PDHonline Course E207W (4 PDH)

Design to the Fire Alarm Code, NFPA 72-2007 (Live Webinar)

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SECTION 16720
FIRE DETECTION AND ALARM SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. The Work shall include all labor, equipment, materials and necessary services to provide a complete addressable multiplex fire alarm system. The system shall be a Master Coded Addressable Fire Alarm Signaling System with devices individually annunciated on the Fire Alarm Control Panel, the remote annunciator and the printer. Evacuation alarm shall be master coded. 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.
2. Manual pull stations.
3. Area smoke detectors.
4. Duct smoke detectors.
5. Sprinkler waterflow switch alarm, for each flow switch.
6. Audible Annunciators (Horns).
7. Visual Annunciators (Strobes).
8. Air handling systems shutdown controls.
9. Exhaust fan and fire/smoke damper control for smoke purge.
10. Elevator recall control.
11. Electromagnetic door holders and release controls.
12. Sprinkler valve tamper switch supervision.
13. Fuse cutout in electric room.
14. Battery Backup.
15. Remote Annunciation at:

a. Custodian's Office (Printer).

c. General Office (LCD Display).

16. Sprinkler Alarm Bell on Building Exterior for buildings not connected to central station. For buildings monitored by central station, Sprinkler Alarm Bell shall be located above FACP.

17. Fire Pump Digital Alarm Communicator System.

18. Emergency Generator status control.

19. Copy of installed System Data Base as part of "closeout requirements".

1.02 APPLICABLE LISTINGS, CODES AND STANDARDS

A. All equipment shall be UL listed for its intended use.

B. All wiring shall be installed as per RS 17-3 of the NYC Building Code and in raceways as described in section 16130.

C. NFPA (National Fire Protection Association) Standards 72.

D. NFPA Standard 13, when used with sprinkler systems.

E. The New York City Building Code.

F. The New York City Materials and Equipment Acceptance (MEA) Division.

G. The New York City Fire Department Rules & Regulations.

H. UL1971 and ADA Guidelines related to Strobe Synchronization.

I. UL 864 requirements effective October 1st 2005. Contractor shall submit proof in writing from the proposed Fire Alarm System manufacturer that submitted system will be modified and upgraded to meet all new UL 864 standards effective October 1st 2005.

1.03 RELATED WORK

A. The Contractor shall coordinate the work in this Section with all related trades. Work and/or equipment provided in other Sections and related to the fire alarm system shall include, but not be limited to:

1. Sprinkler waterflow and tamper switches shall be provided by the Mechanical trade. See Division 15. They shall be wired and connected to the Fire Alarm System by this Contractor.

2. Air handling systems fan and damper control circuits shall be furnished by the air handling system's control equipment. See Division 15. Interconnecting wiring to the Fire Alarm System shall be provided by this Contractor.

3. Elevator recall control circuits to be provided by the elevator control equipment. See Division 14. Interconnecting wiring to the Fire Alarm System shall be provided by this Contractor.

4. Emergency generator status contacts to be provided with the emergency generator control equipment. Interconnecting wiring to the Fire Alarm System shall be provided by this Contractor.

5. Fire pump status contacts to be provided with the fire pump control equipment and wired by this contractor to indicate:

   a. Fire pump running.

   b. Fire pump power failure.

   Interconnecting wiring to the Fire Alarm System shall be provided by this Contractor.

6. Where a kitchen fire extinguishing system (Ansul System) is provided in the building, activation of the system shall be annunciated at the fire alarm control panel.

   Interconnecting wiring between the fire extinguishing system and the Fire Alarm System shall be provided by this Contractor.

1.04 SYSTEM DESCRIPTION

A. The system shall perform as described below. All equipment, components, and labor required shall be provided by the Contractor.

B. Fire Detection

1. Fire detection shall be accomplished by:

   a. Operation of a manual pull station.

b. Water flow in the Sprinkler System.

c. Operation of duct mounted Smoke Detector in the HVAC ductwork.

d. Operation of Area Type Smoke Detector.

e. Operation of Heat Detector.

C. Alarm Indication

1. Operation of a pull station shall immediately alarm the building audibly via the sounding an evacuation code of single four rounds of 3-3-3-3 (total 48 single strokes) and visibly with the flashing of synchronized strobe type indicating lights.The audible annunciators shall sound the 48 strokes and then shall cease to sound. The visual fire indicator lights shall start flashing with the audible annunciators. The visual lights however shall continue to flash until a reset button on the Fire Alarm Control Panel is pushed, or automatically reset after five minutes, whichever comes first.

2. Activation of waterflow in the sprinkler system shall sound four rounds of 10-1.

3. Activation of any smoke detector or Heat Detector shall sound four rounds of 10-2 and operate the exterior sprinkler alarm.

D. Miscellaneous Operations

1. Operation of any automatic fire detection device shall shut down all fans controlled by smoke detectors (except Kitchen exhaust fan), all fire/smoke dampers and purge dampers and release magnetic door holders.

2. Operation of an elevator lobby, shaft and machine room smoke detectors only shall return all elevators in that bank to the main lobby for use by Fire Department Personnel.

3. Operation of the sprinkler water flow switch, the fire alarm control panel shall also activate the elevator recall system.

4. Operation of the stairwell smoke detector shall release associated stairwell hatch opener.

5. Operation of any fire detection device shall be recorded individually at the printer, the control panel, and it shall be indicated at the remote annunciator.

E. Keyboard Display Module Operation/Indications

1. An alarm may be acknowledged by actuating the "ALARM/TROUBLE ACKNOWLEDGE" key/button. This shall silence the keyboard audible device, and change the "SYSTEM ALARM" LED from flashing to steadily lit. If multiple alarm conditions are present, they shall scroll and continue to flash and pulse the system audible device until all alarms are acknowledged.

2. Failure of normal power, open or short circuits, disarrangement in system wiring, failure of microprocessor, failure of any addressable module or any ground fault condition shall activate the system trouble circuitry. Amber "SYSTEM TROUBLE" LED shall illuminate when any of these conditions exist. Along with the trouble LED, a steady trouble audible signal shall be sounded and a flashing 40-character alphanumeric error message shall be displayed.

4. All trouble conditions and error messages shall be indicated on the system alphanumeric printer, including the time and date of each occurrence.

5. A trouble signal may be acknowledged by actuating the "ALARM/TROUBLE ACKNOWLEDGE" key/button. This shall silence the trouble audible signal and change the display from flashing to steady. If multiple trouble conditions are present, the LED shall stay lit and the audible signal will sound until all troubles are acknowledged.

6. During an "alarm" condition, all "trouble" signals shall be suppressed with the exception of illumination of the "SYSTEM TROUBLE" LED.

1.05 QUALITY ASSURANCE

A. Equipment/System

1. All equipment furnished under these Specifications shall be UL listed and be MEA approved for its intended purpose.

2. The system shall be listed in the UL Fire Protection Equipment Directory under product category "Control Units System (UOJZ)".

B. Manufacturer

1. The manufacturer shall have been engaged in the production of this type of equipment for at least ten (10) years and fully equipped service organization within fifty (50) miles of the installation.

C. Distributor

1. The company providing the material and supervision shall be a factory authorized distributor for the material to be provided.

2. The distributor shall be located within 50 miles of the project.

3. If brand names other than those specified are proposed for use, the company shall pay all costs, including travel expenses to the test facility for the Authority's Representative to witness the tests demonstration.

4. The distributor shall provide a fully factory trained and authorized repair and service organization capable of providing on-site supervision throughout the project, and warranty/maintenance service after acceptance.

5. The distributor shall provide all technical support required for an operational system. All service technicians shall be NICET Level 2 certified, factory certified, and possess a Fire Department Certificate of Fitness per Rule 6 of the Fire Prevention Code.

6. The distributor shall provide all engineering support required to provide professional supervision and installation support. The distributor shall have at least one engineering staff member who is NICET certified, factory certified, and possess a Fire Department Certificate of Fitness per Rule 6 of the Fire Prevention Code.

D. Company Field Advisor

Secure the services of a Company Field Advisor for a minimum of 16 working hours for the following:

1. Render advice regarding the installation and final adjustment of the system.

2. Render advice on the suitability of each signal-initiating device for its particular application.

3. Witness final system tests and then certify with an affidavit that the system is installed in accordance with the Contract Documents and is operating properly.

