**Note to Editor: this is a master specification and needs to be edited to become project SPECIFIC. please remove all highlights, text boxes and make all text black once editing is complete.**

**CONFIRM with District if any materials related to this section will be supplied by the district**

**Do not remove footer with document version, update project and submittal date information as needed**

**SECTION 28 31 11**

**DIGITAL ADDRESSABLE FIRE ALARM SYSTEM**

1. **GENERAL**
	1. SUMMARY
		1. Section Includes:
			1. NETWORK FIRE ALARM CONTROL (NODE)
				1. Network fire alarm control panels shall include all features as described in this specification for stand-alone FACPs and shall have network communication capabilities as described herein.
		2. All points monitored and controlled by a single node shall be capable of being programed as “Public”. Each point made public to the network may be programmed to be operated by any other node connected to the network. Network Communications shall be capable of supporting “Central Station DACT Report” that can be handled as though they were a single point.
		3. This section of the specifications includes the furnishing, installation, and connection of the fire alarm equipment to form a complete coordinated system ready for operation. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, control units, fire safety control devices, annunciators, power supplies, digitized voice evacuation signal, and wiring per the contract documents.
	2. RELATED SECTIONS
		* 1. Division 01
			2. 26 05 00: Common Work Results for Electrical
			3. 27 30 00: Voice Communications
			4. 27 41 16: Audiovisual Systems
	3. REFERENCES
		1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.
		2. The system and all associated operations shall be in accordance with the following:
			1. Guidelines of the following Building Code: IBC
			2. Guidelines of the following Building Code: IFC
			3. NFPA 72, National Fire Alarm Code
			4. NFPA 70, National Electrical Code
			5. NFPA 101, Life Safety Code
			6. NFPA 90A, Standard for the Installation of Air Conditioning and Ventilating Systems
			7. Other applicable NFPA standards
			8. Local Jurisdictional Adopted Codes and Standards
			9. ADA Accessibility Guidelines
		3. General: Comply with the following Underwriters Laboratories (UL) Listings:
			1. UL 268 – Smoke Detectors for Fire Protective Signaling Systems
			2. UL 864 – Control Units for Fire Protective Signaling Systems
			3. UL2572 - Mass Notification Systems
			4. UL217 - Smoke Detectors, Single and Multiple Station
			5. UL228 - Door Closers - Holders for Fire Protective Signaling Systems
			6. UL268A - Smoke Detectors for Duct Applications
			7. UL521 - Heat Detectors for Fire Protective Signaling Systems
			8. UL464 - Audible Signaling Appliances
			9. UL38 - Manually Actuated Signaling Boxes
			10. UL1481 - Power Supplies for Fire Protective Signaling Systems
			11. UL346 - Waterflow Indicators for Fire Protective Signaling Systems
			12. UL1076 - Control Units for Burglar Alarm Proprietary Protective Signaling Systems
			13. UL1971 - Visual Notification Appliances
			14. UL2017 - Standard for General-Purpose Signaling Devices and Systems
	4. UL60950 - Safety of Information Technology Equipment
	5. **DEFINITIONS**
		1. Contractor – The entity responsible for performing or overseeing the installation and configuration of the system.
		2. District – Long Beach Unified School District
		3. District Approved Equivalent – A product that the Contractor submitted as equal to or greater than the product specified, which subsequently received District Board approval for use on the intended project. Refer to Division 01 for additional information.
		4. District Standard – a design or brand that has been selected by the District Board as the acceptable product.
		5. District Technology Representative – An individual from the District’s Facilities Technology Group. They should possess an official @lbschools.net email address.
		6. District Representative – An authorized individual representing the District, for example a project manager or construction manager.
		7. FACP – Fire Alarm Control Panel
		8. Large Systems – 100 devices or more.
		9. Node - Each panel with direct communications into the Network is defined as a node.
		10. Owner – The District’s Technology Information Services Branch (TISB), who will oversee the system after turnover.
		11. Small Systems – Less than 100 devices.
	6. **SYSTEM REQUIREMENTS**
		1. The network shall provide a means to log into any node on the system via a laptop computer or CRT/Keyboard and have complete network access (Set Host) for diagnostics, maintenance reporting, and information gathering of all nodes in the system. Systems not meeting this requirement must provide all diagnostic tools required to support this function from selected points on the network. This Section covers fire alarm systems, including initiating devices, notification appliances, controls, and supervisory devices.
		2. Work covered by this section includes the furnishing of labor, equipment, and materials for installation of the fire alarm system as indicated on the drawings and specifications. The system shall be an active/interrogative type system where each addressable device is repetitively scanned, causing a signal to be transmitted to the main fire alarm control panel (FACP) indicating that the device and its associated circuit wiring is functional. Loss of this signal at the main FACP shall result in a trouble indication.
		3. The facility shall have an emergency voice alarm communication system. Digitally stored message sequences shall notify the building occupants that a fire or life safety condition has been reported. Message generator(s) shall be capable of automatically distributing up to eight (8) simultaneous, unique messages to appropriate audio zones within the facility based on the type and location of the initiating event. The Fire Command Center (FCC) shall also support Emergency manual voice announcement capability for both system wide or selected audio zones and shall include provisions for the system operator to override automatic messages system wide or in selected zones.
		4. The Fire Alarm System shall consist of all necessary hardware equipment and software programming to perform the following functions:
			1. Fire alarm and detection operations.
			2. Control and monitoring of elevators, smoke control equipment, door hold-open devices, fire suppression systems, emergency power systems, and other equipment as indicated in the drawings and specifications.
			3. One-way supervised automatic voice alarm operations.

