SECTION 28 31 00
FIRE DETECTION AND ALARM SYSTEM

PART I - GENERAL

I. Fire Alarm Requirements

A. The Contractor is referred to the INSTRUCTIONS TO BIDDERS, FORM OF PROPOSAL, GENERAL CONDITIONS, all of which are hereby made part of this Contract.

B. Bidders may gain entry to the work areas for inspection purposes by visiting the Project Office.

C. As part of this contract, the Contractor shall retain or have on staff a Professional Engineer (the "Engineer of Record") licensed in the State of New York and experienced in the design of fire alarm systems to perform the tasks described herein.

d. Prior to award the contractor shall have an electrical sub-contractor approved by NYCHA.

II. SCOPE OF WORK

A. Removal of existing fire alarm devices including associated wiring and conduit as shown on demolition drawing.

B. The Work shall include all labor, equipment, materials and necessary services to provide a complete addressable Manual, Automatic Smoke/Heat Detection with Central Office Connection (hereinafter denoted by the phrase “the system”). The system shall be addressable, with all initiating devices individually annunciated on the Fire Alarm Control Panel, the remote annunciator and the printer. Evacuation alarm tones shall be programmed to be TEMPORAL 3 in accordance with NYC Building Code. The system shall have supervised wiring with all operations as herein described. The system shall consist of, but not be limited to, the following:

1. Fire alarm control panel (s) with English text annunciator/printer and remote annunciator.
2. Manual pull stations.
3. Air handling systems and rooftop heating and cooling units shutdown controls
4. Area smoke detectors.
5. Heat detectors.
6. Sprinkler water flow switches and tamper switches.
7. Visual Notification Appliances (strobes).
8. Electromagnetic door holders.
9. Fused disconnect switch in electrical room.
10. Battery backup.
11. Remote Annunciation at office (printer).
12. Digital Alarm Communicator Transmitter (dact) for central station notification.
13. Visual Notification Appliances (strobes).
14. Interconnect wiring between new fire alarm control panel and old fire alarm control panel located in kitchen. Trouble, alarm and supervisory signals from old fire alarm panel will be visible on new FACP and vice versa.
15 Where a Kitchen Fire Suppression System (Ansul System) is provided in the building, activation of the system shall be indicated as an alarm on the Fire Alarm System. Interconnecting wiring between the fire extinguishing system and the Fire Alarm shall be provided by this Contractor.

III. SUBMITTALS

A. Drawings must be prepared Micro-station CADD.

1. Owner will provide floor plan drawings for Contractor's use; verify all dimensions on Owner-provided drawings.

B. Design Documents: Submit all information required for plan review and permitting by authorities having jurisdiction, including but not limited to floor plans, riser diagrams, and description of operation:

1. **Fire Alarm System under this Contract is covering specific areas such as Community Center. See drawings for actual details of system that is required.**
2. NFPA 72 "Record of Completion", filled out to the extent known at the time.
3. Clear and concise description of operation, with input/output matrix similar to that shown in NFPA 72 Appendix A-7-5-2.2(9), and complete listing of software required.
4. System zone boundaries and interfaces to fire safety systems.
5. Location of all components, circuits, and raceways; mark components with identifiers used in control unit programming.
6. Circuit layouts; number, size, and type of raceways and conductors; conduit fill calculations; spare capacity calculations; notification appliance circuit voltage drop calculations.
7. List of all devices on each signaling line circuit, with spare capacity indicated.
8. Manufacturer's detailed data sheet for each component, including wiring diagrams, installation instructions, and circuit length limitations.
9. Detailed drawing of graphic annunciator(s).
10. Certification by either the manufacturer of the control unit or by the manufacturer of each other component that the components are compatible with the control unit.
11. Certification by the manufacturer of the control unit that the system design complies with the contract documents.
12. Compliance of the system with the Sequence of Operation as indicated on the Mechanical Design. Manufacturer's installation in conformance with the Sequence of Operation.
13. Certification by Contractor that the system design complies with the contract documents.

IV. CODES, STANDARDS, AND LICENSES

A. Codes

All work performed under this contract must meet applicable codes and standards

□□□□□□□ New York City Building Code
□□□□□□□□□□□□New York City Fire Code
□□□□□□□ NYC Electrical Code
□□□□□□□ All other authorities having jurisdiction

B. Standards

□□□□□□□ NFPA 72 - Fire Alarm Systems
□□□□□□□ NFPA 101 - Life Safety Code

□□□□□□□□□ All equipment shall be UL listed for its intended use

C. Licenses

The Contractor shall possess at the time of bid a valid **"fire alarm installer" license** issued by the New York State, Department of State "to engage in the business of installing, fire alarm system". The Contractor shall be 1) be qualified and experienced, 2) possess the applicable Fire Dept. Certificates and 3) submit evidence of installer qualifications.

