# SECTION 16724 (27 53 13)

## MASTER CLOCK SYSTEM

1. GENERAL
	1. SECTION INCLUDES
		1. Intercom equipment.
		2. Intercom cable.
		3. Accessories
		4. Surge Protection.
		5. All items for complete Intercom/Master Clock system.
	2. RELATED SECTIONS
		1. Section 16050 (25 0500) – Basic Materials and Methods
		2. Section 16060 (26 0526) – Grounding
		3. Section 16080 (26 4400-1.4A) – Electrical Inspection and Testing
		4. Section 16120(26 0520) – Wire & Cables
		5. Section 16130(26 0533 – Raceways and Boxes
		6. Section 16132(26 0533.13) – Conduit, Fittings and Supports
		7. Section 16134(26 2716) – Auxiliary Terminal Panels
		8. Section 16137(26 0523) – Pull and Junction Boxes
		9. Section 16415(26 4300) – Surge Protection
		10. Section 16801 (27 4115)– Cafeteria Sound System (Elementary)
		11. Section 16802(27 4120) – Auditorium Sound System
		12. Section 16803(27 4114) – Gymnasium Sound System
		13. Section 16804 (27 4115)– Multipurpose/ Cafeteria Sound System
		14. Section 16820(27 4116) - Sound-Field Classroom Voice Amplification
	3. REFERENCES

The Latest adopted edition of the following codes or standards shall apply to the design and fabrication of the products and equipment to be supplied by this Section.

* + 1. Americans with Disabilities Act – ADA
		2. FBC -Florida Building Code
		3. FCC, Part 68 - Federal Communications Commission
		4. NFPA-70, - National Electrical Code – NEC
		5. NFPA-72, - National Fire Alarm and Signaling Code
		6. SREF - State Requirements for Educational Facilities
		7. UL - Underwriters Laboratory or other OSHA approved Nationally Recognized Testing Laboratory (NRTL)
	1. SUMMARY
		1. Provide a complete stand-alone microprocessor-controlled intercom and clock/bell system as shown on the drawings and as specified herein to provide a complete sound and voice communication system in the building.
		2. Provide all material and equipment necessary for the proper operation of the system even though not specifically mentioned in the contract documents are deemed part of this contract.
		3. Install and connect all equipment under strict provisions of the manufacturer's recommended instructions.
		4. The system and remote equipment shall be powered by a dedicated 20A 120volt AC circuit. If the site has an emergency generator, the circuit shall be fed from an emergency generator power panel. Ensure that a surge protective (SPD) device is protecting the panel. If a SPD is not present, provide a surge protective device for the intercom circuit.
		5. The Contractor:
			1. Install equipment on the AC voltage supply taking care to arrest damaging electrical transient and spikes, which can cause damage to the microprocessor components of the system.
			2. Protect all incoming intercom lines by the use of surge protectors installed as per manufacturer instructions.
			3. Supply, install, adjust, test and guarantee the specified equipment by a factory authorized communications contractor for the products furnished.
			4. The vendor is responsible for verifying the completeness of the parts list and the suitability if the equipment to meet the intended purpose of the specifications and drawings.
		6. The communication bidder supplying the equipment:
			1. Show satisfactory evidence, upon request, that they maintain a fully equipped service organization capable of furnishing adequate inspection and service to the system, including replacement parts.
			2. Produce evidence that they have a fully experienced and established service organization for at least five (5) years and proven satisfactory installations during that time.
	2. TRAINING
		1. Furnish a minimum of 8 hours or as needed to provide adequate in-service training with this system. These sessions will be broken into segments to facilitate the training of individuals in administrative devices, user programming functions and scheduling software, and program distribution equipment. Operating manuals and user’s guides shall be provided at training sessions.
		2. Training for software updates to the program (via serial port or Ethernet) by and “allowed” programming instrument, shall be given to personnel designated by SBBC in making these updates to the restriction tables.
		3. The user shall access to telephone support from the manufacturer at no additional cost for the life of the product.
		4. Provide minimum of eight hours Factory Training to the School District Physical Plant Operations Electronics Department.
