1. GENERAL

1.01 SECTION INCLUDES

.1 Spot type smoke detectors.

.2 Duct mounted smoke detectors.

.3 Heat detectors.

.4 Accessories.

1.02 RELATED REQUIREMENTS

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

.2 Section 28 46 13 – Fire-Alarm Systems.

.3 Section 28 46 31.18 – Carbon Monoxide Detection Sensors.

.4 Section 28 46 31.26 – Residential Smoke and Carbon Monoxide Alarms.

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 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.

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

.4 Wire guard for any fire alarm device.

1.04 REFERENCES

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

1.05 MAINTENANCE MATERIAL SUBMITTALS

.1 Extra Stock Materials

.1 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 below:

.1 Smoke detectors.

.2 Duct smoke detectors.

.2 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 three of each:

.1 Addressable detector base.

.2 Smoke detector.

.3 Duct smoke detector.

.3 Tools

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

2. PRODUCTS

2.01 ANALYTICAL MICROPROCESSOR ADDRESSABLE DETECTORS – GENERAL

.1 Early warning analog addressable detectors shall use state-of-the-art multi-sensor technology. Each detector shall incorporate a microprocessor capable of making alarm decisions based on fire parameter algorithms stored in the detectors head. The microprocessor shall evaluate all sensing elements simultaneously and take into account real-time environmental conditions and the duration of an event, resulting in reliable and accurate decisions that distinguish real fire conditions from unwanted deceptive nuisance alarms. Digital filters shall eliminate signal patterns that are not typical of fires. Detectors that use the control panel processor to make alarm decisions are not acceptable.

.2 Addressable detectors shall be capable of full digital communications using both broadcast and polling protocols. The maximum total analog loop response time for detectors shall be 750 ms. The maximum alarm response time for the system to sound an alarm shall not be more than 3-seconds regardless of the detector location or the number of detectors on the addressable loop. The analog loop controller shall support up to 250 devices including 125 modules, 125 detectors and 125 isolator bases. The analog loop must not require shielded wire and shall be capable of a total distance of 4000 feet minimum using #18 AWG twisted pair when 100

addressable detectors and 100 addressable modules are connected. The analog loop shall support up to 124 wiring T-taps.

.3 The analog loop controller shall be able to "map" and supervise the location of each addressable device installed on the loop. Device supervision shall be provided for any device that is missing, added or changes to the device type, alarm settings, features, location or changes to the wiring layout or detector bases. It shall be possible to display or print the device "map" from a laptop. The "map" shall indicate all devices on the addressable loop complete with the customer defined device location name, device and base type, supervision information and wiring as-built layout including all T-taps. If two devices are inadvertently switched during routine maintenance, the loop controller shall be able to identify the change and if the device types are identical, it shall automatically download environmental information specific to that device location and all programming shall remain intact for the respective location of each device. No reprogramming or manual addressing shall be required. If the device types do not match, both devices shall still provide their inherent protection, programmed functions shall respond accordingly for that device location and a trouble shall be logged on the system. The "map" shall indicate which devices have been switched, what device type was expected and what device type is actually installed in that location.

.4 Each detector shall have the ability to learn its environment and automatically adjust its reference value for changes in its environment. Detectors that require adjustments to their sensitivity settings months after they are installed are not acceptable. Environmental compensation shall allow each sensing element to adapt to short and long term changes caused by dirt, dust, humidity, temperature and ageing. The detector shall adjust and update its sensitivity (% obscuration) and ambient temperature baselines for each sensing element approximately six times per hour. The detector shall utilise a 4-hour rolling average of the environmental information and for verification purposes also maintain a 24-hour average of the analog values, both of which may be taken into account in the alarm decision making process.

.5 The detector's on-board microprocessor shall monitor the environmental effects on its baseline and generate a "maintenance alert" message at the control panel when the detectors environmental compensation is 80% used up indicating it should be cleaned. This event shall be programmable to initiate any type of system response such as send an e-mail message to maintenance. When the environmental compensation head room is 100% used up, a trouble condition shall latch on the system to advise that the detector requires cleaning immediately. Up to this point the detectors sensitivity shall not have been compromised. Dirty detectors that continue to be ignored will eventually post an internal device fault

and will not false alarm as a result of the accumulation of dirt. Dirty detectors that false alarm if not cleaned are not acceptable.