V. FILING AND PERMITS

In accordance with Section 27-969 of the NYC Building Code, the Engineer of Record shall prepare any necessary plans and file any/all necessary applications to obtain Buildings Dept. and Fire Dept. approvals prior to installing new fire alarm system.

VI. OPERATING AND MAINTENANCE DATA

Operating and Maintenance Data: Revise and resubmit until acceptable; have one set available during closeout demonstration:

1. Complete set of specified design documents, as approved by authority having jurisdiction.
2. Additional printed set of project record documents and closeout documents, bound or filed in same manuals.
3. Contact information for firm that will be providing contract maintenance and trouble call-back service.
4. List of recommended spare parts, tools, and instruments for testing.
5. Replacement parts list with current prices, and source of supply.
6. Detailed troubleshooting guide and large scale input/output matrix.
7. Preventive maintenance, inspection, and testing schedule complying with NFPA 72; provide printed copy and computer format acceptable to Owner.
8. Detailed but easy to read explanation of procedures to be taken by non-technical administrative personnel in the event of system trouble, when routine testing is being conducted, for fire drills, and when entering into contracts for remodeling.

VII. PROJECT RECORD DOCUMENTS

Project Record Documents: Have one set available during closeout demonstration:

1. Complete set of floor plans showing actual installed locations of components, conduit, and zones.
2. “As installed” wiring and schematic diagrams, with final terminal identifications.
3. “As programmed” operating sequences, including control events by device, updated input/output chart, and voice messages by event.

VIII. QUALITY ASSURANCE

A. Copies of Design Criteria Documents: Maintain at the project site for the duration of the project, bound together, an original copy of NFPA 72, the relevant portions of applicable codes, and instructions and guidelines of authorities having jurisdiction; deliver to Owner upon completion.

B. Designer Qualifications: NICET Level III or IV (3 or 4) certified fire alarm technician or registered engineer, employed by fire alarm control panel manufacturer, Contractor, or installer, with experience designing fire alarm systems in the jurisdictional area of the authorities having jurisdiction.

C. Installer Qualifications: Firm with minimum 3 years documented experience installing fire alarm systems of the specified type and providing contract maintenance service as a regular part of their business.

1. Authorized representative of control unit manufacturer; submit manufacturer's certification that installer is authorized; include name and title of manufacturer's representative making certification.
2. Installer Personnel: At least 2 years of experience installing fire alarm systems.
3. Supervisor: NICET level III or IV (3 or 4) certified fire alarm technician; furnish name and address.
4. Certified in the State in which the Project is located as fire alarm installer.

D. Instructor Qualifications: Experienced in technical instruction, understanding fire alarm theory, and able to provide the required training; trained by fire alarm control unit manufacturer.

IX. WARRANTY

A. Provide control panel manufacturer's warranty that system components other than wire and conduit are free from defects and will remain so for 1 year after date of Substantial Completion.

B. Provide installer's warranty that the installation is free from defects and will remain so for 1 year after date of Substantial Completion.

PART 2 PRODUCTS

A. General

1. The work covered in this section shall include all labor, equipment, materials and services to furnish and install new fire alarm system.

2. New Fire Alarm system shall be of the **addressable type** with intelligent addressable alarm initiating devices. Each device shall have a microprocessor with non-volatile memory to support its functionality and serviceability. Each device shall be capable of electronic addressing, either automatically or application programmed assigned. to support physical/ electrical mapping and supervision by location. Setting a device's address by physical means shall not be necessary. Each addressable analog loop shall be circuited as specified or approved by the Engineer of Record. Device loading shall not exceed 80% of loop capacity in order to leave space for future devices. The loop shall have a Class B operation.

3. Each of the following types of devices or equipment shall be provided with supervised circuits:

□□□□□Sprinkler Valve Supervisory Switches: Provide one (1) supervisory module circuit for each sprinkler valve supervisory switch.

4. Each of the following types of alarm notification appliances shall be circuited as follows or as otherwise specified by the Engineer of Record

- Audible Signals: Provide audio amplifiers Centrally Banked type. Amplifiers not to be loaded above 80% of their capacity.

- Visual Signals: Provide one (1) notification appliance for each 3.4 A of signal load connected directly to control panel NACs and 1.7 A of signal load for each NAC connected to a remote signal module.

5. The products specifications described below are intended as a guide for bid purposes. The actual products to be provided at a particular location shall be **as specified or approved by the Engineer of Record.** All fire alarm products shall be UL listed and approved by the New York City Board of Standards and Appeals, and all other authorities having jurisdiction.

