

SECTION 2800

FIRE ALARM SYSTEM

PART 1 GENERAL

1.1 DESCRIPTION

- A. Reference to other Sections:
1. The requirements of the Contract Documents, including the General and Supplementary General Conditions and Division 1 General Requirements shall apply to the work of this Section.
 2. Division 14 - All Related Elevator Sections.
 3. Division 15 - All Related Mechanical Sections.
 4. Division 16 - All Related Electrical Sections.
- B. Drawings are diagrammatic and are a graphic representation of Contract requirements to best available standards at the scale required.

1.2 WORK INCLUDED

- A. The work covered by this section of the specifications shall include all labor, equipment, materials and services to furnish and install a complete analog addressable fire detection and voice-tone evacuation system. The system shall also include Warden telephone communication, visual alarm strobe lights and supervised wiring with all operations as herein described and as shown on the drawings. The system shall be capable of handling addressable points necessary to accommodate devices indicated on plans plus 25% spare capacity for future expansion. The system shall consist of, but not be limited to, the following:
1. Master control panel including all control and annunciation functions such as alarm tone control, live voice announcements and Warden telephone controls, hereafter called the Fire Command Station (FCS) to include Fireman's Smoke Purge Control with built-in strip printer and battery back-up.
 2. Remote annunciator panel(s).
 3. Remote desktop printer.
 4. Central amplifier cabinet(s).
 4. Distributed amplifier cabinets(s).
 5. Intelligent transmission cabinets (ITC's).
 6. Addressable manual fire alarm stations.

7. Addressable analog smoke detectors/sensors.
 8. Addressable analog duct smoke detectors/sensors with sampling tubes.
 9. Duct smoke detector remote alarm LED indicators.
 10. Addressable heat detectors.
 11. Addressable monitor modules for waterflow switches, tamper switches, emergency generator, fire pump, etc. status monitoring.
 12. Addressable control modules for fan/damper control, smoke purge fan/damper control, elevator recall control, elevator shunt trip control, door locks/strikes release control, etc.
 13. Voice/tone alarm speakers.
 14. Alarm strobe lights.
 15. Combination voice/tone alarm speakers with alarm strobe lights.
 16. Warden/Firefighter telephones.
 17. Smoke exhaust control/status devices.
 18. System battery back-up operation of 24 hours (standby condition) and 45 minutes (all call alarm load condition).
- B. Drawings show the fire alarm system schematically. No added compensation shall be permitted for variations due to field conditions or the specific installation requirements of individual manufacturers.

1.2 APPLICABLE LISTINGS, CODES AND STANDARDS

- A. All equipment shall be U.L. Listed for its intended use.
1. U.L. 864 Fire Protective Signaling Systems.
 2. U.L. 268 Smoke Detectors.
 3. U.L. 268A Smoke Detectors for Duct Applications.
 4. U.L. 217 Smoke Detectors – Single Station.
 5. U.L. 521 Heat Detectors.
 6. U.L. 464 Audible Signaling Appliances.
 7. U.L. 1480 Fire Alarm Signaling Devices.
 8. U.L. 1638/1971 Visual Fire Alarm Signaling Devices.

9. U.L. 228 Door Holder for Fire Protective Signaling Systems.
 10. U.L. 38 Manually Activate Signaling Boxes.
 11. U.L. 346 Waterflow Indicator for Fire Protective Signaling System.
 12. U.L. 1481 Power Supplies for Fire Protective Signaling System.
 13. U.L. 1711 Amplifiers for Fire Protective Signaling System.
 14. 520Hz The control panel and all of its associates voice alarm + equipment shall be UL-Listed FOR 520Hz sounding device per NFPA 72.
- B. National Fire Protection Association (NFPA) Standards
1. NFPA No. 70 – National Electrical Code.
 2. NFPA No. 72 – National Fire Alarm Code.
 3. NFPA No. 90A – Standard For The Installation Of Air Conditioning And Ventilating Systems.
 4. NFPA No. 101 – Life Safety Code.
- C. Local Codes and Authority Having Jurisdiction
1. Americans With Disabilities Act (ADA)
 2. COA/BSA – New York City
 3. The 2014 Building Code of the City of New York
 4. The 2011 City of New York Electrical Code
 5. In accordance with New York City Fire Department requirements
 6. In accordance with the Department of Buildings, City of New York – Policy and Procedure Notices
 7. All other codes and authorities having jurisdiction

1.3 RELATED DOCUMENTS

- A. Prior to the commencement of work, obtain all permits necessary for installation of the work. All permit costs and inspections fees shall be included as part of the required work of this Section.
- B. Local code requirements shall be adhered to with regard to submitting plans, specifications, wiring diagrams and shop drawings to the local code authorities for review. Responsibility for furnishing the quantities of copies on cloth and/or paper, as directed by such requirements, shall be included as part of the work of this Section.

- C. Prior to commencement and after completion of work, notify all authorities having jurisdiction.
- D. Submit a letter of approval of the installation, from the local code authority, before requesting final acceptance of the system.

1.4 RELATED WORK

- A. Coordinate 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 (Note: Provide all necessary wiring and connection to the fire alarm system as per approved manufacturers shop drawings):
 - 1. Duct smoke detectors shall be supplied, wired and connected by the Electrical Contractor. The HVAC contractor shall furnish the necessary duct openings in the ductwork and will install the duct smoke detectors. See Division 15.
 - 2. Sprinkler waterflow and tamper switches to be provided and installed by the Fire Protection/Sprinkler Contractor. See Division 15.
 - 3. Fire pump status contacts to be provided by the pump control equipment. See Division 15.
 - 4. Sprinkler tank status contacts to be provided by the tank control equipment. See Division 15.
 - 5. Sprinkler pre-action systems' status contacts to be provided by each system's control equipment. See Division 15.
 - 6. Elevator alarm speakers shall be furnished by the Electrical Contractor. Elevator communications circuit wiring (trail cables) and alarm speaker installation to be provided by the Elevator Contractor. See Division 14.
 - 7. Elevator Warden telephones shall be furnished by the Electrical Contractor. Elevator communications circuit wiring (trail cables) and elevator Warden telephone installation to be provided by the Elevator Contractor. See Division 14.
 - 8. Elevator recall control circuits to be provided by the elevator control equipment. See Division 14.
 - 9. Emergency generator status contacts to be provided at the emergency generator control equipment.
 - 10. Fire alarm system automatic transfer switch status contact to be provided with the automatic transfer switch.
 - 11. Selection of a central station agency, its equipment, its fees and

fees for provision of telephone lines are the responsibility of the Owner or his representative.

12. Coordinate with all other trade Contractors for interface with any and all other fire alarm system related devices.

1.5 QUALITY ASSURANCE

- A. It is the intent of these Specifications is to provide a complete fire alarm system that complies in all respects with the requirements of all applicable New York City codes and standards for a Class "B" Fire Alarm System. Equipment, material, installation practices, etc. that do not meet these requirements or do not meet the performance standards herein specified shall not be acceptable.
- B. All equipment furnished under this Specification shall be UL listed for its intended purpose under the name of a single manufacturer, who has been engaged in production of this type of equipment for at least ten (10) years and has a fully equipped service organization within fifty (50) miles of the installation.
- C. The fire alarm contractor shall provide five (5) project references with contact names for projects of similar size and scope.
- D. The equipment specified under this Section is based on a Firecom, Inc. system, (Firecom Local Sales Office -- Tel. No. 718-899-6100, Attn: Rosario Passalacqua), whose catalog and model numbers are used to indicate the type of design and materials as well as the operating features required.
- E. The base bid shall reflect the equipment of the manufacturer herein specified or an approved equal.
- F. With this bid, state, if any, specific points of the system's operation or the equipment's quality that differ in any way from this specification by submission of a complete technical proposal to include supporting literature and drawings. Only those departures from these specifications, submitted in writing at the time of bid, shall be considered by the Engineer during the submittal review phase. Failure to submit all departures from these specifications at the time of bid shall be cause for summary rejection of any submittal documents.
- G. Acceptance of substitutions, based on submittal documents furnished during bid, shall only be construed as permission to proceed with the installation pending final test and approval of the system. The Contractor shall continue to bear the liability for replacement of substituted equipment if, in the opinion of the Owner or Engineer, the substitute equipment fails to perform as specified or fails to meet approval of all authorities having jurisdiction within three (3) months after scheduled project completion.
- H. Numbers and types of fire alarm system devices or circuits shall be as

shown on the drawings and as herein described in this Section. Should any conflicts arise between any drawings and/or this section, regarding the quantities of devices or circuits, the higher quantity shall be considered as correct.

- I. Submit acceptable equipment for review by the Engineer. Bear all liability for damages arising from failure to submit equipment that meets these specifications, including, but not limited to, any penalties for failure to meet construction deadlines.
- J. Final determination of compliance with these specifications shall rest with the Engineers, who, at their discretion, may require proof of performance. Required proof may include, but shall not be limited to, expense paid visits by representatives of the Owner and Engineer to sites where identical equipment is installed and providing beneficial use.

1.6 SUBMITTAL REQUIREMENTS

- A. Prior to the start of work, provide a complete and comprehensive submittal for review by the Engineer, describing the proposed system and its equipment. Failure to provide a complete submittal shall be grounds for summary rejection of any incomplete submittal documentation. The complete submittal shall include, but not be limited to, all of the following material:
 - 1. Provide a list (bill of materials) of all types of equipment and components provided. Each type of system panel and equipment shall have its New York City Board of Standards and Appeals (B.S.A.) and/or the New York City Building Department Materials and Equipment Acceptance (C.O.A.). Approval Calendar Numbers shall be clearly indicated.
 - 2. Provide description of operation of the system, similar to that provided in Part 2 of this Section, to include any and all departures (exceptions, variances or substitutions) listed at the time of bid. Failure to submit all such departures from these specifications at the time of bid shall be cause for summary rejection of any submittal documents where additional departures are discovered.
 - 3. Provide schedule of active (utilized) and spare addresses provided on each installed addressable circuit to substantiate compliance with circuit usage/spare requirements, described elsewhere in this section. A separate schedule shall be provided for each addressable circuit provided as part of the fire alarm system.
 - 4. Provide system ampere load (during both normal and alarm conditions) and time calculations to substantiate compliance with battery back-up power requirements (battery Ampere-Hour capacity), described elsewhere in this section. Separate calculations shall be provided for the FCS, amplifier cabinet(s) and

each system ITC panel.

5. Provide system speaker circuit wattage load (during all-call activation) to substantiate compliance with audio amplifier power requirements (total wattage including spare), described elsewhere in this section. Separate calculations shall be provided for each system ITC panel.
6. Provide manufacturer's printed product data, catalog pages and descriptions of any special installation procedures.
7. Provide the address and telephone number of the manufacturer's local service facility.
8. Provide shop drawings as follows:
 - a. Drawing or catalog page showing the actual dimensions of the FCS and a typical system ITC panel.
 - b. Drawing or catalog page showing actual dimensions of any auxiliary amplifier and/or battery cabinet(s).
 - c. Drawing or catalog page showing actual dimensions of any remote annunciator panel(s).
 - d. Single line riser diagram showing all equipment and type, all connections and number and size of all conductors.
9. Provide a schedule, for review and approval, of the proposed label for each auxiliary control switch and/or LED indicator at the Fire Command Station (FCS), prior to fabrication and installation.
10. Provide samples of various items when so requested.
11. Submit drawings to the Department of Buildings, City of New York for plan examination and approval prior to the installation. The Contractor shall be responsible to secure permits from the Department of Buildings and pay all required filing fees.
12. Obtain and submit letter of approval from New York City Fire Department for complete acceptance of the fire alarm system installed.

1.7 GUARANTEE

- A. The equipment manufacturer shall directly guarantee the system equipment to the Owner for a period of one **(10) year** from the date of final acceptance of the fire alarm system.
- B. The Electrical Contractor shall guarantee all wiring and raceways to be free of inherent mechanical or electrical defects for one (1) year from the

date of final acceptance of the fire alarm system.

