

SECTION 27 51 23

PUBLIC ADDRESS and CLOCK SYSTEM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Refer to the General Conditions and all other Section of Division.

1.02 DESCRIPTION OF WORK

- A. Furnish and install all labor, materials, equipment, tools, transportation, supervision, services required to provide and leave ready for operation a new Bogen Quantum Multicom IP Clock and Public Address system. The contractor shall include all materials and/or equipment necessary to make a complete working installation. The electrical work shall include, but is not limited to the following:
 - 1. Public address speakers, clocks, head end equipment, wiring and connections as indicated on drawings to establish a new fully functional integrated system.
- B. Related work included in other Sections:
 - 1. Section 26 00 00, Electrical General Provisions, applies all work in this Section.
 - 2. Basic Construction Materials and Methods: Section 26 05 00.
 - 3. Grounding: Section 26 05 00.
 - 4. Complete installation and wiring of each device. The systems shall include conduit, outlet boxes, wiring devices, signaling facilities, programming, staff training and other items as specified.
 - 5. Provide all incidental work and materials involved in installation of the signal equipment including carpentry or structural work for support of junction boxes, conduits, control panels, outlets, etc.
- C. Design Scope:
 - 1. Interconnect intercom system with telephone system.
 - 2. Provide clock/speaker unit in all spaces except for storage and equipment rooms.
 - 3. Provide exterior speakers, one per each exterior wall.

1.03 SUPERVISION AND QUALITY OF WORK

- A. The Contractor shall supervise the work of this section, personally, or through an authorized and competent representative.
- B. All material and equipment shall be installed in a neat manner. Any material or equipment not installed in the manner described shall upon the order of the Architect, Engineer or District be removed and replaced in satisfactory manner. No additional expense shall be allowed to repair work required.
- C. The Contractor shall carefully study and compare all drawings, specifications and other instructions and shall at once report, prior to bid, to the Engineer via the Architect any error, inconsistency or omission that may be discovered.

PART 2 - GENERAL REQUIREMENTS

2.01 CONTRACTOR

- A. The contractor shall furnish all equipment, accessories and material required for the installation of a comprehensive communication system in strict compliance with these specifications and applicable contract drawings. Any material and/or equipment necessary for the proper operation of the system, which is not specified or described herein, shall be deemed part of this specification.

2.02 MANUFACTURER

- A. The manufacturer shall be a United States manufacturer, who has been regularly engaged in the manufacture of communication systems for at least thirty (30) years.
- B. The equipment described herein, and furnished per these specifications shall be the product of one manufacturer. All reference to model numbers and other detailed descriptive data is intended to establish standards of design, performance and quality, as required. Equipment manufactured by Bogen Communications, Inc. shall be acceptable and shall be installed by Sound and Signal, Inc. the Authorized Bogen Distributor of Engineered Sound Products for this region. They can be reached at 925-455-1778 or WWW.SoundandSignal.com
- C. The communications system shall bear the label of a Nationally Recognized Testing Laboratory (NRTL) such as E.T.L., D.S. & G., or UL and be listed by their re-examination service. All work must be completed in strict accordance with all applicable electrical codes, including NEC Section 800-51 (i), under direction of a qualified and factory approved distributor, to the approval of the owner.
- D. The system is to be designed and configured for maximum ease of service and repair. All major components of the system shall be designed as a standard component of one type of card cage. All internal connections of the system shall be with factory keyed plugs designed for fault-free connection. The printed circuit card of the card cage shall be silk screened to indicate the location of each connection.

2.03 SUBMITTALS AND SUBSTITUTIONS

- A. Within thirty-five (35) calendar days after the date of award of the contract, the contractor shall submit to the Architect for review, eight (8) copies of a complete submission. The submission shall consist of five (5) major sections, with each section separated with insertable index tabs. The first section shall be the "index", which shall include the project title and address, name of the firm submitting the proposal and the name of the Architect. Each page in the submission shall be numbered chronologically and shall be summarized in the index. The second section shall include a copy of the authorized distributor's valid C-10 California State Contractors License, letters of factory authorization and guaranteed service, list of projects of equal scope and list of proposed instrumentation to be used by the contractor. The third section shall contain the comparative specification listing, including a complete listing of the characteristics of the equipment to be furnished. The fourth section shall contain an original factory data sheet for every piece of equipment in the specifications. The fifth section shall contain a wiring destination schedule for each circuit leaving each piece of equipment.

- B. The manufacturer's representative shall provide a letter with submittals from the manufacturer of all major equipment stating that the manufacturer's representative is an authorized distributor. This letter shall also state the manufacturer guarantees service performance for the life of the equipment, and that there will always be an authorized distributor assigned to service the area in which the system has been installed.
- C. In order to establish quality and standards of performance of equipment required by the Owner, the specified equipment for the communication systems is that of Bogen Communications, Inc. All mechanical, electrical and general information set forth on the respective data sheets for each specified item shall be considered as part of these Specifications and binding herein. Any proposed equal item offered shall be substantiated fully to prove equality. The Architect reserves the right to require a complete sample tested by an independent testing laboratory to prove equality. The decision of the Architect regarding equality of proposed equal items will be final. All base bids must be submitted using the Bogen Communications, Inc. product.
- D. All parties understand that any substitution(s) of specified products are done for the purpose of cost savings to the Owner. Therefore, any material substitutions or deviations proposed by the Contractor shall be included with the initial bid and shall show a line item credit to the Owner for each item substituted in lieu of specified products.

2.04 QUALIFICATIONS

- A. All work described herein to be done by the manufacturer's authorized representative shall be provided by a documented factory authorized representative of the basic line of equipment to be utilized.
- B. As further qualification for bidding and participating in the work under this specification the manufacturer's representative shall hold a valid C-10 Contractor's License issued by the Contractor's State License Board of California. The manufacturer's representative shall have completed at least fifty (50) projects of equal scope, giving satisfactory performance and have been in the business of furnishing and installing sound systems of this type for at least twenty (20) years. The manufacturer's representative shall be capable of being bonded to assure the owner of performance and satisfactory service during the guarantee period.

