

PART 1 - GENERAL

1.1 SYSTEM DESCRIPTION

- .1 The integrated security alarm and access control system is composed of the following components:
 - .1 Remote operator workstation at the reception/security desk.
 - .2 Security management and reporting software.
 - .3 System head-end equipment.
 - .4 Addressable door access controllers.
 - .5 UL634 High security Level 1 recessed doors contacts.
 - .6 Proximity card readers.
 - .7 The accessories required to operate such an intrusion alarm/access control system in good working order.
 - .8 The spare parts necessary to maintain such a system in good working order.
 - .9 ULC rated power supplies.
 - .10 Minimum 48 hour battery backup for door controllers and field devices
 - .11 Minimum 1-hour battery backup for system head-end equipment
 - .12 The system field devices shall maintain all their functions and continue to operate if communication with the head-end equipment is lost
 - .13 The system shall be fully compatible with all integrated door hardware.

1.2 INTRUSION ALARM OPERATION

- .1 The intrusion alarm shall perform the following tasks:
 - .1 Supervise and report status of door contacts.
 - .2 The system shall have the ability to arm/disarm any single devices or any combination of devices either manually or automatically via time schedule.
 - .3 Programming of the system shall be done at the system head-end equipment in the security LAN room
 - .4 Software shall be provided to track and report status of system components. Changes in door contact status are to be reported to the operator through the use of the software.
 - .5 The system shall be software integrated with CSC's standard Genetec CCTV system. An alarm condition shall feed video of the location causing the alarm to the operator's console.
 - .6 The system shall be software integrated with the P.P.A. system to report all P.P.A alarms and warnings on the security operator's console.
 - .7 The system controller is to store 1000 events in the memory.
 - .8 Alarm monitoring:
 - .1 Display on the operator workstation screen in full text all events. An acknowledge from the operator for any of the events can be defined. The operator will have the option of displaying a graphic of the area at which the event occurred.
 - .2 Significant information should be displayed on screen. The information displayed must contain the following: date and time of the alarm, description of the alarm in plain English text of a minimum of 30 characters, response instructions of a minimum of 360 characters, all descriptions and response instructions can be easily updated by an authorized operator without special coding or software change.
 - .3 Date and time of operator acknowledgment.
 - .4 Generate an event when the alarm condition is restored.

1.3 ACCESS CONTROL OPERATION

- .1 CSC utilizes the HID corporate 1000 program and will be issuing identification/proximity cards to building

- occupants. The system and card readers shall be compatible with these cards.
- .2 The system shall perform the following tasks:
 - .1 Supervise, control and report access to doors equipped with card readers.
 - .2 Allow door access through the programming of access levels for each card user or by an automatic door unlock schedule or by manually unlocking a door via the operator workstation by an authorized operator.
 - .3 The following requirements must be cleared before granting access:
 - .1 The card must be pre-defined in the system.
 - .2 The user must present the card to a reader at a door and at a time authorized for the card holder.
 - .3 If all requirements are met, the door unlocking device is released and access is granted.
 - .4 All access parameters regarding a card holder must be in absolute control of the owner and modified at will without technical assistance.
 - .4 Supervise according to pre-programmed schedules all monitor points. Monitor points may consist of door contacts and all other dry contact conditions as indicated herein.
 - .5 Through the operator work station, provide an authorized operator the ability to:
 - .1 Lock and unlock a door or a group of doors.
 - .2 Activate or deactivate a relay or group of relays.
 - .3 Supervise or shunt a monitor point or group of points.
 - .6 All system events, including a valid access or invalid attempts, will be recorded for future reference on the operator workstations hard disk according to pre-determined schedules as per the Owner's requirements.
 - .7 Display events and alarms to the operator workstation and/or to the remote operation terminal according to pre-determined schedules as per the user's requirements.
 - .8 Provide a fully bilingual software package with menus, system descriptions and device descriptions in both English and a language selected by the Owner.
 - .9 Allow changes to the system's database by an authorized operator without assistance of specialized technicians. Changes to the system shall be done in the security LAN room and shall not be possible from the operator's workstation.
 - .10 Define operators, individual password, operating language and authorized for each menu item. Change of operating language must be done automatically based on the operator's profile.
 - .11 Display on screen, print or send to disk the database content of:
 - .1 One or a group of inputs, relays, doors, controllers, auxiliary outputs, schedules, access codes or operators.
 - .2 Card holders in either numerical or alphabetical order or according to one or more of the parameters of the card holder database.
 - .3 System events related to an operator.
 - .4 System status including doors, monitor points, relays and any other abnormal state or irregular conditions.
 - .13 The system shall also perform the following operations:
 - .1 Key/card programming.
 - .2 Change key/card validation from valid to invalid or lost/stolen.
 - .3 Program 8 various access levels (combining an individual schedule for each door).
 - .4 Program 8 schedules for various applications; each schedule shall be composed of a minimum of 4 start/stop time intervals.
 - .5 Change system date and time. In addition, the system must automatically adjust for time changes as necessary.
 - .14 From the security LAN room, the system must allow to generate the following reports:
 - .1 Define up to 100 reports that may be manually generated or automatically generated weekly without human intervention. These reports shall be able to limit the information to required times, dates, events and/or monitor points, doors, relays, inputs, operators, card users, controllers as pre-programmed by the user.
 - .2 The user will have the option of sending reports to the screen, the hard disk or to a printer.