- C. Upon completion of the installation of fire alarm system equipment, provide to the Construction Manager a signed written statement, substantially in form as follows:

“The undersigned, having engaged as the Electrical Contractor on the (INSERT THE NAME AND ADDRESS OF THE PROJECT), confirms that the fire alarm system equipment was installed in accordance with the wiring diagrams, instructions and direction provided to us by the manufacturer.”

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Basic System Equipment, Circuiting, Addressing And Operating Capabilities Guidelines
1. The Fire Command Station (FCS) central processing unit (CPU) shall provide an individual multiplex data address for each addressable device connected to the fire alarm system.
 2. The FCS shall provide for data, voice/tone audio and Warden or Firefighter telephone bus circuits to the ITC's. The data, voice/tone audio and Warden or Firefighter telephone bus circuit vertical wiring shall be NFPA Standard 72 Class B, two-wire, supervised for opens in the circuit, shorts across the pair and ground faults.
 3. Addressable data communications between the system panels and the addressable devices shall be digital and shall be horizontal wired NFPA Standard 72 Style 4, two-wire (Class B). Utilize no more than eighty percent (80%) of the maximum number of available addresses on any addressable loop, unless additional spare capacity is called for elsewhere within this specification or on the Drawings.
 4. The system addressable data communications circuits shall support one hundred percent (100%) of the addressable devices in alarm or operated at the same time, during both primary (AC) and secondary (battery) power conditions.
 5. The fire alarm system shall provide addressable monitor module circuits for connection to devices to be monitored by the fire alarm system. Monitor module circuits shall be provided as follows:
 - a. Sprinkler waterflow alarm switches: Provide one (1) addressable monitor module circuit for each sprinkler waterflow alarm switch.
 - b. Sprinkler valve tamper switches: Provide one (1)

- addressable monitor module circuit for each sprinkler valve tamper switch.
- c. Fire pump: Provide three (3) addressable monitor module circuits for the fire pump.
 - d. Special service fire pump: Provide three (3) addressable monitor module circuits for the special service fire pump.
 - e. Sprinkler gravity and/or pressure tanks: Provide a minimum of two (2) addressable monitor module circuits for each tank.
 - f. Emergency generator: Provide three (3) addressable monitor module circuits for the emergency generator.
 - g. Fire alarm automatic transfer switch: Provide one (1) addressable monitor module circuit for the fire alarm system automatic transfer switch.
 - h. Smoke exhaust/purge fans: Provide one (1) addressable monitor module circuit for each fan used for smoke exhaust/purge.
 - i. Fire/smoke dampers: Provide one (1) addressable monitor module circuit for each floor's fire/smoke dampers used for smoke exhaust/purge.
6. The system panels shall provide alarm speakers, alarm strobe lights and Warden/Firefighter telephones with NFPA Standard 72 Style Y, two-wire (ITC Class A,B & SLC Loops. DAN add Warden Station circuits being class A.) circuits, typically as follows:
- a. Floor voice/tone alarm speakers: Provide at least two (2) alarm speaker circuits for each floor. On each floor, alarm speakers shall be alternately connected between two (2) alarm speaker circuits. Each alarm speaker circuit shall be capable of supporting at least twenty-five (25) alarm speakers, when each speaker is tapped at one Watt (1 W.).
 - b. Stairwell and elevator voice/tone alarm speakers: Provide one (1) alarm speaker circuit for each stairwell and for each elevator cab.
 - c. Alarm strobe lights: Provide at least two (2) alarm strobe light circuits for each floor. On each floor, alarm strobe lights shall be alternately connected between two (2) alarm strobe light circuits. No more than fourteen (14) alarm strobe lights, to include fifty percent (50%) spare capacity, shall be connected to any single circuit.
 - d. Warden/Firefighter telephones: Provide one (1) telephone

circuit for each mechanical room, each elevator cab and each elevator machine room. Provide one (1) telephone circuit per floor for all common area Warden/Firefighter telephones.

7. The FCS shall provide each of the following types of equipment and circuits associated with the fire alarm system with a manual control switch, as required by the functional requirements of these specifications, which shall be typically as follows:
 - a. Central station alarm disconnect: Provide one (1) switch with one (1) green, "Activated" status LED indicator to disable the central station alarm transmission function.
 - b. Central station alarm transmit: Provide one (1) switch to initiate the transmission of an alarm signal to the central station agency.
 - c. Alarm speaker circuits: Provide one (1) control switch with one (1) two color (red and green) LED for each floor, each stairwell and each elevator cab. The ACM-32 Audio Control Module Displays speaker status in real time in the LSN 2000. This has the capacity to select 1 of 7 audio sources for each 32 groups of speakers. This provides a simple two step operations for controlling speakers on a floor.
 - d. Warden/Firefighter telephone circuits: Provide one (1) control switch with one (1) two color (red and green) LED for each Warden/Firefighter telephone circuit.
 - e. See section on "Smoke Exhaust System Control/Status" for additional switches and LEDs required.
8. The fire alarm system shall provide addressable control modules with, as required, load interface relays for connection to devices to be controlled by the fire alarm system. Addressable control modules shall be provided as follows:
 - a. Central Station Transmitter: Provide five (5) addressable control modules. NOTE: Provide two (2) additional addressable control modules if a fire pump is included as part of the project. Provide one (1) additional addressable control module if carbon monoxide detectors are included as part of the project.
 - b. Elevator controls for recall operation: Provide one (1) addressable control module with load relay for each elevator controller.
 - c. HVAC fan systems: Provide one (1) addressable control

module with load relay for each HVAC fan system.

- d. Smoke Exhaust/Purge fans: Provide one (1) addressable control module with load relay for each fan used for smoke exhaust/purge.
- e. Fire/Smoke Dampers: Provide one (1) addressable control module with load relay for each floor's fire/smoke dampers used for smoke exhaust/purge.

2.2 SYSTEM OPERATION

A. System Alarm Operation

- 1. Alarm activation of any manual fire alarm station shall automatically:
 - a. Sound a pulsing audible signal and flash the general alarm LED indicator at the Fire Command Station (FCS). Pressing the alarm acknowledge key on the FCS shall silence the audible signal and continuously light the LED indicator, during the alarm condition. Subsequent alarm conditions shall resound the audible signal and again flash the LED. Each alarm condition must be individually acknowledged.
 - b. Display the custom label for the device reporting the alarm condition on the FCS Color LCD .
 - c. Flash a backlit sign with the word "FIRE" in three inch (3") high letters at the top of the FCS.
 - d. Printout the alarm information for the device reporting the alarm condition (Time, date, device address, device label,) on the FCS printer.
 - e. Enter the custom label for the device reporting the alarm condition with the time and date of alarm activation into the FCS historical alarm log for future recall/review.
 - f. Sound an audible signal at the remote annunciator panel (RAP). Pressing the alarm acknowledge key on the RAP shall silence the audible signal and continuously light the LED indicator, during the alarm condition.
 - g. Display the custom label for the device reporting the alarm condition on the RAP alphanumeric, blue fluorescent display.
 - h. Sound a "slow whoop" alarm tone on all voice/tone alarm speakers on the floor of alarm initiation, the floor above the floor of the alarm initiation and the floor below the floor of the

alarm initiation. The alarm tone shall continue to sound until the alarm is silenced at the FCS by operation of the panel's alarm silence switch. Subsequent alarm conditions shall resound the alarm tone on the appropriate floors. The voice/alarm communication system shall have multi-channel capability to allow live voice messages to the stairs, to all or selected floors without automatic interruption of the alarm tones on the floor of alarm initiation, the floor above or the floor below. If the alarm has not been acknowledged within 45 seconds of alarm initiation, the alert tone shall simultaneously sound on all other floors of the building.

- i. Flash all alarm strobe lights on the floor of alarm initiation, the floor above the floor of alarm initiation and the floor below the floor of alarm initiation. The alarm strobe lights may be turned off during the alarm condition by operation of the FCS alarm silence switch or shall automatically be turned off after five (5) minutes of operation or the Walk Test will automatically be cancelled if an alarm occurs at a device that is not a member of the active walk test group. Subsequent alarm conditions shall again turn on the alarm strobe lights on the appropriate floors. In areas where multiple strobes can be viewed simultaneously, all alarm strobes shall flash in a synchronized manner.
 - j. Activate system relay to initiate the transmission of a manual station alarm signal to the Central Station Agency transmitter (Provided by others - Selection of a central station agency, its equipment, its fees and fees for provision of telephone lines are the responsibility of the Owner or his representative).
 - k. Unlock all normally locked security doors on the floor of alarm initiation and the floor above.
2. Alarm activation of any area smoke sensor (excluding elevator related smoke sensors), duct smoke sensors, heat detectors shall automatically:
- a. Provide those operations as above listed in A.1. a. through k.
 - b. Shutdown all air handling systems or fan units located on or serving the floor of alarm initiation.
 - c. Activate system relay to initiate the transmission of a smoke/heat alarm signal to the Central Station Agency transmitter (Provided by others - Selection of a central station agency, its equipment, its fees and fees for provision of telephone lines are the responsibility of the Owner or his

representative).

3. Alarm activation of elevator lobby and elevator machine room smoke sensors shall be programmed to provide alarm verification for thirty (30) seconds. A verified alarm signal from any of these sensors shall automatically:
 - a. Provide those operations as above listed in A.1. a. through k.
 - b. Shutdown all air handling systems or fan units located on or serving the floor of alarm initiation.
 - c. Operate control relay(s) to recall all elevators serving the floor of alarm initiation to the street level.
 - d. Activate system relay to initiate the transmission of a smoke/heat alarm signal to the Central Station Agency transmitter (Provided by others - Selection of a central station agency, its equipment, its fees and fees for provision of telephone lines are the responsibility of the Owner or his representative).
4. Alarm activation of any sprinkler waterflow alarm switch shall automatically:
 - a. Provide those operations as above listed in A.1. a. through k.
 - b. Shutdown all air handling systems or fan units located on or serving the floor of alarm initiation.
 - c. Operate control relay(s) to recall all elevators serving the floor of alarm initiation to the street level.
 - d. Activate system relay to initiate the transmission of a sprinkler alarm signal to the Central Station Agency transmitter (Provided by others - Selection of a central station agency, its equipment, its fees and fees for provision of telephone lines are the responsibility of the Owner or his representative).
5. Alarm activation of any heat detector in an elevator shaft or elevator machine room shall automatically:
 - a. Provide those operations as above listed in A.1. a. through k.
 - b. Shutdown all air handling systems or fan units located on or serving the floor of alarm initiation.
 - c. Operate control relay(s) to recall all elevators serving the floor of alarm initiation to the street level.
 - d. Provide a programmable time delayed activation of the

elevator shunt trip breaker(s) in the associated elevator machine room to stop power to the elevators.

- e. Activate system relay to initiate the transmission of a smoke/heat alarm signal to the Central Station Agency transmitter (Provided by others - Selection of a central station agency, its equipment, its fees and fees for provision of telephone lines are the responsibility of the Owner or his representative).

6. Alarm activation of a guest room smoke detector shall automatically:

- a. Provide those operations as above listed in A.1. a through g. (Alarm annunciation only).
- b. Sound the alarm horn built-in to the base of the detector.
- c. In addition, if fire alarm system connected alarm strobe lights (sleeping area and bathroom) are provided in that particular guest room, the fire alarm system shall cause the strobe lights to flash.

B. System Supervision for Off-Normal Conditions

- 1. The following equipment or devices associated with the fire alarm system shall be supervised for off-normal conditions:
 - a. Sprinkler valve tamper switches.
 - b. Fire pump.
 - c. Emergency generator.
 - d. Fire alarm ATS.
 - e. Sprinkler tank(s) high & low level & pressure switches.
 - f. Pre-action sprinkler system.
 - g. Normal power.
- 2. Activation of any of the above listed supervisory devices, contacts or switches to an off-normal condition shall automatically:
 - a. Sound a pulsing audible signal and flash the general supervisory LED indicator at the Fire Command Station (FCS). Pressing the supervisory acknowledge key on the FCS shall silence the audible signal and continuously light the LED indicator, during the supervisory condition. Subsequent supervisory conditions shall resound the audible signal and again flash the LED. Each supervisory condition

must be individually acknowledged.

