

COMMUNICATIONS AND ELECTRONICS REQUIREMENTS

DOCUMENT NUMBER: 16700

APPLICATION: ELEMENTARY, MIDDLE AND HIGH SCHOOL

DATE OF ISSUE:

- 05-28-14** - **Added Access Control Requirements; Updated Approved Equip. List & Clocks**
- 04-16-13** - **Misc. revisions to Clock, Fire Alarm, Intercom & Security Systems Requirements**
- 07-11-12 - Prohibited ceiling-mounted strobes in fire alarm systems
- 10-26-11 - Miscellaneous revisions
- 04-22-11 - Revised allowable number of security devices per zone.
- 08-16-10 - Revised security keypad location/distance; corrected outline numbering; clarified high school outdoor speaker placement.
- 06-11-10 - Clarified motion detector models and coverage for ceilings over 9' high
- 06-03-09 - Revised Approved Equipment and Security System and Requirements
- 04-22-09 - Clarified operation of existing systems; revised fire alarm and intercom warranty
- 03-04-09 - Revised location of speakers and connections
- 03-02-09 - Added Public Address and Stage Lighting Requirements, clarified substitution request procedures, added sound level reqmt. for fire alarm horns and deleted atomic clock
- 10-08-08 - Revised Intercom, Clock and Security System Requirements and Standards
- 10-06-08 - Revised Fire Alarm System Equipment and Requirements
- 10-20-06 - Revised List of Approved Equipment
- 01-14-05 - Revised List of Approved Equipment for fire alarm systems
- 11-10-04 - Revised to clarify close out requirements for fire alarm and intercom
- 05-17-04 - Miscellaneous revisions
- 03-08-04 - Revised List of Approved Equipment, revised fire alarm spec, reissued diagram
- 01-22-04 - Revised secondary clock requirements
- 07-10-03 - revised fire alarm certification requirements
- 06-23-03 - corrected Student Dining, Multi-Purpose Rm speakers to be ceiling mounted
- 05-28-03 - corrected ceiling height for 360 degree detectors
- 11-26-02 - Revised Security System Standards
- 11-01-02 - Revised List of Approved Equipment
- 04-09-02 - Revised List of Approved Equipment
- 06-04-01 - general revisions
- 02-06-01 - added revised security specification
- 10-20-99 - deleted Simplex from list of acceptable systems
- 09-24-99 - general revisions
- 07-16-99 - general revisions to specifications

NOTES:

Systems are to be designed in accordance with the attached requirements.

Any deviation from these standards requires approval prior to bidding. Deviation/substitution requests from bidders and approvals by the HCPS Communications & Electronics (C&E) Department shall be routed through the assigned project coordinator, herinafter referred to as "Owner."

ATTACHMENTS:

List of Approved Equipment, dated 05-28-14	pg 2
Fire Alarm System Requirements, dated 04-16-13	pg 3
Fire Alarm, Security, Telephone Interconnections Diagram, dated 03-08-04	pg 10
Intercom System Requirements, dated 04-16-13	pg 11
Clock System Requirements, dated 05-28-14	pg 18
Security System Requirements, dated 04-16-13	pg 19
Public Address System Requirements, dated 10-26-11	pg 25
Stage Lighting System Requirements, dated 03-02-09	pg 32
Access Control System Requirements, dated 05-28-14	pg 46

**APPROVED EQUIPMENT FOR FIRE ALARM, SECURITY, INTERCOM,
PUBLIC ADDRESS, AND STAGE LIGHTING**

05-28-14

The following equipment is approved for use:

A. Fire Alarm

Silent Knight (E, MS, HS)
Firelite (E, MS, HS)
Edwards EST (E, MS, HS)
Siemens Cerberus Pro (E, MS, HS)

The aforementioned systems have the capability of supporting any district facility by adding additional expansion panels to the fire alarm configuration.

B. Security

Ademco Vista 20P

C. Intercom

Bogen Multicomm 2000/Quantum
Rauland Telecenter
Dukane Starcall

E. Public Address Systems

See attached Public Address Systems Standards for approved equipment.

G. Stage Lighting

Leviton/NSI/Colortran
Strand Century
ETC
EDI
Lehigh

H. Access Control

Aiphone Access Systems
Linear eMerge Card Reader
Von Duprin Door Lock Systems
HES Electric Strikes
IEI Keypads

FIRE ALARM SYSTEM REQUIREMENTS

04-16-13

1. SPECIAL REQUIREMENTS

- A. The fire alarm system herein specified shall be furnished by a manufacturer of fire alarm systems who has been conducting business in the Tampa Bay area for at least three (3) years. A complete stock of parts for the systems furnished shall be in inventory at the local facilities of the supplier. The equipment manufacturer shall have service facilities within a fifty (50) mile radius with parts in stock and trained service personnel.
- B. Trained service personnel shall be onsite within twenty-four (24) hours after receiving a service request during the warranty period, and onsite within four (4) hours for an emergency request.
- C. Installation to be performed only by Manufacturer's authorized installer.
- D. For projects at existing sites, the Contractor shall be responsible for maintaining existing system operation during all phases of construction, unless directed otherwise in writing by the Owner.

