1. GENERAL

1.01 SECTION INCLUDES

.1 Single stage addressable fire alarm systems.

.2 System testing and verification.

.3 Work to be done under this Section shall include furnishing of labour, materials, and equipment required for installation, testing, and putting into proper operation a complete Fire Alarm System as shown, as specified, and as otherwise required. Complete system shall be left ready for continuous and efficient satisfactory operation.

1.02 RELATED REQUIREMENTS

.1 Section 08 71 00 – Door Hardware: additional requirements for access control devices, magnetic door holders, etc.

.2 Section 21 12 00 – Fire-Suppression Standpipes.

.3 Section 21 13 00 – Fire-Suppression Sprinkler Systems.

.4 Section 26 05 00 – Common Work Results for Electrical.

.5 Section 26 05 83.14 – Wiring Connections for Elevators.

1.03 UNIT PRICES

.1 Refer to Document 00 43 00.26.

.2 Submit with Tender unit prices to provide the following. Include installation and verification in the unit price:

.1 Section 28 46 31:

.1 Fire detector (heat detector or smoke detector) complete with wiring and conduit, based on 10 metre distance.

.2 Duct type smoke detector complete with wiring and conduit on a separate zone, based on 30 metre distance.

.2 Section 28 46 31.31:

.1 Manual pull station, complete with wiring and conduit based on 10 metre distance.

.3 Section 28 46 31.41:

.1 Zone Addressable Module (ZAM).

.4 Section 28 46 41:

.1 Fire alarm horn complete with wiring and conduit, based on 10 metre distance.

.2 Combination Fire alarm horn/strobe complete with wiring and conduit, based on 10 metre distance.

.3 Combination speaker/strobe complete with wiring and conduit, based on 10 metre distance.

.5 Unit cost of additional conduit and wire for the above items.

.6 Wire guard for any fire alarm device.

1.04 REFERENCES

.1 Definitions

.1 FACP: Fire Alarm Control Panel. This is the central component of a fire alarm/detection/communication system and consists of a control panel(s) and contains the system power supply, system CPU, circuit terminations, and system annunciation functions.

.2 INITIATION DEVICE: Examples are smoke detectors, heat detectors, water flow switches, valve tamper switches, and manual pull stations. These are devices which initiate a signal and send it to the FACP telling it that an abnormal event has taken place. Data Centre extinguishing systems, kitchen hood extinguishing systems, and other special extinguishing system control panels are additional examples of initiating devices.

.3 NOTIFICATION DEVICE: Examples are alarm horns, alarm speakers, and strobe lights. These devices are used to indicate through visual and audible means the existence of an abnormal event throughout all areas of the protected premises.

.4 CONTROL DEVICE: Examples are electronic relays or solenoids. These devices allow the FACP to automatically take certain actions during an abnormal event. For example, the FACP may energize a relay which, in turn, shuts down an air handling unit.

.5 CENTRAL PROCESSING UNIT (CPU): The central computer of a multiplex fire alarm system.

.6 CONCEALED: Where used in connection with installation of piping or conduit and accessories shall mean "hidden from sight" as in shafts, furred spaces, soffits or above suspended ceilings.

.7 EXPOSED: Where used in connection with installation of piping or conduit and accessories shall mean "visible" or "not concealed."

.8 AHJ: Authority Having Jurisdiction.

.9 LISTED: Materials or equipment included in a list published by a nationally recognized laboratory that maintains periodic inspection of production of listed equipment and materials, and whose listing states either that the equipment or material meets nationally recognized standards or has been tested and found suitable for use in a specified manner.

.10 NFPA: National Fire Protection Association.

.11 CLASS A: Applies to wiring from transponder to central processing unit. The CPU will detect circuit trouble and transponder will retain the ability to transit alarm upon a single fault condition.

.12 CLASS B: Applies to wiring from initiating device to transponder. A trouble signal will be transmitted to the panel upon a single fault condition.

.13 TRANSPONDER: Single or multiple zone/point data collection panel used within a multiplex system.