2.05 EQUIPMENT WARRANTY

- A. The contractor shall furnish a letter from the manufacturer of the equipment, which certifies that the equipment has been installed according to factory intended practices, that all the components used in the system are compatible and that all new portions of the systems are operating satisfactorily. Further, the contractor shall furnish a written unconditional guarantee, guaranteeing all parts and all labor for a period of two (2) years after final acceptance of the project by the owner.

2.06 SERVICE FACILITIES

- A. The contractor shall make available, and maintain a satisfactory service department capable of furnishing equipment inspection and service. The contractor shall be

prepared to offer a service contract for the maintenance of the system beyond the warranty period.

2.07 TRAINING

- A. The contractor shall instruct personnel designated by the owner in the proper use, basic care, and maintenance of the equipment. Such training shall be provided as an integral component of the system.

PART 3 - EQUIPMENT SPECIFICATION

3.01 MANUFACTURERS

- A. Manufactures: Subject to compliance with requirements specifications, provide the following system:
 - 1. Quantum Multicom IP manufactured by Bogen Communications, Inc., Ramsey, NJ.
- B. The Specifying authority must approve any alternate system.
- C. The intent is to establish a standard of quality, function and features. It is the responsibility of the bidder to insure that the proposed product meets or exceeds every standard set forth in these specifications.
- D. The functions and features specified are vital to the operation of this facility; therefore, inclusion in the list of acceptable manufacturers does not release the contractor from strict compliance with the requirements of this specification.

3.02 SYSTEM PARAMETERS

- A. The communication system shall be a Bogen Quantum Multicom IP, and shall provide a comprehensive communication network between administrative areas and staff locations throughout the facility. Nonvolatile memory shall store permanent memory and field-programmable memory. A system, which uses a battery to maintain system configuration information, shall not be acceptable.
- B. The system shall provide no less than the following features and functions:
 - 1. Telephonic communication (complete with DTMF signaling, dial tone, ringing and busy signals, and data display) on administrative stations shall use two wires. Systems that use more than two wires for communication, tones and data display shall not be acceptable.
 - 2. Amplified-voice communication with loudspeakers shall use a shielded audio pair (shield can be used as one of the two required conductors for administrative phone or call-in switch).
 - 3. The system shall be available in the following configurations:
 - a. MC2K Wall-mounted in a custom enclosure. Station capacity shall be from 24 to 130 stations. All stations shall have the ability to support displays.
 - b. MC2KR Rack-mounted. Station capacity shall be from 24 to 250 stations. All telephone stations shall have the ability to support displays.

- c. QRC24 & QRC48 Compact Quantum Rack System. Station capacity shall be from 24 to 48 stations. All stations shall have the ability to support displays, with an option to add up to 8 Central Office phone lines.
 - d. 2223/2233 MC2KR Rack-mounted and integrated with Bogen Multi-Graphic Series 2223 or Series 2233 equipment. In this configuration, Quantum Multicom IP system station capacity shall be expandable up to 250 stations in increments of 24. All telephone stations shall have the ability to support displays. The Multi-Graphic system equipment provides the following: backup fail safe intercom and paging functions (Note: the systems operate independently; if one were to fail, the other provides intercom for student safety), plus two additional program channels, and additional Multi-Graphic functions. It shall be possible, by use of a separate call-in switch, to announce only to the Multi-Graphic portion of the system without using additional station ports within the Quantum Multicom IP system.
- C. The above system configurations represent a single processor in the Quantum Multicom IP. Each processor can be combined with up to 63 additional systems (nodes) for a total single facility capacity of up to 16,000 stations. Up to 99 additional facilities can communicate with each other to provide district-wide point-to-point calling and All-Call Paging with up to 1,600,000 stations.
- 1. The system shall consist of any combination of the following: Administrative Display Phones, Administrative VoIP Phones, and Administrative Phones.
 - a. Staff Classroom Stations shall consist of wall- or ceiling-mounted loudspeakers with call-in switches or handsets.
 - b. Administrative phone stations shall consist of either VoIP phones, display phones, or DTMF dialing 2500 analog-style telephone sets.
 - c. Administrative Display Phones shall be DTMF-dialing digital telephone sets with a 4x16 character LCD display panel. They shall be equipped with a standard 12-key push-button dialing keypad. Phones requiring external LCD displays shall not be accepted as an equal. Optionally, a loudspeaker may be connected at each administrative station location.
 - 1) Up to 5 Administrative Wall Displays may be added to the Administrative Station for large office areas.
 - d. Administrative Display Phones and Administrative Phones shall have the option of including a loudspeaker.
 - e. All types of stations except administrative VoIP phones shall utilize the same type of field wiring. Future station alterations shall only require the station type to be changed and the proper software designation to be selected. Alterations shall not require field wiring or system head-end alterations. All field wiring and system head-end equipment shall support any type of station, at the time of installation. All contractor proposals shall reflect this capacity. Failure to submit and bid this project in this manner will be deemed as being in direct conflict of these specifications and will be rejected.
 - f. There shall be no limit to the number of administrative display stations within the total capacity of the system.
 - g. It shall be possible at any time to change the type of station at any location without equipment or wiring changes except for administrative VoIP phones that utilize existing LAN connections. Systems that limit the quantity of each station type or require future additional equipment and/or system