4. Train facility personnel in operation, programming, and routine maintenance of the system (minimum of 4 hours).

5. Explain available service programs to facility supervisory personnel for their consideration.

E. Company Field Advisor (Existing System)

Secure the services of a Company Field Advisor from the Company of each subsystem for a minimum of 8 working hours for the following:

1. Render advice and witness tests of existing systems.

2. Render advice on the interconnection of existing with the new system.

Witness the final test of the combined new system.

1.06 SUPLEMENTAL SUBMITTALS

A. Contractor shall submit the following material for review by the Authority's Representative.

1. Provide a list (bill of materials) of all equipment and components to be used in the system.

2. Provide description of operation of the system, to include any and all exceptions, variances or substitutions. Include a copy of printer headings, reports, prompts, etc.

3. Provide system Ampere load (during both normal and alarm conditions) and time calculations to substantiate compliance (battery Ampere-Hour capacity) with battery back up power requirements.

4. Provide manufacturer's printed product data, catalog pages and descriptions of any special installation procedures. Include a full listing of all MEA Approval Numbers on all products and components.

   Data from the Company producing the system, proving that:

   a. Fire detection devices that receive their power from the initiating circuit of a fire alarm control unit are listed for use with the control unit.

   b. The system is UL listed and approved for use in New York City.

   c. The batteries proposed for use are compatible with the battery charger.

5. Provide Shop Drawings as follows:

   a. Large scale drawing, including actual dimensions, of the fire alarm control panel(s) (FACP), and all ancillary equipment.

   b. Riser diagram showing all equipment and types, all connections and number and size of all conductors.

6. Provide a schedule, for review and approval, of the proposed label for each auxiliary control switch at the fire alarm control panel.

7. Provide a schedule, for review and approval of the proposed label for each auxiliary control switch and color for each LED/Lamp indictor for the Smoke Purge Panel.

8. Provide a schedule, for review and approval, of the proposed label and color for each LED/lamp indicator at the remote annunciator.

9. Provide samples of equipment as requested.

10. If the new system is a retrofit replacement of existing system, contractor shall provide an outline of detailed migration path describing how existing system will be replaced while providing full Fire protection during the process. Failure to secure approval or submit this migration path will

require contractor to accept all required Fire Watches to maintain full protection of the building at all times.

1.07 MAINTENANCE

A. Service Availability

A fully equipped service organization capable of guaranteeing response time within 8 hours to service call shall be available 24 hours a day, 7 days a week to service the complete Work.

1.08 WARRANTY

A. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace materials or workmanship for a period of one (1) year from the date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. The following manufacturers are approved for the furnishing of the specified items of Fire Detection and Signaling Equipment: Control Instruments, Honeywell/Notifier, GE Security/EST , Faraday, Fire Siemens/Pyrotronics, Simplex and Wheelock. Each item of equipment offered by these manufacturers must meet the full requirements of the Specification for that item.

2.02 APPROVALS

A. The Contractor shall obtain and file Form A-433, "Application for Electrical Inspection and Summary of Contract Equipment to be Installed," with the Bureau of Fire Prevention.

The Contractor shall then accompany the Fire Department inspector during his inspection of the system, make all adjustments required by the inspector and re-file for additional inspections until a non-conditional approval is received from the Fire Department.

B. The fire signal system as installed shall be approved by the Bureau of Fire Prevention of the New York City Fire Department. A certificate of approval shall be obtained by the Contractor and delivered to the Authority as a prerequisite for final acceptance.

2.03 EQUIPMENT

A. General

1. The following equipment where shown on the Drawings or called for in the Specifications shall be furnished and installed by the Contractor at locations where shown on the Drawings or directed.

B. Manual Fire Signal Pull Station.

1. Provide an addressable manual fire signal pull station at each location indicated on the Drawings or called for in the Specifications.

2. Each pull station shall be addressable manual pull lever double action type requiring the opening of a door before an operating lever becomes available. The pull stations shall have push button type actuating mechanism.

3. Each pull station shall have hinged inner and outer doors with the inner door locked. A common key shall be required to gain access for resetting the station. Instructions for operating station shall appear on front of the outer door.

4. The pull station shall be interfaced into the addressable system by means of an addressable interface module. One module shall be provided for each pull station of the manual pull station. Separately mounted addressable modules are not acceptable.

5. (For **surface** or semi-flush mounting) the mechanism shall be set into a separate stamped steel box **with one ¾" knockout.** All parts shall have a baked enamel red finish and exposed edges shall be rounded. **Steel box shall be EST model # 27193-11 or RSG/Aames Security model # RMS-DBB-1K.**

6. Pull stations shall be set so that the centerline of the operating lever of station shall be 4 feet above finished floor. The Contractor shall report to the Authority's Representative any interference with wainscot, or other construction or mechanical equipment.

7. Pull station shall be Simplex Cat #RMS-1T, Faraday Cat. #PM 6696, or Aames Security Cat. #RMS 1T-LPKL

with Honeywell/Notifier FMM-101 monitor module or approved equal.

8. False Fire Alarm Stopper Cover (Only in High Schools): Provide false fire alarm stopper cover to fit every pull station shown on the drawings. False fire alarm stopper shall be Safety Technology International Stopper II P/N - STI 1100 with 9 volts dc battery.

C. Audible Annunciators (Horns)

1. The Contractor shall provide 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 UL reverberant, dB (A), high volume setting, 24 VDC, between 82 and 91 dB(A) at 10'-0". Each horn shall have adjustable Hi-Lo dB setting.

5. Where indicated on Drawings horns shall come equipped with a strobe unit that mounts directly to basic horn mechanism.

   a. The strobe section and horn section shall be separate and can be connected to either separate signal circuit loops or to the same signal circuit loop.

   b. Strobe unit shall be front mounted and visible from all sides of the lens.

   c. Horns shall be 24VDC.

6. Horns and Combination Horn/Strobe units shall be by single supplier. Horns shall be GE Security/EST Genesis Series GIRF-HD and horns/strobe unit shall be GE Security/EST Genesis Series GIRF-HDVM or Wheelock HS4-241575W-FR or approved equal.

D. Visual Annunciators (Strobes)

1. The rating of the strobe unit shall be a minimum of 15/75 candela and shall deliver all characteristics and requirements called for in Local Law 58 of 1987, the American With Disabilities Act (ADA), including the "Equivalent Facilitation" rule, and UL 1971. In corridors and places of assembly and common areas, the strobes shall be synchronized.

2. Visual Annunciators (Strobes) shall be wall-mounted 24 volt DC with a high intensity strobe device.

3. Fixture assembly shall be mounted on a painted steel plate. A translucent dome of hi-impact plastic, with the work "Fire" silk-screened red in 1/2" high letters, shall be provided to provide readability from both sides of the unit.

4. The dome shall be screw fastened or epoxied to plate so as to prevent dome from being removed.

5. Strobes and wiring shall be 100% supervised by the Fire Signal System Control Panel.

6. In new construction, the indicator shall be mounted to a flush 2-gang outlet box with suitably placed threaded holes to accept mounting of the indicator plate. In existing construction, surface mounted boxes shall be a finished cast type box with no knockouts, Type FS or FD. Strobes installed in damp, wet or exterior locations shall be provided with a weatherproof box and gasket.

7. Strobes shall be GE Security/EST Genesis Series GIRF-VM or Wheelock # RSS-241575W-FR or approved equal.

8. All strobes shall be synchronized within the line of sight.

E. Area Type Smoke Detectors

1. The Contractor shall provide intelligent analog addressable photoelectric smoke detectors with bases at locations shown on the Drawings or called for in the Specifications. Analog addressable ionization smoke detectors shall be provided for the elevator lobby.

2. Smoke detectors shall operate on 24V D.C. received from the Fire Signal Control panel. Smoke detectors shall be analog type supervised by that panel for sensitivity rating within acceptable

thresholds. Deviations shall be annunciated at the control panel & remote locations.

3. All smoke detectors shall be supplied with an L.E.D. Indicator lamp which shall give indication that the smoke detector is active (flash) and latch (on steady) when the detector has tripped into alarm.

