# SECTION 283111 - FIRE ALARM AND SMOKE DETECTION SYSTEM (WARRENTON ONLY)

## PART 1 - GENERAL

### 1.1 WORK INCLUDES

A. Contractor shall provide an entire new fire alarm system for the building. The electrical contractor shall provide all required components, devices, conduit, cable, and labor necessary for the complete and successful installation of a fire alarm system including but not limited to the following:

1. Manual pullstations
2. Detection Devices (including Smoke, Heat and Duct Detectors).
3. Smoke Detectors with Sounder Bases (primarily sleeping, i.e. bunk, rooms).
4. Notification Appliances (Visual and Audible/Visual signals).
5. Fire Alarm Control Panel (Existing Panel to Remain, Edwards 2400).
6. Interface to controlled equipment (air-handling units, Access Control System) including addressable interface units, wiring (and needed raceway) and programming.
7. Fire alarm wire and cable.

B. The fire alarm system shall be fully operational by the dates indicated in Division One specifications.

### 1.2 REFERENCES

A. NFPA 70 – National Electrical Code (NEC), 2008.

B. NFPA 72 – National Fire Alarm Code, 2007.

C. International Building Code (IBC), 2009.

D. Americans With Disabilities Act (ADA) 2010, and associated Accessibility Guidelines (ADAAG).

### 1.3 REGULATORY REQUIREMENTS

A. System: UL- and FM- listed. Components for interaction and/or control with Fire Protection pre-action system shall be FM-listed.

### 1.4 SYSTEM DESCRIPTION

A. Fire Alarm System:
1. Fire Alarm: Control Panel shall include Automatic and Manual Initiation, and Visual and Audible signaling. System shall also include monitoring modules to monitor tamper switches and flow switches, and control / relay modules to control indicated equipment (electromagnetic door holders, air-handling unit shutdown, etc.).
2. Signal Transmission: Multiplex signal transmission. Initiation device circuits shall be wired Class B, Style 4. Notification Appliance Circuits shall be wired Class B, Style Y.

B. Definitions:

1. GENERAL ALARM:

    a. Audible, Visual and combined Notification Appliances and auxiliary devices are activated. By convention, we define "auxiliary devices" as equipment that: transmit signal(s) to building mechanical systems to initiate shutdown of fans, and transmit signal(s) to exterior stair doors to deactivate security delay.
    b. Fire Alarm Visual and Audible signals shall be transmitted to the Fire Alarm Annunciator Panels and indicate the location of individual alarm initiating device on 80-character display on Fire Alarm Control Panel.

2. ALARM: Fire alarm notification appliances are not activated and auxiliary devices are not shut down. Visual and audible signals will be transmitted to the Fire Alarm Annunciator Panels and indicate the location of individual alarm initiating device on 80-character display at Fire Alarm Control Panel.
3. NOTIFICATION: General notification appliances are activated shall be provided to the selected zones.

C. SEQUENCE OF OPERATION:

1. Actuation of a manual fire alarm pull station, heat detector, smoke detector, or flow switch shall cause the fire alarm system to enter GENERAL ALARM.
2. Actuation of a smoke detector located in the air handling ductwork shall send the system into ALARM and transmit signal to shut down the associated air handling unit. Detectors shall only shut down the fans associated with it.
3. Activation of the smoke detector located within the sleeping (bunk) rooms shall cause the local alarm within the sounder base of that device to be activated (if there is a visual device located within the room, it shall also be activated). This will not send the building fire alarm system into ALARM. This type of "alarm" shall be communicated to the Control Panel and to the Annunciator as a "PREALARM CONDITION". If a second device in the corridor is activated, the building fire alarm system shall enter ALARM. If a second device in an adjacent room is activated this will cause the local alarm within the sounder base of that device to be activated but will not cause the fire alarm system to enter ALARM.
4. Activation of any other system smoke detector will cause system to enter ALARM.
5. Actuation of a monitoring module connected to a sprinkler tamper switch shall cause system to enter TROUBLE – tamper switches shall not send system into alarm.
6. System ground fault, open circuit, AC power failure or system failure shall cause system to enter TROUBLE mode.
7. GENERAL ALARM Sequence of Operation (see Definitions / this section for additional information):