- expansion to provide additional administrative telephones shall not be accepted as an equal.
2. The system shall be a global switching system, providing up to 512 unrestricted simultaneous private telephone paths per facility. The system shall also be capable of providing up to 512 amplified intercom paths per facility. One amplified intercom path shall automatically be provided with each increment of 24 stations of system capacity. All hardware, etc., required to achieve the necessary number of amplified-voice intercom channels for this system shall be included in this submittal. Amplified-voice intercom channels shall provide voice-activated switching. Systems requiring the use of a push-to-talk switch on administrative telephones shall not be acceptable. There shall be an automatic level control for return speech during amplified-voice communications. The intercom amplifier shall also provide control over the switch sensitivity and delay times of the VOX circuitry.
 3. It is of utmost importance that emergency calls from staff stations receive prompt attention. Therefore, it is important that there be an alternate destination in case the emergency call does not get answered at the primary location. To this end:
 - a. The system shall provide 911 Dial-Through with specific outside line(s) dedicated only for this function to ensure that the line is available all the time for 911 calls. The 911 Dial-Through is available to any station that can dial.
 - b. The 911 CO lines will be pre-configured and reserved. If the 911 reserved lines are busy, the normal CO lines will be connected to route the 911 calls. If all the normal CO lines are busy, the ongoing call shall be disconnected and the 911 call shall be placed.
 - c. Staff-generated Emergency calls shall be treated as the second highest system priority. Therefore, all Emergency calls shall annunciate at the top of the call queue of their respective administrative telephone(s). Should that emergency call go unanswered for 15 seconds, the call shall be re-routed to an alternate speaker station then prompt the caller to make a verbal call for help. During the transfer, the original administrative telephone shall continue to ring the distinctive Emergency Ring. Should the Emergency Transfer to Station have an associated administrative telephone, it too shall ring the distinctive Emergency ring.
 - d. The Emergency Transfer to Station shall be field programmable.
 - e. Should the original administrative telephone be engaged in a non-emergency conversation, its conversation shall be automatically terminated, indicated with an alert tone, and then reconnected to the station that generated the Emergency Call.
 - f. Should the administrative telephone be engaged in an emergency conversation, successive emergency calls shall log into the call queue as well as transfer to the Emergency Transfer Station for their verbal call for help. Upon termination of the initial emergency conversation, the next one shall immediately ring the administrative telephone.
 - g. Systems failing to transfer unanswered Emergency calls or failing to immediately connect to the administrative telephone shall not be deemed as equal.
 4. There shall be a System-Wide Facility Emergency All-Call feature. The Emergency All-Call shall be accessed from designated administrative phones or by the activation of an external contact closure which shall give the third audio program input emergency status. The Emergency All-Call function shall have the

- highest system priority and shall override all other loudspeaker-related functions including Time Tone Distribution.
- a. Considering that emergencies calls are to be treated with the highest level of concern. Systems which do not regard Emergency-All-Call page from an administrative telephone with the highest priority shall not be deemed as equal.
 - b. Upon picking up the receiver and dialing "9", a menu shall appear on the display prompting the user to enter each subsequent digit. In this way, the user shall not be required to memorize complicated key sequences in order to access emergency functions.
 - c. The Emergency All-Call shall capture complete system priority, and shall be transmitted over all speakers in the facility. It shall also activate an external relay, which can be used to automatically override volume controls and other systems.
 - d. Systems without Emergency All-Call, or systems with All-Call that cannot be activated by external means, or which do not capture complete system priority or activate an external relay, shall not be acceptable.
5. There shall be at least four Dedicated Emergency Alarm Tones. Each may be accessed by dialing a three-digit number from designated administrative telephones. These emergency tones should be separate from the time tones. Systems using external alarm generators, or having less than four emergency alarm tones shall not be acceptable.
- a. Upon picking up the receiver and dialing "9", a menu shall appear on the display prompting the user to enter each subsequent digit. In this way, the user shall not be required to memorize complicated key sequences in order to access Emergency Alarm Tones.
6. There shall be four (4) External-Function Relay Driver Outputs, accessible from designated Quantum Commander Users or Administrative Display Telephones by dialing a four-digit number. These outputs remain set until accessed and reset at a later time. The user shall have the ability to review the status of each relay driver. A plain English menu, prompting the user through the fields without requiring the user to remember any dialing sequences shall support this feature. Systems that require the user to remember complicated dialing schemes or prompt the user via cryptic commands shall not be deemed equal.
- a. The stations shall be capable of being programmed for security contact relays for use with magnetic locks, motion detectors, cameras or any low-voltage, dry contact creating device. System using security stations for control of external functions shall not be acceptable.
 - b. Upon picking up the receiver and dialing "9", a menu shall appear on the display prompting the user to enter each subsequent digit. In this way, the user shall not be required to memorize complicated key sequences in order to access external relay functions.
7. There shall be a program-material interface included with each node, which shall accept up to four (4) Bogen Power Vector Series program modules. Systems requiring an external program source interface shall not be acceptable.
8. There shall be an outside line feature. The circuitry shall interface with the station ports of an external telephone system, and shall provide facilities for up to 960 incoming lines per facility which shall be designated by the user to ring "day" and "night" administrative display stations or administrative stations. Where an administrative display station is designated to receive outside line calls, the phone shall ring with a unique tone and the outside line number shall appear on

the display panel. The option shall also provide the ability to make outside line calls from Administrative Display Stations or Administrative Stations. This ability shall be programmable for each phone and there shall be thirty-two Classes of Service available to any station. This feature shall be capable of supporting DID, DISA, and a Security DISA function.