6. Wiring diagram shall be left in the panel. Programming and User Manual shall be stored inside the FACP Panel. All necessary programming code sheets shall be left inside the FACP panel with the programming code.

   The Contractor is to provide On Site meeting on proper usage and procedure for all Fire Alarm installations with designated NYCHA personel at no additional cost.

B. **Alarm Initiating Devices**

1**. Fire Alarm (Pull) Stations**

Fire alarm pull stations shall be conventional as required to be compatible with the new FACP. Pull stations shall be addressable. Pull stations shall be mounted in the path of egress and adjacent to each stair. Pull stations shall consist of die cast aluminum housing painted red and clearly labeled as to function. It shall include a pullout lever which, when activated, locks into position after activation. Pull stations shall be mounted on galvanized steel backboxes.

Conventional coded pull-lever type stations shall be constructed with a door or other approved means to protect the pull lever against accidental injury. The wording "IN CASE OF FIRE- OPEN DOOR AND PULL DOWN LEVER" in raised letters, or equivalent instructions, shall appear on the door.

Intelligent, addressable pull stations shall have single gang construction and provide single action, single state, non-coded operation. Provide locked test feature. The station's electronics shall be mounted behind the body of the station and shall be accessible to authorized personnel only.

In systems using break-glass or break-rod type stations, at least one extra glass rod or glass pane for each station in the system shall be provided to the Superintendent/Manager of the development.

2. **Area Smoke Detectors**

Area smoke detectors shall be conventional as required to be compatible with the new FACP. Area smoke detectors shall be intelligent addressable analog type. Whether conventional or addressable, new area smoke detectors shall be photoelectric, light scattering type with LED indicating light, twistlock base, insect screeen and test button and shall be compatible with the new FACP. New smoke detectors shall be mounted on

standard 3-1/2 inch octagon box or 4S box with vandal-resisting security locking screws. Area smoke detectors may be provided with replaceable sensing chambers.

Conventional area smoke detectors shall be from the following manufacturers or approved equal:

- Electro Signal Lab (ESL)
- Sentrol
- BRK
- Kidde- Fenwall
- Gamewell

Intelligent, addressable area smoke detectors shall be of the same make as the addressable FACP

3. **Heat Detectors**

Heat detectors shall be conventional as required to be compatible with the new FACP. Heat detectors shall be intelligent, addressable analog types. Heat detectors shall be combination fixed temperature/ rate-of-rise types with a thermistor heat sensor that shall monitor the temperature of the air and its surroundings to minimize thermal lag in processing an alarm. Heat detectors shall have a nominal fixed temperature alarm point rating of 135° F and a rate-of-rise alarm point of 15° F per minute. Heat detectors shall be rated for ceiling installation.

Conventional heat detectors shall be from the following manufacturers or approved equal

- Electro Signal Lab (ESL)
- Sentrol
- BRK
- Kidde-Fenwall
- Gamewell

Intelligent, addressable heat detectors shall be of the same make as the addressable FACP.

C. **Notification Devices**

1. **Audible Notification Appliances (Horns)**

1. The Contractor shall provide fire alarm horns wherever the Drawings require.

2. Each horn shall be installed on a standard 4” galvanized electrical box, either flush or surface mounted, as indicated on Drawings. Provide weatherproof box and gasket in damp, wet or exterior locations.

3. Horns shall be electrically polarized and include a blocking network to allow for connection to a supervised fire alarm signal circuit.

4. Each horn shall have a high volume setting between 82 and 91 dBA at 10’-0”. Each horn shall have adjustable Hi-Lo dBA setting.

5. Horns shall be 24 VDC and shall have a selectable Temporal 3 setting to allow one pair of wires to power both horn and strobe.

2. **Visual Notification Appliances (Strobes)**

1. The rating of the strobe unit shall be a minimum of **15** candela and shall deliver all characteristics and requirements called for in NFPZ 72/2002 as accepted by Appendix Q of the NYC Building Code and the American with Disabilities Act (ADA), including the "Equivalent Facilitation" rule, and UL 1971.

2. In corridors, places of assembly and common areas, the strobes shall be synchronized when 3 or more strobes are in line of sight. Strobes to be synchronized shall be UL listed for use with the FACP/power source to ensure synchronization.

3. Strobes shall be listed for wall-mounted application.

4. Strobes shall be listed for 24 volt DC.

D. **Electromagnetic Door Holders**

1. Wall type magnetic door holders shall be furnished where required. This item shall consist of an electromagnetic unit (mounted on the wall) and armature unit (mounted on the door) and shall be fail safe (release the door when power is removed from the magnet).