			1. Training Contents:
				1. Microprocessor Based Control Panels – Overview/ Construction/ Assembly.
				2. Microprocessor Based Control Panels – Programming/ Troubleshooting.
				3. Provide training manuals.
				4. Upon completion and at no cost to SBBC, SBBC personnel to be fully trained for service, programming, maintenance, and operation.
	3. SUBMITTALS
		1. Submit Shop drawings and product data under provisions of Section 01330 (01 3300), “Submittal Procedure. Contractor shall submit record of all digital submissions using the latest SBBC adopted Digital Management System (E-builder).
		2. Shop drawings shall include, but not limited to the following:
			1. Include the manufacturer’s cut sheets and data sheets for all components.
			2. Wiring diagram prepared for the project indicating components and external wiring and connections.
		3. Quality Control Submittals:
			1. Final test and system certification to Architect/ Engineer for distribution.
			2. Provide certification from system manufacturer stating the installer has attended the manufacturer’s installation and service school. A certificate of this training shall be provided with the intercom equipment contractor’s submittal.
			3. Submit Required Shop Drawings and/or Product Approvals/NOA's shall be submitted to the BCPS Building Department for review/approval after consultant has reviewed and approved. (SD-17) https://www.browardschools.com/Page/35944
		4. Closeout Submittals:
			1. Submit under provisions of Section 01 780 (01 7800) “Contract Closeout”.
			2. Operating and maintenance manuals complete with replacement parts data for all systems.
			3. System description and operation
			4. Operating instructions permanently affixed to all administrative control stations (ACS).
			5. As-built drawings: They shall include up-to-date drawings that include any changes made to the system during installation. Include circuit diagrams and other information necessary for the proper operation and maintenance of the system.
			6. System programming on digital format to the SBBC Project Manager for distribution to SBBC Maintenance personnel.
		5. Spare Parts:
			1. Provide the following spare parts per site:
				1. One Switching card.
				2. One power supply assembly unit.
				3. One surge suppression.
		6. Warranty documents
		7. Maintenance Materials.
		8. Maintenance Service Contract.
		9. Demonstration Training and testing Log.
	4. QUALITY ASSURANCE
		1. Intercom system, equipment, and components shall be listed and labeled by Underwriters’ Laboratory, Inc. (UL) or other OSHA approved Nationally Recognized Testing Laboratory (NRTL)
		2. The intercom system shall be a standard product produced by a manufacturer of known reputation and experience in the industry.
		3. The intercom equipment contractor shall provide a letter from the manufacturer certifying the relationship with the manufacturer before bidding.
		4. The installer shall be an authorized distributor for the equipment being provided with full manufacturer’s warranty privileges.
		5. The intercom equipment contractor shall maintain at a local facility the necessary spare parts in the proper proportion as recommended by the equipment manufacturer to maintain and service the equipment being supplied. This facility shall be available for inspection by the SBBC at any time.
		6. Cable connections:
			1. Wiring termination to all equipment shall be performed by a manufacturer certified trained technician.
			2. Same factory trained technician shall perform system test and provide certification for same and verify the final Record Drawing.
		7. The system may have components approved for direct interconnection to the utility services under Part 68 of FCC rules and regulations.
	5. WARRANTY
		1. Provide a minimum of 5-year warranty (non-prorated) of the installed system against defects in material and construction including labor. Warranty period shall begin on date of Substantial Completion.
		2. Provide SBBC with any warranty that supersedes 5 years, including recalled materials and warranty extensions.
		3. Provide a 4-hour response time for routine service and trouble conditions and a 48-hour turnaround for repairs or parts replacement.
1. PRODUCTS
	1. SYSTEM GENERAL REQUIREMENTS
		1. Furnish and install all equipment, accessories, and materials in accordance with these specifications and drawings to provide a complete and operating school communications system including, but not limited to:
			1. Main equipment control console including intercom, digital AM/FM Tuner with compact disc (CD) player, RCA inputs and an input for a 1/8-inch stereo mini jack, Bluetooth requirements, USB port(s), antenna, microphone input, preamp mixer, and monitor speaker.
