This document contains standards that are the minimum requirements for BCIT construction projects. The information in the document is organized using the MasterFormat® and SectionFormat® systems. It is not a specification; it is intended to supplement the Consultant's own documents. Do not use this information as a standalone specification.

SECTION 28 31 00
FIRE ALARM SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

.1 Provide materials and installation for fire alarm systems.

.2 Provide control panel to carry out fire alarm and protection functions including receiving alarm signals, initiating general and two-stage alarm, supervising system continuously, actuating zone annunciators, and initiating trouble signals.

.3 Provide engineered air aspiration technology smoke detection system.

.4 Provide detectors installed in ducts of ionization type and listed by ULC duct installation.

.5 Provide detectors with terminal screw type connections.

.6 Provide appliances specifically listed for outdoor use in locations exposed to weather.

.7 Provide electro-magnetic door holder-releases as indicated. Refer to Door Schedule.

.8 Provide complete, electrically supervised, temporal common coded, manual and automatic, zoned, annunciated, fire alarm system.

.9 Provide trouble signal devices.

.10 Provide power supply facilities.

.11 Provide manual alarm stations.

.12 Provide automatic alarm initiating devices.

.13 Provide audible signal devices.

.14 Provide end-of-line devices.

.15 Provide annunciators.

.16 Provide visual alarm signal devices.

.17 Provide zone isolation modules.

.18 Provide ancillary devices.

1.2 REFERENCES

.1 British Columbia Building Code, 2012 Edition or latest edition (BCBC).

.2 British Columbia Fire Code, 2012 Edition or latest edition.

.3 NFPA (Fire) 72 National Fire Alarm and Signaling Code, 2016 Edition or latest edition.

.4 NFPA (Fire) 90A Installation of Air Conditioning and Ventilating Systems, 2015 Edition or latest edition.

.5 TB OSH Chapter 3 03, 1997 01 28, Treasury Board of Canada, Occupational Safety and Health, Chapter 3 03, Standard for Fire protection Electronic Data Processing Equipment.

.6 TB OSH Chapter 3 04, 1994 12 2], Treasury Board of Canada, Occupational Safety and Health, Chapter 3 04, Standard for Fire Alarm Systems.

.7 ULC 524 Standard for the Installation of Fire Alarm Systems (CAN/ULC S524-14).

.8 ULC 525 Audible Signal Devices for Fire Alarm Systems, Including Accessories (CAN/ULC S525-07).

.9 ULC 526 Visible Signal Devices for Fire Alarm Systems (CAN/ULC S526-07).

.10 ULC 527 Standard for Control Units for Fire Alarm Systems (CAN/ULC S527-11-AMD-1 (2014)).

.11 ULC 528 Manual Pull Stations for Fire Alarm Systems, Including Accessories (CAN/ULC S528-14).

.12 ULC 529 Smoke Detectors for Fire Alarm Systems (CAN/ULC S529-09).

.13 ULC 530 Standard for Heat Actuated Fire Detectors for Fire Alarm Systems (CAN/ULC S530).

.14 ULC 531 Standard for Smoke Alarms (CAN/ULC S531-14).

.15 ULC 536 Inspection and Testing of Fire Alarm Systems (CAN/ULC S536-13).

.16 ULC 537 Verification of Fire Alarm Systems.

1.3 SUBMITTALS

.1 Submit in accordance with Section 01 33 00 Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 Submittal Procedures.

.2 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 Submittal Procedures.

.3 Shop Drawings:

.1 Submit Shop Drawings in accordance with Section 01 33 00 Submittal Procedures.

.2 Shop Drawings: Shop Drawings shall be signed and sealed by a structural engineer licensed to practice in the Province of British Columbia. Engineer to provide Letters of Assurance indicating compliance with B.C. Building Code.

.3 Include:

.1 Layout of equipment.

.2 Zoning.

.3 Complete wiring diagram, including schematics of modules.

.4 Aspirating Smoke Detection System: Submit Shop Drawing for all components including stamped sampling port layout.

1.4 LETTERS OF ASSURANCE

.1 ASD System: The sampling port layout for the ASD system shall be designed by Contractor’s Engineer and signed letters of assurance schedules are required.

.2 Letters of Assurance: Engineer who seals Shop Drawings will submit Schedules S-B and S-C to the Certified Registered Professional (CRP):

.3 Initial Shop Drawing Submission:

.1 Submit Schedule S-B, “Assurance of Professional Design and Commitment for Field Review.”