1.4 SHOP DRAWINGS

- .1 Submit component shop drawings for approvals before site installation.
- .2 Project specific riser diagrams indicating the layout of the planned system must also be submitted to the Engineer for approval.

PART 2 - PRODUCTS

2.1 DOOR CONTROLLERS

- .1 The access control panel shall have, but not limited to the following key features:
 - .1 A lithium battery will maintain data in non-volatile memory and supply power for an on-board real time clock, for a duration of five (5) years.
 - .2 In case of power failure, a battery will maintain the system in function for up to 48 hours,
 - .3 Monitored points will be supervised for such conditions as alarm, short circuit, ground, open and normal conditions.
 - .4 Each of the controllers will be supplied with its own AC power supply. Step down transformer shall be CSA approved and 12V or 24VDC selectable.
 - .5 Each of the controllers will supply power for all associated electric strikes.
 - .6 Controller to accept external contact from intercom system release door.
 - .7 All door controllers and associated head-end equipment shall be rack mountable in a standard 19" communications rack

2.2 PROXIMITY READERS

- .1 The card readers must function with the HID corporate 1000 system and have the following specifications:
 - .1 Minimum reading distance of 4-5inches.
 - .2 Operating temperatures -30 Celsius to +65 Celsius.

2.3 DOOR CONTACT

- .1 Door contacts are to be recessed, high security triple bias type.

2.4 OPERATOR'S CONSOLE

- .1 Where the operator's console is not a proprietary piece of equipment provided by the system manufacturer a dedicated operator's console shall be provided as follows:
- .2 22" high definition LCD display
- .3 Microsoft Windows based work station computer with the following minimum specifications and features.
 - .1 Quad-Core Intel i7 processor
 - .2 8gb RAM
 - .3 1Gb dedicated video memory
 - .4 1TB HDD
 - .5 Access control/Security reporting software
 - .6 All applicable software licenses
 - .7 USB Keyboard and mouse
 - .8 UPS sized for minimum 1 hour runtime

2.4 SECURITY EQUIPMENT ENCLOSURE

- .1 One 42U lockable enclosure shall be provided to house all CSC security electronics including Access Control/Security, Personal Protection Alarm and CCTV. Refer to section 27 05 28 for enclosure specification.

2.5 PROXIMITY CARDS

- .1 125kHz HID Corporate 1000 ID/Proximity cards will be supplied to the occupants by the departmental representative and are not to be acquired as part of this contract. All hardware, software and programming required to integrate these cards is to be included in the scope of this contract.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

- .1 Ensure that every system component is installed according to manufacturer's recommendations, specifications and state-of-the art.

3.2 WIRING

- .1 As per the latest edition of the Canadian Electrical Code.
- .2 All wiring must be FT-4, insulated copper conductors complete with green coloured outer jacket.
- .3 No wire shall be apparent after installation.
- .4 Maximum length of security cable drop between flush installed ceiling device box and associated junction box within the same ceiling space is not to be greater than 1.5m.
- .5 All security/access control system wiring installed outside of the security LAN room shall be installed in conduit in its entirety unless noted otherwise.

3.3 TESTING

- .1 At the end of the installation, make all necessary tests in the presence of the user's representative.
- .2 Upon user approval of the installed system, a 1-year warranty on parts will be in effect.
- .3 Provide user with a written list of equipment warranty periods.

3.4 PROGRAMMING AND TRAINING

- .1 Provide the initial system software programming, customizing and data entry.
- .2 Provide all necessary programming.
- .3 Provide for two (2) day of training, 30 days apart.

3.5 DRAWINGS AND MANUALS

- .1 Provide three (3) copies of system operation and technical manuals.
- .2 At the close of installation, provide "as built" drawings on the wiring, networks and components.

3.6 VERIFICATION

- .1 Verify that the equipment installed meets the specifications.
- .2 Verify wiring connections to all equipment meets applicable codes and standards.
- .3 Verify the operation of all devices.
- .4 Verify the wiring to all equipment is complete.
- .5 Provide a copy of inspecting technician's report to user. Identity each device by location and certify the test results.
- .6 Issue a certificate of verification confirming the completion of the verification.

END OF SECTION

PART 1- GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 26 05 34: Conduits, Conduit Fastenings and Conduit Fittings.
- .2 Section 27 10 05: Structural Cabling for Communications Systems.

1.2 REFERENCES

- .1 Underwriters Laboratories of Canada (ULC)
 - .1 ULC-S317-1996, Installation and Classification of Closed Circuit Video Equipment (CCVE) Systems for Institutional and Commercial Security Systems.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00.
- .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 three (3) days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.

1.4 CLOSEOUT SUBMITTALS

- .1 Operation and Maintenance Data: submit maintenance data for incorporation into manual specified in Section 01 78 00. 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.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 and 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, dry, well-ventilated area.
 - .2 Store and protect video surveillance and network equipment and materials from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

1.6 WARRANTY

- .1 Manufacturer's Warranty: submit, for Departmental Representative's acceptance, manufacturer's standard warranty document executed by authorized company official.