.6 The detector shall be capable of identifying up to 32 self-diagnostic codes including verification that the detectors reference value is within its prescribed factory and ULC limits. Sensitivity reports shall include the percent obscuration that the detectors alarm level is set at and the percentage of compensation used as a result of environmental factors (dirt, dust, humidity, etc.). This information shall be available for system maintenance and may be requested per device or generate reports based on only the detectors that require cleaning.

.7 The early warning analog addressable detectors and the analog loop controller shall provide increased reliability and inherent survivability through intelligent analog conventional operation. Detectors shall automatically change to stand alone, conventional device operation in the event of a loop controller polling communications failure. In the analog conventional detector mode, each detector shall continue to operate using its programmed sensitivity and "learned" environmental information stored in the detector's memory at the time of communication failure. The analog loop controller shall be capable of monitoring the loop and activating a loop alarm, without communicating to the devices, if any detector reaches its alarm sensitivity threshold.

.8 Each Signature Series device shall be capable of automatic electronic addressing and/or custom addressing without the use of DIP or rotary switches. Devices using DIP or rotary switches for addressing, either in the base or on the detector shall not be acceptable.

.9 Each detector shall have a separate means of displaying communication and alarm status. A green LED shall flash to confirm normal status communication with the analog loop controller. A red LED shall flash to display alarm status. Both LED's on steady shall indicate an alarm in the conventional stand-alone mode status. The LEDs shall be visible through a full 360 degree viewing angle.

.10 It shall be possible to matrix program Signature analog detectors. Responses shall be programmable based on activated detectors within the physical location to one another and/or the number of activated detectors in a programmable group or groups.

.11 All detectors shall be compatible with all Signature Series mounting bases.

2.02 [HEAT DETECTORS – COMBINATION FIXED TEMPERATURE/RATE OF RISE]

.1 Heat Detector shall have a solid-state heat sensor, and shall transmit an alarm at a fixed temperature of 135 degrees F (57 degrees C) or due to a temperature Rate of Rise of 15 degrees F/minute (9 degrees C/minute). The detector shall continually monitor the temperature of the air in its

surroundings to minimize thermal lag to the time required to process an alarm. The heat detector shall be rated for ceiling installation at 70 feet (21.3 m) centers and be suitable for wall mount applications.

2.03 [HEAT DETECTORS - FIXED TEMPERATURE]

.1 Heat detector shall have a solid-state heat sensor, and shall transmit an alarm at a fixed temperature of 135 degrees F (57 degrees C). Detector shall continually monitor the temperature of the air in its surroundings to minimize thermal lag to the time required to process an alarm. Heat detector shall be rated for ceiling installation at 70 feet (21.3 m) centers and be suitable for wall mount applications.

2.04 ANALOGUE SMOKE DETECTION SYSTEM

.1 The system shall maintain the sensitivity level set, for each sensor, over time by automatically compensating for environmental factors such as dust and dirt accumulations in a smoke sensor's chamber. The smoke sensor shall be a smoke density measuring device having no self-contained set-point. The alarm decision for each sensor shall be determined by the control panel.

.2 The system shall automatically indicate when an individual sensor needs cleaning. When a sensor's average value reaches a predetermined value a `Dirty Sensor' trouble condition shall be audibly and visually indicated at the control panel for the individual sensor. When `Dirty Sensor' trouble conditions are reported the sensor's sensitivity level will not have been compromised by the dust and dirt accumulation in its chamber.

.3 It shall be possible for the user to obtain a report of all smoke sensors that are `Almost Dirty' and will require cleaning in the near future Before they initiate a `Dirty Sensor' trouble condition.

.4 All data transmissions, including the analogue value, between the smoke sensors and the control panel shall be digitally transmitted and incorporate parity and checksum digital data checks of each transmission. The system must verify that the proper sensor type is in the base to match the desired software configuration.

.5 An operator from the control panel, having a proper access level, shall have the ability to manually access and print the following information for each sensor in a report format that can be easily understood by the user:

.1 Primary Status.

.2 Device Type.

.3 Present Average Value.

.4 Present Sensitivity Selected.

.5 Highest Peak Detection Values.

.6 Sensor Chamber Status (Normal, Almost Dirty, Dirty, Excessively Dirty).

.6 To manually control the following of each sensor:

.1 Clear Peak Detection Values.

.2 Enable or Disable the Point.

.3 Clear Verification Tally.

.4 Control a Sensor's Relay Driver Output.

