

1. GENERAL

1.1 Reference Standards

- .1 Underwriters Laboratories of Canada (ULC):
 - .1 CAN/ULC-S301-09, Standard for Signal Receiving Centre Burglar Alarm System and Operations.
 - .2 CAN/ULC-S302-M91(R1999), Standard for Installation and Classification of Burglar Alarm Systems for Financial and Commercial Premises, Safes and Vaults.
 - .3 CAN/ULC-S304-06, Signal Receiving Centre and Premise Burglar Alarm Control Units.
 - .4 CAN/ULC-S310-M91(R1999), Installation and Classification of Residential Burglar Alarm Systems.
 - .5 ULC-S318-96, Standard for Power Supplies for Burglar Alarm Systems.
 - .6 ULC-C634-86, Guide for the Investigation of Connectors and Switches for Use with Burglar Alarm Systems.

1.2 Submittals

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures Include an equipment list, and data sheets, system description and block diagrams on equipment to be furnished.
- .2 Include all data necessary to evaluate design, function, quality, and configuration of proposed equipment and system(s).
- .3 The installation price given by the Security Contractor is valid for reasonably changed quantities of equipment units.
- .4 Product Data:
 - .1 Submit Manufacturer's printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit:
 - .1 Functional description of equipment.
 - .2 Technical data sheets of all devices.
 - .3 Device location plans and cable lists.
 - .4 System interconnections detail drawings.
- .5 Shop Drawings and Datasheets:
 - .1 Submit shop drawings to indicate project layout, equipment locations, point-to-point diagrams, cable schematics, risers, mounting details and identification labeling scheme.
- .6 Certificates: submit certificates signed by the Manufacturer certifying that materials comply with specified performance characteristics and physical properties.

1.3 **Quality Assurance**

- .1 Quality Assurance: in accordance with Section 01 45 00– Quality Control.
- .2 Installation complies with all applicable codes.
- .3 All equipment is new, in current production, and the standard products of Manufacturers.
- .4 Manufacturers guarantee availability of parts, for a minimum of Seven (7) years from date of shipment.
- .5 If required, the Manufacturers are able to demonstrate features, functions and operating characteristics to the Departmental Representative.
- .6 Systems are installed by a factory authorized Security Contractor with technicians specifically trained.
- .7 Systems allow remote programming. Manufacturers have the ability to access and make changes to the system via IP connectivity.

1.4 **Delivery, Storage and Handling**

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect equipment from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

1.5 **Warranty**

- .1 Systems include a factory warranty certifying that equipment is free from defects in design, material, manufacturing and operation.
- .2 Installing Security Contractor will guarantee the equipment and installation for 24 months from date of acceptance.

2. PRODUCTS

2.1 Materials

.1 System description:

.1 The access control system must be supplied and complete with controllers, accessories, peripherals, software, licenses and all the necessary elements so that the entire system is complete and functional to meet the contractual documents and descriptions the requirements of the Departmental Representative.

.2 Controllers, input modules and output devices:

.1 Complete unit with box and backup power battery and "Networked Intelligent Controllers".

.2 Door module can control two (2) card readers complete with housing.

.3 The system will be able to manage the intrusion security system described in Section 28 31 00.

.4 The system will be able to manage also the video surveillance security system described in Section 28 23 00.

.3 Software and licenses:

.1 Provide and install the software and licenses required for the installation and deployment of the system access control including graphic interface.

.2 System software:

.1 The system software shall be a Microsoft™ Windows™ 32 or 64-bit multi-user application supporting server/client functionality. The security application software shall support database management, manual and timed control functionality, alarm and transaction monitoring and selective transaction and alarm reporting for single and multiple sites. Management of the system shall be accomplished from on-site LCD keypads, a single host PC or from multiple PCs across a LAN. The system software shall be capable of operating on computers running Windows Server 2003, Windows XP Professional, Windows Vista Business or Ultimate Edition, Windows 7 Professional 32 or 64 bit, and Windows Server 2008 Enterprise 32 or 64 bit.

.2 The general requirements shall include a user interface that:

.1 Incorporates a simple Windows explorer software architecture for accessing the different areas of the program. The system shall also provide the functionality required of an Access Control system and an intrusion system with complete integration of both application modules using a single software product.

.2 The user interface shall incorporate an active graphics module, allowing operators to view doors opening and closing, points changing state, and to perform manual commands such as lock doors, unlock doors, arm areas, disarm areas and bypass points.

- .3 System Architecture
 - .1 The system software shall have the flexibility of being configured to support a minimum of 10 controllers connected on a polled RS485 communication bus at a single site and a minimum of 10 site controllers connected on an RS485 communication bus at each remote site.
 - .2 Multi-user operation over a network shall be supported, and the system shall allow use of networked printer resources. The software shall be based upon a 32 or 64-bit multi-user, server/client architecture and run on the operating systems.
 - .3 A single account can consist of up to 10 controllers connected to multiple communications ports including a mix of RS485 and Ethernet. Each controller shall support a combination of 24 application modules connected to each controller using a polled RS485 communication bus. The application modules shall include at minimum:
 - .1 UL/ULC listed Alarm input/output application module.
 - .2 UL/ULC listed Access/Reader application module.
 - .3 UL/ULC listed fire alarm input application module.
 - .4 UL/ULC listed multilingual (English/French/Dutch/Spanish) LCD keypad application module used for programming, control, reporting, arming, disarming, access control and system maintenance.
 - .5 UL listed wireless RF application module.
- .4 Control Panel:
 - .1 Complete with push button or card reader to release and secure each door.
 - .2 Identify each door control function with lamp electronically identified on panel or associated display unit.
 - .3 Permanently label (paper labels are not acceptable) or electronically identified each door location on panel or associated display unit.
 - .4 Fully function within supplied electrical supervision circuits as specified.
- .5 Control Signal Standards:
 - .1 Input and Output Signal: 0.0 dBmV + 1.0 dBmV Level.
 - .2 Input and Output Signals: terminated on each control unit.
 - .3 Input and Output Impedance: 120 Ohms, BAL.
 - .4 Channel Bandwidth:
 - .1 Data: 300 Hz to 3.5 kHz (9.6 kilo bits per second rate).
 - .2 DC: 0.5 Hz to 100 Hz, + 5.0%, MIN.
 - .5 S/N Ratio: 60 dBmV + 1.0 dBmV.
- .6 Door controls items and panels:
 - .1 Include standard "off the shelf" equipment items to form a complete and operating door release system.
 - .2 Include: equipment cabinet, system power supply, door control panels, junction box, system connectors, and system cables.
- .7 Provide system cables including coaxial cable, multiconductor control cable, audio and AC power cable required.
- .8 Power supplies: to CAN/ULC-S318.
- .9 Connectors and switches: to ULC-C634.
- .10 The access control system is based on the AFx system distributed by Chubb Edwards.
- .11 Equivalent to acceptable product: Simplex, Notifier.

- .2 Basic System Criteria:
 - .1 Card readers:
 - .1 Outdoor/Indoor magnetic card reader for door control proximity card reader multiclass SE HID technology with transition, model RP40 approved for -35°C.
 - .2 Proximity technology.
 - .3 Fitted with LED indicator light.
 - .4 Reading distance 50 - 200 mm.
 - .5 Compatible with access card model.
 - .6 All cables and wiring between card reader and controller have to be shielded as recommendation of the manufacturer.
 - .2 Cards: key tag, plastic, credit-card size, sealed and highly resistant to normal handling and weather, fitted with vertical slot punched hole]
 - .1 Quantity of cards required: 75.
 - .2 Guaranteed for 5 years against all defects and protected against:
 - .1 Magnetic encoded cards.
 - .2 Metal objects including coins and keys.
 - .3 Retail shoplifting detection equipment.
 - .4 Communication equipment.
- .3 System Accessories:
 - .1 Magnetic contact for door
 - .1 Magnetic contact for door for monitoring, for open or closed loop, Aritech or Sentrol model 1078W-G or equivalent.
 - .2 Provide appropriate models for indoor doors.
 - .2 Power supplies:
 - .1 Continuous low-voltage operation output.
 - .2 Equipped with secondary protection for each output.
 - .3 Individual outputs for connection of devices.
 - .4 AC power failure output.
 - .5 DC power failure output and low battery output.
 - .6 Fitted with tamper contact.
 - .7 Wall mounted cabinet with locked door complete with 2 keys.
 - .8 Voltage: 12/24 volt DC.

