



1305 E. Vine Street, Lodi, CA 95240

FIRE ALARM SYSTEM UPGRADE

at

LODI MIDDLE SCHOOL

945 Ham Lane, Lodi, CA 95242

TECHNICAL SPECIFICATION



QUALITYSOUND

SYSTEMS INTEGRATION

DIVISION OF BI-JAMAR, INC.

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COVER SHEET

Lodi Middle School, Lodi Unified School System

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FILE NO. 39-50

IDENTIFICATION STAMP DIV. OF THE STATE ARCHITECT OFFICE OF REGULATION SERVICES
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Licensed California Contractor License # 496881 C-7, C-10 Bi-JaMar Inc. dba Quality Sound 2010 E. Fremont St. Stockton, CA 95205 Expiration Date: 8/31/2018 Signature: _____ James E. Bryan, President

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1. Part 1 - General

1.1. Summary

1.1.1. Fire

Provide all permits, labor, equipment, materials and services to furnish and install a fully tested functional, UL Listed, code compliant, intelligent addressable networked fire alarm, emergency communications and active smoke control system including but not limited to all initiation and notification appliances, all raceways and wiring, connection to a central monitoring station.

The system supplied under this specification shall utilize modular low voltage design. The system shall utilize independently addressed, fire detection devices, input/output control modules, audio amplifiers and notification appliances as described in this specification. All equipment provided shall be new and the current products of a single manufacturer, actively engaged in the manufacturing and sale of digital fire detection devices for over ten years.

Also included are system wiring, raceways, pull boxes, terminal cabinets, mounting boxes, and any accessories and miscellaneous items required for a code compliant system.

The DSA approved drawing shall be used for the installation of this system. Any deviations shall be submitted to Quality Sound for approval prior to implementation.

The final system shall be complete, tested, and ready for operation as described elsewhere in this specification, before owner acceptance.

Strict conformance to this specification is required to ensure that the installed and programmed system will function as designed, is compatible with existing systems, and will accommodate the future requirements and operations of the building owner. All specified operational features must be met without exception.

1.1.2. Related Work - Fire

- 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 waterflow and supervisory switches shall be furnished and installed by the owner's fire protection contractor of choice, but wired and connected by the electrical contractor. Modification of existing sprinkler devices to accommodate monitoring by

the new fire alarm system shall be the responsibility of the owner.

2. Kitchen hood extinguishing systems status monitoring.

1.2. References

1.2.1. Codes-General

All work and materials shall conform to all applicable federal, state and local codes and regulations governing the installation.

1.2.2. Fire Code

The equipment and installation shall comply with the provisions of the following codes and standards:

California Building Codes

2016 California Building Code (Part 2, Title 24)

2016 California Electrical Code (Part 3, Title 24)

2016 California Fire Code (Part 9, Title 24)

National Fire Protection Association (NFPA)

2016 NFPA 72 - 2010 *National Fire Alarm Code*®

Underwriter's Laboratories, Inc

UL 864 - Control Units for Fire Protective Signaling Systems.

UL 268 - Smoke Detectors for Fire Protective Signaling Systems.

UL 268A - Smoke Detectors for Duct Applications.

UL 521 - Heat Detectors for Fire Protective Signaling Systems.

UL 464 - Audible Signaling Appliances.

UL 38 - Manually Actuated Signaling Boxes for Use with Fire-Protective Signaling Systems

UL 346 - Waterflow Indicators for Fire Protective Signaling Systems.

UL 1971 - Signaling Devices for the Hearing-Impaired.

UL-1480 - Speakers for Fire Alarm, Emergency, and Commercial and Professional Use

UL 1481 - Power Supplies for Fire Protective Signaling Systems.

UL 1711 - Amplifiers for Fire Protective Signaling Systems.

UL 1635 - Digital Alarm Communicator System Units

UL-1638 - Signaling Appliances - Private Mode Emergency and General Utility Signaling

CSFM (State of California)

Federal Codes and Regulations

Americans with Disabilities Act (ADA)

1.2.3. Definitions and Abbreviations

ACU: Autonomous Control Unit.

AC: Above Ceiling.

ADA: Americans with Disabilities Act.

AFF: Above Finished Floor.

AHJ: Authority Having Jurisdiction.

Approved: Unless otherwise stated, materials, equipment or submittals approved by the Authority or AHJ.

Circuit: Wire path from a group of devices or appliances to a control panel or transponder.

CCS: Central Control Station.

CPU: The central computer of a multiplex fire alarm or voice command control system.

ECS: Emergency Communication System.

FACP: Fire Alarm Control Panel.

FATC: Fire Alarm Terminal Can.

HVAC: Heating Ventilating and Air Conditioning.

IDC: Initiating Device Circuit.

LCD: Liquid Crystal Display.

LED: Light Emitting Diode.

NAC: Notification Appliance Circuit.

NFPA: National Fire Protection Association.

NICET: National Institute for Certification in Engineering Technologies

NRTL: Nationally Recognized Testing Laboratory

SLC: Signaling Line Circuit.

STC: Signal Terminal Can.

UL or ULI: Underwriters Laboratories, Inc.

UL Listed: Materials or equipment listed and included in the most recent edition of the UL Fire Protection Equipment Directory.

Zone: Combination of one or more circuits or devices in a defined building area, i.e. 3 speaker circuits on a floor combined to form a single zone.

1.3. System Description - Fire

1.3.1. General Fire and ECS

The system supplied under this specification shall be a new UL Listed modular fire alarm network that uses independently addressed fire detection devices, input/output control modules, amplifiers and speakers.

The system shall be fully field programmable such that virtually any combination of system output functions may be correlated to any type of input event(s). Inputs may be combined using Boolean logic, be time dependent or under manual control, as defined by required system operation. All software operations are to be stored in a non-volatile programmable memory within the fire alarm control panels. There shall be no limit, other than maximum system capacity, as to the number of addressable devices which may be in alarm simultaneously.

Addressable smoke detector sensitivity settings for both pre-alarm and alarm activation shall be automatically individually configurable for both daytime and nighttime operation. Addressable smoke

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detectors shall be UL listed for automatic sensitivity testing.

Ease of maintenance shall be facilitated by the use of panel based and PC based system diagnostics.

1. The system shall automatically test smoke detector sensitivity, eliminating the need for manual sensitivity testing.
2. Ground fault detection and annunciation shall be by individual module address for supervised input and output devices.
3. System test operation shall be configurable by individual addressable devices, and not disable entire circuits.
4. The system shall be capable of generating a graphical map of connected all addressable devices to aide in circuit troubleshooting.
5. Placement supervision of addressable devices shall couple a device's location (not its address) to the programmed system response.

The system shall provide a one-way multi-channel emergency communication sub-system for the distribution of emergency messages to facility occupants.

The system shall support CO and security detection devices with appropriate independent annunciation and signal processing.

1.3.2. Fire Alarm Performance

1.3.2.1. General Requirements

- A. Comply with the provisions of NFPA 72 and the operational requirements of this specification.
- B. The system shall identify all off normal conditions and log each condition into the system as an event.
 - a. The system shall automatically display on the control panel Liquid Crystal Display (LCD) the first (oldest) event of the highest priority by type. The event priority shall be alarm, supervisory, trouble, and monitor.
 - b. The system shall utilize four event queues, and shall not require event acknowledgment by the system operator. Labeled, color coded indicators shall be provided for each type of event queue: alarm - red, supervisory - yellow, trouble - yellow, monitor - yellow. When an unseen event exists for a given type, the indicator shall be lit.
 - c. 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 42 character custom user description.
 - d. The user shall be able to review each event queue by simply selecting scrolling keys (up-down) for the event type.
 - e. New alarm, supervisory, or trouble events shall sound a distinct, silenceable audible signal at the control panel.
 - f. The LCD shall show the number of active alarm, supervisory, trouble and monitor events
 - g. The LCD shall show the system time and the number of active and disabled points in the system.
 - h. Specific input/output devices shall operate in accordance with the alarm, supervisory, trouble, monitor sections that follow and the input/output matrix.
- C. All critical systems, sub-systems and circuits shall be monitored for integrity. System faults shall be annunciated.