    a. Indicate location of individual alarm initiating device in English on 80-character displays on Fire Alarm Control and Annunciator Panels.
    b. Activate Building Fire Alarm notification appliances.
    c. Transmit signal to release door hold open devices (electromagnetic door holders).
    d. Transmit signal to shutdown the associated air handling unit (as indicated above).

8. TROUBLE Sequence of Operation:

a. Indicate location of individual trouble alarm device in English on 80-character display and provide visual and audible trouble signal at the Fire Alarm Control and Annunciator Panel(s).
b. Manual ACKNOWLEDGE function at either type of panel silences audible trouble alarm; visual alarm is displayed until initiating trouble is cleared.

9. DRILL Sequence of Operation: Manual DRILL function causes ALARM mode operation to:

a. Sound and display local fire alarm notification devices.
b. Transmit signal to release door hold open devices.
c. Transmit signal to Fire Alarm system Annunciator Panels.

10. Alarm Reset and Silence: Key-accessible RESET function at the control panels acknowledges alarm or trouble and resets system out of ALARM if alarm signaling circuits have cleared. If signaling circuits have not cleared, the local panel audible signal silences, the notification devices will be turned off, and an LED is lit. Subsequent alarms or troubles shall cause the panels' audible signal and the notification devices to operate until silenced in turn. Restoration to normal of the signaling circuit shall extinguish the associated LED and cause the panel audible signal to sound until the restoration is acknowledged by switch operation.

1.5 QUALIFICATIONS

A. Equipment Supplier:

1. Existing System is a Edwards 2400 series.

1.6 SUBMITTALS

A. Submit shop drawings and product data under provisions of Division One specifications.

B. Provide project specific wiring diagrams, data sheets, and equipment ratings, layout, dimensions, and finishes, and battery calculation charts.

C. Listing of all addressable detectors and intelligent modules to confirm new Control Panel supports total number of addresses plus 20% spare in <u>both</u> categories.

D. Submit detailed project specific equipment requirements including sequence of operation.

E. Submit manufacturer's installation instructions.

1.7 PROJECT RECORD DOCUMENTS

A. Submit documents under provisions of Division One specifications.

B. Include plans, diagrams and details including locations of all control units, all field devices, all wiring and of end of line devices.

C. Record Documents shall be furnished to A/E for delivery to Owner in both print and

electronic format. Electronic format includes CAD drawings (AutoCAD version 2002 or later) on compact disc. A/E will furnish Contractor and/or their supplier with all electronic files for preparation.

1.8 OPERATION AND MAINTENANCE DATA

A. Submit data under provisions of Division One specifications.

B. Include operating instructions, and maintenance and repair procedures and Project Record Drawings with manual.

C. Include manufacturer representative's letter stating that system is fully operational.

D. Include the system testing documentation in compliance with NFPA 72.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Division One specifications.

B. Store and protect products under provisions of Division One specifications.

1.10 QUALIFICATIONS

A. Equipment Supplier: Company specializing in smoke detection and fire alarm systems with a minimum of three (3) years documented experience.

B. Equipment Installer: Company factory-authorized to work on approved systems with five (5) years documented experience (minimum) with manufacturer of system.

1.11 WARRANTY

A. The fire alarm system components shall be fully guaranteed for a period of one year beginning on the date of substantial completion. Substantial completion will be granted after the system is fully operational and all testing documentation has been completed.

B. The guarantee shall include the entire scope of work including all equipment, devices, materials, cable/wire, software and installation.