2. The electromagnet shall be mounted on the wall about 6'-6" above finish floor at a point where the edge of the open door would normally strike the wall. The armature shall be mounted on the door at a point where the contact plate would be centered on the center of the electromagnet.

3. The armature unit shall be adjustable and shall be set so that the contact plate meets the electromagnet unit flush and not at an angle.

E. **Fire Alarm Control Panels (FACP)**

1. **General**

The operating controls and supervisory indicators shall be located behind locked door with viewing window. All control modules shall be labeled, and all zone locations shall be identified. The typical FACP shall have a **minimum of two (2) Notification Appliance Circuits (NAC) and shall accommodate a minimum of 96 detectors**. The actual FACP to be provided at a specific location shall be as specified or approved by the Engineer of Record.

2. **System Controllers**

The Main Controller Module shall be supervised, site programmable, and of modular design supporting up to 96 detectors and 94 remote modules, and two (2) Notification Appliance Circuits (NACs) that shall be convertible to power risers to serve remote multiple NAC modules for zoned signal applications. The system shall support dual channel voice audio with Centrally Banked amplifiers but shall be provided with single channel audio and panel space for the Firefighter's telephone

control. The system shall support a Paging.

Microphone and Firefighter's telephone operation integrated into the FACP. The cabinet shall be steel with red finish.

The Main Controller Module shall control and monitor all local and remote peripherals. It shall support a 2-LCD Display Module, power supply, remote LCD and zone display annunciators, strip and carriage printers, and support communication interface standard protocol (CSI) devices such as color computer annunciators and color graphic displays. The annunciator port shall be capable of supporting remote annunciators. The Main Controller Module shall provide one loop controller circuit, two notification appliance circuits, and common form 'C' contacts for alarm, supervisory, and trouble. Contact ratings shall be 24Ddc at 1 A.

The FACP shall have an interface module for remote monitoring. The module shall have an alarm communicator transmitter (DACT) module to transmit alarm, supervisory and trouble signals to a Central Monitoring Station (CMS). The DACT shall support dual telephone lines, 20 PPS 4/2 communications, and configured for dual tone multi-frequency (DTMF) or pulse modes. It shall be possible to delay AC power failure reports, auto test call, and site program using a touch-tone phone and password.

The Main Controller Module shall have built-in automatic system programming to automatically address and map all system devices attached to the main controller. A minimum default single stage alarm system operation shall be supported with alarm silence, event silence, drill lamp test, and reset common controls.

Advanced Windows™ based System Definition Utility with Program Version Reporting to document any and all changes made during system start-up or system commissioning shall be used to maintain site specific programming. Time and Date Stamps of all modifications made to the program must be included to allow full retention of all previous program version data. It shall support programming of any input point to any output point. The system shall support the use of Bar Code readers to assist custom programming functions. It shall allow authorized customization of fundamental system operations using initiating events to start actions, timers, sequences and logical algorithms. The system program shall meet the requirements of this project, current codes and standards, and satisfy the local authorities having jurisdiction.

The system shall support distributed processor intelligent detectors with the following operational attributes, integral multiple differential sensors, automatic device mapping, electronic addressing, environmental compensation, pre-alarm, dirty detector identification, automatic day/night sensitivity adjustment, normal/alarm LEDs, relay bases, sounder bases and isolator bases.

The system shall use full digital communications to supervise all addressable loop devices, distributed audio amplifiers and power supplies for placement, correct location, and operation. It shall allow swapping of "same type" devices without the need of addressing and impose the "location" parameters on replacement device. It shall initiate and maintain a trouble if a device is added to a loop and clear the trouble when the new device is mapped and defined into the system.

Each controller shall contain a RS232 printer/programming port for programming locally via a PC or down loading through modems from a remote PC. When

operational, each controller shall support a printer through the RS232 port and be capable of message routing. An RS-232 isolator card to isolate grounded peripheral devices (such as printers and CRTs) from the control panel.

System circuits shall be configured as follows. Addressable analog loops Class B, Initiating Device Circuits Class B, Notification Appliance Circuits Class B, Network Communications B, Annunciator Communications B.

Single stage operation shall be provided.

The system shall have a UL Listed Detector Sensitivity test feature, which will be function of the smoke detectors and performed automatically every 4 hours.

The system shall support 100% of all remote devices in alarm and provide support for a 100% compliment of detector isolator bases.

All panel modules shall be supervised for placement and return trouble if damaged or removed.

The system shall have a CUP watchdog circuit to initiate trouble should the CUP fail.

Audible notification appliances shall be affected by signal silence features. Signal silence features shall not affect visual signal appliance.