**EDITOR**: **CONFIRM REQUIREMENTS FOR EMERGENCY RESPONDER RADIO COVERAGE (ERRC). ARCHITECT TO COORDINATE WITH LOCAL FIRE DEPARTMENT AND/OR EMERGENCY COMMUNICATIONS FOR CRITERIA. CONFIRM REQUIREMENTS FOR NEW CONSTRUCTION OR EXISTING BUILDING.**

**EDITOR: CONFIRM PROJECT REQUIREMENTS INCLUDING EXISTING FIRE ALARM SYSTEM AND HOW THEY WILL INTEGRATE INTO OR BE REPLACED BY NEW FIRE ALARM SYSTEM**

* 1. **SYSTEM DESCRIPTION**
		1. General: Provide a complete, non-coded, addressable, microprocessor-based fire alarm with voice evacuation system with initiating devices, notification appliances, and monitoring and control devices as indicated on the drawings and as specified herein.
		2. Software: The fire alarm system shall allow for loading and editing instructions and operating sequences as necessary. The system shall be capable of on-site programming to accommodate system expansion and facilitate changes in operation. All software operations shall be stored in a non-volatile programmable memory within the fire alarm control unit. Loss of primary and secondary power shall not erase the instructions stored in memory. System shall be capable of storing dual configuration programs with one active and one in reserve. Panel shall be capable of full system operation during a new configuration download.
		3. History Logs: The system shall provide a means to recall alarms and trouble conditions in chronological order for the purpose of recreating an event history. A separate alarm and trouble log shall be provided.
		4. Recording of Events: Record all alarm, supervisory, and trouble events by means of system printer. The printout shall include the type of signal (alarm, supervisory, or trouble) the device identification, date, and time of the occurrence. The printout differentiates alarm signals from all other printed indications.
		5. Wiring/Signal Transmission:
			1. Transmission shall be hard-wired, using separate individual circuits for each zone of alarm operation as required or addressable signal transmission, dedicated to fire alarm service only.
			2. System connections for initiating, signaling line circuits and notification appliance circuits shall be Class B.
			3. Circuit Supervision: Circuit faults shall be indicated by a trouble signal at the FACP. Provide a distinctive indicating audible tone and alphanumeric annunciation.
		6. Basic Performance:
			1. Alarm signals arriving at the FACP shall not be lost following a primary power failure (or outage) until the alarm signal is processed and recorded.
			2. Speaker circuits may be controlled by NAC outputs built into the amplifiers, which shall function as addressable points on the Digital Audio Loop.
			3. Notification Appliance Circuits (NAC) speaker circuits shall be arranged such that there is a minimum of one speaker circuit per floor of the building or smoke zone whichever is greater.
			4. Audio amplifiers and tone generating equipment shall be electrically supervised for normal and abnormal conditions.
			5. Notification Appliance Circuits (NAC) speaker circuits and control equipment shall be arranged such that loss of any one (1) speaker circuit will not cause the loss of any other speaker circuit in the system.
			6. Speaker circuits shall be arranged such that there is a minimum of one speaker circuit per smoke zone.
			7. Speaker circuits shall be electrically supervised for open and short circuit conditions. If a short circuit exists on a speaker circuit, it shall not be possible to activate that circuit.
			8. Audio amplifiers and tone generating equipment shall be electrically supervised for abnormal conditions. Digital amplifiers shall provide built-in speaker circuits, field configurable as four Class B (Style Y), or two Class A (Style Z) circuits.
				1. Speaker circuits shall be 25 VRMS. Speaker circuits shall have 20% space capacity for future expansion or increased power output requirements.
				2. The Long Beach Unified School District (District) monitors its own fire alarms. Connection to the FACP is via telephone (POTS) lines. The District has a Division of School Safety, which includes sworn officers and dispatchers, who are all District employees. Fire alarm calls come into a dispatch center and the District dispatches sworn officers as first responders. The contact information for the District's School Safety office is as follows: Chief Thomas Hickman, 562-997-8101. The District does not have a UL number and does not use a third party who would have such a number.
		7. Remote Access:
			1. FACP shall have the capability to provide Remote Access through a Dial-Up Service Modem using the public switched telephone system of a private switched telephone system.
			2. A personal computer or technician's laptop, configured with terminal emulation software shall have the ability to access the FACP for diagnostics, maintenance reporting and information gathering.
			3. FACP shall have the capability to provide third party access through a serial interface connection and be agency listed for specific interfaces and for the purpose.
			4. FACP shall have the capability to provide remote access via an Internet/Intranet Interface. The Internet interface shall provide alternative access to system information using the familiar interface of a standard Internet browser. A remotely located fire professional can use this access to analyze control panel status during non-alarm conditions and can also use this information to assist local fire responders during alarm conditions.
		8. Network communication:
			1. Network Communication and Audio Risers from the main FACP to all remote panel locations shall be wired with fiber.
			2. Fiber optic cable, multi-mode: 50/125 micrometers
			3. Attenuation of cabling between two nodes (Fiber-optic circuits are point-to-point) must not exceed the maximum allowed attenuation.
			4. Fiber optic cable, shall be installed and terminated in a single panel housing (SPH) wall-mountable that holds one CCH connector panel. Housing Corning SPH-01P or equal. Closet Connector Housing (CCH) panel, LC adapter duplex or equal.
			5. Fiber optic cable, shall be patched to fiber modules using a LC-to-LC OM3 or OM4 multimode jumper patch cable 1 meter in length.
			6. Network node communication shall be through a token ring configuration.
			7. A single open, ground, or short on the network communication loop shall not degrade network communications. Token shall be passed in opposite direction to maintain communications throughout all network nodes. At the same time the status of the communication link shall be reported.
			8. If a group of nodes becomes isolated from the rest of the network due to multiple fault conditions, that group shall automatically form a sub-network with all common interaction of monitoring and control remaining intact. The network shall be notified with the exact details of the lost communications.
			9. The communication method shall be NFPA 72 Class X.
		9. Required Functions: The following are required system functions and operating features:
			1. Priority of Signals: Fire alarm events have highest priority. Subsequent alarm events are queued in the order received and do not affect existing alarm conditions. Priority Two, Supervisory and Trouble events have second-, third-, and fourth-level priority respectively. Signals of a higher-level priority take precedence over signals of lower priority even though the lower-priority condition occurred first. Annunciate all events regardless of priority or order received.
			2. Noninterfering: An event in one zone does not prevent the receipt of signals from any other zone. All zones are manually resettable from the FACP after the initiating device or devices are restored to normal. The activation of an addressable device does not prevent the receipt of signals from subsequent addressable device activations.
			3. Transmission to Remote Central Station: Automatically route alarm, supervisory, and trouble signals to a remote central station service transmitter provided under another contract by LBUSD School Safety.
			4. Annunciation: Operation of alarm and supervisory initiating devices shall be annunciated at the FACP and the remote annunciator, indicating the location and type of device.
			5. Selective Alarm: A system alarm shall include.
				1. Indication of alarm condition at the FACP and the annunciator(s).
				2. Identification of the device/zone that is the source of the alarm at the FACP and the annunciator(s).
				3. Operation of audible and visible notification devices on the fire floor, floor above and floor below until silenced at FACP.
				4. Selectively closing doors normally held open by magnetic door holders on the fire floor, floor above and floor below.
				5. Unlocking designated doors.
				6. Shutting down supply and return fans serving zone where alarm is initiated.