4. Area type photoelectric smoke detector shall be GE Security/EST SIGA-PS or Honeywell/Notifier FSP-851. Elevator lobby_ionization type smoke detector shall be GE Security/EST SIGA-IS or Honeywell/Notifier FSI-851 or approved equal of the manufacturers listed in Article 2.01A.

F. Heat Detectors

1. Contractor shall provide heat detectors in boiler room and in other locations as shown on plans. Heat detectors shall be GE Security / EST model 284BPL 194^0 F fixed temperature and shall be monitored with a GE Security / EST monitor module SIGA-CT1 or Honeywell/Notifier FST-851 or approved equal.

G. Guards:

1. Guard shall be 9-gauge minimum wire that will provide protection without interfering with the operation and maintenance of the unit. The guard shall have a heavy duty corrosion-resistant polyester coating to protect against rust and corrosion.

2. Horns and strobes in corridors and gymnasiums, play areas, and toilets shall be equipped with guards locker rooms.

H. Duct Smoke Detectors

1. The Contractor shall provide intelligent addressable photoelectric duct type smoke detectors at locations shown on the Drawings or called for in the Specifications.

2. Duct detectors shall be designed for mounting on the outside of ducts with two air sampling tubes extending into the air stream within the duct.

3. Duct detectors shall be provided complete with outlet box, photoelectric detector chamber, sampling tubes, sensitivity control.

4. Ducts detectors shall be analog type and operate on 24 volts D.C. received from a fire alarm control panel and shall be 100% supervised by that panel.

5. The Contractor shall arrange for the sheet metal trades to drill holes in the ductwork for mounting the smoke detectors and its sampling tubes. That trade shall perform the actual mounting of these items on and within the ductwork.

6. All sampling tubes shall be sized to fit the interior dimensions of the ductwork being penetrated and in a manner that meets the manufacturer's criterion for an acceptable and working arrangement.

7. The Contractor shall consult the HVAC Drawings for the exact locations and duct size of all duct detectors.

8. In areas where the ducts are very small in interior dimensions (e.g. 12"-36") smoke detectors must be installed on and within those ducts. The detector shall be UL listed for this application.

9. All duct type smoke detectors shall be provided with a remote L.E.D. indicator lamp, at readily visible location, which shall give a local indication that the detector has been activated.

10. Duct detector shall be Honeywell/Notifier FSD-751PL, GE Security/EST SIGA-DH with SIGA -PS, SIGA-SD, or approved equal.

I. Alarm Interface Modules

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

2. Each Interface Module shall provide selector switches to set an individual address to identify the module to the fire alarm control panel. These switches shall be field adjustable. Interface Modules that require an external programmer or prom burner shall not be acceptable.

3. Alarm Interface module shall be GE Security/EST model SIGA-CT1 (single input) or SIGA-CT2 (double input) or Honeywell/Notifier FMM-1 or FMM-101 (Mini Version) or approved equal.

J. Control Relay Interface Module

1. Control Relay Interface Modules shall interface auxiliary and mechanical equipment such as door holders, smoke hatches, smoke dampers and fan shut down control points to the addressable system.

2. Each Interface Module shall provide selector switches to set an individual address to identify the module to the fire alarm control panel. These switches shall be field adjustable. Interface Modules that require an external programmer or prom burner shall not be acceptable. Interface module shall be Honeywell/Notifier FCM-1.

K. Magnetic Door Holder/Wall Type

1. Wall type door holders shall be similar to door mounted units and be provided where shown. This item shall consist of an electromagnet unit (mounted on the wall) and an armature unit (mounted on the door) and shall be fail safe (release the door when power is removed from the magnet.

2. The electromagnet unit shall be mounted on the wall about 6'-6" above the finished 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 electro-magnet unit flush and not at an angle. This is dependent on the angle that the open door makes when fully opened.

4. The item shall be the approved equal of Notifier FM996-24 (Surface Wall Mount) or FM998-24 (Flush Wall Mount) with control module #CMX-2 or GE Security/EST model 1508 (surface wall-mount) or GE Security/EST model 1504 (flush wall-mount).

L. Alphanumeric Printer

1. A dot matrix 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 stations indicating locations of fire signal boxes with respect to exits, stairs (not column numbers) or adjacent room numbers. Included in this list shall also be addresses for the operation of the sprinkler alarm, (water flow switch) & all smoke detectors.

   This list shall be mounted on the wall of the Custodian's office, where directed, behind a transparent non-breakable; non-inflammable plastic face set in aluminum frame. Submit list for approval before installation.

4. Printer shall be Honeywell/Notifier PRN-6, GE Security/EST PTIS or approved equal.

M. Liquid Crystal Display (LCD)

1. Contractor shall provide in General Office and where shown on drawings an 80-character LCD display annunciator.

2. The LCD display shall be Notifier LCD-80 or approved equal.

N. Alarm Bells

1. The Contractor shall provide a suitable 8" alarm bells adjacent to the Fire Alarm Control Panel. Each bell shall have a distinctive unique sound so that it can be identifiable from all other bells when it sounds.

2. Alarm Bell shall be GE Security/EST model 439D-8AW or approved equal.

O. Trouble Bells

1. The Contractor shall provide a trouble bell adjacent to the Fire Alarm Control Panel and where indicated on the plans.

2. Each trouble bell shall be 6" in size and shall indicate trouble on the system.

3. Trouble bell shall be GE Security/EST model 439D-6AW or approved equal.

P. Silencer Switch and Pilot Light for Trouble Bells

1. The Contractor shall provide a combination silencer switch and pilot light wherever a trouble bell is provided.

2. This switch shall be in connection with the trouble bell of the fire signal board. The switch and pilot light shall be placed behind a stainless steel plate type 302 engraved "SILENCER". The switch positions shall be engraved "T. BELL" and "LIGHT". Lettering shall be colored with red enamel. Silencer switch shall be connected in such a manner that the act of silencing the trouble bell, by the operation of the silencer switch, automatically transfers the trouble signal to the pilot light on the control board.

3. When the trouble has been repaired, the trouble bell shall ring until the silencing switch has been reset to its normal position.

4. At the Contractor's option, the silencer switch for the trouble bell located above the panel may be incorporated into the panel.

Q. Sprinkler Alarm Bell

1. The Contractor shall furnish and install a 10" water flow alarm bell on the exterior of the building where shown on the Drawings or where directed.

2. This bell shall be a weather resistant type designed for exterior mounting and painted red.

3. Bell shall be mounted at the height as required by the Building Code of the City of New York. The Contractor shall furnish and install a plaque beneath this bell inscribed as directed by the Building Code of the City of New York.

4. Exterior Water Flow Alarm Bell shall be GE Security/EST model 439D-10AW or Notifier KMS1024 or approved equal.

2.04 CONTROL PANELS

A. Fire Alarm Control Panel

1. Fire Alarm Control Panel shall be GE Security/EST model EST2 350 points / EST3 > 350 points or

Honeywell/Notifier NFC-640 636 points / NFS-3030 > 636 points, FCI FV7200 series or approved equal.

B. System Power Supply

1. The system power supply shall operate on 120 VAC main power, this power shall be transformer converted to low voltage providing rectified and filtered 24 VDC for system operation. This 24 VDC shall be rated @ 4 Amps and shall comply with U.L. Standard 864 for power limited and "brown-out" operation.

2. The power supply shall provide power for all system and auxiliary control functions, including the charging of the back-up stand-by batteries.

4. The charger output shall be supervised and fused.

5. The battery charger shall be capable of charging either sealed lead-acid or vented nickel-cadmium (Ni-Cad) batteries.

6. The batteries shall be sized to provide 24 hours of standby operation in the supervision mode, with 15 minutes of alarm capacity at the end of 24 hours.

7. System power supply shall be Notifier PS12250 or approved equal.

C. Microcontroller Module:

1. The microcontroller module shall contain the microprocessor, memory, system operating software, configuration memory and the circuits necessary to support the fire control system.

2. The microcontroller module shall function as the system's information and control center, processing all messages from the field devices (supervisory, trouble, alarm).