3. **User Interface**

The 2-LCD Display Module shall be of membrane style construction with a 4 line by 20 character Liquid Crystal Display. The LCD shall use super-twist technology and backlighting for high contrast visual clarity. In the normal mode display the time, the total number of active events and the total number of disable points. In the alarm mode display the total number of events and the type of event on display. Reserve a minimum of 40 characters of display space for user custom messages. The module shall have visual indicators for the following common control functions; AC Power, alarm supervisory, monitor, trouble, disable, ground fault, CPU fail, and test. There shall be common control keys and visual indicators for, reset, alarm silence, trouble silence, drill, and one custom programmable key/indicator. Provide four pairs of display control keys for selection of event display by type (alarm, supervisory, monitor and trouble) and forward/backward scrolling through event listings. The operation of these keys shall be integrated with the related common control indicators to flash the indicators when undisplayed events are available for display and turn on steady when all events have been displayed. Allow the first event of the highest priority to capture the LCD for display so that arriving fire fighters can view the first alarm event "hands free". Provide system function keys, status, reports, enable, disable, activate, restore, program, and test. The module shall have numeric keypad, zero through nine with delete and enter keys.

4. **Power Supplies**

The power supply shall be a high efficiency switch mode type with line monitoring to automatically switch to batteries for power failure or brown out conditions. The automatic battery charger shall have low battery discharge protection. The power supply shall provide internal power and 24 Vdc at 6.4 continuous for notification appliance circuits. The power supply shall be capable of providing 8A to output circuits for a maximum period of 100 ms. Auxiliary power shall be 24 Vdc ad 1A Smoke power shall be 24 Vdc at 500mA. All outputs

shall be power limited. The battery shall be sized to support the system for 24 hours of supervisory and trouble signal current plus general alarm for 15 minutes.

Auxiliary power supplies shall be a high efficiency switch mode type with line monitoring to automatically switch to batteries for power failure or brown out conditions. The automatic battery charger shall have low battery discharge protection. The power supply shall provide internal power and 24 Vdc at 6.4A continuous for notification appliance circuits. The power supply shall be capable of providing 8A to output circuits for a maximum period of 100 ms. All outputs shall be power limited. The battery shall be sized to support the system for 24 hours of supervisory and trouble signal current plus general alarm for 15 minutes. All supervision of the auxiliary supply shall be transmitted via addressable analog loop without additional equipment.

5. **Agency Listings and Approvals**

- BSA
- MEA
- UL listed
- NEC

6. **Owner's Test**

Provide a coded one-man walk test feature. Allow audible or silent testing. Signal alarms and troubles during test. Allow receipt of alarms and programmed operations for alarms from areas not under test.

Provide internal system diagnostics and maintenance user interface controls to display/ report the power, communication and general status of specific panel components, detectors and modules

Provide loop controller diagnostics to identify common alarm, trouble, ground fault, and map faults.

Allow the user to display/ report the condition of addressable analog detectors. Include device address, device type, percent obscuration, and maintenance indicator. The maintenance indicator shall provide the user with a measure of contamination of a device upon which cleaning decisions can be made.

Allow the user to report history of alarm, supervisory, monitor, trouble, smoke verification, watchdog and restore activity. Include Facility Name, Compilation Date and the time and date of the History Report.

Allow the user to disable/ enable devices, zones, actions, timers and sequences. Protect the disable function with password.

Allow the user to activate/ restore outputs, actions, sequences, and simulate detector smoke levels.

Allow the service user to enter time and date, reconfigure an external port for download programming, initiate auto programming and change passwords. Protect these functions with password.

7. **Manufacturers and Model Nos.**

- Firelite

- □ Edwards Systems Technologies EST2
- □ Notifier System 5000
- □ Simplex 4100
- □ Gamewell
- □ Approved equal

F. **Digital Alarm Communicator Transmitter (DACT)**

When required, provide a digital alarm communicator transmitter compatible with the FACP to permit central station monitoring.

□□□□□□□□ Primary and secondary telephone line connections (two line dialer)
□□□□□□□□ Automatic verification of communications between fire alarm panel and the receiving equipment every 24 hours
□□□□□□□□□□□□□□□□□□ Transmits up to 32 zones or alarm points to digital alarm communicator receiver station (DACR)
□□□□□□□□□□□□□□□□□□ Transmit common trouble and supervisory conditions
□□□□□□□□□□□□□□□□□□ Dialer status indication
□□□□□□□□□□□□□□□□□□ Dialer enable/disable switch
□□□□□□□□□□□□□□□□□□ 20 PPS 3/2 or 4/2 communication formats
□□□□□□□□□□□□□□□□□□ Dual tone multi-frequency (DTMF) or pulse modes operation
□□□□□□□□□□□□□□□□□□ All programming password protected
□□□□□□□□□□□□□□□□□□ Complies with NFPA 72

G. **Remote Alpha-Numeric Annunciators**

Each annunciator shall contain a supervised; back lit, liquid crystal with a minimum of 4 line with 20 characters per line. Where required, the annunciator shall include a key-switch enabled reset, alarm silence, trouble silence and drill/all-call switches. It must be possible through programming to determine which common control functions are active with the key-switch in the enable or the disable condition.

