

Part 1 General

1.1 SECTION INCLUDES

- .1 Control panel.
- .2 Detection Accessories.
- .3 Communications.
- .4 Environmental monitoring.

1.2 REFERENCE DOCUMENTS

- .1 National Fire Protection Association (NFPA):
 - .1 NFPA 70, National Electric Code.
 - .2 NFPA 101, Life Safety Code.
- .2 Electronic Industries Association (EIA):

1.3 REFERENCE STANDARDS

- .1 Underwriters Laboratories of Canada (ULC):
 - .1 CAN/ULC-S302, Installation and Classification of Burglar Alarm Systems for Financial and Commercial Premises, Safes and Vaults.
 - .2 CAN/ULC-S303, Local Burglar Alarm Units and Systems.
 - .3 CAN/ULC-S304, Intrusion Detection.
 - .4 CAN/ULC-S306, Intrusion Detection Units.
 - .5 ULC-S318, Power Supplies for Burglar Alarm Systems.
 - .6 ORD-C634, Connectors and Switches for Use with Burglar Alarm Systems.
- .2 Underwriters' Laboratories (UL):
 - .1 UL 603, Standard for Power Supplies For Use With Burglar-Alarm Systems.
 - .2 UL 639, the Standard for Intrusion-Detection Units.

1.4 DEFINITIONS

- .1 PIR: Passive Infrared Detectors.

1.5 DESIGN PERFORMANCE REQUIREMENTS

- .1 Provide a complete hardwired intrusion alarm system as specified herein and as shown on the drawings.
- .2 Design intrusion detection system using ULC/UL Listed products.
- .3 Design intrusion detection system using, company specializing in intrusion detection systems.
- .4 Design intrusion detection system as a certified alarm system.

- .5 Design system as alarm monitoring system expandable, and easily modified for inputs, outputs and remote control stations.
 - .1 Design components in accordance with CAN/ULC-S306 and be capable of:
 - .1 Annunciating undesirable, abnormal or dangerous condition.
 - .2 Prioritizing alarms by alarm type; i.e., panic/duress, intrusion and tamper.
 - .3 Determining zone where alarm occurred.
 - .4 Annunciating power failure and power restoration.
 - .5 Annunciating low battery condition.
 - .6 Operate continuously for minimum period of four hours in the event of a power failure.
- .6 Equip control panels with continuous tamper detection on door and wall:
 - .1 Tamper detection to trigger alarm.
- .7 Design system with:
 - .1 Alarm masking.
 - .2 Remote maintenance or diagnostics with password activation and callback modem.
 - .3 Unique identifier for each authorized person.
 - .4 Arming and disarming capabilities: manual and automatic by time of day, day of week, or by operator command.
 - .5 Support both manual and automatic responses to alarms entering system.
 - .6 Zone or alarm location annunciated at monitoring station.
- .8 Communications link: Security level 1 as described in CAN/ULC-S304.
- .9 Signal link: Security level 1 as described in CAN/ULC-S304.
- .10 Alarm condition: Design system to provide maximum time for an alarm to be communicated of 60 seconds from alarm initiation to annunciation at remote monitoring location.
- .11 Junction boxes: tamper proof with continuous tamper-detection capability.
- .12 Design system power supplies rated to provide cumulative load of all systems components plus safety factor of 50% or greater.

1.6 SUBMITTALS

- .1 Product Data: Submit manufacturer's printed product literature, specifications and datasheet in accordance with E3 – Shop Drawings.
 - .1 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with E3 – Shop Drawings.
 - .2 Submit manufacture's literature for each control panel and detection accessory device.
 - .3 Submit:
 - .1 Functional description of equipment.

- .2 Technical data for all devices.
- .3 Device location plans and cable lists.
- .4 Devices mounting location detail drawings.
- .5 Typical devices connection detail drawings
- .4 Submit shop drawings to indicate project layout, mounting heights and locations, wiring diagrams, detection device coverage patterns, contact operating gaps.
- .5 Submit zone layout drawing indicating number and location of zones and areas covered.
- .2 Maintenance Data: Submit maintenance data:
 - .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.

Part 2 PRODUCTS

2.1 MATERIALS

- .1 Control Panel: ULC approved, expandable and designed for multiplexed expansion:
 - .1 Control Panel: DSC Power Series, or equivalent in accordance with Section B7
 - .2 Zones (protection inputs): 32
 - .3 Expandable: 128
 - .4 Number of user codes required: 10
 - .5 Number of Areas/Partitions required: 10
 - .6 Keypads: LCD (liquid crystal display)
 - .7 Alarm: Monitored by Oakley Alarms
 - .8 System: Wired
 - .9 Number of programmable outputs: As required.
 - .10 System supervision: telephone line, battery, and AC power.
 - .11 Output : Siren / Strobe
 - .12 Number of devices per zone: as required.
 - .13 Keypad: DSC Power Series c/w integrated temperature sensor
- .2 Detection Accessories: and
 - .1 PIR / Microwave Detectors: Bosch OD850, or equivalent in accordance with Section B7.
 - .2 Glassbreak Detector: Bosch DS1101i, or equivalent in accordance with Section B7.
 - .3 Door Contacts: GE Magnetic Contact 2500 series, or equivalent in accordance with Section B7.

- .4 Notification Devices:
 - .1 Exterior siren: Potter Amseco SSX-52, or equivalent in accordance with Section B7.
 - .2 Exterior building strobe light: Federal Signal Fireball series with blue lens, or equivalent in accordance with Section B7.
- .3 Communications: Telephone and GSM Wireless Alarm Communicator (DSC – 3G4010), or equivalent in accordance with Section B7.
- .4 Connectors and switches: to ORD-C634.
- .5 Power supplies: to ULC-S318 or UL 603.
- .6 Input / Output Zone Expander: DSC Power Series, or equivalent in accordance with Section B7.

Part 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: Comply with manufacturer's written data, including product technical bulletins, product catalog installation instructions, product carton installation instructions, and datasheet.

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.
 - .1 Intrusion Alarm Panel: 6' AFF
 - .2 Keypads: 4' AFF
 - .3 Wall mounted motion sensor: 10' AFF
 - .4 Security Horn: Mount at high level near the peak of the roof outdoors and at ceiling height indoors.
 - .5 Security Strobes: Mount the security strobes 2' above the roof line.
 - .6 Glass Break Sensors: Ceiling Mount
- .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 door frames, walls and ceiling spaces where possible.
- .5 Commission the intrusion alarm system.
- .6 Contact the Contract Administrator to schedule the City's Security and Emergency Management Coordinator for Water and Waste and Oakley Alarms to inspect and finalize the intrusion alarm configuration. The Electrical Subcontractor shall make arrangements

with the Contract Administrator 5 working days in advance for the City and Oakley alarms to make final adjustments and set up the security alarm monitoring service.

3.3 FIELD QUALITY CONTROL

- .1 Manufacturer's Services:
 - .1 Have manufacturer of products, supplied under this Section, review Work involved in the handling, installation/application, protection and cleaning, of its product[s] and submit written reports, in acceptable format, to verify compliance of Work with Contract.
 - .2 Manufacturer's Field Services: 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, 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 the Work, after cleaning is carried out.
 - .4 Obtain reports, within three days of review, and submit, immediately, to Contract Administrator.

3.4 VERIFICATION

- .1 Perform verification inspections and test in the presence of Contract Administrator.
 - .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.
- .3 Technical verification: Purpose to ensure that all systems and devices are properly install 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.

3.5 CLEANING AND ADJUSTING

- .1 Remove protective coverings from control panels, detection accessories and components.
- .2 Adjust all components for correct function.
- .3 Clean housings and system components, free from marks, packing tape, and finger prints, in accordance with manufacturer's written cleaning recommendations.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Video cameras.
- .2 Video handling.
- .3 Recording devices.
- .4 Transmission methods.

1.2 REFERENCE DOCUMENTS

- .1 National Fire Protection Association (NFPA):
 - .1 NFPA 70, National Electric Code.
 - .2 NFPA 101, Life Safety Code.
- .2 Electronic Industries Association (EIA):
 - .1 REC 12749, Power Supplies.
 - .2 RS 16051, Sound Systems.

