DIVISION 16

SECTION 16C FIRE ALARM SYSTEM

16C.01 GENERAL

A. All work under this Section is subject to the Contract Documents, Contract Drawings and the "General Conditions Governing all Contracts," all of which form a part of this Section as if written out in full herein.

B. The contractor for work under this specification is referred to the General Conditions, Special Conditions and all Contract Documents, all of which are hereby made part of this specification.

C. Perform all necessary removals, cuttings, repairs, replacements etc., for the completion of this work and provide all materials, labor, tools and equipment required to perform the work as specified herein.

D. Contractor must carefully examine the site of the proposed work, as well as its adjacent area, and seek other usual sources of information for they will be conclusively presumed to have full knowledge of any and all conditions on, about, or above the site relating to, or effecting in anyway, the performance of the work to be done under this contract which were or should have been indicated to a reasonably prudent bidder.

NOTE: NOTIFY ARCHITECT/ENGINEER BEFORE STARTING WORK. ALL WORK TO BE DONE UNDER THE DIRECTION OF THE ARCHITECT/ENGINEER. NO WORK TO BE PERFORMED ON WEEKENDS WITHOUT PRIOR APPROVAL FROM THE ARCHITECT/ENGINEER.

E. All Fire Alarm work shall be performed by a Licensed Electrician, as specified by NYC Building Department and Fire Department, in a neat manner and in accordance with best practices. All work shall comply with all local, state and Federal rules and regulations. The Contractor shall obtain and complete all necessary applications, approvals and pay all fees required to obtain all trade related permits and final sign offs from all agencies having jurisdiction.

F. The Contractor shall perform all necessary removal, cutting, repair, replacement, etc. for the completion of this work, and provide all labor, materials, tools and equipment required to perform the work as specified herein and to comply with the New York City Building Code, Fire Department and N.F.P.A. # 72. Rubbish and debris shall be expeditiously removed from the premises.

G. The Contractor shall obtain prior approval from Architect/Engineer for changes, additions, or modifications to the "Scope of Work", specifications, and drawings.

H. Notify Architect/Engineer before starting work. All work is to be done under the supervision and as directed by Architect/Engineer. Prior to completion of Contract, Architect/Engineer shall coordinate with the Management Group a single authorized punch-list for issuance to the Contractor.

I. The Contractor shall fully familiarize himself with the job and field conditions before submitting his bid.

J. Substitutions:

1. Reference in the Contract Document to materials, form of construction, products, and equipment by proprietary name, make and catalogue number shall be interpreted as establishing a standard of quality of manufacture, performance, or appearance, and shall not be construed as limited competition.

2. Should the Contractor desire to substitute any item of brand or manufacture other than that specified, he shall submit to Architect/Engineer a written request for approval of the substitutions he proposes and wishes to make. Such requests shall be accompanied by descriptive literature, drawings, samples or such information as the Architect/Engineer will investigate all such requests and render decisions thereon as promptly as is reasonably possible, and such decisions shall be final.

3. Any substitution of material specified shall be equal in quality and value, or credit is due to the Owner.

K. Immediately upon award of this contract, Contractor shall confer with Architect/Engineer prepare a work program schedule. This schedule shall be revised as may be required by Architect/Engineer and when approved, shall establish the order in which the work shall proceed, and the dates when the various parts shall be installed or completed.

L. Provide for all work for a <u>complete, working, code compliant and approved</u> fire alarm system. Any items or services not indicated in the contract documents and necessary for completion of the system, or required by all codes, must be brought to Architect's/Engineer’s attention prior to bidding. This contractor is responsible for all items or services necessary for a <u>complete</u> installation of an approved sprinkler system.

<u>16C.02 WORK INCLUDED</u>

A. Provide all labor, materials and equipment necessary or incidental to perform the work of this Section and related work as indicated in the Contract Documents. Refer to "Division Scope of Work" section: 16C for complete scope of work for this section, which form a part of the contract specifications. A complete operational fire alarm system in conformance with New York City Building Code, Fire Department, N.F.P.A. # 70 and N.F.P.A. # 72 is required by this contract.