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA

- .1 The CCTV system shall operate using the IP based Genetec Omnicast management software CCTV system. No alternates to this system will be considered.
- .2 Camera viewing will take place at the reception/security desk via an operator's console consisting of two (2) 22" High-Definition LCD screens and mouse run over a KVM module. Additionally, viewing of cameras will be available via KVM tray adjacent CCTV head-end equipment in security equipment enclosure in LAN room.
- .3 Network video recorder storage shall be sized for a minimum of 30 days 24/7 operation of all cameras using H.264 compression.
- .5 Installer to be Genetec certified. All mounting equipment and hardware list to be Genetec and installed by a Genetec certified installer.

2.2 CHARACTERISTICS

- .1 Fixed Video Camera:
 - .1 Colour.
 - .2 Minimum illumination 0.1 fc IRE F1.4
 - .3 Minimum resolution: lines of horizontal resolution:
 - .1 Colour: 800 x 600 (480,000 Pixels) for 30 fps model.
 - .4 Format: 1/4" Progressive Scan CCD.
 - .5 Environment: outdoor.
 - .6 Mounting: visible.
 - .7 Lens functions: Varifocal lens, focal length 2.8mm to 22mm.
 - .8 Operational voltage: High Power Over Ethernet (High PoE).
 - .9 Operation temperature: -40 degrees C -to- +50 degrees C. (Artic Temperature Control).
 - .10 Connector RJ-45 for 10BASE-T/100BASE-TX PoE IP66 rated RJ-45 connector.
 - .11 Video compression: H.264, (MPEG-4 Part 10/AVC) Motion JPEG.
 - .12 Frame rate: adjustable from 1 Fps up to 30 Fps in all resolutions Motion JPEG, up to 30Fps in all resolutions.
 - .13 Housing:
 - .1 IP66/NEMA 4X Rated Metal Casing (Aluminum), Acrylic (PMMA).
 - .2 Clear dome, sun/UV protected (PC/ASA), IK10 or better impact resistance.
 - .14 Mounting:
 - .1 Custom mounting bracket required. Contractor to coordinate with Departmental Representative, and manufacturer. Contractor to pay all associated fees regarding custom bracket.

2.3 CAMERA HOUSINGS

- .1 Domes: outdoor.
- .2 Outdoor: equipped with Artic Temperature Control.
- .3 Transmission Methods: CAT 6 cable (Green) Network cable (dedicated) High Power over Ethernet (High PoE).

2.4 CAMERA POWER SUPPLY

- .1 Power supply: Of High Power over Ethernet (High PoE)

2.5 FAST ETHERNET SWITCH

- .1 Fast Ethernet switch is to be a 48 port managed switch with PoE (Power over Ethernet) capability. Switch is to have the following features:
 - .1 48 10/100 BASE TX ports supporting 802.3at Type 2 PoE.
 - .2 Rack mountable 1U enclosure.
- .2 Standard of acceptance: AVAYA 4850GTS-PWR or equivalent alternate.

2.6 RACK MOUNT UNINTERRUPTABLE POWER SUPPLY

- .1 Uninterruptable power supply (UPS) is to be an online type with the following features:
 - .1 1500VA, 1350W.
 - .2 120V with NEMA 5-20P plug.
 - .3 Full load efficiency ~95%, 86% in online mode minimum.
 - .4 Output distortion less than 3%.
 - .5 Sine wave output.
 - .6 Six (6) NEMA 5-15R Outputs.
 - .7 Built in bypass mode.
 - .8 Minimum 1.83m cord length.
 - .9 Maintenance free sealed lead acid battery with suspended electrolyte.
 - .10 USB connection to PC for monitoring and setup.
 - .11 LED status display showing current mode, load, battery level, and alarms.
 - .12 Remote emergency power off (REPO).
 - .13 Optional external expansion battery pack modules for extended runtime, (2U) in size.
 - .14 Rack mountable in a 2U enclosure.
 - .15 Unit to be complete with communications card(s) for direct control and remote monitoring via SNMP based networks, web browser interface, relay card(s) for integration into existing Building Management Systems.
 - .16 Minimum run time is 1 hour at full load.
- .2 Standard of acceptance: EATON 1500VA UPS: PW9130L1500R-XL2U.

2.7 PATCH PANELS & NETWORK CABLE

- .1 Patch panels are to be 24 port Cat 6 rated, rack mountable, per Section 27 10 05.
- .2 Network cables are to be Cat 6 UTP with a bright green colour jacket.

2.8 REMOTE MONITORING SOFTWARE

- .1 Remote monitoring software is to have the ability to view real time video from all of the security cameras and select views to view in full screen.
- .2 Video review, search and extraction is to occur in the LAN room only and shall not be available at the security desk.
- .3 Remote monitoring software is to be of the same manufacturer as the surveillance server.

PART 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(s).
 - .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 cables, boxes, custom mounting brackets and other hardware, video cameras and system components as indicated on the drawing(s) and in accordance with the manufacturer's written installation instructions.
- .4 Install components secure, properly aligned and in locations shown on reviewed shop drawings.
- .5 Connect cameras to cabling in accordance with installation instructions. Coordinate with Departmental Representative for all terminations.
- .6 Install ULC labels where required.

3.3 FIELD QUALITY CONTROL

- .1 Manufacturer's Field Services:
- .2 Obtain written reports from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product.
- .3 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.
- .4 Schedule site visits to review Work at stages listed:
 - .1 After delivery and storage of products, and when preparatory Work, or other Work, on which the 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.