1.3 REFERENCE STANDARDS

- .1 Canadian Standards Association (CSA International):
 - .1 CSA C22.2No.206, Lighting Poles.
- .2 Canadian Standards Association (CSA International):
 - .1 CSA C22.1-12, Canadian Electrical Code, Part 1 (22nd edition) Safety Standard for Electrical Installations.
 - .2 CAN/CSA-C22.3 No.1-10, Overhead Systems.
- .3 National Fire Protection Association (NFPA):
 - .1 NFPA 70, National Electric Code.
- .4 Underwriters' Laboratories (UL):
 - .1 UL 294, Standard for Safety for Access Control System Units.
 - .2 UL 1076, Standard for Safety for Proprietary Burglar Alarm Units and Systems.
- .5 Underwriters Laboratories of Canada (ULC):
 - .1 ULC-S317-96, Installation and Classification of Closed Circuit Video Equipment (CCVC) Systems for Institutional and Commercial Security Systems.

1.4 DEFINITIONS

- .1 CCTV: Closed Circuit Television.
- .2 CCVC: Closed Circuit Video.
- .3 CCD: Charge Coupled Device.

- .4 FOV: Field of View.

1.5 DESIGN PERFORMANCE REQUIREMENTS

- .1 Support: Camera functions such as pan/tilt and zoom fully supported by CCTV system:
 - .1 Provide operator with ability to control all camera functions.
- .2 Alarm point monitoring: System capable, upon alarm recognition, of switching CCTV cameras associated with alarm point.
- .3 Switching:
 - .1 Provision to switch any camera in system to any monitor in system manually or automatically.
 - .2 Provision to switch system video recorders to selective monitor outputs in system.
- .4 Control: Provision for any camera equipped with pan, tilt, and/or motorized zoom lens:
 - .1 Manually control pan, tilt and lens functions.
 - .2 Set pan and tilt home position.
 - .3 Set and clear movement limits of pan and tilt mechanism.
 - .4 Adjust motorized zoom lens.
- .5 Enter and edit CCTV programs and save them for future use.
- .6 Set dwell time for viewing of any camera picture.
- .7 Define sequence for viewing cameras on each monitor.
- .8 Bypass cameras in system during sequencing to monitor.
- .9 Provide ability to display stored 'video image' of cardholder, and switch real-time camera to card reader location for specific card usage.
- .10 Overall control of CCTV provided through software control, which provides complete integration of security components.
- .11 Environment: Design video components and systems to operate with all specified requirements under following ambient temperatures:
 - .1 Indoor installations:
 - .1 Temperature: -20° C to 55° C.
 - .2 Humidity: < 90%.
 - .2 Outdoor installations:
 - .1 Temperature: -50° C to 50° C.
 - .2 Humidity: < 90%.

1.6 SUBMITTALS

- .1 Product Data: Submit manufacturer's printed product literature, specifications and datasheet in accordance with E3 – Shop Drawings.

- .2 Shop Drawings: Submit in accordance with E3 – 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:
 - .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 Quality Assurance Submittals: Submit the following in accordance with E3 – Shop Drawings.
 - .1 Test Reports: Submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.
 - .2 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".
 - .3 Instructions: Submit manufacturer's installation instructions.
 - .4 Manufacturer's Field Services: Submit copies of manufacturer's field reports.
 - .4 Maintenance Data: Submit maintenance data for incorporation into manual specified in E4 – Building and Occupancy Permits to include following:
 - .1 System configuration and equipment physical layout.
 - .2 Functional description of equipment.
 - .3 Instructions on operation, adjustment and cleaning.
 - .4 Illustrations and diagrams to supplement procedures.
 - .5 Manufacturer's operation instructions.

1.7 WARRANTY

- .1 For the materials and labour the 12 month warranty period prescribed in D31 – Warranty is extended to 60 months.
- .2 Extended warranty period must include warranty against lightning, weather, physical damage meeting specified performance requirements, for specified time period.
- .3 Manufacturer's Warranty: Submit, for Contract Administrator's acceptance, manufacturer's standard warranty document executed by authorized company official.

Part 2 PRODUCTS

2.1 MATERIALS

- .1 Video Camera Characteristics:
 - .1 White Colour with Polycarbonate transparent cover.
 - .2 Sensitivity: Lighting requirements. Measured in 22 LUX for useable video image.
 - .3 Camera hardware:
 - .1 Samsung SNZ-6320 (2 Megapixel Resolution)
 - .2 Samsung SNV-7084R (3 Megapixel Resolution)
 - .3 Samsung SNV-8081R (5 Megapixel Resolution)
 - .4 Samsung SNB-8000 (6 Megapixel Resolution)
 - .4 Environment:
 - .1 Samsung SNZ-6320: Outdoor
 - .2 Samsung SNV-7084R: Indoor
 - .3 Samsung SNV-8081R: Outdoor
 - .4 Samsung SNB-8000: Outdoor
 - .5 Mounting:
 - .1 Provide all mounting hardware required, including housing, brackets, etc.
 - .6 Addition features: Backlight compensation.
 - .7 Operational voltage:
 - .1 Power over Ethernet IEEE 802.3af/802.3at
 - .8 Operation temperature:
 - .1 Indoor Cameras: -20° C to 55° C.
 - .2 Outdoor Cameras: -10° C to 55° C.
- .2 Camera Housings:
 - .1 Indoor Domes (Samsung SNV-7084R) shall be constructed with IP66 housings.
 - .2 Outdoor Domes (Samsung SNV-7084R): shall be constructed with IP66 housings complete with POE heater.
 - .3 Outdoor Fixed Cameras (SNZ-6320, SNB-8000) shall be complete with extreme weather proof housing with articulating mount and POE Heater (Samsung SHB-4300H1).
- .3 Network Video Recorder Hardware:
 - .1 Operating System: Windows embedded standard 7
 - .1 CPU: Intel Core i5-6500 Quad Core 3.6 GHz Processor
 - .2 Memory: 12GB DDR4
 - .3 Peripheral Interfaces: 4 USB 2.0, 6 USB 3.0
 - .4 Built-in encoder cards option:
 - .1 Up to 2x PCIe capture cards (support for up to 32 analog channels)
 - .2 1x I/O Alarm Card
 - .5 Display:
 - .1 2x Display Port

- .2 1xVGA
- .6 Ethernet: 1xGbE Port
- .7 Internal Storage:
 - .1 128GB 2.5 SSD
 - .2 2x 3.5” SATA HDD bays for up to 16TB of storage capacity
- .8 Power: 200W standard efficiency, active PFC, energy star qualified
- .9 Operating Temperature: 10°C to 35°C
- .10 Operating Humidity: 10% to 90%
- .11 Dimensions: 13.3”x3.95”x14.9” (WxHxD)
- .12 Certifications: UL, FCC, CE, CCC, KC, C-Tick, BSMI
- .4 Network Video Recorder Software:
 - .1 The Network Security Appliance Software
 - .1 The Network Security Appliance (NSA) shall be a stand-alone IP-enabled network security appliance.
 - .2 The NSA shall come preloaded with Genetec Security Software Standard version 5.3 or higher.
 - .3 Licences for 19 camera connections.
 - .4 The NSA shall support the seamless unification of IP video management system (VMS) and IP access control system (ACS) under a Unified Security Platform (USP). The user interface applications shall present a unified security interface for the management, configuration, monitoring, and reporting of embedded ACS, VMS, and associated edge devices.
 - .5 Functionalities offered by USP Core Platform Software shall include:
 - .1 Live monitoring of Video and Access control events
 - .2 Full Reporting capabilities of Video and Access control
 - .3 Full alarm & health monitoring and reporting capabilities.
 - .4 Ability to be federated to a head end USP system for global monitoring, reporting, and alarm management of multiple remote and independent NSAs spread across multiple facilities and geographic areas.
 - .5 Allow for global cardholder management support at a head end USP system to manage multiple facilities and geographic areas running multiple NSAs, each with their own independent ACS system.
 - .6 Dynamic graphical map viewing.
 - .7 Mobile server support for remote monitoring and control of video surveillance and access control systems in Mobile/Handheld devices over any wireless IP network.
 - .6 Functionalities offered by the VMS and available on the NSA shall include:
 - .1 Support for recording up to 32 video streams from IP cameras and Video Encoders.
 - .2 Support for Built in capture card(s) to support up to 32 analog cameras