- D. Strobes shall be synchronized per the requirements of NFPA 72.
- E. Batteries shall be sized to support the system for 24 Hrs. of standby operation followed by 15 minutes of alarm operation at the end of the 24 Hour period.
- F. Off premises reporting of the loss of AC mains power to any system component shall be automatically delayed for a period of time acceptable to the AHJ to reduce traffic at the central monitoring station due to wide-area power failures.
- G. Event processing and display shall be prioritized as follows:
 - a. Fire alarms
 - b. Supervisory events
 - c. Trouble events
 - d. Monitor events

1.3.2.2. Alarm Operation - ECS

Upon the **alarm activation** of any area smoke detector, heat detector, manual pull station, sprinkler waterflow, the following functions shall automatically occur:

The system shall remain in the alarm mode until all initiating devices are reset and the fire alarm panel is manually reset and restored to normal.

The internal audible device shall sound at the control panel or command center.

The LCD Display shall indicate all applicable information associated with the alarm condition including: zone, device type, device location and time/date.

All system activity/events shall be logged into system history.

Any remote or local annunciator LCD/LED's associated with the alarm zone shall be illuminated.

The following audio messages and actions shall occur simultaneously:

A general evacuation message shall be sounded throughout the campus.

Activate visual strobes for general alarm evacuation. The visual strobe shall continue to flash until the system has been reset.

Provide selective paging to each individual building (zone).

The Multipurpose building stage sprinkler system water flow bell shall not be silenced while the sprinkler system is flowing at a rate of flow equal to a single head.

Transmit signal to the central monitoring station.

Activate emergency shutdown for the following equipment: Multipurpose Building Audio Rack.

1.3.2.3. Supervisory Operation

Upon **supervisory activation** of any sprinkler valve supervisory switch, duct smoke detector the following functions shall automatically occur:

The internal supervisory event audible device shall sound at the control panel.

The LCD display shall indicate all applicable information associated with the supervisory condition including; zone, device type, device location and time/date.

All system activity/events shall be logged into system history.

Any remote or local annunciator LCD/LED's associated with the supervisory zone shall be illuminated.

Transmit signal to the central monitoring station.

1.3.2.4. Trouble Operation

Upon activation of a **trouble condition** or signal from any device or internal system integrity monitoring function on the system, the following functions shall automatically occur:

The internal panel audible device shall sound at the control panel.

The LCD keypad display shall indicate all applicable information associated with the trouble condition including; zone, device type, device location and time/date.

Trouble conditions that have been restored to normal shall be automatically removed from the trouble display queue and not require operator intervention. This feature shall be software selectable and shall not prevent the logging of trouble events to the historical file.

All system activity/events shall be logged to system history.

Any remote or local annunciator LCD/LED's associated with the trouble zone shall be illuminated.

Transmit a trouble signal to the central monitoring station with point identification.

1.4. Quality Assurance

1.4.1. Qualifications of Supplier

The system supplier shall have a minimum of 15 years of experience in distribution and service of Edwards Fire Alarm products.

The supplier shall have successfully designed and installed similar system fire detection, evacuation voice and visual signaling control components on a previous project of comparable scope, size and complexity.

The supplier shall have in-house engineering and project management capability consistent with the requirements of this project. The project shall be supervised by personnel certified by a NICET fire alarm Level IV technician.

The supplier shall employ qualified and manufacturer certified system designers to perform the detailed engineering design, system calculations, for all the system equipment and programming.

The supplier shall produce all panel and equipment drawings, submittals, and operating manuals, as detailed elsewhere in this specification.

The supplier shall be responsible for providing qualified on site representative(s) for coordination of system installation, and final system testing and commissioning in accordance with these specifications.

The supplier shall be Bi-Jamar, Inc. dba QUALITY SOUND.

1.4.2. Qualifications of Installer

The contractor/installer shall be responsible for retaining qualified and authorized representative(s) of the system manufacturer (The Supplier) specified for detailed system design and documentation, coordination of system installation requirements, and final system testing and commissioning in accordance with these specifications.

The contractor/installer shall employ on staff a minimum of one NICET level IV technician or a professional engineer, registered in the State of the installation.

Per DSA IR A-21, 2.2 Any system designed by a C-10 licensed electrical contractor must be installed by that contractor with his/her own employees and under the supervision of the license holder. Such

systems may not be installed by another company or individual not professionally associated with the licensed installation contractor. The installing contractor shall be Bi-Jamar, Inc. dba QUALITY SOUND.

1.5. Submittals

1.5.1. Submittal General

- A. The contractor shall not purchase any equipment for the specified system until the owner has approved the project submittals in their entirety and has returned them to the contractor.
- B. The DSA approved contract drawings, product manufacturer's data sheets and specifications shall be used for construction. No further submittals are required.

1.5.2. Closeout

Two (2) copies of the following documents shall be delivered to the building owner's representative at the time of system acceptance.

Project specific operating and maintenance manuals covering the system as installed. The manuals shall contain a description of the system architecture, inputs, notification signaling, auxiliary functions, annunciation, sequence of operations, expansion capability, application considerations and limitations. A generic instruction and operation manual shall not be acceptable.

Technical literature (manufacturer's data sheets and installation manuals/instructions) for all parts of the system, including control panels, smoke detectors, batteries, manual stations, alarm notification appliances, power supplies, and remote alarm transmission means.

Software and Firmware Operational Documentation:

THE END-USER SHALL RETAIN COMPLETE RIGHTS AND OWNERSHIP TO ALL SITE-SPECIFIC SOFTWARE RUNNING IN THE SYSTEM. The fire alarm equipment supplier shall provide soft copies of the software database to the end-user at the end of the warranty period. The database provided shall be useable by any authorized and certified distributor of the product line, and shall include all applicable passwords necessary for total and unrestricted use and modification of the database.

Drawings

Provide "As Built" drawings of record of all the shop drawings used in the installation of the system.

Record of Completion

A filled out Record of Completion similar to NFPA 72, 2007 edition figure 4.5.2.1 shall be provided.

Warranty

Provide copies of the warranty documentation as detailed in the Warranty section of this specification.

Service Organization

Provide the name, address and telephone of the authorized factory representative.

Training

Conduct the required training as detailed in the Startup and Commissioning - Training section of this specification.

1.6. Project Conditions

1.6.1. Responsibility

It shall be the contractor's responsibility to inspect the job site and become familiar with the conditions under which the work will be performed.

A pre-bid meeting will be held to familiarize the contractors with the project. Failure to attend the pre-bid meeting may be considered cause for rejection of the contractor's bid.

1.7. Warranty

1.7.1. Installation Workmanship and Parts

The contractor shall warranty the installation and workmanship for one (1) year and all parts for thirty-six (36) months from date of final acceptance. A copy of the manufacturer's warranty shall be provided with closeout documentation and included with the operation and installation manuals. The full cost of maintenance, labor and materials required to correct any defect during the warranty period shall be included in the submittal bid.

The system supplier shall maintain a service organization with adequate spare parts stock within 75 miles of the installation.

1.8. Startup and Commissioning

1.8.1. Test and Inspection - Fire

A. Testing, general

1. The contractor shall perform all testing in occupied facilities at times of day that present the lowest impact and disruption to business and activities. Coordinate all testing in occupied buildings with the building owner's representative to assure that fire alarm system testing does not interrupt operations.
2. All equipment, instruments, tools and labor required to conduct the system tests shall be provided by the installing contractor. At a minimum, the following equipment shall be made available testing:

- a. Ladders and scaffolds as required to reach all installed equipment.
- b. Meters for reading voltage, current and resistance.
- c. Two-way communication devices
- d. Simulated smoke, heat-producing devices for heat detectors, extension poles for

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- introducing smoke into detectors, as needed.
 - e. Manufacturer's instruments to measure air flow through duct smoke detectors.
 - f. Decibel meter.
 - g. Status and diagnostic software and PC.
- B. All testing shall utilize a written acceptance test plan for testing the system components and operation in accordance with NFPA 72 and this specification. The contractor shall be responsible for the performance of the acceptance test plan, demonstrating the function of the system and verifying the correct operation of all system components, circuits, and system programming.
 - 1. The systems operation matrix created by the equipment supplier shall be used to identify each alarm input and verify all associated output functions.
- C. The system test plan shall include but not be limited to the following:
 - 1. Visually inspect all wiring.
 - 2. Verify the absence of unwanted voltages between circuit conductors and ground. The tests shall be accomplished at the preliminary test with results available at the final acceptance test.
- D. System indications shall be demonstrated as follows:
 - 1. Correct message content for each alarm input at all system displays.
 - 2. Correct history logging for all system activity.
 - 3. Correct sensitivity for all smoke detection devices. The use of system generated sensitivity reports is acceptable in meeting this requirement.
 - a. Correct signals sent to the Central Monitoring Station.
 - 5. Notification appliances shall be demonstrated as follows:
 - a. All alarm notification appliances actuate as programmed
 - 6. System control functions shall be demonstrated as follows:
 - a. In accordance with the system operation matrix.
 - 7. System off premises reporting functions shall be demonstrated as follows:
 - a. Correct information received for each alarm and trouble event
 - 8. Verify the "As Built" record drawings are accurate.