3.4 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 and security specialists 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. Technical verification: purpose to ensure that all systems and devices are properly installed and free of defects and damage.

- .3 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.

3.6 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11.
 - .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.
 - .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.

END OF SECTION

PART 1 – GENERAL

1.1 SYSTEM SUMMARY

- .1 Install the personal protection alarm system (PPA) as specified herein. The system will be used to identify personnel under duress in potentially high-risk situations.
- .2 System to consist of a lightweight, wearable Personal Protection Device (PPD) that communicates over radio frequency (RF) with receivers distributed throughout the building or complex.
- .3 A duress alarm will be initiated by pressing a button on the PPD.
- .4 System to provide a software interface to the building's security system operator's console to report all PPA system Alarms and Warnings.
- .5 System to provide a telephone system interface to send alarms to an external monitoring agency.

1.2 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Include, project specific riser diagram, block diagram of complete PPA system.

1.3 SPARES

- .1 Provide the Departmental Representative spare system components.
- .2 For each system components, provide spares consisting of at least one unit or 10% of the number that comprise the system, whichever is greater.

PART 2 – PRODUCTS

2.1 PERSONAL PROTECTION ALARM

- .1 System to consist of:
 - .1 30 wearable Personal Protection Devices (PPDs) and 20 fixed location personal Protection devices that communicate over radio frequency (RF) with receivers distributed throughout the building or complex.
 - .2 A software application that alerts operators of received alarms and can display them on user-configurable maps.

2.2 REGULATORY REQUIREMENTS

- .1 Register the PPA system with a nationally registered testing laboratory such as CSA or UL, under the appropriate performance category for duress alarm equipment.
- .2 All equipment must carry the appropriate registration label(s).

- .3 PPA System to operate within a licensed frequency band that will not be shared by other RF equipment at the same location.
- .4 PPA System must not operate within the unlicensed frequency bands.
- .5 PPA equipment to carry the appropriate RF registrations for use in Canada.

2.3 MECHANICAL REQUIREMENTS

- .1 PPDs:
 - .1 Dimensions: approximately 12 x 5.0 x 2.5 cm (4.7 x 2 x 1 inches).
 - .2 Weight: approximately 200 g (7 ounces) (including battery).
 - .3 Durability: other than for cosmetic damage, the PPDs must not be damaged or malfunction after six (6) drops onto a tiled floor from a height of 1.5 m (5 feet) with one drop on each of the six (6) sides on three (3) orthogonal axes.
 - .4 PPD enclosure to have a tamper-resistant construction.
 - .5 PPD to include a belt-holster.
 - .6 PPD to include an option for a lanyard with pull-pin.
- .2 RF receivers:
 - .1 RF receiver enclosure to include mounting flanges to facilitate its installation on a wide variety of surfaces.
 - .2 RF receiver to have the option of using external antennas for increased range.

2.4 ELECTRICAL REQUIREMENTS

- .1 PPD:
 - .1 PPD to use commercially available 9VDC non-rechargeable batteries.
 - .2 Battery must be replaceable by the user or system administrator.
 - .3 PPD to automatically report a low battery condition to the operator's alarm notification system.
 - .4 Under normal operating conditions (3 test transmissions per day) the PPD battery must provide a minimum life time of one (1) year before a low battery condition is reported.
 - .5 PPD to be capable of operating normally for at least 15 days following the initial reporting of a low battery condition.
- .2 RF receivers:
 - .1 The input voltage for the RF receiver will be 19VDC and it must consume less than 4 watts.
 - .2 RF receivers to have the option of being powered from an AC source (115VAC, 50/60 Hz).
 - .3 RF receivers to have the option of being powered via Power-over-Ethernet (PoE).
 - .4 Each RF receiver must be capable when operating under AC of including individual integral battery backup. When fully charged, the backup batteries must provide a minimum of four (4) continuous hours of operation following the loss of AC power.
 - .5 The failure of AC power, resulting in the operation of any installed equipment on the optional backup battery, will result in a warning alarm within 10 minutes of the condition having been continuously present.

2.5 ENVIRONMENTAL REQUIREMENTS

- .1 PPD to operate within specifications under the following environmental conditions:
 - .1 Operating temperature: -20°C to 60°C.
 - .2 Water resistance: PPD must not malfunction after being exposed to 30 seconds of heavy rain.

- .2 The RF receivers and other installed devices must be able to operate within specifications under the following environmental conditions:
 - .1 Operating temperature: 0°C to 60°C.

2.6 RF REQUIREMENTS

- .1 PPA System to operate in licensed bands as to avoid potential interference from a third-party.
- .2 PPA System to support the International Public Safety band, 420 to 470 MHz.
- .3 It must be possible to configure the PPA to operate at any of a number of frequencies within the approved band in order to avoid RF interference from pre-existing RF sources on or near a particular site.
- .4 The option exists for an external antenna to be used in order to increase the coverage area.
- .5 The RF signal must not be blocked by common building materials, smoke, the human body, or heavy clothing.