- .3 Support for 4 trigger outputs and 8 alarm inputs using a daughter card
- .4 Ability to run client application directly on the NSA to view up to 32 cameras
- .5 Full playback control and instant replay
- .6 Smooth (all-frame) forward and reverse playback.
- .7 Tile recoding for video evidence.
- .8 Visual tracking, watermarking and camera blocking support.
- .9 Support for Genetec Cloud Archives.
- .7 Functionalities offered by the ACS and available on the NSA shall include:
 - .1 Support for up to 100 readers
 - .2 Real-time access control event monitoring.
 - .3 HID edge controller or Genetec Synergis Cloud link support
 - .4 Card holder and credential management
 - .5 Access rule management and schedule
 - .6 Visitor management, people counting, and import tool
 - .7 Cardholder picture tied to access events
 - .8 Conditional access control (first person in), two-person rule, and visitor escort mode
- .2 Supporting Interface Application
 - .1 The NSA shall support an interface application to ease the configuration and use of the NSA. The following functionalities are to be available at any time:
 - .1 Shortcuts to frequently used tasks in USP Config Tool, Security Desk, and Server Admin.
 - .2 Provide access to change General system information, Network, and user account settings.
 - .3 Ability to automatically check and download the latest updates to both the interface application and USP software. Updates include USP minor/major releases as well as service releases and cumulative updates.
 - .4 Receive a notification of when updates are available or are ready to be installed.
 - .5 Ability to change bandwidth priority for available software updates (low, medium, high)
 - .6 Display system, license, and SMA information
 - .7 Provide access to supporting documents like user guide and factory resets documents.
 - .2 The NSA shall support an initial setup wizard as part of the interface application. The initial setup wizard will automatically run the first time the NSA boots to assist in the initial setup. Functionalities include:
 - .1 Ability to configure network configuration settings (Dynamic or static assignment of IP address, Subnet, Gateway, or DNS server)

- .2 Ability to update the interface application to the latest available release
- .3 Option to assign General and Regional settings; Date & time, Time zone, Keyboard and USP Language.
- .4 Ability to change Windows and USP passwords
- .5 Option to turn on a cloud based feature to track system health online
- .3 The NSA shall support an activation wizard which offers the ability to activate the USP software either automatically or manually.
Functionalities include:
 - .1 Online mode for automatic license activation in case the NSA is connected to the internet
 - .2 Offline mode for manual license activation in case the NSA is not connected to the internet
- .4 The NSA shall support an Installer Assistant and unit enrollment tool. The tools offers the ability to quickly complete the setup of VMS/ACS system. Functionalities include:
 - .1 Turn on and off available features within VMS/ACS
 - .2 Ability to assign specific camera vendor login information (username/password) for discovery
 - .3 Option to assign default camera video settings; resolution (low, medium, high) and frame rate.
 - .4 Allow to set up the recording settings (off, continuous, on motion, manual, or custom)
 - .5 Ability to create one or more users and predefined user privileges.
 - .6 Allow for the auto discovery and enrollment of IP cameras/encoders on the network
 - .7 Ability to specify a camera manufacturer
 - .8 User notification of newly discovered entities and includes information like unit name, manufacturer, IP address, firmware version, status, serial number,
 - .9 Ability to add manually or ignore specific camera(s)
 - .10 Option to change camera IP address, discovery/command port
 - .11 Option to reboot a specific camera or upgrade firmware
- .5 Fibre Optic Convertor:
 - .1 Field Mounted: As required.
 - .2 Server Rack: As required
- .6 Security Camera System UPS: Supplied by the City, installed by the Electrical Subcontractor.
- .7 Lighting Arrestor: As required.

2.2 CAMERA SCHEDULE

- .1 The cameras supplied shall match the following schedule:

- .1 VI-01 Samsung SNV-7084R
- .2 VI -02 Samsung SNV-7084R
- .3 VI -03 Samsung SNV-7084R
- .4 VI -04 Samsung SNV-7084R
- .5 VI -05 Samsung SNV-7084R
- .6 VI -06 Samsung SNB-8000
- .7 VI -07 Samsung SNZ-6320
- .8 VI -08 Samsung SNZ-6320
- .9 VI -09 Samsung SNZ-6320
- .10 VI -10 Samsung SNZ-6320
- .11 VI -11 Samsung SNZ-6320
- .12 VI -12 Samsung SNZ-6320
- .13 VI -13 Samsung SNZ-6320
- .14 VI -14 Samsung SNZ-6320
- .15 VI -15 Samsung SNZ-6320
- .16 VI -16 Samsung SNZ-6320
- .17 VI -17 Samsung SNZ-6320
- .18 VI -18 Samsung SNZ-6320
- .19 VI -19 Rough-In Only
- .20 VI -20 Rough-In Only
- .21 VI -21 Samsung SNV-8081R

2.3 IR ILLUMINATOR

- .1 Provide IR illuminators as shown on the site plan. The IR illuminator shall be mounted such that it does not interfere with the camera.
- .2 The IR illuminators shall be a Raytec long range Infra-ref illuminator complete with adjustable beam spread (standard 35° x 10°), integral photocell and 48W 24VAC input. Provide 120VAC-24VAC power supplies as required.
 - .1 Raytec – VAR2-i8-1

2.4 JUNCTION BOX

- .1 Metal, Nema 4, sized to handle all system conduit interconnections with appropriate expansion.

2.5 NETWORK SWITCH

- .1 Supplied by the City and installed by the Electrical Subcontractor.

2.6 RACK

- .1 The security equipment will share the same rack as the structured cabling equipment and will house network patch panels, fibre optic termination, Network Video Controller and City supplied network equipment.

2.7 CAMERA STEEL POLES

- .1 Steel poles: to CSA C22.2 No.206 designed for underground wiring and:
 - .1 Mounting on concrete anchor base.
 - .2 Style: minimum 9 mm thick side wall, 6.625” round straight steel camera pole.
 - .3 Straight for two - three camera mounting brackets and a single IR camera mounting bracket.
 - .4 Access handhole 457 mm above pole base for wiring connections, with welded-on reinforcing frame and bolted-on cover.
 - .5 Size: 4.84 m [16’]
 - .6 Anchor bolts: minimum four steel with shims, nuts and covers.
 - .7 Finish: galvanized steel.
 - .8 Grounding lug.
- .2 Steel poles: designed for maximum deflection of less than 6.35 mm with a 100kmph wind.
- .3 Manufacturer: Prairie Pole – 6RS-16-HW-0-GV or equivalent in accordance with B7.
- .4 Mounting brackets steel.

2.8 UPS

- .1 Supplied by the City and installed by the Electrical Subcontractor.

Part 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: Comply with manufacturer's written data, including product technical bulletins, product catalog installation instructions, product carton installation instructions, and datasheet.

3.2 INSTALLATION

- .1 Mounting Heights:
 - .1 Indoor Domes: Ceiling corner mount. Maximum mounting height shall not exceed 10’ AFF.
 - .2 Exterior Pole Mounted Cameras, IR illuminators and termination enclosures: Refer to drawing 16-0107-010_E11.
 - .3 Exterior Building Mounted Cameras and IR Illuminators: Mount the camera at elevation 103.7m (same level as exterior lighting wall packs) and mount the IR illuminator to the cameras weather proof housing.
- .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 Connect cameras to cabling in accordance with installation instructions.
- .6 Install ULC labels where required.
- .7 Provide all necessary configuration and programming for a complete and operational video surveillance system.

3.3 FIELD QUALITY CONTROL

- .1 Manufacturer's Services:
 - .1 Have manufacturer of products, supplied under this Section, review Work involved in the handling, installation/application, protection and cleaning, of its products and submit written reports, in acceptable format, to verify compliance of Work with Contract.
 - .2 Manufacturer's Field Services: 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, 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 the Work, after cleaning is carried out.
 - .4 Obtain reports, within three days of review, and submit, immediately, to Contract Administrator.

3.4 VERIFICATION

- .1 Perform verification inspections and test in the presence of Contract Administrator.
 - .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.
- .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 CLEANING AND ADJUSTING

- .1 Remove protective coverings from cameras and components.
- .2 Adjust cameras for correct function and field of view.
- .3 Clean camera housing, system components and lens, free from marks, packing tape, and finger prints, in accordance with manufacturer's written cleaning recommendations.

END OF SECTION

Part 1 General

1.1 SUMMARY

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

1.2 SCOPE OF WORK

- .1 Supply and install a single stage addressable fire alarm system as shown on the drawings and specified herein. The fire alarm system shall include but not be limited to the fire alarm panel including all necessary additional modules, auto dialer, ULC listed transponder, receptacle on separate circuit, detection devices, notification devices, interlocks and smoke alarms.