Preliminary Testing

Conduct preliminary tests to ensure that all devices and circuits are functioning properly. Tests shall meet the requirements of the written test plan. Correct any deficiencies, omissions or anomalies and retest the affected devices to assure proper function per the specification.

Test Reports

A "Fire Alarm System Record of Completion" per the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA72 and the "Inspection and Testing Form" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in shall be prepared by the Contractor

1.8.2. Training

The system supplier shall schedule and present a formal site specific instruction for the building owner, detailing the proper operation and maintenance of the installed system.

The instruction shall be presented in an organized and professional manner by a person factory trained in the operation and maintenance of the equipment and who is also thoroughly familiar with the installation.

Copies of all training aids, presentations, etc. shall be left with the owner.

2. Part 2 - Products

2.1. Acceptable Manufacturers

A. The manufacturer of the system equipment shall be EDWARDS.

2.2. Fire Alarm Panel

2.2.1. General - Fire

Overview

All materials, equipment, accessories, devices and other facilities and appurtenances covered by these specifications or noted on the drawings shall be new (unless otherwise noted on the drawings), best suited for the intended use and shall conform to applicable and recognized standards for their use.

The fire alarm control panel(s) shall be a multi-processor based networked system designed specifically for fire, one-way and two-way emergency audio communications. The control panel shall be listed and approved for the application standard(s) as listed in the References section of this specification.

The control panel shall include all required hardware, software and site specific system programming to provide a complete and operational system. The control panel(s) shall be designed such that interactions between any applications can be configured, and modified using software provided by the manufacturer. The control panel(s) operational priority shall assure that life safety takes precedence among the activities coordinated by the control panel.

The operating controls shall be located in a dead-front steel enclosure behind a locked door with viewing window. All panel modules shall be placement supervised and signal a trouble if damaged or removed.

System Features

Each control panel shall include the following capabilities:

Supervision of the system electronics, wiring, detection devices and software

Up to 2500 analog/addressable input/output points

Network connections with up to 63 other control panels and annunciators.

Support multiple dialers (DACTs) and modems

An internal audible signal with different patterns to distinguish between alarm, supervisory, trouble and monitor events

Support multiple 24 VDC and Audio NACs

User configurable switches and LED indicators to support auxiliary functions

Log up to 1740 chronological events

The ability to download all applications and firmware from the configuration computer at a single location on the fire network

A real-time clock for time stamps and timed event control

Electronic addressing of intelligent addressable devices

Provide an independent hardware watchdog to supervise software and CPU operation

“Dry” alarm, trouble and supervisory relay contacts

Control panel modules shall plug in to a chassis assembly for ease of maintenance

Field wiring shall connect to the panel using removable connectors

User Oriented Features

Each control panel shall include the following user oriented features:

An LCD user interface control/display that shall annunciate and control system functions.

Provide discreet system control switches for reset, alarm silence, panel silence, drill switch, previous message switch, next message switch and details.

A “lamp test” feature shall verify operation of all visual indicators on the panel.

An authorized user shall have the ability to operate or modify system functions including system time, date, passwords, holiday dates, restart the system and clear control panel event history file.

An authorized user shall have the ability to disable/enable devices, zones, actions, timers and sequences.

An authorized user shall have the ability to activate/restore outputs, actions, sequences, and simulate detector smoke levels.

An authorized user shall have the ability to enter time and date, reconfigure an external port for download programming, initiate programming and change passwords.

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.

SLC loop controller diagnostics shall identify common alarm, trouble, ground fault, Class A fault, and map faults. Map faults include wire changes, device type changes by location, device additions/deletions and conventional open, short, and ground conditions. Ground faults on the supervised circuit wiring of remote addressable modules shall be identified by device address.

An authorized user shall have the ability to generate a report history for alarm, supervisory, monitor, trouble, smoke verification, watchdog, and restore activity.

System reports shall provide detailed description of the status of system parameters for corrective action or for preventative maintenance programs. Reports shall be displayed by the operator interface or capable of being printed on a printer.

An authorized user shall have the ability to display/report the condition of addressable analog detectors. Reports shall include device address, device type, percent obscuration, and maintenance indication. The maintenance indication shall provide the user with a measure of contamination of a device upon which cleaning decisions can be made.

Programmability

A Windows-based Configuration Utility (CU) shall be used to create the site-specific system programming. The utility shall facilitate programming of any input point to any output point. The utility shall allow customization of fundamental system operations using initiating events to start actions, timers, sequences and logical algorithms.

- Zoning of initiation devices.
- Initiation of events by time of day, day of week, day of year.
- Initiation of events by matrix groups (X-Y coordinate relationships) for releasing systems.

- Initiation of events using OR, AND, NOT and counting functions.
- Prioritizing system events.
- Programmable activation of detector sounder bases by detector, groups of bases, or all bases.
- Directing selected device messages to specific panel annunciators
- Detector sensitivity selection by time of day
- Support of 256 Central Monitoring Station accounts and directing selected device messages to any one of ten Central Monitoring Stations.

The configuration utility shall time and date stamp all changes to the site-specific program, and shall facilitate program versioning and shall store all previous program version data. The utility shall provide a compare feature to identify the differences between different versions of the site-specific program.

The configuration utility shall be capable of generating reports which detail the configurations of all fire alarm panels, addressable devices and their configuration settings including generating electrical maps of the addressable device SLCs.

The configuration utility shall support the use of bar code readers to expedite electronic addressing and custom programming functions.

Please refer to the *General, System Description Section* for this project's site-specific system operating requirements.

The fire alarm control panel shall be an EDWARDS EST3 and support components in an appropriately sized enclosure.

2.2.2. Power Supply

System power supply(s) shall be a high efficiency switched mode design providing multiple supervised power limited 24 VDC output circuits as required by the panel and external loads fed by the panel. Each system power supply shall be individually supervised. Power supply trouble signals shall identify the specific supply and the nature of the trouble condition.

It shall be possible to parallel system power supplies to increase capacity or to provide redundant operation.

Upon failure of normal (AC) power, the affected portion(s) of the system shall automatically switch over to secondary power without losing any system functionality.

All system power supplies shall be capable of recharging their associated batteries, from a fully discharged condition to a capacity sufficient to allow the system to perform consistent with the requirements of this section, in 48 hours maximum.

All standby batteries shall be continuously monitored by the power supply. The power supply shall be able to perform an automatic load test of batteries and indicate a trouble condition if the batteries fall outside a predetermined range. Power supplies shall incorporate the ability to adjust the charge rate of batteries based on ambient temperatures. The power supply shall automatically disconnect the battery before low voltage damages the battery. Low battery and disconnection of battery power supply conditions shall immediately be annunciated as battery trouble and identify the specific power supply(s) affected.

Batteries shall utilize sealed lead acid chemistry. Initial battery capacity shall provide 125% of calculated capacity requirements in order to allow for future system expansion.

All AC power connections shall be to the building's designated emergency electrical power circuit and shall meet the requirements of NFPA 70 and NFPA 72. The power circuit disconnect means shall be clearly labeled FIRE ALARM CIRCUIT CONTROL and shall have a red marking. The location of the circuit disconnect shall be labeled permanently inside the each control panel the disconnect serves.

The primary power supply shall be an EDWARDS 3-PPS/M series. Additional power supplies shall be he shall be EDWARDS 3-BPS/M series.

2.2.3. User Interface

2.2.3.1. Panel LCD and Common Controls

The system shall be designed and equipped to receive, monitor, and annunciate signals from devices and circuits installed throughout the facility.

Each fire alarm control panel (system node) shall be capable of supporting a backlit LCD display. The display on each system node shall be configurable to *display* the status of any and/or all combinations of all alarm, supervisory, trouble, monitor, or service group event messages on the network. Each LCD display on the system shall be capable of being programmed to allow *control* functions of any combination of nodes on the entire network. The system shall support both 168 character and 960 character LCD displays on the same network.

