

# Brigham Young University-Idaho

## SECTION 16721-AUTOMATIC FIRE ALARM AND DETECTION SYSTEM

### PART 1 GENERAL

- A. The work covered by this Section of the Specification shall include all labor, equipment, materials and services to furnish and install a complete fire alarm system of the addressable, analog non-coded general alarm type. It shall be complete with all necessary hardware, software and memory specifically tailored for this installation. All equipment herein specified shall comply with application standards of Underwriters Laboratories, the National Fire Protection Association and local authorities having jurisdiction.
- B. Location of the controls, alarm initiating devices, and alarm indicating devices shall be as shown on the prints.
- C. Electrical Contractor shall include in this bid \$300.00 cash allowance and ten man hours for miscellaneous additions and/or requirements imposed by local authority having jurisdiction.
- D. Fire Alarm Contractor shall include an allowance of \$2000.00 for diagnostic equipment and off-site factory training to be selected by and delivered to the Owner's Designated Representative.

### 1.01 CODES AND STANDARDS

- A. Installation shall be in accordance with UNDERWRITERS LABORATORIES listings, the manufacturer's recommendations, these specifications and the following standards:
  - 1. NFPA 70-The National Electrical Code
  - 2. NFPA 72-Chapters 1 through 9
  - 3. IBC 2000
  - 4. IFC 2003
  - 5. Authorities having jurisdiction

### 1.02 GUARANTEE

- A. All equipment and systems shall be guaranteed by the contractor for a period of three years following acceptance by the owner. The guarantee shall include all parts, labor, prompt field service, pickup, installation and delivery.

### 1.03 QUALITY ASSURANCE

- A. *Manufacturer:* Firms regularly engaged in the manufacturing of fire alarm and detection equipment and accessories of the types and sizes required.
- B. *Installer:* The contractor for the automatic fire alarm system shall be a duly licensed fire alarm contractor by the state of Idaho and shall be NICET or IMSA certified. The contractor must be regularly engaged in the installation, testing and maintenance of automatic fire alarm and detection systems. The contractor shall be fully familiar with all local conditions, codes and requirements.

## 1.04

### RELATED WORK

- A. The Contractor shall 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:
1. Sprinkler water flow and supervisory switches shall be furnished and installed by the plumbing contractor, but wired and connected by the electrical contractor.
  2. Duct smoke detectors shall be furnished, installed wired and connected by the Electrical Contractor. The contractor shall also furnish necessary duct openings to install the duct smoke detectors. Provide a monitor module per duct detector and a control module for each HVAC unit for fire alarm shut down.

## PART 2

### PRODUCTS

## 2.01

### CIRCUITING GUIDELINES

- A. Each addressable analog loop shall be circuited as shown on the drawings but device loading is not to exceed 80% of loop capacity in order to leave for space for future devices. The loop shall have Class B operation. All wiring shall indicate polarity of wire by the color of the wire jacket (Red = Positive, Black = Negative etc.)
- B. Where it is necessary and approved by the owner to interface conventional initiating devices, provide intelligent input modules to supervise zone wiring.
- C. Each of the following types of devices or equipment shall be provided with supervised circuits as shown on the drawings but shall be typically as follows:
1. Sprinkler valve supervisory switches: Provide one (1) supervisory module circuit for each sprinkler valve supervisory switch or flow.
  2. Emergency generator: provide two (2) supervisory module circuits: one (1) for "Emergency Generator one"; one (1) for "Fire Pump Power Failure".
  3. Dry pipe/deluge sprinkler release valves: Provide one (1) releasing module circuit for each dry pipe/deluge sprinkler release valve.
  4. Computer room smoke alarm control panels (i.e VESDA): Provide one (1) alarm module circuit for each computer room smoke alarm control panel.
  5. Kitchen hood suppressor system.
- D. Each of the following types of alarm notification appliances shall be circuited as shown on the drawings but shall be typically as follows:
1. Audible signals: provide one (1) notification appliance circuit for each twelve (12) alarm bells, horn strobes, horns, and chimes.
- E. Each of the following types of remote equipment associated with the fire alarm system shall be provided with a form 'C' control relay contact as shown on the drawings, but shall be typically as follows:
1. HVAC fan systems: Provide one (1) shutdown addressable control relay contact for each HVAC fan system.
  2. HVAC supply fans: Provide one (1) shutdown addressable control relay contact for each HVAC supply fan.
  3. HVAC return fans: Provide one (1) shutdown addressable control relay contact for each HVAC return fan.
  4. HVAC exhaust systems: Provide one (1) shutdown addressable control relay contact for each HVAC exhaust fan as required.

