted.

.4 The Manufacturer shall be a nationally recognized company specializing in fire alarm and detection systems. This organization shall employ factory trained and CFAA (Canadian Fire Alarm Association) certified technicians, and shall maintain a service organization within 250 kilometres of this project location. The Manufacturer and service organization shall have a minimum of 10 years experience in the fire protective signalling systems industry.

1.5 SUBMITTALS

.1 General: Submit the following according the conditions of the contract and Division 01 Specification Sections.

.1 Product data sheets for system components highlighted to indicated the specific products, features, or functions to meet this specification. Alternate or as-equal products submitted under this contract must provide line-by-line comparison of how the submitted product meets, exceeds or does not comply with this specification.

.2 Wiring diagrams from the manufacturer.

.3 Shop drawings showing system details including location of Control panels, all devices, circuiting and details of the graphic annunciator.

.4 System operation description including method of operation and supervision of 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 IDC, NAC, Relay, Sensor, and auxiliary control circuits.

.5 Operation and maintenance data for inclusion in the Operating and Maintenance Manual. Include data for each type product, including all features and operating sequences, both automatic and manual. Provide the names, addresses, and telephone numbers of service organizations.

.6 Product certification signed by the manufacturer of the fire alarm system components certifying that their products comply with indicated requirements.

.7 Record of field tests of system in compliance with CAN/ULC-S537-04.

.2 Submission to the 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.

1.6 WARRANTY

.1 The Fire Alarm / Life Safety system manufacturer shall supply a one (1) year warranty from date of verification for all control system, field devices, and appliances.

.2 The contractor shall warrant the installed devices to be free from defects of material and installation for a period of one (1) year from acceptance by the Departmental Representative. Any deficiencies shall be immediately corrected at no additional cost to the Departmental Representative.

Part 2 Products

2.1 MATERIALS

.1 Materials and devices shall be supplied by a single manufacturer and shall be ULC listed as follows:

.1	Manual Fire Alarm Stations	CAN/ULC S528-08
.2	Smoke Detectors	CAN/ULC S529-02

2.2 SYSTEM OPERATION

.1 Actuation of any alarm initiating device to:

.1 Indicate zone of alarm at central control unit and at remote annunciators.

.2 Cause audible signalling devices to sound in alarm tone throughout the building.

.2 Actuation of any supervisory device to:

.1 Cause electronic latch to lock-in supervisory state at central control unit and data gathering panel/transponder.

.2 Indicate respective supervisory zone at central control unit and remote annunciator.

.3 Cause audible signal at central control unit to sound.

.4 Activate common supervisory sequence.

.3 Resetting alarm and/or supervisory device not to return system indications/functions back to normal until control unit is reset.

.4 Trouble on system to:

.1 Indicate circuit in trouble at central control unit.

.2 Activate "system trouble" indication, buzzer and common trouble sequence. Acknowledging trouble condition to silence audible indication; visual indication to remain until trouble is cleared and system is back to normal.

.5 Troubles on system: suppressed during course of alarm.

.6 Trouble condition on any circuit in system not to initiate alarm conditions.

2.3 INITIATING/ INPUT CIRCUITS

.1 Receiving circuits for alarm initiating devices such as manual pull stations, smoke detectors, heat detectors and water flow switches, wired in DCLA configuration to associated control panel.

.2 Alarm receiving circuits (active and spare): compatible with smoke detectors and open contact devices.

.3 Actuation of alarm initiating device: cause system to operate as specified in "System Operation".

.4 Actuation of supervisory initiating device: cause system to operate as specified in "System Operation".

.5 Input circuits to have isolation built in for panel protection. Systems that do not have circuit isolation shall be provided with panel mounted isolators as required.

2.4 AUXILIARY CIRCUITS

.1 Auxiliary contacts for control functions.

.2 Alarm on system to cause operation of programmed auxiliary output circuits.

.3 Upon resetting system, auxiliary contacts to return to normal or to operate as pre-programmed.

.4 Auxiliary circuits: rated at 2 A, 24 Vdc or 120 Vac, fuse-protected.

.5 Auxiliary circuits to be compatible with existing fire alarm system.

2.5 MANUAL ALARM STATIONS

.1 Addressable manual pull station to be compatible with existing fire alarm system.

.1 Pull lever, break glass rod, surface or semi-flush wall mounted type, single action, 2 stage, electronics to communicate station's status to addressable module/transponder over 2 wires and to supply power to station. Station address to be set on station in field.