3. EXECUTION

3.1 Installation

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for access control system installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 Installation: Security Access

- .1 Install security access systems and components in accordance with /ULC-S302 and ULC-S310.
- .2 Install components in accordance with manufacturer's written installation instructions to locations, heights and surfaces shown on reviewed shop drawings.
- .3 Install components secure to walls, ceilings or other substrates.
- .4 Install required boxes in inconspicuous accessible locations.
- .5 Conceal conduit and wiring.

3.3 Site Test and Inspection

- .1 Perform verification inspections and test in presence of Departmental Representative.
 - .1 Provide all necessary tools, ladders and equipment.
 - .2 Ensure appropriate subcontractor and manufacturer's representatives specialists in security are present for verification.
- .2 Pretesting procedure:
 - .1 Verify (utilizing an approved spectrum analyzer and test equipment) that system is fully operational and meets all system performance requirements of this specification.
 - .2 Measure and record, control (and/or voice) carrier levels of every system channel at each of following points in the system:
 - .1 Door located actuating devices.
 - .2 Door control panel functions.
 - .3 Electronic supervisory control units inputs and outputs.
 - .4 Distribution system input and output.
 - .5 Telephone system interface input and output.
 - .3 Submit to Departmental Representative 2 copies of recorded system pretest measurements, along with pretest certification.

- .3 Performance testing:
 - .1 Test procedure: perform test on a "go-no-go" basis.
 - .1 Make only operator adjustments required to show proof of performance.
 - .2 Test to demonstrate and verify that installed system complies with installation and technical requirements of this specification under operating conditions.
 - .3 Test results to be evaluated by Departmental Representative as either acceptable or unacceptable using following procedures.
 - .2 Documentation review:
 - .1 This review will determine if information provided is sufficient to meet requirements of this specification.
 - .2 Provide for review all System manuals, as installed drawings, pretest forms, antenna radiation patterns, equipment cabinet pictorials, antenna pictorial, antenna mount pictorial, video and audio equipment details.
 - .3 Mechanical inspection:
 - .1 Departmental Representative and Contractor to tour areas to insure that Systems and Subsystems are installed in place for proof of performance testing.
 - .2 Take system inventory at this time. Verify following items before beginning proof of performance tests:
 - .1 Electrical power circuits designated for system equipment are properly labeled, wired, phased, protected and grounded.
 - .2 Conductor ends are protected by heat shrink wrap; audio spade lugs, barrier strips and punch blocks are used.
 - .3 Dust, debris, solder splatter, etc. are cleaned and removed from site.
 - .4 Equipment is properly labelled.
 - .5 Equipment identified in system's equipment lists are in-place and properly installed.
 - .6 Each lightning and System ground method are installed in accordance with manufacturer's instructions and this specification.
- .4 Subsystem functional test:
 - .1 Conduct operational testing after review of documentation and mechanical inspection completed. Proceed as follows.
 - .1 Perform operational test of each Subsystem to verify that all equipment is properly connected, interfaced and is functionally operational to meet requirements of this specification.
 - .2 Control units:
 - .1 Take S/N readings from control unit's input and output in manual (and/or automatic) mode. Check output of DC/Data converter for S/N. Evaluate entire signal quality at baseband connector output of control unit and remote equipment.
 - .3 Audio:
 - .1 Take S/N readings from transmitter input and receiver output with equipment placed in manual gain mode. Check output of the audio converter, modulator or demodulator for S/N. Evaluate entire audio signal at baseband connector input and output of control unit.

- .4 Distribution (or interface) system:
 - .1 Check each door utilizing a volt/ohm (or signal level) meter to confirm each function and to insure that system meets all performance requirements.
 - .2 Test each interconnection point (i.e.: door unit, junction box "cross connection", control unit, etc.) to ensure compliance with this specification.
- .5 Total system test:
 - .1 Proceed with testing when system and subsystems are functionally tested and accepted. Total system tests to verify that requirements have been met for DC (and/or audio), sub carrier, and control signals in accordance with this specification.
- .6 Safety:
 - .1 Demonstrate with documentation that access control system meets safety requirements specified in UL 294.
- .5 Visual verification: objective is to assess quality of installation and assembly and overall appearance to ensure compliance with Contract Documents. Visual inspection to include:
 - .1 Sturdiness of equipment fastening.
 - .2 Non-existence of installation related damages.
 - .3 Compliance of device locations with reviewed shop drawings.
 - .4 Compatibility of equipment installation with physical environment.
 - .5 Inclusion of all accessories.
 - .6 Device and cabling identification.
 - .7 Application and location of ULC approval decals.
- .6 Technical verification: purpose to ensure that all systems and devices are properly installed and free of defects and damage. Technical verification includes:
 - .1 Validate sensitivity of readers and applicability and application of cards.
 - .2 Connecting joints and equipment fastening.
 - .3 Compliance with manufacturer's specification, product literature and installation instructions.
- .7 Operational verification: purpose to ensure that devices and systems' performance meet or exceed established functional requirements. Operational verification includes:
 - .1 Operation of each device individually and within its environment.
 - .2 Operation of each device in relation with programmable schedule and or/specific functions.

3.4 **Cleaning**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
 - .1 Remove protective coverings from accessories and components.
 - .2 Clean housings and system components, free from marks, packing tape, and finger prints, in accordance with manufacturer's written cleaning recommendations.
 - .3 Clean components free from dirt and fingerprints.
 - .4 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 Protection

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by access controls and equipment installation.

3.6 Training

- .1 The integrator is responsible for organizing and training session for at least two (2) days of formation, hands-on training on site, using the purchased and installed system. This training shall cover all aspects of system operation, management and troubleshooting. The cost of this training shall be included in the tender price. The date must be planned and coordinated with the Departmental Representative.

3.7 As built drawings

- .1 The integrator shall furnish such shop drawings and diagrams as are reasonably required to clarify the details of work included in this tender.
- .2 At the conclusion of the project, the Supplier shall provide one (1) set of "as built" drawings which indicate, for example, the location of all supplied equipment in the system, all electrical box identifications, and cable identifications as installed under the terms and conditions of the final contract.

3.8 Miscellaneous Hardware

- .1 Any miscellaneous hardware items, such as connectors, cable plugs, mounting brackets, not specified in this document but which are required to make up a fully operational system shall be provided by the Supplier as part of his tender.

3.9 Commissioning the System

- .1 The Supplier shall be responsible for verifying that each component of the system is fully operational and in conformity with the requirements specified within this document. He shall also be responsible for ensuring that all elements function together as a system in accordance with this document.
- .2 Commissioning shall be done in a phased manner as the installation of field equipment proceeds. It shall not be necessary for the computer to be installed and operational in order for commissioning of the system to begin. All field equipment shall be capable of being installed and programmed to operate in a stand-alone mode prior to installation of the computer.