- b. Display the custom label for the device reporting the off-normal condition on the FCS Color LCD display.
- c. Printout the alarm information for the device reporting the off-normal condition (Time, date, device address, device label) on the FCS printer.
- d. Enter the custom label for the device reporting the off-normal condition with the time and date of off-normal activation into the FCS historical trouble log for future recall/review.
- e. Sound an audible signal at the remote annunciator panel (RAP). Pressing the supervisory acknowledge key on the RAP shall silence the audible signal and continuously light the LED indicator, during the supervisory condition.
- f. Display the custom label for the device reporting the off-normal condition on the RAP alphanumeric display.
- g. Activate system relay to initiate the transmission of an off-normal/supervisory signal to the Central Station Agency transmitter (Provided by others).

C. One-Way Voice Communication

- 1. The fire alarm tone signal shall be capable of being initiated automatically from the FCS, and transmitted to any speaker circuit, selected speaker circuits or all speaker circuits. No alarm tones shall be automatically broadcast in stairwells or elevator cabs.
- 2. The fire alarm tone signal and live voice announcements shall be capable of being manually transmitted from the FCS to any speaker circuit, selected speaker circuits or all speaker circuits by manual selection of the associated speaker circuit control switches.
- 3. Manual override, for live voice announcements, via the handheld microphone and speaker circuit control switches shall take priority over any and all automatic alarm tone signals.
- 4. Alarm speaker amplification equipment shall be sized to provide one (1) watt of input power to each speaker shown on the drawings, plus fifty percent (50%) spare capacity to permit the addition of future alarm speakers.
- 5. One (1) back-up amplifier shall be provided for each group of alarm amplifiers. If any primary alarm speaker amplifier fails, its function shall be taken over by the backup amplifier.

D. Two-Way Warden/Firefighter Telephone Communication

1. Picking up an installed Warden telephone handset or plugging in a portable Firefighter telephone handset shall automatically:
 - a. Sound an audible signal at the FCS.
 - b. Flash the individual telephone "calling-in/connected" LED indicator for the callingin circuit at the FCS.
2. Connecting the call, by operating the appropriate telephone line "connect" switch, at the FCS shall automatically:
 - a. Silence the audible callin signal.
 - b. Continuously light the individual telephone "calling-in/connected" LED indicator for the callingin circuit at the FCS.
 - c. Connect the appropriate Warden/Firefighter telephone circuit to the FCS master telephone for talking.
 - d. Light the LED indicator at the connected Warden/Fighter telephone.
3. Operating additional Warden/Firefighter telephone line "connect" switches, at the FCS shall automatically:
 - a. Permit Warden/Firefighter telephones to talk to other Warden/Firefighter telephone locations via a patch in the telephone network, controlled at the FCS. Up to six (6) Warden/Firefighter telephones may be operated simultaneously.
4. Warden/Firefighter telephones shall be capable of making announcements over alarm speaker circuits via a "patch" circuit and speaker circuit control switches, controlled at the FCS.

E. Alarm Strobe Lights

1. Alarm strobe light power supplies and circuits shall be sized to support each alarm strobe light shown on the drawings, plus fifty percent (50%) spare capacity on each alarm strobe light circuit to permit the addition of future alarm strobe lights.

F. Air Handling Systems Control/Status

1. Air handling systems over 2,000 CFM shall automatically be controlled from the fire alarm system control relays, as previously described in A.2.b.
2. Air handling systems shall not be permitted to restart to normal

operation from the simple operation of the system reset switch. A separate air handling system restart switch shall be provided on the FCS to permit air handling systems to be restarted after the fire alarm system has been reset to normal.

G. Smoke Exhaust System Control/Status

1. The FSCS shall be integral to the Fire Command Station or Fire Alarm Control Panel. It shall include switch/LED modules that provide three position (on/off/auto and open/closed/auto) switches and 4 LED's (normal, on, off, fault or normal, open, closed, fault) per each smoke control system controlled as required by NYC Code section 909.16.
 - a. The FSCS shall be UL864 and UUKL listed and designed per the NYC Building Code Chapter 9.
 - b. The FSCS shall include 3 position switches for each smoke control system. Each switch shall include On/Off/Auto positions for control of smoke control fan systems and Open/Closed/Auto positions for Smoke Control Dampers systems.
 - c. The FSCS shall include the following indicators for each smoke control system as required per section 909 of the NYC Building Code:
 - 1) Fans, Dampers, or other operating equipment in their normal status – White Indicator
 - 2) Fans, Dampers, or other operating equipment in their off or closed position – Red Indicator
 - 3) Fans, Dampers, or other operating equipment in their on or open Status – Green Indicator
 - 4) Fans, Dampers, or other operating equipment in Fault - Yellow Indicator
 - d. Smoke Control switch and LED modules shall include a printable portion next to each switch and LED set for a custom descriptor of each smoke control system. The printable portion shall include text and graphical icons indicating the function of the smoke control system.
4. Verification: All Dampers that are part of the smoke control system shall include verification per section 909 of the NYC Building code and NFPA 92A.
 - a. Verification shall mean end switches (true open and true closed) for each smoke control damper.
 - b. All fans used for smoke control shall include verification per section 909 of the NYC Building code and NFPA 92A. Verification shall mean duct pressure, airflow, or equivalent sensors.

- c. The white normal indicator shall give the FSCS operator a clear indication that the smoke control equipment is operating properly. Dampers that are not open or not closed (mid point) shall extinguish the white indicator.
- d. When a smoke control fan is indexed to start manually or from the fire alarm system all dampers shall open. When fan is indexed to stop, all dampers shall close unless indicated differently on the project plans.
- e. Fire detection systems providing control input or output signals to mechanical smoke control systems or elements thereof shall comply with the requirements of Chapter 9 and NFPA 72.

3. The FSCS shall include manual post fire smoke purge per section 912 of the NYC Building Code. Manual smoke purge shall be integral to the FSCS or located on Led/Switch modules directly adjacent to the smoke control controls and indicators. Controls for smoke purge shall only be available after activation of a built in FDNY/NYC approved 2642 key. A 2-position On/Off switch shall be included by floor or area for manual evacuation of smoke. Each 2-position switch shall include a green indicator that displays when the purge fan is on and a yellow trouble indicator. A graphic diagram indicating the portions of the building served by each post fire smoke purge system shall be included.

4. Fans will not be affected upon system reset. Restarting the fans may be accomplished by turning them back on in an individual sequential fashion or through individual manual switches at the FSCS controls to eliminate the possibility of all fans turning on simultaneously.
5. Under normal circumstances, smoke exhaust fans, respective fire-smoke dampers, motorized dampers shall be closed unless noted otherwise on the project plans.

H. System Supervision for Trouble Conditions

1. The fire alarm system wiring (except control wiring to fans, door holders, security door unlock, etc.) shall be electrically supervised to automatically detect and report trouble conditions to the FCS.
2. Any opens or grounds on alarm initiating or supervisory circuit wiring and any opens, grounds or shorts across network addressable data communications, remote annunciator panel data communications, alarm signal, alarm speaker, Warden/Firefighter telephone or alarm strobe light circuit wiring shall initiate a system trouble condition.
3. System addressable devices shall be supervised for placement and

normal operation. Removal of an addressable device or the failure of its internal electronic circuitry shall initiate a system trouble condition.

4. Operation of the central station agency alarm disconnect switch or any manual control commands that alter the system from its normal programmed standby configuration shall initiate a trouble condition.
5. The following fire alarm system states shall initiate a system trouble condition:
 - a. Primary 120 VAC power loss.
 - b. Battery disconnect.
 - c. Battery low voltage.

6. Trouble conditions shall automatically:

- a. Sound a pulsing audible signal and flash the trouble LED indicator at the Fire Command Station (FCS). Pressing the trouble acknowledge key on the FCS shall silence the audible signal and continuously light the LED indicator, during the trouble condition. Subsequent trouble conditions shall resound the audible signal and again flash the LED. Each trouble condition must be individually acknowledged.
- b. Display the custom label for the device or circuit reporting the trouble condition on the FCS Color LCD display.
- c. Printout the alarm information for the device or circuit reporting the trouble condition (Time, date, device/circuit address, device/circuit label) on the FCS printer.
- d. Enter the custom label for the device or circuit reporting the trouble condition with the time and date of trouble condition activation into the FCS historical trouble log for future recall/review.
- e. Sound an audible signal at the remote annunciator panel (RAP). Pressing the trouble acknowledge key on the RAP shall silence the audible signal and continuously light the LED indicator, during the trouble condition.
- f. Display the custom label for the device or circuit reporting the trouble condition on the RAP alphanumeric display.
- g. The Remote Annunciator (RA) provides system status information, Alarm, Trouble & Supervisory LEDs. RA provides Remote System Reset, Alarm Silence and remote Acknowledge switches. RA provides Enable/Disable key

switch. RA display last five events 80 characters and all with low power consumption.

- h. Activate system relay to initiate the transmission of a trouble signal to the Central Station Agency transmitter (Provided by others).

I. One Person System Alarm Device Test

1. The Fire Command Station (FCS) shall permit one person system alarm test. The walk test mode shall be passcode protected, requiring the entry of a minimum four (4) digit passcode before the alarm device test mode is enabled.
2. Fire alarm system addressable devices may be divided into at least eight (8) groups for testing purposes. Putting one (1) group into the walk test mode shall not impair the normal operation of the remaining seven (7) groups.
3. The walk test mode may be enabled for a programmable amount of time up to eight (8) hours. If no devices in the enabled group have been activated during the programmed time, the FCS shall automatically revert to normal system operation.
4. When placed in the walk test mode by authorized personnel:
 - a. The central station agency alarm transmit function shall be bypassed.
 - b. Control relay functions shall be bypassed such as fan shutdown, elevator recall, etc.
 - c. The FCS shall indicate a system trouble condition.
5. When placed in the walk test mode by authorized personnel, activation of any alarm initiating device shall:
 - a. Sound an audible signal on all audible alarm signaling on the floor of alarm initiation for a programmable period, typically five (5) to ten (10) seconds.
 - b. Flash the visual signals on the floor of alarm initiation for a programmable period, typically five (5) to ten (10) seconds.
 - c. Log the alarm condition in the FCS historical trouble log for future review/recall.
 - d. The FCS shall automatically reset the system after each alarm test.

