SECTION 16723

FIRE ALARM/INTRUSION DETECTION SYSTEMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Allowance: Carry the sum of $5,000.00 (Five thousand Dollars) for work which may be required above and beyond what is defined (shown on drawings and defined within the specifications) in Division 16 for additional work defined as a result of the Meeting and Vendor presentation with the Fire Department and other work as may be directed by the fire department and as required. Refer to Section 16100. The contract will be adjusted by an add or deduct change order for the differential, based on the net difference without markup after receipt of bills upon completion of work.

B. Complete Intrusion detection system/Fire Alarm System (Addressable by the use of SIMS modules) including but not limited to:

C. Equipment, materials, labor, installation, connection, programming, testing, training and performance of all operations of the intelligent reporting fire alarm system as indicated on the drawings and as herein specified.

D. Alarm initiating devices, alarm notification appliances, fire and intrusion alarm control panel (FACP), auxiliary control devices, annunciators (one for security partition and one for the fire alarm partition), and wiring.

E. Cost for first year monitoring services, excluding costs associated with leasing of telephone lines from the Utility Co.

1.02 RELATED SECTIONS

A. Section 16100 - Electrical.

1.03 REFERENCES

A. NFPA 70 (N.E.C.) latest edition.

B. U.L. Standards.

C. FM Factory Mutual

D. NFPA 72 National Fire Alarm Code.

E. ADA - Americans with Disabilities Act.

F. NFPA 101 - Life Safety Code.

G. Local and State Codes.

1.04 PERFORMANCE REQUIREMENTS

A. Conform to requirements of NFPA 70. (N.E.C.), specifically Art 760.

B. Conform to requirements of the National Fire Protection Association, Standards NFPA 72 NFPA 101 and also all applicable Federal, State and local codes.

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

D. All components of the same manufacturer, FM approved and listed by Underwriters' Laboratories, Inc., and so labeled.

E. Furnish products listed and classified by Underwriters' Laboratories, Inc. (U.L.) as suitable for purpose specified and shown. The fire alarm control panel, network interface and all transponders shall meet the modular labeling requirements of U.L. Each subassembly, including all printed circuits, shall include U.L. modular labels.

F. Include all necessary software, programming and the selection of the proper type and quantities of the system components to assure a complete, operational, and Code Compliant System.

G. System shall be completely field programmable.
   1. Provide the Owner with all required components, interfaces and passwords to allow them full access to the programming features. Provide minimum of 8 hours on site training on programming features.
   2. Provide all hardware, software, programming tools, and documentation necessary to allow modifying the fire alarm network on site. Modifications include addition and deletion of devices, circuits, zones and changes to system operation and custom label changes for devices and zones.
   3. The system structure and software shall place no limit on the type and extent of ON-SITE software modifications. Software modification shall not require power shut down of system and shall not cause loss of system fire protection while making modifications.

H. Special programable features:
   1. Elevator

I. The drawings do not show all details of the Alarm System. It shall be the responsibility of the authorized supplier/installer to provide a fully operational code compliant system.

J. Coordinate with and obtain approval from the local Fire Chief (AHJ), prior to the Shop Drawing submittal. See Item Submittals.

1.05 FIRE ALARM DESCRIPTION

A. Alarm System: Addressable (through the use of SIMS modules) automatic and manual initiating, Intelligent reporting, microprocessor controlled fire detection and intrusion detection alarm system with communications capabilities.

B. An active/interactive type system where each FACP is repetitively scanned, causing a signal to be transmitted to the local fire alarm control panel node indicating that the FACP and its associated initiating devices and notification appliance circuit wiring is functional. Loss of this signal at the local FACP shall result in a trouble indication on both the FACP display and at the network display.

C. System Performance and Supervision:
   1. Alarm, trouble and supervisory signals from all intelligent reporting devices: Encoded on NFPA style 4 (Class B) signaling line circuits (SLC).
   2. Initiating device circuits (IDC): Wired class A NFPA Style D as part of an addressable device connected by the SCL circuit (end of line returns to the panel using a separate path).
   3. Digital electronic signals: Employ check digits or multiple polling.
   4. Occurrence of single ground or open condition in initiating or signaling circuit places circuit in TROUBLE mode.
   5. Occurrence of single ground or open condition in the initiating circuit does not disable any device on that circuit.
   6. Occurrence of single ground or open condition on alarm initiating or signaling circuits does not disable that circuit from transmitting in ALARM.
   7. Component or power supply failure places system in TROUBLE mode.