End of Section

1. GENERAL**1.1 Reference Standards**

- .1 CAN/CSA-C22.2 No.65 Wire Connectors.
- .2 CAN/CSA-C22.2 No.18.1-13 Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware.
- .3 EEMAC 1Y-2 Bushing Stud Connectors and Aluminum Adapters.
- .4 Underwriters Laboratories of Canada (ULC)
 - .1 ULC-S317-1996, Installation and Classification of Closed Circuit Video Equipment (CCVC) Systems for Institutional and Commercial Security Systems.

1.2 Action and Informational Submittals

- .1 Submit in accordance with Section 01 33 00- Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for video surveillance equipment and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit:
 - .1 Functional description of equipment.
 - .2 Technical data sheets of all devices.
 - .3 Device location plans and cable lists.
 - .4 Video camera surveillance chart.
 - .5 Video interconnection detail drawings.
- .3 Shop Drawings:
 - .1 Submit shop drawings to indicate project layout, camera locations, point-to-point diagrams, cable schematics, risers, mounting details and identification labeling scheme including:
 - .2 Submit zone layout drawings indicating number and location of zones and areas covered.
- .4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .1 Submit UL Product safety Certificates.
 - .2 Submit verification Certificate that service company is "UL List alarm service company".
 - .3 Submit verification Certificate that monitoring facility is "UL Listed central station".
 - .4 Submit verification Certificate that video surveillance system is "Certified alarm system".
- .5 Test and Evaluation Reports:
 - .1 Submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.
- .6 Manufacturer's Instructions: submit manufacturer's installation instructions.

- .7 Manufacturer's Field Reports: submit manufacturer's written reports within [3] days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.

1.3 **Delivery, Storage and Handling**

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors, in dry location and in accordance with manufacturer's recommendations in clean and well-ventilated area.
 - .2 Store and protect video surveillance materials from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

1.4 **Warranty**

- .1 Systems include a factory warranty certifying that equipment is free from defects in design, material, manufacturing and operation.
- .2 Installing Security Contractor will guarantee the equipment and installation for 24 months from date of acceptance.

1.5 **Closeout Submittals**

- .1 Operation and Maintenance Data: submit maintenance data for incorporation into manual specified in Section 01 78 00- Closeout Submittals. Include following:
 - .1 System configuration and equipment physical layout.
 - .2 Functional description of equipment.
 - .3 Manufacturer's Instructions for operation, adjustment and cleaning.
 - .4 Illustrations and diagrams to supplement procedures.

2. **PRODUCTS**

2.1 **GENERAL**

- .1 All systems and components shall have undergone a thoroughly documented quality assurance process by manufacturer. The manufacturer's warranty, extended warranty and replacement policies for each specified component.
- .2 The Network Video Management Software, Network Video Recorder Hardware and related components shall be installed and commissioned by authorized integrators trained and certified by the manufacturer. Certification and training for authorized integrators shall be available from the manufacturer.
- .3 The manufacturer shall have a dedicated professional services group providing Integrators and End Users the following services including but not limited to: training, installation, commissioning, remote diagnostics and integration with party software and hardware systems.

2.1 Materials

- .1 All cameras must be delivered complete with housing and mounting accessories.
- .2 All indoor/outdoor cameras operate under 24VDC and POE, 60Hz.
- .3 Fixed dome cameras for indoor/outdoor installations
 - .1 Cameras with high sensitivity to low light "day / night".
 - .1 Image Sensor: Progressive IP.
 - .2 Lens: Focus manual/autofocus.2.8 to 12mm.
 - .3 Sensibility: 0.01 lux (color).
 - .4 Resolution: 3 Mpx.
 - .5 Operating temperature: -50°C to 60°C with heater on.
 - .6 Power input: 24 VDC and POE, 60 Hz.
 - .7 The lenses must be fitted with UV filter to protect them from sunlight.
 - .8 I/O Connection: Terminal Plug RJ45.
 - .9 IP rating: 66.
 - .10 IK rating: IK10.
 - .11 Power consumption: 12.5 watts.
 - .12 Installation accessories for ceiling or wall mounted.
 - .13 Camera model: TVD-3203 by Truvision or equivalent.
 - .2 Equivalent to acceptable product: Simplex, Notifier.

2.2 Network video recorder and network switch

- .1 The Network video recorder must be an all-in-one integrated with the following characteristics firmware.
- .2 Compatible with "Windows Server 2008" or the latest version supports Windows Internet Explorer Version 6.7, 8 to the latest version.
- .3 Recording images in real time, up to 16 cameras in H.265/MPEG-4 format protected.
- .4 To support IP cameras.
- .5 Video resolution CIF, 2CIF or 4CIF adjustable automatically detected or alarm movement.
- .6 Storage capacity: 6TB.
- .7 Export video clip directly on USB device or DVD/CD.
- .8 Network interface: 2 RJ-45 10 /100 /1000 Mbps.
- .9 16 inputs / 4 output for alarm or other equipment.
- .10 Provided an configure a wireless mouse.
- .11 The Network video recorder will be installed in the telecommunication cabinet located in office (room #105A).
- .12 Model No. TVN-2216 of Truvision.

- .13 Equivalent to acceptable product: Simplex, Notifier.
- .14 Provide a network switch with 24 ports POE, 300W. Provide all necessary software and accessory for operation and connection.

2.3 Computer

- .1 The video surveillance system, the access control system, intrusion system and the building management computer will be located in room # 105A in the telecommunication cabinet equipment.
- .2 Provide a complete and functional computer for managing access control, security, and video surveillance system including:
 - .1 Operating system: windows professional 7 or 8.
 - .2 Processor type Intel Core i8:
 - .3 Processor speed: >=2.5GHz
 - .4 RAM memory 16GB DDR3 / 1333 MhZ
 - .5 Hard drive 4TB.
 - .6 Graphic card NVIDIA Quadro 600 1GB GDDR3.
 - .7 Wireless keyboard and mouse.
 - .8 Monitor: Provide one 19" in the equipment cabinet and one 19" on the office desk.
 - .9 Power supply: 120V.
 - .10 Ethernet Port: 10/100/1000.
 - .11 Wireless LAN 802.11b/g/n.
 - .12 USB ports: 2 front, 6 back.
 - .13 Optical drive: 24X SATA DVDRW with burner.
- .3 The computer software shall support dynamic mapping and links to closed circuit video.
 - .1 The software link between the security software and the video capture stations shall be through a standard network connection to a NVR.
 - .2 Video capture, pan, tilt and zoom control of cameras on the local site and remote sites using the internet shall be achieved with the use of a DVR or designated TruVision recorders. Optional surveillance software applications modules shall be available to view live video, capture video, control cameras where pan/tilt hardware has been implemented and view captured video. The surveillance software may reside on the same site as one of the capture stations or communicate with the capture stations using the Internet.
 - .3 A single surveillance software package shall be able to connect, view and control cameras located on multiple sites at the same time. Also, multiple surveillance software applications operating across a network and through the Internet shall be able to connect to and view the same cameras at the same time.
- .4 The computer will be place in the room #105A in the telecommunication cabinet.

3. EXECUTION

3.1 Examination

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for video surveillance installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 Installation

- .1 Comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheet.
- .2 Install video surveillance equipment and components in accordance with ULC-S317
- .3 Install cable, boxes, mounting hardware, brackets, video cameras and system components in accordance with manufacturer's written installation instructions.
- .4 Install components secure, properly aligned and in locations shown on reviewed shop drawings.
- .5 Supply and install power cables and network cables in separate conduit.
- .6 24 volts power cables size between cameras and supply box have to take care of tension drop.
- .7 Network cables between cameras and network switch have to be CAT, 6.
- .8 Connect cameras to cabling in accordance with installation instructions.
- .9 Install ULC labels where required.