.14 UL, and ULC: Underwriters Laboratories, Inc., and Underwriters Laboratories of Canada, Inc.

.15 ULC Listed: Materials or equipment listed by Underwriters Laboratories of Canada and included in the most recent edition of the UL and ULC Fire Protection Equipment Directory.

.16 AHU: Air Handling Unit.

.17 FM: Factory Mutual Research Corporation/Factory Mutual Engineering Association.

.2 Reference Standards

.1 The publications listed below form a part of this specification. The publications are referenced in text by the basic designation only. The equipment and installation shall comply with the latest edition/amendment referenced code, standard, or publication.

.1 CSA Group:

.1 CSA C22.1:21, Canadian Electrical Code, Part 1 (25th edition), Safety Standard for Electrical Installations.

.2 Ontario Electrical Safety Code (28th edition/2021).

.3 CSA C22.2 No. 208-14 - Fire Alarm and Signal Cable.

.2 Ontario Regulations:

.1 2012 Ontario Building Code.

.2 2007 Ontario Fire Code.

.3 Underwriters Laboratories of Canada:

.1 CAN/ULC-S524-14 – Standard for Installation of Fire Alarm Systems.

.2 CAN/ULC-S525 – Audible Signal Appliances for Fire Alarm Systems.

.3 CAN/ULC-S526 – Visual Signal Appliances for Fire Alarm Systems.

.4 CAN/ULC-S527 – Control Units for Fire Alarm Systems.

.5 CAN/ULC-S528 – Manual Pull Stations for Fire Alarm Systems.

.6 CAN/ULC-S529 – Smoke Detectors for Fire Alarm Systems.

.7 CAN/ULC-S530 – Heat Detectors for Fire Alarm Systems.

.8 CAN/ULC-S533 – Egress Door Securing and Releasing Devices.

.9 CAN/ULC-S536 – Inspection and Testing of Fire Alarm Systems.

.10 CAN/ULC-S537 – Verification of Fire Alarm Systems.

.11 CAN/ULC-S548 – Alarm Initiating and Supervisory Devices for Water Type Extinguishing Systems.

.12 CAN/ULC-S561-13 – Standard for Installation and Services for Fire Signal Receiving Centres and Systems.

.13 CAN/ULC-S1001-11 (R2018) – Integrated Systems Testing of Fire Protection and Life Safety Systems.

.4 All requirements of the Authority Having Jurisdiction (AHJ).

.2 In the case of any discrepancy between these specifications, the project drawings, and any applicable local codes, the installed Fire Alarm / Life Safety System shall comply with the most stringent requirement.

1.05 ACTION SUBMITTALS

.1 In accordance with Section 01 33 00.

.2 Product Data: Provide electrical characteristics and connection requirements.

.3 Submit drawings to municipal Fire Department if required, showing annunciation devices, manual pull stations, complete wiring diagrams and annunciator details and obtain their approval.

.4 Shop Drawings:

.1 Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.

.2 Include manufacturer's name(s), model numbers, ratings, power requirements, equipment layout, and device arrangement, and clearly showing ULC certification of all components.

.3 Show annunciator layout and main control panel module layout, configurations and terminations.

.4 Floor plan layouts showing all devices.

.5 Complete riser diagram, and auxiliary functions.

.6 The supplier of the system shall prepare a complete zoning schedule and artwork layout for passive graphic to be included with submittal package.

.7 Sequence of Operation narrative and zone chart.

1.06 INFORMATIONAL SUBMITTALS

.1 Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of products.

1.07 CLOSEOUT SUBMITTALS

.1 Maintenance Contracts

.1 Provide service and maintenance of fire alarm system for one year from Date of Substantial Completion.

.2 Operation and Maintenance Data

.1 Operation Data: Operating instructions.

.2 Maintenance Data: Maintenance and repair procedures.

.3 Record Documentation

.1 Record actual locations of initiating devices, signaling appliances, and end-of-line devices.

.2 Electrical Safety Authority (ESA) inspection certificate.

.3 Fire alarm verification report.

.4 Audibility test.

.5 CAN/ULC-S1001 functional test report.