8. Alarm signals arriving at the main FACP shall not be lost following a primary power failure until the alarm signal is processed and recorded.
9. Batteries: Under or over battery voltage, shorted or disconnected battery supply places system in TROUBLE mode.
10. FACP devices are to consist of low current, solid-state integrated circuits, and shall be powered locally from a primary power and standby power source.

D. Alarm Sequence of Operation: Actuation of manual fire alarm station, automatic initiating device and sprinkler flow switches causes system to enter ALARM, which includes the following operations:
1. Indicate location of alarm zone on fire alarm control panels for all events.
2. Indicate on FACP and remote 32 character LCD display.
3. Transmit signals to building elevator control panel to initiate elevator capture.
4. Activate all programmed events.

E. Alarm Silence: The alarm horns may be silenced, after three (3) minutes, at the associated locked control cabinet. Alarm lights shall remain flashing until system is reset. A subsequent zone alarm shall reactivate the signals.

F. Alarm Reset: RESET function resets alarm system to NORMAL condition (out of ALARM) if alarm initiating circuits have cleared.

G. Trouble Sequence of Operation: System trouble, including grounding or open circuit of supervised circuits, or power or system failure causes system to enter TROUBLE mode, including the following operations:
1. Visual and audible trouble alarm by zone at associated control panel.
2. Visual and audible trouble alarm at annunciator panels.
3. Manual ACKNOWLEDGE function (trouble silence switch) at control panel silences audible trouble alarm; visual alarm is displayed until initiating trouble is cleared.

H. The activation of any system smoke detector shall initiate an Alarm Verification operation whereby the panel resets the activated detector and waits for a second activation. If, after reset, a second alarm is reported from the same or any other smoke detector within one (1) minute the system shall process the alarm. If no second alarm occurs within one minute the system shall resume normal operations. The Alarm Verification shall operate only for smoke detectors. Other activated initiating devices shall be processed immediately.

I. Zoning: Programmable, initially set up as scheduled on Drawings. Provide labor to reschedule zones as direct by owner and Fire Department.

1.06 INTRUSION DESCRIPTION

A. Alarm System: Electrically-supervised automatic alarm system capable of transmitting all input zones to the Central Receiving Station. Status inputs shall include Motion sensors, door switches, and inputs from automatic transfer switch.

B. Entry/Exit Sequence.
1. Entering at front door begins delay timer to allow disarming.
2. Arm/disarm via key pad with alpha numeric display.
3. Disarm: Display reads: "SYSTEM ARMED or ALL SECURE". Authorized person enters alarm delayed entry doors and inputs security code at key pad. System is disarmed and display reads: "READY TO ARM".
4. ARM: Display reads: "READY TO ARM". Authorized person inputs security code. Display flashes "ALL SECURE / READY TO ARM" for a preset time then displays constant "SYSTEM ARMED or ALL SECURE". System now armed.
5. System may be Armed by zones.
6. Individual zones may be bypassed to force arm the system.

C. System Supervision:
   1. Occurrence of single ground or open condition in initiating or signaling circuit places circuit in TROUBLE mode.
   2. Component or power supply failure places system in TROUBLE mode.
   3. Occurrence of single ground or open condition on alarm initiating or signaling circuits does not disable that circuit from transmitting in ALARM whether device is upstream or downstream of break.
   4. Batteries: Under or over battery voltage, shorted or disconnected battery supply places system in TROUBLE mode.
   5. All end of line devices shall be located in control panel.

D. Alarm Sequence of Operation: Actuation of any initiating device causes system to enter ALARM, which includes the following operations:
   1. Silent alarm at the Intrusion detection panel.
   2. Indicate location of alarm zone on alpha numeric display.
   3. Energize a digital electronic communicator to transmit signals to a UL listed central receiving station, (Protection One).
   4. Alarm Reset: Key pad RESET function resets alarm system to NORMAL condition (out of ALARM) if alarm initiating circuits have cleared.

E. Trouble Sequence of Operation: System trouble, including grounding or open circuit of supervised circuits, or power or system failure causes system to enter TROUBLE mode, including the following operations:
   1. Visual and audible trouble alarm by zone at the alpha numeric display panel.
   2. Key pad ACKNOWLEDGE function (trouble silence) silences audible trouble alarm; visual alarm is displayed until initiating trouble is cleared.