				7. Closing smoke dampers on system serving zone where alarm is initiated.
				8. Initiation of smoke control sequence through the building temperature control system.
				9. Notifying the local fire department.
				10. Initiation of elevator recall in accordance with ASME/ANSI A17.1, when specified detectors or sensors are activated.
			6. Supervisory Operations: Upon activation of a supervisory device such as fire pump power failure, low air pressure switch, and tamper switch, the system shall operate as follows.
				1. Activate the system supervisory service audible signal and illuminate the LED at the control unit and the remote annunciator.
				2. Pressing the Supervisory Acknowledge Key will silence the supervisory audible signal while maintaining the Supervisory LED "on" indicating off-normal condition.
				3. Record the event in the FACP historical log.
				4. Transmission of supervisory signal to remote central station.
				5. Restoring the condition shall cause the Supervisory LED to clear and restore the system to normal.
			7. Alarm Silencing: If the "Alarm Silence" button is pressed, all audible and visible alarm signals shall cease operation.
			8. System Reset:
				1. The "System Reset" button shall be used to return the system to its normal state. Display messages shall provide operator assurance of the sequential steps ("IN PROGRESS", "RESET COMPLETED") as they occur. The system shall verify all circuits or devices are restored prior to resetting the system to avoid the potential for re-alarming the system. The display message shall indicate "ALARM PRESENT, SYSTEM RESET ABORTED."
				2. Should an alarm condition continue, the system will remain in an alarmed state.
			9. A manual evacuation (drill) switch shall be provided to operate the notification appliances without causing other control circuits to be activated.
			10. WALKTEST: The system shall have the capacity of 8 programmable passcode protected one person testing groups, such that only a portion of the system need be disabled during testing. The actuation of the "enable one-person test" program at the control unit shall activate the "One Person Testing" mode of the system as follows:
				1. The city circuit connection and any suppression release circuits shall be bypassed for the testing group.
				2. Control relay functions associated to one of the 8 testing groups shall be bypassed.
				3. The control unit shall indicate a trouble condition.
				4. The alarm activation of any initiation device in the testing group shall cause the audible notification appliances assigned only to that group to sound a code to identify the device or zone.
				5. The unit shall automatically reset itself after signaling is complete.
				6. Any opening of an initiating or notification appliance circuit wiring shall cause the audible signals to sound for 4 seconds indicating the trouble condition.
			11. Support additional Fire Command Centers, capable of simultaneous monitoring of all system events. Alternate Fire Command Centers can transfer the control functions to an alternate Fire Command Center when necessary. All Fire Command Centers shall be individually capable of assuming Audio Command functions such as Emergency Paging, audio zone control functions.
		10. Analog Smoke Sensors:
			1. Monitoring: FACP shall individually monitor sensors for calibration, sensitivity, and alarm condition, and shall individually adjust for sensitivity. The control unit shall determine the condition of each sensor by comparing the sensor value to the stored values.
			2. Environmental Compensation: The FACP shall maintain a moving average of the sensor's smoke chamber value to automatically compensate for dust, dirt, and other conditions that could affect detection operations.
			3. Programmable Sensitivity: Photoelectric Smoke Sensors shall have 7 selectable sensitivity levels ranging from 0.2% to 3.7%, programmed and monitored from the FACP.
			4. Sensitivity Testing Reports: The FACP shall provide sensor reports that meet NFPA 72 calibrated test method requirements. The reports shall be viewed on a CRT Display or printed for annual recording and logging of the calibration maintenance schedule.
			5. The FACP shall automatically indicate when an individual sensor needs cleaning. The system shall provide a means to automatically indicate when a sensor requires cleaning. When a sensor's average value reaches a predetermined value, (3) progressive levels of reporting are provided. The first level shall indicate if a sensor is close to a trouble reporting condition and will be indicated on the FACP as "ALMOST DIRTY." This condition provides a means to alert maintenance staff of a sensor approaching dirty without creating a trouble in the system. If this indicator is ignored and the second level is reached, a "DIRTY SENSOR" condition shall be indicated at the FACP and subsequently a system trouble is reported to the Central Monitoring Station. The sensor base LED shall glow steady giving a visible indication at the sensor location. The "DIRTY SENSOR" condition shall not affect the sensitivity level required to alarm the sensor. If a "DIRTY SENSOR" is left unattended, and its average value increases to a third predetermined value, an "EXCESSIVELY DIRTY SENSOR" trouble condition shall be indicated at the control unit.
			6. The FACP shall continuously perform an automatic self-test on each sensor which will check sensor electronics and ensure the accuracy of the values being transmitted. Any sensor that fails this test shall indicate a "SELF TEST ABNORMAL" trouble condition.
			7. Multi-Sensors shall combine photoelectric smoke sensing and heat sensing technologies. An alarm shall be determined by either smoke detection, with selectable sensitivity from 0.2 to 3.7 %/ft. obscuration; or heat detection, selectable as fixed temperature or fixed with selectable rate-of-rise; or based on an analysis of the combination of smoke and heat activity.
			8. Programmable bases. It shall be possible to program relay and sounder bases to operate independently of their associated sensor.
			9. Magnet test activation of smoke sensors shall be distinguished by its label and history log entry as being activated by a magnet.
		11. Smoke Detectors: A maintenance and testing service providing the following shall be included with the base bid.
			1. Biannual sensitivity reading and logging for each smoke sensor.
			2. Scheduled biannual threshold adjustments to maintain proper sensitivity for each smoke sensor.
			3. Threshold adjustment to any smoke sensor that has alarmed the system without the presence of particles of combustion.
			4. Scheduled biannual cleaning or replacement of each smoke detector or sensor within the system.
			5. Semi-annual functional testing of each smoke detector or sensor using the manufacturer's calibrated test tool.
			6. Written documentation of all testing, cleaning, replacing, threshold adjustment, and sensitivity reading for each smoke detector or sensor device within the system.
			7. The initial service included in the bid price shall provide the above listed procedures for a period of five years after District acceptance of the system.
		12. Intelligent Thermal Detectors:
			1. Thermal detectors shall be intelligent addressable devices rated at 135 degrees Fahrenheit Fixed Temperature. 195 degrees where required. It shall connect via two wires to the fire alarm control panel signaling line circuit.
		13. CO detectors shall be intelligent, addressable carbon monoxide (CO) detectors with integral communication to provide point location for alarm communication and selective maintenance. Model: Notifier FSCO-951. The FSCO-951 will be installed in conjunction with B200S series intelligent sounder bases.
		14. Manual Fire Alarm Stations:
			1. Manual fire alarm stations shall be non-code, non-break glass type, equipped with key lock so that they may be tested without operating the handle.
			2. Stations must be designed such that after an actual activation, they cannot be restored to normal except by key reset.
			3. An operated station shall automatically condition itself so as to be visually detected, as operated, at a minimum distance of 100 feet (30.5 m) front or side.
			4. Manual stations shall be constructed of high impact Lexan, with operating instructions provided on the cover. The word FIRE shall appear on the manual station in letters one half inch (12.7 mm) in size or larger.
			5. Fire alarm systems shall include one manual pull station located in the campus administrative office.
		15. Duct Smoke Detectors:
			1. Duct smoke detectors shall be a 24 VDC type with visual alarm and power indicators, and a reset switch. Each detector shall be installed upon the composite supply/return air ducts(s), with properly sized air sampling tubes.
		16. Projected Beam Detectors:

**NOTE TO EDITOR: CONFIRM LOCATION OF ALL BEAM DETECTORS. CONFIRM ACCESS FOR MAINTENANCE OR REPAIR**

* + - 1. The projected beam type shall be 24 VDC device.
			2. The detector shall be listed to UL 268
			3. The detector shall operate in either a short range (16' - 100') or long range (100' - 330') mode.
			4. The temperature range of the device shall be -22 degrees F to 131 degrees F.
			5. The detector shall feature a bank of four alignment LEDs on both the receiver and the transmitter that are used to ensure proper alignment of unit without special tools.
			6. Beam detectors shall feature automatic gain control which will compensate for gradual signal deterioration from dirt accumulation on lenses.
			7. The unit shall be both ceiling and wall mountable.
			8. The detector shall have the ability to be tested using calibrated test filters or magnet activated remote test station.
		1. Waterflow Indicator:
			1. Waterflow Switches shall be an integral, mechanical, non-coded, non-accumulative retard type.
			2. Waterflow Switches shall have an alarm transmission delay time which is conveniently adjustable from 0 to 60 seconds. Initial settings shall be 30-45 seconds.
			3. All waterflow switches shall come from a single manufacturer and series.
			4. Waterflow switches shall be provided and connected under this section but installed by the mechanical contractor.
			5. Where possible, locate waterflow switches a minimum of one (1) foot from a fitting which changes the direction of the flow and a minimum of three (3) feet from a valve.
			6. Confirm that wires are not exposed or easily accessible.
		2. Sprinkler and Standpipe Valve Supervisory Switches:
			1. Each sprinkler system water supply control valve riser, zone control valve, and standpipe system riser control valve shall be equipped with a supervisory switch. Standpipe hose valves, and test and drain valves shall not be equipped with supervisory switches.
			2. PIV (post indicator valve) or main gate valves shall be equipped with a supervisory switch.
			3. The switch shall be mounted so as not to interfere with the normal operation of the valve and adjusted to operate within two revolutions toward the closed position of the valve control, or when the stem has moved no more than one-fifth of the distance from its normal position.
			4. The supervisory switch shall be contained in a weatherproof aluminum housing, which shall provide a 3/4-inch (19 mm) conduit entrance and incorporate the necessary facilities for attachment to the valves.
			5. The switch housing shall be finished in red baked enamel.
			6. The entire installed assembly shall be tamper-proof and arranged to cause a switch operation if the housing cover is removed, or if the unit is removed from its mounting.
			7. Valve supervisory switches shall be provided and connected under this section and installed by mechanical contractor.
		3. Power Requirements:
			1. The control unit shall receive AC power via a dedicated fused disconnect circuit.
			2. The system shall be provided with sufficient battery capacity to operate the entire system upon loss of normal AC power in a normal supervisory mode for a period of 24 hours with 15 minutes of alarm operation at the end of this period. The system shall automatically transfer to battery standby upon power failure. All battery charging and recharging operations shall be automatic.
			3. All circuits requiring system-operating power shall be 24 VDC and shall be individually fused at the control unit.
			4. The incoming power to the system shall be supervised so that any power failure will be indicated at the control unit. A green "power on" LED shall be displayed continuously at the user interface while incoming power is present.
			5. The system batteries shall be supervised so that a low battery or a depleted battery condition, or disconnection of the battery shall be indicated at the control unit and displayed for the specific fault type.
			6. The system shall support NAC Lockout feature to prevent subsequent activation of Notification Appliance Circuits after a Depleted Battery condition occurs in order to make use of battery reserve for front panel annunciation and control.
			7. The system shall support 100% of addressable devices in alarm or operated at the same time, under both primary (AC) and secondary (battery) power conditions.
			8. Loss of primary power shall sound a trouble signal at the FACP. FACP shall indicate when the system is operating on an alternate power supply.
		4. UDACT Requirements:
			1. Existing Central Station UDACT Report shall be based on final signage and building labeling submittals. For existing facilities Contractor shall obtain from the District or Architect a copy of the current site layout, floor plan, and building labeling designations.
			2. DSA Inspector of Record (IOR) shall verify the Central Station UDACT Report is based on final signage and building labeling submittals.
			3. The UDACT shall be supplied with two eight conductors, two to six-foot-long line cords. One end of the cords shall plug into the jacks on the UDACT. The other end of the cords shall plug into industry standard RJ-31X surface mounted telephone jacks. Install jacks in a screw cover box adjacent to the FACP if sufficient space is not available within the FACP, or adjacent fire alarm terminal cabinet. The line cords shall be installed in conduit when it is necessary to locate the jacks remotely from the FACP enclosure. The jacks shall be mounted to the rear of the box. The Primary and Secondary telephone number for each line shall be labeled on its respective jack. Two individual multipair telephone cables shall be installed from the MPOE (main point of entry) to the FACP. The telephone cables shall be labeled at both ends with FA PRIMARY and FA SECONDARY.
	1. **QUALITY ASSURANCE**
		1. Installer Qualifications: A factory authorized installer is to perform the work of this section.
		2. Each and all items of the Fire Alarm System shall be listed as a product of a single fire alarm system manufacturer under the appropriate category by Underwriters Laboratories, Inc. (UL), and shall bear the "UL" label
		3. The fire alarm system shall be manufactured by an ISO 9001 certified company and meet the requirements of BS EN9001: ANSI/ASQC Q9001-1994.
		4. The system and its components shall be Underwriters Laboratories, Inc. listed under the appropriate UL testing standard as listed herein for fire alarm applications and the installation shall be in compliance with the UL listing.
	2. **SUBMITTALS**
		1. General: Submit the following according to Conditions of Contract.
			1. Product data sheets for system components highlighted to indicate the specific products, features, or functions required to meet this specification. Alternate or as-equal products submitted under this contract must provide a detailed line-by-line comparison of how the submitted product meets, exceeds, or does not comply with this specification.
			2. Wiring diagrams from manufacturer.
			3. Shop drawings showing system details including location of FACP, all devices, circuiting and details of graphic annunciator.
			4. System Power and battery charts with performance graphs and voltage drop calculations to assure that the system will operate per the prescribed backup time periods and under all voltage conditions per UL and NFPA standards.
			5. System operation description including method of operation and supervision of each type of circuit and sequence of operations for all manually and automatically initiated system inputs and outputs. A list of all input and output points in the system shall be provided with a label indicating location or use of IDC, NAC, relay, Sensor, and auxiliary control circuits.
			6. Operating instructions for FACP.
			7. Operation and maintenance data for inclusion in Operating and Maintenance Manual. Include data for each type product, including all features and operating sequences, both automatic and manual. Provide the names, addresses, and telephone numbers of service organizations.
			8. Product certification signed by the manufacturer of the fire alarm system components certifying that their products comply with indicated requirements Record of field tests of system.
		2. Submission to Authority Having Jurisdiction: In addition to routine submission of the above material, make an identical submission to the authority having jurisdiction. Include copies of shop drawings as required to depict component locations to facilitate review. Upon receipt of comments from the Authority, make resubmissions if required to make clarifications revisions to obtain approval.
	3. **CLOSEOUT SUBMITTALS**
		1. Fire Alarm Documents (FAD) Cabinet by Notifier Honeywell: Provide all documents as required per site
		2. Operation and Maintenance Data
		3. Warranties
		4. Initial Service Agreement
		5. As-Built Drawings
		6. Fire Alarm Zone Map: 11x17, laminated or framed and mounted adjacent to panel. Zone map shall be updated upon completion of each phase of the project.
		7. NFPA Record Documents
		8. Demonstration and Training Video
		9. Transmittal of Keys to District Representative. Contractor is responsible for coordinating with LBUSD Maintenance Lock Shop and School Safety to provide any construction keys that are changed over.
		10. Central Station UDACT Report
		11. Project Deliverables shall be submitted after completion of each phase and include the following: Record of Completion and Record of Inspection and Testing.
	4. **EXTRA MATERIALS**
		1. General: Furnish extra materials, packaged with protective covering for storage, and identified with labels clearly describing contents as follows:
			1. Strobe Units: Furnish quantity equal to 10 percent of the number of units installed, but not less than one.
			2. Smoke Detectors and CO2 Sensors: Furnish quantity equal to 10 percent of the number of units of each type installed but not less than one of each type.
			3. Heat Detectors: Furnish quantity equal to 10 percent of the number of units of each type installed but not less than one of each type.

**EDITOR: ON PROJECTS WHERE MANUAL PULL STATIONS ARE REQUIRED AT ASSEMBLY OR OTHER PUBLIC SPACES, SPECIFY PROTECTIVE COVER WITH BATTERY OPERATED ALARM, BY SAFETY TECHNOLOGY INTERNATIONAL, OR APPROVED EQUAL,** [www.sti-usa.com](http://www.sti-usa.com)

**FIRE ALARM SYSTEMS SHALL INCLUDE ONE MANUAL PULL STATION LOCATED IN THE CAMPUS ADMINISTRATIVE OFFICE.**

* + - 1. Detector or Sensor Bases: Furnish quantity equal to 2 percent of the number of units of each type installed but not less than one of each type.
			2. Manual Pull Station and associated cover/bases: Furnish quantity equal to no less than one of each type installed.
	1. **MAINTENANCE SERVICE**
		1. Maintenance Service Contract: Provide maintenance of fire alarm systems and equipment for a period of 12 months, using factory-authorized service representatives.
		2. Basic Services: Systematic, routine maintenance visits on a quarterly basis at times scheduled with the District. In addition, respond to service calls within 24 hours of notification of system trouble. Adjust and replace defective parts and components with original manufacturer's replacement parts, components, and supplies.
		3. Additional Services: Perform services within the above 12-month period not classified as routine maintenance or as warranty work when authorized in writing. Compensation for additional services must be agreed upon in writing prior to performing services.
		4. Renewal of Maintenance Service Contract: No later than 60 days prior to the expiration of the maintenance services contract, deliver to the District a proposal to provide contract maintenance and repair services for an additional one-year term. District will be under no obligation to accept maintenance service contract renewal proposal.
1. **PRODUCTS**