1.3 ACCEPTABLE EQUIPMENT AND SERVICE PROVIDERS

- .1 Manufacturers: The equipment and service described in this specification are those supplied and supported by Simplex Grinnell and represent the base bid for the equipment.
 - .1 Subject to compliance with the requirements of this specification, provide alternate products by one of the following:
 - .1 Simplex Grinnell
 - .2 Edwards
 - .3 Mircom
 - .4 Notifier
 - .5 Or equivalent in accordance with section B7
 - .2 Being listed as an acceptable Manufacturer in no way relieves obligation to provide all equipment and features in accordance with these specifications.
 - .3 Alternate products must be submitted to the Contract Administrator two weeks prior to bid for approval. Alternate or as-equal products submitted under this Contract must provide a detailed line-by-line comparison of how the submitted product meets, exceeds, or does not comply with this specification.
 - .4 The equipment and service provider shall be a nationally recognized company specializing in fire alarm and detection systems. This provider shall employ factory trained and CFAA registered technicians, and shall maintain a service organization within 100 miles of this

project location. The equipment and service provider shall have a minimum of 10 years experience in the fire protective signaling systems industry.

1.4 RELATED DOCUMENTS

- .1 Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this section.
- .2 The work covered by this section is to be coordinated with related work as specified elsewhere in the specifications. Requirements of the following sections apply:
 - .1 Division 26: "Common Work Electrical."
 - .2 Division 26: "Wiring Methods."
 - .3 Division 25: "Fire Protection".
 - .4 Division 25: "HVAC Systems".
 - .5 Division 23: "Building Automation and Control".
- .3 The system and all associated operations shall be in accordance with the following:
 - .1 Requirements of the following Building Code(s): National Building Code of Canada, MBC
 - .2 Requirements of the following Fire Code: National Fire Code of Canada, MFC
 - .3 CAN/ULC-S524-06 Installation of Fire Alarm Systems
 - .4 C22.1-12, Canadian Electrical Code, Part 1 - 2012
 - .5 CAN/ULC-S527-11, Control Units for Fire Alarm Systems
 - .6 Local Jurisdictional Adopted Codes and Standards

1.5 SYSTEM DESCRIPTION

- .1 General: Provide a complete, non-coded addressable, microprocessor-based fire alarm system with initiating devices, notification appliances, and monitoring and control devices as indicated on the drawings and as specified herein.
- .2 Power Requirements
 - .1 The control unit shall receive AC power via a dedicated circuit.
 - .2 The system shall be provided with sufficient battery capacity to operate the entire system upon loss of normal AC power in a normal supervisory mode for a period of 24 hours with 60 minutes of alarm operation at the end of this period. The system shall automatically transfer to battery standby upon power failure. All battery charging and recharging operations shall be automatic.
 - .3 All circuits requiring system-operating power shall be 24 VDC, or 29VDC nominal voltage and shall be individually fused at the control unit.
 - .4 The incoming power to the system shall be supervised so that any power failure will be indicated at the control unit. A green "power on" LED shall be displayed continuously at the user interface while incoming power is present.

- .5 The system batteries shall be supervised so that a low battery or a depleted battery condition, or disconnection of the battery shall be indicated at the control unit and displayed for the specific fault type.
 - .6 The system shall support shutdown operation as defined by CAN/ULC-S527 standard after a Depleted Battery condition occurs.
 - .7 The system shall support 100% of addressable devices in alarm or operated at the same time, under both primary (AC) and secondary (battery) power conditions.
 - .8 Loss of primary power shall sound a trouble signal at the FACP. FACP shall indicate when the system is operating on an alternate power supply.
- .3 Software: The fire alarm system shall allow for loading and editing instructions and operating sequences as necessary.
- .1 The system shall be capable of on-site programming to accommodate system expansion and facilitate changes in operation.
 - .2 All software operations shall be stored in a non-volatile programmable memory within the fire alarm control unit. Loss of primary and secondary power shall not erase the instructions stored in memory.
 - .3 Panels shall be capable of full system operation during new site specific configuration download, master exec downloads, and slave exec downloads.
 - .4 Panels shall automatically store all program changes to the panel's non-volatile memory each time a new program is downloaded. Panels shall be capable of storing the active site-specific configuration program and no less than 9 previous revisions in reserve. A compare utility program shall also be available to authorized users to compare any two of the saved programs. The compare utility shall provide a deviation report highlighting the changes between the two compared programs.
 - .5 Panels shall provide electronic file storage with a means to retrieve a record copy of the site-specific software and up to 9 previous revisions. Sufficient file storage shall be provided for other related system documentation such as record drawings, record of completion, owner's manuals, testing and maintenance records, etc.
 - .6 The media used to store the record copy of site-specific software and other related system documentation shall be electrically supervised. If the media is removed a trouble shall be reported on the fire alarm control panel.
- .4 History Logs: The system shall provide a means to recall alarms and trouble conditions in chronological order for the purpose of recreating an event history. A separate alarm and trouble log shall be provided.
- .5 Recording of Events: The system shall be capable of recording all alarm, supervisory, and trouble events by means of system printer. The printout shall include the type of signal (alarm, supervisory, or trouble) the device identification, date and time of the occurrence. The printout shall differentiate alarm signals from all other printed indications.
- .6 Wiring/Signal Transmission:
- .1 Transmission shall be hard-wired using separate individual circuits for each zone of alarm operation, as required or addressable signal transmission, dedicated to fire alarm service only.

- .2 System connections for initiating devices data communication links shall be Class A.
- .3 System connections for notification appliance data communication links shall be Class B.
- .4 Circuit Supervision: Circuit faults shall be indicated by a trouble signal at the FACP. Provide a distinctive indicating audible tone and alphanumeric annunciation.
- .7 Required Functions: The following are required system functions and operating features:
 - .1 The fire alarm system operation shall be single stage.
 - .2 Priority of Signals: Fire alarm events have highest priority. Subsequent alarm events are queued in the order received and do not affect existing alarm conditions. Priority Two, Supervisory and Trouble events have second-, third-, and fourth-level priority, respectively. Signals of a higher-level priority take precedence over signals of lower priority even though the lower-priority condition occurred first. Annunciate all events regardless of priority or order received.
 - .3 Non-interfering: An event on one zone does not prevent the receipt of signals from any other zone. All zones are manually resettable from the FACP after the initiating device or devices are restored to normal. The activation of an addressable device does not prevent the receipt of signals from subsequent addressable device activations.
 - .4 Transmission to an approved Supervising Station: Automatically route alarm, supervisory, and trouble signals to an approved supervising station service provider, under another Contract.
 - .5 Annunciation: Operation of alarm and supervisory initiating devices shall be annunciated at the FACP, indicating the type of device, the operational state of the device (i.e. alarm, trouble or supervisory) and shall display the custom label associated with the device.
 - .6 Selective Alarm: A system alarm shall include:
 - .1 Indication of alarm condition at the FACP and the annunciator(s).
 - .2 Identification of the device /zone that is the source of the alarm at the FACP and the annunciator(s).
 - .3 Operation of audible and visible notification appliances until silenced at FACP.
 - .4 Selectively closing doors normally held open by magnetic door holders on the fire floor, floor above and floor below.
 - .5 Unlocking designated doors.
 - .6 Shutting down supply and return fans.
 - .7 Closing smoke dampers on system.
 - .8 Initiation of smoke control sequence.
 - .9 Transmission of signal to the supervising station.
 - .7 Supervisory Operations: Upon activation of a supervisory device such as a fire pump power failure, low air pressure switch, and tamper switch, the system shall operate as follows:

- .1 Activate the system supervisory service audible signal and illuminate the LED at the control unit.
- .2 Pressing the Supervisory Acknowledge Key will silence the supervisory audible signal while maintaining the Supervisory LED "on" indicating off-normal condition.
- .3 Record the event in the FACP historical log.
- .4 Transmission of supervisory signal to the supervising station.
- .5 Restoring the condition shall cause the Supervisory LED to clear and restore the system to normal.
- .8 Alarm Silencing: If the "Alarm Silence" button is pressed, all audible and visible alarm signals shall cease operation.
- .9 Priority Two Operations: Upon activation of a priority two condition such as gas detection, or chemical leak detection, the system shall operate as follows:
 - .1 Activate the system priority two audible signal and illuminate the LED at the control unit.
 - .2 Pressing the Priority 2 Acknowledge Key will silence the audible signal while maintaining the Priority 2 LED "on" indicating off-normal condition.
 - .3 Record the event in the FACP historical log.
 - .4 Transmission of priority two signal to the supervising station.
 - .5 Restoring the condition shall cause the Priority 2 LED to clear and restore the system to normal.
- .10 System Reset
 - .1 The "System Reset" button shall be used to return the system to its normal state. Display messages shall provide operator assurance of the sequential steps ("IN PROGRESS", "RESET COMPLETED") as they occur. The system shall verify all circuits or devices are restored prior to resetting the system to avoid the potential for re-alarmed the system. The display message shall indicate "ALARM PRESENT, SYSTEM RESET ABORTED."
 - .2 Should an alarm condition continue, the system will remain in an alarmed state.
- .11 A manual evacuation (drill) switch shall be provided to operate the notification appliances without causing other control circuits to be activated.
- .12 Install Mode: The system shall provide the capability to group all non-verified points and devices into a single "Install Mode" trouble condition allowing an operator to clearly identify event activations from verified points and devices in occupied areas.
 - .1 It shall be possible to individually remove points from Install Mode as required for phased system verification.
 - .2 It shall be possible to retrieve an Install Mode report listing that includes a list of all points assigned to the Install Mode. Panels not having an install mode shall be reprogrammed to remove any non-verified points and devices.