F. Central Receiving Station signals to be transmitted as listed on schedule.

G. Intrusion detection of all perimeter doors plus any interior doors shown with magnetic switches.

H. Intrusion detection of corridors, and as indicated with motion detectors.

I. Key Pad Access Levels: Minimum of eight.

1.07 QUALIFICATIONS

A. Alarm equipment Manufacturer:
   1. Company specializing in manufacturing the products specified in this Section with minimum five years documented experience.
   2. Company maintaining engineering and service departments capable of rendering advice regarding installation and final adjustment of the system.

B. Supplier/Installer (Vendor):
   1. Company authorized by the manufacturer and specializing in fire alarm systems with minimum five years experience.
   2. Company shall employ NICET (minimum Level II fire alarm technology) technicians.
   3. Company offering service contracts for continuing factory authorized service after the initial warranty period.
   4. Protection One, contact: Robin Russell 207-347-5327.

1.08 SUBMITTALS

A. Prior to submitting Shop Drawings to the Architect, set up a meeting at the Local Fire Department with a complete submittal package. Meeting shall include the Fire Chief, Assistant Fire Chief, and, System Vendor. Vendor shall present the proposed system to the Fire Department and describe in detail, the operation. Once the fire department is satisfied that the proposed system satisfies their requirement

(including locations of ADA required Strobes), then the shop drawings may be submitted to the Architect along with a copy of the minutes of the meeting. Shop drawings will not be reviewed by the Architect without this presentation and minutes of the meeting.

B. Include floor plans showing all devices, wiring, and connections: Plan layout, connection diagrams and catalog cuts of all components. Use composite contract drawing for shop drawing purposes and shall be marked-up showing all wiring between devices, number of conductors, and labeling system. Shop drawings will not be reviewed by the Architect without these drawings.

C. Include proposed wiring color code and verification that it meets local fire department standards.

D. Include narrative description of system functions and sequence of operation.

E. Include catalog cuts of all equipment, devices, annunciator layout, control panel modules, and internal terminal configurations.

F. Include documentation showing proof of U.L. listing for all system components.

G. Include System Power Supply Requirements:
   1. Total panel supervisory current.
   2. Total horn/light signal current.
   3. Total auxiliary power.
   4. Total smoke detector supervisory and alarm power.
   5. Total battery amp-hour calculations.
   6. Total power on each Field Charger/Power Supply (FCPS).

H. Include all cable types.

I. Include letter verifying that system has been reviewed and approved by the local Fire Department.

J. Include second year extended service contract listing services included and costs. The cost of this service contract is included under this section.

K. Submit manufacturer's instructions.

1.09 PROJECT RECORD DOCUMENTS

A. Accurately record actual locations and mounting heights of outlets if not as shown on Drawings, plus pull and junction boxes larger than 12x12x6 inches.

B. Accurately record actual routing of conduits larger than 1 inch and main wiring trunks.

1.10 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data.

B. Include spare parts data listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

C. Include operating instructions, and maintenance and repair procedures.

D. Include manufacturer's representative's letter stating that system has been tested and is operational. Use NFPA 72 FIRE ALARM SYSTEM CERTIFICATION and DESCRIPTION form.

1.11 EXTRA MATERIALS

A. Provide two manual pull stations.

B. Provide two keys of each type.

C. Provide one smoke detector of each type.

D. Provide one heat detector of each type.

E. Provide one Horn/Light and one Speaker/Light and one adjustable Cd Strobe.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Ademco: Model numbers used except as noted.
   1. Or equal by Radionics
   2. Or equivalent /equal.

2.02 CONTROL PANEL

A. Control Panel: VISTA-128FB series, modular construction wall-mounted enclosure, supervised, battery operated system, 128 zones, with 8 programmable area partitions. Modules shall include, but not be limited to, the following:
   1. Zone modules.
   2. Power signal modules.
   3. Battery charger module.
   4. Battery pack.
   5. Auxiliary Relays: Minimum one SPDT contact for each detection zone for remote annunciation, plus additional contacts to provide accessory functions specified.
   6. Battery-operated emergency power supply with capacity to operated the batteries herein specified.

B. System shall support up to eight (8) separate areas (partitions).

C. System shall support up to 512 event log and 96 relay outputs.

D. Batteries: Sealed lead calcium type capable of operation of the system under supervisory conditions for a minimum of 60 hours after power failure and capable of operating the alarm devices for 15 minutes during the 60 hour period.