**EDITOR: DESIGN TEAM RESPONSIBLE FOR IDENTIFYING AND DETAILING ALL PROJECT SPECIFIC FIRE ALARM RELATED DEVICES AND EQUIPMENT TO MEET DISTRICT STANDARDS. DESIGN TEAM SHALL VERIFY ALL PRODUCTS ARE AVAILABLE PRIOR TO SPECIFYING.**

* 1. **ACCEPTABLE MANUFACTURERS**
		1. Manufacturers: The equipment and service described in this specification are those supplied and supported by Honeywell and represent the base bid for the equipment.
			1. Subject to compliance with requirements, provide products by only the following:
				1. Notifier by Honeywell (for Large Systems)
				2. Firelite by Honeywell (for Small Systems)
		2. Being listed as an acceptable Manufacturer in no way relieves obligation to provide all equipment and features in accordance with these specifications.
		3. The Manufacturer shall be a nationally recognized company specializing in fire alarm and detection systems. This organization shall employ factory trained and NICET certified technicians and shall maintain a service organization within 100 miles of this project location. The Manufacturer and service organization shall have a minimum of 10 years’ experience in the fire protective signaling systems industry.
		4. Underground Conductors
			1. West Penn Aquaseal <http://www.westpenn-wpw.com/>
			2. Or Approved Equal
		5. Miscellaneous Components
			1. Wire Guard Protective Covers: Provide covers by Safety Technology International, Inc., at gymnasium strobes, [www.sti-usa.com](http://www.sti-usa.com)
			2. Or Approved Equal
		6. Knox Box: Coordinate with requirements of local AHJ and District Door Hardware Specification 08 71 00Knox Box: Coordinate with requirements of local AHJ and District Door Hardware Specification 08 71 00
		7. Fire Alarm Documents (FDS) Cabinet by Honeywell, Model DN-61031-A
	2. **FIRE ALARM CONTROL PANEL (FACP)**
		1. The following FACP hardware shall be provided:

**NOTE TO EDITOR: CONFIRM EXISTING AND FUTURE CAPACITY REQUIREMENTS FOR THE NEW PANEL. CONFIRM WITH DISTRICT IF ANY PORTABLE OR OTHER BUILDINGS WILL BE REMOVED OFF-SITE OR DEMOLISHED.**