2.7 PERFORMANCE REQUIREMENTS

- .1 PPA to support transmissions up to 1 km (0.6 miles) when PPD has a line-of-sight with an RF receiver equipped with an external antenna.
- .2 PPA System to support at least 10 alarms within a 10 second time period.
- .3 PPA System must meet the following system capacity requirements:
 - .1 A minimum of 4,000 unique PPD identification codes.
 - .2 A minimum of 24,000 unique locations, or zones, per facility. Any or all zones may be either indoor or outdoor locations.

2.8 PERSONAL PROTECTION DEVICE FUNCTIONALITY

- .1 PPD to include a button that, when pressed, activates an alarm transmission.
- .2 Optionally, the PPD must be capable of generating an alarm if the PPD is taken from the user. This tamper function will require the use of an optional device, such as lanyard with a pull-pin, which causes an alarm to be generated when it is removed from the PPD.
- .3 Man-down feature:
 - .1 PPD to have an optional man-down capability, whereby the PPD automatically transmits a duress alarm when it tilts beyond a user-specified angle for a user-selectable period.
 - .2 PPD to use an internal accelerometer to detect tilt conditions.
 - .3 Man-down function to include the following user-programmable features:
 - Tilt angle
 - .4 Audible warning of pending alarm
 - .5 Silent mode (no audible warning)
 - .6 Time delay before warning of pending alarm
 - .7 Warning duration
 - .8 Retransmission at user-defined intervals

- .4 Each PPD must be configurable by the system administrator to report a specific identification code, without a return to the factory. This will enable any PPD to be used as a replacement for another PPD that is damaged or otherwise needs to be replaced.
- .5 Optionally, each PPD with a pull-pin option must be capable of being configured by the system administrator to transmit repeatedly after a duress call is initiated by pull-pin activation. In this way, a PPD can be tracked and located if the person carrying it does not remain in one location.

2.9 ALARM GENERATION AND ANNOUNCEMENTS

- .1 Each person requiring the ability to generate a duress alarm must wear a PPD.
- .2 Each PPD user will be capable of transmitting a duress alarm, which will be reported at the control computer, using one or more of the following activation methods:
 - .1 Pressing a button on the PPD.
 - .2 Removing a pin attached to a lanyard from the PPD (optional)
 - .3 Activation of the man-down function (optional)
- .3 The acknowledgement and clearing of duress alarms, and all other alarm handling functions, will be performed using a computer mouse or touch screen interface. A computer keyboard will not be required for the alarm processing operation of the PPA System.
- .4 PPA System must be able to display alarms from multiple PPDs, up to the number of PPDs used in the system.
- .5 PPA System to report duress alarms with a distinct audible and visual indication that is easily distinguished from equipment, maintenance, and diagnostic alarms.
- .6 Optionally, the PPA System must be capable of generating an EIA-232 data string for each reported alarm. This interface can be used to communicate duress alarms to other systems in the control room, or in remote locations.

2.10 RELIABILITY AND MAINTENANCE REQUIREMENTS

- .1 PPA System to continuously monitor the state of all system hardware. The system must be capable of immediately reporting a maintenance or diagnostic warning to the operator's console, upon the detection of a system problem or the failure of a hardware component.
- .2 Configuration and upgrades:
 - .1 The RF receivers, transmitters and other hardware items must be microprocessor based, and shall be designed such that software reconfigurations and software upgrades can be accomplished without removing the units from the site.
 - .2 The unique ID code and frequency of operation for each PPD must be configurable.
 - .3 Installed equipment must be capable of receiving software patches or software upgrades from the control computer at the site, without the need to physically access each piece of equipment.
- .3 Diagnostics and accuracy checks:
 - .1 System to run daily diagnostic checks on all installed equipment.
 - .2 System to report any exceptions or failures as warnings on the operators console, but shall not trigger and alarm to the monitoring agency.
 - .3 System to perform a locating accuracy check along with RF receiver functionality verification, a minimum of once per day, to ensure that all receiver equipment is functioning correctly.

.4 PPA System to provide notification of the failure of any integrated backup battery by means of a warning alarm.

.5 PPA System to create and maintain a record of all system equipment failure notifications.

2.11 ALARM RECORDING AND STORAGE

.1 PPA System to log all duress and warning alarms to a computer hard disk.

.2 Duress alarms will be displayed as a distinct log, separate from equipment failure and other alarms.

.3 The data logged for each alarm to include the identification and location of the alarm, the time of the alarm, the time that the alarm condition was acknowledged and the time that the alarm was cleared from the system.

.4 Save all logged data in a current Windows-compatible, commonly accessible data format, from which data can be exported or retrieved by the system administrator, or others, for analysis or to archive.

.5 Provide the PPA System administrator with the capability of selecting and printing any, or all, alarms from the alarm logs on demand.

2.12 INSTALLATION AND CONFIGURATION CAPABILITIES

.1 The distributed RF receivers to function correctly when mounted in cable chases, above false ceilings, and in other areas, which are not accessible or visible.

.2 The PPD must be configurable from a software application running on a Windows-based PC.

.3 It must be possible to convert and edit Computer-Aided Design (CAD) files of the facility for use as floor plans in the control computer.

2.13 SYSTEM SECURITY

.1 PPA System to provide a minimum of three (3) levels of password protection. Each level of password protection must allow successively greater levels of access to operating, maintenance, and administrative functions.