<u>16C.03 WORK EXCLUDED</u>

A. Painting, except as noted herein.

B. Removal of friable asbestos insulation.

16C.04 SUBMISSION REQUIREMENTS

A. BEFORE WORK COMMENCES, ARCHITECT/ENGINEER'S APPROVAL REQUIRED

1. Submit four (4) catalog cuts for fire alarm panel, all initiating devices, all alarm notification devices, pull station, annunciator and any auxiliary device.

B. Must Accompany Final Payment Request

1. New York City Department of Buildings and Fire Department Final Sign-offs.

2. Operation and service manuals and warrantee information for all equipment and devices installed.

16C.05 SCOPE OF WORK

A. This contractor must only refer to the appropriate sections of the specification as requested in the Scope of Work and/or contract drawings.

B. Provide complete Fire Alarm system in accordance with New York City and N.F.P.A. codes including alarm panel, all initiating devices, all alarm notification devices, pull station, annunciator and any auxiliary device, etc.

16C.06 CODES, RULES AND CERTIFICATES

A. The complete installation of the fire alarm system and all other items of the work shall be in strict accordance with all laws and with latest rules and regulations of all Municipal and other Public Agencies, and the National Board of Fire Underwriters. Should there be a conflict between any items or requirements, specified herein and/or shown on the contract drawings, all pertinent rules, regulations and legal requirements shall apply.

B. This contractor is responsible to complete all necessary applications, pay all fees, give all notices, file all necessary drawings (if required) and obtain all permits and final sign-offs from Dept. of Buildings and Fire Department for all work under this contract. Comply with all laws, ordinances, rules and jurisdiction over this work and the standards of the Fire Underwriter's Association. If any discrepancies exist between the contract documents and prevailing code requirement, the contractor shall comply with code criteria.

16C.07 CONTRACT DRAWINGS

A. The contract drawings show the approximate location of all required equipment and the diagrammatic arrangement of devices. Wiring runs have been shown with the intention of most clearly indicating the routing. Actual wiring runs are not shown. Exact location of all equipment will be determined in the field as to be code compliant and the contractor must secure exact dimensional data before laying out any work.

B. This contractor must submit shop drawings only if the final field installation will differ from Architect's/Engineer's proposed drawings.

1. Five (5) copies of each drawing shall be submitted to Architect/Engineer before any work begins.

2. Drawing shall be 1/4" = l' - 0" scale indicating exact location and size of all equipment and wiring. Plans to include cellar layout and first floor layout, riser diagram, and any drawings Architect/Engineer may request. Drawings will not be accepted unless a complete list of deviations from Architect's/Engineer's proposed plans is included.

16C.08 REMOVAL OF RUBBISH

A. This contractor shall remove at all times from the building, waste materials or rubbish accumulated resulting from this work. Upon completion of the work, clean all materials and equipment to the satisfaction of Architect/Engineer.

16C.09 ACCESSIBILITY

A. Ascertain that all equipment, such as panels, and such other apparatus as may be necessary to be reached from time to time for operation and maintenance is made easily accessible.

B. The location of equipment may conflict with the building construction and may disclose the fact that the location for this work does not make its position easily and quickly accessible. In such cases, call Architect's/Engineer's attention to this fact before installing this work and contractor shall be guided by Architect's/Engineer's instructions.

16C.10 REQUIREMENTS AND PROCEDURES

A. General

1. The new Fire Alarm system shall include all equipment and wiring a complete addressable fire alarm system. System to include, but limited to, an approved Addressable Fire Alarm Control Panel with a Digital Alarm Communicator connected to a Central Monitoring Station via the public telephone network, annunciator panel, pull station(s), all initiating devices, all alarm notification devices, addressable monitor modules, relay modules for elevator recall, all wiring and conduits, mounting boxes, etc.

B. Coordination of Work and Trades

1. The installation of all wiring, conduits, water flow detector and equipment required under this contract shall be installed in coordination with all other trades.

2. All conduits shall be concealed in wall chases, recesses, shafts, and hung ceilings where same are provided. Refer to, and carefully check Architectural, Structural, Plumbing, Sprinkler, Electrical and HVAC Drawings and details for locations where walls, partitions, ceilings, beams, columns and other surfaces are furred, locations of shafts and conflicts with work of other trades.