## 2.02

### FIRE ALARM SYSTEM SEQUENCE OF OPERATION

- A. The system shall identify any off normal condition and log each condition into the system database as an event.
1. The system shall automatically display on the control panel Liquid Crystal Display the first event of the highest priority by type. The priorities and types shall be alarm, supervisory, trouble, and monitor.
  2. The system shall have a labeled color coded indicator for each type of event; alarm-red, supervisory - yellow, trouble - yellow, monitor - green which shall turn on when active events exist.
  3. For each event, the display shall include the current time, the total number of events, the type of event, the time the event occurred and up to a 40 character custom user description.
  4. The user shall be able to silence the local signal and review each event by simply selecting scrolling keys (up-down) for each event type.
  5. New supervisory or trouble events shall sound a silence-able signal at the control panel.
  6. All system activity shall be logged on a dedicated fire alarm printer located at the FACP.
- B. Operation of any Alarm initiating device shall automatically:
1. Update the control/display as described above (2.02, A).
  2. Sound all alarm signals throughout the building as the evacuation rate.
  3. Turn on all strobe lights throughout the building.
  4. Turn on a red alarm zone LED at the fire alarm control panel.
  5. Operate the alarm relay contacts to initiate the transmission of an alarm to a central station agency via leased telephone lines.
  6. Operate addressable control relay contacts to shutdown all HVAC units serving floor of alarm.
  7. Operate control relay contacts to return all elevators that serve the floor of alarm initiation to the ground floor. If the alarm originates from the ground floor, operate control circuits contacts to return all elevators to the floor above or to a level as directed by the local fire department.
  8. Operate control relay contacts to release all magnetically held smoke doors throughout the building.
  9. Visually annunciate the zone of alarm on the remote annunciator panel. The visual indication shall remain on until the alarm condition is reset to normal.
  10. Log activity on dedicated fire alarm printer.
- C. Activation of a sprinkler supervisory initiating device shall:
1. Update the control/display as described above and turn on the trouble relay.
  2. Turn on a yellow zone LED at the fire alarm control panel.
  3. Operate the supervisory relay contacts to initiate the transmission of an alarm to a central station agency via campus telephone lines.
  4. Visually annunciate the zone of alarm on the remote annunciator panel. The visual indication shall remain on until the alarm condition is reset to normal.
  5. Log activity on dedicated fire alarm printer.
- D. The entire fire alarm system wiring shall be electrically supervised to automatically detect and report trouble conditions to the fire alarm control panel. Any opens, grounds or disarrangement of system wiring and shorts across alarm bell/strobe wiring shall automatically.
1. Update the control/display as described above (2.02, A).
  2. Operate the supervisory relay contracts to initiate the transmission of an alarm to a central station agency via leased telephone lines.
  3. Visually and audibly annunciate a general trouble condition, on the remote annunciator panel. The visual indication shall remain on until the trouble condition is repaired.
  4. Log activity on dedicated fire alarm printer.

**2.03****SUPPORT FOR INSTALLER AND OWNER MAINTENANCE**

- A. Provide a coded one man walk test feature. Allow audible or silent testing. Signal alarms and troubles during test. Allow receipt of alarms and programmed operations for alarms from areas not under test.
- B. Provide internal system diagnostics and maintenance user interface controls to display/report the power, communication, and general status of specific panel components, detectors, and modules.
- C. Provide loop controller diagnostics to identify common alarm, trouble, ground fault, and Class A fault. Addressable loop faults include device type changes by location, device additions/deletions and conventional open, short, and ground conditions.
- D. Allow the user to display/report the condition of addressable analog detectors. Include device address, device type, percent obscuration, and current sensitivity indicator. The sensitivity indicator shall provide the user with a measure of contamination of a device upon which cleaning decisions can confidently be made.
- E. Allow the user to report history for alarm, supervisory, monitor, trouble, smoke verification, and restore activity. Include Facility Name, and the time and date of the History Report.
- F. Allow the user to disable/enable devices, zones, actions, timers and sequences. Protect the disable function with a password.
- G. Allow the user to activate/restore outputs, actions and sequences.
- H. Allow the service user to enter time and date, reconfigure an external port for download programming, initiate auto programming and change passwords. Protect these functions with a password.
- J. Allow all diagnostics and programming of FACP features from a field configuration software program compatible with the specific manufacturer of the system.