2.3 MATERIALS

A. Fire Command Station (FCS):

The FCS shall be Firecom Model LSN-2000 please contact **(Mr. Rosario Passalacqua at (718) 899-6100)**. The FCS shall be capable of annunciating a minimum of 40,000 addressable points. The operating control switches and status indicators shall be located behind locked with New York City Fire Department Key #2642 steel door and smoke gray, Plexiglas window assembly. The keys shall be made available only to the New York City Fire Department and other authorized operating personnel. All control switches and LED indicators shall be labeled. All zone locations shall be identified, and the panel shall be provided with a set of permanently mounted operating instructions. The panel door and frame assembly shall be steel, with red door finish and suitable for semi-flush mounting. The panel shall contain necessary power supplies, data bus conductors, battery charger and all necessary function modules and components, as necessitated by system functional requirements:

1. GCP-70 Control Panel Module: A master control module shall be provided to act as a central processing unit for the control of the fire alarm system and be capable of supporting 40,000 system points. The master control module shall provide the following indicators and controls:
 - a. 8.4" (Diagonal) Color LCD Display with 640 x 480 Pixel resolution and touchscreen control capability.
 - b. Eighty (80) character alphanumeric display for each alarm condition including forty (40) character individual label for each addressable device.
 - c. Simultaneous display of 4 alarm/supervisory or trouble conditions.
 - d. 1,000 event history log.
 - e. Master acknowledge button for alarm, supervisory, trouble and telephone call-in conditions with 4 "activated" LED indicators.
 - f. Twelve (12) individually programmable switches with "activated" LED indicators.
 - g. Numeric entry keypad
 - h. 9 Liquid Crystal Display control switches
2. MAC-201 Audio Control Module: The dual channel audio control module shall act as the master audio control unit for the voice alarm

system. The module shall contain:

- a. Master Microphone: shall provide a dynamic, paging microphone with a builtin presstotalk switch with five foot (5') coil cord, "Microphone On" LED indicator. Microphone frequency response shall be from 200 Hz. to 4,000 Hz. The microphone shall be supervised for disconnection and have priority over all other signals. Any automatic alarm or inquiry tone shall be overridden by the use of the microphone; the system shall revert back to the automatic tone unless reset or silenced.
 - b. Master Telephone: The Master Telephone shall be a red telephone handset with a five foot (5') coiled line cord and with a telephone to audio interface circuitry.
 - c. "All Page" button with "activated" LED indicator.
 - d. "Stair Page" button with "activated" LED indicator.
 - e. "Telephone Page" button with "activated" LED indicator.
 - f. "Evac Tone On" button with "activated" LED indicator.
 - g. "Alert Tone On" button with "activated" LED indicator.
 - h. Phone to audio interface to permit voice announcements to be made from any remote telephone to any selected speaker circuit(s), under the control of the FCS operator. The FCS shall contain a manual control switch to enable the telephone to audio connection to be made.
3. NY-100 Module: Shall provide the following control switches:
- a. A manual central station alarm transmit toggle switch with snap-action guard.
 - b. A manual fan reset keyswitch.
 - c. A smoke purge "Enable/Disable" keyswitch with NYC Fire Department #1620 keyed cylinder.
4. Fire Sign Module: The "FIRE" sign shall be a backlit, flashing sign with the word "FIRE" in three inch (3") high letters. It shall be used to indicate any fire alarm condition.
5. DCM-41 Display/Control Module: The module shall provide forty (40) switches for the control system devices such as speaker and Warden telephone circuits. Each switch shall also have a two color (red and green) LED indicator to display the "Off/On" status of the circuit or device being controlled.

6. DM-46 Display/control Module: shall contain 40 red/green/blue LEDs with 40 associate membrane switches. Each LEDs/switch shall be individually programmable to indicate the status of a device or group or manually control or disable a device group. Each LED/switch position shall be designed its own unique system address or event such as a time function, group control or disable, or a programmable sequence. When controlling a device, with LED can represent the manual control or true status of the device, color-code to illuminated Red or Green. Typical, Red shall be used to indicate devices in alarm, and Green shall be used to indicate active monitor devices.
7. ACM-32 Display/Control Module: The module shall provide thirty-two (32) switches for the control of system speaker circuits. Each switch shall also have a multi-color LED indicator to display the status of the circuit
 - a. Speaker audio sources or status conditions shall be indicated by the adjacent LED indicator color as follows:
 - 1) Red = Evacuation tone
 - 2) Green = Inquiry tone
 - 3) Blue = Manual page mode
 - 4) White = Normal/standby/no source
 - 5) Yellow/Cyan = Trouble condition
 - b. Module audio source master switches:
 - 1) Evacuation tone
 - 2) Inquiry tone
 - 3) Manual page
 - 4) Public address system microphone
 - 5) Pre-recorded message player
 - 6) Unassigned
 - 7) All sources "off"
7. DCM-8 Display/Control Module: The module shall provide four rotary switches for control of fans and dampers. Each switch shall also have 4 associated LED indicators to display the status of the controlled device or group of devices (On/Open, Off/Closed, Auto/Normal, Trouble)

8. ALM-200-T Addressable Loop Module: The addressable circuit module(s) shall provide one (1) multiple addressable network data communications circuit to enable the FCS to communicate with up to one hundred twenty-six (126) addressable devices. Each addressable data communications circuit shall provide NFPA Standard 72, Style 4, two-wire (Class B), supervised operation. The module shall be readily disconnected for ease of servicing and shall be supervised by the FCS motherboard.
 9. MIO-8 Multiple Input/Output Board: A multifunction module shall be provided to communicate with an addressable circuit and provide up to eight (8) programmable functions as follows:
 - a. Single Style B (two-wire) alarm initiating/supervisory monitor circuit.
 - b. Single Style D (four-wire) alarm initiating/supervisory monitor circuit.
 - c. Dual Style Y (two-wire) signal circuits, each rated at two Amperes (2.0 A) @ 24 VDC.
 - d. Single Style Z (four-wire) signal circuit, rated at two Amperes (2.0 A) @ 24 VDC.
 - e. Single Style Y (two-wire) Warden telephone circuit.
 - f. Single single-pole, double-throw (SPDT) relay contact, rated at five Amperes (5 A.) @ 115 VAC and five Amperes (5 A.) @ 30 VDC.
 10. TP-40 Strip Printer: The FCS shall be provided with a built-in strip printer which shall record alarm condition information in white with a black background and all other system condition information (off-normal, trouble, etc.) in black on a white background. It shall operate from 24 VDC and shall be supported by FCS battery back-up power.
 11. Battery Standby: The FCS shall be provided with adequate battery back-up capability to operate in the standby mode for at least twenty-four (24) hours and to operate in all call alarm mode for at least forty-five (45) minutes at the end of the twenty-four (24) hour standby period.
 12. The FCS shall be provided with an engraved white-core phenolic or bakelite sign (minimum 1" high, white letters on a red background) identifying its function as "FIRE COMMAND STATION", mounted on the upper front of the panel.
- B. Remote Annunciator Panel Shall be Firecom Model RA-41/41P Remote

Annunciator shall provide status information on either a portion or the entire system. The Remote Annunciator shall contain a 80 character (2x40 line) alphanumeric fluorescent display with options to connect a remote printer. The RA-41/41P shall also provide system status LEDs for Alarm, Troubles and Supervisory devices within the system. Push button switches shall provide remote functions for system reset. Alarm Silence and Acknowledge. All push button switches shall be capable of being disabled via a Enabled/disabled key switch. The RA-41/41P shall be mounted on a back box or with a fire command center enclosure.

- C. The FDP-1 flat panel display shall provide status information on either a portion or the entire system. FDP-1 shall contain a touchscreen color LCD. The FDP-1 shall also provide system status indications for alarm. Troubles and Supervisory devices within the system. The FDP-1 shall mount within a Fire Command Center Enclosure.

Model RA-41V7; capable of annunciating all system addressable points. The remote annunciator panel(s) shall communicate with the FCS via a supervised, serial, data communications circuit which shall enable the remote annunciator panel to operate and supervise local LED indicators and monitor local control buttons. The remote annunciator panel(s) shall operate from 24 VDC power supplied by the FCS and shall be provided for semi-flush mounting in finished areas or for surface mounting with matching backbox in unfinished areas (as shown on drawings). The remote annunciator panel(s) shall include the following components and capabilities:

1. An audible signal to indicate system alarm, supervisory and trouble conditions.
2. "Enable/Disable" keyswitch to permit the operation of the annunciator control buttons (key shall be removable only in the "Disabled" position).
3. Eighty (80) character, alphanumeric, vacuum fluorescent (blue) display, providing two (2) lines of forty (40) alphanumeric characters each.
4. "Alarm Condition" LED indicator.
5. "Trouble Condition" LED indicator.
6. "Supervisory Condition" LED indicator.
7. "System Reset" button.

8. "Alarm Silence" button.
9. "Alarm/Supervisory/Trouble Acknowledge" button.

D. Remote Desktop Printer:

Shall be Firecom Model 890 dot matrix, 120 VAC printer; capable of 80 characters per line and print speeds of up to 380 characters per second. It shall record, in black type only, all system events to include type of event, time and date of activation and the assigned nomenclature for the system event.

The Car-2700 Central Audio Rack Shall be capable of providing up to 1000 watts of audio power. The Car-2700 shall have the ability of being a single, dual or three-channel rack. Rack configuration shall be programmed in software. The CAR-2700 shall contain a CAR-2700 Central Audio Motherboard. The CAM-2700 shall contain card slots for a COM-2 Communication card, an AMC-7 Audio Monitor Card, two TGC-7 Tone Generator Card (primary and back-up if required) and an MDX -2 Modular Digital Voice Module (if required) A DIS-1 Display Module can be plugged into the CAM-2700 to assist in serving the rack. The CAR-2700 communication within the LSN-2000 system over the network lines and outputs up to four 250 watts-riser lines. Upon AC failure, the CAR-2700 will go into a degrade mode power and power the amplifier only when a tone or page is required. Multiple racks can be added to the system to increase the number of channels. The Master rack can drive up to three slave rack.

The DAC-2700 Central Audio Rack Shall be capable of providing up to 1000 watts of audio power. The DAC-2700 shall have the ability of being a single, dual or three-channel rack. Rack configuration shall be programmed in software. The DAC-2700 shall contain a CAM-2700 Central Audio Motherboard. The CAM-2700 shall contain card slots for a COM-2 Communication card, an AMC-7 Audio Monitor Card, two TGC-7 Tone Generator Card (primary and back-up if required) and an MDX -2 Modular Digital Voice Module (if required) A DIS-1 Display Module can be plugged into the CAM-2700 to assist in serving the rack. The DAC-2700 communication within the LSN-2000 system over the network lines and outputs up to four 250 watts-riser lines. Upon AC failure, the DAC-2700 will go into a degrade mode power and power the amplifier only when a tone or page is required. Multiple racks can be added to the system to increase the number of channels. The Master rack can drive up to three slave rack

E. Audio Tone/Amplifier Panel/Cabinet:

The Audio Tone/Amplifier Panel/Cabinet shall be Firecom Model ITC-2000/CAR-2700. The panel door and frame assembly shall be steel,

with red finish. The panel shall contain necessary power supplies, data bus conductors, battery charger and all necessary function modules and components, including but not necessarily limited to the following:

1. Tone Generator/Pre-Amp Card shall provide:
 - a. Audio inputs for the master microphone, primary and backup alarm tone generators, primary and backup inquiry tone generators and the telephone to audio interface.
 - b. Audio outputs for Channel 1 and Channel 2.
 - c. Primary and backup tone generator cards for "Slow Whoop" alarm tone and "Horn" alert/inquiry tone.

F. Audio Source unit:

The Fire Alarm / Life Safety System shall be provided with a fully intergraded Emergency Communication system. The Emergency Communication System shall include a paging microphone, digital message playback unit, and fully digitized and multiplexed Audio Channels. A dedicated page(s) mode control switches shall provide the emergency operator with instantaneous one touch paging to safely control the staged evacuation of the building occupants. Automatic programming shall dramatically group the most frequently targeted paging zones. The "ALL CALL" switch will direct the manual page to the entire facility. The "Page to Evac" switch will direct the manual page to those building areas automatically receiving the Evacuation Signal. The "Page to Alert" switch will direct the manual page to those building areas automatically receiving Alert Signal. The "All Call Minus" switch will direct the manual page to those building areas which are programmed to receive the auxiliary and general channel connection such as stairwells. The system shall have paging control switches and LEDs to support specific zone selection as shown on the plans and on by floor basis. The zone control / display shall confirm amplifiers selection and annunciate amplifier and amplifier trouble. The system shall automatically deliver a preannounce tone of 1000 Hz for three seconds when the emergency operator presses the microphone talk key. A "Ready to page" LED shall flash during the preannounce and turn steady when the system is ready for user's page delivery. The system shall include a page deactivation timer, which activates for 3 seconds when the emergency user release the microphone talk key. Should the user subsequently press the microphone key during the deactivation period a page can be delivered immediately. Should the timer complete its cycle the system shall automatically restore emergency signaling and any subsequent paging have end to end UL compliance for 520Hz.