3.3 Field Quality Control

- .1 Manufacturer's Field Services:
 - .1 Obtain written reports from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product.
 - .2 Submit 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 at stages listed:
 - .1 During progress of Work at 60% complete.
 - .2 Upon completion of Work, after cleaning is carried out.

3.4 System Startup

- .1 Perform verification inspections and test in the presence of Departmental Representative.
 - .1 Provide all necessary tools, ladders and equipment.
 - .2 Ensure appropriate subcontractors and manufacturer's representatives are present for verification.
- .2 Visual verification: objective is to assess quality of installation and assembly and overall appearance to ensure compliance with Contract Documents. Visual inspection to include:
 - .1 Sturdiness of equipment fastening.
 - .2 Non-existence of installation related damages.
 - .3 Compliance of device locations with reviewed shop drawings.
 - .4 Compatibility of equipment installation with physical environment.
 - .5 Inclusion of all accessories.
 - .6 Device and cabling identification.
 - .7 Application and location of ULC approval decals.
- .3 Technical verification: purpose to ensure that all systems and devices are properly installed and free of defects and damage. Technical verification includes:
 - .1 Measurements of tension and power.
 - .2 Connecting joints and equipment fastening.
 - .3 Measurements of signals (dB, lux, baud rate, etc).
 - .4 Compliance with manufacturer's specification, product literature and installation instructions.
- .4 Operational verification: purpose to ensure that devices and systems' performance meet or exceed established functional requirements. Operational verification includes:
 - .1 Operation of each device individually and within its environment.
 - .2 Operation of each device in relation with programmable schedule and or/specific functions.
 - .3 Operation control of camera lens, pan, tilt and zoom.
 - .4 Switching of camera to any monitor.
 - .5 Switching of system video recorder to selective monitor.
 - .6 Set dwell times.
 - .7 Demonstrate:
 - .1 Sequence viewing of cameras on each monitor.
 - .2 Bypass capability.
 - .3 Display of stored image to cardholder.

3.5 Adjusting

- .1 Remove protective coverings from cameras and components.
- .2 Adjust cameras for correct function and at Departmental Representative's satisfaction.

3.6 Cleaning

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.

- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

- .1 Clean camera housing, system components and lens, free from marks, packing tape, and finger prints, in accordance with manufacturer's written cleaning recommendations.

3.7 Protection

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by video surveillance installation.

3.8 Training

- .1 The integrator is responsible for organizing and training session for period of two (2) hours on site. The date must be planned and coordinated with the Departmental Representative's.

End of Section

1. GENERAL**1.1 References**

- .1 Underwriters Laboratories of Canada (ULC)
 - .1 CAN/ULC-S304-06, Signal Receiving Centre and Premise Burglar Alarm Control Units.
 - .2 CAN/ULC-S306-03, Intrusion Detection Units.
 - .3 ULC-S318-96, Standard for Power Supplies for Burglar Alarm Systems.
 - .4 ULC-C634-M1986, Guide for the Investigation of Connectors and Switches for Use with Burglar Alarm Systems.
- .2 Underwriters' Laboratories (UL)
 - .1 UL 603-[08] , Power Supplies For Use With Burglar-Alarm Systems.

1.2 Action and Informational Submittals

- .1 Submit in accordance with Section 01 33 00- Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for control panels, detection accessory devices and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit:
 - .1 Functional description of equipment.
 - .2 Technical data for devices.
 - .3 Device location plans and cable lists.
 - .4 Devices mounting location detail drawings.
 - .5 Typical devices connection detail drawings.
- .3 Shop Drawings:
 - .1 Shop drawings to indicate project layout, mounting heights and locations, wiring diagrams, detection device coverage patterns, contact operating gaps
 - .2 Submit zone layout drawing indicating number and location of zones and areas covered.
- .4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .1 Submit UL Product Safety Certificates.
 - .2 Submit verification Certificate that service company is ULC/UL List alarm service company.
 - .3 Submit verification Certificate that intrusion alarm system is Certified Alarm System.
- .5 Test and Evaluation Reports:
 - .1 Submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.
- .6 Manufacturer's Instructions: submit manufacturer's installation instructions.

1.3 Closeout Submittals

- .1 Operation and Maintenance Data: submit maintenance data for incorporation into manual specified in Section 01 78 00- Closeout Submittals.
 - .1 Include:
 - .1 System configuration and equipment physical layout.
 - .2 Functional description of equipment.
 - .3 Instructions of operation of equipment.
 - .4 Illustrations and diagrams to supplement procedures.
 - .5 Operation instructions provided by manufacturer.
 - .6 Cleaning instructions.

1.4 Delivery, Storage and Handlings

- .1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions 01 61 00- Common Product Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect intrusion detection from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

1.5 Warranty

- .1 Systems include a factory warranty certifying that equipment is free from defects in design, material, manufacturing and operation.
- .2 Installing Security Contractor will guarantee the equipment and installation for 24 months from date of acceptance.

2. PRODUCT**2.1 Control Panel**

- .1 Network Control Panel Includes Owner's Manual and Installation Instructions. Keyboard and Transformer Sold Separately. UL, FCC, CE Approved.
- .2 Control panel with microprocessor, wall mounted, and monitoring multiples detections zones will be located in the Mech/Elec Room (112).
- .3 Programming from a keyboard, without losing system status during a blackout.

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- .4 The panel may be divided into eight (32) independent sectors, with separate areas and access code separate.
 - .5 The panel can operate automatically if you forget to programme it.
 - .6 Panel with a battery and charger for 24 hours operation in case of blackout.
 - .7 Powers supply 120 V AC with battery.
 - .8 Intrusion alarm controller functionality:
 - .1 Communications test initiated from the controller. Programmable settings from once every 30 minutes to once every 7 days.
 - .1 Dial mode, (none, digital, digital back-up to High Security).
 - .2 Dial format to alarm Monitoring Center, (SIA, Contact ID).
 - .3 Primary phone number to call upon alarm.
 - .4 Secondary phone number to call upon alarm when the panel cannot make contact with the alarm Monitoring Center using the primary phone number.
 - .5 Paging when an alarm occurs.
 - .6 Configurable siren time on alarm, from 1 second to 2 hours.
 - .7 Number of ID plus PIN digit options supported [PIN only, ID(2 digits) + PIN(4 digits), or ID (3 to 5 digits) + PIN (4 to 5 digits)].
 - .8 Communication speed between the controller and the application modules (19K2 and 38K4).
 - .9 Support a 2 line by 16 character message to be viewed on the LCD keypad.
 - .10 Support duress PIN operation.
 - .2 Each controller will support up to 12 hardwired input devices: a maximum of 256 such input points shall be supported by each controller via supervised 8 or 16 input expansion modules.
 - .3 Each point shall be configured for supervision according to one of four fully programmable circuit types (including custom resistance values), configurations include N/C, N/C with EOL, N/O with EOL, Dual EOL.
 - .4 Each controller shall support programmable alarm point input types. These input points shall incorporate a programmable pre-process delay from 1 second to 1 week to accommodate devices in applications where an alarm condition from the device must exist continuously for the programmed pre-process period before a response occurs. Each controller shall support also audible outputs and central station.
 - .5 32 zones to be protected.
 - .6 Zones (protection inputs): 32
 - .7 Fixed zones: 16.
 - .8 Expandable: 32 zones.
 - .9 Keypads: LCD (liquid crystal display).
 - .10 Alarm: local.
 - .11 System: wired.
 - .12 Integrated with sub systems [intercom] [building entry] [access control] .
 - .13 Siren output.
 - .9 Model AFx controller distributed by Chubb Edwards.

- .10 Equivalent to acceptable product: Simplex, Notifier.