- a. Cellular system access for Security is of the utmost concern. Wireless security page offers a password-protected Security DISA feature that shall be accessible only from authorized Police, Fire, Emergency personal or an off-premise security office, which monitors the facility's security system. It shall function as follows: upon confirmation of the password DISA number, the system shall allow security personnel to dial access any station and monitor the activity without pre-announce tone or the privacy tone. This will then allow the security office to determine exactly what the conditions are in the station and the actions need to be taken.
9. The system shall provide for field-programmable three-, four-, five-, or six-digit architectural station numbers.
10. There shall be an automatic level control for return speech during amplified-voice communications.
11. Each station loudspeaker shall be assignable to any one, any combination, or all of 64 Multi-purpose zones or any of the 16,000 hard-wired zones per facility.
 - a. Each station loudspeaker shall be assignable to any one, any combination, or all of 64 Multi-purpose zones. Systems with less than 64 Multi-purpose zones shall not be acceptable.
12. There shall be thirty-two (32) Flexible Time-Signaling Schedules with a total of 1024 user-programmed events per facility. Each event shall sound one of user-selected tones or external audio. It shall be possible to assign each schedule to a day of the week, or manually change schedules from an authorized Quantum Commander User via Web browser. Systems, which do not provide a minimum of thirty-two (32) flexible time-signaling schedules or a choice of eight (8) time tones plus external audio, shall not be acceptable.
13. An internal program clock (with battery backup) shall be included, allowing a total of 1024 user-programmed events per facility. It shall be possible to synchronize the internal program clock with an external master clock. Systems, which do not provide an internal program clock and/or can not synchronize with an external master clock to meet these specifications, are not equal.
 - a. There shall be thirty-two (32) flexible time-signaling schedules. It shall be possible to assign each schedule to a day of the week, or manually change schedules from an authorized Quantum Commander User via Web browser on the LAN/WAN.
 - b. The built-in Master Clock corrects time by accessing the LAN/WAN NTP time server.
 - c. The Quantum Processor is capable of adjusting the Daylight Savings Time automatically.
 - d. Each event shall be able to be directed to any one or more of the sixty-four (64) Multi-purpose time-signaling zones.
 - e. Each of the 64 Multi-purpose zones shall have a programmable "tone duration" unique unto itself. For example: the gymnasium shall receive a time tone for ten (10) seconds while the rest of the facility receives a tone for five (5) seconds.
 - f. Each event shall sound one of eight (8) user-selected tones or external audio. Each event may utilize a different custom tone. It shall be utilized to

- send the gymnasium, shop classes, and pool (if necessary), a separate time tone to indicate "clean up." Minutes later the entire facility can then receive the same time tone to indicate class change.
- g. Each of the eight (8) Distinct Time Tone Signals may be manually activated by selected Administrative Display Phones or from an authorized Quantum Commander User via web-browser. These tone signals shall remain active as long as the telephone remains off-hook, or until canceled from the keypad or Quantum Commander.
 - 1) Upon picking up the receiver and dialing "9", a menu shall appear on the display prompting the user to enter the next digit. In this way, the user shall not be required to memorize complicated key sequences in order to access manual time-tone functions.
 - 2) Systems that do not provide at least thirty-two (32) flexible time signaling schedules or do not provide automatic activation of schedules shall not be acceptable.
 - h. Shall have the capability to control Analog, Digital and Wireless Secondary Clocks.
14. There shall be a zone-page/all-page feature that is accessible by selected administrative VoIP phones and administrative phones.
- a. There shall be automatic muting of the loudspeaker in the area where a page is originating.
 - b. There shall be a pre-announce tone signal at any loudspeaker selected for voice paging.
15. There shall be a voice-intercom feature that is accessible by selected administrative phones, administrative VoIP phones and all administrative display phones.
- a. There shall be a periodic privacy tone signal at any loudspeaker selected for amplified-voice communication.
 - b. There shall be a pre-announce tone signal at any loudspeaker selected for voice-intercom communication.
 - c. Privacy and pre-announce tone signals shall be capable of being disabled during system initialization.
 - d. There shall be an automatic switchover to private telephone communication should the person at the loudspeaker pick up his handset.
 - e. By picking up the receiver and dialing the first digit of the number of the station to be called, that number shall appear on the display along with a loudspeaker symbol, prompting the user to enter the next digits. There shall be no confusion as to the type of conversation that is to be established.
16. There shall be a telephonic communication feature, which is accessible by all Administrative VoIP Phones, Administrative Phones, and Administrative Display Phones.

3.03 COMPONENTS AND DESCRIPTIONS

- A. The Quantum Multicom IP must be capable of supporting the existing Multicom 2000 hardware and functions as well as the new features across the Quantum Processor's interfaced over the LAN. The VoIP capabilities of the QSPC1 Quantum Processor Card will enable the support of the features across the various processors' nodes. The sections below cover how the system will handle each of the existing and the new features in the QSPC1 product. Systems that do not allow the reuse of existing

equipment or are not backwards compatible shall not be deemed acceptable. Systems that don't allow processors to be seamlessly integrated via the LAN/WAN are not considered equal.

B. Quantum Multicom IP:

1. The Quantum facility shall have a minimum of one node/processor and a maximum of 64 interconnected nodes/processors. A maximum of 100 facilities can be interconnected into a district.
2. The station numbers, program buses, etc. shall be identified with a QSPC1#, Station card# and port# or QSPC1#, program#.
3. Audio Information will be transmitted between the processors on the LAN/WAN using VoIP technology. Quantum will utilize all of the existing Multicom 2000 hardware except the current processor card. Thus making Quantum Multicom IP backwards-compatible with existing Multicom 2000 systems.
4. The processor software shall be upgradeable via Quantum Commander. The System shall maintain Active/Standby loads and whenever the upgrade takes place, the current active load shall be overwritten as Standby and new load shall be copied as Active. The system shall reset itself and boot up with the latest load once the upgrade is success. If the system can not come up with a new load, it shall revert to the old working load.
5. It shall be possible for Quantum schools to exchange 'station-to-station' calls and 'inter-facility All-Call paging' to a single facility or all facilities in a district using VoIP technology.
6. The primary QSPC1 shall be configured to act as a Gateway for facility point-to-point calls. Using Quantum Commander, every facility shall be configured with the IP addresses of the primary QSPC1 systems of all the other known facilities (maximum of 99 additional), and an organizationally private multicast IP address (i.e. 239.192.x.y series), which shall be used for inter-facility paging.
7. The maximum number of simultaneous inter-facility point-to-point calls supported is based on the actual performance of the network and the CPU load. The voice quality of the inter-facility calls may vary based on the network conditions.
8. The system shall facilitate the playing of short audio clips repetitively played until stopped by the Quantum Commander User or administrative display phone MCDS3 whichever occurs earlier.
9. A built-in Master Program Clock, with battery backup, shall be included to automatically control class change or other signals. The Master Program Clock shall have 1024 events that may be programmed into any of the 32 time signaling schedules, and/or 32 flexible holiday schedules. Systems that rely on external master clock shall not be considered equivalent.
10. Network Time Synchronization. The system shall be capable of periodic update/synchronization of the processor's time with a Network Time Server via the school's LAN/WAN network. Systems that do not provide Network Time Synchronization will not be deemed equivalent.