2. 7070-70 AMP Audio Power Amplifiers: The Audio Power Amplifiers shall provide a minimum of seventy watts (70 W), shall be solid state employing silicon transistors exclusively and shall be designed to operate from 24 VDC. The amplifier(s) shall be provided with a 120 VAC to 24 VDC power supply(ies). Each amplifier shall include an amplifier supervisory circuit. Frequency response shall be 50 – 10,000 Hertz and total harmonic distortion to be less than 1% at 1,000 Hertz.
3. 7070-120 AMP Audio Power Amplifiers: The Audio Power Amplifiers shall provide a minimum of one-hundred-twenty watts (120 W), shall be solid state employing silicon transistors exclusively and shall be designed to operate from 24 VDC. The amplifier(s) shall be provided with a 120 VAC to 24 VDC power supply(ies). Each amplifier shall include an amplifier supervisory circuit. Frequency response shall be 50 – 10,000 Hertz and total harmonic distortion to be less than 1% at 1,000 Hertz.
4. 1B3250 Audio Power Amplifiers: The Audio Power Amplifiers shall provide a minimum two hundred-fifty watts (250 W), shall be solid state employing silicon transistors exclusively and shall be designed to operate from 24 VDC. The amplifier(s) shall be provided with a 120 VAC to 24 VDC power supply. Each amplifier shall include an amplifier supervisory circuit. Frequency response shall be 20 – 20,000 Hertz and total harmonic distortion to be less than 0.5% at 1,000 Hertz.
5. Battery Standby: The Audio Tone/Amplifier Panel(s) shall be provided with adequate battery back-up capability to operate in the standby mode for at least twenty-four (24) hours and to operate in all call alarm mode for at least forty five (45) minutes at the end of the twenty-four (24) hour standby period.

G. BMS/Fire Alarm System Interface Panel

The BMS/Fire Alarm System Interface Panel shall permit direct software communication between the two systems utilizing Eshelon Lon Talk communications protocols to permit exchange of information. The panel shall be equipped with input and output boards which shall connect to the BMS data port(s). Each board shall provide the capability to process either fifty (50) software inputs from the BMS to the fire alarm system or fifty (50) software outputs from the fire alarm system to the BMS. The panel shall be provided with adequate battery back-up capability to operate in the standby mode for at least twenty-four (24) hours and to operate in alarm mode for at least forty five (45) minutes at the end of the twenty-four (24) hour standby period.

H. Intelligent Transmission Cabinet (ITC):

Shall be Firecom Model ITC-2001. The panel door and frame assembly

shall be steel, with red finish. The panel shall contain necessary power supplies, data bus conductors, battery charger and all necessary function modules and components, selected from but not necessarily limited to the following:

1. ALB-2-SMT Addressable Loop Board: Each addressable circuit board shall provide one (1) multiple addressable network data communications circuit to enable the ITC to communicate with up to one hundred twenty-six (126) addressable devices. Each addressable data communications circuit shall provide NFPA Standard 72, Style 4, two-wire (Class B) or Style 6, four-wire (Class A), supervised operation. The module shall be readily disconnected for ease of servicing and shall be supervised by the ITC-2001 motherboard.
2. SPK-4A Speaker Card: The speaker circuit module shall provide four (4) independently controllable alarm speaker circuits rated at fifteen Watts (15 W) @ 25 VRMS or thirty Watts (30W) @ 70.7 VRMS. Each circuit may be configured for NFPA Standard 72, Style Y, two-wire (Class B) or Style Z, four-wire (Class A), supervised operation monitoring for opens, shorts or ground faults. Each signal circuit shall be protected by an individual over-current device on the card. The module shall be readily disconnected for ease of servicing and shall be supervised by the ITC-2001 motherboard.
3. SIG-4 Signal Card: The signal circuit module for alarm horns and alarm strobe lights shall provide four (4) independently controllable alarm signal circuits rated at one and one-half Amperes (1.5 A.) @ 24 VDC. Each circuit may be configured for NFPA Standard 72, Style Y, two-wire (Class B) or Style Z, four-wire (Class A), supervised operation monitoring for opens, shorts or ground faults. Each signal circuit shall be protected by an individual over-current device on the card. The module shall be readily disconnected for ease of servicing and shall be supervised by the ITC-2001 motherboard.
4. TEL-8B Warden Telephone Card: The Warden telephone circuit module shall provide eight (8) independently controllable telephone circuits. Each circuit shall be configured for NFPA Standard 72, Style Y, two-wire (Class B) supervised operation monitoring for opens, shorts or ground faults. The module shall be readily disconnected for ease of servicing and shall be supervised by the ITC-2001 motherboard.
5. APB-1 Motherboard: The motherboard shall provide two (2) card slots and all necessary wiring terminals for optional daughter cards (ASPK-8, ATEL-8, CAZ-8 & ARLY-8). It shall be equipped with a 24 VDC power on/off switch with "Power On" LED indicator and AC

fail, low battery and door tamper switch input circuits.

6. ASPK-8 Speaker Card: The speaker circuit card shall provide eight (8) independently controllable alarm speaker circuits rated at fifteen Watts (15 W) @ 25 VRMS or thirty Watts (30W) @ 70.7 VRMS. Each circuit shall provide NFPA Standard 72, Style Y, two-wire (Class B), supervised operation monitoring for opens, shorts or ground faults. Each signal circuit shall be protected by an individual over-current device on the card. The card shall be readily disconnected for ease of servicing and shall be supervised by the APB-1 motherboard.
7. ATEL-8 Telephone Card: The telephone circuit card shall provide eight (8) independently controllable telephone circuits. Each circuit shall be configured for NFPA Standard 72, Style Y, two-wire (Class B) supervised operation monitoring for opens, shorts or ground faults. The card shall be readily disconnected for ease of servicing and shall be supervised by the APB-1 motherboard.
8. Battery Standby: Each ITC shall be provided with adequate battery back-up capability to operate in the standby mode for at least twenty-four (24) hours and to operate in all call alarm mode for at least forty-five (45) minutes at the end of the twenty-four (24) hour standby period.

I. Mini Intelligent Transmission Cabinet (M-ITC):

Shall be Firecom Model ITC-2001. The panel door and frame assembly shall be steel, with red finish. The panel shall contain necessary power supplies, data bus conductors, battery charger and all necessary function modules and components, selected from but not necessarily limited to the following:

1. ALM-100/200 Addressable Loop Module: The addressable circuit module(s) shall provide one (1) addressable data communications circuit to communicate with up to one hundred twenty-six (126) addressable devices or addresses. Each addressable data communications circuit shall provide NFPA Standard 72, Style 4, two-wire (Class B), supervised operation. The module shall be supervised as part of the system network by the FCS CPU via the ALM-101 Network Adapter Board and network data communications circuit.
2. ALM-101 Network Adapter Board: The network adapter board shall provide for connections between the system network data communications circuit and one (1) or more ALM-100/200 Addressable Loop Module(s). It shall have wiring terminals for connection of the system network data communications circuit and 24 VDC power input. It shall provide a ribbon cable connector for

connection to the ALM-100/200 Addressable Loop Module(s).

3. ALB-2-SMT Addressable Loop Board: Each addressable circuit board shall provide one (1) multiple addressable network data communications circuit to enable the ITC to communicate with up to one hundred twenty-six (126) addressable devices. Each addressable data communications circuit shall provide NFPA Standard 72, Style 4, two-wire (Class B) or Style 6, four-wire (Class A), supervised operation. The module shall be readily disconnected for ease of servicing and shall be supervised by the ITC-2001 motherboard.
4. SPK-4A Speaker Card: The speaker circuit module shall provide four (4) independently controllable alarm speaker circuits rated at thirty Watts (30W) @ 25 VRMS or 70.7 VRMS for alarm speaker circuits. Each circuit may be configured for NFPA Standard 72, Style Y, two-wire (Class B) or Style Z, four-wire (Class A), supervised operation monitoring for opens, shorts or ground faults. Each signal circuit shall be protected by an individual over-current device on the card. The module shall be readily disconnected for ease of servicing and shall be supervised by the ITC-2001 motherboard.
5. SIG-4 Signal Card: The signal circuit module for alarm horns and alarm strobe lights shall provide four (4) independently controllable alarm signal circuits rated at one and one-half Amperes (1.5 A.) @ 24 VDC. Each circuit may be configured for NFPA Standard 72, Style Y, two-wire (Class B) or Style Z, four-wire (Class A), supervised operation monitoring for opens, shorts or ground faults. Each signal circuit shall be protected by an individual over-current device on the card. The module shall be readily disconnected for ease of servicing and shall be supervised by the ITC-2001 motherboard.
6. TEL-8B Warden Telephone Card: The Warden telephone circuit module shall provide eight (8) independently controllable telephone circuits. Each circuit shall be configured for NFPA Standard 72, Style Y, two-wire (Class B) supervised operation monitoring for opens, shorts or ground faults. The module shall be readily disconnected for ease of servicing and shall be supervised by the ITC-2001 motherboard.
7. APB-1 Motherboard: The motherboard shall provide two (2) card slots and all necessary wiring terminals for optional daughter cards (ASPK-8, ATEL-8, CAZ-8 & ARLY-8). It shall be equipped with a 24 VDC power on/off switch with "Power On" LED indicator and AC fail, low battery and door tamper switch input circuits.
8. ASPK-8 Speaker Card: The speaker circuit card shall provide eight (8) independently controllable alarm speaker circuits rated at fifteen

Watts (15 W) @ 25 VRMS or thirty Watts (30W) @ 70.7 VRMS for alarm speakers. Each circuit shall provide NFPA Standard 72, Style Y, two-wire (Class B), supervised operation monitoring for opens, shorts or ground faults. Each signal circuit shall be protected by an individual over-current device on the card. The card shall be readily disconnected for ease of servicing and shall be supervised by the APB-1 motherboard.

9. ATEL-8 Telephone Card: The telephone circuit card shall provide eight (8) independently controllable telephone circuits. Each circuit shall be configured for NFPA Standard 72, Style Y, two-wire (Class B) supervised operation monitoring for opens, shorts or ground faults. The card shall be readily disconnected for ease of servicing and shall be supervised by the APB-1 motherboard.
10. ARLY-8 Relay Driver Card: The relay driver card shall provide eight (8) independently controllable relay control circuits. Each circuit shall be rated for up to 125 mA @ 24 VDC. Each circuit shall provide NFPA Standard 72, Style Y, two-wire (Class B), supervised operation monitoring for opens, shorts or ground faults between the card and the relay coil input that it controls. Each control circuit shall be protected by an individual over-current device on the card. The module shall be readily disconnected for ease of servicing and shall be supervised by the APB-1 motherboard.
11. Battery Standby: Each ITC shall be provided with adequate battery back-up capability to operate in the standby mode for at least twenty-four (24) hours and to operate in all call alarm mode for at least forty-five (45) minutes at the end of the twenty-four (24) hour standby period.

J. Addressable Manual Fire Alarm Stations

Shall be Firecom Model FSG-32SK2/F900-943 single action manual station with addressable monitor module. The station shall be of cast metal construction with normally open, single-pole, single-throw (SPST) general alarm contact. The station shall be painted with a one inch (1") wide white stripe running diagonally from the upper left corner to the lower right corner. The station shall be furnished for semi-flush mounting in finished areas or surface mounting with matching backbox in unfinished areas (where shown on drawings).

K. Addressable Manual Fire Alarm Stations

Shall be Firecom Model FSG-32SK1 double action manual station with addressable "Mini" monitor module. The station shall be of cast metal construction with normally open, single-pole, single-throw (SPST) general alarm contact. The station shall be provided with a trim plate painted with a one inch (1") wide white stripe running diagonally from the upper left corner to the lower right corner. The station shall be furnished for

semi-flush mounting in finished areas or surface mounting with matching backbox in unfinished areas (where shown on drawings).

L. Photoelectric Area Smoke Sensors

Shall be Firecom Model F900-650 addressable, two-wire, 24VDC, photoelectric type. Each sensor shall utilize solid state components and shall be equipped with a fully regulated LED light source for long life reliability, a thirty (30) mesh insect screen and remote alarm LED output and shall obtain its operating power from the addressable data communications circuit wiring. Sensors shall be two part, base and head, with replaceable smoke sensor head for ease of maintenance and cleaning. Sensors shall provide four (4) levels of sensitivity, which shall be set at the Fire Command Station (FCS). The sensors shall indicate the need for cleaning at the FCS via a "Dirty" indication with audible signal. Sensors shall be provided with power-on/alarm led indicator and a surface mount, addressable base assembly. Smoke sensor trouble conditions shall also be reported to the FCS. Base assemblies shall provide for sensor twist-in capability.