The LCD display shall provide separate alarm, trouble, supervisory, and monitor event queues of to minimize operator confusion. Receipt of alarm, trouble, and supervisory signals shall activate integral audible devices at the control panel(s) and at each remote annunciation device. The integral audible devices shall produce a sound output upon activation of not less than 85 dBA at 10 feet.

The LCD display shall contain the following system status indicators:

- System Power Indicator
- System Test Indicator
- System CPU Fail Indicator
- Ground Fault Indicator
- Disabled Points Indicator
- System Normal Indicator
- System Common Alarm Indicator
- System Common Trouble Indicator
- System Common Supervisory Indicator
- System Common Monitor Event Indicator

The LCD display shall contain the following system switch/indicators:

- System Reset Switch with Indicator
- System Alarm Silence Switch with Indicator
- System Panel Silence Switch with Indicator
- Drill Switch with Indicator
- Alarm Acknowledge Switch with Indicator
- Trouble Acknowledge Switch with Indicator
- Supervisory Acknowledge Switch with Indicator

Monitor Acknowledge Switch with Indicator

The LCD display shall contain the following system function switches

- System Event Message Queue Scroll Switch.

- Event Details Switch (provides an additional 2000 character message about the device highlighted by the operator.)

- Command Menu Switch

- 10-Digit Keypad with Enter and Backspace switches

168 Character Backlit Liquid Crystal Text Display

The user interface shall provide a backlit LCD that will allow custom event messages of up to 42 characters. The interface shall provide a minimum of eight lines by 21 characters and provide the emergency user hands free viewing of the first and last highest priority events. The last highest priority event shall always display and update automatically. Events shall be automatically placed in one of four easy to access queues. It shall be possible to scroll through and view specific alarm, trouble, supervisory and monitor events separately. Having to scroll through a mixed list of event types shall not be considered as equal. The total number of active and disabled events by type shall be displayed. Visual indication shall be provided of any event type that has not been acknowledged or viewed. It shall be possible to customize the designation of all user interface LEDs and Switches for local language requirements.

Instructional text messages shall support a maximum of 2,000 characters each.

The system 168 character LCD display shall be an EDWARDS model 3-LCD.

2.2.3.2. LEDs and Switches

A modular series of switches and LED indicators shall be available to customize the fire alarm control panel operation in accordance with this specification. All LED and switch functions shall be software programmable. Switches shall be configurable for momentary, maintained, toggle, or “exclusive or” operation as required by the application. LEDs shall be configurable for slow flash, fast flash or steady operation. LED/Switch modules shall be capable of mounting in any available fire panel module position. All LED/Switch modules shall be supervised. LEDs shall be available in a variety of colors to facilitate identification from a distance. The LED/Switch modules shall provide ample room for custom function text labels under a protective membrane.

The LED/Switch modules shall be EDWARDS 3-12SIGY devices.

2.2.3.3. Audio Annunciation and Control

Provide a master one-way emergency audio control unit as part of the main fire alarm control panel. The emergency audio control shall contain a paging microphone and shall be capable of generating and delivering multi-channel audio messages simultaneously over copper and/or fiber media to remote parts of the facility.

All audio messages and live pages shall originate at the one-way audio control unit. The one-way audio control unit shall store up to 32 minutes of pre-recorded audio messages digitally as WAV files. These messages shall be automatically directed to various areas in a facility under program control. The unit shall have the capacity to store up to 200 individual audio messages and to simultaneously play back seven (7) different messages in addition to live page message.

During non-alarm conditions, the control unit shall continuously distribute a default audio message to all

amplifiers, providing total audio path supervision. To enhance system survivability, each remote FACP cabinet containing an amplifier shall play the default audio message in the event of a fire AND a control network system failure.

The one-way emergency audio control shall provide control switches to direct live paging messages as follows:

- "All Call" to direct the page messages to all areas in the facility, overriding all other messages and tones.
- "Page to Evacuation Area" to direct the message to the evacuation area(s), overriding all other messages and tones.
- "Page to Alert Area" to direct page messages to the area(s) receiving the alert message and tones, overriding all other messages and tones.
- "Page to Balance Building" to direct page messages to the areas) in the facility NOT receiving either the evacuation area or alert area messages.
- "Page by Phone" switch to select the firefighter's telephone system as the paging source.

A 'ready to page' LED shall turn steady when the system is ready for the 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 will be preceded by the pre-announce tone. A VU display shall indicate voice level to the emergency operator.

The one-way audio control unit shall be capable of supporting up to 64 remote microphone inputs and a line level audio input.

The fire alarm control panels shall support remote cabinets with zoned amplifiers to receive, amplify and distribute messages through speakers over supervised circuits.

The master one-way emergency audio control unit shall be an EDWARDS 3-ASU/4.

2.2.3.4. Reports

The system shall provide the operator with system reports that give detailed description of the status of system parameters for corrective action, or for preventative maintenance programs. The system shall provide these reports via the main LCD, and shall be capable of being printed on any system printer.

The system shall provide a report that gives a sensitivity listing of all detectors that have less than 80% environmental compensation remaining. The system shall provide a report that provides a sensitivity (% Obscuration per foot) listing of any particular detector.

When addressable CO detectors are installed, performing a "sensitivity" check from the panel shall report the approximate number months of sensor life remaining.

The system shall provide a report that gives a listing of the sensitivity of all of the detectors on any given panel in the system, or any given analog/addressable device loop within any given panel.

The system shall provide a report that gives a chronological listing of at least the last 1000 system events.

The system shall provide a listing of all of the firmware revision listings for all of the installed components in the system.

2.2.4. Signaling Line Circuits

2.2.4.1. EST3 System

The signaling line circuit connecting panels/nodes to intelligent addressable devices including, detectors, monitor modules, control modules, isolation modules and notification circuit modules shall be Class B. All signaling line circuits shall be supervised and power limited.

When the addressable devices on a signaling line circuit cover more than one designated fire/smoke compartment, a wire-to-wire short on the circuit shall not affect the operation of the addressable devices in other fire/smoke compartments.

Each SLC shall support 125 addressable detector addresses and 125 module addresses. The SLC shall support 100% of all addressable devices in alarm and provide support for a 100% compliment of detector isolator bases.

T-taps (branching) shall be permitted on Class B circuits only where designated on the approved drawings.

Each intelligent addressable device shall transmit information about its location with respect to other devices on the circuit. This information shall be used to create an "As-Built" wiring diagram as well as provide enhanced supervision of a device's physical location. The device message and programmed system output function shall be associated with the device's location on the SLC circuit location and not a device address.

The SLC module shall allow replacement of "same type" devices without the need to address and reload the "location" parameters on replacement device.

The SLC/Panels shall notify the user when programmed devices are detected on the SLC circuit. The SLC/Panels shall notify the user when the wrong device type is installed at a location configured for a different device type on the SLC circuit.

Should an SLC Controller CPU fail to communicate, the SLC circuit shall go into the stand-alone mode. The circuit shall be capable of producing a loop alarm if an alarm type device becomes active during stand-alone mode to enhance system integrity.

The addressable device signaling line circuit modules shall be an EDWARDS 3-SSDC1 & 3-SDDC1 series.

2.2.5. Notification Appliance Circuits

2.2.5.1. Notification Appliance Circuits

General

All notification circuits shall be supervised and power limited. Non-power limited circuits are not acceptable. All notification appliance circuits shall be Class B.

24 VDC Notification Appliance circuits

Notification appliance circuits shall have a minimum circuit output rating of 2 amps @ 24 VDC

24VDC NACs shall be polarized and provide strobe synchronization.

Audio Notification Appliance Circuits

Audio notification appliance circuits shall be polarized and have a minimum circuit output rating of 40 watts @ 70V audio.

2.2.5.2. Audio Amplifiers

Each audio power amplifier shall have integral audio signal de-multiplexers, allowing the amplifier to select any one of eight digitized audio channels as directed by system programming.

Audio amplifiers shall be power limited and protected from short circuits conditions on the audio circuit wiring. Each amplifier output shall provide a selectable 25/70 Vrms output, suitable for connection to emergency speakers.

To enhance system survivability in the event of a total loss of audio data communications, all amplifiers shall default to the local "EVAC" tone generator channel. If the local panel has an alarm condition, then all amplifiers will sound the EVAC message on their speaker circuits. In the event of a loss of the fully digitized, multiplexed audio riser data, the audio amplifiers shall automatically default to an internally generated alarm tone which shall sound a 3-3-3 temporal pattern.