**2.04****ACCEPTABLE MANUFACTURERS & INSTALLERS**

- A. The catalog numbers used are those of FCI Inc. and constitute the type and quality of equipment to be furnished. Acceptable manufacturers are: EST, by Wasatch Electric, FCI, by Nelson Fire Systems, and Notifier by Mountain Alarm. All are to meet the following specifications and are limited to the product approved in this SPEC and in the bid with no substitutions.

**2.05****MATERIALS**

- A. Fire Alarm Control Panel:
  - 1. The fire alarm control panels shall be a complete networked fire alarm system, with all wiring, programming, and connections as described on the drawings and this document. The networked system shall be wired in a supervised, 2-wire fashion. The network shall include the capability of utilizing either twisted pair wiring, a pair of fiber optic cables up to 200 microns, or both, to maximize flexibility in system configuration. The system shall be a true peer to peer network and shall incorporate all control electronics, relays, and necessary modules and components in a semi-flush mounted cabinet. The operating controls and zone/supervisory indicators shall be located behind locked door with viewing window. All control modules shall be labeled, and all zone locations shall be identified. The assembly shall contain a base panel, system power supply and battery charger with optional modules suitable to meet the requirements of these specifications. The control panels shall have the capability to accept firmware upgrades via connection with a laptop computer, without the requirement of replacing microchips.
  - 2. System circuits shall be configured as follow: Addressable analog loops Class B; Notification Appliance Circuits Class B.

3. Single stage operation.
4. The system shall be supervised, site programmable, and of modular design with expansion modules to serve up to 198 detectors and 196 remote modules, and multiple notification appliance circuits (NAC's) convertible to power risers to serve remote multiple NAC modules for zoned signal applications.
5. The system shall store all basic system functionality and job specific data in non-volatile memory. The system shall survive a complete power failure intact.
6. The system shall have built-in automatic system programming to automatically address all system devices and provide a minimum default single stage alarm system operation with support of alarm silence, trouble silence, drill, lamp test, and reset common controls.
7. The system shall allow down loading and uploading from panel to a Field Configuration Program for purposes of recovery, of a job specific custom program by means of a Field Configuration Program (FCP). It shall support programming of any input point to any output point.
8. The system shall support detectors with the following operational attributes; integral multiple differential sensors, environmental compensation, pre-alarm, normal/alarm LED's, relay bases, and isolator bases.
9. The system shall use full digital communications to supervise all addressable loop devices for placement, correct location, and operation. It shall allow swapping of "same type" devices without the need of re-addressing and impose the swapping of the "location" parameters on replacement device. It shall initiate and maintain a trouble if a device is added to a loop and clear the trouble when the new device is addressed and defined into the system.
10. The system shall automatically test each analog smoke sensor a minimum of three times daily. Failure of a sensor shall activate the system trouble circuitry, display a "test failed" indication, and identify the individual unit.
11. The system shall support 100% of all remote devices in alarm and provide support for a 100% compliment of detector isolator bases.
12. All panel modules shall be supervised for placement and return trouble if damaged or removed.
13. The system shall have a CPU watchdog circuit to initiate trouble should the CPU fail.
14. The system evacuation signal rate shall be the "Temporal" pattern.
15. Provide a signal silence inhibit feature set to enter integer time between 0-99 minutes and an automatic signal silence timer set to enter integer time between 0-99 minutes. Audible notification appliances shall be affected by signal features.
16. The system program shall meet the requirements of this project, current codes and standards, and satisfy the local Authority Having Jurisdiction.
17. Passwords shall protect any changes to system operations.
18. The power supply shall be a high efficiency switch mode type with line monitoring to automatically switch to batteries for power failure or brown out conditions. The automatic battery charger shall have low battery discharge protection. All outputs shall be power limited. The battery shall be sized to support the system for 24 hours of supervisory and trouble signal current plus general alarm for 5 minutes.
19. The LCD Display shall be membrane style construction with a 2 line by 40 character Liquid Crystal Display. The LCD shall use backlighting for high contract visual clarity. In the normal mode display the time, the date, and provide 40 characters of user defined text. In the alarm mode shall display space for user custom messages. The module shall have visual indicators for the following common control functions; AC Power, alarm, supervisory, trouble, disable, ground fault, CPU fail, and test. There shall be common control keys and visual indictors for; reset alarm, silence, trouble silence, and drill. Provide three (3) pairs of display control keys for selection of event display by type (alarm, supervisory, and trouble) and forward/backward scrolling through event listings. The operation of these keys shall be integrated with the related common control indicators to flash the indicators when un-displayed events are available for display and turn on steady when all events have been displayed. Allow the first event of the highest priority to capture the LCD for display so that arriving fire fighters can view the first alarm event "hands free". Provide system function keys: status, reports, enable,