2.03 SYSTEM COMPONENTS

A. Initiating Devices - General:
   1. Detectors shall be intelligent (analog) and addressable, and shall connected to the FACP signaling line circuit.
   2. Addressable smoke and thermal detectors shall provide dual alarm and power/polling LEDs. Both LED's shall flash under normal conditions, indicating that the detector is operational and in regular communication with the control panel, and both LED's shall be placed into steady illumination by the control panel, indicating that an alarm condition has been detected. If required, the LED flash shall have the ability to be removed from the system program. An output connection shall also be provided in the base to connect an external remote alarm LED.
   3. The detectors shall be listed by UL as meeting the calibrated sensitivity test requirements of NFPA Standard 72, Chapter 7.
   4. The detectors shall be ceiling-mount and shall include a separate twist-lock base with tamper proof feature.

5. The detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated at the detector itself (by activating a magnetic switch) or initiated remotely on command from the control panel.
6. Detectors shall operate in an analog fashion, where the detector simply measures its designed environment variable and transmits an analog value to the FACP based on real-time measured values. The FACP software, not the detector, shall make the alarm/normal decision, thereby allowing the sensitivity of each detector to be set in the FACP program and allowing the system operator to view the current analog value of each detector.
7. A magnetic test switch shall be provided to test detectors and modules.

B. Pull Box (Manual Station):
1. Addressable pull boxes shall, on command from the control panel, send data to the panel representing the state of the manual switch and the addressable communication module status. They shall use a key operated test-reset lock, and shall be designed so that after actual emergency operation, they cannot be restored to normal use except by the use of a key.
2. All operated stations shall have a positive, visual indication of operation and utilize a key type reset.
3. Manual stations shall be constructed of Lexan with clearly visible operating instructions provided on the cover.
4. Stations shall be suitable for surface mounting or semiflush mounting as shown on the plans, and shall be installed not less than 42 inches, nor more than 48 inches above the finished floor.

C. Photoelectric Smoke Detector: 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 analog level of smoke density. Detectors shall be by System Sensor or equal.

D. Thermal Detectors: Thermal detectors shall be addressable devices rated at 135°F. (58°C.) And have a rate-of-rise element rated at 15°F. (9.4°C.) per minute. It shall connect via two wires to the fire alarm control panel signaling line circuit.

E. Addressable Monitor Module (Ademco SIMS module).

F. LCD Alphanumeric Display Annunciator keypad (at panel and remote locations):
1. The alphanumeric display annunciator shall be a supervised, back-lit LCD display containing a minimum of 32 characters for alarm annunciation in clear English text.
2. AT the designated annunciator, provide a graphic display (map) of the building foot print with alpha numeric engraved labels indicating locations for all devices. Display screen shall be made of Lexan and shall have all devices located for all levels and areas. The alpha-numeric display and the map shall be both coordinated to show initiation location by zone, area, floor, room name, device description and device number. The “area” shall be as indicated on the contract documents. Map shall be framed and permanently secured to wall. Exact location and layout as approved by shop drawing submittal.
3. Ademco 6160R for fire partition. Red faceplate.
4. Ademco 6160 for security partition. White faceplate.

G. Horn/Strobes: Combination Audible/Visible signals shall be similar to System Sensor P1224MCW series.
1. Peak sound output: selectable 75 & 90 dBA.
2. Ability to silence the horn while leaving the visible signal active.
3. Capable of meeting the candela requirements of ADA.
4. Polarized to allow electrical supervision.
5. Candela ratings: Selectable 15, 30, 75, 110, with visual indicator.
6. Set initially as shown on drawings. Where drawings show 15/75, then use a fixed 15/75 or set selection at 75.
7. White face plate with red letters.

H. Strobe lights shall be similar to System Sensor S1224MCW and shall meet the requirements of the ADA, UL Standard 1971 and shall meet the following criteria:
   1. The maximum pulse duration shall be 2/10 of one second.
   2. Strobe intensity shall meet the requirements of UL 1971.
   3. The flash rate shall meet the requirements of UL 1971.
   4. Where more than one strobe is visible in one location, synchronization shall be required.
   5. Candela ratings: Selectable 15, 30, 75, 110, with visual indicator.
   6. Set initially as shown on drawings. Where drawings show 15/75, then use a fixed 15/75 or set selection at 75.
   7. White face plate with red letters.

I. MINI-Units in small rooms and where indicated: Use lowest sounding level setting.

2.04 INTRUSION INITIATING DEVICES

A. Motion Detectors: Detection systems - Wall mounted, DS820i/DS835i series with 7 curtains and 20' range when mounted at 7.5 feet. Provide specific detectors as required to provide coverage as indicated, intended and required.