C. The guarantee shall exclude acts of God, vandalism, physical abuse or operator misuse.

PART 2 - PRODUCTS

2.1 FIRE ALARM CONTROL PANEL

A. Manufacturers / Suppliers

1. Edwards 2400 Series

B. Fire Alarm and Smoke Detection Control Panels (FACP)

1. System Capacity and General Operation:

a. The control panels shall provide sufficient capacity for the Analog Addressable Smoke and Heat Detectors, Addressable Monitor and Control Modules, and all other Intelligent/Addressable devices that are indicated on the plans and that are necessary to make the system fully functional and 20% spare device capacity for both the detector AND intelligent modules independently.

2. Each Fire Alarm control panel shall be provided with a locking door to prevent unauthorized access to any function or control. The 80-character LED display shall be visible through this door.
3. Each fire alarm control panel shall include a full featured operator interface control and annunciation panel which shall include a backlit 80-character Liquid Crystal Display, individual, color coded system status LEDs, and an alpha-numeric keypad for the Field Programming and Control of the Fire alarm System.
4. All programming of the system shall be achieved without special equipment and without interrupting the alarm monitoring functions of the Fire Alarm Control Panel.
5. The Central Processing Unit shall communicate with, monitor, and control all other modules within the control panel. Removal, disconnection or failure of any control panel module shall be detected and reported to the System Common Control Annunciator by the Central Processing Unit. The Central Processing Unit shall contain and execute all control-by-event programs for specific action to be taken if an alarm condition is detected by the system. Such-control-by-event programs shall be held in non-volatile programmable memory, and shall not be lost even if system primary and secondary power failure occurs. The Central Processing Unit shall also provide a real-time clock for time annunciation of all system displays. The Time-of-Day and date shall not be lost if system primary and secondary power supplies fail.
6. The System Display shall be the system common control/annunciator, and shall provide all the controls and indicators used by the system operator and may also be used to program all system operational parameters. The Display Interface Assembly shall contain, and display as required, the custom alphanumeric labels for all Intelligent Detectors and Addressable Modules on an 80-character alphanumeric Liquid Crystal Display. Such label information shall be stored in programmable non-volatile memory.
7. Activation of the system Test Switch shall initiate an automatic test of all Intelligent/Addressable detectors in the system. The System Test shall activate the electronics in each intelligent sensor, simulating an alarm condition and causing the transmission of the alarm condition from that sensor to the Fire Alarm Control Panel. The Fire alarm Control panel shall interpret the data from each sensor installed in the system. A report summarizing the results of this test shall be displayed automatically on the System Liquid Crystal Display.
8. Means shall be provided for adjusting the sensitivity of any or all analog intelligent detectors in the system from the system keypad. Sensitivity range shall be within the allowed NRTL window, and shall be a HIGH/MEDIUM/LOW selection. These levels shall be adjustable from the Workstation Software located in the Command Center.
9. Each of the Intelligent/Addressable Smoke Detectors in the system shall be independently selected and enabled to be an alarm verified detector. The Alarm Verification Function shall be from 5-50 seconds and each detector shall be able to be enabled/disabled during the field programming of the system, or anytime after system turn-on.
10. The system will be able to generate and print a summary of all of the Detectors, Modules and Pullstations that are currently active in the system. This printout will require

password protection to prevent unauthorized user access, and will automatically print the system report using keys. No computer expertise will be required to initiate the System Report sequence.