3. Microprocessor Functions:

a. The microprocessor shall execute all supervisory programming to detect and report the failure or disconnection of any module or peripheral device. An isolated circuit shall be incorporated, which will monitor the microprocessor, if a failure were to occur, this circuitry would provide audible and visual indication of this abnormal condition.

b. The microprocessor shall access the system program for all control-by-event (CBE) functions. No system memory shall be lost due to failure of the primary and secondary power. Volatile memory shall not be acceptable.

c. All job specific system programming, as to device monitoring and control functions, shall be field programmable.

4. Real-Time Clock:

a. The micro-controller module shall have a real-time clock capable of monitoring all real-time programming and all time control functions.

D. Keyboard Display Module

1. These keyboard display modules shall provide display, annunciation and control for the complete Fire Alarm Control System.

2. An alphanumeric, true English, display shall be an integral part of the keyboard display module. This display shall be back lighted for ease of reading in the dark or bright light conditions.

3. The keyboard shall provide keypad permitting selection of system functions. Also incorporated with the keypad shall be three (3) control keys: ALARM/TROUBLE ACKNOWLEDGE, RESET/LAMP TEST, and ALARM SILENCE.

E. Notification Appliance Circuits

1. Provide a Notification Appliance Circuit Module in the Fire Alarm Control Panel to supervise the audible and visual circuit wiring for open, grounds and shorts. Field located modules shall be housed as Transponders. The use of Control Modules for signal circuits will not be accepted.

F. Coder Module

1. The coder module shall be solid state located at the Fire Alarm Control Panel. The coder shall be 100% field programmable for all codes from 1-1-1 to 15-15-15-15. The module shall provide a minimum of 256 codes. Each addressable device that must generate a code will be assigned a code on the coder module. All signals shall be PNIS as

required by NFPA. All alarm actuating circuits shall ring a master code of 3-3-3-3 for a total of four(4) rounds.

G. Addressable Loop Module

1. An addressable loop module shall be provided for communications with all addressable devices (initiation/control) connected to the system.

2. Each addressable loop module shall contain one loop, capable of communicating with a minimum of 192 addressable devices. Each system shall be capable of monitoring multiple loop modules. Provide a minimum of 25% spare capacity.

3. Communication loops shall be capable of being wired either Class "A" (Style 6), a ground fault on either conductor or a break shall not prevent a device from operating on either side of the break or Class "B" (Style 4), a break or ground fault in any conductor shall be reported as a trouble condition.

4. Each communication loop shall be electrically supervised for opens, shorts, and ground fault conditions.

5. The system shall be capable of a minimum capacity of 198 addressable smoke detectors, 198 addressable control modules and additional capacities for full point annunciation without decreasing the aforementioned capacities.

H. Fans Restart

Shut down fans due to alarm activation shall not be affected upon fire alarm system reset. To eliminate the possibility of all fans turning on simultaneously, restarting the fans shall be accomplished by turning them back on individually in a sequential fashion controlled through software timers or through individual manual switches at the Fire Alarm Control Panel.

I. Smoke Purge Control Panel

1. A smoke purge control panel shall be provided at the main entrance of the building, adjacent to the FACP. Access to the purge system shall be via New York City Fireman Lock Only. The smoke purge panel may be incorporated into the fire alarm control panel,

if approved by the Fire Department, and if the panel is suitably located.

2. Smoke purge control panel shall be UUKL listed for smoke control operation and include the followings:

   a. Control switches shall be provided to permit the Fire Department to turn on/off each smoke purge fan individually and open/close each motorized purge damper zone in the building.

   b. LED displays shall be provided to indicate the status of each smoke purge fan (ON/OFF) and each motorized purge damper zone (OPEN/CLOSE).

   c. Motorized dampers in fire rescue area shall be displayed as one zone at the smoke purge control panel.

   d. A separate lamp test switch shall be provided.

J. Elevator Recall

1. Smoke detectors shall be provided for each elevator on each floor landing/elevator lobby, elevator shaft and machine room. These smoke detectors shall be grouped into one sub-system and be powered by one module on the control panel. This module shall deliver a signal to the Elevator Control Panel to direct all elevators to return to the main lobby and alarm the building.

2. Activation of the sprinkler water flow switch shall deliver a signal to the Elevator Control Panel to direct all elevators to return to the main lobby.

3. Control module shall be Notifier # CMX-2, GE Security/EST SIGA-CR, or approved equal.

K. Fire Pump Digital Alarm Communicator System

1. A Fire Pump Digital Alarm Communicator System shall be installed to send Fire Pump status to a Fire Department approved Central Station. The Fire Pump Digital Alarm Communicator System shall consist of:

   a. Digital Alarm Communicator Transmitter (DACT). The Digital Alarm Communicator Transmitter (DACT)shall be ADEMCO CO. Model #5110-XM or approved equal of Firelight or Silent Knight.

b. Two (2) RJ-31X with two (2) dedicated telephone lines upstream of any telephone system in the school. The RJ-31X jacks shall be mounted next to the DACT.

2. The DACT shall be connected to the fire alarm control panel (FACP) and shall be labeled to indicate the central station monitoring.

2.05 FIRE SIGNAL CUTOUT PANEL (FUSE CUTOUT PANEL)

A. The Contractor shall provide an individual cartridge fuse cutout with 3 poles, and a removable solid neutral bar in fuse gap for each fire control system indicated on Drawings.

B. Compartments shall be provided for each fuse cutout with partitions between each fuse cutout.

C. Fuse Cutouts shall be provided with silver sand fuses, current limiting type with an interrupting capacity rating of 200,000 amps (RMS symmetrical). The size of the fuse shall be as required by the connected load and the protection of wiring connected to the fuse.

D. Each cutout shall bear a white-core bakelite identification nameplate.

E. Power connection to fuse cutout shall be provided per code.

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

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

2. One (1) circuit for custodial printer.

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

H. Fuse cutout box shall be Notifier # FCO or approved equal.

2.06 MARKERS AND RISER

A. Markers

Premarked self-adhesive; W.H. Brady Co.'s B940, Thomas and Betts Co.'s E-Z Code WSL self-laminating, Ideal Industries' Mylar/Cloth wire markers, or Markwick Corp.'s permanent wire markers.

B. Riser

Contractor shall provide a readable riser diagram in a frame with glass cover. Riser shall be mounted where indicated by the Authority's Representative and properly secured to the wall. All Fire Alarm devices shall be clearly indicated on riser diagram.

2.07 WIRING

A. Power Conductors (Above 75 volts) shall be:

1. Copper, THHN, minimum 600 volts, 90 C° and shall be installed in electric metallic tubing (EMT)

2. Cable type MI, M.E.A. approved for 2-hour fire resistance rating.

B. Low Voltage Conductors (75 volts and less) shall be:

1. Copper, THHN, minimum 600 volts, 90 C° and shall be installed in electric metallic tubing (EMT).

2. Minimum wire size No.14 AWG.

3. Multi-conductor cables run in raceways or exposed as described hereinafter, shall meet the following additional requirements:

a. Type FPLP (plenum type), minimum insulation thickness of 15 mils, minimum temperature 150 C° and colored red.

b. Red colored jacket overall with minimum thickness of 25 mils.

c. Cable printing as per UL 1424 and additionally shall be marked "ALSO CLASSIFIED NYC CERT. FIRE ALARM CABLE" legible without removing jacket.

PART 3 - EXECUTION

3.01 INSTALLATION

A. 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, cabinet's ad similar devices necessary for the complete installation.

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

C. End of Line Devices (Resistors/Diodes/Capacitors).

Shall be provided as required for mounting as directed by the manufacturer.

D. Installation of conductors and raceway shall be in accordance with the following:

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

2. Conductors other than M.I. cable shall be run in raceway, except as specifically described below.

3. Multi-conductor cables shall be installed without raceway protection only in the following locations: above the hung ceiling in the cable tray, raised floors, shafts, telephone and communication equipment rooms and closets, and rooms used exclusively for fire alarm system equipment.

4. Raceways run within 8 feet of the finished floor in garage areas, loading docks, mechanical rooms, and elsewhere where subject to mechanical damage, shall be rigid galvanized steel conduit only.