2. FIRE ALARM EQUIPMENT

- A. The Fire Alarm System shall be an electronically operated, multi-zoned, supervised, point-addressable closed circuit Fire Alarm System. The system shall comply with current NFPA 72 and NFPA 70. All equipment provided must have a current U.L. label and shall be listed to comply with U.L. Standard 864, Ninth Edition, effective December 31, 2008.
- B. Operation of any alarm initiating device shall be indicated by point (or address) on the fire alarm control panel display and on the remote annunciator (if applicable).
- C. Control Unit:
 - (1). The Fire Alarm Control Panel (FACP) shall be flush mounted in the Administration Reception area, easily accessible to staff, or as required by the Emergency Hurricane Protection Area (EHPA) requirements.
 - (a). For replacement of an existing system, the actual location shall be verified with the A/E/Owner.
 - (b). New Construction: The Fire Alarm panel can be mounted in a data or electrical room. Do not mount the panel in a classroom. Note: One annunciator panel should be mounted in the hallway (per EHPA requirements) and a second annunciator panel mounted in the Administration Reception area.
 - (c). Renovation: Equipment may be surface mounted in an equipment or data room once you receive written approval from the Owner.
 - (2). The control unit shall be 24V D.C. modular dead front construction using solid state components to operate the system.

- (3). The control unit shall contain a supervised signal silencing switch to silence both audible and visual signals, and a system reset switch and shall be supervised so that the trouble signal shall sound in the event of loss of either operating or standby power.
- (4). A trouble signal silencing switch shall be furnished so that faults on the alarm initiating circuits and the alarm signal circuits can initiate trouble signals and can be silenced.
- (5). The control unit shall have a LCD display with a minimum of 80 characters.
- (6). The control panel shall contain a USB Connection for troubleshooting on a Microsoft Windows-based computer. Provide detailed documentation on a CD-ROM showing how each component of the fire alarm system has been programmed. This disc, which will be used for troubleshooting, shall be placed in a protective sleeve and secured to the inside of the main FACP panel door.
- (7). Provision shall be made in signal circuits, initiating circuits, and battery and panel power for spare capacity for an additional thirty percent (30%) of devices. This is to be based on the actual number called for on the plans. For future portable hookup, an additional initiating and signal circuit with power supply shall also be included. System should have memory to store history log of up to 1,000 events.
- (8). Proper number of addressable circuits shall be provided. A minimum of two (2) spare circuits shall be provided to allow for emergency maintenance and future expansion of the system.
- (9). The initial receipt of a device alarm shall cause the fire alarm control display to indicate the specific device. In the event subsequent new alarms are received after previous acknowledgement of alarm, the fire alarm control panel display shall indicate the subsequent device.
- (10). Standby batteries (lead-acid) with charger shall provide twenty-four (24) hours supervisory power and five (5) minutes of alarm capability with thirty percent (30%) spare capacity should a failure of primary power occur. Batteries shall be maintenance-free type located within control panel.
- (11). Provide interconnection with Kitchen Hood System and Fire Protection Sprinkler Systems where required.
- (12). Supervision shall include all external wiring, fire protection sprinkler systems, smoke detectors, power interruptions (main or battery) and internal Fire Alarm Control Panel failures (L.E.D.'s, circuits, etc.). It should be capable of detecting grounds, shorts, and opens.
- (13). Provide Power Extender Units as required.

D. Manual Fire Stations:

- (1). Stations shall be point-addressable, non-coded single action that does not require break-rod to maintain box in normal position. The station shall mechanically latch when activated and require a tool or key to reset to normal position. Construction shall be finished red with instructions in raised white lettering.

- (2). Additions to existing systems: Fire Alarm manual stations will match the existing stations, no substitutes are permitted.
- (3). No station shall be mounted on the exterior of any building.
- (4). Provide exterior signage as required by code to indicate locations of interior fire pull stations.

E. Automatic Heat Detectors:

- (1). Automatic heat detectors shall be point-addressable, rate-of-rise/fixed temperature type. When activated on the fixed temperature limit, units shall be non-restorable and give visual evidence of such operation. Automatic heat detectors shall be 190 degree for kitchens, kiln rooms, attics, or boiler rooms and 135 degree for all other spaces where indicated on the drawings.
- (2). Explosion-proof, rate-of-rise/fixed temperature type shall be provided in Flammable Storage Rooms.