11. The Fire Alarm Control Panel shall contain a History Buffer that will be capable of storing up to 300 system output/input/control activations. Each of these activations will be stored and time and date stamped with the actual time of the activation, until a password authorized operator requests that the contents be displayed. The contents of the History Buffer may be manually reviewed, one event at a time, and the actual number of activations may also be displayed.
12. The Fire Alarm Control Panel shall automatically interrogate each Intelligent System Detector and shall analyze the detector responses over a period of time. If any Intelligent Detector in the system responds with a reading which is below 20% of normal limits (for 5 out of 6 polls), or above 80% of normal limits for a period of 24 hours, then the system will enter the Trouble Mode, and the particular Intelligent Detector will be annunciated on the System Display, and printed on the future System Printer.
13. When a fire alarm condition is detected and reported by one of the system initiating devices or appliances, the following functions shall immediately occur:
14. 14. A local signal in the control panel shall sound.
15. The 80-character LCD display shall indicate all information associated with the Fire Alarm condition, including: type of alarm point, its location within the protected premises, and the time and date of that activation. All system output programs assigned via control-by-event equations to be activated by the particular point in alarm shall be executed including: Alarm Notification Devices, control relays for door release, elevator and AHU shutdown.
16. The fire alarm control panel shall contain auxiliary contacts, one to close when the system enters the trouble mode, and a separate auxiliary contact to close when the system enters into alarm.
17. Power supply: Adequate to serve control panel modules, and all alarm signaling devices. Include battery operated emergency power supply with capacity for operating system in <u>standby mode for **24 hours** followed by alarm mode for **15** minutes</u>.

## 2.2 INITIATING DEVICES

A. Manual Station: Double-action type, fabricated of metal or high-impact plastic, and finished in red with molded raised letter operating instructions of contrasting color. Stations requiring the breaking of a glass rod shall not be provided. Provide with keyed reset.

B. Smoke Detector: Comply with UL 268; the Photoelectric-Type Smoke Detectors shall be Intelligent and Addressable, and shall connect with two wires to one of the Fire Alarm Control Panel Signaling Line Circuits. The detectors shall use either a light obscuration or light scattering principal to measure products of combustion and shall, on command from the control panel, send data to the panel representing the analog level of products of combustion.

C. Smoke Detector <u>for sleeping rooms:</u> Comply with UL 268; The Photoelectric- Type Smoke Detectors shall be Intelligent and addressable, and shall connect with two wires to one of the Fire Alarm Control Panel Signaling Line Circuits. The detectors shall use the light scattering principal to measure products of combustion and shall, on command from the control panel, send data to the panel representing the analog level of products of combustion. The detector shall be provided with a sounder base (connected to remote power supply as indicated on drawings) that produces an interrupted 85 dBA (UL reverberant room) tone. Both audible

("horn") and visual ("strobe") notification shall be given locally when the unit senses smoke in the room as well as under GENERAL ALARM. In rooms that contain visual notification devices (ADA rooms), the smoke detector base shall also contain an auxiliary relay to activate the combined audible/visual notification appliance.

D. Heat Detector: The Intelligent Heat Detectors shall be Intelligent and Addressable, and shall connect with two wires to one of the Fire Alarm Control Panel Signaling Line Circuits. The detectors shall use an electronic sensor to measure thermal conditions caused by a fire and shall, on command from the control panel, send data to the panel representing the analog level of such thermal measurements.

E. Duct Mounted Smoke Detector: Duct Smoke Detectors shall be addressable and analog devices similar to the area smoke detectors except enclosed in an enclosure / housing rated for duct application and supplied with sampling tubes sized for the duct.

F. Monitor modules shall be provided to connect any N.O. or N.C. dry contact device as shown. The Monitor Module shall provide address setting and store an internal identifying code that the Fire Alarm Control Panel shall use to identify the type of device.

G. Control Modules shall be provided to supervise and control the operation of one signal circuit or as an addressable dry contact (form C) relay. The Control Module shall provide address-setting means and store an internal identifying code that the Control Panel shall use to identify the type of device.

## 2.3 SIGNALING DEVICES

A. Audible/Visual Signal: certifications shall include NFPA 72, UL 1971, and Americans with Disabilities Act. Device shall be semi-flush type horn with white lettered FIRE on red device body. Sound Rating 89 dB at 10 feet (minimum). Provide with integral strobe assembly and flasher with candela rating as indicated on the drawings. Device shall be clearly marked with strobe device intensity rating visible without unit disassembly or device removal. Devices shall be capable of silencing the audible component while the visual component is still active, on the same pair of NAC circuit wires.