2.14 NETWORKING CAPABILITIES

.1 PPA System to support the following RF receiver interconnect options:
Standard off-the-shelf 10/100BaseT Ethernet (RJ-45 connectors)

.1 CEBus on AC power line dedicated circuit or shielded twisted pair.

.2 CEBus shielded twisted pair backbone between buildings.

.3 Fiber backbone between buildings.

.4 Wireless backbone between buildings.

PART 3 – EXECUTION

3.1 SITE ASSESSMENT

- .1 Before installation begins, inform the Departmental Representative of any site conditions that may prevent the system from operating satisfactorily.

3.2 SYSTEM INSTALLATION

- .1 Install the system in accordance with the manufacturer's recommended procedures as defined in the manufacturer's documentation.

3.3 SYSTEM CALIBRATION

- .1 Calibrate the system in accordance with the manufacturer's recommended procedures as defined in the manufacturer's documentation.
- .2 Submit to the facility the configuration settings for the system.

3.4 TRAINING

- .1 Train the maintenance personnel in the system maintenance procedures as described in the manufacturer's product documentation.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK

- .1 Wiring: Section 26 05 21
- .2 Conduits: Section 26 05 34

1.2 REFERENCES

- .1 CAN/ULC-S524-2014, Installation of Fire Alarm Systems.
- .2 ULC-S525-2007, Audible Signal Appliances for Fire Alarm.
- .3 CAN/ULC-S527-2011, Control Units, Fire Alarm.
- .4 CAN/ULC-S528-2005, Manual Pull Stations.
- .5 CAN/ULC-S529-2009, Smoke Detectors, Fire Alarm.
- .6 CAN/ULC-S530-M91, Heat Actuated Fire Detectors, Fire Alarm.
- .7 CAN/ULC-S536-2013, Inspection and Testing of Fire Alarm Systems.
- .8 CAN/ULC-S537-2013, Verification of Fire Alarm Systems.
- .9 NBC, National Building Code of Canada, 2011.

1.3 SYSTEM DESCRIPTION

- .1 Fully supervised, microprocessor-based, fire alarm and control system, utilizing digital techniques for data control and digital, and multiplexing techniques for data transmission. System shall be a fully addressable, two wire using intelligent devices.
- .2 System to carry out fire alarm and protection functions; including receiving alarm signals; initiating general alarm; supervising components and wiring; actuating annunciators and auxiliary functions; initiating trouble signals and signalling to monitoring agency.
- .3 Zoned, non-coded single stage.
- .4 Modular in design to allow for future expansion.
- .5 Operation of system must not require personnel with special computer skills.
- .6 System to include:
 - .1 Central Control Unit with power supply, stand-by batteries, central processor with microprocessor and logic interface, main system memory, input-output interfaces for alarm receiving, annunciation/display, and program control/signalling.
 - .2 Power supplies.
 - .3 Initiating/input circuits.
 - .4 Output circuits.

- .5 Auxiliary circuits.
- .6 Wiring.
- .7 Manual and automatic initiating devices.
- .8 Audible and visual signaling devices.
- .9 End-of-line resistors.
- .10 LCD annunciation and control panel.
- .11 Dual line dialer.
- .12 Network connection

1.4 REQUIREMENTS OF REGULATORY AGENCIES

- .1 System components: listed by ULC and comply with applicable provisions of National Building Code Local/Provincial Building Code, and meet requirements of local authority having jurisdiction.

1.5 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Section 01 33 00.
- .2 Include:
 - .1 Detail assembly and internal wiring diagrams for control units and Auxiliary cabinets.
 - .2 Project specific system riser wiring diagram identifying control equipment, initiating zones, signaling circuits; identifying terminations, terminal numbers, conductors and raceways.
 - .3 Details for devices.
 - .4 Details and performance specifications for control, annunciation and peripherals with item by item cross reference to specification for compliance.
 - .5 Step-by-step operating sequence, cross referenced to logic flow diagram.
 - .6 Circuit and battery loading calculations

1.6 OPERATION AND MAINTENANCE DATA

- .1 Provide operation and maintenance data for fire alarm system for incorporation into manual specified in Section 01 78 00.
- .2 Include:
 - .1 Instructions for complete fire alarm system to permit effective operation and maintenance.
 - .2 Technical data - illustrated parts lists with parts catalogue numbers.
 - .3 Copy of approved shop drawings with corrections completed and marks removed except review stamps.
 - .4 List of recommended spare parts for system.
 - .5 Complete list of all points and a description for each.

1.7 MAINTENANCE

- .1 Provide one (1) year's free maintenance and monitoring with two inspections by manufacturer during warranty period. Inspection tests to conform to CAN/ULC-S536. Submit inspection report to Departmental Representative.
- .2 Provide individual price on tender form for temporary program changes during construction period, to include zone labels, control functions, system operation.

1.8 TRAINING

- .1 Provide on-site lectures and demonstration by fire alarm equipment manufacturer to train operational personnel in use and maintenance of fire alarm system.
- .2 Provide advance copy of training material and instructional outline 14 days prior to scheduled training.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Equipment and devices: ULC listed and labelled and supplied by single manufacturer.