Amplifiers shall also include a 24 VDC notification appliance circuit rated at 24Vdc @ 3.5A for connection of visible (strobe) appliances. This circuit shall be fully programmable.

Audio amplifiers shall be EDWARDS 3-ZA40B devices.

2.2.6. Initiating Device Circuits

2.2.6.1. Initiating Device Circuits

Conventional (2-wire) initiating device circuits monitoring manual fire alarm stations, heat detectors, waterflow switches and valve supervisory switches shall be Class B.

Initiating device circuits shall be configurable for latched or non-latched operation and configurable to initiate alarm, supervisory or monitor events.

End-of-line resistors for conventional initiating device circuits shall be covered with insulated tubing, terminated with ring lugs and display a UL label.

2.2.7. Off Premises Communications

2.2.7.1. DACT

The system shall provide off premises communications capability using a Digital Alarm Communications Transmitter (DACT) for sending system events to multiple Central Monitoring Station (CMS) receivers over conventional telephone lines.

The system shall provide the CMS(s) with point identification of system events using 4/2, Contact ID ID (SIA DC-05) or SIA DCS protocols.

The dialer shall support up to 255 individual accounts and to send account information to eight (8) different receivers, each having a primary and secondary telephone access number. System events shall be capable of being directed to one or more receivers depending on event type or location as specified by the system design.

In the event of a fire alarm panel CPU failure during a fire alarm condition, the DACT degrade mode shall transmit a general fire alarm signal to the CMS.

The owner shall arrange for two (2) dedicated loop-start phone lines to be terminated using two RJ31X jacks within 5 ft of the main fire alarm control panel.

The DACT shall be an EDWARDS 3-MODCOM.

2.3. Remote Booster Power Supply

2.3.1. Remote Booster Power Supply

Install Remote NAC Power Supplies (boosters) at the locations shown on the drawings, as required, to minimize NAC voltage drops. Remote NAC power supplies shall be treated as peripheral NAC devices and shall not be considered fire alarm control units.

The NAC power supplies shall be fully enclosed in a surface mounted steel enclosure with hinged door and cylinder lock, and finished in red enamel. Door keys shall be the identical to FACP enclosure keys. The enclosure shall have factory installed mounting brackets for additional UL listed fire alarm equipment within its cabinet. Enclosures shall be sized to allow ample space for interconnection of all components and field wiring, and up to 10AH batteries. The enclosure shall have provisions for an optional tamper switch. All FACP addressable control modules required to initiate the required NAC power supply output functions shall be installed within the NAC power supply enclosure

Remote NAC power supply *input* circuits shall be configurable as Class B supervised inputs or for connection to any 6 to 45 VDC initiation source.

Remote booster power supplies shall provide four (4) synchronized Class B supervised or two (2) Class A, power limited, 24VDC filtered and regulated Notification Appliance Circuits (NACs). Each NAC output shall be configurable as a continuous 24Vdc auxiliary power output circuit. The booster power supply shall be capable of a total output of 10 amps.

The power supply NACs shall be configurable to operate independently at any one of the following rates: continuous synchronized, or 3-3-3 temporal. It shall be possible to configure the NACs to follow the main FACP NAC or activate from intelligent addressable synchronized modules. Where more than two visible NACs within a building in direct view of each other are installed they shall be synchronized.

Upon failure of primary AC power, the remote power supply shall automatically switch over to secondary battery power without losing any system functions. It shall be possible to delay reporting of an AC power failure for up to 6 hours. All standby batteries shall be continuously monitored by the power supply. Low battery and disconnection of battery power supply conditions shall immediately be announced as locally as battery trouble. All power supply trouble conditions (DC power failure, ground faults, low batteries, and IDC/NAC circuit faults) shall identify the specific remote power supply affected at the main FACP. All power supply trouble conditions except loss of AC power shall report immediately. Interconnecting NAC Booster power supplies in a manner which prevents identification of an individual

power supply trouble shall not be considered as an equal.

The remote booster power supply shall be capable of recharging up to 24AH batteries to 70% capacity in 24 hours maximum. Batteries provided shall be sized to meet the same power supply performance requirements as the main FACP, as detailed elsewhere in this specification.

All AC power connections shall be to the building's designated dedicated emergency electrical power circuit. The power circuit disconnect means shall be clearly labeled FIRE ALARM CIRCUIT CONTROL and shall have a red marking. The location of the circuit disconnect shall be labeled permanently inside the each remote NAC power supply the disconnect serves.

The remote NAC power supplies shall be EDWARDS model BPS10A series.

2.4. Peripheral Components

2.4.1. Addressable

2.4.1.1. Detectors

2.4.1.1.1. General

General Requirements for Intelligent Addressable Heat, Smoke and CO Detectors

Each detector shall contain an integral microprocessor which shall determine if the device is normal, in alarm, or has an internal trouble. The microprocessor's non-volatile memory shall permanently store the detector's serial number, device type and system address. It shall be possible to address each intelligent device without the use of switches. Devices requiring switches for addressing shall not be considered as equal. Memory shall automatically be updated with the hours of operation, last maintenance date, number of alarms and troubles, time of last alarm, and analog signal patterns for each sensing element just before the last alarm.

Each detector shall be capable of identifying up to 32 diagnostic codes. This information shall be available for system maintenance. The diagnostic code shall be stored at the detector.

Each addressable detector on the Signaling Line Circuit (SLC) shall transmit information regarding its location with respect to other intelligent devices on the signaling line circuit to the control panel, creating an "As-Built" circuit map. The circuit mapping function shall provide location supervision of all intelligent devices on the signaling line circuit. An intelligent detector's programmed system response functions shall be associated with the detector's actual *location* on the signaling line circuit and *not with the detector's address*. After system commissioning, detectors improperly installed in the wrong location shall function according to the mapped programmed response for its *location* on the circuit, not its detector's address.

A status indicator shall be provided on each detector. Flashing green shall indicate normal operation; flashing RED shall indicate the alarm state. The indicator shall be visible from any direction.

The system shall allow for changing of detector types for service replacement purposes without the

need to reprogram the system. The replacement detector type shall automatically continue to operate with the same programmed sensitivity levels and functions as the detector it replaced, without the need for reprogramming. System shall display an off-normal condition until the proper detector type is installed or a change in the device type profile has been made.

Detectors shall be rated for operation in the following environment unless specifically noted:

- Temperature: 32°F to 120°F (0°C to 49°C)
- Humidity: 0-93% RH, non-condensing

Detectors with addressing components in the base shall not be considered as equal.

The intelligent detectors shall be EDWARDS Signature Series devices.

2.4.1.1.2. Photoelectric Detector

Provide analog/addressable photoelectric smoke detectors at the locations shown on the drawings.

The photoelectric smoke detector shall be suitable for direct insertion into air ducts up to 3 ft (0.91m) high and 3 ft (0.91m) wide with air velocities up to 4,000 ft/min. (0-25.39 m/sec) without requiring specific duct detector housings or supply tubes.

Each smoke detector shall be individually programmable to operate at any one of five (5) sensitivity settings. The detector shall also store pre-alarm and alternate pre-alarm sensitivity settings. Pre alarm sensitivity values shall be configurable in 5% increments of the alarm and alternate alarm sensitivity settings respectively. The detector shall be able to differentiate between a long term drift above the pre alarm threshold and fast rise above the threshold. The detector shall monitor the sensitivity of the smoke sensor. If the sensitivity shifts outside the UL limits, a trouble signal shall be sent to the panel. It shall be possible to automatically change the sensitivity of individual intelligent addressable smoke detectors for day and night (alternate) periods.

Each detector shall utilize an environmental compensation algorithm that shall automatically adjust for background environmental conditions such as dust, temperature, and pressure. The detector shall provide a maintenance alert signal when 80% (dirty) of the available compensation range has been used. The detector shall provide a dirty fault signal when 100% or greater compensation has been used.

The photoelectric smoke detector shall be an EDWARDS SIGA-PD.

2.4.1.1.3. Duct Smoke Detector

Provide intelligent low profile photoelectric duct smoke detectors at the locations shown on the drawings.

The intelligent duct smoke detector shall operate in ducts having from 100ft/min to 4,000ft/min air velocity. The detector shall be suitable for operation over a temperature range of -20 to 158F° and offer a harsh environment gasket option. The detector shall utilize an air exhaust tube and an air sampling inlet tube that extends into the duct air stream up to ten (10) feet. Design of the detector shall permit sampling tube installation from either side of the detector and permit sampling tube installation in 45- degree increments to ensure proper alignment with duct airflow. Drilling templates and gaskets to facilitate locating and mounting the housing shall be provided.