			2. Program tones
			3. Classroom clock/speaker units, speakers, and dual call buttons.
			4. Secondary clocks
			5. Uninterruptible power supply (UPS)
			6. Telephone interface to VoIP (SIP) and Legacy PBX and hybrid telephone systems
			7. Metal terminal cabinet enclosures for wiring to main equipment rack
			8. Terminal blocks
			9. Wire, raceway and pull box systems including conduits and outlet boxes.
			10. Speaker/clock back-boxes
			11. Administrative Control Station with pushbutton dialing and custom programmed soft keys and LCD display for the administration of the system. Administrative Control Station shall be located as follows:
				1. One (1) in the Principal’s office
				2. One (1) in the Administration secretarial area
				3. One (1) in the Media Center at the circulation desk – at school’s discretion
				4. One (1) in the Single Point of Entry area
				5. One (1) if used as EHPA at “Manager’s Office/EHPA Manager’s office”.
		2. The system can connect to the Public Switched Telephone Network (PSTN) via analog CO trunks or SIP trunks.
		3. The intercom system must support the existing 25V speakers and wires. Systems shall not be deemed acceptable if they do not allow the reuse of existing equipment or are not backwards compatible.
		4. The system shall contain natively RS232, RS485, USB, and Ethernet ports for communication to any third-party system. Systems that do not contain all the above communication ports or require additional equipment shall not be considered.
		5. The Campus Intercom System and Controller at each site shall operate independently of other systems and not relay on any LAN/WAN connections. LAN/WAN connections shall be only necessary for software update, programming, system checks, etc.
		6. Network Time Synchronization. The system shall be capable of periodic update/synchronization of the processor’s time with a Network Time Server running NTP via the school’s LAN network. Systems that do not provide Network Time Synchronization will not be deemed equivalent.
	2. SYSTEM FEATURES AND FUNCTIONS
		1. The Intercom communication system shall provide a comprehensive communication network between administrative areas and Classroom locations throughout the facility. Non-volatile removable memory shall store the programming and operating system. A system that uses a battery to maintain system configuration information or does not have removeable memory shall not be acceptable.
		2. Telephonic communication (complete with Dual-Tone Multi-Frequency signaling, dial tone, ringing and busy signals, and data display).
		3. The system shall be capable of using two wire conductors for a speaker and call button referred from herein as a 2-wire circuit. It shall be possible to mix 2-wire and standard 4-wire circuits on the same switching/line card with the use of a two-wire adapter. Systems that cannot mix 2-wire and 4-wire circuits on the same switching/line card shall not be considered.
		4. The system shall be capable for expansion to accommodate 200 call-in or speaker locations for elementary schools and 500 call-in or speaker locations for K-8 centers, middle and high schools. 300 call-in or speaker locations for other facilities.
		5. The system shall provide 911 Dial-Through. The 911 Dial-Through is available to any port that can dial.
		6. There shall be an automatic level control for return speech during amplified-voice communications.
		7. Each room loudspeaker shall be assignable to anyone, any combination, or all of 64 multi-purpose zones per facility. Systems with less than 64 multi-purpose zones shall not be acceptable.
		8. There shall be a zone-page/all-page feature that is accessible by Phones and Administrative Phones.
2. There shall be automatic muting of the loudspeaker in the area where a page is originating.
3. There shall be a pre-announce tone signal at any loudspeaker selected for voice paging.
	* 1. There shall be a voice-intercom feature that is accessible by Phones and all Administrative Control Station.
4. There shall be a privacy tone every 15 seconds to signal that any loudspeaker selected for amplified-voice intercom is in progress.
5. There shall be a pre-announce tone signal at any loudspeaker selected for voice-intercom communication.
6. Privacy and pre-announce tone signals shall be capable of being disabled during system initialization.
	* 1. Direct dialing, 2-way intercom between locations equipped with administrative display phone and staff/classroom station speakers, without the use of press-to-talk or talk-listen switch.
		2. Minimum of two separate intercom channels to allow simultaneous communication between any two administrative display telephones and any two locations.
		3. Provisions for user-programmable “executive override,” allowing assigned administrative display phone to be programmed to “break-in” on ongoing conversations in the system.
		4. Provisions for zone-page and all-page restriction. This assignment shall be user-programmed by designated administrative telephone.