5. Conductors for other electrical systems shall not be installed in raceways containing conductors described in the Building Code Reference Standard

6. Where allowed to be run without raceway protection, multi-conductor cables shall be installed as follows:

a. Cables shall not depend on ceiling media, pipes, ducts, conduits, or equipment for support. Cables shall be supported independently from the building structure.

b. Cables shall be secured by cable ties, straps or similar fittings, so designed and installed as not to damage the cable. Cable shall be secured in place at intervals not exceeding 5'-0" on centers and within 12" of every associated cabinet, box or fitting.

7. Installation of raceways, boxes and cabinets shall comply with the following general requirements.

a. Covers of boxes and cabinets shall be painted red and permanently identified as to their use.

b. Penetrations of fire-rated walls, floors or ceilings shall be fire stopped.

c. Raceways or cables shall not penetrate top of any equipment box or cabinet.

8. Splices and terminations of wires and cables shall be as follows:

a. Permitted only in boxes or cabinets specifically approved for the purpose.

b. Utilize mechanical connections specifically approved by U.L. 486 A & C for the conductors, or if soldered, first joined so as to be mechanically and electrically secure prior to soldering and insulating. Temperature rating of completed splices shall equal or exceed the temperature rating of the highest rated conductor.

9. Wiring for audible and visual alarm notification devices shall be arranged so that a loss of a portion of the wiring on a floor will not render more than 60% of the devices of each type inoperative, and the devices shall be so connected to the circuitry (i.e., by means of alternate circuits) as to maintain at least partial audibility/visibility throughout the entire floor.

10. All wiring shall be color coded throughout to New York City Electrical Code standards and shall be of the type recommended by the manufacturer and approved by the Fire Department.

E. Wiring for Elevator Emergency Recall Operation

1. Provide wiring to and including a terminal strip cabinet in elevator machine room.

2. The Contractor shall provide all elevator control equipment for elevator emergency recall operation and final electrical connections between terminal strip cabinet and the elevator controllers.

F. Circuits from the fire alarm control panel to the system peripheral equipment shall be a minimum of as follows:

1. Each alarm initiating or supervisory circuit: Two (2) No. 14 AWG conductors

2. Each alarm signaling/indicating circuit: Two (2) No. 14 AWG conductors.

3. Each control circuit: Two (2) No. 14 AWG conductors.

G. Identification, Labeling, Marking

1. Procedure Sign: Install adjacent to FACP and remote annunciator.

2. Zone Locator: Install adjacent to FACP and remote annunciator.

3. Power-Limited Circuits: Mark circuits at terminations, indicating that circuit is a power-limited fire protective signaling circuit.

4. Labeling Circuit Disconnects: Label the device used as the circuit disconnecting means for the dedicated branch circuits serving the system "FIRE ALARM CIRCUIT CONTROL."

5. Identification of Circuits: Identify wires and cables in interconnection cabinets, and FACP with premarked, self-adhesive, wraparound type markers. Designations shall correspond with point to point wiring diagrams.

6. Battery Data: Insert a copy of the battery warranty in each battery compartment and mark on batteries the date placed in service.

7. 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.

H. The system shall be arranged to receive power from 120 volt, 60-cycle alternating current supply through a fuse cutout. All low voltage operation shall be provided from the fire alarm control panel(s).

I. All final connections shall be made under the supervision of a trained manufacturer's technical representative.

J. Do not install smoke detector until the Work (including cleaning) of all trades in the area has been completed. Protect installed smoke detectors from airborne dust and

debris with covers provided by the manufacturer for this purpose.

K. The Contractor shall arrange for the sheet metal trades to drill holes in the ductwork for mounting the smoke detectors and its sampling tubes. That trade shall perform the actual mounting of these items on and within the ductwork. The duct detectors shall be wired and connected to the Fire Alarm System by the Electrical contractor.

L. Guards

1. Attach guards directly to the surface with vandal resistant fasteners.

2. Where detectors are installed on suspended ceiling provide additional supports in the ceiling, such as channel support system, angel iron or additional runner bars. Fasten the additional supports rigidly to the ceiling runner bar system. Attach frame of resistant fasteners. Install metal spacers between the vandal guard frame and the supports so that the ceiling tiles will not be a part of the support system.

2. Use finishing collar between ceiling and vandal guard where vandal guard cannot be mounted tight against ceiling due to job conditions.

N. 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 the New York City Electrical Code (#10 AWG minimum). 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 fuse cutout panel supplying the fire alarm system, the contractor shall provide a grounding electrode conductor sized and installed in accordance with the New York City Electrical Code (#10 AWG minimum). The grounding electrode conductor shall be connected to the water main ground bus of the building. Ground connection at water pipe shall be by means of Thomas and Betts 3670 line, Appleton, Crouse-Hinds or other approved ground fitting.

0. **While replacing an existing fire alarm system, the contractor shall securely cover all the new devices being installed until the new Fire Alarm System is approved by the Fire Department and the old system is removed. The cover shall be labeled "Not in Use."**

3.02 TESTS

A. Prior to the final acceptance test, the Contractor and a trained manufacturer's technical representative shall test the completed system for proper operation in the presence of the Authority. The entire system shall be demonstrated to perform all of the functions as below listed in these Specifications. Any system, equipment device or wiring failure discovered during said test shall be repaired or replaced before requesting scheduling of the final acceptance test. All repairs shall be retested in the presence of the Authority prior to the final acceptance test.

B. The Contractor shall File A-433 (Application for Electrical Inspection and Summary of Contract Equipment to be installed) with the Bureau of Fire Prevention of the Fire Department. He shall do this in preparation for the final tests of the system.

C. Upon completion of above, the Contractor shall perform final acceptance in the presence of the Authority's Representative, DOE personnel, the Inspector from the Bureau of Fire Prevention, Contractor's representative and the Manufacturer's representative. Notify the Authority at least 3 working days prior to the test so arrangements can be made to have a facility representative witness the test.

D. During the tests indicated above and during the final acceptance test:

1. Every manual fire alarm station shall be tested.

2. Every smoke detector and heat detector shall be tested.

3. The sprinkler system waterflow alarm switches shall be tested by flowing water. The sprinkler system valve tamper switches shall be tested by closing sprinkler valves. On dry type sprinkler systems, the air pressure shall be measured.

4 Every audible alarm signaling device shall be sounded.

5. Every visual alarm signaling device shall be lighted or flashed.

6. Every system control function shall be tested for its proper operation, including fan shutdown, smoke purge and elevator recall.

7. All circuits shall be opened at two (2) locations to test for proper supervision.

8. Any and all other tests which the inspector from the Bureau of Fire Prevention shall request.

E. If any of the tests shall fail to indicate proper operation or if the Fire Department inspector issues a list of faults or objections to the system, the Contractor shall immediately correct all faults and improper functioning as part of his Contract obligation. He shall furnish and install all labor and materials that is necessary to accomplish this. The Contractor shall then reschedule the final acceptance test, file a new A-433 form, and redo all tests until the system is accepted without qualification.

F. Upon successful completion of all final acceptance tests, the Contractor and Manufacturer's representative shall co-sign certificate attesting to the completion of testing and forward two (2) copies of said certificate to the Authority's Representative, the Bureau of Fire Prevention, Contractor's representative and the Manufacturer's representative.

G. All final acceptance testing shall be done at a time convenient to the Bureau of Fire Prevention official and the Authority's Representative and all testing costs shall be born by the Contractor as part of this Contract.

3.04 CLOSEOUT DOCUMENTATION AND TRAINING

A. 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, all as-built wiring diagrams (both floor plan and riser types) and a manufacturer's suggested spare parts list.

B. The Contractor shall provide two computer diskettes 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 systems distributor 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.

C. 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. 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.

Training shall be videotaped by the trainer (or contractor). Tapes shall be labeled and turned over to the Authority's Representative within forty-eight (48) hours of training completion

d. Contractor shall provide Sensitivity Reports for all smoke detectors (Ionization and photoelectric types).

e. Contractor shall provide a Certificate of Approval by the Bureau of Fire Prevention of the New York City Fire Department.