M. Ionization Area Smoke Sensors

Shall be Firecom Model F900-550 addressable, two-wire, 24VDC, ionization type. Each sensor shall utilize solid state components and shall be equipped with an ionization sensing chamber, a thirty (30) mesh insect screen and remote alarm LED output and shall obtain its operating power from the addressable data communications circuit wiring. Sensors shall be two part, base and head, with replaceable smoke sensor head for ease of maintenance and cleaning. Sensors shall provide four (4) levels of sensitivity, which shall be set at the Fire Command Station (FCS). The sensors shall indicate the need for cleaning at the FCS via a "Dirty" indication with audible signal. Sensors shall be provided with power-on/alarm led indicator and a surface mount, addressable base assembly. Smoke sensor trouble conditions shall also be reported to the FCS. Base assemblies shall provide for sensor twist-in capability.

N. Guest Room Photoelectric Area Smoke Sensors

Shall be Firecom Model F900-650 addressable, two-wire, 24VDC, photoelectric type. Each sensor shall utilize solid state components and shall be equipped with a fully regulated LED light source for long life reliability, a thirty (30) mesh insect screen and remote alarm LED output and shall obtain its operating power from the addressable data communications circuit wiring. Sensors shall be two part, base and head, with replaceable smoke sensor head for ease of maintenance and cleaning. Sensors shall provide four (4) levels of sensitivity, which shall be set at the Fire Command Station (FCS). The sensors shall indicate the need for cleaning at the FCS via a "Dirty" indication with audible signal. Sensors shall be provided with power-on/alarm led indicator and a surface mount, addressable base assembly. The base assembly shall contain a

24 VDC, alarm sounder which is capable of producing an alarm sound level of 85 Db at 10 feet. The sounder base shall draw its power from the FCS/ITC via a separate 24VDC power circuit. Smoke sensor trouble conditions shall also be reported to the FCS. Base assemblies shall provide for sensor twist-in capability.

O. Duct Smoke Sensors

Shall be Firecom Model F900-AA addressable, two-wire, 24VDC, photoelectric type. Each sensor shall utilize solid state components and shall be equipped with a fully regulated LED light source for long life reliability, a thirty (30) mesh insect screen and remote alarm LED output and shall obtain its operating power from the addressable data communications circuit wiring. Sensors shall be two part, base and head, with replaceable smoke sensor head for ease of maintenance and cleaning. Sensors shall be provided with power-on/alarm led indicator and addressable base assembly. Base assemblies shall provide for sensor twist-in capability. The sensor head/base shall be provided in a steel housing backbox with clear plastic cover, reference tube and sampling tube, sized according to duct width. Duct housings shall permit the sensor to sample duct air velocities of from 500 to 4,000 feet per minute. Sensors shall provide four (4) levels of sensitivity, which shall be set at the Fire Command Station (FCS). The sensors shall indicate the need for cleaning at the FCS via a "Dirty" indication with audible signal. Smoke sensor trouble conditions shall also be reported to the FCS. When the built-in detector alarm LED indicator is not easily visible, provide Firecom Model FMS-RA Remote red alarm LED on a single gang plate (surface or flush mounted).

P. Beam Smoke Detectors

Shall be photoelectric, four-wire, 24 VDC transmitter and receiver (beam type) smoke detector, and shall be field adjustable to U.L. Standards for sensitivity (25%, 35% or 50% beam obscuration). The transmitter unit shall utilize a modulated, solid-state infrared (IR) beam source, which shall provide RFI immunity of 10V/m @ 1KHz-1GHz. The detector receiver shall provide automatic gain control circuitry to adjust for dirt accumulation on the lens and component aging and also be able to discriminate between smoke obscuration and beam interruption. The detector shall utilize solid-state components for long life reliability and provide a range of from thirty feet (30') to three hundred thirty feet (330') with the beam transmitter and receiver optics being adjustable. Maximum parallel, beam-to-beam dimension shall be sixty feet (60'). Maximum distance from a wall parallel to the beam shall be thirty feet (30'). Detectors shall be listed for U.L. Standard 268.

Q. Heat Detectors

Shall be Firecom Model F900-450 twowire, 24VDC, 135° F fixed

temperature detector. Heat detector shall utilize an electronic thermistor heat sensing element to sense its rated fixed alarm temperature. Heat detector shall be resettable after reporting an alarm condition with an alarm LED indicator. Heat detector shall utilize solid state components and shall be U.L. Standard 521 listed for a coverage of up to 625 square feet, installed 25 feet on center. Heat detectors shall be provided with, low profile, surface mount, base assembly and screw terminals for all connections. Base assemblies shall provide for detector twist-in mounting.

R. High Temperature Heat Detectors

Shall be Firecom Model DT200CS, 200° F., conventional, rate compensation and fixed temperature heat detector. The high temperature heat detector shall be provided with and connected to a system addressable monitor module, mounted outside the high temperature space. Heat detector shall be self restoring after reporting an alarm condition. Heat detector shall be U.L. Standard 521 listed for a coverage of up to 2,500 square feet, installed 50 feet on center. Heat detectors shall be provided with, low profile, surface mount, base assembly and screw terminals for all connections.

S. High Temperature Heat Detectors (Non-restoring)

Shall be Firecom Model 284B, 194° F., conventional, fixed temperature only heat detector. The high temperature heat detector shall be provided with and connected to a system addressable monitor module, mounted outside the high temperature space. Heat detector shall be self restoring after reporting an alarm condition. Heat detector shall be U.L. Standard 521 listed for a coverage of up to 625 square feet, installed 25 feet on center. Heat detectors shall be provided with, low profile, surface mount, base assembly and screw terminals for all connections.

T. Addressable Monitor Modules

Shall be Firecom Model F900-805 (single circuit) or Model F900-790 (dual circuit) and shall consist of a printed circuit board with discrete circuitry for monitoring normally-open dry contacts using NFPA Standard 72, Style B, two-wire (Class B) or Style D, four-wire (Class A) circuit supervision. The module and its associated monitor circuit(s) shall respond to polling signals from the FCS/ITC and shall report alarm initiating/supervisory circuit status changes to it. The addressable monitor module shall draw its power from the addressable data communications circuit. The monitor module shall be mounted on a four inch (4") standard backbox and shall be provided for flush mounting in finished areas or surface mounting in unfinished areas (where shown on the drawings).

U. Addressable Combination Monitor Circuit and Control Relay Modules

Shall be Firecom Model F900-820 shall consist of a printed circuit board

providing one (1) monitor circuit and one (1) control relay. The monitor circuit shall be capable of monitoring normally-open dry contacts using NFPA Standard 72, Style B, two-wire (Class B) or Style D, four-wire (Class A) circuit supervision. The module and its associated monitor circuit shall respond to polling signals from the FCC/ITC and shall report alarm initiating/supervisory circuit status changes to it. The individually addressable control relay shall provide single-pole, double-throw (SPDT) contacts rated at one-half Ampere (.5A) @120VAC (resistive) and one Ampere (1.0A.) @ 24 VDC (resistive). The control relay shall respond to control signals from the FCS/ITC. The module shall draw its power from the addressable data communications circuit. The module shall be mounted on a four inch (4") standard backbox and shall be provided for flush mounting in finished areas or surface mounting in unfinished areas (where shown on the drawings).

V. Addressable Combination Monitor Circuit and Control Relay Modules

Shall be Firecom Model F900-821 shall consist of a printed circuit board providing one (1) monitor circuit and one (1) control relay. The monitor circuit shall be capable of monitoring normally-open dry contacts using NFPA Standard 72, Style B, two-wire (Class B) or Style D, four-wire (Class A) circuit supervision. The module and its associated monitor circuit shall respond to polling signals from the FCC/ITC and shall report alarm initiating/supervisory circuit status changes to it. The individually addressable control relay shall provide single-pole, double-throw (SPDT) contacts rated at four Amperes (4.0A) @120VAC (resistive) and four Amperes (4.0A.) @ 24 VDC (resistive). The control relay shall respond to control signals from the FCS/ITC. The module shall draw its power from the addressable data communications circuit. The module shall be mounted on a four inch (4") standard backbox and shall be provided for flush mounting in finished areas or surface mounting in unfinished areas (where shown on the drawings).

W. Addressable Signal Circuit/Relay Control Modules

Shall be Firecom Model F900-825 and shall consist of printed circuit board with discrete circuitry for controlling one (1) individually controllable signal/relay circuit rated at one Ampere (1.0 A) @ 24 VDC. Each circuit may be configured for NFPA Standard 72, Style Y, two-wire (Class B) or Style Z, four-wire (Class A) supervised operation monitoring for opens, shorts or ground faults. Each signal/relay circuit shall be protected by an individual short circuit sensing device on the circuit board. The signal circuit/relay control module shall respond to control signals from the FCS/ITC. The signal circuit/relay control module shall draw its power from the FCS/ITC via a separate 24VDC power circuit. The module shall be mounted on a four inch (4") standard backbox and shall be provided for flush mounting in finished areas or surface mounting in unfinished areas (where shown on the drawings).

X. Load Interface Relays

Shall be Firecom Model FMR-201/C/R and shall consist of multi-voltage coil (24 VDC, 24 VAC, 115 VAC and 230 VAC) relay with double-pole, double throw (DPDT) control contacts rated at ten Amperes (10 A.) @ 115 VAC. The load relay shall be provided in a surface mounted, red, metal enclosure and an "activated" LED indicator visible through the enclosure.

Y. Alarm Speaker/Alarm Strobe Light Combination Units (Wall Mount)

Shall be Firecom E70-24MCW Series. The alarm speaker/strobe faceplate/grille shall be red. The alarm speaker component shall operate at 25 or 70 VRMS with multiple wattage taps (1/8, 1/4, 1/2, 1 and 2 watts) and shall provide a minimum sound output (as per U.L. Standard 1480), at the one Watt (1 W) tap, of eighty-five decibels at ten feet (85db@10'). The alarm strobe light component shall operate at 24 VDC and shall be a 1.0 Hertz, Xenon strobe light with a selectable output of 15, 30, 75 or 110 Candela (as per U.L. Standard 1971) in a clear, polycarbonate lens mounted on the faceplate/grille. The word "FIRE" shall be imprinted in white in one-half inch (1/2") high letters, on the red faceplate/grille. The combination speaker-strobe unit shall be furnished for semi-flush mounting in finished areas or surface mounting with matching backbox in unfinished areas (where shown on the drawings). Synchronized alarm strobe lights shall be provided.

Z. Alarm Speaker/Alarm Strobe Light Combination Units (Ceiling Mount)

Shall be Firecom E90-24MCC Series. The alarm speaker/strobe faceplate/grille shall be white. The alarm speaker component shall operate at 25 or 70 VRMS with multiple wattage taps (1/8, 1/4, 1/2, 1 and 2 watts) and shall provide a minimum sound output (as per U.L. Standard 1480), at the one Watt (1 W) tap, of eighty-five decibels at ten feet (85db@10'). The alarm strobe light component shall operate at 24 VDC and shall be a 1.0 Hertz, Xenon strobe light with a selectable output of 15, 30, 75 or 95 Candela (as per U.L. Standard 1971) in a clear, polycarbonate lens mounted on the faceplate/grille. The word "FIRE" shall be imprinted in red in one-half inch (1/2") high letters, on the white faceplate/grille. The combination speaker-strobe unit shall be furnished for ceiling mounting (where shown on the drawings). Synchronized alarm strobe lights shall be provided.