		5. Capability for assigning speaker locations within any one or more of 64 zones for zone paging or time signal reception. This assignment will be user-programmed by a designated administrative telephone.
		6. Provision for calls originating from any staff/classroom station location shall be user programmed by designated administrative display telephone for assignment to any location having displays. Systems unable to direct station calls are not allowed. Classroom stations shall be provided with dual call-in switches.
		7. Provide provisions to cancel all staff/classroom station-originated calls from any authorized administrative telephone.
		8. Intercom System shall actively override existing sound systems throughout the campus (i.e., classroom sound systems, auditorium, and cafeteria sound systems). The override shall be activated during an “All Page” of the Intercom System. When a Sound System Override Interface, Relay, Module, or Line Level Audio Switch is to be installed, provide a device to sense contact closure for Fire Alarm activation of the muting/override device. The intercom must not override the Fire Alarm system.
		9. Schools equipped with Fire Alarm voice evacuation, the Fire Alarm will mute the Intercom System during a FA.
		10. The Intercom system shall be integrated with the Fire Alarm system to completely mute/disabled the bells/tones during an active fire event. However after the FA event is cleared the bells/tone relay returns to normal, allowing for the bells/tones to be used as the recall function.
	1. CENTRAL CABINET
		1. Intercom system central cabinet Wall/Rack mountable in a custom enclosure. The VoIP telephone module shall integrate with the intercom central cabinet.
		2. The processor software shall be upgradeable via Intercom system Settings. After rebooting the central, the software upgrade is complete. If for some reason the newly installed software does not boot properly, the system shall allow for a manual revert to the previous working software load.
		3. The system shall facilitate the playing of pre-recorded audio files repetitively until stopped by the intercom system Assistant User, an Administrative Display Phone, or a dry contact closure.
	2. SETTING AND CALENDAR
		1. The Intercom system shall use a PC-based programming tool. Systems that do not use Ethernet communications for programing are not deemed equal. Systems that do not separate scheduling functions into a separate tool shall not be deemed equal.
		2. Only Facilities Technicians shall have access to Settings.
		3. Users shall have access to Calendar with all the scheduling functions.
	3. ADMINISTRATIVE CONTROL STATION
		1. The Administrative Control Station LCD screen shows the time of day and date, and the Port numbers and call-in priority of Classroom stations that have called that room.. Administrative phones can use display menus to activate zone pages, and external functions; select program sources; and distribute or cancel a program to any or all speakers or zones.
		2. Administrative Control Station shall be able to dial and have the option of dialing either the loudspeaker or phone at each room location. The system shall automatically switch from phone-to- intercom communication to phone-to-phone communication when the phone on the receiving end of the call is lifted.
7. Administrative Control Station shall receive dial tone upon going off-hook. Outgoing calls are made by dialing the desired port number. Incoming calls can be directed to the telephone via call groups.
8. The display shall normally show the time of day and day of week, the current time, and the numbers of up to four stations calling in along with the call-in status of each station (normal or priority). When dialing from the Administrative Display Phone, the display shall indicate the room number being dialed.
9. The display shall also provide user-friendly menu selections to assist the operator when paging and distributing program material. Displays shall be in English or French. Systems that require the operator to memorize long lists of operating symbols or control codes shall not be acceptable.
10. Program selection and its distribution or cancellation shall be accomplished from a designated Administrative Display Phone with the assistance of the menu display system. Distribution and cancellation shall be to any one or combination of speakers, any zone(s), or all zones. It shall be possible to provide two program channels at the same time.
11. It shall be possible, via an Administrative Display Phone, to manually initiate any of 100 tones. The tones shall be separate and distinctly different.
12. Each Administrative Control Station shall maintain a unique queue of all stations calling that phone.
	* 1. Administrative Control Station shall have the ability to manually override the active schedule in the facility.
	1. SYSTEM MASTER CLOCK
		1. Micro-processor base programmable by the user through electronic means:
			1. Provide a step-by-step guide to enable the user to accomplish the programming easily and correctly.
			2. Provide a web-based interface to program the master clock from a PC.
			3. Provide ability to program at the physical clock via keypad and built in display.
		2. The Master Control Clock shall provide:
			1. Digital Display
			2. Pushbuttons for local programming
			3. Synchronize to the district NTP (Network Time Protocol) time server or US Naval Observatory (USNO) time, a minimum of once every 24 hours, using a GPS receiver or network time.