.4 After Completion of Field Reviews:

.1 Submit Schedule S-C, “Assurance of Professional Field Review and Compliance.”

1.5 QUALITY ASSURANCE

.1 Certificates: Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.2 Instructions: Submit manufacturer's installation instructions.

.3 Manufacturer's Field Reports: Manufacturer's field reports specified.

.4 Closeout Submittals:

.1 Submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00 Closeout Submittals in accordance with ANSI/NFPA 20.

.2 Authority of Jurisdiction will delegate authority for review and approval of submittals required by this Section.

.3 Submit to Authority of Jurisdiction [two] sets of reviewed submittals and Shop Drawings immediately after review but no later than [15] working days to prior to final inspection.

.4 Submit manufacturer’s data for the following:

.1 Control panel and modules.

.2 Storage batteries.

.3 Battery charger.

.4 Manual pull stations.

.5 Heat detectors.

.6 Open-area smoke detectors.

.7 Duct smoke detectors.

.8 Alarm bells.

.9 Alarm horns.

.10 Visible appliances.

.11 Main annunciator.

.12 Remote annunciator panel.

.13 Smoke Detector Covers.

.14 Graphic annunciator panel.

.15 Master fire alarm boxes.

.16 Auxiliary transmitter.

.17 Aspirating Smoke Detection.

.18 Video Fire detection.

.19 Freeze protection thermostatic switch.

.20 Electro-magnetic door holder-releases.

.21 Valve tamper switches.

.22 Wiring.

.23 Trouble buzzer.

.24 Projected beam smoke detector.

.25 Surge suppression devices.

.26 Isolation modules.

.27 Mark data which describe more than one type of item to indicate which type will be provided.

.5 System Wiring Diagrams:

.1 Submit complete wiring diagrams of system showing points of connection and terminals used for electrical connections in the system.

.2 Show modules, relays, switches and lamps in control panel.

.5 Design Data - Power Calculations:

.1 Submit design calculations to substantiate that battery capacity exceeds supervisory and alarm power requirements.

.2 Show comparison of notification appliance circuit alarm power requirements with rated circuit power output.

.6 Instructions for Operation:

.1 Projected beam smoke detector.

.2 Aspirating smoke detector.

.3 Video fire detector.

.7 Schedules:

.1 Conductor wire marker schedule.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store, handle and protect materials in accordance with Section 01 61 00 Common Product Requirements.

.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.3 Handle materials with suitable lifting equipment.

.4 Store materials in heated, dry, weather-protected enclosure

PART 2 - PRODUCTS

2.1 MANUFACTURERS

.1 Subject to compliance with specifications the following manufacturers are acceptable:

.1 GE/Edwards, (existing buildings).

.2 Mircom, (existing buildings).

.3 Honeywell, (existing buildings).

.4 Simplex-Grinnell (new building or system replacement).

2.2 MATERIALS

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

.2 Power supply: In accordance with CAN/ULC S524.

.3 Audible signal devices: In accordance with CAN/ULC S525.

.4 Visual signal devices: In accordance with CAN/ULC S526.

.5 Control unit: In accordance with CAN/ULC S527.

.6 Manual pull stations: In accordance with CAN/ULC S528.

.7 Thermal detectors: In accordance with CAN/ULC S530.

.8 Smoke detectors: In accordance with CAN/ULC S529.

.9 Provide spare maintenance materials as recommended by system manufacturer.

2.3 PANELS

.1 Control Panel:

.1 Single - stage operation.

.2 Addressable.

.3 Zoned.

.4 Coded.

.5 Enclosure:

.1 CSA enclosure, complete with lockable concealed hinged door, full viewing window, flush lock and two keys.

.2 Switches and other controls shall not be accessible without use of key.

.3 Design of control panel shall be neat, compact assembly containing parts and equipment required to provide specified operating and supervisory functions of system.

.4 Control panel components shall be CSA approved and approved by control panel manufacturer for use in control panel.

.5 Panel cabinet shall be finished on inside and outside with factory-applied enamel finish.

.6 Provide main annunciator located on exterior of cabinet door or visible through cabinet door.

.7 Provide audible trouble signal.

.8 Provide one set of Form C dry alarm contacts per zone, common system Form C dry alarm contact, and common system Form C dry trouble contact.

.9 Permanently label switches.