C. Quantum Commander:

1. The processor utilizes a web-based programming tool. The Quantum Commander is built into the QSPC1 processor card and upon boot up, users can login to the Quantum Commander Web Server via their web browser.
2. The Quantum Commander shall be broken into three access levels depending on user access credentials. Systems that do not provide at least three (3) levels of access are not equal.

3. Only the Administrator and Technician shall have access to add/delete/modify the database objects.
 4. Users shall have display only access to see the data objects that include configuration, alarms, and performance data and perform certain operations based on the user's CoS (Class of Service).
- D. Administrative Display Phone:
1. Administrative Display Phones shall be Bogen Model MCDS4. The administrative telephone display panel shows the time of day and day of week, the current time signaling schedule, and the station numbers and call-in priority of staff stations that have called that particular administrative station. A 3-key response is used to scroll the display, and answer or erase normal, urgent, and security calls. Depending upon the system access level, an administrative station can use display menus to activate zone pages, alarm signals and external functions, as well as select program sources and distribute or cancel a program to any or all speakers or zones.
 2. Administrative stations shall have the ability to dial and have the option of dialing either the loudspeaker or phone at each station location. The system shall automatically switch from phone-to-intercom communication to phone-to-phone communication when the staff handset or enhanced staff phone on the receiving end of the call is lifted.
 3. The Administrative Display Phone shall display the classroom number of any station that calls 911. This feature will notify the main office when a classroom has dialed 911 emergency centers so that administrators can direct emergency personnel to the correct physical location in the building when they arrive. Systems that do not provide this feature will not be deemed equal.
- E. Administrative Wall Display:
1. Administrative wall display shall be a Bogen Model MCWD. The wall display shows the time of day, current time signaling schedule that is running, and the station numbers and call-in priority of call switches, and emergencies from Administrative VoIP Phone and Administrative Phones.
 2. The Administrative Wall Display shall display the classroom number of any station that calls 911. This feature will notify the main office when a classroom has dialed the 911 emergency centers so that administrators can direct emergency personnel to the correct physical location in the building when they arrive. Systems that do not provide this feature will not be deemed equal.
- F. Administrative Phone:
1. Classroom phones shall be one of the following Bogen Model(s)
 - a. MCDS4 – Administrative Display Phone
 - b. MCIPP – Administrative VoIP Phone (Desk or Wall)
 2. The Station goes Off-Hook and dials the 3- to 6-digit (preceded by an * if calling a telephone instead of loudspeaker) number of the desired station. The call is routed to any station (admin/staff).The classroom phone shall be capable of the following features:
 - a. Emergency Call involves going off hook and flash hook the switch at least four times. The Call is then switched to the assigned Admin Phone. This requires the display of the architectural number on the Administrative Display phone and or Wall Display. Systems that do not provide this feature are not equivalent.

- b. Alarm Distribution
 - c. Audio Program On/Off
 - d. Call Forward activation for All-Calls/Busy/No Answer/Busy or No Answer
 - e. Cancel Call Forward
 - f. Conference Calling
 - g. Transfer Call
 - h. Dial administrative phone, dial the station number to call to the speaker or dial the station number preceded with * to call the phone. The call shall be routed to the administrative display phone and/or administrative wall display showing the architectural number that is calling.
 - i. Emergency All-Call shall be broadcasted to all the stations in the facility.
 - j. Place Outside Call
 - k. Remote Answer
 - l. Single-Zone/All-Station Page
 - m. Call Waiting Tone for Outside Calls, and it shall be possible to feed the call waiting tone to the Administrative Phone during a conversation.
- G. Classroom Call Staff Stations (as indicated on the drawings):
- 1. Staff Stations shall be Bogen Model: SC-1 – Call Switch
 - 2. Shall be capable of Normal/Urgent/Emergency Calls
 - 3. Normal/Urgent Call involves pressing the Call Switch once or lifting the Telephone Handset. The Call is then switched to the Admin Phone. This requires the display of the architectural number on the Admin phone and/or Wall Display.
 - 4. Emergency Call involves pressing the emergency call switch; flash hook the switch at least 4 times in a non-dial analog handset with Call Level Normal or Urgent; pressing the call switch or hook switch one time in a non-dial analog handset with Call Level Emergency only. The Call is then switched to the Admin Phone. This requires the display of the architectural number on the Admin phone and/or Wall Display.
 - 5. Emergency Link Transfer - If the emergency call is unanswered by the Administrative Display Phone and the emergency link transfer is provisioned and programmed; the emergency call will be forwarded to the loudspeaker associated with that station. Any station/admin phone with speaker can be programmed for the Emergency Link Transfer. Systems that do not provide Emergency Link Transfer will not be considered equal.
- H. Secondary Clocks:
- 1. Analog Synchronous Clocks with minute and second hands.
 - a. The secondary clock shall be a Bogen BCAM series clock with automatic-selectable correction protocols. It shall be designed to be used in either a 2-wire or 3-wire system. Upon receipt of the digital signal, the clock shall immediately self-correct. The secondary clock shall also accept sync-wire communication protocols with hourly and daily correction. The secondary clock shall have a microprocessor-based movement and shall be capable of being used as a stand-alone clock. The clock shall have a low-profile/semi-flush smooth surface metal case. The crystal shall be shatterproof polycarbonate with no visible molding marks. Glass is unacceptable. The clock shall have black hour and minute hands and a red second hand. The clock shall have U.L., cUL. and F.C.C. compliance's.