The intelligent duct smoke detector shall obtain information from a photoelectric sensing element. The detector shall be able to differentiate between a long term drift above the pre alarm threshold and fast rise

above the threshold. The detector shall monitor the sensitivity of the smoke sensor. If the sensitivity shifts outside the UL limits, a trouble signal shall be sent to the panel

Each detector shall utilize an environmental compensation algorithm that shall automatically adjust for background environmental conditions such as dust, temperature, and pressure. The detector shall provide a maintenance alert signal when 80% (dirty) of the available compensation range has been used. The detector shall provide a dirty fault signal when 100% or greater compensation has been used.

The intelligent duct smoke detector shall provide a form "C" auxiliary alarm relay rated at 2amps @ 30Vdc. The position of the relay contact shall be supervised by the control panel software. Operation of the relay shall be controlled either by its respective detector processor or under program control from the control panel as required by the application. Detector relays not capable of programmed operation independent of the detector's state shall not be considered as equal. The detector shall be equipped with a local magnet-activated test switch.

Each duct detector shall be installed and testing in accordance with manufacturer's instructions, including pressure differential and, velocity testing. Test results shall be submitted to the owner.

Remote test switches/LED indicators shall be provided below the detector on the ceiling to indicate location of the detector in non-mechanical areas, at locations indicated on the drawings.

The Intelligent Photoelectric Duct Smoke Detector shall be an EDWARDS model SIGA-SD.

2.4.1.1.4. Fixed Heat Detector

Provide intelligent fixed temperature heat detectors at the locations shown on the drawings.

The detector shall continually monitor the temperature of the air in its surroundings to minimize thermal lag to the time required to process an alarm. The detector shall utilize a low mass thermistor heat sensor and operate at a nominal fixed temperature alarm point rating of 135°F (57°C). The integral microprocessor shall determine if an alarm condition exists and initiate an alarm based on the analysis of thermistor data. Systems using central intelligence for alarm decisions shall not be considered as equal.

The heat detector shall be rated for ceiling installation at a minimum of 50 ft (15.24m) centers and also be suitable for wall mount applications.

The Intelligent fixed temperature detector shall be an EDWARDS SIGA-HFD.

2.4.1.1.5. Rate of Rise Detector

Provide intelligent combination fixed temperature / rate-of-rise heat detectors at the locations shown on the drawings.

The detector shall continually monitor the temperature of the air in its surroundings to minimize thermal lag to the time required to process an alarm. The detector shall utilize a low mass thermistor heat sensor and operate at a nominal fixed temperature alarm point rating of 135°F and at a temperature rate-of-rise alarm point of 15°F per minute. The integral microprocessor shall determine if an alarm condition exists and initiate an alarm based on the analysis of thermistor data. Systems using central intelligence for alarm decisions shall not be considered as equal.

The heat detector shall be rated for ceiling installation at a minimum of 50 ft centers and also be suitable for wall mount applications.

The Intelligent combination fixed temperature / rate-of-rise heat detector shall be an EDWARDS SIGA-HRD.

2.4.1.1.6. Standard Base

Provide standard detector bases suitable for mounting on either North American 1-gang, 3½ or 4 inch octagon box and 4 inch square box, European BESA or 1-gang box.

The bases shall utilize a twist-lock design and provide screw terminals for all field wiring connections.

The base shall contain no active electronics and support all Signature series detector types.

Removal of the respective detector shall not affect communications with other detectors.

The standard addressable detector base shall be an EDWARDS SIGA-SB.

2.4.1.1.7. Photoelectric-CO Detector

Provide analog/addressable combination photoelectric smoke and carbon monoxide (CO) detectors at the locations shown on the drawings.

The combination smoke and CO detector shall provide two independent signals (smoke & CO) to the control panel for programming system responses. The temporal 4-4-4 shall sound throughout the campus via the EVAC system when CO is detected. Detectors that transmit a common signal to the control panel for both smoke and CO alarms shall not be considered as equals. The detector shall be listed under standards UL-268 and UL-2075.

Each smoke detector shall be individually programmable to operate at any one of five (5) sensitivity settings. The detector shall also store pre-alarm and alternate pre-alarm sensitivity settings. Pre alarm sensitivity values shall be configurable in 5% increments of the alarm and alternate alarm sensitivity settings respectively. The detector shall be able to differentiate between a long term drift above the pre alarm threshold and fast rise above the threshold. The detector shall monitor the sensitivity of the smoke sensor. If the sensitivity shifts outside the UL limits, a trouble signal shall be sent to the panel. It shall be possible to automatically change the sensitivity of individual intelligent addressable smoke detectors for day and night (alternate) periods.

Each detector shall utilize an environmental compensation algorithm that shall automatically adjust for background environmental conditions such as dust, temperature, and pressure. The detector shall provide a maintenance alert signal when 80% (dirty) of the available compensation range has been used. The detector shall provide a dirty fault signal when 100% or greater compensation has been used.

The photoelectric smoke-CO detector shall be an EDWARDS SIGA-PCD.

2.4.1.2. Manual Stations

2.4.1.2.1. Double Action Single Stage

Provide addressable double action, single stage fire alarm stations at the locations shown on the drawings.

The manual station shall be suitable for mounting on North American 2 ½ (64mm) deep 1-gang boxes and 1 ½ (38mm) deep 4 square boxes with 1-gang covers. If indicated as surface mounted, provide

manufacturer's surface back box.

The fire alarm station shall utilize red polycarbonate construction with molded, raised-letter operating instructions in a contrasting color; shall show visible indication of operation and incorporate an internal toggle switch.

The manual pull station will have an addressable module integral to the unit.

The station reset key shall match the control panel key.

Manual pull stations that initiated an alarm condition when opening the unit are not acceptable.

The addressable double action, single stage manual fire alarm station shall be an EDWARDS SIGA-278.

2.4.1.3. Modules

2.4.1.3.1. General

Intelligent addressable multifunction modules shall be provided at the locations shown on the drawings to provide the specific system input and output functions described by the operation section and functional matrix found elsewhere in this specification.

The operation of multifunction modules shall be software configurable at the site to meet operational conditions, and may be changed at any time by download changes from the control panel. The intelligent multifunction modules shall utilize electronic addressing. Modules using rotary or DIP switches, memory chips and / or jumpers for addressing shall not be considered as equal.

Each intelligent multifunction module on the Signaling Line Circuit (SLC) shall transmit information regarding its location with respect to other intelligent devices on the signaling line circuit to the control panel, creating an "As-Built" circuit map. The circuit mapping function shall provide location supervision of all intelligent devices on the signaling line circuit. An intelligent device's programmed system response functions shall be associated with the device's actual *location* on the signaling line circuit and *not with the device's address*. After system commissioning, devices improperly installed in the wrong location shall function according to the mapped programmed response for its *location* on the circuit, not its device address.

All input /output status decisions shall be made by the microprocessor within the module. Communications with a control panel shall not be required in order for the module to identify off-normal input/output conditions. Modules with supervised input or output circuits shall be capable of identifying ground fault conditions down to the module address level.

Each module shall be equipped with two (2) diagnostic indicators; a green LED to confirm communications and a red LED to display active status. LEDs shall be visible through the finished cover plate. The module shall be capable of storing a unique serial number and up to 24 diagnostic codes, hours of operation, number of alarms and troubles, and time of last alarm in its memory which can be retrieved for troubleshooting.

Modules shall be rated for operation in the following environment:

- Temperature: 32°F to 120°F (0°C to 49°C)
- Humidity: 0-93% RH, non-condensing

Where multiple modules are mounted in close proximity to each other, plug-in modular versions of the modules and motherboards shall be available to minimize field wiring and facilitate troubleshooting.

The addressable multifunction modules shall EDWARDS Signature Series devices.

2.4.1.3.2. One Input Monitor

Provide addressable single input multifunction modules at the locations shown on the drawings.

The module shall be suitable for mounting on North American 2½” (64mm) deep 1-gang boxes and 1½” (38mm) deep 4” square boxes with 1-gang covers.

Each module shall provide one (1) supervised Class B input circuit configurable as one of the following “personalities.”

1. Normally-Open Alarm Latching (for alarm initiation applications)
2. Normally-Open Alarm Delayed Latching (for waterflow switch applications)
3. Normally-Open Active Non-Latching (for limit switch and monitor applications)
4. Normally-Open Active Latching (for tamper switch and supervisory applications)

Each module shall identify and report by device address, ground faults and opens associated with its initiating device circuit, to the control panel. Single function modules or without individual ground fault detection identification capability shall not be considered as equal.