.4 Manuals

.1 Submit complete operating and maintenance manuals listing the manufacturer's name(s) including technical data sheets (with model numbers to be used indicated).

.2 Wiring diagrams shall indicate terminals and the interconnections between the items of equipment.

.3 Provide a clear and concise description of operation which gives, in detail, the information required to properly operate the equipment.

1.08 SPARE PARTS

.1 Supply the following additional equipment as spare parts in a proper metal enclosure sized to accept the equipment as listed herein. Label the enclosure fire alarm spare parts. Enclosure shall be placed in the same room as the FACP.

.1 Supply six keys of each type.

.2 Supply three of each type of addressable detector base, smoke detector, heat detector, and fire alarm pull station.

.3 Supply three of each type of other installed initiating, notification, or controlling devices.

.4 Supply three of each type of any special tools required for system use and maintenance.

.5 Supply three of each type of signalling device used on the project.

.2 Provide (supply and install) an additional five of each of the following devices as directed during construction. Turn over unused surplus in addition to those devices listed above:

.1 Section 28 46 31:

.1 Smoke detectors.

.2 Duct smoke detectors.

.2 Section 28 46 41:

.1 Fire alarm speakers.

.2 Combination speaker/strobes.

.3 Door hold open devices.

1.09 QUALITY ASSURANCE

.1 Manufacturer shall examine drawings and specifications prior to award of contract to ensure that detectors, control panels and miscellaneous devices being supplied will provide a satisfactory working installation.

.2 Each and all items of the fire alarm system shall be listed as the products of a single manufacturer under the appropriate category by Underwriters Laboratories of Canada and shall bear the "ULC" label.

.3 The fire alarm control, panel shall meet the modular listing requirements of ULC. Each subassembly of the FACP, including all printed circuit boards, shall include the appropriate ULC modular label.

.4 Each and all items of the fire alarm system shall be covered by a one-year parts and labour warranty covering defects resulting from faulty workmanship and materials. The warranty shall be deemed to begin on the date the system is accepted by the Project Manager on issuance of the substantial performance certificate for the project.

.5 Regulatory Requirements

.1 Provide products listed and classified by ULC as suitable for purpose specified and indicated.

.6 Qualifications of Manufacturer

.1 Equipment and materials shall be provided by an experienced reputable manufacturer to ensure proper specification adherence, final connection, test, turnover, warranty compliance, and service.

.2 The manufacturer is required to have been in the fire alarm industry (service and installation) for a minimum of ten years.

.3 The manufacturer shall have in-house engineering and project management capability consistent with the requirements of this project. Qualified and approved representatives of the system manufacturer shall perform the detailed engineering design of central and remote control equipment.

.4 International Standards Organization. The system and all components will be manufactured to ISO 9001 international Quality Management and Quality Assurance Standards.

.5 Manufacturer must have service facilities within a 50 km radius of the installation location.

.7 Qualifications of Installers

.1 All work performed to comply with this specification shall be carried out by and/or managed by a competent firm regularly engaged in the installation and testing of fire alarm systems for commercial buildings. Equipment manufacturer shall also be competent firms which are regularly engaged in the design, installation, testing, and servicing of fire alarm systems for this type of building.

.2 Review of cut-sheets, shop drawings, calculations and other materials submitted by the contractor shall not relieve the contractor's responsibility for full compliance with the design drawings and specification unless written approval is requested by the contractor and obtained from the Consultant for each non-complying feature. Finalized agreements for all equipment deviations from the drawings and specification shall be completed prior to award of the installation contract.

.3 For those instances where the contractor cannot conform to the drawings and specification, a proposed variance shall be submitted in writing to the Consultant at least five working days prior to the bidding date. The Consultant will respond to all proposed variances within two working days of receipt.

.4 All questions concerning interpretation of the design drawings and specification shall be submitted to the Consultant in writing no later than three working days prior to the bidding date. Requests

for interpretations received after this date will not be answered. The Consultant will respond to all requests for interpretations in writing and will provide a summary of each request and the response to all bidding contractors. The Consultant will respond to all requests for interpretations within two working days of receipt.