disable, activate, restore, program, and test. The module shall have a numeric keypad, zero through nine with delete and enter keys.

20. The Basic System Module shall contain the power supply, microprocessor, memory, system operating software stored on a non-volatile EPROM, system configuration memory stored on a non-volatile EEPROM, and the circuits necessary to support a fire alarm system. Volatile memory shall not be acceptable. The module shall function as the system control center, processing all messages from the field devices (supervisory, trouble, alarm). The microprocessor shall execute all supervisory programming to detect and report the failure or disconnection of any module or peripheral device.

The microprocessor shall access the system program, for all control-by-event (CBE) functions. The system program shall not be lost upon failure of both primary and secondary power. The basic system module shall provide communication with all analog/addressable devices (initiation/control) connected to the 7100 via two (2) signaling line circuits. Each signaling line circuit shall communicate with a maximum of ninety-nine (99) analog sensors and ninety-eight (98) addressable monitor/control devices.

The basic system module shall contain a real-time clock capable of monitoring all real-time programming and all time control functions.

21. Two independent notification appliance circuits shall be provided on the basic module, polarized and rated at 1.5 amperes DC per circuit, individually over current protected and supervised for opens, grounds, and short circuits.
22. Operate a Digital Alarm Communicator Transmitter (DACT) mounted in the Fire Alarm Control Panel for automatic transmission of the specific zone Alarm/Trouble to a Digital Alarm Communicator Receiver station. The DACT shall support dual telephone lines and shall be programmed to operate only with 20 PPS ADEMCO Contact ID communications and configure for dual tone multi-frequency (DTMF) or pulse modes. It shall be possible to delay AC power failure reports, and auto test call. System shall report to owner's DACR Proprietary Monitoring Station. Reporting shall represent as closely as possible through the programming Point-by-point reporting. Provide for all required programming of panel and Central Station communications in bid.

**B. Peripheral Devices (3 spares of each type to owner)**

1. Analog Ionization Smoke Sensor
  - a. Analog ionization sensors shall have a low profile and contain dual ionization chambers. Each sensor shall be capable of being set at seven (7) sensitivity settings ranging from 3.0 to 1.0 %/ft equivalent obscuration, with a predefined setting of 3.0%.
  - b. Automatic and manual functional sensitivity and performance tests shall be possible on all sensors without the need for generating smoke.
  - c. Two LED's providing 360- degree visibility of operating status and alarm indication shall be provided on each sensor. The LED's shall pulse periodically indicating that the sensor is receiving power and communication is taking place. This feature shall be field programmable. Upon alarm, these LED's shall light continuously. An alarm output shall be available for remote annunciation.
  - d. The system shall check the sensitivity of each sensor periodically. If sensor alarm threshold sensitivity has changed, due to aging and/or dust accumulation, the system shall automatically compensate for this change (drift compensation).