B. Magnetic Door Switches: Ademco 945series surface mount SPDT with three foot lead wires use only where a recessed door switch cannot be used. Ademco 944 series recessed SPDT. Select proper size and gap as require. Coordinate with Division 8.

2.05 TEMPERATURE SENSOR

A. Temperature Sensor: Ademco - TS300 series programable high/low settings.

2.06 NOTIFICATION APPLIANCE POWER EXTENDER

A. Notification Appliance Power Extender: The power extender is a device designed for use as either a remote 24 volt power supply or used to power Notification Appliances.
   1. The power extender shall offer a minimum of 6.0 amps of regulated 24 volt power. It shall include an integral charger designed to charge two 12.0 amp hour batteries and to support 60 hour standby.
   2. The Power Extender shall have two input triggers. The input trigger shall be a Notification Appliance Circuit (from the fire alarm control panel) or a relay. Four outputs (two Style Y or Z and two style Y) shall be available for connection to the Notification devices.
   3. The power extender shall include a surface mount back box.
   4. The power extender shall include the ability to delay the AC fail delay per NFPA requirements.
   5. The power extender include power limited circuitry, per 1995 UL standards.
   6. Provide quantity as required to serve devices shown on plans. Locate in mechanical, electrical or storage rooms. Extend circuit from nearest panelboard 120V, 20A, spare breaker. Intent is to distribute the loads to limit wire runs and voltage drop.

2.07 FIREMAN'S KEY BOX

A. Fireman's Key Box: Recessed with tamper switch and high security lock to match Fire Department standards (Knox).

2.08 BATTERIES

A. Sealed lead calcium type capable of operation of the system under supervisory conditions for a minimum of 60 hours after power failure and capable of operating the alarm devices for 15 minutes during the 60 hour period. IF batteries do not fit in control panels, then remotely mount in battery cabinet in nearest storage/mech room.

2.09 AUXILIARY DEVICES

A. Provide and install interface relays with number of poles as required (in no event less than three poles). Relays shall be Allen-Bradley, or approved equal, Bulletin 700, Type "BR" series, 120 volt coil in NEMA I enclosures. Paint enclosure red and mark "Fire Alarm Relay."

2.10 ALARM WIRE AND CABLE

A. Alarm Power Branch Circuits: Specified in Section 16100.

B. Alarm System Wiring Within Building: Minimum size #16 AWG for initiating circuits and #14 AWG for alarm signal circuits, all copper-THWN, except as noted. Non power-limited wiring and exposed wiring shall be in rigid conduit or electrical metallic tubing or flexible metal conduit in accordance with Specifications for locations used, see Section 16123 - Wire and Cable: Wiring Methods. Concealed power limited wiring in dry locations above ceilings, in attic space, in stud walls, except as noted, shall be fire resistant teflon covered cables approved for use in an air plenum for fire alarm system.

1. Cables shall be properly supported, labeled and tie wrapped.
2. Complete FIRE ALARM installation shall meet requirements of NEC Article 760 "Fire Protective Signaling Systems."
3. Cables shall be separated from any conductors of power or class 1 circuits and shall not enter in same conduits or J-boxes.

C. SLC Multiplex Communication Loop: Twisted shielded pair sized per manufacturer and installed in conduit.

D. Telephone Circuits: Twisted shielded pair sized per manufacturer.

E. All wiring shall be per manufacturers recommendations for load and length required.

2.11 ELEVATOR POWER SHUT DOWN

A. Required in order to meet the State Elevator Inspector, Sprinkler Inspector, State Fire Marshal and Department of Public Safety requirements whenever a sprinkler head is located in the Elevator Machine Room.

B. Adjacent to each sprinkler head, in the Elevator Machine Room ceiling, in elevator pit and at top of elevator shaft, provide and install a smoke detector and a 135 degree F heat detector with auxiliary.
1. Do not install smoke detector at top of shaft if there is no sprinkler head. Per AHJ, provide a heat detector at top of shaft.
2. Do not install detectors in pit if sprinkler head is less than 2 feet from floor of pit.

C. The smoke detector shall be wired to its own fire alarm zone and shall activate the elevator recall function prior to actual elevator power shutdown.

D. Activation of the 135°F heat detector auxiliary contacts shall activate the shunt trip branch circuit breaker and shut down power to the Elevator prime mover in the Machine Room (typical for both elevators).