AA. Alarm Strobe Lights

Shall be Firecom RSS-MCW Series. The alarm strobe light shall be a 1.0 Hertz, Xenon strobe light, operate at 24 VDC and have a selectable output of 15, 30, 75 or 110 Candela (as per U.L. Standard 1971) with a clear, polycarbonate lens mounted on a red faceplate. The word "FIRE" shall be imprinted in white, one-half inch (1/2") high letters on the front of the alarm strobe light faceplate. The alarm strobe light shall be furnished for

semi-flush mounting in finished areas or surface mounting in unfinished areas (where shown on the drawings). Synchronized alarm strobe lights shall be provided.

BB. Alarm Speakers

Shall be Firecom FE70 Series. The speaker shall have a red faceplate/grille and operate at 25 or 70 VRMS with multiple wattage taps (1/8, 1/4, 1/2, 1 and 2 watts) and shall provide a minimum sound output (as per U.L. Standard 1480), at the one Watt (1 W) tap, of eight-five decibels at ten feet (85db@10'). The speakers shall be furnished for semi-flush mounting in finished areas or surface mounting with matching backbox in unfinished areas (where shown on the drawings).

CC. Warden Telephones/Addressable Warden Stations

Shall be Firecom Model WS-100-P with magnetically latched door and handset with armored cable. The Warden telephone shall have a "call connected" LED indicator. The telephone shall be furnished for semi-flush mounting in finished areas or surface mounting in unfinished areas (where shown on drawings).

WS-100-A Series: Addressable Firefighter's Telephone Stations are designed For the Firecom Life Safety Communication systems. The Firefighter Telephone is used to establish emergency verbal communication between a Firefighter Telephone and the Fire Command Center (FCC). When electronically authorize by the FCC, the WS -100-A Firefighter's Telephone Station can also be connected to the floor public address system for emergency announcements. A "Pull TO CALL" switch and an "IN USE" Led talk indicator that lights when communication is established are incorporated. All models house a red telephone handset with a stainless armored cable. Surface and flush options are available in a magnetic pull down version.

WS-100-A2 Series: Addressable Firefighters Telephone Station with 2-Zone Module designed for use with the Firecom Life Safety Communication System. The Firefighter Telephone is used to establish emergency verbal communication between a Firefighter Telephone and the Fire Command Center (FCC). The Telephone station also incorporates a 2 input addressable module for monitoring two inputs such as Waterflow and Tamper Switch. When electrically authorized by the FCC, WS-100-A2 Firefighter's Telephone Station can also be connected to the floor public address system for emergency announcements. A "Pull TO CALL" switch and an "IN USE" Led talk indicator that lights when communication is established are incorporated. All models house a red telephone handset with a stainless armored cable. Surface and flush options are available in a magnetic pull down version.

DD. Firefighter Telephones

The WS-100-P Series Firefighter's Telephone Stations are designed for use with the Firecom Life Safety Communication System. The Firefighter's Telephone is used to establish emergency verbal communication between a Firefighter's Telephone and the Fire Command Center (FCC). When electronically authorized by the FCC, the WS-100-P Firefighter's Telephone Station can also be connected to the floor public address system for emergency announcements. A "Pull to Call" switch and an "IN USE LED" indicator that lights when communication is established is incorporated. All models house a red telephone handset with stainless steel armored cable. Surface and flush options are available in both the magnetic pull down and break glass version.

EE. Magnetic Door Holders

Shall be Firecom Model FDHF-24120-C magnetic door holder. It shall operate from 24 VDC, 24 VAC or 120 VAC with a current load of fifteen milliamperes (.015 ma.). It shall provide a holding force of thirty-five pounds (35 lbs.) and shall be provided with a brushed chrome finish for semi-flush mounting.

FF. Fire Alarm System Fused Cut-out(s)

The Contractor shall provide an individual cartridge fused cut-out panel with a minimum of two (2) poles and a removable, solid copper, neutral bar in fuse gap for the FCS, central audio rack and the ITC's.

1. Fused cut-outs shall be provided with silver sand fuses, current limiting type with an interrupting capacity rating of 200,000 amps (r.m.s. symmetrical). The size of the fuses shall be thirty amperes (30.0A).
2. The fused cut-out panel shall bear an engraved white-core phenolic or bakelite identification nameplate stating in minimum one-quarter inch (1/4") high white letters on a red background "FIRE ALARM FUSED CUT-OUT".
3. A three (3) wire feeder shall bring two phase 120/208 volt service to the fused cut-out. The feeder shall be tapped off the main building service ahead of the main service switch but after the Current Transformers (Metering Transformers).

GG. Fire Alarm System Fused Disconnect Switch(es)

The primary source of power and the secondary source of power shall each be provided with a means of disconnect from the fire alarm system. Each disconnect shall consist of a fused disconnect switch, locked in the ON position with key kept on premises accessible only to authorized personnel. Such disconnect shall be painted red and permanently identified as fire alarm circuit and labeled as to system/location served,

with a means of interrupting the unfused neutral and all ungrounded conductors. For buildings served at up to 300 volts to ground, the service voltage shall be transformed to 120/208 volts and a fire alarm fused disconnect provided within a circuit length of ten 3.05 m (10 ft.), shall be connected at the transformer secondary on the 120/208 volt side. The fire alarm system fused disconnect switch on the transformer secondary side shall comply with the requirements of the primary and secondary power source fused disconnect switches specified above. Fused cutouts shall be provided where multiple circuits are required to support the fire alarm system and related auxiliaries mounted in a fused cutout panel suitable for the number of circuits needed. The Contractor shall provide an individual cartridge fused cut-out panel with three (3) poles and a removable, solid copper, neutral bar in fuse gap for the FCS, remote Data Gathering Panels (DGPs), booster power supplies and other fire alarm equipment. Fused cut-outs shall be provided with silver sand fuses, current limiting type with an interrupting capacity rating of 200,000 amps (r.m.s. symmetrical). The size of the fuses shall be sized appropriately but be thirty (30) amperes minimum. The fused cut-out panel shall bear an engraved white-core phenolic or bakelite identification nameplate stating in minimum one-quarter inch (1/4") high white letters on a red background "FIRE ALARM FUSED CUT-OUT". A four (4) wire feeder shall bring three phase 120/208 volt service to the fused cut-out. The feeder shall be tapped off the main building service ahead of the main service switch but after the Current Transformers (Metering Transformers).

HH. Carbon Monoxide Detector (120 VAC)

The carbon monoxide (CO) detector shall be BRK Model CO5120BN, Kidde Model KN-COP-IC or approved equal. The single-station, 120 VAC, detector shall include sensing and alarm indications of carbon monoxide. The carbon monoxide (CO) detector shall utilize an electro-chemical, semi-conductor CO sensing element, have a distinct, 85 dB (at ten feet) "CO alarm" signal and a "CO alarm" LED indicator. The CO detector shall be able to be interconnected with other like units, so that activation of a CO alarm shall sound the audible signal in all other units, which are connected to it. The detector shall normally operate from hard-wired 120 VAC and shall be provided with 9 Volt battery backup. A distinct "low battery" audible signal ("chirp") shall sound when the battery needs to be replaced. The detector shall be listed for U.L. Standard 2075.

II. Combination Smoke and Carbon Monoxide Detector (120 VAC)

The combination smoke and CO detector shall be BRK Model SC9120B, Kidde Model KN-COSM-IB or approved equal. The single-station, 120 VAC, combination detector shall include sensing and alarm indications of both smoke and carbon monoxide. The smoke detector portion of the unit shall utilize an ionization smoke sensing element, have a distinct, 85 dB (at ten feet) "smoke alarm" signal and a "smoke alarm" LED indicator. The

carbon monoxide (CO) detector portion of the unit shall utilize an electro-chemical, semi-conductor CO sensing element, have a distinct, 85 dB (at ten feet) "CO alarm" signal and a "CO alarm" LED indicator. The combination detector shall be able to be interconnected with other like units, so that activation of either a smoke or CO alarm shall sound the appropriate audible signal (smoke or CO) in all other units, which are connected to it. The combination detector shall normally operate from hard-wired 120 VAC and shall be provided with 9 Volt battery back-up. A distinct "low battery" audible signal ("chirp") shall sound when the battery needs to be replaced. The combination detector shall be U.L. Listed for the applicable standards, U.L. 217 for the smoke detector and U.L. 2075 for the CO detector.

JJ. Sleeping Room Smoke Detector and CO Detection:

Provide combination intelligent addressable photoelectric smoke and carbon Monoxide (CO) detector with 82dB (per UL464) audible base for installation inside each sleeping room and as indicated on the project plans. The "Sleeping Rooms" smoke and CO detection devices shall be fully addressable with a built in sounder. The detector shall be arranged so that the fire alarm condition shall sound the internal horn at a Low Frequency 520Hz Temporal 3 pattern and a Carbon Monoxide condition shall sound the temporal 4 pattern per NFPA 720. All sounders within the dwelling shall sound together in tandem at the same temporal rate. The CO fire alarm control panel shall be UL2017 listed for general purpose signaling. The CO detector shall also be UL2075 listed and provide the panel with "End OF Life" signal for the CO element and the CO element of the detector shall be field replaceable. Systems using central intelligence for alarm decisions shall not be acceptable. A smoke alarm or CO detector alarm from the sleeping room detector shall not cause automatic building alarm; rather indicate the alarm condition at the main fire alarm panel and at designated remote displays. The CO detector shall report as a address to the fire alarm control panel and be treated as a supervisory signal. Rooms that include more then one detector (i.e. a single living space with two or more smoke/co detector) shall be arranged so that all detectors within the space shall activate their built-in sounder in a common alarm fashion (if one detector alarms, the sounder from all detectors shall sound in the space). At the appropriate temporal rate (temporal 3 or temporal 4). The detector shall continually monitor any changes in sensitivity due to environmental effects of dirt, smoke, temperature, aging and humidity. The percent smoke obscuration per foot alarm set point shall be field selectable to any of five sensitivity setting ranging from .99% to 3% sleeping rooms designated handicapped accessible, shall include a wall mounted strobe light meeting ADA code that that is activated by the building alarm AND by the in room smoke detector. The fire alarm vendor shall provide control module(s) arranged so that rooms addressable smoke detectors can activate the strobe in associated guest rooms addressable smoke detectors can activate the strobe in the associated guest room independent of the building strobe

devices.

- KK. Low Frequency Audible Detector Mounting provided low frequency 520Hz audible detector mounting bases suitable for mounting on 4" square x 1/8" (54mm) deep box. The audible base shall produce tone sound with-in the frequency range of 520Hz 10% square wave tone. The operational of the audible base shall be controlled by its respective detector processor or under program control as required by the application. The base shall support all LSN detector types and be capable of single or group operation. The audible base shall emit a temporal 3 alarm tone and/or temporal 4 tone. The audible bases shall be UL268 AND UL464 Listed as a system, and nominal sound level shall be 87dBa in anechoic chamber and 80dBa in reverberant room, Listed. All low frequency sounder bases audible temporal 3 tone shall be synchronized throughout the facility.

LL. 120 VAC CO Detector Interface Relay

Shall be BRK Model RM4 Relay or approved equal. The relay shall consist of a 120 VAC coil with a single-pole, double throw (SPDT) control contact rated at fifteen Amperes (15 A.) @ 115 VAC. The relay shall be provided in a plastic wrapped package with coil and contact connection wire pigtails.

- MM. The F900-MB-6CO Analog Addressable CO Sounder Base is a combination carbon monoxide (CO) detector and sounder base. It is designed to be used as a stand alone device or with the addition of Firecom F900 or F1000 Series analog addressable smoke, heat or multi sensor detectors. The CO sounder base sounds a temporal 3 sound for smoke detection and a temporal 4 sound for carbon monoxide detection. The integral is capable of producing an 85db tone at 10 feet. The CO Sounder Base Powered by a UL listed Notification Appliance Circuit, and may be synchronized with Other CO Sounder Bases using appropriate synchronization modules.

PART 3 - EXECUTION

3.1 DELIVERY, STORAGE AND HANDLING

- A. Receive and store all material and equipment necessary to the completion of the project.
- B. Store fire alarm equipment in a clean, dry place. Protect from weather, dirt, fumes, water, construction debris, and physical damage.
- C. Handle fire alarm equipment carefully to prevent damage, breaking, and scoring. Do not install damaged equipment or components; replace with

new.