- e. Each sensor shall allow for setting of two sensitivity levels. These levels may be programmed so that when the building is occupied, a sensor will be less sensitive than when the building is unoccupied. This feature permits the sensors to be more reliable and at the same time reduces/minimizes unwanted alarms. This feature shall also incorporate programmable weekend days, where the sensor will remain at unoccupied sensitivity levels.
  - f. The sensor screen and cover assembly shall be removable for field cleaning.
2. Addressable Thermal Sensor
- a. Addressable thermal sensors shall have a low profile and operate on the combination "rate of rise" and "fixed temperature" principles with the fixed temperature set point at 135 degrees F. They shall contain dual thermistor sensing circuitry for fast response.
  - b. Two LED's providing 360- degree visibility of operating status and alarm indication shall be provided on each sensor. The LED's shall pulse periodically indicating that the sensor is receiving power and communication is taking place. This feature shall be field programmable. Upon alarm, these LED's shall light continuously. An alarm output shall be available for remote annunciation.
3. Monitor Modules (3-spare for each type of module utilized to owner)
- a. Addressable Monitor Module,  
An addressable monitor module with an initiating circuit wired Class B; Style B shall be furnished to provide an address for individual, normally open (N.O.) contact devices.
  - b. Addressable Dual Monitor Module, An addressable monitor module with two (2) initiating circuits wired Class B; Style B shall be furnished to provide two addresses for individual, normally open (N.O.) contact devices.
  - c. Addressable Monitor Module,  
An addressable monitor module with an initiating circuit capable of being configured with Class A, Style D or Class B, Style B shall be furnished to provide an address for an individual, normally open (N.O.) contact device, or a collective address for a group of such devices.  
  
The module shall contain a red status LED that shall flash in a quiescent mode and light continuously in an alarm mode. The LED shall be programmable not to provide quiescent status indication, if so desired.
  - d. Addressable Sub loop Monitor Module  
An addressable monitor module with an initiating circuit capable of being configured with Class A, Style D or Class B, Style B shall be furnished to provide a collective address for up to twenty (20) conventional two-wire smoke detectors.  
The AMM-4S module shall contain a red status LED that shall flash in a quiescent mode and light continuously in an alarm mode. The LED shall be programmable not to provide quiescent status indication, if so desired.
  - e. Addressable Output Module.  
An addressable output module shall be connected to the same signaling line circuit as the analog/addressable monitor devices and shall provide a DPDT relay output (2 form "C" 2 amp @ 24 VDC, resistive only) .  
  
The module shall contain a red status LED that shall flash in a quiescent mode and light continuously in an alarm mode. The LED shall be programmable not to provide quiescent status indication, if so desired.

- f. **Fault Isolator Module**  
This module enables part of the signaling line circuit to continue operating when a short circuit occurs on a section of it. An LED flashes in the normal condition and lights during a short circuit condition. The module automatically restored the entire circuit to the normal condition when the short circuit is removed. This module may be used in multiple ways, in any combination with other modules, providing circuit operation similar to that of NFPA Style 7. It does not require an address on the signaling line circuit.
- 4. **Manual Fire Alarm Station,**
    - a. Furnish and install manual stations as indicated. Each station shall be of the non-coded, double action type, requiring an outer door to be lifted to expose the actuator door. Upon pulling forward of the actuator door, the unit shall lock into a readily observable "alarm" position.
    - b. The station shall be equipped with a break glass rod feature, and require a key to reset. This key shall be keyed alike with the control cabinet. The stations shall employ a highly reliable action to activate an alarm. This feature shall provide an exceptionally high resistance to accidental operation.
  - 5. **Duct Smoke Detector (1-spares of detector and base to owner)**
    - a. A duct smoke detector shall be furnished and installed where required on HVAC units. Each duct smoke detector shall be provided with two (2) form "C" relay rated @ 10 amperes.
    - b. The duct detector shall contain a red status LED that shall flash in a quiescent mode and light continuously in an alarm mode. The LED shall be programmable not to provide quiescent status indication, if so desired.
- C. **FIRE ALARM NOTIFICATION APPLIANCES (5 spares of matching to owner)**
- 1. **Furnish and install where shown on the plans:**
    - a. Horns shall be a sound output level of 103 dBA Peak shall be provided. In-Out Screw terminals shall be provided for wiring.
    - b. Horn/Strobes shall be provide synchronized flash strobe output, and 100 dBA Peak sound output level from the horn. Provide strobe outputs as indicated on drawing.
    - c. Mini-Horn/Strobes shall provide strobe output, and 91 dBA Peak sound level out put from the horn. Provide strobe outputs as indicated on drawing.
    - d. Strobes shall provide synchronized flash output. Provide strobe outputs as indicated on drawing.
    - e. Speaker/Strobes shall be manufactured for wall mount applications and for ceiling mount applications. In-Out screw terminals shall be provided for wiring. Provide speaker/strobes as indicated on the drawings.
    - f. All notification appliances shall be white in color.
  - G. **End-of-line Notification Device shall be the color red and be clearly labeled on the exterior of the device and indicated on as-built drawings and the site map located at FACP.**
- D. **FIRE ALARM NOTIFICATION APPLIANCE POWER BOOSTER,**
- 1. **Furnish and install where shown on plans;**