2.2 SYSTEM OPERATION TWO STAGE SIGNALS ONLY

- .1 Actuation of any one (1) alarm initiating device to:
 - .1 Cause electronic latch to lock-in alarm state at central control unit and data gathering panel/transponder..
 - .2 Indicate zone of event at central control unit.
 - .3 Cause an audible and visual signal from signaling throughout building and at central control unit..
 - .4 Transmit signal to Building Automation System network via addressable output.
 - .5 Cause ventilation signal to shut down or to function to provide required control
- .3 Acknowledging alarm: indicated at central control unit.
- .5 Possible to silence signals by "alarm silence" switch at control unit, after 60 s period of operation.
- .6 Subsequent events, received after previous alarm has been silenced, to re- activate signals.
- .7 Actuation of supervisory devices to:
 - .1 Indicate respective supervisory zone at central control unit and at the graphic annunciator.
 - .2 Cause audible signal at central control unit to sound.
 - .3 Activate common supervisory sequence.
- .8 Resetting alarm and supervisory device not to return system indications/functions back to normal until control unit has been reset.
- .9 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; whereas visual indication to remain until trouble is cleared and system is back to normal.
 - .3 Transmit signal to Building Automation System network via addressable network.
- .10 Trouble on system: suppressed during course of alarm.
- .11 Trouble condition on any circuit in system not to initiate alarm conditions.

2.3 CONTROL PANEL

- .1 Central control unit (CCU):
 - .1 Suitable for DCLA and DCLB communication style: to CAN/ULC-S524.
 - .2 Features specified are minimum requirements for microprocessor- based system with digital data control and digital multiplexing techniques for data transmission.
 - .3 Minimum capacity of 250 addressable monitoring and 250 addressable control/signal points per loop.
 - .4 System to provide for priority reporting levels, with fire alarm points assigned highest priority, supervisory and monitoring lower priority, and third priority for troubles. Possible to assign control priorities to control points in system to guarantee operation or allow emergency override as required.
 - .5 Integral TVSS protected point for power source termination, power supply, battery charger and standby batteries.
 - .6 Basic life safety software: retained in non volatile Erasable Programmable Read-Only-Memory (EPROM). Extra memory chips: easily field-installed. Random- Access-Memory (RAM) chips in panel to facilitate password-protected field editing of simple software functions (e.g. zone labels, priorities) and changing of system operation software.
 - .7 Circuitry to continuously monitor communications and data processing cycles of microprocessor. Upon failure, audible and visual trouble indication to activate.
 - .8 Support up to two (2) RS-232-C I/O ports. CCU output: parallel ASCII with adjustable baud rates to allow interface of any commercially available printer, terminal or PC.
 - .9 Equipped with software routines to provide Event-Initiated- Programs (EIP); change the status of one or more monitor points, may be programmed to operate any or all of system's control points.
 - .10 Software and hardware to maintain time of day, day of week, day of month, month and year.
 - .11 Software to operate variable sensitivity addressable smoke detectors and annunciate their status and sensitivity settings at control panel.

2.4 POWER SUPPLIES

- .1 120 V, 60 Hz as primary source of power for system.
- .2 Voltage regulated, current limited distributed system power.
- .3 Primary power failure or power loss (less than 102 V) will activate common trouble sequence.
- .4 Interface with battery charger and battery to provide uninterruptible transfer of power to standby source during primary power failure or loss.
- .5 During normal operating conditions fault in battery charging circuit, short or open in battery leads to activate common trouble sequence and standby power trouble indicator.
- .6 Standby batteries: sealed, maintenance free.
- .7 Continuous supervision of wiring for external initiating and alarm circuits to be maintained during power failure.
- .8 Provide TVSS protected point integral to fire alarm panel for power source termination.

2.5 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 central control unit.

- .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 Receiving circuits for supervisory, N/O devices. Devices: wired in DCLA configuration to central control unit.
- .5 Actuation of supervisory initiating device: cause system to operate as specified in "System Operation".

2.6 ALARM OUTPUT CIRCUITS

- .1 Alarm output circuit: connected to signals, wired in class A configuration to central control unit.
 - .1 Signal circuits' operation to follow system programming; capable of sounding bells horns and strobes continuously at 20 spm. Each signal circuit: rated at 2 A, 24 VDC; fuse- protected from overloading/overcurrent.
 - .2 Manual alarm silence, automatic alarm silence and alarm silence inhibit to be provided by system's common control.

2.7 AUXILIARY CIRCUITS

- .1 Auxiliary contacts for control functions.
- .2 Actual status indication (positive feedback) from controlled device.
- .3 Alarm and supervisory on system to cause operation of programmed auxiliary output circuits.
- .4 Upon resetting system, auxiliary contacts to return to normal or to operate as pre-programmed.
- .5 Fans: stagger-started upon system reset; timing circuit to separate starting of each fan or set of fans connected to auxiliary contact on system. Timing circuit: controlled by CCU.
- .6 Auxiliary circuits: rated at 2 A, 24 V dc or 120 V ac, fuse-protected.

2.8 WIRING

- .1 Twisted copper conductors: rated 300 V.
- .2 To initiating circuits: 16 AWG minimum, and in accordance with manufacturer's requirements.
- .3 To signal circuits: 14 AWG minimum, and in accordance with manufacturer's requirements.
- .4 To control circuits: 14 AWG minimum, and in accordance with manufacturer's requirements.
- .5 House all wiring in approved conduit system. Install initiating and signalling wiring in separate conduit.