			4. Interface with secondary clocks, either analog or digital with provision for hourly and 12-hour corrections.
			5. Ability to program for required secondary clock correction.
			6. Selection of 12-hour or 24-hour display format.
			7. A battery back-up
			8. AC or DC output buffer.
		3. The power requirements for the programmable master clock shall be 120 volts AC, 60 Hz. It shall be available for standard rack or for wall mount. The clock shall incorporate all-solid-state circuitry.
		4. The master control clock shall be capable of driving both analog and digital secondary clock simultaneously through solid-state-relay type buffer modules.
		5. Secondary Clocks:
			1. Flush mounted
			2. Shall be 120V AC synchronous.
			3. Shall be regulated by the master control clock each hour for “minute” correction, and every 12 hours for “hour” correction.
			4. Secondary clocks shall be analog unless otherwise specified.
				1. Classroom clock: 10 inches diameter (Clocks must use the same correction scheme as existing clocks)
				2. Gymnasium clock and cafeteria clock: 12 inches diameter (Clocks must use the same correction scheme as existing clocks)
				3. Clock motion: Mechanical
				4. Display: Standard 12-hour dial face with black numerals
				5. Clock dial face shall be white and impervious to discoloration.
				6. The hour and minute hands shall be black.
				7. The clock case shall be metal or ABS with a black or silver finish. Clock shall be supplied with a sway-proof hinge for secure mounting.
	2. POWER AMPLIFIERS
		1. Design the power amplifiers for completely dependable continuous operation in paging and sound reinforcement use.
		2. Provide only professional/commercial grade audio power amplifier(s) designed for distributed paging/BGM (background music) systems.
		3. System amplifiers shall be Class D only.
		4. The Amplifier shall have a Power Switch with a LED to indicate status located on the front of the unit.
		5. The amplifier shall have internal circuits with manual or automatic reset to protect itself from output short circuits and thermal overloads and will protect the attached speakers from amplifier failure and DC voltages, LED indication for status shall be provided.
		6. When designing a system, leave a 20% margin below the maximum rated output power of the amplifier (do not exceed 80% of the maximum output power of the amplifier).
		7. Amplifiers shall not be installed in public areas. Amplifiers and intercom wiring shall be installed enclosed, and rack mounted.
		8. The amplifiers shall deliver an output as designed for the system at elementary, middle, and high schools at less than 2 percent harmonic distortion at full rated output.
		9. Input power protection shall be provided by an easily replaceable slow-blow fuse.
		10. The amplifier shall operate continuously from 120 VAC. The 120 VAC shall be supplied from a panel fed from the emergency generator if there is a power failure.
	3. UNINTERRUPTIBLE POWER SUPPLY
		1. Provide an install a rack mounted uninterruptible power supply for the clock/intercom with the capacity for operating the intercom system under normal idle load for 2 hours and then operating the system at full power to all speakers for 5 minutes.
		2. The UPS shall be properly sized according to the load of the intercom system.
		3. UPS shall maintain continuous battery power through the inverter at all times.
	4. TONE GENERATOR
		1. The installation shall include a tone generator or WAV file system for distributing class change and signaling tones to loudspeakers.
		2. The tone generator or WAV files shall be capable of producing at least seven (7) different and distinct tone signals. The tones shall be activated in the following ways:
			1. Tones shall be activated by dialing access codes from authorized administrative phones via the communications system central control.
			2. Tones shall be activated via signals from the master program clock.
	5. SPEAKERS
		1. Remote speakers to be 8 ohms, with a 25-volt transformer with a minimum of five (5) taps ranging from 0.5 watt to 5 watts.
			1. Room speakers: Mounted in clock/speaker combination baffles.
			2. Interior ceiling speakers
				1. Mounted in baffle and back-box and T-bar Support
				2. Adequately support speakers in acoustical ceilings with independent hanger wires
			3. Outdoor speakers: in weatherproof housing, UL rated for use. The outdoor speakers shall be able to be controlled with a separate channel.