3.2 INSTALLATION

- A. The entire system shall be installed in a workmanlike manner, in accordance with approved manufacturer's wiring diagrams. Furnish all conduit, wiring, outlet boxes, junction boxes, cabinets, fused cut-out(s) and similar devices necessary for the complete installation.
- B. System Software Programming and Labeling
 - 1. Subsequent to equipment approval and prior to software programming of the FCS, a representative of the equipment manufacturer shall meet with a representative of the Owner to establish a schedule of the custom labels for each addressable device and/or circuit to be displayed on the alphanumeric display of the FCS.
 - 2. Subsequent to equipment approval and prior to labeling of control switches and LED indicators at the FCS, a representative of the equipment manufacturer shall meet with a representative of the Owner to establish a schedule of the labels to be provided for each control switch and LED indicator at the FCS.

C. Manual Fire Alarm Stations

- 1. Furnish and install manual fire alarm stations, where shown on the drawings.
- 2. Manual fire alarm stations shall be mounted with their operating handles 48" above the finished floor.
- 3. When manual fire alarm stations are to be surface mounted, matching red backboxes shall be provided by the equipment manufacturer.

D. Area Smoke Sensors

- 1. Furnish and install area type smoke sensors at locations where shown on the drawings or called for in the specifications.
- 2. These smoke sensors shall be surface or semi-flush mounted at designated locations.
- 3. In general, these sensors will be mounted semi-flush in ceilings or surface in exposed construction areas. Furnish and install a suitable surface or semi-flush backbox to which the sensor or detector will be mounted.
- 4. Smoke sensors shall be installed no closer than five feet (5.0') from air registers.

5. Do not install smoke sensor heads until the work (including cleaning) of all trades in the area has been completed. Protect installed smoke sensor/detector heads from airborne dust and debris. Any sensor/detector cleaning costs, necessitated by failure to protect the smoke sensor or detector heads, shall be done at no additional cost.

E. Duct Smoke Sensors

1. Furnish the duct smoke sensors, where shown on the drawings or called for in the specifications.
2. Coordinate with the Mechanical Contractor (sheet metal tradesman) for the installation of the duct smoke sensor housings.
3. The Mechanical Contractor (sheet metal tradesman) is to provide holes in the ductwork for duct smoke sensor sampling and reference tubes, where shown on the HVAC drawings.
4. The Mechanical Contractor (sheet metal tradesman) is to provide the actual installation of the duct smoke sensor housings and sampling and reference tubes on and into the ductwork, where shown on the HVAC drawings.
5. All sampling and reference tubes shall be cut 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.
6. Consult the HVAC drawings for locations of the duct smoke sensors, in order to provide adequate conduit, wiring and connections.
7. Do not install duct smoke sensor heads until the work (including cleaning) of all trades in the building has been completed and the air handling systems have been run for a minimum of four (4) hours. Protect all installed duct smoke sensor heads from duct airborne dust and debris, with plastic bags, until the final acceptance test. Any sensor cleaning costs, necessitated by failure to protect the duct smoke sensor heads, shall be done at no additional cost.

F. Visual Alarm Indicating Devices (Alarm Strobe Lights And Combination Assemblies)

1. Furnish and install visual alarm indicating devices, where shown on the drawings.
2. The centerline of an alarm strobe light and/or the centerline of the alarm strobe light component of an audio/visual combination assembly shall be located eighty inches above the finished floor

(80" AFF). Final location as coordinated with architect. Do not install unless approval is granted.

G. Wiring

1. All wiring shall be:
 - a. 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.
 - b. Copper conductors only. Aluminum conductors or copper clad, plated or coated aluminum conductors shall not be acceptable.
 - c. Color coded throughout.
 - d. In conformance with the applicable New York City and National Electrical Code standards.
 - e. Approved by the New York City Fire Department and New York City Building Department.
 - f. A minimum of No. 16 A.W.G., unless otherwise noted.
 - g. Teflon insulated, 200°C rating minimum. Cable to include marking for NYC approval.
2. All wires shall 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 fused cut-out, the FCS, the amplifier cabinet and each system ITC 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 conduit.
4. Circuit wiring from the FCS to the remote annunciator panel shall be a minimum of as follows:
 - a. Data communications wiring to the remote annunciator panel(s): Two (2) No. 16 A.W.G., twisted, copper conductors.
 - b. 24 VDC Power wiring to the remote annunciator panel(s): Two (2) No. 14 A.W.G., copper conductors.
5. Riser "trunk" circuit wiring from the FCS to the central amplifier rack and from the central amplifier rack to the ITC's shall be a minimum

of as follows:

- a. Network data communications circuits: Two (2) cables with two (2) No. 16 A.W.G. twisted, copper conductors.
 - b. Microphone riser circuit: One (1) cable with two (2) No. 16 A.W.G., twisted and shielded, copper conductors.
 - c. Alarm speaker riser circuit(s): One (1) cable with two (2) No. 14 A.W.G., twisted, copper conductors for each central 250 Watt amplifier provided.
 - d. Warden telephone riser circuit: One (1) cable with two (2) No. 16 A.W.G., twisted and shielded, copper conductors.
 - e. Spare riser circuit(s): One (1) cable with two (2) No. 14 A.W.G., twisted, copper conductors and one (1) cable with two (2) No. 16 A.W.G., twisted, copper conductors.
6. Circuit wiring from the FCS or ITC's to the system peripheral equipment shall be a minimum of as follows:
- a. Each addressable data communications circuit: One (1) cable with two (2) No. 16 A.W.G. twisted, copper conductors.
 - b. Each addressable control relay module 24 VDC power: Two (2) No. 14 A.W.G. conductors in addition to data communications circuit mentioned in 5. a. above.
 - c. Each addressable monitor module circuit for alarm initiating, supervisory or status monitoring: Two (2) No. 16 A.W.G., copper conductors.
 - d. Each alarm speaker circuit: One (1) cable with two (2) No. 16 A.W.G., twisted and shielded, copper conductors.
 - e. Each alarm strobe light circuit: Two (2) No. 14 A.W.G., copper conductors.
 - f. Each Warden telephone circuit: One (1) cable with two (2) No. 16 A.W.G., twisted and shielded, copper conductors.
7. Wiring For Elevator Emergency Recall Operation
- a. Provide addressable control relay modules to enable the fire alarm system to initiate elevator emergency recall operation. Also provide conduit, wiring and final electrical connections between the control relay modules terminals and the elevator control equipment terminals as designated by the Elevator Contractor.
8. Connections to the central station agency transmitter (Provided by

others)

- a. Provide addressable control relay modules to enable the fire alarm system to initiate transmission of system alarm, supervisory, trouble, etc. conditions to the central station agency transmitter. Also provide conduit, wiring and final electrical connections between the control relay modules terminals and the transmitter terminals as designated by the central station agency personnel.

H. Conduit And Raceways

1. All wiring shall be installed in accordance with the NYC Building Code, NFPA 72 (2002 Edition) as modified by Appendix Q of the NYC Building Code and NYC Electrical Code.
 2. 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.
 3. All penetrations of floor slabs and fire walls shall be fire stopped in accordance with all local fire codes.
 4. 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.
 5. Conduits serving the Fire Command Station (FCS) shall only enter the sides or bottom of the FCS cabinet(s). Conduits shall not enter the top of the FCS cabinet(s).
- I. The system shall be arranged to receive power from three phase/fourwire, 30 Ampere, 120/208 volt, 60 cycle alternating current supply through fused cut-out with emergency generator backup through dedicated fire alarm system automatic transfer switch. All low voltage operation shall be provided from the FCS and ITC's. Risers of 120V shall be provided for all ITC panels or remote strobe panels and system peripherals and auxiliaries (i.e., smoke dampers).
 - J. End of line devices (resistors, diodes, capacitors, etc.) shall be furnished as required for mounting as directed by the manufacturer.

- K. The manufacturer's technical representative shall provide the following field services:
1. A list of addressable device address numbers, for each addressable circuit, for setting by the Electrical Contractor.
 2. Program the FCS central processing unit (CPU).
 3. Supervise all final connections between system control equipment and the field peripheral equipment circuit wiring.
 4. Prepare, adjust and start system prior to testing.

3.3 CLEAN UP

- A. Upon completion of the installation, all debris created by the installation shall be removed from the premises or disposed of as directed by the Owner.

3.4 TESTS

- A. 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 listed in 3.4.C. Any system, equipment or wiring failures discovered during said test shall be repaired or replaced before requesting scheduling of the final acceptance test. Submit a letter stating that the entire system has been tested and is working properly.
- B. The system shall be tested for final acceptance in the presence of the Owner's representative, Architect's representative, Engineer's representative, the local Code enforcement official, and the Manufacturer's representative. Provide adequate staffing to fully demonstrate each device.
- C. During the final acceptance test:
1. Every manual and automatic alarm initiating device shall be operated and/or activated to its alarm state.
 2. Every smoke sensor shall be tested using Gemini test gas, tester or equivalent device.
 3. Every heat detector shall be tested using a controllable heat source such as a blower type hair dryer.
 4. The sprinkler system waterflow alarm switches shall be tested by flowing water. On dry type sprinkler systems, the air pressure shall be measured.
 5. All other alarm initiating devices/connected panels shall be

activated to their alarm state.

6. The sprinkler system valve tamper switches shall be tested by closing sprinkler valves.
 7. All other supervised devices/connected panels shall be activated to their off-normal position or state.
 8. Every audible alarm signaling device shall be sounded.
 9. Every visual alarm signaling device shall be flashed.
 10. Every Warden and/or Firefighter telephone and/or jack shall be tested for proper communication.
 11. Every system control function shall be tested for its proper operation.
- D. Upon successful completion of all final acceptance tests, the Contractor's and Manufacturer's representatives shall each author and sign a letter confirming the successful completion of testing. Two (2) copies of each letter shall be forwarded to the Owner's representative, the Architect's representative, the Engineer's representative and the local Code enforcement official.
- E. All final acceptance testing shall be done at a time convenient to the local Code enforcement official and the Owner's representatives and all testing costs shall be born by the Contractor as part of this Contract. Electrical contractor is responsible for self certification.
- F. Upon final acceptance of the system test, the Manufacturer shall provide the Owner with the software for the entire Fire Alarm/Life Safety system.

3.5 DOCUMENTATION AND TRAINING

- A. With the assistance of the equipment manufacturer, this Contractor shall compile and provide to the Owner, six (6) complete manuals on the finished system to include:
1. Operating instructions for this specific system.
 2. Preventive and required maintenance schedules.
 3. Manufacturer's catalog pages of all equipment and components provided.
 4. Manufacturer's suggested spare parts list.
 5. All asbuilt wiring and conduit diagrams, both floor plan and riser types.
- B. The manuals shall be in 3 ring, tabbed binders.

3.6 SPARE PARTS

- A. Upon completion of the project, the equipment manufacturer/distributor shall provide to the Owner the following spare parts, if said parts are provided with the base fire alarm system:
1. One (1) addressable manual fire alarm station.
 2. One (1) addressable photoelectric smoke detector/sensor head.
 3. One (1) addressable ionization smoke detector/sensor head.
 4. One (1) addressable heat detector.
 5. One (1) addressable detector standard base.
 6. One (1) high temperature heat detector with addressable monitor module.
 7. One (1) alarm speaker and strobe combination unit.
 8. One (1) alarm strobe only unit.
 9. One (1) roll of FCC printer paper.
 10. Three (3) of each type of system key.
 11. Three (3) of each type of system fuse.

3.7 SERVICE AND MAINTENANCE

- A. The equipment manufacturer shall make available a fully equipped service organization, capable of guaranteeing an on-site service response time within eight (8) hours to a service request call. Said service shall be available twenty-four (24) hours per day and seven (7) days per week.
- B. The equipment manufacturer shall make available, to the Owner, a price quotation for a one (1) year maintenance and testing agreement, to take effect on the date of final acceptance.

END OF SECTION