3. Obtain maximum possible headroom to the bottom of exposed conduits. In no case shall headroom be less than seven (7) foot six (6) inches above finished floor.

4. The Contractor shall provide offsets as may be required to maintain pitch, elevation or to accommodate routing around obstacles.

5. Should any work installed require subsequent modification to avoid interference, as determined by the Architect/Engineer such changes shall be made without cost to Owner. Architect's/Engineer's decision where interference or other conditions require the changing of work installed shall be final.

6. Where the work of the Contractor is concealed, the contractor is responsible for its proper installation to assure that it does not project beyond the finished lines of floors, ceilings or walls.

16C.11 MATERIALS AND WORKMANSHIP

A. Fire Alarm System (General)

1. The new Fire Alarm System shall include all equipment and wiring for a complete addressable fire alarm system. System to include, but limited to, an approved Addressable Fire Alarm Control Panel with a Digital Alarm Communicator connected to a Central Monitoring Station via the public telephone network, annunciator panel, pull station(s), all initiating devices, all alarm notification devices, addressable monitor modules, relay modules for elevator recall, all wiring and conduits, mounting boxes, etc. The entire system shall be in conformance with the requirements of the N.Y.C. Building Code, Fire Department, N.F.P.A. 70 and N.F.P.A. 72. The provisions of the pamphlet (unless otherwise specified) shall be followed in total whether the stipulations listed therein are directed or recommended. The entire system shall be installed according to the D.O.B. and Fire Department approved plans by a Licensed N.Y.C. Electrical Contractor as specified by NYC Building Department with a letter of fitness from N.Y.C. Fire Department.

B. Sequence of Operation

1. Manual Pull Station: Activation of any manual pull station shall automatically operate all audible appliances, produce an alarm signal at the Fire Alarm Control Panel (FACP) and the remote annunciators and automatically transmitted to an approved Central Monitoring Station as an "Alarm" signal. All manual pull station signals shall also display the type and time of alarm, and zone of location of device on the FACP and annunciator LCD display screen.

2. Smoke Detector: Activation of any smoke detector shall automatically operate all audible appliances, produce an alarm signal at the Fire Alarm Control Panel (FACP) and the remote annunciators and automatically transmitted to an approved Central Monitoring Station as an "Alarm" signal. All smoke detector signals shall also display the type and time of alarm, and zone of location of device on the FACP and annunciator LCD display screen.

3. Heat Detector: Activation of any heat detector shall automatically operate all audible appliances, produce an alarm signal at the Fire Alarm Control Panel (FACP) and the remote annunciators and automatically transmitted to an approved Central Monitoring Station as an "Alarm" signal. All heat detector signals shall also display the type and time of alarm, and zone of location of device on the FACP and annunciator LCD display screen.

4. Water Flow Alarms: Activation of the sprinkler water flow switch shall automatically operate all audible appliances, produce an alarm signal at the Fire Alarm Control Panel (FACP) and the remote annunciators and automatically transmitted to an approved Central Monitoring Station as an "Alarm" signal. Each individual water flow switch shall have a distinct address via an Addressable Monitoring Module. All water flow signals shall also display the type and time of alarm, and zone of location of device on the FACP and annunciator LCD display screen.

5. Valve Tamper Switch: Activation of a valve tamper switch shall initiate a supervisory alarm at the system control panel and at the remote annunciators. Supervisory audible alarms at these locations shall be distinct from either alarm or trouble conditions involving the same or related devices. Each individual tamper switch shall have a distinct address via an Addressable Monitoring Module. All valve tamper alarm signals shall be transmitted as a "Valve Tamper" signal. All tamper switch signals shall also display the type and time of alarm, and zone of location of device on the FACP and annunciator LCD display screen.

6. Fire Booster Pump Supervisory Signals: In buildings provided with fire booster pumps, individual supervisory signals shall be provided for the following conditions:

    a. Fire booster pump running
    b. Fire booster pump loss of power in any phase
    c. Fire booster pump phase reversal

Activation of a just fire booster pump supervisory signal shall initiate a supervisory alarm at the system control panel and at the remote annunciators. Each set of contacts in the fire booster pump controller shall have a distinct address via an Addressable Monitoring Module. All fire booster pump supervisory signals shall be transmitted as a "Trouble" signal. The simultaneous activation of both the water flow switch and booster pump shall be produce an alarm signal at the Fire Alarm Control Panel (FACP) and the remote annunciators and automatically transmitted to an approved Central Monitoring Station as an "Alarm" signal. All booster pump signals shall also display the type and time of alarm, and zone of location of device on the FACP and annunciator LCD display screen.