			4. Install Classroom/room speakers in a common clock/speaker enclosure.
			5. Install corridor-ceiling speakers in a ceiling grille back box, SSB-3 mounting rails. Spacing of approximately 30’ centers and no less than one per corridor.
			6. Drop in ceiling speaker option for common areas and corridors, compatible and UL listed for use.
		2. Speakers shall be tapped according to room/area requirements.
		3. Do not place wall speakers back-to-back on a sharing wall:
			1. All wall speakers on a sharing wall shall have sound dampening material behind each speaker.
		4. Provide speaker controls (On/Off) at:
			1. CCTV Control room and CCTV Studio.
			2. Principal/Assistant Principal’s Office.
			3. Outdoor speakers.
			4. Other locations as may be called for on the Contract Documents.
		5. Provide a speaker (high-low) volume control switch at the following locations:
			1. At the Principal’s and at each Assistant Principal’s Office. Locate volume switch adjacent to the Staff’s technology center at 46” AFF.
			2. Closed Circuit Television (CCTV) Production Studio, CCTV Distribution Room, and CCTV Room. The intercom speakers in these areas shall be provided with a volume control (On/Off) switch properly labeled and located in an accessible area at 46” AFF.
			3. Administrative spaces shall have volume control to speakers.
	6. CALL-IN SWITCHES
		1. Shall be capable of Normal and Priorities Calls.
		2. Cover plates: Stainless Steel plates.
		3. Normal Call involves pressing the Call Switch once. The call is then switched to the Administrative Display Phone. This requires the display of the architectural number on the Administrative Display Phone.
		4. Priority Call involves pressing the call switch at 2 times. The call is then switched to the Administrative Display Phone. This requires the display of the architectural number on the Administrative Display Phone and the LCD color to change to red.
		5. Priority call escalation - If the priority call is unanswered by the Administrative Display Phone and the priority call escalation programmed, the Priority call will be forwarded to all the other administrative phones.
		6. Classroom call-in switches shall be Two Black-Button/Dual Operation and indicate 1 Normal and 1 Priority button.
	7. EQUIPMENT RACKS
		1. Mount control components of the communications system, the program distribution system, the tone generation system, and the master program clock system in free standing upright metal equipment rack(s) designed to mount standard 19-inch components.
		2. Properly size the racks to accommodate necessary equipment panels with 20 percent spare blank panel space.
		3. Controls shall be handicapped accessible according to Americans with Disabilities Act (ADA).
		4. Construct the rack of at least 16 gage steel, heavily reinforced for maximum strength and durability equipped with casters.
		5. Provide a hinged and key-locking rear door providing authorized personnel with easy access to the equipment.
		6. The rack shall be finished in ebony black baked enamel and shall be listed by Underwriters laboratories (UL) or other NRTL.
		7. Included in the rack shall be a roll-out storage drawer for use for storage of documentation, operation manuals and/or microphone, with a face panel styled to match the other equipment panels in the rack. The roll-out mechanism shall be of the dual section type providing at least 12.25 inches total extension.
		8. Include in the rack a shelf 12 inches deep across the front of the rack.
		9. Label inputs, switches, and controls with permanent markings.
	8. MANUFACTURERS
		1. Model numbers listed in this specification indicate the type of equipment used as basis of design. Manufacturers listed serve to establish a level of quality.
		2. Listed accepted manufacturers shall submit equivalent products as specified in this section.
		3. All products to be the newest approved model unless specifically agreed to. All materials and system components shall be new and refurbished parts are not acceptable.
		4. For new buildings and additions of an existing facility, all manufactures must match existing and be compatible with the existing control system.