2.2 Numeric keypad

- .1 A keypad with (16) buttons, tactile and audible feedback for wall mounting. Two (2) keypads are required for this project.
- .2 Show system status and zone via an LCD screen
- .3 LCD keypad white, Model PAT-KLCS by Chubb Edwards. The cable wiring for the keyboard has to be shielded as recommend by Chubb Edwards.
- .4 Equivalent to acceptable product: Simplex, Notifier.

2.3 End of line resistor.

- .1 To set the monitor courant in each circuit mounted in the intrusion panel.

2.4 Magnetic contact for door

- .1 Magnetic contact for door monitoring, for open or closed loop, pale color. Aritech or Sentrol model 1078W-G.
- .2 Provide appropriate models for indoor doors.

2.5 Motion detector

- .1 Passive Infrared Detectors (PIR's): ULC approved.
 - .1 Coverage pattern: 24.4m.
 - .2 Tamper switch.
 - .3 Mounting: wall.
 - .4 Digital signal analysis for consistent detection throughout the coverage pattern.
 - .5 Multi-level signal processing for accurate detection of human IR energy over a broad range of temperatures.
 - .6 Sensitivity adjustment to configure the detector for "normal" (high sensitivity) or "hostile" (low sensitivity) environments.
 - .7 Static and transient protection.
 - .8 White light immunity.
 - .9 RF immunity.
 - .10 4 interchangeable lenses.
 - .11 4 interchangeable lenses.
 - .12 The detector is designed to use a 12VDC power supply provided by a UL listed alarm control panel.
 - .13 Selectable range up to 80 feet (24.4m) – interchangeable lenses allows optimizing the coverage pattern.
 - .14 LED indicator.
 - .15 Tamper switch - Activated when the pins on the circuit board are removed from the terminal sockets on the base.

- .2 Model DSC PIR de CHUBB EDWARDS.
- .3 Equivalent to acceptable product: Simplex, Notifier.

2.6 Local audible alarm

- .1 Two (2) tones audible piezo alarm of 112dB at 1 meter.
 - .1 Model MA2 by Chubb Edwards.
- .2 Equivalent to acceptable product: Simplex, Notifier.

2.7 Glass break detector

- .1 Glass break detector: ULC approved, complete with tamperproof switch and be designed to meet temperature and mounting requirements of project.
 - .1 Coverage pattern: 7.6m (25').
- .2 Model FG-1625T de CHUBB EDWARDS.
- .3 Equivalent to acceptable product: Simplex, Notifier.

3. EXECUTION

3.1 Examination

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for intrusion detection installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of the electrical contractor, the manufacturer's technician specialist in security and the Consultant.
 - .2 Inform the electrical contractor, the manufacturer's technician specialist in security and the Consultant of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from the Consultant.

3.2 Installation

- .1 Install panels, intrusion detection system and components in accordance with manufacturer's written installation instructions to locations, heights and surfaces shown on reviewed shop drawings.
- .2 Install panels, intrusion detection system and components secure to walls, ceilings or other substrates.
- .3 Install required boxes in inconspicuous accessible locations.
- .4 Conceal conduit and wiring.

3.3 Site Test and Inspection

- .1 Perform verification inspections and test in the presence of Departmental Representative.
 - .1 Provide necessary tools, ladders and equipment.
 - .2 Ensure appropriate subcontractors, and manufacturer's representative's specialists in security and the Departmental Representative are present for verification.
- .2 Visual verification: objective is to assess quality of installation and assembly and overall appearance to ensure compliance with Contract Documents. Visual inspection to include:
 - .1 Sturdiness of equipment fastening.
 - .2 Non-existence of installation related damages.
 - .3 Compliance of device locations with reviewed shop drawings.
 - .4 Compatibility of equipment installation with physical environment.
 - .5 Inclusion of all accessories.
 - .6 Device and cabling identification.
 - .7 Application and location of ULC approval decals.
- .3 Technical verification: purpose to ensure that all systems and devices are properly installed and free of defects and damage. Technical verification includes:
 - .1 Measurements of coverage patterns
 - .2 Connecting joints and equipment fastening.
 - .3 Compliance with manufacturer's specification, product literature and installation instructions.
- .4 Operational verification: purpose to ensure that devices and systems' performance meet or exceed established functional requirements. Operational verification includes:
 - .1 Operation of each device individually and within its environment.
 - .2 Operation of each device in relation with programmable schedule and or/specific functions.

3.4 Field Quality Control

- .1 Manufacturer's Field Services:
 - .1 Obtain written reports from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product.
 - .2 Submit 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 Ensure manufacturer's representative is present before and during critical periods of installation and testing.
 - .4 Schedule site visits to review Work at stages listed:
 - .1 After delivery and storage of products, and when preparatory Work on which Work of this Section depends is complete, but before installation begins.
 - .2 Twice during progress of Work at 25% and 60% complete.
 - .3 Upon completion of Work, after cleaning is carried out.

3.5 Adjusting

- .1 Adjust all components for correct function.

3.6 Cleaning

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
 - .1 Remove protective coverings from accessories and components.
 - .2 Clean housings and system components, free from marks, packing tape, and finger prints, in accordance with manufacturer's written cleaning recommendations.

3.7 Protection

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by intrusion detection installation.

3.8 Training

- .1 The integrator is responsible for organizing and training session for period of four (4) hours on site.
- .2 The date must be planned and coordinated with the Departmental Representative.

End of Section

1. GENERAL**1.1 Submittals**

- .1 The system supplier of alarm telephone line transmission must provide the contractor in this section the shop drawings of the following important information and all information required for approval, pursuant to Section 26-05-00 – Common Work Results for Electrical.
 - .1 Equipments specification.
 - .2 A list of differences equipments proposed and specified.
 - .3 Control panel shop drawing.
 - .4 All necessary documents.
 - .5 The programming form and example to follow.
 - .6 Connecting diagram.

1.2 Closeout Submittals

- .1 Submit maintenance and engineering data for incorporation into manual.
- .2 Submit following:
 - .1 Manufacturer's data much include:
 - .1 Operating and maintenance instructions for the complete alarm-fire to facilitate the operation, maintenance and repair.
 - .2 Technical data illustrated parts lists.
 - .3 A copy of each shop drawing approved
 - .4 Include a list of all programming points within the maintenance and operation manuals.

1.3 Quality Assurance

- .1 Qualifications
 - .1 Installation: Company or person specializing in fire alarm system installation with five (5) years documented experiences and approved by manufacturer.
- .2 Provide service of representatives or technician from manufacturer of system, experienced in installation and operation of type of system being approved, to supervise installation, adjustment, preliminary testing, and final testing and to approve instruction to project personnel.
- .3 Extra Material
 - .1 Provide maintenance materials in accordance with section 01 78 00 Closeout submittals
- .4 Maintenances services
 - .1 Provide two (2) years free maintenance service with two inspections by manufacturer during the warranty period. Inspection tests to conform to CAN/ULC-S537. Submit inspection report to Departmental Representative.

2. PRODUCTS

2.1 Automatic voice dialer system

- .1 Provide, install and connect an alarm transmission system by telephone line with voicemail as described in this section of the specifications and as indicated in the plans.
- .2 All products deemed equivalent must be provided with shop drawing for verification by Departmental Representative.
- .3 All operation to connect the automatic signaler must be conformed the description.
- .4 Automatic signaler will have four input channels activated by contact normally open N.O and / or normally closed N.C.
- .5 Five voicemails and an identification message can be transmitted.
- .6 Automatic signaler is provided with a power transformer 120/12V DC with battery charger, battery, connection sockets for telephone lines, telephone cable, telephone handset for programming and all the necessary components for proper operation.
- .7 Type of programming
 - .1 Programming the telephone number.
 - .2 Programming the call list in order of priority with adjustable time.
 - .3 Programming the type of alarm.
 - .4 Programming the type of disorder.
 - .5 Programming the digital pager message.
- .8 Alarm transmission system by telephone line with voicemail, model AD-2000 of the United Security Product Co. inc. or equivalent approved by the Departmental Representative.