.7 It shall be possible to program the control panel to automatically change the sensitivity settings of each sensor based on time-of-day and day-of-week.

.8 The control panel shall have the capability of programming each sensor for a two-stage function. This function allows a control function to occur when for example, a sensor programmed for 3% smoke obscuration reaches the threshold of 1.5% smoke obscuration.

2.05 INTELLIGENT PHOTOELECTRIC SMOKE DETECTORS

.1 The detectors shall use the photoelectric (light scattering) principal to measure smoke density and shall, on command from the control panel, send data to the panel representing the analogue level of smoke density.

2.06 INTELLIGENT VERY EARLY WARNING (VEW) LASER DETECTORS

.1 The VEW Detector shall be a laser type detector, which incorporates a laser diode and an integral lens. The photo sensor shall be activated by the scattering of smoke particles.

.2 The detector shall have multiple sensitivity levels and be capable of detecting a minimum obscuration of 0.03%/ft. At least two separate and distinct alarm thresholds shall be capable of being monitored by the fire alarm control panel.

2.07 DETECTORS - PHOTOELECTRIC SMOKE DETECTOR, (DUCT DETECTOR USE)

.1 Photoelectric detector shall utilize a light scattering type photoelectric smoke sensor to detect visible particulates produced by combustion. The integral microprocessor shall dynamically examine values from the sensor and initiate a system alarm based on the analysis of data.

.2 The alarm set point shall be field selectable to any of five sensitivity settings ranging from 1.0% to 3.5% smoke obscuration per foot. The photo detector shall be suitable for operation in the following environment:

.1 Temperature: 0 degrees C to 49 degrees C (32 degrees F to 120 degrees F).

.2 Humidity: 0-93% RH, non-condensing.

.3 Elevation: no limit.

2.08 DUCT DETECTOR HOUSING

.1 The Analytical Microprocessor-based photoelectric smoke detector shall be readily adaptable for use in air duct smoke detection applications, using a housing that mounts to the outside of the duct. When used for duct smoke detection, the smoke detectors will not forfeit any of the system functionality that they have when used as area smoke detectors.

.2 The duct smoke detection housing shall allow the detector to sample and compensate for, variations in duct air velocity between 300 and 4 000 feet per minute.

.3 Remote alarm LEDs and Remote Test Stations shall be supported by the duct smoke detector and provided where indicated.

.4 Install duct smoke detectors in heated areas. If mounted outdoors, provide heater in duct smoke detector housing.

2.09 DETECTOR BASES – STANDARD

.1 Mounting bases shall support all microprocessor-based detector types detailed in this specification.

.2 Removal of the respective detector shall not affect communications with other addressable devices.

.3 Field wiring connections shall be made to the room side of the base, so that wiring connections can be made or disconnected by the contractor without the need for remove the mounting base from the electrical box. Bases will have the option of external LED operation, Relay Base or Data Line Isolator Base.

2.10 DETECTOR BASE – RELAY

.1 The relay base shall support all Addressable Detector types and have the following requirements:

.1 Form “C” contacts rated at 1 amp @ 30 VDC and listed for “pilot duty”.

.2 The position of the contact shall be supervised.

.3 Separate power shall not be required to the relay base.

.4 The relay shall automatically de-energize when a detector is removed.

.5 The relay operation shall be exercised by the detector processor on power up.

.6 The relay shall be a bi-stable type and selectable for normally open or normally closed operation.

.2 For added survivability, relay operation shall be controlled by the detectors microprocessor. The relay shall be capable or operation in the conventional stand-alone mode in the event communication is lost with the loop controller. Relay bases not controlled by the detector's microprocessor shall not be acceptable.

3. EXECUTION

3.01 INSTALLATION

.1 Installation to Section 28 46 13.

3.02 IDENTIFICATION

.1 [Provide an engraved phenolic nameplate, red text on red background at the ceiling location below any concealed duct mounted smoke detectors indicating "Smoke Detector Above – DSD-ERV-1" where DSD-ERV-1 is the identification of the detector, and ERV-1 is the identification of the energy recovery air handling unit interlocked with the duct smoke detector. Locate on lay-in ceiling grid or access hatch where located. Provide similar labels for other equipment such as combination Fire and Smoke Dampers (FSD's).]

3.03 FIELD TESTS AND INSPECTIONS

.1 Testing, and inspection to Section 28 46 13.

.2 Verification to Section 28 46 13.

End of Section