B. Visual Fire Alarm System Signal: certifications include NFPA 72, UL 1971, and Americans with Disabilities Act. Device shall be semi-flush strobe assembly and flasher with candela rating as indicated on the drawings, with white lettered FIRE on red device body. Device shall be clearly marked with strobe device intensity rating visible without unit disassembly or device removal.

## 2.4 FIRE ALARM WIRE AND CABLE

A. Provide all fire alarm cabling as power-limited fire-protective signaling cable, plenum rated (FPLP).

B. Initiating and Signaling Circuits:

1. Meets requirements of Article 760 of the NEC for power limited cable, including required jacket marking.
2. Minimum wire gauge: #16 AWG solid copper.

3. Number of pairs: 1 Pair, shielded.
4. Voltage rating: 300 volts.
5. Jacket material: Plenum rated.
6. Temperature rating: 105 deg. C in plenum.
7. Shielding: Overall foil shield with 22-gauge drain wire.

C. Notification Appliance Circuits (NAC) and Control Circuits:

1. Meets requirements of Article 760 of the NEC for power limited cables, including required jacket marking.
2. Minimum wire gauge: #14 AWG solid copper.
3. Number of pairs: 1 Pair, unshielded.
4. Voltage rating: 300 volts.
5. Jacket material: Plenum rated.
6. Temperature rating: 105 deg. C in plenum.

2.5 NAMEPLATES AND LABELS.

A. Nameplates and labels shall be provided for all addressable devices. Nameplates and labels shall be in accordance with Specification Section 260553 and mounted within the protective cover for the device were applicable. Labels for ceiling mounted smoke or heat detectors shall have 1/4" lettering and be mounted on the inside of the protective cover at the base of the unit. The contractor shall take care to orient all nameplates so that they can be read from the floor. Labels for pull stations and other wall devices shall have 1/8" lettering. These shall be secured to the wall using tamper proof screws.

2.6 ADDITIONAL DEVICES

A. **In addition to the devices indicated on the electrical drawings,** Electrical Contractor shall provide (5) additional single-input intelligent monitoring modules and (2) additional control modules, plus all installation and programming labor, as well as all final connections. E.C. shall also include an allotment (both material and labor costs) of 100’-0” of SLC (Fire Alarm signaling line circuit) cabling**,** 50’-0” of 3/4” EMT conduit, and 25’-0” of 3/4” liquid-tight flexible conduit, as well as all fittings, connectors, etc.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Install system in accordance with NFPA Standards referenced in Parts 1 and 2 of this Section.

B. Connect fire alarm system initiating circuits to devices to be controlled by fire alarm. Coordinate with equipment supplier.

3.2 EQUIPMENT INSTALLATION

A. Manual Pull Stations: Unless otherwise indicated mount semi-flush in recessed back boxes with operating handles 48" above finished floor. For surface mounted devices, mount device in surface box appropriately sized for device.

B. Smoke and Heat Detectors: Install detectors indicated to be ceiling mounted not less than 4”

from a side wall to the near edge. Install detectors located on the wall at least 4" but not more than 12"below the ceiling. For exposed solid joist construction, mount detectors on the bottoms of the joists. Install detectors no closer than 3'-0" from air registers.

C. Horn/Strobe and Strobe: Install 80" above floor or 6" below the ceiling whichever is lower. If architectural appurtenances (i.e. Lockers, Marker Boards, and Mirrors) interfere with device mounting at this height, devices may be installed up to 96" above floor.

D. Duct Mounted Smoke Detector: Securely mount detector housing to duct and install sampling tube. Seal all duct penetrations to provide an airtight installation. Modify associated equipment's starting mechanism to incorporate fan shutdown. Starting mechanism shall be modified such that the fire alarm system will shutdown fan regardless of hand-off-auto switch position.