7. Elevator Recall - In buildings provided with elevators, the activation of an “Alarm” signal shall activate the Elevator(s) Recall to the designated floor or to the designated alternate floor as required by the Fire Department via an Addressable Relay Module.

8. Trouble Signals: Loss of primary power, short circuit, open faults, ground faults, missing detectors, abnormal detector status (e.g.: dirty detector, replacement incompatible with the defined address), disabled devices and abnormal control functions shall initiate audible trouble signals at the control unit and remote annunciators. Audible trouble signals shall sound until silenced. Silenced trouble signals shall be continuously indicated by a textual message and a trouble LED until restored to normal operation. The trouble LED shall remain illuminated until all abnormal conditions are cleared. Upon a return to normal operation, the audible trouble signal shall resound until restored to normal position. Subsequent trouble events shall resound audible trouble signals until silenced. All trouble events shall automatically be transmitted as a "Trouble" signal.

C. System Components

1. General:

a. All equipment and components shall be new. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a fire protective signaling system, meeting the National Fire Protection Code.

b. All equipment and components shall be installed in strict compliance with manufacturers' recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.

c. All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to

support the required load.

d. All equipment must be available "over the counter" through the Security Equipment Distributor (SED) market and can be installed by dealerships independent of the manufacturer.

2. Fire Alarm Control Panel (FACP)

a. The FACP shall contain a microprocessor-based Central Processing Unit (CPU). The CPU shall communicate with and control the following types of equipment used to make up the system: intelligent addressable smoke and thermal (heat) detectors, manual pull stations, addressable modules, printer, annunciators, Digital Dialer and Ethernet Communicators and other system controlled devices. Ethernet communications shall be via a Fire-Lite Model IPDACT. Central station supervisory equipment shall be a Teldat Corporation Visoralarm-Plus 2U listed to UL-864 standards. Unit as manufactured by Fire-Lite, Model MS-9050UD or approved equal.

b. The system shall allow the programming of any input to activate any output or group of outputs. System which have limited programming (such as general alarm), have complicated programming (such as a diode matrix), or REQUIRE a laptop personal computer are not considered suitable substitutes.

c. The microprocessor shall be a state-of-the-art; high speed, 16-bit RISC device and it shall communicate with, monitor and control all external interfaces. It shall include an EPROM for system program storage, non-volatile memory for building-specific program storage, and a "watch dog" timer circuit to detect and report microprocessor failure.

d. The microprocessor shall also provide a real-time clock for time annotation of system displays, printer, and history file.

e. An auto-programming capability (self-learn) shall be provided to quickly identify devices connected on the SLC and make the system operational.

f. The display shall provide all the controls and indicators used by the system operator and may also be used to program all system operational parameters.

g. The display shall include status information and custom alphanumeric labels for intelligent detectors, addressable modules, internal panel circuits, and software zones.

h. The display shall contain an alphanumeric, text-type display and dedicated LEDs for the annunciation of AC POWER, FIRE ALARM, SUPERVISORY, TROUBLE, , and ALARM SILENCED conditions.

i. The Signaling Line Circuit (SLC) interface shall provide power to and communicate with up to 50 devices of any type including: intelligent detectors (ionization, photoelectric or thermal) addressable pull stations, addressable Beam Detectors, intelligent modules (monitor or control). Each SLC shall be capable of NFPA 72 Style 4, Style 6, or Style 7 (Class A or B) wiring.

j. The CPU shall receive information from all intelligent detectors to be processed to determine whether normal, alarm, pre-alarm, or trouble conditions exist for each detector. The software shall automatically compensate for the accumulation of dust in each detector up to allowable limits. The information shall also be used for automatic detector testing and for the determination of detector maintenance conditions.