- .8 Analog Smoke Sensors:
 - .1 Monitoring: FACP shall individually monitor sensors for calibration, sensitivity, and alarm condition, and shall individually adjust for sensitivity. The control unit shall determine the condition of each sensor by comparing the sensor value to the stored values.
 - .2 Environmental Compensation: The FACP shall maintain a moving average of the sensor's smoke chamber value to automatically compensate for dust, dirt, and other conditions that could affect detection operations.
 - .3 Programmable Sensitivity: Photoelectric Smoke Sensors shall have 7 selectable sensitivity levels ranging from 0.2% to 3.7%, programmed and monitored from the FACP.
 - .1 Reports shall be capable of being printed for annual recording and logging of the calibration maintenance schedule.
 - .2 Where required, reports shall be accessible remotely through:
 - .1 A Fire Panel Internet Interface using Ethernet and TCP/IP communications protocol compatible with IEEE Standard 802.3. The Fire Panel Internet Interface shall be capable of automatically scheduling email reports to individual user accounts on a weekly, bi-weekly, or monthly schedule.
 - .2 A PC Annunciator using an RS232-C connection to the FACP or a PC Annunciator Client using a TCP/IP communications protocol connection to the PC Annunciator server compatible with IEEE Standard 802.3.
 - .4 The FACP shall automatically indicate when an individual sensor needs cleaning. The system shall provide a means to automatically indicate when a sensor requires cleaning. When a sensor's average value reaches a predetermined value, (3) progressive levels of reporting are provided. The first level shall indicate if a sensor is close to a trouble reporting condition and will be indicated on the FACP as "ALMOST DIRTY." This condition provides a means to alert maintenance staff of a sensor approaching dirty without creating a trouble in the system. If this indicator is ignored and the second level is reached, a "DIRTY SENSOR" condition shall be indicated at the FACP and subsequently a system trouble is reported to the Supervising Station. The sensor base LED shall glow steady giving a visible indication at the sensor location. The "DIRTY SENSOR" condition shall not affect the sensitivity level required to alarm the sensor. If a "DIRTY SENSOR" is left unattended, and its average value increases to a third predetermined value, an "EXCESSIVELY DIRTY SENSOR" trouble condition shall be indicated at the control unit.
 - .5 The FACP shall continuously perform an automatic self-test on each sensor that will check sensor electronics and ensure the accuracy of the values being transmitted. Any sensor that fails this test shall indicate a "SELF TEST ABNORMAL" trouble condition.
 - .6 Multi-Sensors shall combine photoelectric smoke sensing and heat sensing technologies. An alarm shall be determined by either smoke detection, with selectable sensitivity from 0.2 to 3.7 %/ft obscuration; or heat detection, selectable

as fixed temperature or fixed with selectable rate-of-rise; or based on an analysis of the combination of smoke and heat activity.

- .7 Programmable bases: It shall be possible to program relay and sounder bases to operate independently of their associated sensor.
- .8 Magnet test activation of smoke sensors shall be distinguished by its label and history log entry as being activated by a magnet.
- .9 Audible and Visible Alarm Notification: By horn/strobe, and strobe only appliances in areas as indicated on drawings.

1.6 SUBMITTALS

- .1 General: Submit the following according to Conditions of Contract.
 - .1 Product data sheets for system components highlighted to indicate the specific products, features, or functions required to meet this specification. Alternate or as-equal products submitted under this Contract must provide a detailed line-by-line comparison of how the submitted product meets, exceeds, or does not comply with this specification.
 - .2 Wiring diagrams from manufacturer.
 - .3 System power and battery charts with performance graphs and voltage drop calculations to assure that the system will operate in accordance with the prescribed backup time periods and under all voltage conditions per ULC and NBC/MBC standards.
 - .4 System operation description including method of operation and supervision of each type of circuit and sequence of operations for all manually and automatically initiated system inputs and outputs. A list of all input and output points in the system shall be provided with a label indicating location or use of IDC, DLC, NAC, relay, sensor, and auxiliary control circuits.
 - .5 Operating instructions for FACP.
 - .6 Operation and maintenance data for inclusion in Operating and Maintenance Manual. Include data for each type product, including all features and operating sequences, both automatic and manual. Provide the names, addresses, and telephone numbers of service organizations.
 - .7 Product certification signed by the manufacturer of the fire alarm system components certifying that their products comply with indicated requirements.
 - .8 Record of field tests of system.
- .2 Submission to Authority Having Jurisdiction: In addition to routine submission of the above material, make an identical submission to the authority having jurisdiction. Include copies of shop drawings as required to depict component locations to facilitate review. Upon receipt of comments from the Authority, make resubmissions, if required, to make clarifications or revisions to obtain approval.

1.7 QUALITY ASSURANCE

- .1 Installer Qualifications: A factory authorized installer is to perform the work of this section.

- .2 Each and every item of the Fire Alarm System shall be listed under the appropriate category by Underwriters Laboratories of Canada, Inc. (ULC), and shall bear the "ULC" label.

1.8 EXTRA MATERIALS

- .1 General: Furnish extra materials, packaged with protective covering for storage, and identified with labels clearly describing contents as follows:
 - .1 Break Rods for Manual Stations: Furnish quantity equal to 10 percent of the number of manual stations installed; minimum of 6 rods.
 - .2 Notification Appliances: Furnish quantity equal to 10 percent of each type and number of units installed, but not less than one of each type.
 - .3 Smoke Sensors and Fire Sensors: Furnish quantity equal to 10 percent of each type and number of units installed but not less than one of each type.
 - .4 Sensor Bases: Furnish quantity equal to 10 percent of each type and number of units installed but not less than one of each type.

Part 2 Products

2.1 FIRE ALARM CONTROL PANEL

- .1 General: Comply with CAN/ULC-S527-11, "Control Units for Fire Alarm Systems".
- .2 The following FACP hardware shall be provided:
 - .1 Base panel with platinum cabinet and door, 120 VAC input power.
 - .2 2,500 point capacity where (1) point equals (1) monitor (input) or (1) control (output).
 - .3 2,000 points of annunciation where on (1) point of annunciation equals:
 - .1 1 LED driver output on a graphic driver or 1 switch input on a graphic switch input module.
 - .2 1 LED on panel or 1 switch on panel.
 - .4 From all battery charging circuits in the system provide battery voltage and ammeter readouts on the FACP LCD Display.
 - .5 One Auxiliary electronically resettable fused 2A @24VDC Output, with programmable disconnect operation for 4-wire detector reset.
 - .6 One Auxiliary Relay, SPDT 2A @32VDC, programmable as a trouble relay, either as normally energized or de-energized, or as an auxiliary control.
 - .7 Three (3) Class B, (and Class A Capable), Addressable Notification Appliance Data Communication Link Circuits (DCLs)
 - .1 Each Addressable Notification Appliance DCL shall be rated at 3A and capable of supporting up to 63 Notification Appliances per channel.
 - .2 Wiring shall be 18 AWG to 12 AWG unshielded twisted pair wire. Systems that require shielded wire for Notification Appliances shall not be preferred.