E. Control modules and monitor modules: Mount within 3'-0" of device controlled/monitored.

F. Device Location Indicating Lights: Locate in the public space immediately adjacent to the device they monitor.

G. Fire Alarm Control and Annunciator Panels: Surface or Flush mount as indicated on the drawings with tops of cabinets not more than 5'-6" above the finished floor.

3.3 WIRING INSTALLATION

A. Wiring Method: Install wiring in accordance with Section 260519 - "Building Wire & Cable". Contractor shall protect all edges of surface raceway to ensure that cable is not damaged during installation.

B. Wiring / cabling may be installed open above accessible ceilings only; where rooms or areas do not contain any ceiling (exposed structure) or inaccessible ("hard") ceilings without adequate access, fire alarm cabling shall be installed in conduit. Raceway and/or conduit shall be painted to match adjacent surfaces. Install fire alarm cabling to structure (decking) above accessible ceiling space.

C. Wiring within enclosures: Install conductors parallel with or at right angles to the sides and back of the enclosure. Bundle, lace, and train the conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal in accordance with the wiring diagrams of the system. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

D. Cable Taps: Use numbered terminal strips in junction, pull or outlet boxes, cabinets, or equipment enclosures where any circuit tap is made.

E. Alarm Wiring: For the low-voltage portion of the fire alarm system, install 75-deg C insulation in wet, damp, or dry locations. Provide wiring operating at line voltage having similar insulation.

F. Color Coding: Color code all fire alarm conductors differently from the normal building power wiring. Provide one color code for alarm circuits wiring and a different color code for supervisory circuits. Provide a color code for audible alarm indicating circuits different from

alarm initiating circuits. Use different colors for visual alarm indicating devices.

3.4 GROUNDING

A. Ground equipment and conductor and cable shields. Provide 5-ohm ground at main equipment location. Measure, record, and report ground resistance.

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Provide services of a factory-authorized service representative for the pretesting, testing, and adjustment of the system.

B. Pretesting: Upon completing installation of the system, align, adjust, and balance the system and perform complete pretesting. Determine, through pretesting, the conformance of the system to the requirements of the Drawings and Specifications. Correct deficiencies observed in pretesting. Replace malfunctioning or damaged items with new, and retest until satisfactory performance and conditions are achieved. Prepare forms for systematic recording of acceptance test results. Each device shall be tested during the pretest. Verify the absence of unwanted voltages between circuit conductors and ground. Megger test all conductors other than those intentionally and permanently grounded with electronic components disconnected. Test for resistance to ground. Report readings less than 1-megohm for evaluation. Test all conductors for short circuits utilizing an insulation testing device. With each circuit pair, short circuit at the far end of the circuit and measure the circuit resistance with an ohmmeter.

C. Report of Pretesting: After pretesting is complete, provide a letter certifying the installation is complete and fully operable. The letter shall include the names and titles of the witnesses to the preliminary tests.

D. Final Test Notice: Provide 10 days minimum notice in writing when the system is ready for final acceptance testing.

E. Final Test: This test must be complete for the fire alarm system to be considered 'Fully Operational'.

1. Have the fire alarm acceptance test performed by the Alarm Company Representative and installing Contractor in the presence of Architect/Engineer, Owner, and Fire Marshall and /or Fire Chief.
2. Acceptable Test Procedures: Test the system in accordance with the procedures outlined in NFPA 72, Chapters 10. Minimum required tests are as follows:

| | |
|---|---|
| -Normal Power to Panel | (Secure/Normal) |
| -Disconnect Power to Panel | (Trouble) |
| -Activated Detection Device | (Alarm) |
| -Silence Alarm Signaling Devices | (Trouble) |
| -Return Normal Power to Panel & Reset Panel | (Secure/Normal) |
| -Place Each Function Switch in an Abnormal Positions | (Trouble) |
| -Remove supervised Devices from System (During this portion of testing, ensure proper wire has been used and devices are properly installed). | (Trouble) |
| -Return Supervised Device to System | (Secure/Normal) |

| | |
|---|---|
| -Disconnect Normal Power to Panel | (Trouble) |
| -Activate Detector(s) (Alarm) Inspect all Horns/Bells, Zone Indication, and Auxiliary Devices | (Working List) |
| -Silence Horns/Bells | (Alarm/Trouble) |
| -Reset System | (Trouble) |
| -Return Normal Power to System | (Secure/Normal) |