It must be possible to have up to 30 of any type of LSRA (-C) and SMDN (-C) annunciators on a single annunciator network.

Each annunciator must be capable of supporting custom messages as well as system event annunciation. It must be possible to filter unwanted annunciation of trouble, alarm or supervisory functions. The annunciator must incorporate a power-saving feature. The front panel lighting feature must turn off after a minimum of four minutes if there is no switch activity and no unacknowledged messages waiting.

Where required, it must be possible to connect a printer directly to the annunciator through a dedicated RS-232 port. The printer will facilitate generation of hard copy records of system event activity.

The annunciators shall be mounted in stand-alone enclosures or integrated into the network panels as indicated on the plans.

H. **Wiring**

1. All wiring shall be of the size and configuration type recommended by the manufacturer for each type of circuit in the system and providing the recommendations meet the requirements listed below:

□□□□□□□□□ Copper conductors only. Aluminum conductors or copper clad, plated or coated aluminum conductors shall not be acceptable.

□□□□□□□□□ Color coded throughout

□□□□□□□□□□□□□□□In conformance with the NYC and National Electrical Codes

□□□□□□□□□□□□□□□Approved by the NYC Fire and Buildings Departments

□□□□□□□□□□□□□□□A minimum of No. 16 A.W.G., unless otherwise specified

□□□□□□□□□ Teflon insulated

2. All wires shall be test free from grounds and crosses between conductors.

3. A ground wire equal in size to the largest conductor used on the system, but not less than No. 10 A.W.G., attached to the FACP and each system transponder panel, shall be installed in 3/4" conduit and securely connected to the "grounding busbar" in the same manner as the other ground wires and conduits.

4 . Circuit wiring from the FACP to any remote annunciator panel shall be a minimum as follows:

□□□□□□□□□□ Data communications and power wiring to the remote annunciator panel: Two (2) cables, each with two (2) No. 16 A.W.G., twisted and shielded, copper conductors.

□□□□□□□□□□ Power wiring to the remote annunciator panel: Two (2) No. 12 A.W.G., copper conductors.

5. Circuit wiring from the FACP or addressable module to the system peripheral equipment shall be as follows:

□□□□□□□□□□ Each network addressable data communications circuit; Two (2) No. 14 A.W.G. twisted and shielded, copper conductors.

□□□□□□□□□□ Each alarm strobe light circuit: Two (2) No. 14 A.W.G., twisted and shielded, copper conductors.

□□□□□□□□□□ Each control circuit: Two (2) No. 14 or No. 12 A.W.G. copper conductors.

6. Circuit wiring from FACP or ZAM to related system equipment shall be as follows:

□□□□□□□□□□ Each alarm initiating, supervisory or status monitoring circuit: Two (2) No. 16 A.W.G. copper conductors.

□□□□□□□□□□ Each door holder control circuit: Two (2) No. 14 A.W.G. copper conductors.

7. Monitor Circuit: 2 #14 A.W.G

8. Circuit wiring from FACP to DACT: Minimum ten (10) No. 14 A.W.G copper conductors.

9. 24V DC Circuit: 2 #14 A.W.G

10. RS485 circuit: 1PR #18 TW, SI-ITLDED

I. **Alarm Interface Modules**

1. Alarm interface Modules shall interface normally open contacts of sprinkler water flow switches, tamper switches and other supervisory devices to the addressable Fire Alarm System.

J. **Control Relay Interface Module**

1. Control Relay Interface Modules shall interface auxiliary equipment such as door holders, electromagnetic locks, and fan shut down control points to the addressable Fire Alarm System.

K. **Alphanumeric Printer**

1. A UL Listed or FM approved alphanumeric printer shall be provided, capable of printing the appropriate addressable device number and customized location message for any active device.

2. Any device status message shall be printed with date and time of occurrence.

3. The Contractor shall provide a printed list of the addresses for all manual pull stations with respect to exists, stairs (not column numbers) or adjacent room numbers. Included in this list shall also be addresses for all other initiating devices. List shall be mounted on the wall of the office.