.5 The contractor shall utilize the services of a fire alarm equipment distributor who is a factory authorized representative and a full line stocking distributor of the equipment manufacturer and shall maintain a constant inventory of the parts typical of those used in the system installation covered under this specification.

.6 The contractor and the fire alarm equipment manufacturer or distributor shall each have a minimum of 7 years of continuous experience in the design and/or installation of fire alarm systems and shall have completed a minimum of five projects of similar scope and complexity which were completed using addressable/analog systems. It is intended that these projects incorporated the same equipment, manufacturer, and model number, as is being proposed for this project. To verify the qualifications, the contractor and the fire alarm equipment distributor shall submit a brief design narrative which covers at least five fire alarm systems selected for references. This narrative shall indicate the project location, approximate contract value, system size by device counts, and a functional overview. These narratives shall provide an end-user contact name and telephone number for each referenced system. Where a fire alarm equipment distributor is a branch office of a fire alarm manufacturer, the references shall be chosen from projects in which the branch office completed both the design implementation and the installation.

.7 The Owner reserves the right to request documentation from the contractor with respect to any pending litigation against the contractor or any subcontractor. Further, the Owner reserves the right to review an audited financial statement of the contractor or any subcontractor for the most recently completed fiscal year.

.8 The Owner reserves the right to disqualify any contractor who does not comply with all requirements of the Contractor Performance Standard of this specification.

.9 Installer must be certified by the Province of Ontario as a fire alarm installer.

1.10 DELIVERY, STORAGE, AND HANDLING

.1 In accordance with Section 01 61 00.

1.11 WARRANTY

.1 All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least one year from the date of Substantial Performance.

2. PRODUCTS

2.01 MANUFACTURERS

.1 All references to manufacturer's model numbers and other pertinent information herein is intended to establish minimum standards of performance, function and quality.

.1 [Autocall 4100ES series.]

.2 Edwards; EST4 series.

.3 Notifier by Honeywell; Onyx [NFS2-640C] [NFS2-3030] series.

.4 Mircom; FX-4000 series.

.5 Siemens; Desigo series.

.6 SimplexGrinnell by Tyco Integrated Fire & Security; 4100ES series.

.2 All equipment and components shall be the manufacturer's current model.

.3 The materials, appliances, equipment, and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a protected premises protective signaling (fire alarm) system.

.4 The authorized representative of the manufacturer of the major equipment, such as control panels, shall be responsible for the satisfactory installation of the complete system.

.5 The contractor shall provide, from the acceptable manufacturer's current product lines, equipment, and components, which comply, with the requirements of these specifications.

.6 Manufacturer is to support a 20 year product.

2.02 CONDUIT AND WIRE FOR FIRE ALARM SYSTEM

.1 Conduit:

.1 In accordance with Section 26 05 33.13.

.2 Conduit shall be in accordance with the Electrical Safety Authority (ESA), local and provincial requirements.

.3 All wiring shall be installed in conduit or raceway.

.2 Terminal Boxes, Junction Boxes and Cabinets:

.1 All boxes and cabinets shall be listed for their purpose and use.

.3 Fire Alarm Cable

.1 Wiring shall be in accordance with local, provincial and national codes and as recommended by the manufacturer of the fire alarm system. Number and size of conductors shall be as outlined in the Ontario Electrical Safety Code and as recommended by the fire alarm system manufacturer.

.2 All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signalling system, as outlined in the Ontario Electrical Safety Code.

.3 Conductors: 300 V rated multiconductor, insulated, colour coded, copper conductor, minimum size to be 16 AWG for device loops and 14 AWG for signal circuits.

.4 Certified by CSA as fire alarm and signal cable type FAS 105 to CSA C22.2 No. 208.

.5 Non-Fire rated cable:

.1 Insulation: 105°C flame retardant PVC

.2 Outer Jacket: 105°C flame retardant PVC Red.

.3 Armour: Interlocking aluminum without overall jacket. For drops to devices in suspended ceilings from conduit system.