END OF SECTION

LIST OF SUBMITTALS

SUBMITTAL	DATE SUBMITTED	DATE APPROVED
List of equipment and components.	_____	_____
Description of operation of the system.	_____	_____
System Ampere load.	_____	_____
Product data.	_____	_____
Shop Drawings	_____	_____
Schedule of the proposed labels.	_____	_____
Samples of equipment as requested.	_____	_____
Certificate of compliance with the Quality Assurance requirements.	_____	_____
Warranty.	_____	_____
Videotape of the personnel training.	_____	_____
Operation and Maintenance Manuals, including Riser diagram in a frame with glass cover.	_____	_____
Computer program, including manufacturers' codes and instructions.	_____	_____
Bureau of Fire Prevention of the New York City Fire Department certificate of approval.	_____	_____
Test results and certificate of completion of testing.	_____	_____

* * *

SECTION 16721
CITY FIRE ALARM SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. The Contractor shall provide a City Fire Alarm System as shown on the Drawings and as specified, to permit the transmission of a signal from the school building to the New York City Fire Department via the Fire Departments Telecommunications System.

1.02 REFERENCES

A. All equipment, appurtenances, and other material, and the performance of all work must be in conformance with detailed Specifications and Drawings of the Fire Department and must be completely acceptable to the Division of Fire Communications. Copies of these Standard Specifications and Drawings may be examined at Fire Department, 9 Metrotech Center, Brooklyn, N.Y. 11201.

B. The Contractor shall obtain from the Division of Fire Communications the latest editions of the detailed Drawings and Specifications which pertain to the Work, including:

1. Specifications:

   a. Cable (City of New York, Department of Purchase, Spec. No. 12-C-9:68. Latest Revision)

   b. Installation of underground conduit, manholes and posts (Division of Fire Communications, F.D.N.Y.)

   c. Installation of Cable (Division Fire Communications, F.D.N.Y.)

   d. Fire Alarm Installation (For Communications with the Fire Department) at Schools, Hospitals and Institutions.

2. Drawings:

   a. Manhole Cover and Frame (Division of Fire Communications Standard Drawing No. 140 with lock bar screw)

   b. Manhole Construction, Post Setting, Subsidiary Connection (Division of Fire

Communications Drawing No. 141). Type "A" Chamber shall be installed unless otherwise specified.

c. Pole Terminal Boxes and Appurtenances (Division of Fire Communications Standard Drawing No. 142 Series and No. 145 Series. (Latest Revision)

d. Typical Cable Installations Drawing No. 145 series (Latest Revision)

1.03 SYSTEM DESCRIPTION

A. Prior to commencing Work, the Contractor shall make an appointment to meet the Engineer of the Division of Fire Communications, F.D.N.Y. (Telephone: (718) 999-1715 and discuss details involved in the installing of fire alarm equipment described in these Specifications and Drawings and in preparation of the necessary applications for permits to be issued by the Bureau of Water Supply and the Department of Highways in the borough affected, for the necessary work to be done in streets outside the building.

B. The Contractor shall provide all material and labor to furnish and install the following:

1. Within the Building - A city fire alarm signal box, a service entrance junction box, with all connecting conduits and conductors required. The City Fire Alarm Signal Box shall be electronic ERS type as required by the Fire Dept.

2. Outside of the Building - The Contractor shall provide all conduits, ducts, manholes, poles, conductors, cables, lightning arrestors, terminal blocks, fittings, excavation, back filling, etc., to extend existing lines of the Fire Department to the service entrance junction box.

C. All work must be performed in conformance with the N.Y.C. Fire Department Specifications and Drawings. The Contractor shall provide the City Fire Alarm Box, junction box, pull box, insulated coupling, manholes, conduits, and conductors at locations shown on the Drawings and as required.

D. All work shall be performed to the complete satisfaction of the Authority and with the approval of the Director of Fire Communications.

E. The Fire Department will make the final connections to their lines.

1.04 PERMITS, FEES, ETC.

A. Where conduits, manholes, etc., are to be installed in existing or proposed streets, the Contractor shall obtain and pay for all necessary permits required by the various Municipal Departments and Bureaus. Permits for street openings shall be obtained through the Division of Sub-Structures, Department of Transportation, the Department of Water Supply, the Bureau of Electrical Control, and in respective offices of the President of the Borough in which the school is located.

B. The Contractor shall present all such permits and accompanying data to the Division of Fire Communications for approval.

C. A diagram in duplicate shall be provided by the Contractor to the Director of the Division of Fire Communications (of the Fire Department) giving exact locations and measurements of all work done in connection with the fire alarm circuits. Measurements to pipe or conduit shall show the depth from street grade, also distance from curb, etc., as approved by the Department of Transportation and Division of Sub-Structures.

D. After approval by the Fire Department, the diagram shall be submitted to the Authority.

1.05 STREET GRADE

A. Before starting the underground Work, the Contractor shall submit to the Authority satisfactory Drawings or written statements from the Department of Transportation giving the proposed grade of the street or streets throughout the length of the underground Work.

1.06 UNDERGROUND WORK - NOTICE

A. Duplicate notices in writing shall be sent to the Authority and to the Director of the Division of Fire Communications, Room 701 Municipal Building, Borough of Brooklyn, when underground Work will begin. Should the Contractor fail to notify said parties, all and every pipe or conductor that may be covered shall be uncovered for inspection at the expense of the Contractor. Both notices shall be delivered at least 48 hours in advance (Saturdays, Sundays and holidays excepted).

1.07 SUPLEMENTAL SUBMITTALS

A. Approval by the Fire Department of the work diagram.

B. Notice when underground Work will begin.

C. Field test report.

1.08 SAFETY OBLIGATIONS OF THE CONTRACTOR

A. In constructing underground Work and doing other Work required in the highways, the Contractor shall not unnecessarily interfere with traffic, and shall build such temporary bridges and place such guards as shall be acceptable to the authorities having jurisdiction and the Chief of the Division of Fire Communications. Before doing any Work over, under or near railroad tracks and/or bus routes, pipe lines, duct lines or other sub-surfaces structures, the Contractor shall make such arrangements for properly removing or protecting them during the progress of the Work as shall be satisfactory to the Authority, to the City Department controlling them and to the Director of the Division of Fire Communications. Whenever it may be necessary to interfere with the service of any bus routes, and/or railroad, due notice shall be given the company by the Contractor. Damage to any structure occasioned in the prosecution on the work shall be immediately reported to the Authority and the City department having jurisdiction.

1.09 SIDEWALK AND STREET REPAIRING

A. All gutters, curb, flag and street pavement which have been displaced during the progress of the Work shall be re-set in their former positions. Should any of the displaced material be broken or injured in any way, the Contractor shall provide suitable new material. All replaced material shall match present Work in color and finish. Cement sidewalks shall be re-laid in full squares. Only first class mechanics shall be employed in the repairing of streets after excavations. All stone, dirt and rubbish shall be removed and streets cleaned after street repairing is completed. This Work shall be done to the satisfaction of the Department of Highways. The Contractor shall comply with all laws, ordinances and regulations by the City authorities relative to the use and maintenance of the public thoroughfares.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. The following manufacturers are approved suppliers of equipment specified in this Section: Brown Brothers,

, Philips/Norelco Electronics. All equipment made by these companies shall be modified as necessary to meet the full requirements of the Drawings and these Specifications.

2.02 EQUIPMENT

A. City Fire Alarm Signal Box

The City Fire Alarm Signal Box shall be of ERS (EMERGENCY RESPONSE SYSTEM) audio type.

1. ERS Type: An E.R.S. electronics module and housing with a front door and break-glass window. The box shall be equal in every respect to Phillips Electronics Instruments, Inc. E.R.S. alarm box for interior applications. Painted surfaces of the box shall be red.

B. Supplier

The Fire Department, Bureau of Fire Communications normally maintains a supply of signal box and offers them for sale. The Contractor may call them at (718) 999-1715 for information on availability, latest price, and to arrange purchase. If stocks are depleted or no longer available, the Contractor shall purchase the item from the respective manufacturer.

C. Service Junction Box

1. No. 12 U.S. gauge sheet steel junction box, as per Fire Department Standard Drawing 142D, shall be provided by the Contractor near the service entrance, in an accessible location, approximately 7-1/2 feet above the finished floor and shimmed out approximately 1/4" from wall. This box shall be 12 x 12 x 6 inches and provided with a one piece door with approved hinges and a lock to fit the standard F.D. #2 key (T.B. 2658). The Fire Department will furnish and the Contractor shall install the lock on the junction box. The box shall be given two coats of black asphaltum paint, inside and outside, and the letters "F.D.N.Y." in red one to three inches in height shall be stenciled on the cover in red enamel. A bakelite terminal block, equal to Fahnestock No.13B, shall be provided at the junction box.