- I. Intercom/Paging System Speakers:
 1. Interior Speakers shall be Bogen:
 - a. Flush Wall/Ceiling Speakers: S86T725PG8U/RE84
 - b. Ceiling Speakers: CSD2X2 Drop-In Ceiling Speakers
 - c. Surface Wall Speakers: MB8TSQ/SL Metal Box Speakers
 - d. Surface Wall Speakers:WBS8T725 Wood Baffle Speakers
 2. Combination Clock/Speakers shall be:
 - a. Flush Clock/Speaker Combination: Lowell SCB-300/PC312 Enclosure with a Lowell 805T725 Speaker and a Bogen BCAM-1BS-12R-1 Secondary Clock
 - b. Surface Clock/Speaker Combination: Lowell SCB700/PC712 Enclosure with a Bogen S86T725 Speaker and a Bogen BCAM-1BS-12R-1 Secondary Clock
 3. Outdoor / Gym / Multi-Purpose Room Speakers shall be Bogen:
 - a. FMH15T mounted in BBFM6 flush-mounted vandal-resistant enclosure/BBFM6 flush-mounted vandal-resistant enclosure with FMHAR8 adapter ring and SGHD8 heavy duty grille

- J. Quantum Commander:
 1. The processor utilizes a web-based programming tool. The Quantum Commander is built into the QSPC1 processor card, and upon boot up, user can login to the Quantum Commander Web Server.
 2. The Quantum Commander shall be broken into three access levels depending on user access credentials. Systems that do not provide at least three (3) Levels of access are not equivalent. The three levels are:
 - a. User
 - b. Administrator
 - c. Technician
 3. Only the Administrator and Technician shall have access to add/delete/modify the database objects.
 4. Users shall have display only access to see the data objects that include configuration, alarms, and performance data and perform certain operations based on the user's CoS (Class of Service).
 5. The following Menu Items must be available on the Multicom IP Quantum Commander:
 - a. File - Open Database, New System, Save, Delete, Report and Exit, Upload Database, Download Database, Download Software, Diagnostics, Tones and Announcements, Relay Configuration, Program Distribution, Media Assignment, List Passwords, Add Password, and Change Password.
 - b. There shall be an audible ring signal announcing that a call has been placed to that station.
 - c. Upon picking up the receiver and dialing * (star), a telephone symbol shall appear on the display, prompting the user to enter the number of the station to be called. There shall be no confusion as to the type of conversation that is to be established.
 - d. There shall be an automatic disconnect of Staff Handsets left off-hook to prevent them from tying up communications channels. The station shall receive a busy signal and shall automatically disconnect after 45 seconds. Systems shall also be capable of doing off hook emergency call-in.
 - e. There shall be an automatic disconnect of Administrative Display Phones, Administrative VoIP Phones, and Administrative Phones to prevent them

- from tying up communications channels. When a phone goes off-hook and does not initiate a call within ten seconds, the station shall receive a busy signal and shall automatically disconnect after 45 more seconds.
- f. Staff and Administrative Phone Stations may be programmed to ring an Administrative Display Phone during day hours and another Administrative Phone during night hours. Day and Night Hours shall be user-programmable. Assignment of Staff Stations shall not be restricted to any particular Administrative Station. Systems that limit the number and assignment of staff call-in to particular Administrative Station of Administrative Stations shall not be acceptable.
6. Each staff call station shall be programmable for one of three call-in types, as follows:
 - Normal / Emergency
 - Urgent / Emergency
 - Emergency
 - a. Staff Call Stations programmed for access Normal / Emergency or Urgent / Emergency shall be able to initiate an emergency call by repeated flashing of the hook switch or repeated pressing of the call-in switch. Systems, which require additional switches and/or conductors to initiate an emergency call, shall not be acceptable.
 - b. Emergency Calls from Administrative VoIP Phones, Administrative Phones or Staff Call Switch Stations shall interrupt a non-emergency call in progress at the designated Administrative Display Phone. The administrator shall receive a warning tone and be connected to the emergency caller. The disconnected party shall receive a busy signal. Systems which do not provide emergency call interrupt shall not be acceptable.
 - c. It shall be possible to connect a single push emergency call-in switch to any Administrative VoIP Phone or Administrative Phone, without effecting normal station operation.
 - d. Normal and Urgent calls shall be logged into queue for the designated administrative display phones.
 - e. Administrative Display Phones shall ring for a period of 45 seconds when they receive a call, and then stop ringing.
 - f. Each queue shall first be sorted according to call priority (emergency calls, then urgent calls, and then normal calls). Calls are sorted within each priority level on a first-in, first-out basis. When a call is answered, it shall automatically be removed from the queue. Systems, which do not sort calls according to priority and order received, shall not be acceptable. 1) The display shall simultaneously show up to four (4) Staff Call Switch Station Calls pending. Additional calls, beyond four (4), shall be indicated by an arrow pointing down thus prompting the user that additional calls are waiting.
 - g. It shall be possible to answer any incoming call simply by picking up the handset while it is ringing. It shall not be necessary to hit any buttons to answer a call unless the call has dropped into the queue.
 7. Administrative VoIP Phones or Administrative Phones shall receive dial tone upon going off-hook. Outgoing calls are made by dialing the desired station. Incoming calls can be directed to the telephone or to the associated loudspeaker for a hands-free reply. There shall be an automatic switchover from loudspeaker to private telephone communication should the person pick up the handset.