The Intelligent Single Input Module shall be an EDWARDS SIGA-CT1.

2.4.1.3.3. Two Input Monitor

Provide addressable dual input multifunction modules at the locations shown on the drawings.

The module shall be suitable for mounting on North American 2½” (64mm) deep 1-gang boxes and 1½” (38mm) deep 4” square boxes with 1-gang covers.

Each module shall provide two (2) supervised Class B input circuit configurable as one of the following “personalities.”

1. Normally-Open Alarm Latching (for alarm initiation applications)
2. Normally-Open Alarm Delayed Latching (for waterflow switch applications)
3. Normally-Open Active Non-Latching (for limit switch and monitor applications)
4. Normally-Open Active Latching (for tamper switch and supervisory applications)

Each module shall identify and report by device address, ground faults and opens associated with its initiating device circuits, to the control panel. Single function modules or without individual ground fault detection identification capability shall not be considered as equal.

The Addressable Dual Input Module shall be an EDWARDS SIGA-CT2.

2.4.1.3.4. Notification Circuit

Provide addressable notification appliance circuit modules at the locations shown on the drawings.

The module shall be suitable for mounting in North American 2 ½” (64mm) deep 2-gang boxes and 1 ½” (38mm) deep 4” square boxes with 2-gang covers, or European 100mm square boxes.

The addressable NAC module shall provide one (1) supervised Class B notification appliance circuit.

The NAC control module shall be configurable for the following operations:

- 24 VDC synchronized NAC circuit, 2 amps @ 24 VDC.
- Audio notification circuit 25Vrms @ 50 watts or 70 Vrms @ 35 watts
- Firefighter's Telephone control with ring tone

The addressable notification appliance circuit module shall be an EDWARDS SIGA-CC1(S) or MCC1(S)

2.4.1.3.5. Relay

Provide addressable control relay modules at the locations shown on the drawings.

The addressable control relay module shall be an EDWARDS SIGA-CR or SIGA-MCRH.

2.4.1.3.6. Isolation Module

Provide addressable isolator modules at the locations shown on the drawings.

The module shall be suitable for mounting on North American 2½" (64mm) deep 1-gang boxes and 1½" (38mm) deep 4" square boxes with 1-gang covers.

In the event the Class A signaling line circuit on which the intelligent isolator module is installed is shorted, each module shall open the SLC. Isolator modules shall then sequentially reconnect the isolated circuit segments until only the segment with the short is left out of the circuit, leaving the balance of the circuit operational.

SLC isolation shall be provided for each building.

The addressable Isolator Module shall be an EDWARDS SIGA-IM.

2.4.2. Notification Appliances

2.4.2.1. General

All appliances supplied for the requirements of this specification shall be UL Listed for Fire Protective Service, and shall be capable of providing the "equivalent facilitation" which is allowed under the Americans with Disabilities Act Accessibilities Guidelines (ADA(AG)), and shall be UL 1971 Listed.

All appliances shall be of the same manufacturer as the fire alarm control panel specified to insure absolute compatibility between the appliances and the control panels, and to insure that the application of the appliances are done in accordance with the single manufacturer's instructions.

Any appliances that do not meet the above requirements, and are submitted for use must show written proof of their compatibility for the purpose intended. Such proof shall be in the form of documentation from all manufacturers that clearly states that their equipment (as submitted) is 100% compatible with each other for the purpose intended.

All strobes shall be provided with lens markings oriented for wall mounting. Exterior mounted devices shall be provided with a weatherproof backbox.

All visual appliances shall be synchronized. Light and audible output levels shall be designed to meet ADA and NFPA requirements

All ceiling mounted notification appliances shall be white unless noted otherwise on the drawings. All wall mounted notification appliances shall be red unless noted otherwise on the drawings.

2.4.2.2. Low Profile

2.4.2.2.1. Strobe

Provide low profile wall or ceiling mounted strobes at the locations shown on the drawings.

The strobe output shall be switch selectable as required by its application from the following available settings: 15cd, 30cd, 75cd & 110cd. Selected strobe rating shall be visible when the strobe is in its installed position. Amber lens strobes shall be available with outputs of 12/24/60/88cd. Light shall be evenly distributed throughout the required volume using cavity and mask "FullLight" technology to prevent hot spots. Strobes using specular reflectors shall not be considered as equal.

When multiple strobes are installed within view of each other, their outputs shall be synchronized within ten (10) milliseconds of each other for an indefinite period without the need for separate synchronization modules.

Strobe power and strobe synchronization shall be accomplished over a single pair of wires. In and out screw terminals shall accommodate 18AWG to 12 AWG wiring and have captive hardware.

The strobes shall be EDWARDS Genesis G1 Series-wall & Genesis GC Series-ceiling.

2.4.2.2.2. Speaker-Wall

Provide low profile wall mounted speakers at the locations shown on the drawings.

The speaker output shall be switch selectable from the following available settings: 2W (90dBA), 1W (87dBA), 1/2W (84dBA), or 1/4W (81dBA) at 10 ft. when measured in reverberation room per UL-464. Frequency response shall be 400 to 4,000Hz. The selected speaker wattage shall be visible when the speaker is in its installed position.

The speaker shall provide in and out screw terminals shall accommodate 18AWG to 12 AWG wiring and have captive hardware.

The low profile wall mounted speakers shall be an EDWARDS Genesis G4 series.

2.4.2.2.3. Speaker-Ceiling

Provide low profile ceiling mounted speaker at the locations shown on the drawings.

The speaker output shall be switch selectable from the following available settings: 2W (91dBA), 1W (87dBA), 1/2W (84dBA), or 1/4W (80dBA) at 10 ft. when measured in reverberation room per UL-1480. Frequency response shall be 400 to 4,000Hz. The selected speaker wattage shall be visible when the speaker-strobe is in its installed position.

The speaker shall provide in and out screw terminals shall accommodate 18AWG to 12 AWG wiring and have captive hardware.

The low profile ceiling mounted speaker shall be an EDWARDS Genesis GC series.

2.4.2.2.4. Speaker-Weatherproof

Provide low profile weatherproof speakers at the locations shown on the drawings.

The weatherproof speaker shall mount in a North American 4" square 1 1/2" deep electrical box for indoor applications without a trim skirt and a and a 4" square 2 1/8" deep electrical box when used with a trim skirt. A factory supplied back box shall be supplied for weatherproof applications.

The speaker shall be suitable for wall or ceiling mount and operate in temperatures from -40 to 151 degrees F. The word FIRE shall be prominently displayed on the housing.

The speaker output shall be switch selectable from the following available settings:

Wattage	Switch Position	25Vrms	70Vrms
2W	T	90.0 dBA	89.7 dBA
1W	X	87.1 dBA	86.9 dBA
1/2 W	Y	84.0 dBA	83.9 dBA
1/4 W	Z	80.8 dBA	80.8 dBA

Output is at 10 ft. when measured in reverberation room per UL-464. Frequency response shall be 400 to 4,000Hz. The selected speaker wattage shall be visible when the speaker-strobe is in its installed position.

The speaker shall provide in and out screw terminals shall accommodate 18AWG to 12 AWG wiring and have captive hardware.

The weatherproof speaker shall be EDWARDS Genesis WG4 Series.

2.4.2.2.5. Speaker-Strobe-Wall

Provide low profile wall mounted speaker-strobes at the locations shown on the drawings.

The speaker output shall be switch selectable from the following available settings: 2W (90dBA), 1W (87dBA), 1/2W (84dBA), or 1/4W (81dBA) at 10 ft. when measured in reverberation room per UL-464. Frequency response shall be 400 to 4,000Hz. The selected speaker wattage shall be visible when the speaker-strobe is in its installed position.

The strobe output shall be switch selectable as required by its application from the following available settings: 15cd, 30cd, 75cd & 110cd. Selected strobe rating shall be visible when the speaker-strobe is in its installed position. Amber lens strobes shall be available with outputs of 12/24/60/88cd. Light shall be evenly distributed throughout the required volume using cavity and mask "FullLight" technology to prevent hot spots. Strobes using specular reflectors shall not be considered as equal.