2.6 AUTOMATIC ALARM INITIATING DEVICES

.1 Addressable variable-sensitivity smoke detectors to be compatible with existing fire alarm system.

.1 Photo-electric type.

.2 Electronics to communicate detector's status to addressable module/transponder.

.3 Detector address to be set on detector in field or by automatic electronic addressing.

.4 The detector or base shall contain an LED to provide indication of communication to the control unit. The LED shall provide indication of alarm condition.

.5 Sensitivity settings: 3 settings, determined and operated by control panel. No shifting in detector sensitivity due to atmospheric conditions (dust, dirt) within certain parameters.

.6 Ability to annunciate minimum of 2 levels of detector contamination automatically with trouble condition at control panel.

.7 Each detector shall be scanned by the Control unit for its type identification to prevent inadvertent substitution of another type of sensor. Upon detection of a "wrong device", the control unit shall operation with the installed unit's inherent settings for that type of unit, but shall indicate a trouble condition shall be logged on the system.

2.7 BASES

.1 Standard base to mount on either octagon box or 4x4 square box. Provide trim ring or adapter plate for all detectors.

.2 Relay output, sounder and isolator bases shall be supported alternatives to the standard base.

.1 Relay bases shall provide a form 'C' contract rated at 1A 30VDC.

.2 Sounder base to provide 82 dBA at 3m. 24Vdc powered from steady external source.

.3 Isolator base shall provide loop protection from short circuit conditions. Isolator base when used with detector shall only use one address.

2.8 INPUT MODULES

.1 Addressable input module complete with a supervised Class "B" input circuit to monitor non-addressable contact devices. Module to include a polling LED and an alarm LED, and shall be compatible with existing fire alarm system.

.2 Addressable input module complete with two supervised Class "B" input circuit to monitor non-addressable contact devices. Module to include a polling LED and an alarm LED.

.3 Input modules to wire to end-of-line resistor located after the contact device.

2.9 RELAY MODULES

.1 Addressable relay complete with a form “C” dry relay contact rated 0.5 amps at 120 Vac or 2A at 24Vdc. Module to include a polling LED, an alarm LED, and shall be compatible with existing fire alarm system.

2.10 ISOLATOR MODULES (AS REQUIRED)

.1 Line isolator module. Module to isolate short circuits within floor areas not exceeding 2,000 square metres and between floors, so that a fault within one floor area shall not affect another floor area. At least one isolator module shall be provided for each protected zone of the building.

.2 The use of isolation modules shall not severely limit the input circuit quantity of detectors or modules, and shall not have a limitation of the number of detectors between isolators. The use of additional isolators to add quantity of detectors onto the loop will not be allowed.

.3 Isolators shall be provided for minimum of each floor area / fire zone as required by ULC S524-06.

.4 Isolator modules to be compatible with existing fire alarm system.

2.11 END OF LINE RESISTORS (AS REQUIRED)

.1 End-of-line devices to control supervisory current in alarm circuits and signalling circuits, sized to ensure correct supervisory current for each circuit, and shall be compatible with existing fire alarm system. Open, short or ground fault in any circuit will alter supervisory current in that circuit, producing audible and visible alarm at main control panel and remotely as indicated.

Part 3 Execution

3.1 PROGRAMMING

.1 All necessary re-programming to the existing fire alarm system shall be performed in this Contract.

.2 All field re-programming to be stored in a non-volatile memory.

.3 Final system programming shall be performed during the construction period.

.4 The system shall be fully programmed and operational prior to the commencement of the verification inspection.

3.2 INSTALLATION

.1 All fire alarm wiring shall be installed in approved raceways.

.2 End-of-line resistor for each box circuited to be mounted in separate box located not more than 2 m above finished floor beyond the last bell and strobe circuits.

.3 Mount fire alarm boxes at 1300 mm above finished floor to center of the manual pullstation.

.4 Detectors must be installed to have a clear space around the detector for 600 mm. This space is to extend below and around the detector as well as on the ceiling. Detectors must not be mounted closer than 600 mm to an outlet of any air distribution system.

.5 Provide the services of a factory trained and authorized technician to perform all system software modifications, upgrades or changes.

.6 Install fire alarm relays at the following locations:

.1 Where shown on the drawings.

.7 Provide high current relays where the load exceeds the rating of the addressable relays.