- a. Furnish and install power booster for surface or semi-flush mounting as shown on the plans. The power booster shall have four (4) Class 'A' or Class 'B' circuits. The power booster shall use a switching power supply. The output circuits may be activated in groups of two or four at a time. The power booster shall be fully supervised for ground faults, short circuits, open circuits, and low battery. Any fault condition shall transmit a trouble signal to the main panel. The power booster shall have an integral battery charger. The power booster shall have a 10 hour delay on transmission of trouble for AC power failure.
- E. **ANCILLARY DEVICES;**
  - 1. Furnish and install where shown on the plans;
    - a. Furnish and install magnetic door holder for flush wall mounting as shown on the plans. The housings and contact plates shall have a brushed zinc finish. All units shall have a holding of force of approximately 25 lb. ft.
- F. Tie panel to direct phone lines for control station monitoring.
- G. Furnish and install a dedicated Fire Alarm printer to be installed at the FACP. Printer is to show all system activity on continuous feed paper. (3-spare printer ribbons provided to owner)

## 2.06

### **AUDIO EVACUATION SUB-SYSTEM (Where required by code)**

- A. Provide a tone and voice evacuation fire alarm subsystem as indicated below. The system should be an extension of or an integral part of the building fire alarm system. This subsystem shall be activated, monitored, and controlled by the building fire alarm system. This subsystem shall be U.L. listed with the fire alarm system.
- B. The subsystem shall be provided with a tone and voice evacuation control panel to be located as shown on the drawings. 100 watts minimum rms audio amplifiers shall be provided along with all necessary 24 volt DC power supplies. Provide battery back up as required in other sections of the specification.
- C. This subsystem shall be provided with the following features and functions.
  - 1. Supervised System Microphone
  - 2. Built-in Tone Generator
  - 3. Minimum 3.5 Amp regulated Power Supply with battery charger
  - 4. Two Digital 50 watt Audio Amplifiers
  - 5. 25 volt rms Audio output
  - 6. Auxiliary Audio input for Public Address Microphone
  - 7. Minimum two supervised Speaker Circuits expandable to a total of 6 Circuits
  - 8. All-Call-Switch
  - 9. Trouble Silence Switch
  - 10. Remote Reset Input
- D. System shall be provided with a Digital Message Repeater. This module shall provide pre-recorded voice evacuation messages and tones. System shall provide for an alert tone followed by a programmed message with the message repeated up to 7 times. The message shall be followed by a temporal alarm tone.

## 2.07

### SEQUENCE OF OPERATION OF NOTIFICATION SYSTEM

- A. Upon activation of any initiating device within the building, the building fire alarm evacuation indicating appliances shall operate. This includes the voice evacuation subsystem described herein. Upon alarm all indication devices will activate. Upon manual command from the annunciators or fire alarm control panel, all evacuation tones and signals will cease. Panel will reset upon reset command initiated at fire alarm annunciators
- B. The FACP shall cause any existing sound or P.A. system to cease operation while the audio EVAC system takes priority and after three rounds of the repeats the designated message until silenced by authorized personnel.
- C. The FACP shall transmit a digital signal via Digital Alarm Communicator Transmitter (DACT) to a central station receiver for dispatch of appropriate personnel.
- D. Voice Evacuation
  - 1. The voice evacuation subsystem shall be provided with a microphone allowing for local paging from the evacuation panel.
  - 2. Provide high output UL listed fire alarm speakers as indicated on the plans. Speakers shall be provided with aluminum projectors and shall be capable of a minimum of 116 dba sound power at 15 watts.
  - 3. All system components and interfaces shall be provided per UL 864.