k. The detector software shall meet NFPA 72, Chapter 10 requirements and be certified by UL as a calibrated sensitivity test instrument.

l. Digital Alarm Communicator Transmitter (DACT) and Internet Protocol Digital Alarm Communicator Transmitter (IPDACT). The DACT is an interface for communicating digital information between a fire alarm control panel and a UL-Listed central station. When the optional IPDACT Ethernet module is connected to the on board DACT, the system shall be capable of transmitting contact ID formatted alarms to a central station equipped with a compatible IP receiver via Ethernet over a private or public WAN/LAN, Intranet or Ethernet. The IPDACT communicator shall be an integral module component of the fire alarm control panel enclosure.

m. The IPDACT communicator shall include connections to the alarm panel’s phone outputs and shall convert the contact ID protocol in DTMF form into UDP Ethernet Packets. It shall include the ability for simultaneous reporting of panel events up to three different IP addresses. Communication shall include vital system status such as:

- Independent Zone (Alarm, trouble, non-alarm, supervisory)
- Independent Addressable Device Status
- AC (Mains) Power Loss
- Low Battery and Earth Fault
- System Off Normal
- 12 and 24 Hour Test Signal
- Abnormal Test Signal (per UL requirements)
- EIA-485 Communications Failure
- IP Line Failure

n. The control panel shall be housed in a UL-listed cabinet suitable for surface or semi-flush mounting. The cabinet and front shall be corrosion protected and painted red via the powder coat method with manufacturer's

standard finish.

o. The back box and door shall be constructed of steel with provisions for electrical conduit connections into the sides and top.

p. The door shall provide a key lock and shall provide for the viewing of all indicators.

q. The main power supply for the fire alarm control panel shall provide up to 3.0 amps of available power for the control panel and peripheral devices.

r. Positive-Temperature-Coefficient (PTC) thermistors, circuit breakers, or other over-current protection shall be provided on all power outputs. The power supply shall provide an integral battery charger or may be used with an external battery and charger systems. Battery arrangement may be configured in the field.

s. The main power supply shall operate on 120 VAC, 60 Hz, and shall provide all necessary power for the FACP.

t. Notification Alarm devices shall operate on 24 VDC nominal.

u. System History Recording and Reporting: The fire alarm control panel shall contain a history buffer that will be capable of storing up to 500 events. Each of these activations will be stored and time and date stamped with the actual time of the activation. The contents of the history buffer may be manually reviewed, one event at a time, or printed in its entirety. The history buffer shall use non-volatile memory. Systems that use volatile memory for history storage are not acceptable substitutes.

v. Automatic Detector Maintenance Alert: The fire alarm control panel shall automatically interrogate each intelligent detector and shall analyze the detector responses over a period of time. If any intelligent detector in the system responds with a reading that is above or below normal limits, then the system will enter the trouble mode, and the particular detector will be annunciated on the system display. This feature shall in no way inhibit the receipt of alarm conditions in the system, nor shall it require any special hardware, special tools or computer expertise to perform.

w. The fire alarm control panel shall include Silent and Audible Walk Test functions – Silent and Audible. It shall include the ability to test initiating device circuits and Notification Appliance Circuits from the field without returning to the panel to reset the system.

x. Water-flow Operation: An alarm from a water-flow detection device shall activate the appropriate alarm message on the control panel display; turn on all programmed Notification Appliance Circuits and shall not be

affected by the Signal Silence switch.

y. The Fire Alarm Control Panel shall a battery back-up feature as follows:

1). Two 12V 18 AH lead-acid batteries complete with charging system.

2). Upon loss of Primary (AC) power to the control panel, the batteries shall have sufficient capacity to power the fire alarm system for required standby time (24 hours) followed by 5 minutes of alarm.

3). The batteries are to be completely maintenance free. No liquids are required. Fluid level checks for refilling, spills, and leakage shall not be required.

4). If necessary to meet standby requirements, external battery/charger systems may be used.