2. Where it is not practical to meet the above location requirements, the junction box shall be installed at a location other than the service entrance, and conforming to the remaining

requirement. A pull box 12 x 12 x 6 inches shall then be installed on the wall at the conduit entrance into the building, a 1½" galvanized mild steel rigid conduit shall be installed between the junction box. An insulation coupling shall be installed in this conduit at its entrance into pull box.

D. Interior Wiring

Contractor shall provide the following interior wiring:

1. One No. 14 A.W.G. soft drawn solid duplex cable, shall be provided in the conduit system where shown by the Contractor.

2. One No. 14 A.W.G. solid single soft drawn wire shall be installed between the fire alarm box and the water main, for a system ground.

3. The above wire shall be type "THWN/THHN" as specified in Section 16120-"Wiring Systems".

4. An approved metal marker, painted red and inscribed "Fire Alarm GRD", shall be fastened to the ground wire at the point of the ground connection. Submit marker for approval.

5. The No. 14 A.W.G. duplex cable shall be connected to the line terminals of the fire alarm box. The No. 14 A.W.G. single wire shall be connected to the ground terminal of the fire alarm box by means of a machine screw. All wiring shall be continuous in length, splices are not allowed.

E. Underground Work

The Contractor shall perform all underground work, as well as installation of conduits, conductors, manholes, etc. indicated in the Specifications and on the Drawings to accomplish a complete electrical connection between the Fire Alarm Box within the building and the lines of the Fire Department.

F. Overhead Conductors

Overhead aerial conductors shall be No. 10 A.W.G. solid, hard drawn copper capable of withstanding a minimum stress of 505 lbs. conforming to A.S.T.M. designation B-1, latest revision. The conductor shall be covered with a High Density Polyethylene insulation resistant to the weather, ultra violet moisture, and abrasion. Overhead conductors shall be manufactured in accordance with Fire

Department Specifications No. 1.2 or 1.21, latest revisions.

G. Manholes

1. Manholes shall consist of a standard Fire Department cast-iron frame and cover, and concrete splicing chamber, of dimensions and construction in accordance with the latest standard Specifications and Drawings of the Fire Department. A print of the standard Fire Department manhole casting shall be obtained by the Contractor from the Division of Communications. Either pre-cast or job-formed manholes in accordance to Fire Department Specifications will be acceptable. Specifications and Drawings may be examined at the Division of Fire Communications by the Contractor and intending bidders, to determine compliance with Fire Department requirements.

2. Concrete for manholes shall be in accordance with Fire Department Specifications, composed of one part of Portland cement, two parts of clean, sharp sand, and four parts of clean, hard, machine broken stone (not to exceed ¾-inch on the longest side) mixed dry until thoroughly incorporated, properly wetted and tamped in place until the water flushes the surface. Layers of concrete shall not exceed 8-inches in depth; each layer shall be rammed but not set before the next is applied. All concrete shall be laid in plank frames where necessary, the bottom of the trenches having been previously well cleaned out and wetted and tamped level and firm.

3. Manhole frame shall be installed flush with the finished grade of street. Where streets have not been regulated and where the present grade is above the proposed grade, the concrete chamber of the manhole shall be built to conform with the proposed grade, having a brick chimney on which the head casting shall set at the present grade. The inside of the chimney shall be a minimum of 2½ feet by 2½ feet, or 2½ feet in diameter. Steps shall be provided in the chimney, if so directed by the Fire Department Engineer.

   Where a brick chimney is necessary, the Contractor shall advise the Authority and the Engineer of the Division of Fire Communications before back filling.

H. Underground Service Conduit:

Conduit shall be plastic coated galvanized rigid steel with an inside diameter as indicated on Drawings. At the point of entrance into building and in the manhole, and in the post, conduit shall be sealed with oakum and approved sealing compound to prevent water or gases from entering into building.

I. Poles

1. All new poles indicated on the Drawings, or in the Schedule Specification shall be furnished by the Contractor. Poles shall be creosote pressure treated, southern yellow pine or other approved. Poles shall be reasonably free from knots. Accepted Standard Specifications are ASA for poles, and AWPA 36C- for treatment. Treatment shall be for 8 pounds final retention AWPA 36C, empty cell process. Pole shall be thirty-five (35) feet long, with a minimum top circumference of twenty-one (21) inches. Poles shall be set in ground to a depth of six (6) feet, and shall be set so that poles will stand perpendicular when the line is completed. Holes shall be augered to admit the poles without stabbing or hewing, and shall be as large at the bottom as at the top. Three (3) tampers shall be continuously employed to pack in the filling until the hole for each pole is completely filled. Where the ground shall be found soft and moist, the poles shall be set in a large barrel; the space between the barrel and the pole shall be filled with small stone and earth and shall be well tamped.

2. Crossarms and Pins: Crossarms shall be three feet long (standard) thoroughly seasoned, straight grained pine, free from such sap wood and knots as would weaken same; crossarms shall be painted color of pole, and shall be fitted with two braces. The braces shall be attached to the crossarm by means of carriage bolts, which shall pass first through the arm and then through the brace. A round washer shall be placed under the head of the bolt. Crossarms shall be fitted with $1\frac{1}{2}$" standard pins. Each pin shall be nailed in the crossarm with one six-penny nail, the nails shall be driven straight through the middle of the side of the crossarm, a 5/8" hole shall be bored through the center of the grain at the time the crossarm is placed in position. Crossarms shall be placed in position with the braces facing away from the pole, and shall be attached to the pole by one crossarm bolt, which shall be long enough to pass through the pole and the crossarm without cutting out the back of the pole. The bolt shall be driven

through the back of the pole, a square washer being placed under the head and a square washer shall be placed under the nut on the crossarm. The pair of crossarm braces shall be attached to the pole by means of one fetter drive screw.

3. Insulators: Insulators to which the conductors are secured shall be furnished and installed by the Contractor. Insulators shall be porcelain.

4. Joints: All joints in line conductors shall be made with double McIntyre sleeves and covered with not less than three (3) layers of 3/4" black Grimshaw, or other approved, tape. No joint shall be made in the line wire at a distance greater than two feet from a crossarm.

5. Trimming Trees: All overhead lines shall be free from foliage and branches of any trees. The Contractor shall coordinate all tree trimming required with the Commissioner of Parks. The Contractor shall pay the Inspector designated by the Commissioner of Parks to supervise the Work for each and every day actually employed at the rate fixed by said Commissioner.

PART 3 - EXECUTION

3.01 CITY FIRE ALARM SIGNAL BOX

A. Install City Fire Alarm Box where shown on the Drawings. The box shall be secured to a 1" thick wooden backboard, conforming to the shape of the outer shell of the box. The board shall be set on the terra cotta of the building wall and secured to building wall in an approved manner, independent of the fire alarm box. The outer shell shall not come in contact with the finished surface of the recess. The board shall be painted red. The pull handle or pushbuttons of the fire alarm box shall be 48" above finished floor.

B. The outlet box of the ¾-inch conduit shall set flush with the wall at the back of the recess and position to conform to the entrance wire space of fire alarm box procured for this installation. The backboard shall be cut out to conform to size and position of the outlet box.

C. The 3/4" chase nipple and lock nut shall be installed in the rear of the outer shell of the fire alarm box to the outlet box in wall. Unused openings in shell of fire alarm box shall be closed with flat brass screw plugs.

D. Where the fire alarm box is surface mounted, the ¾-inch conduit from the junction box shall be terminated in a pull box located below the fire alarm box. Solid or flexible conduit shall be installed between the pull box and existing hole in bottom of the fire alarm box.

3.02 CONDUITS

A. A 3/4" conduit shall be installed between the fire alarm box and the junction box; and a 3/4" conduit between junction box or fire alarm box (whichever is closer) and the grounding connection. At the point where the 3/4" and 1/2" conduits enter the junction box, approved insulated couplings shall be installed so that the conduits are not electrically connected to the box. The insulated couplings in the 1/2" and 3/4" conduit shall be omitted when the installation described in subparagraphs D.1 of Service Junction Box.