.6 Fire rated fire alarm cable:

.1 Pentair Pyrotenax 1850 series mineral insulated (MI) cable with 2 hour fire rating to ULC S139 and to meet 2012 Ontario Building Code rule 3.2.7.10.

.2 Substitution: VITALink MC Brand Type MC, manufactured by Marmon Wire & Cable Inc. (listed by ULC under ULC category code 'FHJRC', dated 19 May 2015).

2.03 ADDRESSABLE FIRE ALARM SYSTEM

.1 The system to be electrically supervised, non-coded, annunciated, single-stage, addressable fire alarm system using addressable devices.

.2 The Central Processing Unit (CPU) uses multiplex communication techniques to receive data from and transmit data to transponders remotely located throughout facility to minimize wiring costs, simplify design, to allow economical expansion and easy retrofit.

.3 Make provisions during detailed design for future expansion of the system.

.4 System to be complete with a minimum of three data loops per node.

.5 The CPU is microprocessor-based to increase system reliability, speed response to alarm conditions, and reduce cost. CPU response time to alarm conditions to be no more than four seconds, regardless of system size.

.6 Fire alarm system will be zoned as required plus 20 per cent spares.

.7 Basic Performance:

.1 Alarm signals arriving at the main FACP shall not be lost following a power failure (or outage) until the alarm signal is processed and recorded.

.2 Provided with an emergency power supply, i.e. batteries capable of providing supervisory power for not less than 24 hours, and immediately following, emergency power under full load for not less than two hours.

2.04 FIRE ALARM ANNUNCIATOR PANEL (FAAP) AND GRAPHIC

.1 To Section 28 46 21.22.

2.05 ULC MONITORING TRANSMITTER

.1 To Section 28 46 21.24.

2.06 FIRE ALARM SYSTEM ACCESSORIES

.1 To Section 28 46 25.

2.07 FIRE ALARM INITIATION DEVICES

.1 Automatic Initiating Devices to Section 28 46 31.

.2 Manual Pull Stations to Section 28 46 31 31.

.3 Supervisory Signal devices and Sprinkler Flow Switch alarms to Section 28 46 31.41.

2.08 FIRE-ALARM SUPERVISED INTERFACE HARDWARE

.1 Door Hardware Fire Alarm Integration to Section 28 46 51.08.

.2 Elevator Interface to Section 28 46 51.14.

.3 HVAC Integration to Section 28 46 51.23.

2.09 SIGNALLING DEVICES

.1 Speakers and visual signal devices (strobes) to Section 28 46 41.

.1 Strobe Frequency: maximum 5 Hz.

.2 Programmable Electronic Sounders:

.1 Shall be flush mounted as required.

.3 Audible/Visual Combination Devices:

.1 Shall meet the applicable requirements listed above for audibility.

.2 Shall have a built in strobe, 75 candela.

.4 Strobe Synchronizing Modules:

.1 Synchronize strobes at 1 Hz and horns at temporal over single wire pan.

2.10 OPERATION SEQUENCE

.1 To Section 28 46 15.

3. EXECUTION

3.01 INSTALLATION

.1 The entire system shall be installed in accordance with the edition of CAN/ULC-S524 as adopted by the applicable legislation, and the manufacturer's manuals and wiring diagrams.

.2 The contractor shall furnish all labour, conduit, wiring, outlet boxes, junction boxes, cabinets, and similar devices necessary for a complete, functional life safety fire alarm system.

.3 Provide all necessary power supply, interconnecting and remote signal wire in dedicated conduit throughout and installed in accordance with

the manufacturer's wiring diagrams and the requirements of the Canadian Electrical Code and the Inspection Authority.

.4 All penetration of floor slabs and fire walls shall be fire stopped in accordance with all local fire codes.

.5 Power supply:

.1 Connect fire alarm system power supply to a dedicated circuit.

.2 Circuit breaker(s) feeding fire alarm system to be coloured red, clearly labelled, and be locked in the ON position.

.6 Wiring:

.1 Install all wiring in metal raceways.

.2 Provide wiring suitable for fire alarm circuits.