- .3 A constant voltage under both primary and secondary power conditions shall be maintained at the notification appliance field wiring terminal connections in the FACP to ensure the voltage drop on the circuit is consistent under both primary and secondary power conditions.
- .4 For systems that do not provide a constant voltage source at the FACP notification appliance field wiring terminal connections, the fire alarm Electrical Subcontractor shall:
 - .1 Provide separate point-to-point voltage drop calculations for all notification appliances under worst case secondary power specifications, and
 - .2 Perform a complete functional test of all notification appliances under worst case secondary power conditions.
- .8 Where required provide Intelligent Remote Battery Charger for charging up to 110Ah batteries.
- .9 Four (4) form "C" Auxiliary Relay Circuits (Form C contacts rated 2A @ 24VDC, resistive), operation is programmable for trouble, alarm, supervisory of other fire response functions. Relays shall be capable of switching up to ½ A @ 120VAC, inductive.
- .10 The FACP shall support up to (5) RS-232-C ports and one service port. All (5) RS-232 Ports shall be capable of two-way communications.
- .11 Remote Unit Interface: supervised serial communication channel for control and monitoring of remotely located annunciators and I/O panels.
- .12 Municipal City Circuit Connection with disconnect switch, with a form "C" contact output.
- .3 Cabinet: Lockable steel enclosure. Arrange unit so all operations required for testing or for normal care and maintenance of the system are performed from the front of the enclosure. If more than a single unit is required to form a complete control unit, provide exactly matching modular unit enclosures.
- .4 Alphanumeric Display and System Controls: Panel shall include an 80 character, LCD display to indicate alarm, supervisory, and component status messages and shall include a keypad for use in entering and executing control commands.
 - .1 The system shall have the capability to provide expanded content, multi-line, operator interface displays. The expanded content multi-line displays shall be Quarter-VGA (QVGA) or larger and be capable of supporting a minimum of 854 standard ASCII characters to minimize or eliminate the levels of navigation required for access to information when responding to critical emergencies and abnormal system conditions. The QVGA operator interface shall provide operator prompts and six context sensitive soft-keys for intuitive operation.
 - .1 Expanded content, multi-line operator interfaces shall be capable of providing the following functions:
 - .1 Dual language operation with Instant-Switch language selection during runtime.
 - .2 Activity display choices for:
 - .1 First 8 Events.

- .2 First 5 Events and Most Recent Event (with first and most recent event time and date stamps).
- .3 First Event and Most Recent Event (with first and most recent event time and date stamps).
- .4 Scrollable List Display.
- .5 General Event Status (alarm, priority 2, supervisory, or trouble in system).
- .6 Site Plan.
- .3 Equal or hierarchal priority assignment: In systems with two or more operator interfaces, each operator interface shall be programmable to allow multiple operator interfaces to have equal operation priority or to allow hierarchal priority control to be assigned to individual operator interfaces (locations).
- .4 Up to 50 custom point detail messages for providing additional point specific information in detailed point status screens.
- .5 Bitmap file import for operator interface display of site plan and background watermark images.
- .2 Expanded content, multi-line displays shall to provide Dual-Language operation.
 - .1 Language selection shall be via a switch on the operator interface panel. Operator interface panels shall support instant-language-switchover during runtime to allow the operator to toggle between languages each time the language selection switch is operated, without requiring complicated multi-step processes.
 - .2 Both one-byte and two-byte characters shall be supported.
- .5 Distributed Module Operation: FACP shall be capable of allowing remote location of the following modules; interface of such modules shall be through a Class A (Style 7) data communications link (DCL):
 - .1 Addressable Data Communication Link Circuits
 - .2 Initiating Device Circuits
 - .3 Notification Appliance Circuits
 - .4 Auxiliary Control Circuits
 - .5 Graphic Annunciator LED/Switch Control Modules
 - .1 In systems with two or more Annunciators and/or Command Centers, each Annunciator/Command Center shall be programmable to allow multiple Annunciators/Command Centers to have equal operation priority or to allow hierarchal priority control to be assigned to individual Annunciator/Command Center locations.

2.2 EMERGENCY POWER SUPPLY

- .1 General: Components include battery, charger, and an automatic transfer switch.
- .2 Battery: Sealed lead-acid or nickel cadmium type. Provide sufficient capacity to operate the complete alarm system in normal or supervisory (non-alarm) mode for a period of 24

hours. Following this period of operation on battery power, the battery shall have sufficient capacity to operate all components of the system, including all alarm notification devices in alarm mode for a period of 60 minutes.

2.3 ADDRESSABLE INITIATING

.1 ADDRESSABLE MANUAL PULL STATIONS

- .1 Description: Addressable single stage, red LEXAN, with molded, raised-letter operating instructions of contrasting color. Station will mechanically latch upon operation and remain so until manually reset by opening with a key common with the control units. All Manual Stations will be listed to CAN/ULC-S528, Manual Stations for Fire Alarm Systems
- .2 Protective Shield: Where required, as indicated on the drawings, provide a tamperproof, clear LEXAN shield and red frame that easily fit over manual pull stations. When shield is lifted to gain access to the station, a battery powered piercing warning horn shall be activated. The horn shall be silenced by lowering and realigning the shield. The horn shall provide 85dB at 10 feet and shall be powered by a 9 VDC battery.
- .3 Persons with Disability Access: Where required manual station shall be operable with one hand and shall not require tight grasping, pinching or twisting of the wrist. Provides a more easily operated manual station lever compared to standard stations.

.2 SMOKE SENSORS

- .1 General: Comply with CAN/ULC-S529, "Smoke Detectors for Fire Alarm Systems." Include the following features:
 - .1 Factory Nameplate: Serial number and type identification.
 - .2 Operating Voltage: 24 VDC, nominal.
 - .3 Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore normal operation.
 - .4 Plug-In Arrangement: Sensor and associated electronic components are mounted in a module that connects to a fixed base with a twist-locking plug connection. Base shall provide break-off plastic tab that can be removed to engage the head/base locking mechanism. No special tools shall be required to remove head once it has been locked. Removal of the detector head shall interrupt the supervisory circuit of the fire alarm detection loop and cause a trouble signal at the control unit.
 - .5 Each sensor base shall contain an LED that will flash each time it is scanned by the Control Unit (once every 4 seconds). In alarm condition, the sensor base LED shall be on steady.
 - .6 Each sensor shall be scanned by the Control Unit for its type identification to prevent inadvertent substitution of another sensor type. Upon detection of a "wrong device", the control unit shall operate with the installed device at the default alarm settings for that sensor; 2.5% obscuration for photoelectric sensor, 57-deg C and 8.3-deg C rate-of-rise for the heat sensor, but shall indicate a "Wrong Device" trouble condition.

- .7 The addition a sensor or addressable device to the DCL circuit shall initiate an 'extra device' trouble (if the added sensor or device has not been programmed).
- .8 The sensor's electronics shall be immune from nuisance alarms caused by EMI and RFI.
- .9 Sensors include a communication transmitter and receiver in the mounting base having a unique identification and capability for status reporting to the Fire Alarm Control Panel. Sensor address shall be located in base to eliminate false addressing when replacing sensors.
- .10 Removal of the sensor head for cleaning shall not require the setting of addresses.
- .2 Type: Smoke sensors shall be of the photoelectric or combination photoelectric / heat type.
- .3 Bases: Relay output, sounder and isolator bases shall be supported alternatives to the standard base.
- .4 Duct Smoke Sensor: Photoelectric type, with sampling tube of design and dimensions as recommended by the manufacturer for the specific duct size and installation conditions where applied. Sensor includes relay as required for fan shutdown.
 - .1 Environmental compensation, programmable sensitivity settings, status testing, and monitoring of sensor dirt accumulation for the duct smoke sensor shall be provided by the FACP.
 - .2 The Duct Housing shall provide a supervised relay driver circuit for driving up to 15 relays with a single "Form C" contact rated at 7A@ 28VDC or 10A@ 120VAC. This auxiliary relay output shall be fully programmable. Relay shall be mounted within 3 feet of HVAC control circuit.
 - .3 Duct Housing shall provide a relay control trouble indicator Yellow LED.
 - .4 Duct Housing shall have a transparent cover to monitor for the presence of smoke. Cover shall secure to housing by means of four (4) captive fastening screws.
 - .5 Duct Housing shall provide two (2) Test Ports for measuring airflow and for testing. These ports will allow aerosol injection in order to test the activation of the duct smoke sensor.
 - .6 Duct Housing shall provide a magnetic test area and Red sensor status LED.
 - .7 For maintenance purposes, it shall be possible to clean the duct housing sampling tubes by accessing them through the duct housing front cover.
 - .8 Each duct smoke sensor shall have a Remote Test Station with an alarm LED and test switch.
- .5 Addressable Air Aspirating Duct Smoke Sensors: Photoelectric type smoke detection with an aspirating system shall provide remote sensor location for ducts with difficult service access. Detectors shall support remote housing up to 82 feet with 1.05" OD rigid pipe; detectors shall support remote housing up to 50 feet with 3/4" OD flexible tubing. Sampling tubes shall be provided per design and

dimensions as recommended by the manufacturer for the specific duct size and installation conditions where applied. Duct Detection system shall be ULC listed to CAN/ULC-S529.