2.2 ULC monitoring panel

- .1 Provide, install and connect an ULC monitoring system by two telephone lines as described in this section of the specifications and as indicated in the plans.
- .2 **The monitoring panel has to be in accordance with the local central monitoring.**
- .3 Specifications:
 - .1 16 to 128 zone panel configurations.
 - .2 On-Board zones: 6
 - .3 Total zones supported: 16
 - .4 Keypad zone expansion
 - .5 Hardwired zone
 - .6 Wireless zone expansion
 - .7 Number of hardwired keypads: 8
 - .8 Number of wireless keypads: 8
 - .9 Number of wireless receivers: 1

- .10 Number of wireless repeaters: 4
 - .11 Number of partitions: 2
 - .12 Panel event buffer: 500
 - .13 Audio alarm verification
 - .14 Number of wireless repeaters: 4
 - .15 Cellular alarm communicationa
 - .16 Battery required
 - .17 Visual alarm verification
 - .18 2-way audio alarm verification via phone or cellular
 - .19 Alternate communications via cellular and IP
 - .20 Local and remote downloading
 - .21 Remote firmware upgrade (panel/keypads/transceiver)
- 4 ULC monitoring panel, model HS2016 C/W 12VDC batteries, modular block CA38A, internet alarm communicator model TL280RE and keypad or equivalent approved by the Departmental Representative.

2.3 Conduits and Wiring

- .1 Install two separate conduits, one for detection and one for signaling.
- .2 The grounding of each control panels and microprocessors must be made by means of an electrical conductor #8 insulated in accordance with the Electrical Code. This work must be performed by specialized contractor.
- .3 All conduits shall be identified by a red band of 10 cm in length every 3 m. All mounting boxes, junction and pull must be clearly identified by a permanent and visible red mark. In addition, these boxes should also be clearly identified in connection with their associated zones.
- .4 All supply conductors shall be installed in metal conduit with watertight connectors. All conductors will be copper, insulated for 600 V minimum and respecting CSA standards. The branch conductors and power arteries will type RW-90-RHH FT4 type fire resistant two (2) hours, classified ULC S139-00-and wire #12.

2.4 Test

- .1 Perform tests in accordance with the current standard, latest edition.
- .2 To test all the features of alarm circuits and trouble to ensure that they transmit alarms automatic signaler and communicates well outside of the building.
- .3 Simulate a fault condition by a ground fault or breakdown, on alarm and signaling circuits to ensure proper functioning of the state of the wiring.
- .4 Automatic signaler must be provided with a conductor to earth isolated gauge as required by the manufacturer.

3. EXECUTION**3.1 Start**

- .1 The contractor of this section or an authorized supplier shall check the complete system. The initial step shall be made by a representative of supplier or by a certified technician. The supplier shall provide a report of the commissioning and installation to the contractor and it shall transmit a copy to the engineer and the owner.
- .2 The acceptance of the system will be given when the system is programmed, connected to telephone lines checked in the presence of owner's representative.

3.2 Training

- .1 The Contractor shall provide two sessions of two hours of training for maintenance and administrative staff at the presence of the general contractor. This training must be given by a representative of the manufacturer or an authorized technician.

3.3 Spare

- .1 The manufacturer of transmitting alarm system by telephone line must provide:
 - .1 One (1) transformer 120v/12V cc as required
 - .2 Five (5) fuse "small size" for each model

3.4 Cleaning

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

End of Section

1. GENERAL

1.1 Summary

.1 Section Includes:

- .1 Materials and installation for fire alarm systems.
- .2 Control panel to carry out fire alarm and protection functions including receiving alarm signals, initiating general alarm, supervising system continuously, annunciator, and initiating trouble signals.
- .3 Trouble signal devices.
- .4 Power supply facilities.
- .5 Manual alarm stations.
- .6 Automatic alarm initiating devices.
- .7 Audible signal devices.
- .8 End-of-line devices.
- .9 Annunciators.
- .10 Visual alarm signal devices.
- .11 Ancillary devices.

1.2 References Standards

- .1 National Fire Protection Agency
 - .1 NFPA 72-2002 , National Fire Alarm Code.
 - .2 NFPA 90A-2002, Installation of Air Conditioning and Ventilating Systems.
- .2 National Research Council Canada (NRC)
 - .1 National Building Code of Canada 2015 (NBC).
- .3 Underwriter's Laboratories of Canada (ULC)
 - .1 CAN/ULC-S524-2001, 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, Standard for Control Units for Fire Alarm Systems.
 - .5 CAN/ULC-S528-05, Manual Pull Stations for Fire Alarm Systems, Including S529-2002, smoke detector for fire alarm system.
 - .6 CAN/ULC-S530-M1991, Heat Actuated Fire Detectors for Fire Alarm Systems.
 - .7 CAN/ULC-S531-2002, Standard for Smoke Alarms.
- .4 CAN/ULC-S536-S537-2004, Burglar for fire alarm system and complements.

1.3 Submittals

- .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00- Submittal Procedures.
- .2 Shop drawings
 - .1 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure coordinated installation.

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- .2 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.
 - .3 Indicate on drawings clearances for operation, maintenance, and replacement of equipment devices.
 - .4 If changes are required, notify the Departmental Representative of these changes before they are made.
 - .5 Use the identification card for shop drawings attached in the Appendix for the transition of shop drawings. An electronic version will be sent on request by the Professional.
- .3 Quality Control: in accordance with Section 01 45 00 – Quality Control.
- .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.
- 1.4 **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 Open-area smoke detectors.
 - .6 Duct smoke detectors.
 - .7 Alarm bells.
 - .8 Alarm horns.
 - .9 Visible appliances.
 - .10 Main annunciator.
 - .11 Master box.
 - .12 Wiring.
 - .13 Conduit.
 - .14 Outlet boxes.
 - .15 Fittings for conduit and outlet boxes.
 - .16 Trouble bell.
 - .17 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 Schedules:
 - .1 Conductor wire marker schedule.
- .4 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.

1.5 Quality Assurance

- .1 Qualifications
 - .1 Installation: Company or person specializing in fire alarm system installation with five (5) years documented experiences and approved by manufacturer.
- .2 Provide service of representatives or technician from manufacturer of system, experienced in installation and operation of type of system being approved, to supervise installation, adjustment, preliminary testing, and final testing and to approve instruction to project personnel.
- .3 Extra Material
 - .1 Provide maintenance materials in accordance with section 01 78 00 Closeout submittals
- .4 Maintenances services
 - .1 Provide one (1) year free maintenance service with two inspections by manufacturer during the warranty period. Inspection tests to conform to CAN/ULC-S537. Submit inspection report to department Representative.

1.6 Delivery, Storage and Handling

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect equipment from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

2. PRODUCTS

2.1 Materials

- .1 Equipment and devices: ULC listed and labelled and supplied by single manufacturer.
- .2 Power supply: to CAN/ULC-S524.
- .3 Audible signal devices: to CAN/ULC-S525.
- .4 Visual signal devices: to CAN/ULC-S526.
- .5 Control unit: to CAN/ULC-S527.
- .6 Manual pull stations: to CAN/ULC-S528.
- .7 Thermal detectors: to CAN/ULC-S530.
- .8 Smoke detectors: to CAN/ULC-S529.
- .9 Smoke alarms: to CAN/ULC-S531.