- a. Administrative VoIP Phones or Administrative Phones shall be able to make a normal call to any Administrative Display Phone by dialing the number. They shall also be able to initiate an Emergency Call by flashing the hook switch. Emergency Calls shall ring the Designated Day/Night Administrative Display Phone and then their speaker will be connected to the emergency station if not answered within a predetermined time period. The system shall provide for selected administrators to have a PIN Numbers. By dialing the PIN at any system telephone, the administrator shall have access to emergency paging regardless of the restrictions on the particular phone being used.
8. Student Phone:
 - a. Student Phone shall be supported. The Student Phone can only make 10-digit (7 digit or less than or equal to 10 digit), 0 local and 911 calls. The call duration shall be set to 5 minutes. The dial tone shall be fed momentarily at 00:04:30, 00:04:40, 00:04:50, then at five minutes, calls are disconnected. The student phone can not receive any incoming calls.
 - b. The Station is not allowed to dial the same number within 30 minutes and a busy signal shall be fed to the Station if the number is dialed.
9. Administrative Display Phones shall be equipped with a 4x16 character alphanumeric display panel.
 - a. Administrative Display Phones shall receive dial tone upon going off-hook. Outgoing calls are made by dialing the desired stations. Incoming calls can be directed to the telephone or to the associated loudspeaker for a hands-free reply. There shall be an automatic switchover from loudspeaker to private telephone communication should the person pick up his handset.
 - b. The display shall normally show the time of day and day of week, the current time signaling schedule, and the numbers of up to four stations calling in along with the call-in status of each station (normal, urgent, emergency). When dialing from the Administrative Display Phone, the display shall indicate the station number and type of station (loudspeaker or handset) being dialed.
 - c. The display shall also provide user-friendly menu selections to assist the operator when paging and distributing program material. Displays shall be in English with internationally recognized symbols for maximum ease of use. Systems, which require the operator to memorize long lists of operating symbols or control codes, shall not be acceptable.
 - d. Administrative Display Phones shall be programmable for one of 3 station types for system access, as follows:
 - 1) Shall permit dialing any station in the system; turn program material on/off at their location; scroll, erase and auto-dial call-waiting queue; make conference calls and transfer calls; call forward to other administrative stations; make all-zone pages and emergency all-zone pages; have access to outside lines and be designated to receive outside line calls.
 - 2) Select and distribute or cancel program material to any combination of stations, paging zones, or all zones; set/reset alarm/external functions and zone paging.
 - 3) Bump or join a conversation in progress, manually initiate time tones.
 - e. Program selection, and its distribution or cancellation shall be accomplished from a designated administrative display telephone, with the assistance of the menu display system. Distribution and cancellation shall

- be to any one, or combination of speakers, or any zone(s), or all zones. It shall be possible to provide three program channels at the same time.
- f. It shall be possible, via an Administrative Display telephone, to manually initiate any of eight (8) tones or any of the emergency tones. The tones shall be separate and distinctly different from the emergency tones. The tone selected shall continue to sound until it is canceled, or until the administrative display phone is placed back on-hook.
 - g. Each Administrative Phone shall maintain a unique queue of all stations calling that particular phone.
10. System programming shall be from an authorized Quantum Commander User via Web browser. All system programming data shall be stored in nonvolatile memory. A valid password shall be required to gain access to the following programmable functions:
- a. Station Initialization shall be accomplished from an authorized Quantum Commander User via web browser. All station initialization data shall be stored in nonvolatile memory. A password (separate from the password necessary for system programming) shall be required to gain access to the following station initialization parameters:
 - 1) Programming and diagnostics shall be built into the Quantum Commander web server browser and be accessible only by authorized personnel. Diagnostics shall indicate passes and failures of system memory, system clock, all audio busses, tone generators, DTMF generators and decoders and the integrity of the field wiring.
 - 2) The diagnostics feature shall be the Quantum Commander. It shall be possible to individually select the test and card, or all to run diagnostics on. This shall be a standard feature of the system and supplied at the time of installation. It shall be accessible only by authorized stations and personnel.
 - 3) Systems not capable of supporting web-based diagnostics, and any computer interface for programming and diagnostics, nor supportive of built-in diagnostics for the end user shall not be deemed as equal.
11. Rollover EOL (End-Of-Line Device):
- a. This feature shall be supported for all the Stations (Staff/Enhanced/Admin/SIP) configured with a loudspeaker. Based on the dialed sequence, (*xxx, xxx) the call will be connected to the corresponding station/speaker. If the speaker/station is busy, the call is rolled over to the station/speaker corresponding to that station.
 - b. If a handset station, configured with this feature, is busy when an Admin User calls the station, the call shall be rolled over to the associated speaker. If the speaker is also busy in this case, then the Admin call can bump the conversation.
 - c. Rollover End-of-Line features not applicable with the Station with Call Switch or Station without the speaker.
 - d. For calls initiated by a call switch or a non-dial handset, rollover to the admin speaker shall not happen.
12. Admin AAA Group (Always An Answer):
- a. This is an Administrative Phone feature. This feature shall be programmed from the Bogen Commander. A maximum of 10 Admin Phones will be supported in an Admin Group and there shall be a maximum of 32 Admin Groups per facility.

- b. Once the Admin Group is set:
 - 1) For normal calls, if the primary Day/Night Admin Phone is busy/no answer, all the phones in the Admin Group shall ring.
 - 2) For emergency calls, if the primary day/night phone does not answer, all the phones in the Admin Group shall ring.
 - 3) On no answer from any of the admin phones and if the emergency announce link is configured, the call shall be transferred to the emergency announce link as per the existing procedures.
 - 4) On answer from any of the Admin Phones, all the other phones shall stop ringing.