* + - 1. Power Limited base panel, 120 VAC input power.
			2. Emergency Voice/Evacuation Communication System.
			3. FACP shall have up to a 3,180 capacity with 159 alarm points and 159 modules per SLC loop card.
			4. 500 points of Network Annunciation at FACP Display when applied as a Network Node
			5. 500 points of annunciation where one (1) point of annunciation equals:
				1. 1 LED driver output on a graphic driver or 1 switch input on a graphic switch input module.
				2. 1 LED on panel or 1 switch on panel.
			6. From all battery charging circuits in the system provide battery voltage and ammeter readouts on the FCP LCD Display.
			7. Municipal City Circuit Connection with Disconnect switch, 24VDC Remote Station (reverse polarity), local energy, shunt master box, or a form "C" contact output.
			8. One Auxiliary electronically resettable fused 2A @24VDC Output, with programmable disconnect operation for 4-wire detector reset.
			9. One Auxiliary Relay, SPDT 2A @32VDC, programmable as a trouble relay, either as normally energized or de-energized, or as an auxiliary control.
			10. Where required provide Intelligent Remote Battery Charger for charging up to 110Ah batteries.
			11. Power Supplies with integral intelligent Notification Appliance Circuit Class B for system expansion.
			12. Four (4) form "C" Auxiliary Relay Circuits (Form C contacts rated 2A @ 24VDC, resistive), operation is programmable for trouble, alarm, supervisory of other fire response functions. Relays shall be capable of switching up to ½ A @ 120VAC, inductive.
			13. The FACP shall support six (6) RS-232-C ports and one (1) service port.
			14. Remote Unit Interface: supervised serial communication channel for control and monitoring of remotely located annunciators and I/O panels.
			15. Modular Network Communications Card.
			16. Programmable DACT for either Common Event Reporting or per Point Reporting.
			17. Service Port Modem for dial in passcode access to all fire control panel information.
		1. Distributed Module Operation: FACP shall be capable of allowing remote location of the following modules: interface of such modules shall be through a Style 4 (Class B) supervised serial communications channel (SLC):
			1. Addressable Signaling Line Circuits
			2. Initiating Device Circuits
			3. Notification Appliance Circuits
			4. Auxiliary Control Circuits
			5. Graphic Annunciator LED/Switch Control Modules
		2. Cabinet: Lockable steel enclosure. Arrange unit so all operations required for testing or for normal care and maintenance of the system are performed from the front of the enclosure. If more than a single unit is required to form a complete control unit, provide exactly matching modular unit enclosures.
		3. Alphanumeric Display and System Controls: Panel shall include an 80-character LCD display to indicate alarm, supervisory, and component status messages and shall include a keypad for use in entering and executing control commands.
	1. **REMOTE LCD ANNUNCIATOR**
		1. Provide a remote LCD Annunciator with the same "look and feel" as the FACP operator interface. The Remote LCD Annunciator shall use the same Primary Acknowledge, Silence, and Reset Keys, Status LEDs, and LCD Display as the FACP.
		2. Annunciator shall have super-twist LCD display with two lines of 40 characters each. Annunciator shall be provided with four (4) programmable control switches and associated LEDs.
		3. Under normal conditions the LCD shall display a "SYSTEM IS NORMAL" message and the current time and date.
		4. Should an abnormal condition be detected the appropriate LED (Alarm, Supervisory or Trouble) shall flash. The unit audible signal shall pulse for alarm conditions and sound steady for trouble and supervisory conditions.
		5. The annunciator shall connect to a separate, dedicated "terminal mode" EIA-485 interface. Connection shall be equivalent to a two-wire loop connection and be capable of distances up to 6,000 feet. Each terminal mode LCD display shall mimic the main control panel.
		6. The LCD shall display the following information relative to the abnormal condition of a point in the system:
			1. 40-character custom location label.
			2. Type of device (e.g., smoke, pull station, waterflow).
			3. Point status (e.g., alarm, trouble).
		7. Operator keys shall be key switch enabled to prevent unauthorized use. The key shall only be removable in the disabled position. Acknowledge, Silence and Reset operation shall be the same as the FACP. The system shall allow a minimum of 32 terminal mode LCD annunciators. Up to 10 LCD annunciators shall be capable of the following system functions: Acknowledge, Signal Silence and Reset, functions shall be protected from unauthorized use by a key switch or password.
	2. **NETWORK ANNUNCIATORS**
		1. Network Display Unit shall contain the following features:
			1. 80 columns by 2 line back-lighted LCD readout of point status. A 640-character backlit LCD display and control interface.
			2. Capacity to annunciate 12,000 network point and/or point lists.
			3. Historical event logs shall maintain separate 600 Alarm and 600 Trouble events. Historical event logs shall maintain separate 1000 Alarm and 4000 Trouble events.
			4. The network shall provide a means to log into any node on the system via a laptop computer or CRT/Keyboard and have complete network access (Set Host) for diagnostics, maintenance reporting, and information gathering of all nodes in the system. Systems not meeting this requirement must provide all diagnostic tools required to support this function from selected points on the network.
			5. Shall be listed to meet NFPA requirements for Firefighter Smoke Control Station (FSCS) and HVAC.
1. **EXECUTION**
	1. **INSTALLATION**
		1. Install the networked fire alarm system in accordance with manufacturer’s instructions.
		2. Coordinate the installation of fire alarm equipment with the manufacturer or authorized distributor.
		3. Install conductors and wiring according to the manufacturer's recommendations.
		4. Coordinate with the supplier regarding correct wiring procedures before installing conduits or conductors.