- .1 Environmental compensation, programmable sensitivity settings, status testing and monitoring of sensor dirt accumulation for the duct smoke sensor shall be provided by the Fire alarm Control Panel.
- .2 The Air Aspirating duct detection system shall continuously supervise air flow through the duct housing and shall communicate trouble to the fire alarm control panel on a high or low air flow fault condition.
- .3 Duct Housing shall provide a magnetic test area and Red Sensor status LED.
- .4 Each duct smoke sensor shall have a Remote Test Station with an alarm LED and test switch.
- .5 Each duct housing shall have remote functional smoke testing capability.
- .6 Each duct housing shall be supplied with a replacement air inlet filter.
- .7 Each duct housing shall have an optional water trap with an integral ball valve for draining to eliminate moisture buildup.
- .8 The Air Aspirating Detection system shall have an operating air velocity range of 0 to 4000 linear feet/minute (0 to 1220 meters/minute).
- .9 The Addressable Air Aspirating Detection system shall be capable of use in other areas where spot type detectors are not practical or difficult to access, such as: prison cells in correctional facilities, transformer vaults, cable tunnels and MRI rooms.

.3 HEAT SENSORS

- .1 Thermal Sensor: Combination fixed-temperature and rate-of-rise unit with plug-in base and alarm indication lamp; 57-deg C (135-deg F) fixed-temperature setting except as indicated.
- .2 Thermal sensor shall be of the epoxy encapsulated electronic design. It shall be thermistor-based, rate-compensated, self-restoring and shall not be affected by thermal lag.
- .3 Sensor fixed temperature sensing shall be independent of rate-of-rise sensing and programmable to operate at 57-deg C (135-deg F) or 68-deg C (155-deg F). Sensor rate-of-rise temperature detection shall be selectable at the FACP for either 8.3-deg C (15-deg F) or 11.1-deg C (20-deg F) per minute.
- .4 Sensor shall have the capability to be programmed as a utility monitoring device to monitor for temperature extremes in the range from 0-deg C (32-deg F) to 68-deg C (155-deg F).

.4 ADDRESSABLE CO SENSOR

- .1 The CO sensor shall be an addressable carbon monoxide (CO) sensing module providing both CO toxic gas detection and enhanced fire detection, and shall be listed to CAN/ULC-S529 Standard for Smoke Detectors for Fire Alarm Systems, UL 2034, Single and Multiple Station Carbon Monoxide Alarms and CAN/CSA-6.19, Residential Carbon Monoxide Alarming Devices.

- .1 The CO Sensor shall include CO sensor element mounted in the sensor base which can be easily replaced without replacing the complete sensor base assembly.
- .2 The CO Sensor base shall provide address selection in the base allowing the address to remain with its location when the sensor is removed for service or type change.
- .3 The CO Sensor base shall include an integral red LED to indicate the power-on, test mode or alarm status.
- .4 The CO Sensor shall provide enhanced fire detection with the addition of two selectable modes of operation: Nuisance Alarm Reduction Mode and Faster Fire Detection.
- .5 The CO Sensor base shall report the following CO Sensor troubles: Communication loss, Disabled, Almost Expired 12 Months, Almost Expired 6 Months, Expired (End of Life), and Sensor Missing/Failed.

.5 ADDRESSABLE CO SOUNDER BASE

- .1 The CO sensor shall be an addressable carbon monoxide (CO) sensing module providing both CO toxic gas detection and enhanced fire detection, and shall be listed to CAN/ULC-S529 Standard for Smoke Detectors For Fire Alarm Systems, UL 2034, Single and Multiple Station Carbon Monoxide Alarms and CAN/CSA-6.19, Residential Carbon Monoxide Alarming Devices.
 - .1 The CO sensing element shall support operation with a Sounder base; the CO sounder base shall provide temporal code 3 (TC3) for fire or temporal code 4 (TC4) for toxic carbon monoxide alarm signaling.
 - .2 The CO Sounder base shall be listed to UL 464, Audible Signal Appliances.
 - .3 The CO sensor shall provide enhanced fire detection with the addition of two selectable modes of operation: Nuisance Alarm Reduction Mode and Faster Fire Detection Mode.
 - .4 The CO Sounder Base shall include CO sensor element mounted in the sounder base which can be easily replaced without replacing the complete sensor base assembly.
 - .5 The CO Sounder base shall provide address selection in the base, allowing the address to remain with its location when the sensor is removed for service or type change.
 - .6 The CO Sounder Sensor base shall include an integral red LED to indicate the power-on, trouble, test mode or alarm status.
 - .7 The CO Sensor base shall report the following CO Sensor troubles: Communication loss, Disabled, Almost Expired 12 Months, Almost Expired 6 Months, Expired (End of Life) and Sensor Missing/Failed.

.6 ADDRESSABLE CIRCUIT INTERFACE MODULES

- .1 Addressable Circuit Interface Modules: Arrange to monitor or control one or more system components that are not otherwise equipped for addressable communication. Modules shall be used for monitoring of non-addressable devices, and for control of AHU systems.

- .2 Addressable Circuit Interface Modules will be capable of mounting in a standard electric outlet box. Modules will include cover plates to allow surface or flush mounting. Modules will receive their operating power from the signaling line circuit or a separate two wire pair running from an appropriate power supply, as required.
- .3 There shall be the following types of modules:
 - .1 Type 1: Monitor Circuit Interface Module:
 - .1 For conventional 2-wire smoke detector and/or contact device monitoring with Class B or Class A wiring supervision. The supervision of the zone wiring will be Class B. This module will communicate status (normal, alarm, trouble) to the FACP.
 - .2 For conventional 4-wire smoke detector with Class B wiring supervision. The module will provide detector reset capability and over-current power protection for the 4-wire detector. This module will communicate status (normal, alarm, trouble) to the FACP.
 - .2 Type 2: Line Powered Monitor Circuit Interface Module
 - .1 This type of module is an individually addressable module that has both its power and its communications supplied by the two wire signaling line circuit. It provides location specific addressability to an initiating device by monitoring normally open dry contacts. This module shall have the capability of communicating four zone status conditions (normal, alarm, current limited, trouble) to the FACP.
 - .2 This module shall provide location specific addressability for up to five initiating devices by monitoring normally closed or normally open dry contact security devices. The module shall communicate four zone status conditions (open, normal, abnormal, and short). The two-wire signaling line circuit shall supply power and communications to the module.
 - .3 Type 3: Single Address Multi-Point Interface Modules
 - .1 This multipoint module shall provide location specific addressability for four initiating circuits and control two output relays from a single address. Inputs shall provide supervised monitoring of normally open, dry contacts and be capable of communicating four zone status conditions (normal, open, current limited, and short). The input circuits and output relay operation shall be controlled independently and disabled separately.
 - .2 This dual point module shall provide a supervised multi-state input and a relay output, using a single address. The input shall provide supervised monitoring of two normally open, dry contacts with a single point and be capable of communicating four zone status conditions (normal, open, current limited, and short). The two-wire signaling line circuit shall supply power and communications to the module.

- .3 This dual point module shall monitor an unsupervised normally open, dry contact with one point and control an output relay with the other point, using a single address. The two-wire signaling line circuit shall supply power and communications to the module.
- .4 Type 4: Line Powered Control Circuit Interface Module
 - .1 This module shall provide control and status tracking of a Form "C" contact. The two-wire signaling line circuit shall supply power and communications to the module.
- .5 Type 5: 4-20 mA Analog Monitor Circuit Interface Module
 - .1 This module shall communicate the status of a compatible 4-20 mA sensor to the FACP. The FACP shall annunciate up to three threshold levels, each with custom action message; display and archive actual sensor analog levels; and permit sensor calibration date recording.
- .4 All Circuit Interface Modules shall be supervised and uniquely identified by the control unit. Module identification shall be transmitted to the control unit for processing according to the program instructions. Modules shall have an on-board LED to provide an indication that the module is powered and communicating with the FACP. The LEDs shall provide a troubleshooting aid since the LED blinks on poll whenever the peripheral is powered and communicating.