2.2 System Operation

- .1 Single stage operation. Operation to actuation following:
 - .1 Manual station.
 - .2 Heat detector.
 - .3 Smoke detector.
 - .4 Automatic fire sprinkler system.
 - .5 Fire extinguishing system.
 - .6 Fire standpipe system.
- .2 Actuation of single operation device to initiate following:
 - .1 Building evacuation alarm devices to operate continuously.
 - .2 Transmit signal to fire department via fire alarm transmitter .
 - .3 Zone of alarm device to be indicated on control panel annunciator.
 - .4 Air conditioning and ventilating fans to shut down or to function so as to provide required control of smoke movement.
 - .5 Fire doors and smoke control doors if normally held open, to close automatically.
 - .6 Electro-magnetic door holders to de-energize.
 - .7 Operations to remain in alarm mode (except alarm notification appliances if manually silenced) until system is manually restored to normal.

2.3 Control Panel

- .1 Class A.
- .2 Single stage operation.
- .3 Non-zoned.
- .4 Non-coded.

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- .5 Enclosure:
- .1 CSA Enclosure 1, c/w lockable concealed hinged door, full viewing window, flush lock and 2 keys.
 - .2 Provide modular type panel installed in flush mounted steel cabinet with hinged door and cylinder lock.
 - .3 Mount with panel centerline 1.5 m above finished floor elevation.
 - .4 Switches and other controls: not accessible without use of key.
 - .5 Design of control panel: neat, compact assembly containing parts and equipment required to provide specified operating and supervisory functions of system.
 - .6 Control panel components: CSA approved and approved by control panel manufacturer for use in control panel.
 - .7 Panel cabinet: finished on inside and outside with factory-applied enamel finish.
 - .8 Provide main annunciator located on exterior of cabinet door or visible through cabinet door.
 - .9 Provide audible trouble signal.
 - .10 Provide permanent engraved identification plates attached to rear face of panel viewing window, for lamps and switches.
 - .11 Provide 1 set of Form C dry alarm contacts per zone, common system Form C dry alarm contact, and common system Form C dry trouble contact. Indicate set/unset condition of auxiliary transmitter by control panel .
 - .12 Permanently label switches.
 - .13 Provide panel with following switches:
 - .1 Trouble silencing switch which silences audible trouble signals [including remote trouble devices] without extinguishing trouble indicating lamp(s).
 - .1 For non-self-resetting type switch: Upon correction of trouble condition, audible signals will again sound until switch is returned to its normal position.
 - .2 For silencing switch of momentary action self-resetting type: trouble signal circuit automatically restored to normal upon correction of trouble condition.
 - .2 Evacuation alarm silencing switch which when activated will silence alarm notification appliances without resetting panel, and cause operation of system trouble signals.
 - .3 Individual zone disconnect switches which when operated will disable only their respective initiating circuit and cause operation of system and zone trouble signals.
 - .4 Reset switch which when activated will restore the system to normal standby status after cause of alarm has been corrected, and activated initiating devices reset.
 - .1 Operation of reset switch to restore activated smoke detectors to normal standby status.
 - .5 Lamp test switch.

- .6 Drill switch which will enable test of notification appliances and restoration to normal without tripping master box.
- .7 Master box disconnect switch which when activated will disconnect coded device and cause operation of system trouble signal.
- .8 HVAC shutdown bypass switch. Operation of the switch to allow HVAC system to operate with detectors in alarm and cause operation of system trouble signals.
- .6 Supervised, modular design with plug-in modules:
 - .1 Alarm receiver with trouble and alarm indications, for class A initiating circuit.
 - .2 Spare zones: compatible with smoke detectors and open circuit devices.
 - .3 Space for future modules.
 - .4 Latching type supervisory receiver circuits. Discrete indication for both off-normal and trouble.
- .7 Components:
 - .1 Coded alarm receiver panel with trouble and alarm indications for class A initiating circuit.
 - .2 Single stage alarm pulse rate panels:
 - .1 Single stroke control type for output to signal control panel continuously.
 - .3 Common control and power units:
 - .1 Control panel containing following indications and controls:
 - .1 "Power on" LED (green) to monitor primary source of power to system.
 - .2 "Power trouble" indication.
 - .3 "Ground trouble" indication.
 - .4 "Remote annunciator trouble" indication.
 - .5 "System trouble" indication.
 - .6 "System trouble" buzzer and silence switch c/w trouble resound feature.
 - .7 System reset switch.
 - .8 "LED test" switch if applicable.
 - .9 "Alarm silence" switch to silence signals manually. If new alarm occurs after signals have been silenced, signals to resound.
 - .10 "Signals silenced" indication.
 - .2 Master power supply panel to provide 24 V dc to system from 120 V ac, 60 Hz input.
 - .3 Fire department connections:
 - .1 Plug-in module for shunt type municipal box.
 - .2 Fire department bypass switch c/w indicator for trouble at panel.
 - .4 Auxiliary relays: plug-in type, dust cover, supervised against unauthorized removal by common trouble circuit and c/w individual bypass switch .
 - .1 Contacts: 2.0 A, 120 V ac, for functions such as release of door holders or initiation of fan shut down.
 - .2 Contact terminal size: capable of accepting 22-12 AWG wire.

- .5 Control panel, model IO1000G of Chubb Edwards include without limitation:
 - .1 One (1) detection loop that supports up to 250 intelligent devices.
 - .2 Four (4) signalling circuits of 6 A, class B.
 - .3 Emergency accumulator.
 - .4 A standard recessed box.
 - .5 Municipal module link # 2-CTM.
 - .6 SA-DAT card, including two telephone lines CA-38A.
 - .7 The annunciator panel of the R series, model: CF-RLCD.
- .6 Equivalent to acceptable product: Simplex, Notifier

2.4 Manual Alarm Stations

- .1 **Manual alarm station complete with guard protection.**
- .2 Provide non-coded single action type with mechanical reset features.
 - .1 Non-coded single pole normally open contact for single stage.
 - .2 General alarm key switch for two stage system.
- .3 Stations: surface mounted and interior.
 - .1 For surface mounting provide station manufacturer's approved back box.
 - .2 Back box finish to match station finish.
- .4 Equip each station with terminal strip with contacts of proper number and type to perform functions required.
- .5 Stations: type not subject to operation by jarring or vibration.
- .6 Station colour: red.
- .7 Provide station with visible indication of operation.
- .8 Restoration to require use of key.
 - .1 Keys: identical throughout system for stations and control panel.
- .9 Mount stations with operating lever not more than 1.2 m above finished floor.
- .10 Manual alarm station, model SIGA 270F of Chubb Edwards.
- .11 Equivalent to acceptable product: Simplex, Notifier.

2.5 Alarm Initiating Devices

- .1 Open-Area Smoke Detectors: provide detectors designed for detection of abnormal smoke densities by photoelectric principle.
 - .1 Provide necessary control and power modules required for operation integral with control panel.
 - .2 Detectors and associated modules: compatible with control panel and suitable for use in supervised circuit.
 - .3 Malfunction of electrical circuits to detector or its control or power units to result in operation of system trouble signals.
 - .4 Equip each detector with visible indicator lamp that will flash when detector is in normal standby mode and glow continuously when detector is activated.