Place Panel in Alarm Condition. Disconnect Primary Power Source for a Minimum of 15 Seconds and Return to Normal Power. (The above transfer procedure shall not cause a loss of an alarm condition at Receiving Station.)

a. Test the system for all specified functions in accordance with the manufacturer's operating and maintenance manual. Systematically initiate specified functional performance items at each station including making all possible alarm and monitoring initiations and using all communications options. For each item, observe related performance at all devices required to be affected by the item under all system sequences. Observe indicating lights, displays, signal tones, and annunciator indications. Record the functionality of each and every device in the system.
b. Test both primary power and secondary power. Verify, by test, the secondary power system is capable of operating the system for the period and in the manner specified.

3. Submit system test certification / record of completion information.

3.6 CORRECTION OF DEFECTS

A. When the tests disclose any unsatisfactory workmanship or equipment furnished under this Contract, correct defects and retest. Repeat tests until satisfactory results are obtained.

B. When any wiring or equipment is damaged by tests, repair or replace such wiring or equipment. Test repaired items to ensure satisfactory operation.

3.7 COMMISSIONING

A. Provide the services of a factory-authorized service representative to demonstrate and train the Owner’s personnel as specified below.

1. Train maintenance personnel in the procedures and schedules involved in installing, operating, troubleshooting, servicing, and preventive maintaining of the system. Allot (8) hours for this training.
2. Provide (4) hours of additional training for the Owner’s appointed responding personnel regarding the operation of the specific systems installed on this project. This phase of training shall not include installing, troubleshooting, servicing or preventive maintenance.
3. Operation and Maintenance Manuals shall be submitted to the Engineer and approved prior to Training. Utilize the O&M manual as reference material during all training sessions.
4. Schedule training at least two weeks in advance. Notify both A/E and Owner of

training dates.

B. SOFTWARE

1. Contractor and Fire Alarm system manufacturer / supplier shall furnish complete programming of system on compact disc at commencement of project. Provide this information with O&M Manuals.

3.8 WARRANTY

A. General. The contractor warrants that all work provided under the contract will be in conformance with the contract and free from defects in workmanship, materials and equipment for a period of one (1) year or such longer periods may be specified in the contract documents, except as provided below. Warranty time periods shall commence from the date of Owner acceptance of the whole, or any part of the project.

B. Latent Defects. On demand by the Owner, at any time within the one (1) year period following substantial completion or final acceptance, if applicable, the Contractor shall promptly repair or replace all defective or non-conforming work resulting from, or constituting, latent defects, fraud, fraudulent concealment or gross negligence. The Owner and/or A/E will give timely notice of such defects.

C. Prompt Repair. Upon notice from Owner of such defects or non-conforming work, the Contractor shall promptly visit the site within 48 hours in the company of a building representative, and shall provide all labor, material and equipment to promptly repair or replace the defective or non-conforming work. The repair shall include all adjacent work not necessarily provided by the Contractor but damaged as a result of such defects or non-conforming work, Owner may repair or replace such work and charge the cost thereof to the Contractor. Work which is repaired or replaced by the Contractor shall be inspected and shall be warranted by the Contractor in accordance with this Article. The warranties set forth herein are in addition to all warranties or guarantees expressed or implied by operation of law, statute or ordinance.

D. Commercial Warranties. The Contractor shall deliver all commercial warranties received from manufacturers to the A/E prior to final completion but this shall not reduce Contractor's obligations under this article.

END OF SECTION 283111