3.04 EQUIPMENT

- A. To fulfill the requirements, the following control equipment shall be provided:
 - 1. Bogen TCPER 60" communications rack.
 - 2. Bogen QSPC1-IP processor card.
 - 3. Bogen MC512 power supply.
 - 4. Bogen MC2626 power supply.
 - 5. Bogen MCAPI audio program interface.
 - 6. Bogen rack mounting mainframe.
 - 7. Bogen MCAC analog cards.
 - 8. Bogen MCSC station card.
 - 9. Bogen MCRRP relay cards.
 - 10. Bogen CDR-1 AM/FM CD Player
 - 11. Bogen DCM-290P Five Disk changer
 - 12. Bogen HTA250 amplifier.
 - 13. MCTC telephone access card with full interface to the school telephone system.
 - 14. TRIPPLITE BC1400 UPS unit.
 - 15. Middle Atlantic CBS-ERK-20 Base with Casters
 - 16. Bogen ACFDS AC Line Filter
 - 17. Bogen SAX-1R Aux Mic Module
 - 18. Bogen MCTC Telephone Interface Card
 - 19. Bogen MCOE Telephone Line Card
 - 20. Bogen MCOCA Telephone Ribbon Cable
 - 21. Bogen WMT-1A 600 Ohm Transformer
 - 22. SSI 25' Power Cord Extension
 - 23. 25 Pair 22 Gauge Umbilical Cord properly laced and terminated to Bogen SK-2522 and 66M Connection Panels
- B. Accessory Equipment: As Required (See Section 3.04 Above)

3.05 TERMINAL BLOCKS

- A. All conductors in all-terminal cabinets, equipment rack, etc., shall be terminated on Siemens 66M1-50 punch blocks or approved equal.

3.06 WIRING CABLES

- A. Each Speaker/Call Switch to console: West Penn 357
- B. Outdoor speakers: West Penn #291

- C. Clock Cable: West Penn 236 or THWN in conduit
- D. Speaker Multi Conductor Cables: General Cable 25 pair 22 gauge direct burial PE-22 overall shield cable. Quantity per wing as required
 - 1. All cables and wires shall be Copper and shall be installed in raceways per C.E.C. Code. All conductors and wires shall be new when delivered to the job site in unbroken packages, with the manufacturer's name and voltage class that shall be plainly indicated on cables and wires.
 - 2. All cables and wires shall be National, General Electric, General Cable, West Penn or approved equal. All conductors installed in underground conduit shall be type "THWN" or UL listed for wet location or direct burial.
- E. Call-in Multi Conductor Cables: General Cable 25 pair 22 gauge direct burial PE-22 overall shield cable. Quantity per wing as required
 - 1. All cables and wires shall be Copper and shall be installed in raceways per C.E.C. Code. All conductors and wires shall be new when delivered to the job site in unbroken packages, with the manufacturer's name and voltage class that shall be plainly indicated on cables and wires.
 - 2. All cables and wires shall be National, General Electric, General Cable, West Penn or approved equal. All conductors installed in underground conduit shall be type "THWN" or UL listed for wet location or direct burial.
- F. Contractor has option to provide current cabling standards.

PART 4 – EXECUTION

4.01 DIVISION OF WORK

- A. While all work included under this specification is the complete responsibility of the contractor, the division of actual work listed following shall occur.
- B. The conduit, outlets, terminal cabinets, etc., which form part of the rough-in work shall be furnished and installed completely by the electrical contractor. The manufacturer's authorized representative shall perform the balance of the system, including installation of speakers and equipment, making all connections, etc. The entire responsibility of the system, its operation, function, testing and complete maintenance for one (1) year after final acceptance of the project by the owner, shall also be the responsibility of the manufacturer's authorized representative.

4.02 INSTALLATION

- A. Plug disconnect: All major equipment components shall be fully pluggable by means of multi-pin receptacles and matching plugs to provide for ease of maintenance and service.
- B. Protection of cables: Cables within terminal cabinets, equipment racks, etc., shall be grouped and bundled (harnessed) as to type and laced with No. 12 cord waxed linen lacing twine or T & B "Ty-Rap" cable. Edge protection material ("cat-track") shall be installed on edges of holes, lips of ducts or any other point where cables or harnesses cross metallic edge.

- C. Cable identification: Cable conductors shall be color-coded and individual cables shall be individually identified. Each cable identification shall be a unique number, located approximately 1-1/2" from cable connection at both ends of cable. Numbers shall be approximately 1/4" in height. These unique numbers shall appear on the As-Built Drawings.
- D. Shielding: Cable shielding shall be connected to common ground at point of lowest audio level and shall be free from ground at any other point. Cable shields shall be terminated in same manner as conductors.
- E. Provide complete "in service" instructions of system operation to school personnel. Assist in programming of telephone system.

PART 5 – EXECUTION

5.01 GROUNDING

- A. The Contractor shall provide all necessary grounding for the entire system in accordance with and required by the National Electric Code, and the State of California "Safety Orders".

5.02 TEST AND ADJUSTING

- A. The Contractor shall furnish all required test instruments and equipment. Each piece of equipment and the entire systems shall be adjusted and readjusted to insure proper function of all equipment, elimination of noise, and vibration and left improper operating condition.

5.03 ACCEPTANCE

- A. Before the work shall be accepted, the Electrical Contractor shall demonstrate to the District and the Engineer that the entire installation is complete and in proper operating condition and the Contract has been properly and fully executed.
- B. Upon acceptance of the work, the Contractor shall deliver to the District a written guarantee to the effect that all parts of the work, including all individual items of equipment and materials and the systems as a whole, shall be free from defects for a period of one year. Upon proper notice, the Contractor shall make good, at their expense any defect that develops or becomes apparent during this period.

END OF SECTION