3. Annunciator Panel

a. The alphanumeric display annunciator shall be a supervised, remotely located back-lit eighty (80) characters LCD display for alarm annunciation in clear English text.

b. The LCD annunciator shall display all alarm and trouble conditions in the system.

c. An audible indication of alarm shall be integral to the alphanumeric display.

d. The display shall be UL listed for fire alarm application.

e. It shall be possible to connect up to 8 LCD displays and be capable of wiring distances up to 6,000 feet from the control panel.

f. The annunciator shall connect to a separate, dedicated "terminal mode" EIA-RS-485 interface using two-wire loop connection and 2 wires for power. Each terminal mode LCD display shall mimic the main control panel.

g. Unit shall be semi-flush mounted into a fully recessed standard 4 inch square electrical box.

h. Unit shall be mounted between 42 and 48 inches above finished floor.

i. Unit as manufactured by Fire-Lite Alarms, model #ANN-80 or approved equal.

4. Initiation Devices

a. Addressable Devices – General;

1). Addressable devices shall employ the simple-to-set decade addressing scheme. Addressable devices which use a binary-coded address setting method, such as a DIP switch, are not an allowable substitute.

2). Detectors shall be addressable and intelligent, and shall connect with two wires to the fire alarm control panel signaling line circuits (SLC).

3). Dry contact switches, such as tamper, water flow and fire booster pump switches must be provided with individual Addressable Monitoring Modules to provide an addressable signal for the control panel. Modules shall connect with two wires to the fire alarm control panel signaling line circuits (SLC).

4). Addressable smoke and thermal (heat) detectors shall provide dual alarm and power/polling LEDs. Both LEDs shall flash under normal conditions, indicating that the detector is operational and in regular communication with the control panel, and both LEDs shall be placed into steady illumination by the control panel, indicating that an alarm condition has been detected. An output connection shall also be provided in the base to connect an external remote alarm LED.

5). Using software in the FACP, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. The detectors shall be listed by UL as meeting the calibrated sensitivity test requirements of NFPA Standard 72, Chapter 10.

6). Smoke and heat detectors shall be ceiling-mount and shall include a separate twist-lock base with tamper proof feature.

7). Detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel.

8). Detectors shall also store an internal identifying type code that the control panel shall use to identify the type of device (ION, PHOTO, THERMAL).

9). Detectors shall provide address-setting means using decimal switches.

b. Addressable Pull Box (manual pull 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 pull stations shall be constructed of Lexan with clearly visible operating instructions provided on the cover. The word FIRE shall appear on the front of the stations in raised letters, 1.75 inches (44 mm) or larger.

4). Unit shall be mounted between 42 and 48 inches above finished floor.

5). Unit shall be semi-flush mounted into a standard 4 inch square electrical box.

6). Unit as manufactured by Fire-Lite Alarms, model #BG-12LX or approved equal.

c. Addressable Photoelectric Smoke Detector

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 analog level of smoke density.

2). All detectors shall be ceiling-mounted, into a standard 4 inch square electrical box.

3). Each detector shall contain a remote LED output and a built-in test switch.

4). Detector shall be provided on a twist-lock base.

5). It shall be possible to perform a calibrated sensitivity and performance test on the detector without the need for the generation of smoke. The test method shall test all detector circuits.

6). A visual indication of an alarm shall be provided by dual latching

Light Emitting Diodes (LEDs), on the detector, which may be seen from ground level over 360 degrees. These LEDs shall periodically flash to indicate that the detector is in communication with the control panel.

7). The detector shall not go into alarm when exposed to air velocities of up to 1500 feet per minute (fpm).

8). The detector screen and cover assembly shall be easily removable for field cleaning of the detector chamber.

9). All field wire connections shall be made to the base through the use of a clamping plate and screw.

10). Unit shall be surface mounted into a standard 4 inch square electrical box.

11). Provide three spare smoke detectors in original packaging for future use.

12). Unit as manufactured by Fire-Lite Alarms, model #SD355(A) or approved equal.

d. Addressable Thermal Detector

1). The detectors shall use a thermistor sensing circuit for fast response time and shall, on command from the control panel, send data to the panel.

2). All detectors shall be ceiling-mounted.

3). Each detector shall contain a remote LED output and a built-in test switch.

4). Detector shall be provided on a twist-lock base.

5). A visual indication of an alarm shall be provided by dual latching Light Emitting Diodes (LEDs), on the detector, which may be seen from ground level over 360 degrees. These LEDs shall periodically flash to indicate that the detector is in communication with the control panel.