.1 Class "A" wiring for initiating circuits.

.2 Class "A" wiring for signalling circuits unless noted otherwise.

.3 Provide fire rated cables for fire alarm circuits as required by applicable codes and standards.

.4 Provide separate signalling circuits for audible and visual devices.

.5 End-of-line resistors shall be furnished as required for mounting as directed by the manufacturer on Class B circuits.

.1 Install EOL resistors maximum 1800 mm above finished floor in interior spaces.

.7 Install manual pull stations at 1200 mm above finished floor.

.8 Identification

.1 Provide lamacoid label (white text on red background) for all supporting field devices indicating function of the device.

3.02 FIELD QUALITY CONTROL

.1 The installing contractor shall provide a qualified project superintendent for the overall management and supervision of the work.

.2 The project superintendent shall assure that adequate supervision is provided during all periods of installation of the fire alarm system. The project superintendent and all job site supervisors shall have a minimum of

five years of continuous experience in the installation of fire alarm systems of similar scope and complexity.

.3 Upon completion of the installation, the installing contractor shall test all alarm initiating devices, supervisory devices, control devices and notification devices for proper response and effectiveness. Operation of all annunciating devices including the FACP, printer and remote LCD panel shall be verified. Testing shall include thorough sound level measurements of audible notification devices. These tests shall be fully documented. All testing up to the point of conducting the final acceptance tests shall be recorded using a temporary printer. The permanent printer of the system, where such has been provided, shall not be installed prior to the final acceptance tests.

.4 All smoke detectors shall be suitably protected against contamination up to the time of the final acceptance tests.

.5 An itemized test report in accordance with CAN/ULC-S524, CAN/ULC-S536, and CAN/ULC-S537 shall be submitted to the Consultant. This report shall provide complete details of the testing completed for all devices as well as circuit testing parameters. Data shall be submitted indicating the sensitivity level of all system smoke detectors.

.6 Following completion of a 100 per cent system functional test, the contractor shall perform a thorough acceptance test of the system at the direction of and to the satisfaction of the Owner and Consultant. This test shall not be carried out until at least 15 days after completion of all contractor's testing, modification and repairs following the original contractor's functional test and submittal of the functional testing documentation to the Consultant. The 15 day interval is also intended to be a system "burn-in" period. Any false activations of the system which occur within the burn-in period which are determined to be the result of a system fault shall result in the restart of the 15 day period.

.7 In the event that the acceptance test of the system results in the need for system repair or modification, the contractor shall demonstrate the operability of the system to the full satisfaction of the Owner and Consultant following the completion of repairs or modification.

.8 In the event that the AHJ requires a separate demonstration of the operability of the system for acceptance purposes, these additional tests shall be carried out by the Contractor without expense to the Owner.

.9 The contractor shall conduct an independent quality assurance review of all developed "record" drawings to assure accuracy and completeness of these drawings. Any discrepancies shall be brought to the attention of the Consultant prior to construction start.

.10 Only directly prior to verification, remove smoke detector protectors, and clean smoke detectors thoroughly.

.11 Inspect and check each individual device in entire system for proper connection, supervision, and function in accordance with CAN/ULC-S537. Identify detectors, manual pull stations and signal appliances not installed within requirements of CAN/ULC-S524 in remarks column of verification report.

.12 Obtain verification certificate and verification report from manufacturer showing each device checked, and that work has been carried out. Utilize standard verification forms similar to Canadian Fire Alarm Association (CFAA) forms.

3.03 ADJUSTING

.1 Contractor to verify programming of room names prior to fire alarm system programming, and allow for a revision to the fire alarm system programming should the Owner or AHJ wish to revise the room names.

3.04 MONITORING

.1 Fire alarm control panel to be located as indicated. Coordinate third party CUL Listed monitoring with Owner.

3.05 MANUFACTURER SERVICES

.1 At the final inspection a factory trained representative of the manufacturer of the major equipment shall demonstrate that the systems function properly in every respect.