.10 Provide panel with the following switches:

.1 Trouble silencing switch which silences audible trouble signals without extinguishing trouble indicating lamp(s).

.1 For Non-Self-Resetting Type Switch: Upon correction of trouble condition, audible signals will again sound until switch is returned to its normal position.

.2 For Silencing Switch of Momentary Action Self-Resetting Type: Trouble signal circuit automatically restored to normal upon correction of trouble condition.

.2 When activated, evacuation alarm silencing switch will silence alarm notification appliances without resetting panel, and cause operation of system trouble signals.

.3 Subsequent alarm(s) from additional zone(s) not originally in alarm causes activation of notification appliances even with alarm silencing switch in "silenced" position.

.4 Reset switch, when activated, will restore the system to normal standby status after cause of alarm has been corrected, and activated initiating devices reset.

.1 Operate reset switch to restore activated smoke detectors to normal standby status.

.5 Lamp test switch.

.6 Drill switch which will enable test of notification appliances and restoration to normal without tripping master box.

.7 HVAC shutdown bypass switch: Operation of the switch to allow HVAC system to operate with detectors in alarm and cause operation of system trouble signals.

.6 Supervised, Modular Design with Plug In Modules:

.1 Alarm receiver with trouble and alarm indications provision for remote supervised annunciation, for Class A and/or B initiating circuit.

.2 Spare zones shall be compatible with smoke detectors and open circuit devices.

.3 Space for future modules.

.4 Latching type supervisory receiver circuits. Discrete indication for both off-normal and trouble.

.7 Components:

.1 Coded alarm receiver panel with trouble and alarm indications for Class A and/or B initiating circuit.

.2 Single stage alarm pulse rate panels:

.1 Single stroke control type for output to signal control panel continuously.

.3 Two stage alarm pulse rate panel for single stroke output to signal control panel.

.1 First stage: 20 strokes per minute.

.2 Second stage: Continuous.

.4 Common Control and Power Units:

.1 Control panel containing following indications and controls:

.1 "Power on" LED (green) to monitor primary source of power to system.

.2 "Power trouble" indication.

.3 "Ground trouble" indication.

.4 "Remote annunciator trouble" indication.

.5 "System trouble" indication.

.6 "System trouble" buzzer and silence switch complete with trouble resound feature.

.7 System reset switch.

.8 "LED test" switch if applicable.

.9 "Alarm silence" switch to silence signals manually. If new alarm occurs after signals have been silenced, signals to resound.

.10 "Signals silenced" indication.

.2 Master power supply panel to provide 24 V DC to system from 120 V AC, 60 Hz input.

.5 Auxiliary relays shall be plug-in type, dust cover, supervised against unauthorized removal by common trouble circuit and complete with individual bypass switch.

.1 Contacts: 2.0 A, 120 V AC, for functions such as release of door holders or initiation of fan shutdown.

.2 Contact Terminal Size: Capable of accepting 22 12 AWG wire.

.2 Remote Annunciator Panels:

.1 Panels shall duplicate requirements for control panel annunciator. Individual trouble lamps are not required.

.2 LED type with designation cards to indicate zone.

.3 LED's to annunciate alarm and trouble.

.4 Supervised, including trouble signal for open circuit.

.5 LED test button.

2.4 ADDRESSABLE MANUAL ALARM STATIONS

.1 Provide non-coded single action type with mechanical reset features.

.1 Non-coded single-pole normally open contact for single stage.

.2 General alarm key switch for two stage system.

.2 Stations: Surface and Semi-flush mounted and interior type as indicated.

.1 For surface mounting provide station manufacturer's approved back box.

.2 Back box finish to match station finish.

.3 Equip each station with terminal strip with contacts of proper number and type to perform functions required.

.4 Stations: Type not subject to operation by jarring or vibration.

.1 Break-glass-front stations are not permitted; pull-lever break-rod type is acceptable provided presence of rod is not required to reset station.

.5 Station Colour: Red.

.6 Manual Alarm Stations: Provide station with visible indication of operation.

.7 Keys: Restoration to require use of key. Keys shall be identical throughout system for stations and control panel(s).

.8 Mount stations with operating lever not more than 1.4 m above finished floor.

.9 Finish housings with red enamel paint and provide permanently affixed bilingual signage indicating "FIRE ALARM" with white letters of 19 mm high.

2.5 AUTOMATIC ALARM INITIATING DEVICES

.1 Heat Detectors: Provide heat detectors designed for detection of fire by combination fixed temperature rate-of-rise principle.