.8 Provide all hardware, software, programming tools and documentation necessary to modify the fire alarm system on site. Modification includes additional and detection devices, circuits, zones and changes to system operation and custom label changes for devices or zones. The system structure and software shall place no limit on the type or extent of software modifications on site. Modification of software shall not require power down of the system or loss of system fire protection while modifications are being made. All programming to be completed prior to final verification. Confirm all device addresses with User prior to initial programming.

3.3 CONDUIT

.1 Conduit shall be in accordance with the Canadian Electrical Code, Local and Provincial requirements.

.2 Where possible, all wiring shall be installed in conduit or raceway. Conduit fill shall not exceed 40% of interior cross sectional area where three or more cables are contained within a single conduit.

.3 Cable must be separated from any open conductors of power, or Class 1 circuits, and shall not be placed in any conduit junction box or raceway containing these conductors.

.4 Conduit shall not enter the fire alarm control panel, or any other remotely mounted control panel equipment or backboxes, except where conduit entry is specified by the FACP manufacturer.

3.4 WIRING

.1 Fire alarm conductor terminations in control panel and annunciator panel to be made on terminal strips with separate point for each conductor. All such strips to be number identified as schedule for in wiring diagrams attached to inside of door of control panel. Wiring to be neatly installed to all terminal strips and clipped with nylon cable straps or laced with jute cord. Termination of cabling to be set up in such a manner that sections of the system may be isolated or sorted out for servicing a trouble or fault.

.2 Wiring shall be in accordance with Local, Provincial and National Codes and as recommended by the manufacturer of the fire alarm system. Number and size of conductors shall be as recommended by fire alarm system manufacturer, but not less than 16 AWG for Indicating Device Circuits, and 12 AWG for Indicating Appliance Circuits.

.3 Wiring used for multiplex communication loop shall be twisted and shielded and installed in conduit unless specifically excepted by the fire alarm equipment manufacturer. The system shall permit use of IDC and IAC wiring in the same conduit with the communication loop.

.4 Attach wiring diagram to inside of panel door.

.5 All fire alarms system wiring shall be new.

.6 All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signalling system.

.7 All field wiring shall be completed supervised.

3.5 FIRE SYSTEMS INSPECTION

.1 Complete system programming. Multiple programming trips will be required during construction.

.2 Prior to requesting verification of the fire alarm system by the Departmental Representative, Electrical Contactor and the system manufacturer's technical staff shall:

.1 Inspect system to ensure that the fire alarm system is correctly installed, connected and fully operational in accordance with the requirements of the full contract documents and manufacturer's recommendations. This shall include all auxiliary equipment connected to fire alarm system such as sprinklers, door release devices, as follows:

.1 Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.

.2 Open initiating device circuits and verify that the trouble signal actuates.

.3 Open and short signalling line circuits and verify that the trouble signal actuates.

.4 Open and short indicating applicable circuits and verify that trouble signal actuates.

.5 Ground all circuits and verify response of trouble signals.

.6 Check presence and audibility of tone at all alarm notification devices.

.7 Check installation, supervision and operation of all intelligent smoke detectors using the Walk Test.

.8 Each of the alarm conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.

.9 When the system is equipped with operational features, the manufacturer's manual should be consulted to determine the proper testing procedures. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar.

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

.11 24 hour test on batteries.

.12 Ensure that operation and maintenance data has been submitted.

.13 Ensure that spare parts and maintenance materials have been delivered.

.3 Advise the Departmental Representative, in writing, that the above prerequisites have been fulfilled and list known exceptions in the form of a list of items to be completed or corrected, prior to proceeding with the verification.

.4 The Departmental Representative will proceed with the verification or advise Contractor that prerequisites are not adequately fulfilled.

3.6 FIRE ALARM VERIFICATION

.1 The direction of the procedure for the inspection, testing and completion of the reports for the verification of the fire alarm system shall be in accordance with ULC Standard CSA/ULC-S537-04 "Standard for Verification of Fire Alarm System Installation".

.2 Assist and cooperate with the Departmental Representative in the verification procedure. Fire alarm manufacturer shall provide the following:

.1 Velometer
.2 Artificial smoke
.3 Minimum of four portable communication devices
.4 Rate of rise heat detector tester

.3 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.
.3 Departmental Representative

.4 Disassemble and re-assemble system components.

.5 Disconnect and reconnect wiring.

.6 Perform required field adjustments.

.7 Repair defective work and replace defective components.

.8 Electrical Contractor to include in his base bid all costs for fire alarm system verification and any additional costs to change or alter operation or installation to meet intent of the specification or regulatory code.

.9 Multiple fire alarm verifications will be required during construction.

END OF SECTION