2.9 MANUAL ALARM STATIONS

- .1 Addressable manual pull station.
 - .1 Pull lever, semi-flush wall mounted type, single action, single stage, electronics to communicate station's status to addressable module/transponder over two (2) wires and to supply power to station. Station

address to be set on station in field.

- .2 Standard of Acceptance: Simplex 4099-9001CB Series.

2.10 AUTOMATIC ALARM INITIATING DEVICES

- .1 Addressable thermal fire detectors, combination fixed temperature of 57 C. Electronics to communicate detector's status to addressable module/transponder.
 - .1 Detector address to be set on detector base and head in field.
- .2 Addressable variable-sensitivity smoke/heat/carbon monoxide detectors.
 - .1 Photo-electric type smoke detection.
 - .2 Electronics to communicate detector's status to addressable module/transponder.
 - .3 Detector address to be set on detector base and head in field.
 - .4 Sensitivity settings: determined and operated by control panel. No shifting in detector sensitivity due to atmospheric conditions (dust, dirt) within certain parameters.
 - .5 Ability to annunciate minimum of two (2) levels of detector contamination automatically with trouble condition at control panel.
 - .6 Duct mounted where indicated. Duct mounted detectors to come complete with relay base for fan shut down.
 - .7 Audible bases where indicated.
 - .8 Standard of Acceptance: Simplex 4098-9714 Series.
- .3 Addressable Interface Modules (AIM).
 - .1 To provide ability to communicate with CCU for sprinkler supervisory devices and other equipment which would otherwise be unaddressed.
 - .2 Provide as indicated and as coordinated on-site with sprinkler system installed.
 - .3 Standard of Acceptance: Simplex 4090-9002 Series.
- .4 Addressable Relays.
 - .1 To allow the CCU to selectively monitor and control equipment.
 - .2 Provide as indicated.
 - .3 Standard of Acceptance: Simplex 4099-9001CB Series.

2.11 SIGNALLING DEVICES

- .1 Combination horn/strobe unit, Strobe units and piezoelectric mini horn units as indicated on plans.
- .2 Surface mounted, red in colour.
- .3 High-low dB setting.
- .4 Selectable candela output.
- .5 Standard of Acceptance: Simplex.

2.12 END-OF LINE DEVICES

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

2.13 ANCILLARY DEVICES

- .1 Remote relay unit to initiate equipment shutdown, as indicated.

2.14 STANDARD OF ACCEPTANCE

- .1 Simplex 4100ES Series.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Install systems in accordance with CAN/ULC-S524.
- .2 Install central control unit and connect to ac power supply.
- .3 Install manual alarm stations and connect to alarm circuit wiring.
- .4 Locate and install detectors and connect to alarm circuit wiring. Do not mount detectors within 1m of air outlets. Maintain at least 600mm radius clear space on ceiling, below and around detectors. Locate duct type detectors in straight portions of ducts.
- .5 Connect alarm circuits to main control panel in class A loop configuration.
- .6 Install signal horns and visual signal devices and connect to signalling circuits in class A loop configuration.
- .7 Connect signalling circuits to main control panel.
- .8 Install end-of-line devices at end of alarm and signalling circuits as required.
- .9 Install annunciator panel where indicated and connect to annunciator circuit wiring.
- .10 Install door releasing devices as indicated.
- .11 Install remote relay units to control equipment shut down, elevator and shunt trips.
- .12 Sprinkler system: wire alarm and supervisory switches and connect to control panel as indicated.
- .13 Connect fire suppression systems to control panel.
- .14 Splices are not permitted.
- .15 Provide necessary raceways, cable and wiring to make interconnections to terminal boxes, annunciator equipment and CCU, as required by equipment manufacturer.
- .16 Confirm wiring is free of opens, shorts or grounds, before system testing and handing over.
- .17 Identify circuits and other related wiring at central control unit, annunciators, and terminal boxes.

3.2 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 - Electrical General Requirements and CAN/ULC-S537.
- .2 Fire alarm system:
 - .1 Test such device and alarm circuit to ensure manual stations, thermal and smoke detectors, sprinkler system transmit alarm to control panel and actuate general alarm and ancillary devices.
 - .2 Check annunciator panels to ensure zones are shown correctly.
 - .3 Simulate grounds and breaks on alarm and signaling circuits to ensure proper operation of systems.
 - .4 Addressable circuits system style DCLA:
 - .1 Test each conductor on all DCLA addressable links for capability of providing 3 or more subsequent alarm signals on line side of single open-circuit fault condition imposed near electrically most remote device on each link. Operate Acknowledge/Silence switch after reception of each of the three (3) signals. Correct imposed fault after completion of each series of tests.
 - .2 Test each conductor on all DCLA addressable links for capability of providing three (3) or more subsequent alarm signals during ground- fault condition imposed near electrically most remote device on each link. Operate Acknowledge/Silence switch after reception of each of the three (3) signals. Correct imposed fault after completion of each series of tests.
- .3 Test complete operation of fire alarm system ventilation unit control. Coordinate commissioning with commissioning Agent and other trades.
- .4 Verification agency to provide Verification Certification to Departmental Representative upon completion of all testing.
- .5 Confirm transmission of signals to ULC monitoring agency.

END OF SECTION