.2 Combination Fixed Temperature Rate-Of-Rise Detectors (Spot Type): Designed for surface and semi-flush outlet box mounting and supported independently of conduit, tubing or wiring connections.

.1 Contacts shall be self-resetting after response to rate-of-rise actuation

.2 Operation under fixed temperature actuation to result in external indication.

.3 Detector units located in boiler rooms, showers, or other areas subject to abnormal temperature changes to operate on fixed temperature principle only.

.3 Open-Area Smoke Detectors: Provide detectors designed for detection of abnormal smoke densities by photoelectric principle.

.1 Provide necessary control and power modules required for operation integral with control panel.

.2 Detectors and associated modules shall be compatible with control panel and suitable for use in supervised circuit.

.3 Malfunction of electrical circuits to detector or its control or power units to result in operation of system trouble signals.

.4 Equip each detector with visible indicator lamp that will flash when detector is in normal standby mode and glow continuously when detector is activated.

.5 Each detector shall be plug-in type with tab-lock or twist-lock, quick disconnect head and separate base in which detector base contains screw terminals for making wiring connections.

.6 Detector head shall be removable from its base without disconnecting wires. Removal of detector head from its base to cause activation of system trouble signals.

.7 Screen each detector to prevent entrance of insects into detection chamber(s).

.4 Four-Wire Smoke Detectors: Detector circuits four-wire type capable of transmitting detector operating power over conductors separate from initiating circuit.

.1 Provide separate, power circuit for each smoke detection initiating circuit (zone).

.2 Failure of power circuit to be indicated as trouble condition on corresponding initiating circuit.

.5 Two-Wire Smoke Detectors: Detector circuits of two-wire type capable of transmitting detector operating power over initiating circuit are permitted, provided detectors used are approved by control panel manufacturer for use with control panel provided and are ULC listed as being compatible with control panel.

.1 Total number of detectors on any detection circuit shall not exceed 80% of maximum number of detectors allowed by control panel manufacturer for that circuit. Provide additional zones if required to meet this requirement.

.6 Photoelectric Detectors shall operate on light scattering principle using LED light source.

.1 Detector shall respond to both flaming and smoldering fires.

.7 Temperature rating of detectors shall be in accordance with NFPA 72.

.8 Locate detectors in accordance with their listing by ULC and the requirements of NFPA 72, except provide at least two detectors in rooms of 54 square meters or larger in area.

.9 Mount detectors at underside of ceiling or deck above unless otherwise indicated.

.1 For mounting heights greater than 3 m above floor level, reduce actual detector linear spacing from listed spacing as required by NFPA 72.

.10 Locate detectors minimum 300 mm to lighting fixtures and not closer than 600 mm to air supply or return diffuser.

.11 Ensure detectors, located in areas subject to moisture or exterior atmospheric conditions or hazardous locations as defined by NFPA 70, are approved for such locations.

.12 Removal of detector head from its base to cause activation of system trouble signals if detectors are provided with separable heads and bases.

2.6 SMOKE DETECTORS

.1 Duct Smoke Detectors:

.1 Ensure duct smoke detectors and associated modules are compatible with main control panel and suitable for use in supervised circuit.

.2 Detector circuits: 4-wire type where detector operating power is transmitted over conductors separate from initiating circuit. Malfunction of electrical circuits to detector or its control or power modules to cause operation of system trouble signals.

.3 Provide a separate, fused power circuit for each smoke detection initiating circuit.

.4 Failure of power circuit: indicated as a trouble condition on corresponding initiating circuit.

.5 Provide duct detectors with approved duct housing, mounted exterior to duct, with perforated sampling tubes extending across width of duct.

.6 Activation of duct detectors to cause shutdown of associated air handling unit annunciation at control panel and sounding of building evacuation alarms.

.7 Provide detectors with visible indicator lamp that flashes when detector is in normal standby mode and glows continuously when detector is activated.

.8 Provide remote indicator lamp for each detector.

.9 Permanently label remote indicator with description of associated air handling unit(s).

.10 Provide each detector with remote test switch. Mount switch not more than1.8m above finished floor.

.11 Permanently label test switch with description of associated air handling unit(s).

.2 Projected Beam Smoke Detector:

.1 Provide projected beam smoke detectors to protect spaces indicated.

.2 Provide detectors and associated controls compatible with main control panel and suitable for use in supervised circuit.