		5. Install system components in accordance with DSA & CSFM requirements, appropriate NFPA Standards, specified requirements, National Electrical Code, local and state regulations, requirements of fire department, and other applicable authorities having jurisdiction (AHJ).
		6. Install all conduit for power and data entering each equipment rack, panel, enclosure, box, cabinet and significant equipment from the side or bottom.
		7. Equipment Identification:
			1. System labels and devices programming addresses shall be based on final signage and building labeling submittals. For existing facilities, Contractor shall obtain from the District, an approved site layout and building and room labeling designations.
			2. Install a nameplate on each individual equipment rack, enclosure, boxes, cabinet, and significant equipment item.
			3. Use identifiers and abbreviations defined in the Drawings whenever possible. Use plan designation for labeling, unless indicated otherwise.
			4. Nameplates shall be laminated black phonemic resin with a white core and engraved lettering, a minimum of ¼” high.
			5. Engrave using upper case letters of uniform height; centered on device, cover plate, or enclosure; with all characters made clearly and distinctly.
			6. All equipment shall have the manufacturer’s name, address, model number, and rating on a name plate securely affixed in a conspicuous place. All equipment shall bear labels attesting to Underwriters Laboratories approval where subject to Underwriters Laboratories label service.
			7. Identify all field terminals and relays with device identification. Lettering shall be 3/16” high minimum.
	2. **FIELD QUALITY CONTROL**
		1. Final Test: The final Test shall be performed in the presence of the DSA IOR. Perform the following before the installation shall be considered completed and acceptable by awarding authority:
			1. Operate by the Contractor’s job foreman, in presence of a representative of the manufacturer, a representative of the District and extend invitation to fire department for every installed device to verify proper operation and correct annunciation at control panel.
			2. Perform at least one half of all tests on battery standby power.
			3. Where application of heat would destroy any detector, it may be manually activated.
			4. Open signaling line circuits and notification appliance circuits in at least 2 locations to verify presence of supervision.
			5. When testing has been completed to satisfaction of both Contractor's job foreman and representatives of the manufacturer and the District, a notarized letter co-signed by each attesting to satisfactory completion of said testing shall be forwarded to the Owner and fire department.
			6. Leave the fire alarm system in proper working order, and, without additional expense to the Owner, replace defective materials and equipment provided under this contract within 1 year (365 days) from date of final acceptance by the owner.
			7. Notify the fire department before the final test in accordance with local requirements.
	3. **TEST AND INSPECTION REPORT**
		1. Only a factory-authorized service representative trained shall be allowed to test and inspect components, assemblies, and equipment installations, including connections.
		2. Perform the following tests and inspections:
			1. Visual Inspection: Conduct visual inspection prior to testing.
				1. Inspection shall be based on completed record Drawings and system documentation that is required by the "Documentation" chapter in NFPA 72.
				2. Comply with the "Visual Inspection" table in the "Inspection" section of the "Inspection, Testing, and Maintenance" chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.
			2. System Testing: Comply with the "Testing" table in the "Testing" section of the "Inspection, Testing, and Maintenance" chapter in NFPA 72.
			3. During inspection the software shall automatically comply and generate "Fire Alarm System Record of Completion" in the "Documentation" chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" section of the "Inspection, Testing, and Maintenance" chapter in NFPA 72.
		3. Annual Test and Inspection: One year after date of Completion, test fire alarm system complying with visual and testing inspection requirements in NFPA 72.
	4. **SYSTEM COMMISIONING AND TESTING**
		1. Provide the service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment to technically supervise and participate during all of the adjustments and tests for the system.
		2. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.
		3. All the following functions of the system shall be performed and tested:
			1. Close each sprinkler system flow valve and verify proper supervisory alarm at the FACP.
			2. Verify activation of all flow switches.
			3. Open initiating device circuits and verify that the trouble signal actuates.
			4. Open signaling line circuits and verify that the trouble signal actuates.
			5. Open and short notification appliance circuits and verify that trouble signal actuates.
			6. Ground initiating device circuits and verify response of trouble signals.
			7. Ground signaling line circuits and verify response of trouble signals.
			8. Ground notification appliance circuits and verify response of trouble signals.
			9. Check presence and audibility of tone at all alarm notification devices.
			10. Check installation, supervision, and operation of all intelligent smoke detectors during a walk test.
		4. Each of the alarm conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.
		5. When the system is equipped with optional features, the manufacturer's manual should be consulted to determine the proper testing procedures. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar.
	5. **FINAL INSPECTION**
		1. At the final inspection a factory trained representative of the manufacturer of the major equipment shall demonstrate that the systems function properly in every respect.
		2. If Project includes phased construction, all documentation, including but not limited to NFPA 72 Record of Completion, NFPA 72 Record of Inspection and Testing, and UDACT points list must signed by DSA IOR and submitted to the District, prior to occupancy of building(s).