L. **Conduit and Raceways**

1. All wiring shall be mechanically protected when installed exposed and in areas with no drop ceiling and when penetrating fire walls and floor slabs. Rigid heavy wall conduit, tubing or other approved raceway, properly sized to New York City Electrical Code requirements, shall be used to provide said mechanical protection. Only rigid heavy wall conduit, properly sized to New York City Electrical Code requirements, shall be used to provide said mechanical protection, when wiring is penetrating fire walls and floor slabs (risers) and for all system power wiring.

2. All penetrations of floor slabs and firewalls shall be fire stopped in accordance with all local fire codes.

3. Fire alarm system terminal and junction locations shall be identified in accordance with NFPA Standard 70, Section 760-3. Terminal and junction boxes shall be painted red and stenciled in white letters "FIRE ALARM", preventing unintentional interference with the fire alarm system wiring during testing, servicing and additional modifications to the system.

M. **Fire Alarm Fused Disconnect Switch**

1. The Contractor shall provide an individual fused disconnect switch with 3 poles, and a removable solid neutral bar in fuse gap for each fire alarm system indicated on the Engineering Drawings, in accordance with Art. 4000 (new NEC/NFPA 70 – 2008 Art. 760 as modified for use in NYC).

2. Rating of the fused disconnect switch shall be as required by the connected load. The fusible disconnect switch shall be heavy-duty type, UL listed for use as Service Entrance Equipment.

3. Each fused disconnect switch shall be painted RED and bear a white-core bakelite identification nameplate to identify its use by the phrase “FIRE ALARM SYSTEM DISCONNECT” and control equipment served.

4. Power connection to fused disconnect switch shall be provided per code.

5. The circuits for the Fire Alarm Systems shall be as follows:

    1. One (1) circuit for fire alarm panels.

    2. One (1) circuit for custodial printer.

    3. One (1) circuit for the Digital Alarm Communicator Transmitter (where applicable).

6. The complete assembly shall meet N.Y.C. Electrical & Fire code requirements.

N. **Location of Alarm Initiating Devices**

1. **Smoke Detectors**: In spaces served by air-handling systems, detectors shall not be located where air from supply diffusers could dilute smoke before it reaches the detectors.

2. **Manual Pull Stations**: When required, provide manual pull stations on each floor at the entrance to each stairway, at all natural path of egress to the street, throughout Community Centers, Child Care Centers and Senior Centers, throughout basement areas or a specified by the Engineer of Record.

3. **Speaker/ Strobes**: When required, provide speaker/ strobes if they are already present in the building or the existing FACP can accommodate such devices on each floor, at the entrance to each stairway, at all natural path of egress to the street, throughout basement areas or as specified by the Engineer of Record. Speaker/ strobes shall typically be located 8 feet above the floor.

PART 3 EXECUTION

A. INSTALLATION

1. The entire system shall be installed in a workmanlike manner, in accordance with approved manufacturers’ wiring diagram. The Contractor shall provide all conduit, wiring, outlet boxes, junction boxes, cabinets and similar devices necessary for the complete installation.

2. All penetrations of floor slabs and fire walls shall be fire stopped in accordance with the 2008 NYC Building Code and the NYC Electrical Code.

3. Installation of conductors and raceway shall be in accordance with the following. For raceway installation requirements:

    1. Power conductors shall not be installed in common raceways with low voltage conductors.

    2. Low Voltage THHN copper wires must be installed in rigid steel metallic conduit in accordance with Art. 4000 (new NEC/NFPA 70 – 2008 Art. 760 as modified for use in NYC).

    3. Conductors other than M.I. cable shall be run in rigid steel metallic conduit raceway, except as specifically described below.

    4. Telephone lines shall be installed in EMT from the DACT to the Telephone Demarcation point.

    5. Raceways run within 8 feet of the finished floor in Electrical rooms and mechanical rooms over 900 square feet, and elsewhere where subject to mechanical damage, shall be rigid galvanized steel conduit only.

    6. Grounding

        1. All conduits supplying power to the fire alarm control panel and control cabinets shall contain a green insulated grounding conductor sized in accordance with Art. 4000 (new NYCEC/NFPA 70). Ground wiring shall be No. 10 AWG minimum from the fused disconnect switch to the service panel and booster cabinets.

        2. The Contractor shall connect the grounding conductor to the ground bus or other suitable grounding terminal in each panel and cabinet in which it enters. At the fused disconnect switch supplying the fire alarm system, the contractor shall provide a grounding electrode conductor sized and installed in accordance with the Code.