.3 Detector circuits: 4-wire type, where detector operating power is transmitted over conductors separate from initiating circuit.

.4 Provide separate, fused power circuit for each smoke detection initiating circuit.

.5 Failure of the power circuit: indicated as trouble condition on initiating circuit.

.6 Malfunction of detector or its control unit or blockage of projected beam to cause operation of system trouble signals.

.7 Beam length and distance between adjacent beams, and distance between beams and walls, not exceeding maximum permitted by equipment listing.

.8 Do not use mirrors to alter direction of projected beam.

.3 Aspirating Smoke Detection System (ASD):

.1 Obscuration measurements shall communicate to the fire alarm control panel and sprinkler pre-action system for status determination.

.2 Ensure system includes pipe and inlets in accordance with manufactures requirements.

.3 Provide three programmable thresholds:

.1 Stage 1 – Alert (0.016 to 0.6218% obscuration/feet).

.2 Stage 2 – Pre-Alarm (0.03 to 0.6234% obscuration/feet).

.3 Stage 3 – Alarm (0.05 to 4.08% obscuration/feet).

2.7 SWITCHES

.1 Freeze Protection Thermostatic Switch:

.1 Provide switch with concealed set point, cover, and Allen head screws.

.2 Provide with insulating sub base when mounting on exterior wall.

.3 Omit temperature indicator or conceal indicator within cover.

.4 Switch: Not to be adjustable below 4°C. Switch contacts to transfer when fire protection equipment room air temperature drops below 4°C, causing supervisory signal on fire alarm system. Removal of switch from circuit to cause trouble signal on its respective zone.

.2 Valve Tamper Switches:

.1 Provide switches to monitor open position of valves controlling water supply to sprinkler systems.

.2 Switch contacts to transfer from normal position to off-normal position during first two revolutions of hand wheel or when stem of valve has moved not more than one-fifth of distance from its normal position.

.3 Provide switch with tamper resistant cover.

.4 Removal of the cover to cause switch to operate into off-normal position.

2.8 ADDRESSABLE AUDIBLE SIGNAL DEVICES

.1 Audible Device(s):

.1 Horns shall be flush mounted, single stroke, polarized, 24 V DC. (to be verified by BCIT).

.2 Mini-horns shall be 96 dB flush mounting, red colour, 24 V DC. (to be verified by BCIT)

.3 Do not exceed 80% of listed rating in amperes of notification appliance circuit. Provide additional circuits above those shown if required to meet this requirement.

.4 Finish appliances in red enamel.

.2 End-Of-Line Devices:

.1 Size end-of-line devices to control supervisory current in alarm circuits and signalling circuits to ensure correct supervisory current for each circuit.

.2 Open, short or ground fault in any circuit will alter supervisory current in that circuit, producing audible and visible alarm at main control panel and remotely as indicated.

.3 Visual Alarm Signal Devices:

.1 Flush-mounted assembly of stroboscopic type suitable for use in electrically supervised circuit and powered from notification appliance circuit.

.2 Appliances shall have minimum of 30 candela measured as approved by ULC, but not less than effective intensity required by National Building Code of Canada for appliance spacing and location.

.3 Protect lamps with thermoplastic lens and labelled "FIRE" in letters at least 12 mm high.

.4 Provide visible appliances within 300 mm of each audible appliance as indicated.

.5 Visible appliances may be part of audio-visual assembly, where more than two appliances are located in same room or corridor.

2.9 ACCESSORIES

.1 Acceptable equipment:

.1 GE/Edwards – Model 6255-004.

.2 Notifier – Model G1A-2.

.3 Simplex-Grinnell – Model 2098-9829C/4098-9806C.

.2 Remote relay unit to initiate fan shutdown.

.3 Smoke detector guard: Guard shall be approved manufacturer and model to meet BCIT requirements.

.4 Grout: High yield grout material to fill any space between backs of mounting plate and ceiling surfaces.

.5 As-Built Riser Diagram: Fire alarm system riser diagram shall be in glazed frame minimum size 600 mm x 600 mm.

.6 Power Supply:

.1 Product: 120 V, AC, 60 Hz input, 24 V DC (to be verified by BCIT).

.2 Output from rectifier to operate alarm and signal circuits, with standby power of gel cell batteries minimum expected life of four years.

.7 Regular Surge Suppression: Provide line voltage surge suppression devices to suppress voltage transients which might damage control panel components.