**EDITOR: CONFIRM IF TECHNICAL TRAINING FOR DISTRICT’S TECHNOLOGY AND INFORMATION SERVICES STAFF IS REQUIRED ON THIS PROJECT**

* 1. **USER INSTRUCTION AND TRAINING**
		1. Provide instruction as required for operating the system. Hands-on demonstrations of the operation of all system components and the entire system including program changes and functions shall be provided.
			1. Before Completion and with a fully functional fire alarm system installed at the site provide the following closeout trainings:
				1. The Contractor shall provide up to four hours of user training for site-based staff.
				2. The Contractor shall provide a minimum of one (1) technical training of up to 40 hours of Notifier Onyx program
				3. The date and time for trainings shall be coordinated with the District Representative. Provide notification at least two (2) weeks in advance
		2. Before Completion, provide one instruction period for the Project site-based operators and system users. The instruction period shall be scheduled and coordinated with the District Representative.
		3. Training materials and required deliverables shall be submitted to the District Representative prior to day of training.
			1. The contractor and/or the systems manufacturer's representatives shall provide the following to the attendees:
				1. Training Agenda
				2. System operation Instructions
			2. Have staff attendees sign off training sheet and provide a copy to the DSA IOR.
		4. Prior to beginning the operational demonstration, notify Central monitoring Station that an instructional activity is beginning; inform them that it includes setting and resetting the system in test mode. After the demonstration is completed and the system restored, notify the Central Monitoring Station that the system has been restored and it is back online for continuous monitoring.
		5. Instruction period training for site-based staff shall consist of the following:
			1. Overview:
				1. Explain the fire system is “addressable” which means every device-smoke detector, heat detector, sprinkler water flow switch, manual pull station, etc. has a unique address or identity. This makes it possible to positively identify the exact device causing an alarm, trouble, or supervisory condition.
				2. Explain the fire alarm control panel also controls the horns and strobes throughout the campus or building.
				3. Explain that the fire alarm system is interconnected to various other systems and equipment throughout the site such as:

Elevators to recall them to the main floor or to an alternate floor and as an option dependent circumstances turn off the power to the elevators.

Heating and air conditioning equipment to turn off fans and close dampers to stop the spread of smoke throughout a building.

The class passing signaling system to disable the bells or tones to not accidentally signal students and staff to return to the buildings.

Magnetically held doors to close them to stop the spread of smoke.

To turn up house lighting in an occupied Auditorium or Multi-Purpose room to provide adequate egress lighting.

The Central and Autonomous PA systems to mute them during the sounding of the alarm signal.

* + - * 1. Explain the fire system has a battery backup in case of power failure and that it will continue to function for a minimum of 24 hours after a total power failure.
				2. Explain that the fire alarm system components and wiring are monitored to report a malfunction, damage, or vandalism. When this occurs, a trouble indication will appear on the fire alarm annunciator and FACP and this indication will be transmitted to the central monitoring station.
				3. Explain that other equipment and systems are monitored for abnormal conditions such as the fire sprinkler water being turned off. When this occurs, a supervisory condition is created. A supervisory indication will appear on the fire alarm annunciator and FACP and this indication will be transmitted to the central monitoring station.
				4. Explain that the fire system in addition to notifying the occupants of a possible fire condition also transmits an alarm indication to the central monitoring station that will in turn notify and dispatch the local fire department to your site.
			1. Basic:
				1. Hand out the SYSTEM OPERATION instructions to attendees.
				2. Point out the Fire Alarm Control Panel and have them observe the normal LED status (one green LED only should be on):

GREEN = Normal.

YELLOW = Trouble.

RED = ALARM.

* + - * 1. Have the attendees observe the LCD display that should be indicating a SYSTEM NORMAL message.
				2. Point out the Fire Alarm System Annunciator and have attendees observe the LCD display that should be indicating a SYSTEM NORMAL message.
			1. Operation and Demonstration:
				1. After putting the system or having someone put the system central station monitoring into the test mode demonstrate the following:
				2. Activate a Manual Pull Station to demonstrate ALARM.

Demonstrate audible and visual notification appliances and if installed the voice evacuation signal announcement.

Demonstrate panel or annunciator sounder tone for ALARM.

Have staff SILENCE system.

Show LCD display and LED of alarm.

Demonstrate and have staff reset the manual pull station.

Have staff RESET fire system.

* + - * 1. Activate Smoke Detector with canned smoke to demonstrate address identification:

Have staff SILENCE system.

Show LCD and display LED of ALARM.

Have staff RESET fire system.

* + - * 1. Remove Smoke Detector to demonstrate SYSTEM TROUBLE.

Demonstrate panel or annunciator sounder tone for TROUBLE.

Have staff SILENCE system.

Show LCD display and LED of TROUBLE.

Replace the smoke detector.

Have staff RESET fire system.

* + - * 1. Remove power to demonstrate function during power failure.

Have staff SILENCE system.

Show LCD display and LED of TROUBLE.

Activate manual pull station to demonstrate audible or visual functions in power failure mode.

Reset manual pull station.

Reset fire system.

If applicable, point out sprinkler riser and shut off valves.

Show location of a water flow switch.

Show location of a valve tamper switch.

Point out valves must always be OPEN or fully counter clockwise.

Point out PIV (Post Indicator Valves) if applicable.

Have water flow through the inspector’s test valve and point out the ringing water flow bell.

After the horns are silenced by an assistant, show that the water flow bell is ringing continuously indicating water flow.

Have the assistant turn off the inspector’s test valve to show that water flow alarm bell turns off.

Reset system.

Unlock and turn off a PIV or riser valve to show a supervisory condition.

Turn valve back on, lock the valve open and demonstrate the end of the indication of a supervisory condition.

* + - * 1. Ensure fire panel is reset and indicates normal and central station monitoring is taken off of the test mode.

**END OF SECTION**