		5. Accepted Manufacturers:
			1. Dukane/Carehawk, CH1000
			2. Simplex, 5120 Series Communications Network Controller (for up to 360-point capacity).
			3. Simplex, 5130 Series Controller (for more than 360-point capacity).
			4. Audio Enhancement – EPIC (Education Paging & Intercom Communications) System
			5. Substitutions: Under provisions of Section 01 60 00
	9. EQUIPMENT
		1. SYSTEM EQUIPMENT
			1. CH1000 (Central Cabinet)

The central equipment: Mounted in a standard 19-inch equipment rack. The central equipment consists of but not be limited to:

* + - * 1. CC200 Central Controller Card
				2. MI100 Main Interface Card
				3. TC2 Telephone Interface Card(s)
				4. AC1 Admin Interface Card(s)
				5. 5 Volt/12 Volt Power Supply
				6. DAF250C 300-Watt Class D Amplifier(s)
				7. IA5 Intercom Amplifier Card(s)
			1. SS16/SS32 Remote Switching Cards
				1. ACA16 Audible Call Assurance Card
				2. OC16 Output Contact Card
				3. CR16 Camera Routing Card
			2. IP/Analog Telephone Equipment
				1. VTM VoIP Telephone Expansion Module
				2. VG2/VG4 2 or 4 Port FXO Telephone Gateway
				3. VFS16/VFS32 16 or 32 Port FXS Telephone Gateway
			3. Program Sources
				1. MP100 Media Player
			4. Port Equipment
				1. AP1-B Administrative Control Station
				2. STELVP-1 VoIP Telephone
				3. STEL Analog Telephone
				4. CS100/CS35 – Silicon Call-in Switch
				5. CS45 Rocker-style Call Switch with Privacy
				6. CS25 Rocker-style Call Switch
			5. System Software
				1. Settings
				2. Calendar
				3. Decisions
			6. Other Equipment
				1. AD2W16 16 Port Two Wire Adapter
				2. CS20 2 Wire Call-in Switch
				3. RK100 Rack Mount Kit
				4. Assistant PC based Visual Console
				5. Vcall PC based Virtual Call Switch
				6. Tone Alerts PC based tone control
	1. WIRING
		1. Comply with SBBC Section 16120 (26 0520) – Wire & Cables.
		2. Intercom wiring shall comply with National Electric Code and applicable local ordinances.
		3. Wiring shall test free from grounds and shorts.
		4. Wiring shall be as follows:
			1. Aboveground: West Penn #373 or other product of equal quality and performance as approved by the Architect/Engineer.
			2. Underground: West Penn AQC #373 or other product of equal quality and performance as approved by Architect/Engineer if required.
			3. Speaker station cable: shall be #22 stranded with Aluminum polyester foil shield with drain wire. Conductors shall be color-coded:
				1. Gray PVC jacket
				2. 6 conductors (1 pair shielded: Black/Red, 2 pair unshielded: Black/Green – Black/White).
				3. Use one cable per speaker selector station.
				4. Multiple speaker groups increase wire gauge to #18 AWG stranded.
				5. Use black and red to speaker, black and green to call button.
			4. Microphone wire shall be a 2-conductor shielded cable, No. 18 AWG, with PVC jacket for microphone use, West Penn Cable No. 293 or equal.
			5. Digital Wall Display: As determined by system supplier.
			6. Secondary Clocks: Four No. 12 AWG THHN
			7. Provide all intercom speaker wiring and clock wiring in raceway and install suitable type hinged terminal cabinets as indicated on plans.
			8. Provide marked terminal strips in all junction boxes. Soldered and tap joints will not be permitted.
			9. Provide isolating barrier in clock/speaker enclosure to keep wiring separated.
		5. Provide at least four spare cables at each building terminal cabinet.
		6. Whenever possible, install homerun wiring in continuous runs from field device to head-end terminal cabinet with no breaks or splices.
		7. Splices in wire trays are not allowed. Clock splices/taps shall be on screw terminals or terminal strips in an accessible junction box. Wire terminations for the intercom and clocks at the central equipment rack shall be made of terminal blocks. The terminal blocks shall be installed in a flush mounted terminal cabinet where possible.
		8. Systems utilizing fiber optic cabling between remote terminal cabinets and head-end terminal cabinet are acceptable.
	2. RACEWAYS
		1. Raceways shall be in accordance with SBBC Section 16132 (26 0533.13) – Conduit, Fittings, and Supports.
		2. Conduits between buildings shall be underground. (Not permitted on covered canopies or aluminum walkways).
		3. Refer to drawings and SBBC Design Criteria for conduit details.
1. EXECUTION
	1. EXAMINATION
		1. Do not proceed with the work of this section until conditions detrimental to the proper and time completion of the work have been corrected in an accepted manner.