.8 Line Voltage Surge Suppressor:

.1 ULC approved with maximum 330 volt clamping level and maximum response time of five nanoseconds.

.2 Multi-stage construction including inductors and silicon avalanche zener diodes.

.3 Equip suppressor with light emitting diode which extinguishes upon failure of protection components.

.4 Ensure fuses are externally accessible.

.9 Wire and Cables:

.1 Conductor Insulation: Minimum 300 V. Single conductor RW 90xLPE.

.2 Multiconductor Cables /05°C with PVC jacket, colour coded, FAS rated.

.3 Conductor sizes:

.1 Initiating circuits #18AWG minimum, and in accordance with manufacturer.

.2 Signaling circuits #16 AWG minimum, and in accordance with manufacturer.

.3 Control circuits #12 AWG minimum, and in accordance with manufacturer.

.4 Size Fire Alarm wiring for maximum 3% voltage drop at “Max Load” at last device in run.

.4 Copper conductor.

.5 Colour code wiring.

.6 In conduit minimum ¾” (21 mm). Short drops from ceiling JB to T-Bar detectors may be in fire rated cable.

2.10 SYSTEM OPERATION

.1 Single Stage Operation: Actuation of single operation device to initiate following:

.1 Cause audible signal devices throughout building to sound continuously.

.2 Transmit signal to fire department via monitoring station.

.3 Indicate zone of alarm device on control panel and remote annunciator.

.4 Air conditioning and ventilating fans to shut down or to function so as to provide required control of smoke movement.

.5 Operations to remain in alarm mode (except alarm notification appliances if manually silenced) until system is manually restored to normal.

.2 Capability to program smoke detector status change confirmation on any or zones in accordance with CAN/ULC S527, Appendix C.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Alarm Initiating Device Spacing and Location:

.1 Ensure spacing does not exceed 9 x 9 m per detector, and 9 linear m per detector along corridors.

.2 Mount detectors at underside of deck above in areas without finished ceilings unless otherwise indicated.

.2 Audible Devices: Provide appliance manufacturer's approved back box for surface mounting. Back box finish to match appliance finish.

.3 Electro-magnetic Door Holder-releases:

.1 Mount armature portion on door complete with adjusting screw for setting angle of contact plate.

.2 Mount electro-magnetic release on wall or in wall recess behind door.

.3 Activation of fire alarm system to release doors on circuit to close.

.4 Total projection of door holder-release not to exceed 100 mm.

.5 Door holders: Do not require battery backup power.

.4 Enclosure: Mount with panel centerline 1.5 m above finished floor elevation.

.5 Freeze Protection Thermostatic Switch: Mount switch with centerline 1.5 m above finished floor.

.6 Guards:

.1 Install guard in accordance with manufacturer’s requirements to ensure proper required conduit entry.

.2 Confirm method of installation meets BCIT requirements prior to installation.

.7 Line Voltage Surge Suppressor: Wire in series with incoming power source to protected equipment using screw terminations.

.8 Remote Annunciator Panels: Provide panel where indicated, and mount 1.5 m above finished floor elevation.

.9 Sprinkler Pre-Action System Sequence of Operation:

.1 Stage 1: Arrange room fire detection system so that operation of any smoke detector causes the following:

.1 Audible signal in room to sound.

.2 Indication of alarm zone at main fire alarm control panel and room panel.

.3 Audible signal at main fire alarm control panel to sound.

.4 Transmit alarm signal to fire department.

.2 Stage 2: Arrange room fire detection system so that operation of any heat detector that reaches 43°C causes the following:

.1 It will send a signal to the pre-action system allowing it to open valve and flood the piping.

.10 Surge Suppression: Mount suppressors in separate enclosure(s) adjacent to control panel except where suppressors are specifically UL approved for mounting inside control panel provided and approved for such use by control panel manufacturer.

.11 Wire and Cables: For underground or wet locations cable from control panel to remote devices.

3.2 FIELD QUALITY CONTROL

.1 Perform site tests in accordance with section 26 05 00 – Common Work Results – for Electrical and CAN/ULC-S537.

.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Obtain written report from manufacturer verifying compliance of works, in handling, installing, applying, protecting and cleaning of product. Submit manufacturer's field reports.

3.3 TRAINING

.1 Arrange and pay for on-site lectures and demonstrations by fire alarm equipment manufacturer to train operational personnel in use and maintenance of fire alarm system

END OF SECTION