B. Acceptance Test

1. Prior to the final acceptance test, test the completed system for proper operations with a trained manufacturer's technical representative. The system shall be demonstrated to perform all of the functions as below. Any system, equipment or wiring failures discovered during said test shall be repaired or replaced before requesting scheduling of the final acceptance test.

2. The Contractor shall test the system for final acceptance in the presence of a NYCHA representative or Engineer of Record. The system shall also be tested in the presence of an NYFD official if required.

3. During the final acceptance test:

    - Every manual and automatic alarm-initiating device shall be operated and/or activated to its alarm state.

- Every smoke detector shall be tested using a tester or equivalent device.

- Every rate-of-rise heat detector shall be tested using a controllable heat source such as a blower type hair dryer.

- The sprinkler system waterflow alarm switches shall be tested by flowing water. On dry type sprinkler systems, air pressure shall be measured.

- All other alarm initiating devices shall be activated to their alarm state.

- Sprinkler system tamper switches shall be tested by closing sprinkler valves.

- All other supervised devices shall be activated to their off-normal position or state.

- Every audible alarm-signaling device shall be sounded.

4. Upon approval of new interior fire alarm system installations, the contractor **shall** provide the Administering Officer with a copy of all system programming codes and access passwords on readable CD. A copy shall also be provided to the Development Superintendent/Manager or placed inside the systems fire alarm panel for future maintenance and repairs.

5. Upon approval of system by FDNY a copy of the "Letter Of Approval" must be submitted to the Administrating Officer, as well as submitting "Appendix A–1". The process of "Sign Off" by Dept. of Buildings (D.O.B.) shall begin immediately following this approval.

6. Documentation confirming "sign off" by D.O.B. must be submitted to the Administering Officer before final invoice can be submitted payment.

C. INSPECTIONS

1. Submit inspection report prior to closeout demonstration.

2. Submit documentation of satisfactory inspections and tests.

3. Submit NFPA 72 "Inspection and Test Form" filled out.

D. "AS BUILT" DRAWINGS

The Contractor shall prepare "As Built" drawings. Such drawings shall be schematic in nature but shall be of sufficient detail and show all the components of the fire alarm system at their respective locations. As Built drawings shall include a riser diagram. As Built drawings shall be prepared on the latest version of Auto CAD and submitted to the Authority as follows:

- One set of approved drawings to the Technical Services Department
- One set of approved drawings on CD-ROM to the Technical Services Department.
- Submit complete set of As Built Fire Alarm drawings to NYCHA/Engineer of Record.
- Submit Fire Alarm As Built drawings for the purpose of NYCDOB approval. Contractor will provide his seal and sign As Built drawings prior to submission to NYCHA Engineer of record.

E. NOTIFICATION TO START WORK

A. Prior to commencing the work, the Contractor shall attend a pre-start meeting at a location to be specified by the Authority.

B. When performing work at a development, the Contractor shall sign the Contractor's log book upon arriving and leaving the development, listing time, date and location of work, as well as number of workers.

F. CLOSEOUT DOCUMENTATION AND TRAINING

1. **The following shall be submitted immediately after receiving the Letter of Approval by the Bureau of Fire Prevention of the New York City Fire Department for transmission to the Division of School Facilities to allow legal use of the system.**

   i. Copies of the Fire Department Letter of Approval.

   ii. Copies of the updated form A-433R, "Application for Electrical Inspection and Summary of Contract Equipment to be Installed" filed with the Bureau of Fire Prevention.

   iii. As required by NFPa 72 as adopted by the NYC Building Code Appendix Q and NYC Fire Code, the Contractor shall provide **three (3)** Compact Disks (CDs) And four (4) hard copies of the system Data Base, including all system data files As programmed (as built) and all information to allow alternate authorized Fire Alarm Company to access, modify, alter, add to, or maintain the installed system. Manufacturers that do not comply with this provision of the specification shall not be considered "as equal".

2. Contractor shall compile and provide to the Owner manuals on the finished system to include: operating and maintenance instructions, manufacturer's catalog pages of all equipment and components, detailed as-built floor plans and riser diagrams showing all installed devices and point-to-point wiring diagrams (this is separate from the Engineer-of-Record "as-built" drawings), and a manufacturer's suggested spare parts list.

3. Contractor shall arrange with the manufacturer to provide Two (2) four-hour training sessions. Both four-hour training sessions shall be conducted during normal business hours to instruct school personnel on the operation and maintenance of the entire system, **including how to program the fan shut down, by-pass and start up operation**. The first shall be conducted after final acceptance; the second shall take place after six (6) months as a retraining course. The Contractor may schedule this session in conjunction with the first semi-annual maintenance as required under this Contract.

END OF SPECIFICATIONS