E. The intent is that the elevator will be recalled and all power will be removed from the elevator machine before the 212 degree F sprinkler head can operate.

F. Circuit breaker serving the elevator shall have 120 volt shunt trip option. Source shall be provide from an in-line 15A Fusetron connected to the load side of the over current protection device serving the panelboard. Intent is to assure that control voltage is available from the panel serving the elevator.

G. Coordinate sprinkler head temperature rating to insure proper operation.

2.12 ENCLOSURES

A. Control panels shall be housed in UL listed cabinets suitable for surface or semi-flush mounting. Cabinets shall be corrosion protected, given a rust-resistant prime coat, and the manufacturer's standard finish. Mount flush in finished areas.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install system in accordance with manufacturer's instructions.

B. Wiring shall be concealed in walls and above ceilings. Wiring in exposed construction shall be enclosed in conduit and run along structural members and painted to match.

C. Minimum size conduit: 3/4 inch. Refer to above paragraph: ALARM WIRE AND CABLE.

D. Install manual station with operating handle 48 inches above floor. Install audible and visual signal devices 80 inches above floor to bottom of the lens, or 6" below ceiling whichever is lower, except as noted.

E. Smoke detectors shall not be installed prior to system programming and testing period. If construction is on going during this period, then protect the smoke detectors from contamination and physical damage.

F. Make conduit and wiring connections to sprinkler flow switches, sprinkler valve tamper switches. Provide modules as required for connection to the fire alarm loop.

G. Automatic Detector Installation: Per NFPA 72.

H. Provide nameplates identifying all equipment, junction boxes and controls. Paint all junction boxes red.

I. Homerun interface contacts from elevator lobbies detector address to labeled junction box in Elevator Machine Room. Extend to elevator control panel as directed by elevator installer.

J. All devices and panels shall be flush mounted in finished areas and may be surface mounted in unfinished areas such as storage rooms. Where devices are surface mounted, the back box shall be a cast red box designed to mate with the device for a smooth appearance.

K. Locate motion detectors to maximize area covered. Do not install behind obstructions.

L. Provide temperature sensor at the sprinkler riser location and wire as a supervisory zone.

3.02 MANUFACTURER'S FIELD SERVICES

A. Provide the services of a Factory Trained, licensed authorized technical representative of the manufacturer of the equipment to supervise the installation and final connections, plus adjusting, programming and all testing of the system required to assure a complete and fully operative facility in accordance with the specifications; and to instruct designated personnel in the operation, adjustment, testing and maintenance of the system. Provide letter certifying results of test.

B. Include testing at substantial completion, at 6 months after occupancy and again two weeks prior to end of first year warranty. (Total of 3 complete documented tests). Invite the Owner, Architect and Local Fire Department to witness each test.

3.03 FIELD TEST

A. Test in accordance with NFPA 72 and local fire department requirements. See Submittals item above.

B. Test shall include but not be limited to:
1. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.
2. Close each sprinkler system flow valve and verify proper supervisory alarm at the FACP.
3. Verify activation of all flow switches.
4. Open initiating device circuits and verify that the trouble signal actuates.
5. Open signaling line circuits and verify that the trouble signal actuates.
6. Open and short notification appliance circuits and verify that trouble signal actuates.
7. Open and short (wire only) network communications and verify that trouble signals are received at network annunciators or reporting terminals.
8. Ground initiating device circuits and verify response of trouble signals.
9. Ground signaling line circuits and verify response of trouble signals.
10. Check alert tone and prerecorded voice message to all alarm notification devices.
11. Check installation, supervision, and operation of all intelligent smoke detectors using walk test.
12. Each of the alarm conditions that the system is required to detect shall be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control panel points.
13. When the Vendor determines that the system must be equipped with optional features to satisfy this specification, the manufacturer's manual shall be consulted to determine the proper testing procedures. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar.

3.04 FINAL INSPECTION

A. A factory trained representative shall demonstrate that the system functions as specified.

B. Demonstrate in the presence of the Owner, Local Fire Chief, the contractor. Invite the Architects representative.

3.05 INSTRUCTIONS

A. In addition to the site training on programming features previously specified, provide minimum of two four hour periods to instruct the owner in the proper operation and maintenance requirements of the system. Provide one four hour period at substantial completion (after all testing and the system is fully operational and accepted by the fire department) and the other four hour period six months after substantial completion.

B. Provide a typewritten, bound, laminated "Sequence of Operation" to the Owner.

END OF SECTION