2.4 CONVENTIONAL NOTIFICATION

- .1 CONVENTIONAL ALARM NOTIFICATION APPLIANCES
 - .1 Conventional Notification Appliances: The Electrical Subcontractor shall furnish and install Notification Appliances and accessories to operate on compatible Class A or B NAC circuit.
 - .1 Notification appliance operation shall provide power, supervision and separate control of horns and strobes over a single pair of wires.
 - .2 All Audible and Visible Notification Appliances shall be synchronized.
 - .3 Class B (Style 4) notification appliances shall be wired requiring traditional in/out wiring methods with a circuit end of line resistor; circuit loading shall be as per ULC requirements; wiring gauges, circuit wiring lengths, and appliance quantities shall be calculated and provided as part of the shop drawing submittal to ensure circuit voltage drops are within ULC requirements
 - .2 Visible/Only: Addressable strobe shall be listed to CAN/ULC-S526. The V/O shall consist of a xenon flash tube and associated lens/reflector system, cover and mounting plate. For ease of installation the mounting plate shall mount directly to standard single gang, double gang or 4" square electrical box, without the use of special adapters or trim rings. When the appliance is connected to an active circuit, the front cover of the appliance shall be removable without causing a trouble indication on the fire alarm control panel. V/O appliances shall be provided with different minimum flash intensities of 15cd, 75cd, and 110cd. The Candela levels shall be settable by using a hardware selector on the appliance.

- .3 Multi-Tone Audible/Visible: Combination Audible/Visible (A/V) Notification Appliances shall be listed to CAN/ULC-S525 and CAN/ULC-S526. The strobe light device shall consist of a xenon flash tube and associated lens/reflector system, cover and mounting plate. For ease of installation, audible/visible mounting plate shall mount directly to standard single gang, double gang or 4" square electrical box, without the use of special adapters or trim rings. The strobe shall provide multiple minimum flash intensities of 15cd, 75cd, and 110cd. The Candela levels shall be settable by using a hardware selector on the appliance. The horn shall have per appliance tone selection of: Horn, Bell, 500Hz, Horn, Canadian Horn, Slow Whoop, Siren, or Hi/Lo; selected using an on-board DIP switch.
- .4 Horn Tones shall be controlled separately from strobes on the same two wire circuit with "on till silenced" and "on till reset" operation on the same 2-wire pair.
- .5 The appliance shall be capable of two-wire synchronization with both of the following options (2-Stage operation):
 - Alert: Synchronized Strobe with 20 BPM March Time cadence on Horn.
 - Evac: Synchronized Strobe with Temporal Code 3 pattern.

2.5 FIRE ALARM MONITORING

- .1 Provide a ULC listed auto dialer complete with a phone line and GSM. Coordinate with the City to set up services prior to the verification inspection.
- .2 The Electrical Subcontractor shall supply and install all necessary devices to allow for correct monitoring of the:
 - .1 Fire Alarm Signal
 - .2 Fire Alarm Trouble Signal
 - .3 Fire Alarm Supervisory Signal
- .3 The Electrical Subcontractor shall arrange for and coordinate to ensure that the fire alarm system is correctly monitored via a NFPA approved method to a central dedicated ULC listed monitoring facility (Oakley Alarms).
 - .1 All initial setup costs shall be carried by the Electrical Subcontractor and all service costs shall be by the City. The Electrical Subcontractor shall coordinate and arrange all required telephone (MTS) and monitoring (Oakley Alarms) services on behalf of the City.

Part 3 Execution

3.1 INSTALLATION GENERAL

- .1 Install system components and all associated devices in accordance with applicable ULC Standards, National Building Code of Canada and manufacturer's recommendations.
- .2 Installation personnel shall be supervised by persons who are qualified and experienced in the installation, inspection, and testing of fire alarm systems. Qualified personnel shall be:

- .1 Factory trained and certified personnel, and
- .2 CFAA Certified Fire Alarm Technician, and
- .3 Registered technician with a current Class M license.

3.2 EQUIPMENT INSTALLATION

- .1 Furnish and install a complete Fire Alarm System as described herein and as shown on the plans. Including the fire alarm control panel, manual stations, automatic fire detectors, audible and visible notification appliances, wiring, terminations, electrical boxes, ethernet drops, and all other necessary material for a complete operating system.
- .2 Device Location-Indicating Lights: Locate in the public space immediately adjacent to the device they monitor.
- .3 Install manual stations at 1220 mm above finished floor to centre.
- .4 Install wall mounted audible and visual notification appliances not less than 2300 mm above floor to top of device and with the top of the strobe lens no higher than 2400mm, and not less than 150 mm below ceiling height to the top of the device.
- .5 Mount outlet box for electric door holder to withstand 80 pounds pulling force.
- .6 Automatic Detector Installation: Conform to CAN/ULC-S524.

3.3 PREPARATION

- .1 Coordinate work of this Section with other affected work and construction schedule.

3.4 WIRING INSTALLATION

- .1 System Wiring: Wire and cable shall be a type listed for its intended use by an approval agency acceptable to the Authority Having Jurisdiction and shall be installed in accordance with the appropriate articles from the current approved edition of the Canadian Electrical Code and National Building Code of Canada (MBC).
- .2 Electrical Subcontractor shall obtain from the Fire Alarm System Manufacturer written instruction regarding the appropriate wire/cable to be used for this installation. No deviation from the written instruction shall be made by the Electrical Subcontractor without the prior written approval of the Fire Alarm System Manufacturer.
- .3 Color Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color code for alarm initiating device circuits wiring and a different color code for supervisory circuits. Color-code signal circuits differently from alarm-initiating circuits. Paint fire alarm system junction boxes and covers red.

3.5 FIELD QUALITY CONTROL

- .1 Manufacturer's Field Services: Provide services of a factory-authorized service representative to supervise the field assembly and connection of components and the pretesting, testing, and adjustment of the system.

- .2 Service personnel shall be qualified and experienced in the inspection, testing, and maintenance of fire alarm systems. Examples of qualified personnel shall be permitted to include, but shall not be limited to, individuals with the following qualifications:
 - .1 Factory trained and certified.
 - .2 Canadian Fire Alarm Association Registered Fire Alarm Technician
 - .3 Certified by a provincial or local authority.
- .3 Pretesting: Determine, through pretesting, the conformance of the system to the requirements of the Drawings and Specifications. Correct deficiencies observed in pretesting. Replace malfunctioning or damaged items with new and retest until satisfactory performance and conditions are achieved.
- .4 Inspection:
 - .1 Inspect equipment installation, interconnection with system devices, mounting locations, and mounting methods.
 - .2 Verify that units and controls are properly installed, connected, and labeled and that interconnecting wires and terminals are identified.
- .5 Acceptance Operational Tests:
 - .1 Perform operational system tests to verify conformance with specifications:
 - .1 Each alarm initiating device installed shall be operationally tested as described in CAN/ULC-S537 Verification of Fire Alarm Systems. Each device shall be tested for alarm and trouble conditions. Electrical Subcontractor shall submit a written certification that the Fire Alarm System installation is complete including all punch-list items. Test battery operated emergency power supply. Test emergency power supply to minimum durations specified. Test Supervising Station Signal Transmitter. Coordinate testing with Supervising Station monitoring firm/entity (Oakley Alarms).
 - .2 Test each Signal device installed for proper operation. Submit written report indicating sound pressure levels at specified distances following device listing form as shown in the Appendix of CAN/ULC-S537.
 - .3 Test Fire Alarm Control Panel and Remote Annunciator.
 - .2 Provide minimum 10 days notice of acceptance test performance schedule to Contract Administrator, and local Authority Having Jurisdiction.
- .6 Retesting: Correct deficiencies indicated by tests and completely retest work affected by such deficiencies. Verify by the system test that the total system meets the Specifications and complies with applicable standards.
- .7 Report of Tests and Inspections: Provide a written record of inspections, tests, and detailed test results in the form of a test log. Use CAN/ULC-S537 Forms for documentation.
- .8 Final Test, Record of Completion, and Certificate of Occupancy:

FIRE ALARM

- .1 Test the system as required by the Authority Having Jurisdiction in order to obtain a certificate of occupancy. Provide completed CAN/ULC-S537 Report to Contract Administrator and AHJ.

3.6 CLEANING AND ADJUSTING

- .1 Cleaning: Remove paint splatters and other spots, dirt, and debris. Clean unit internally using methods and materials recommended by manufacturer.
- .2 Occupancy Adjustments: When requested within one year of date of Substantial Completion, provide on-site assistance in adjusting sound pressure levels and adjusting controls and sensitivities to suit actual occupied conditions. Provide up to three visits to the site for this purpose.

3.7 TRAINING

- .1 Provide the services of a factory-authorized service representative to demonstrate the system and train City maintenance personnel as specified below.
 - .1 Train City maintenance personnel in the procedures and schedules involved in operating, troubleshooting, servicing, and preventive maintaining of the system. Provide a minimum of 3 hours' training.
 - .2 Schedule training with the Contract Administrator at least seven days in advance.

END OF SECTION