## PART 3

### EXECUTION

## 3.01

### INSTALLATION

- A. The control and other panels shall be mounted with sufficient clearance for observation and testing. All fire alarm junction boxes must be clearly marked (painted red) for easy identification.
- B. All wiring shall be installed in accordance with the National Electrical Code (NFPA 70) Article 760 and the following:
  - 1. All conduit, mounting boxes, junction boxes, panels, detectors, alarm devices, etc. shall be mounted and fastened with appropriate fittings to insure positive grounding throughout the entire system.
  - 2. No wiring other than that directly associated with the fire alarm and detection systems shall be permitted inside the fire alarm conduits.
  - 3. Wiring splices are to be avoided to the maximum extent possible, if needed, they must be made only in junction boxes. Transposing or changing wire color coding of the wires shall not be permitted. Color coding shall indicate polarity of wire.
  - 4. Wires shall be clearly labeled as to source and use where fastened to terminal blocks.

## 3.02

### TESTING AND MAINTENANCE

- A. Provide one year testing and maintenance, conducted by the qualified, factory trained fire alarm equipment supplier. The testing shall consist of the following, as a minimum:
  - 1. Semi-annual testing (twice each calendar year) of each automatic (heat, smoke) fire detector and manual fire alarm station.
  - 2. Semi-annual testing of each supervisory signal device.
  - 3. Tests and written reports which certify that all initiating and indicating devices have been tested and are operational shall be submitted to the owner and engineer.
- B. Final test and inspection shall be held in the presence of the engineer, the owner's designated representative, and the authority having jurisdiction to their satisfaction. The fire alarm equipment supplier shall conduct the tests. The contractor shall supply the personnel and equipment necessary to conduct the testing at no additional cost to the owner.

- C. All fire detection devices shall be marked in nominal 1/2" high letters with the device address number (example 0120, indicates loop 1, device number 20).

### **3.03 EQUIPMENT**

- A. The equipment shall be manufactured by a firm having an established reputation and experience, who shall have produced similar equipment for a period of at least five years. The equipment supplier shall be able to refer to similar installations providing satisfactory service within the state of Idaho.
- B. Part numbers and functions described herein are used to describe the levels of quality, features, and performance required by this specification. It is not the intent of these specifications and plans to eliminate approved competitive equipment.

## **PART 4 CONTRACTOR SUBMITTALS**

### **4.01 PRELIMINARY**

- A. Within thirty days after the contract award and prior to the purchase of any equipment, the fire alarm system contractor shall submit for approval four (4) copies of the following:
  1. A list of materials that are to be used on the project, including manufacturer, model number and technical information.
  2. Preliminary circuit diagrams showing interconnection of all modules, detectors, horns, panels and wiring counts. Diagrams are to be 11" x 17" done in a good workmanlike manner.
  3. Technical manuals for all of the equipment that is to be used on the project.
  4. Submit shop drawings and calculations to the local authority having jurisdiction. Obtain a written Letter of Acceptance of the proposed system. Include with shop drawings submittal to engineer.

### **4.02 TESTS AND REPORTS**

- A. The contractor shall perform all of the electrical and mechanical tests required by the equipment manufacturer. All test reports shall be submitted as part of the Acceptance Test Procedure required by these specifications.

### **4.03 FINAL**

- A. Before final acceptance of the work, the fire alarm system contractor shall deliver four (4) copies of the operating and maintenance manual of this system to the Electrical Contractor for inclusion in the Div. 16 O & M manuals. Each manual shall contain as a minimum the following:
  1. As-built circuit drawing.
  2. Technical manuals containing information on the testing and maintenance of all equipment.
  3. Recommended testing and maintenance schedule for all equipment including a recommended spare parts list.
  4. The name, address, and telephone number of the person and/or firm to be contacted in the event of equipment failure.
  5. The one year guarantee including effective date and the equipment that is covered.
  6. Provide complete FA system database (CAD drawings, panel FC software etc.) on disk to be stored with the Owner's Manual.
  7. Provide complete site map with zone addresses to be visibly posted at the FACP for quick identification of device conditions.
  8. Provide training for the Owner, at his convenience. No less than four hours of training shall be provided.
  9. Provide training for the owner to the extent he desires. He should be completely comfortable with the operation of the system when training is complete.

**END OF SECTION**