6). The detector shall have a fixed high temperature that activates at 190deg. F.

7). The detector screen and cover assembly shall be easily removable for field cleaning.

8). All field wire connections shall be made to the base through the use of a clamping plate and screw.

9). Unit shall be surface mounted into a standard 4 inch square electrical box.

10). Provide two spare heat detectors in original packaging for future use.

11). Unit as manufactured by Fire-Lite Alarms, model #H355HT(A) or approved equal.

e. Addressable Monitoring Module (Used to supervise a dry contact device and provides addressable signal)

1). Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional alarm initiating devices (any normally open dry contact device such as the sprinkler tampering and flow switches, and sprinkler booster pump controller) to one of the fire alarm control panel SLCs.

2). Each monitor module shall mount in a 4-inch square (101.6 mm square), 2-1/8 inch (54 mm) deep electrical box.

3). The IDC zone shall be suitable for Style D or Style B operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.

4). Unit as manufactured by Fire-Lite Alarms, model #MMF-300(A) or approved equal.

f. Addressable Relay Module (Used to provide a dry contact output for activation of elevator lobby recall)

1). Addressable control relay modules shall be provided to control the operation of elevator lobby recall and other auxiliary control functions.

2). Each monitor module shall mount in a 4-inch square (101.6 mm square), 2-1/8 inch (54 mm) deep electrical box.

3). The control relay module will provide a dry contact, Form-C relay. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to insure that 100% of all auxiliary relays may be energized at the same time on the same pair of

wires.

4). The control relay module shall be suitable for pilot duty applications and rated for a minimum of 0.6 amps at 30 VDC.

5). Unit as manufactured by Fire-Lite Alarms, model #CRF-300(A) or approved equal.

g. Dry-Contact OS&Y Valve Supervisory Switch

1). Supervisory switches shall be securely mounted on all sprinkler service OS&Y valves however; they can not interfere with normal operation of the valve. Unit shall be adjusted to operate within two revolutions of the valve control or when the stem has moved no more than one-fifth of the distance from its normal position.

2). Each switch shall be connected to individual Addressable Monitoring Modules to provide an addressable signal for the Fire Alarm Control Panel.

3). Enclosures must be NEMA 3R rated and UL listed.

4). Unit as manufactured by System Sensor, model #OSY2 or approved equal.

h. Dry-Contact Water-flow Detector

Note: Detector installation must be coordinated with sprinkler installer.

1). Detectors shall be securely mounted on the sprinkler service on any clear pipe span of appropriate size, either a vertical or horizontal run, at least 6 inches from any fitting which may change water direction, flow rate, or pipe diameter or no closer than 24 inches from a valve or drain.

2). Detectors shall have sensitivity in the range of 4 to 10 gallons per minute and a static pressure rating of 450psi.

3). Each detector shall be connected to individual Addressable Monitoring Modules to provide an addressable signal for the Fire Alarm Control Panel.

4). Enclosures must be NEMA 4 rated and UL listed.

5). Unit as manufactured by System Sensor, WFD series or approved equal.

5. Alarm Notification Devices

   a. Alarm notification devices (bells) shall be mounted above fire alarm control panel.

   b. Bells shall have underdome strikers and operating mechanisms and operate with a voltage of 24VDC.

   c. Bells shall be surface mounted to a standard 4 inch square electrical box.

   d. Bells sizes are as follows:

      - Water-flow – 10 inches
      - Smoke – 8 inches
      - Trouble – 6 inches

   e. Devices shall be field programmable without the use of special tools, to provide continuous or interrupted tones with an output sound level of at least 80 dBA measured at 10 feet from the device.

   f. Devices shall be flush or surface mounted above fire alarm control panel or as shown on plans.

   g. Unit as manufactured by System Sensor, SSM series or approved equal.