- .5 Provide remote indicator lamps for each detector.
- .6 Each detector: plug-in type with tab-lock or twist-lock, quick disconnect head and separate base in which detector base contains screw terminals for making wiring connections.
- .7 Detector head: removable from its base without disconnecting wires. Removal of detector head from its base to cause activation of system trouble signals.
- .8 Screen each detector to prevent entrance of insects into detection chamber.
- .2 Locate detectors in accordance with their listing by ULC and the requirements of NFPA 72, except provide at least 2 detectors in rooms of 54 square meters or larger in area.
- .3 Mount detectors at underside of ceiling or deck above unless otherwise indicated.
 - .1 For mounting heights greater than 3 m above floor level, reduce actual detector linear spacing from listed spacing as required by NFPA 72.
 - .2 For heights greater than 9 m space detectors no farther apart than 34 % of their listed spacing.
- .4 Temperature rating of detectors: in accordance with NFPA 72.
- .5 Locate detectors minimum 300 mm to lighting fixtures and not closer than 600 mm to air supply or return diffuser.
- .6 Ensure detectors, located in areas subject to moisture or exterior atmospheric conditions or hazardous locations as defined by NFPA 70, are approved for such locations.
- .7 Provide detectors with terminal screw type connections.
- .8 Removal of detector head from its base to cause activation of system trouble signals if detectors are provided with separable heads and bases.
- .9 Manual alarm station, model SIGA-PS with mounting base SIGA-SB and remote alarm LED.
- .10 Equivalent to acceptable product: Simplex, Notifier.

2.6 Alarm initiating device spacing and Location

- .1 Detector spacing and location: in accordance with manufacturer's recommendations and requirements of NFPA 72.
- .2 Provide at least 2 detectors in rooms of 54 square meters or larger.
- .3 Spacing: not to exceed 9 m by 9 m per detector, and 9 linear m per detector along corridors.
- .4 Locate detectors minimum 0.9 m from air discharge or return grille, and not closer than 300 mm to lighting fixtures.
- .5 In areas without finished ceilings, mount detectors at underside of deck above unless otherwise indicated.

2.7 Duct smoke detectors

- .1 Provide detectors installed in ducts of photoelectric type and listed by ULC duct installation.
- .2 Provide integral control and power modules required for operation with main control panel.
- .3 Ensure detectors and associated modules are compatible with main control panel and suitable for use in supervised circuit.

- .4 Detector circuits: 4-wire type where detector operating power is transmitted over conductors separate from initiating circuit. Malfunction of electrical circuits to detector or its control or power modules to cause operation of system trouble signals.
- .5 Provide a separate, fused power circuit for each smoke detection initiating circuit.
- .6 Failure of power circuit: indicated as a trouble condition on corresponding initiating circuit.
- .7 Provide duct detectors in accordance with NFPA 90A.
- .8 Provide duct detectors with approved duct housing, mounted exterior to duct, with perforated sampling tubes extending across width of duct.
- .9 Activation of duct detectors to cause shutdown of associated air handling unit annunciation at control panel and tripping of transmitter and sounding of building evacuation alarms.
- .10 Provide detectors with visible indicator lamp that flashes when detector is in normal standby mode and glows continuously when detector is activated.
- .11 Provide remote indicator lamp for each detector.
- .12 Permanently label remote indicator with description of associated air handling units.
- .13 Provide each detector with remote test switch. Mount switch not more than 1.8 m above finished floor.
- .14 Permanently label test switch with description of associated air handling units.
- .15 Duct smoke detector c/w relay, model SIGA-SD with 42" sampling tube SD-T42 and remote alarm SIGA-LED.
- .16 Equivalent to acceptable product: Simplex, Notifier.

2.8 Audible signal devices

- .1 Provide remote system trouble 100 mm buzzer arranged to operate in conjunction with panel's integral trouble signal.
- .2 Locate remote trouble buzzer at the control panel.
- .3 Audible device(s):
 - .1 Bells: surface mounted, single stroke, 24 V dc.
 - .2 Signal chimes: heavy duty, single stroke, 24 V dc, with solid striking plunger and resonating chamber.
 - .3 Bells: vibrating type, gongs of special alloy steel, 24 V dc.
 - .4 Horns: surface mounting, 24 V dc.
- .4 Do not exceed 80 percent of listed rating in amperes of notification appliance circuit. Provide additional circuits above those shown if required to meet this requirement.
- .5 Provide appliances specifically listed for outdoor use in locations exposed to weather.
- .6 Finish appliances in red enamel.
- .7 For surface mounting provide appliance manufacturer's approved back box. Back box finish to match appliance finish.
- .8 Horn only, model G1R-HD of Chubb edwards.
- .9 Equivalent to acceptable product: Simplex, Notifier.

2.9 Visual alarm signal devices

- .1 Surface mounted assembly of stroboscopic type suitable for use in electrically supervised circuit and powered from notification appliance circuit.
- .2 Appliances: minimum of 75 candela measured as approved by ULC, but not less than effective intensity required by National Building Code of Canada for appliance spacing and location.
- .3 Protect lamps with thermoplastic lens and labelled "FIRE" in letters at least 12 mm high.
- .4 Provide visible appliances within 300 mm of each audible appliance.
- .5 Visible appliances may be part of audio-visual assembly, where more than two appliances are located in same room or
- .6 Horn and strobe, model G1R-HDVM, OF Chubb edwads.
- .7 Equivalent to acceptable product: Simplex, Notifier.

2.10 End-of-line devices

- .1 End-of-line devices to control supervisory current in signalling circuits, sized to ensure correct supervisory current for each circuit. Open or ground fault in any circuit will alter supervisory current in that circuit, producing audible and visible alarm at main control panel.

2.11 Valve tamper switches

- .1 Provide switches to monitor open position of valves controlling water supply to sprinkler systems.
- .2 Switch contacts to transfer from normal position to off-normal position during first two revolutions of hand wheel or when stem of valve has moved not more than one-fifth of distance from its normal position.
- .3 Provide switch with tamper resistant cover.
- .4 Removal of the cover to cause switch to operate into off-normal position.

2.12 Off-premises fire alarm

- .1 Provide auxiliary connection to base fire alarm system in accordance with NFPA 72, except as specified.

2.13 Conduit

- .1 Electrical Metallic Tubing (EMT).

2.14 Wiring

- .1 Wire for 120 V circuits: No. 12 AWG minimum solid copper conductor.
- .2 Wire for low voltage DC circuits: No. 14 AWG minimum solid copper conductor
- .3 Colour code wiring.

2.15 Grounding

- .1 Ground each control panel by connection from grounding terminal connection of box to the building main grounding bar.

2.16 As-built riser diagram

- .1 Fire alarm system riser diagram on black lamicoid sheet with bevelled edges, white lettering and designations, minimum size 600 x 600 mm.

2.17 Ancillary devices

- .1 Remote relay unit to initiate fan shutdown.

3. EXECUTION**3.1 Installation**

- .1 Install systems in accordance with CAN/ULC-S524 and TB OSH Chapter 3-04.
- .2 Install main control panel and connect to ac power supply standby power.
- .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 1 m of air outlets. Maintain at least 600 mm radius clear space on ceiling.
- .5 Connect alarm circuits to main control panel.
- .6 Locate and install horns and visual signal devices and connect to signaling circuits.
- .7 Connect signaling circuits to main control panel.
- .8 Install end-of-line devices at end of alarm and signaling circuits.
- .9 Install remote annunciator panels and connect to annunciator circuit wiring.
- .10 Locate and install door releasing devices.
- .11 Locate and install remote relay units to control fan shut down.

3.2 Field Quality Control

- .1 Site Tests:
 - .1 Perform tests in accordance with Section 26 05 00 - 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 transmit alarm to control panel and actuate general alarm devices.
 - .2 Simulate grounds and breaks on alarm and signalling circuits to ensure proper operation of system.
 - .3 Check the programming and ensure that it operates correctly
- .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 Verification requirements in accordance with Section 01 47 17 - Sustainable Requirements: Contractor's Verification, include:
 - .1 Materials and resources.
 - .2 Storage and collection of recyclables.
 - .3 Construction waste management.
 - .4 Resource reuse.
 - .5 Recycled content.
 - .6 Local/regional materials.
 - .7 Low-emitting materials.

3.3 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.

3.4 Cleaning

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

End of Section