		2. Verify and coordinate mounting height and exact locations of all mounting boxes with architectural details, furniture layout, and elevations prior to installation.
	2. PREPARATION
		1. If none exists, provide necessary Surge Protective device on the AC power feed, low voltage intercom wiring at the head-end terminal cabinet. Protection shall be as recommended by the equipment supplier and reference to earth ground.
			1. Lightning protection and transient voltage and surge suppression shall be provided as recommended by system manufacturer.
		2. Speaker wires and call-in circuits shall be protected by an individual circuits surge suppressor or accepted equivalent at the central rack termination equipment cabinet. Gang strips surge suppressors are not allowed.
		3. Note in system drawings the type, locations, and wiring information of protection devices.
		4. Wiring termination shall be accomplished on standard telephone-type 66 Style punch down blocks. Each punch block shall be independently grounded to the ground bar.
		5. High power paging circuits 18 AWG or larger above the AWG capacity of the 66 Style punch block shall be landed on terminal strips.
	3. INSTALLATION
		1. Provide and install the intercom and clock systems according to applicable codes and the contract documents.
		2. System equipment and wiring installation shall be by the properly licensed company either the original equipment manufacturer or the factory distributer for the brand of equipment used.
		3. The system shall be tested for shorts, grounds, continuity, and finally for proper functioning and operation.
		4. Final connections of equipment, testing of system, and any other necessary adjustments shall be performed by a certified factory trained technician, employed by the equipment manufacturer, and under the manufacturer’s direct supervision.
		5. Equipment shall be installed according to manufacturer’s recommendation.
		6. Installation of head-end or control equipment shall be done only by the employees of the factory authorized distributor of equipment being installed.
		7. Install wiring, conduit, boxes, and the like required for installation of a complete system as specified in this section and as shown on the drawings according to manufacturer’s instruction, accepted submittals, and the requirements of this section.
			1. Color code wires.
			2. Tag wires at junction points. Wire terminations shall be made at equipment terminals or at terminal cabinets. No splices are allowed in the wire runs.
			3. Install wiring in conduit free from opens, ground, or crosses between conductors.
			4. Do not use PVC or other plastic conduit above ground.
		8. Number of wires shall be according to manufacturer’s wiring diagram. Install wiring in conduit. Pull and junction boxes and terminal cabinets for the system shall be provided with terminal strips, identified for wire terminations, and painted blue.
		9. Terminations shall be in hinged terminal cabinets and provided with wire tabs. Solder or taped joints are not allowed. Loop trough wiring is allowed with slack (no pulled tight cables), but spares shall be terminated.
		10. Furnish and install entire system according to accepted shop drawings of equipment and wiring diagrams.
	4. FIELD QUALITY CONTROL
		1. Factory trained technician shall check and test system for shorts, grounds, and circuit continuity and finally for proper function and operation before scheduling initial system test by SBBC.
		2. After SBBC initial testing approval, a continuous thirty calendar day period of trouble-free operation is required before system acceptance.
	5. EXISTING BUILDINGS
		1. Existing intercom and clock systems replaced with a new intercom and clock system installation shall have existing panels, sub-panels, power supplies, speaker/clock assemblies, and any other non-operational component removed after the new intercom and clock system certificate of completion is accepted by SBBC. ALL disturbed walls shall be repaired and painted to match adjacent existing surfaces.
		2. Where additions to or alterations in existing schools involve new wire in existing raceways, remove all the wire in the existing raceways and do not reuse.
		3. Pull new wire in for both new and existing circuits.
		4. Note: When the scope includes replacement of the entire systems, all items shall comply with the ADA mounting heights.
		5. For new buildings and additions of an existing facility, all manufactures must match existing.
	6. DEMONSTRATION
		1. After system has been tested, checked, and certified as complete and operational, technician shall demonstrate various functions and operations of system to SBBC maintenance and administrative staff.
		2. Demonstrate and explain system functions and operations in detail to school personnel designated by the school’s principal.
		3. Submit record of demonstration and testing with close requirements.
	7. MAINTENANCE
		1. Provide a minimum of two annual visits in basic fees.

END OF SECTION