6. Conduit:

   a. Conduit shall be in accordance with The National Electrical Code (NEC), local and state requirements.

   b. Where required, all wiring shall be installed in conduit or raceway. Conduit fill shall not exceed 40 percent of interior cross sectional area where three or more cables are contained within a single conduit.

   c. Cable must be separated from any open conductors of power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, per NEC Article 760-29.

   d. With the exception of telephone connections, wiring for 24 volt DC control, alarm notification, emergency communication and similar power-limited auxiliary functions may be run in the same conduit as initiating and signaling line circuits. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.

   e. Conduit shall not enter the fire alarm control panel, or any other remotely

mounted control panel equipment or back-boxes, except where conduit entry is specified by the FACP manufacturer.

f. Conduit shall be 3/4 inch (19.1 mm) minimum.

7. Wire:

a. All fire alarm system wiring shall be new.

b. Wiring shall be in accordance with local, state and national codes (e.g., NEC Article 760) and as recommended by the manufacturer of the fire alarm system. Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 18 AWG (1.02 mm) for Initiating Device Circuits and Signaling Line Circuits, and 14 AWG (1.63 mm) for Notification Appliance Circuits.

c. All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.

d. Wire and cable not installed in conduit shall have a fire resistance rating suitable for the installation as indicated in NEC 760 (e.g., FPLR).

e. Wiring used for the multiplex communication circuit (SLC) shall be twisted non-shielded and support a minimum wiring distance of 10,000 feet when sized at 12 AWG.

f. All field wiring shall be electrically supervised for open circuit and ground fault.

g. The fire alarm control panel shall be capable of T-tapping NFPA Style 4 (Class B) Signaling Line Circuits (SLCs). Systems which do not allow or have restrictions for the number of T-taps, length of T-taps etc., are not acceptable.

8. Terminal Boxes, Junction Boxes and Cabinets:

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

b. The fire alarm control panel shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labeled at the main power distribution panel as FIRE ALARM. Fire alarm control panel primary power wiring shall be 12 AWG. The control panel cabinet shall be grounded securely to either a cold water pipe or grounding rod. The control panel enclosure shall feature a quick removal chassis to facilitate rapid replacement of the FACP electronics.

9. Installation:

a. Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer.

b. All conduit, junction boxes, conduit supports and hangers shall be concealed in all finished and exterior areas, and may be exposed in unfinished areas. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage.

c. All fire detection and alarm system devices and control panels shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas.

d. Manual pull stations and remote annunciators shall be semi-flush mounting as shown on the plans, and shall be installed not less than 42 inches (1067 mm), nor more than 48 inches (122 mm) above the finished floor.

16C.12 SYSTEM TESTING

A. The service of a competent technician shall be provided to technically supervise and participate during all of the adjustments and tests for the system. All testing shall be in accordance with NFPA 72 (Chapter 10), Fire Department and the Building Code.

B. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.

C. Close each sprinkler system flow valve and verify proper supervisory alarm at the FACP.

D. Verify activation of all water-flow switches.

E. Open initiating device circuits and verify that the trouble signal actuates.

F. Open and short signaling line circuits and verify that the trouble signal actuates.

G. Open and short notification appliance circuits and verify that trouble signal actuates.

H. Ground all circuits and verify response of trouble signals.

I. Check presence and audibility of tone at all alarm notification devices.

J. Check installation, supervision, and operation of all intelligent smoke detectors using the walk test.

K. Each of the alarm conditions that the system is required to detect should 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 points.

L. When the system is equipped with optional features, 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.

16C.13 GUARANTEES

NOTE: ANY CHANGE FROM THE ORIGINAL INTENT (SCOPE OF WORK) MUST BE APPROVED BY ARCHITECT/ENGINEER.

A. Upon completion of all work to be performed under this Contract and acceptance of same by Architect/Engineer, this contractor shall guarantee that all workmanship and materials used in the performance of this contact, shall remain free from defects for a period of one (1) year, in addition to manufacturer's standard warranties. All guarantees to be from the date, when **Final Certificate of Occupancy** is issued from Department of Buildings. This contractor shall guarantee to repair or replace, as determined by Architect/Engineer, any defective portions of the various systems described herein the guarantee period.

16C.14 MAINTENANCE AND OPERATING INSTRUCTIONS

A. Submit three sets of typewritten maintenance and operating instructions for all equipment furnished in building.

B. Give full instructions to Architect/Engineer and management group as to the location, operation and maintenance of all machinery, apparatus and other work installed by him.

END OF SECTION