B. Sealing material shall extend 3" inside mouth of pipe. A No. 10 galvanized drag wire shall be left in pipe for pulling cable.

C. Where conduits must of necessity cross within 2" of other iron pipes of metal structure, pipes shall be protected by sleeves composed of one or more lengths of vitrified clay or sewer tile duct. Sleeves shall be installed in such manner as to permanently insulate and separate the conduits containing Fire Department conductors from the other pipes or structures. All joints in pipes shall be made in a substantial manner with standard couplings screwed up tight. Where it may be necessary to cut conduits, the inside edge shall be carefully reamed and cleaned in such a manner that no burrs or other obstacles shall exist which might injure cables.

D. Where Drawings show conduits entering an existing manhole, the Contractor shall cut openings in the walls of manholes were directed by the Engineer of the Division of Fire Communications for entrance of pipes. All pipes shall be brought into manholes and terminated in the wall, a distance from the inner surface indicated on the Fire Department Drawing of "manhole construction". The opening at the outer surface of the wall shall be filled with concrete around the conduits backfilling the trench. The opening at the inner wall shall also be sealed by concrete to the satisfaction of the Engineer of the Division of Fire Communications.

E. Where Drawings show conduit terminating in posts, it shall be terminated in a 90 degree bend and extended by a pipe nipple to a point 3" above sidewalk level. The joint between the pipe and the bend shall be made by using a solid wrought iron sleeve at least 12" long. Sleeve shall fit completely over the conduit and bend and shall be completely covered by concrete.

F. The Contractor shall cut all necessary openings in walls of buildings for entrance of pipe at location indicated on the Drawings. All openings cut for the conduit entrance to buildings shall be properly sealed and surface "pointed up" to the satisfaction of the Authority. Where the surface of a painted wall has been disturbed, the Contractor shall repaint the wall and restore it to its original condition. Pipe or conduit entering a building shall be pitched away from building toward manhole. Service conduits shall terminate in a junction box in building.

G. Where the Drawing shows the cable shall terminate on a pole, the following procedure shall prevail: A 2" plastic coated conduit or approved type "U" ground with conduit adapter size as per Division of Fire Communications Drawing for the particular installation, shall be extended up the pole a distance of ten feet, avoiding the curb side of the pole. This conduit shall be attached to the underground conduit by means of a wrought iron or steel boiler sleeve and a 90 degree wrought iron bend. The sleeve shall fit snugly over the pipe and bend, and shall be completely covered with concrete. If this conduit does not readily drain into a manhole, a one-half inch hole, free of sharp edges, shall be made in the conduit at the lowest point to prevent the trapping and freezing of water.

A lead weather bell, cap or approved type split rubber cone shall be installed to cover the mouth of the conduit on the pole. If a lead weather bell is used it shall be beaten in tightly to the outer covering of the cable.

Where the bottom of the pole terminal box is installed at a height greater than 12 feet, the exposed cable above the iron conduit shall be enclosed in a two inch fibre conduit (equal to Orangeburg or Bernice). This fibre conduit shall rest on the lead weather bell, cap or split rubber cone over the mouth of the wrought iron conduit and terminate approximately two feet below the bottom of the pole terminal box. The open end of this fibre conduit shall be sealed with oakum and compound. Both iron and fibre conduits shall be properly secured to the pole with galvanized wrought iron straps, spaced

at least every 24 inches and using 1/4" x 3" lag screws. The fibre conduit may be omitted on poles, which are the sole property of the New York Telephone Company.

The cable on the pole shall be terminated in an approved manner to an arrester mounting terminal block that shall be the latest Fire Department approved model. This block shall be contained in a pole terminal box, built to F.D. Standard Drawing 142, Series Latest Revision. A No. 10 A.W.G. soft drawn copper wire, 1/2" galvanized rigid steel conduit, or approved type wood channel mounding, 7/16" x 7/8" x 8'0" shall be extended from the ground lug of the lightning arresters to an approved threaded sectional 6 foot, 1/2" copperweld ground rod, driven into the earth as directed. Where this rod does not produce a ground of less than 75 ohms, additional sections shall be added and the rod driven deeper into earth until the desired 75 ohms or less ground is obtained. The No. 10 A.W.G. ground wire shall be connected to the end of the rod with an approved clamp. The iron conduits and ground wire U-Guard moulding shall be painted black.

3.03 UNDERGROUND WORK

A. The cable entering the service junction box shall be properly clamped, using plastic or plastic-coated clamps and the cable conductors soldered to the lugs of the terminal block. The cable conductors shall be laced and properly formed in the service junction box so as not to touch the sides or the back of the enclosure.

B. The installation of underground pipe and conduit and manholes shall be one continuous operation. In manholes, the cable shall be secured in place on cable supports, Joslyn Mfg. and Supply Co. Rack No. J-5125 and Hook No. J-5131 or length as specified equipped with Insulator No. J-5122 if specified by Fire Department or equal thereto all in accordance with Fire Department Standard Drawing No. 141.

C. The underground conductors shall be a four (4) pair cable unless otherwise specified. The conductors shall be solid No.14 A.W.G. The insulation and cable assembly shall meet the requirements of the City of New York, Department of Purchase, Cable Specification No. 12-C9:68. The fire alarm cable shall be properly terminated in the pole terminal box and in the service junction box, all in accordance with Fire Department cable installation Specifications.

The cable conductors shall be properly laced and or taped and formed so as not to touch the sides or back of the enclosure. The Contractor shall terminate the cable in the post terminal box in "dead" fire alarm posts. Where the cable enters a "working fire alarm post" the Contractor shall pull the cable up into the post leaving sufficient cable for proper terminating by others.

D. The end of this cable must be hermetically sealed to prevent the entrance of moisture into the core of the cable. The Fire Department will make the splice to the "live" cable in the manhole. The Contractor shall leave sufficient cable in the manhole properly racked and positioned with the end hermetically sealed. Where directed, the cable shall be lubricated before pulling into ducts. The Contractor shall take every precaution by sealing the end of the cable prior to drawing into the ducts to preclude the entrance of moisture or water into the core of the cable. All connections to lines of the Fire Department will be made by the Fire Department.

E. A "come along" cable grip shall be used to pull in cable.

F. Where cable connections to fire alarm lines are made within a fire alarm post, the Contractor shall install cable in accordance with Fire Department Communications F.D.N.Y. Standard Specifications.

3.04 TRENCHES

A. All excavations for pipes or conduits shall be at a depth to leave a space of not less than 20" between the highest point of pipe, and surface of roadway, or the surface of sidewalk or lawn. Under roadways excavations shall be to a depth as required by the Fire Department. Excavations shall be of sufficient width to give at least 3" clear space on both sides of conduit. Trench when completed shall be straight and true between pole or manhole and entrance into the building. Where obstructions are encountered which would prevent the trench from running in the straight line, the trench shall be dug in accordance with directions of the Engineer of the Fire Department. Curves in conduit shall have a radius not less than 25 feet. All pipe shall be run so that rods may be pushed through without difficulty and so that pipe will pitch away from building. The trenches and other excavations spread in layers not over 6" deep and thoroughly tamped and wetted down. The surface of lawns and sidewalks shall be left in as good condition as before excavations were made.

B. Trenches shall not be back filled until conduits have been inspected by the Authority and the Fire Department, and specified permission to fill trench has been given.

3.05 TESTS AND ACCEPTANCE

A. The Director of the Division of Fire Communications shall be notified 48 hours in advance of time of starting work so that a representative may be present.

B. The installation will be inspected and tested by the Division of Fire Communications to determine its compliance with these Specifications before it is connected to the lines of the Fire Department. The Contractor shall provide the necessary manpower, the tools and materials required to aid the Fire Department Engineer in the testing and inspection of the cable installation.

END OF SECTION

LIST OF SUBMITTALS

SUBMITTAL	DATE SUBMITTED	DATE APPROVED
Approval by the Fire Department of the work diagram.	_____	_____
Notice when underground Work will begin.	_____	_____
Field test report.	_____	_____