.2 The manufacturer's representative shall perform an inspection of the fire alarm equipment, including those components necessary to the direct operation of the system such as manual stations, thermal and smoke actuated detectors and controls, whether or not manufactured by the manufacturer. The inspection shall comprise an examination and test of such equipment for the following:

.1 That the type of equipment installed is that designated by the specifications.

.2 That the wiring connections to all equipment components show that the installer undertook to have observed ULC requirements. That all products of combustion (smoke) detectors have been properly calibrated, and adjustments set correctly.

.3 That the representative's equipment has been installed in accordance with the manufacturer's recommendations.

.4 That the supervisory wiring of all devices connected to a supervised circuit is operating and that the wiring, having been met to the satisfaction of the inspecting officials.

.3 Testing to be done in the presence of the local building inspector, and the local fire inspector.

.4 The manufacturer(s) of the fire alarm shall make a complete inspection of all components installed for system(s), such as manual stations, horns, and annunciators and sprinkler and standpipe valves and smoke detectors to ensure the following:

.1 That the system is complete in accordance with Specifications.

.2 That the system is connected according to ULC requirements.

.3 That the system is connected in accordance with the manufacturer's recommendations.

.4 That the regulations concerning the supervision of components have been adhered to (e.g. stations, detectors, supervised valves, bells), and are properly wired and supervised.

.5 That all valves are properly connected and displayed correctly on each annunciator.

.6 That any subsequent changes necessary to conform to the above will be carried out with technical advice supplied by the Manufacturer.

.7 That all thermal detectors, smoke detectors and manual pull stations have been operated and are in good working order.

.8 That all sprinkler system and standpipe system valves have been operated and are in good working order.

.9 That all annunciators correctly pin-pint the origin of any fire alarm.

.10 That actual smoke concentration of sufficient density, have been applied to each smoke detector to cause the detector to be set off and that the sensitivity of each smoke detector has been set.

.11 That all devices are in good working order. Include for replacing any defective/damaged devices at no extra cost to Owner.

.12 That signal audibility is acceptable in all areas. Submit audibility readings for every Room.

3.06 SITE TESTS AND INSPECTIONS

.1 Provide the service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment to technically supervise and participate during all of the adjustments and tests for the system.

.2 All initial testing shall be in accordance with the latest issue of ULC-S537 Verification of Fire Alarm Systems standard.

.3 Provided integrated testing of life safety systems in accordance with Section 28 08 46.

.4 A representative of the electrical contractor shall be present to participate and assist the manufacturer representative during the course of the verification. The electrical contractor shall make good any deficiencies discovered during the verification. Verify all devices. The electrical contractor shall provide one person for assistance with the verification.

.5 The verification report shall be submitted for approval to the Consultant.

.1 Ensure verification report uses room numbers and space descriptions that are consistent with the drawings.

.6 On completion of the inspection the manufacturer shall supply a certificate, together with detailed inspection record sheets showing location of each device and certifying the test results per unit, confirming that the system is installed, supervised, and operate in accordance with Article "System Verification".

.7 Audibility Test:

.1 Provide audibility test of signalling devices after other systems have been commissioned to verify operation at ambient sound levels.

.2 Provide audibility test report to the Consultant.

.3 Implement varied tone to suit audibility requirements.

3.07 CLOSEOUT ACTIVITIES

.1 The System Supplier shall schedule and present documented formalized instruction for the building owner, detailing the proper operation and maintenance of the installed System.

.2 The instruction shall be presented in an organized and professional manner by a person factory trained in the operation and maintenance of the equipment and who is also thoroughly familiar with the installation.

.3 The instruction shall cover the schedule of maintenance required by ULC and any additional maintenance recommended by the system manufacturer.

.4 Instruction shall be made available to the Local Municipal Fire Department if requested by the Local Authority Having Jurisdiction.

.5 The contractor shall provide for a minimum of three training sessions of two hours in length. At least one of these training sessions shall be carried out for key personnel prior to the system being initially placed on-line for the beginning of the burn-in period.

.6 Three bound copies which summarize the training instruction shall be submitted to the Owner for future reference.

End of Section