When multiple strobes are installed within view of each other, their outputs shall be synchronized within ten (10) milliseconds of each other for an indefinite period without the need for separate synchronization modules

Horn and strobe power, horn silencing, and strobe synchronization shall be accomplished over a single pair of wires. Both the speaker and strobe elements shall provide in and out screw terminals shall accommodate 18AWG to 12 AWG wiring and have captive hardware.

The low profile wall mounted speaker-strobes shall be an EDWARDS G4 series.

2.4.2.2.6. Speaker-Strobe-Ceiling

Provide low profile ceiling mounted speaker-strobes at the locations shown on the drawings.

The speaker output shall be switch selectable from the following available settings: 2W (91dBA), 1W (87dBA), 1/2W (84dBA), or 1/4W (80dBA) at 10 ft. when measured in reverberation room per UL-1480. Frequency response shall be 400 to 4,000Hz. The selected speaker wattage shall be visible when the speaker-strobe is in its installed position.

The strobe output shall be switch selectable as required by its application from the following available settings: 15cd, 30cd, 75cd & 95cd or 95cd, 115cd, 150cd, &177cd. Selected strobe rating shall be visible when the speaker-strobe is in its installed position. Amber lens strobes shall be available with outputs of 13/26/65/82cd or 82/100/130/155cd.

When multiple strobes are installed within view of each other, their outputs shall be synchronized within ten (10) milliseconds of each other for an indefinite period without the need for separate synchronization modules

Strobe power and synchronization shall be accomplished over a single pair of wires. Both the speaker and strobe elements shall provide in and out screw terminals shall accommodate 18AWG to 12 AWG wiring and have captive hardware.

The low profile ceiling mounted speaker-strobes shall be an EDWARDS Genesis GC series.

3. Part 3 - Execution

3.1. Installation

3.1.1. General

General

- A. The entire system shall be installed in a skillful manner in accordance with approved manufacturer's installation manuals, shop drawings and wiring diagrams.
- B. All work shall be performed in accordance with the requirements of NFPA 70 and NFPA 72.
- C. Coordinate locations of all devices with the approved drawings and existing conditions.
- D. All fire alarm devices shall be accessible for periodic maintenance. Should a device location indicated on the contract drawings not meet this requirement, it shall be the responsibility of the installing contractor to bring it, in writing, to the attention of the Owner.
- E. Fasten equipment to structural members of building or metal supports attached to structure, or to concrete surfaces.
- F. All systems and system components listed to UL864 Control Units for Fire Protective

Signaling Systems maybe installed within a common conduit raceway system, in accordance with the manufacture's recommendations. System(s) or system components not listed to the UL864 standard shall utilize a separate conduit raceway system for each of the sub-systems.

- G. No wiring except life safety system circuits and system power supply circuits shall be permitted in the control panel enclosures.

3.1.2. Electrical

Electrical

1.01 BOXES, ENCLOSURES AND WIRING DEVICES

- A. Boxes shall be installed plumb and firmly in position.
- B. Extension rings with blank covers shall be installed on junction boxes where required.
- C. Junction boxes served by concealed conduit shall be flush mounted.
- D. Fire alarm system junction box covers shall be painted red.
- E. Wiring within cabinets, enclosures, boxes, junction boxes and fittings shall be installed in a neat and workmanlike manner, installed parallel with or at right angles to the sides and back of any box, enclosure or cabinet, and routed to allow access for maintenance. All conductors that are terminated, spliced, or otherwise interrupted in any enclosure, cabinet, mounting or junction box shall be connected to terminal blocks. No more than two conductors shall be installed under one connection.

1.02 CONDUCTORS

- A. Each conductor shall be identified. Permanent wire markers shall be located within 2 inches of the wire termination.
- B. Maintain a consistent color code for fire alarm system conductor functions throughout the installation.
- C. All wiring shall be installed in compliance with the National Electric Code, NFPA 70, and the equipment manufacturer's requirements.

Wiring for Signaling Line Circuit and Initiating Device Circuit field wiring shall be copper, No. 16 AWG twisted pair conductors at a minimum. Speaker circuits; 16 AWG twisted pair at a minimum. 24VDC visual Notification Appliance Circuits shall be copper No. 14 AWG size conductors at a minimum. Audible Notification Appliance Circuits shall be copper No. 16 AWG size conductors at a minimum. The wiring sizes listed herein are minimum sizes. Use larger wire sizes when recommended by the manufacturer, based on system configuration and project specific calculations.

Circuits to third-party systems (HVAC, Elevators, fire pumps, etc.) shall terminate in terminal cabinets within three (3) feet of the controllers for those systems.

AC power wiring shall be No. 12 AWG solid copper having insulation rated for 600 volts.

- D. All wiring shall be checked and tested to insure that there are no grounds, opens or shorts.

1.03 DEVICES

- A. All devices and appliances shall be mounted to or in an approved electrical box.

1.04 Raceways

- A. Conduits shall be sized according to the conductors contained therein. Cross sectional area percentage fill for system conduits shall not exceed 40%.
- B. Install all conductors in rigid metal conduit or electro-metallic tubing, utilizing compression type fittings and couplings, with a minimum diameter 3/4". The use of flexible metal conduit not exceeding a six (6) foot length shall be permitted for initiating device circuits.
- C. All fire alarm conduit systems shall be routed and installed to minimize the potential for physical, mechanical or fire damage, and shall not to interfere with existing building systems, facilities or equipment.
- D. All system conduits, junction boxes, pull boxes, terminal cabinets, electrical enclosures and device back box locations shall be readily accessible for inspection, testing, service and maintenance.

3.1.3. FA Components

FA Components

1.01 DEVICES

- 1. All devices and appliances shall be mounted to or in an approved electrical box.
 - A. Fire Alarm Control Panels
 - a. Mount the enclosure with the top of the cabinet 72" above the finished floor or center the cabinet at 63", whichever is lower.
 - b. Label the fire alarm panels with the room number, electrical panel number and circuit breaker number feeding them.
 - c. Paint the handles of the dedicated circuit breakers feeding fire alarm panels red, and install handle locks.
 - d. Within the panel, all non-power limited wiring must be properly separated from power limited circuits.
 - e. Grounds shall comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.
 - C. Remote power supplies and auxiliary fire alarm panels
 - a. Do not locate these panels above ceilings or where inaccessible by a person standing on the finished floor of the space.
 - b. Label the power supplies and auxiliary FACPs with the room number, electrical panel number and circuit breaker number feeding them.
 - c. Paint the handles of the dedicated circuit breakers feeding fire alarm panels red, and install handle locks.

- d. Within the panel, all non-power limited wiring must be properly separated from power limited circuits.
- D. Manual Pull Stations
 - a. Mount stations so that their operating handles are between 42” and 48” above the finished floor.
- E. Notification Appliances: Mount assemblies as follows:
 - a. All wall mounted audio/visual devices shall be mounted so the entire lens is between 80” and 96” above the finished floor. Where low ceilings exist, devices shall be mounted within 6” of the ceiling.
 - b. Each speaker’s output shall be set to the wattage value indicated for its specific location as shown on the drawings.
 - c. Each strobe’s output shall be set to the candela value indicated for its specific location as shown on the drawings.
 - d. Each speaker-strobe’s outputs shall be set to the wattage/candela value indicated for its specific location as shown on the drawings.
 - e. Where ceiling height exceeds 30 feet, appliances shall be suspended from the ceiling to a height of 30 feet maximum above the finished floor.
 - f. Appliances installed outdoors shall be UL listed for outdoor use.
- F. Smoke Detectors:
 - a. Smoke and heat detector heads shall not be installed until after construction clean-up is completed.
 - b. Detectors located on the wall shall have the top of the detector at not more than 12” below the ceiling.
 - c. On smooth ceilings, detectors shall not be installed over 30 ft. apart in any direction.
 - d. Install smoke detectors no closer than 3 ft. from air handling supply air diffusers or return air openings.
 - e. Locate detectors no closer than 12” from any part of a lighting fixture.
- G. Duct Smoke Detectors:
 - a. Install sampling tubes so they extend the full width of ducts exceeding 36”.
 - b. Detectors shall be located to facilitate ease of maintenance.
 - c. All penetrations near detectors located on/in return ducts shall be sealed to prevent air entry.
- H. Heat Detectors
 - a. Heat detectors shall be installed in strict accordance with their UL listing and the requirements of NFPA 72.
- I. Addressable Control (relay) Modules
 - a. Install the module less than 3 feet from the device controlled.
 - b. Orient the device mounting for best maintenance access.
 - c. Label all addressable control modules as to their function.

-END OF SECTION-