F. Smoke Detectors

- (1). Area smoke detectors shall be point-addressable, and of the light refraction or photoelectric type and shall utilize solid state L.E.D. light source. No incandescent or neon lamps shall be used in the detection chamber. Dual photocells shall be used to provide maximum stability against effects of aging, dust, and film accumulation. Each detector shall include a "Power On" light, red "Alarm" light, and an alarm relay. Detector shall contain no radioactive materials.
- (2). Duct smoke detectors shall be point-addressable, and operate on the light scatter principle, calibrated to actuate at a nominal two percent (2%) light obscuration per foot. The light source for the detection chambers shall be solid state L.E.D. No incandescent or neon lamps will be acceptable. Dual photocell circuits shall compensate against aging, dust and film accumulation. Changes of air velocity, air pressure, temperature, or humidity shall not effect the sensitivity of the detector. The detector shall include a red "Alarm" light. The unit shall mount directly outside of the duct. Provide adequate access to the unit. Sampling tube shall extend into the air stream up to 10 feet. Detector shall contain no radioactive materials.
- (3). Provide a remote alarm L.E.D. indicator where the detector is not visible from the floor on the wall of the closest proximity device. Provide laminated plastic template engraved "Concealed Smoke Detector."

G. Audio-Visual Alarm Signals

- (1). Fire alarm signals shall meet the requirements of the applicable accessibility code.
 - (a) Horns located in hallways and cafeterias shall have a sound level of at least 90 dbA.

- (2). Horns shall be flush mounted except where new device is installed over existing flush mounted outlet box. A surface mounted device is permitted during a renovation project.
- (3). Weatherproof horns shall be the same as above except surface mounted in a WL/weatherproof outlet box.
- (4). Horn/Strobe combination shall consist of horn and strobe as specified above and shall meet the requirements of the applicable accessibility code.
- (5). Alarm Strobes shall be located, at minimum, in all egress areas, gang toilets, handicap accessible toilets, and Exceptional Student Education (ESE) areas. Strobes shall be wall-mounted. Ceiling-mounted strobes are prohibited.
- (6). At locations where the horn or horn/strobe is exposed to the elements, a protective hood should be installed over the device. [Such hoods shall be painted red.](#)

H. OTHER:

- (1). Fan shutdown relay shall be a point-addressable relay with contact configuration and rating as required for the air handler controls. Make connections between relay and air handler controls as required. Run conduit from roof mounted air handler controls through new pitch pocket if not feasible to run within roof curb of unit. Relay shall be surface mounted in a NEMA 1 enclosure in interior locations and a NEMA 3R enclosure in exterior locations. Relay shall be located within three (3) feet of the controller.
- (2). A terminal cabinet should be located in each building.
- (3). Magnetic door holders shall be satin aluminum finished consisting of a strike plate mounted on the door and electromagnet wall mounted on an outlet box and single gang device plate. Device plate shall be heavy gauge stainless steel. Voltage shall be 24V D.C./ 24V A.C. Door holders are not required to operate on standby power and consideration should be given to a separate 24V A.C. supply to reduce the power requirement of the Fire Alarm Control Panel. Smoke doors designed to be held in the open position within a door pocket shall be provided with hold open devices as required to facilitate a flush installation of the door within the pocket. Smoke detectors shall be provided as required.
- (4). [Unless exempted in writing by the Owner, install RESET* switches in the main FACP, labeled for each of the following sub-systems:](#)
 - (1) [Air Handling Units \(AHU\)](#)
 - (2) [Door Holders](#)
 - (3) [Security Panel](#)

* [Following an alarm event, if the fire alarm system cannot be restored to normal operation in a reasonable timeframe, these switches can be used to to override or bypass the FACP, restoring the indicated equipment to normal operation.](#)

- I. Elevators: Provide Fire Alarm as needed for compliance with all local, state, and national codes and the Local Authority Having Jurisdiction (AHJ).

3. WIRING

- A. All electrical junction boxes shall be labeled "FIRE ALARM SYSTEM" with decal or other approved markings. The Fire Alarm/Life Safety Installation shall comply fully with all Local, State, and National Codes, and the Local Authority Having Jurisdiction (AHJ).
- B. Wiring shall match existing color coding or if not clear, wiring should be coded as follows:

(1). Existing Systems

Manual Stations, Smoke & Heat Detectors	Orange/Brown
Horns/Strobes	Yellow & Blue
Door Holders	White
Air Handler Shutdown Relays	Purple
Control Panel Power	Black & White

(2). New Systems or System Replacements

Manual Stations, Smoke & Heat Detectors	Orange/Brown
Horns & Flashing Lights	Yellow/Blue
Smoke Detector Power	Red & Black
Door Holders	White
Air Handler Shutdown Relays	Purple
Control Panel Power	Black/White

- C. Wire terminating at the control panel or terminal cabinets shall be identified as to circuit and use.
- D. AC Power disconnect will be labeled as "FIRE ALARM DISCONNECT". Location of AC Power disconnect shall be indicated, [by room number, panel number and breaker number](#), on inside of main fire panel door.
- E. Locations of all secondary panels, expansion panels and power supplies will be indicated, [by room number](#), on the inside of the main fire panel door.
- F. [Location of the AC Power disconnect for each secondary panel, expansion panel and power supply will be labeled on the inside of each panel door. Labels should indicate locations by room number, panel number and breaker number.](#)

4. RACEWAYS AND FITTINGS

- A. Fire Alarm Wiring shall be installed in Conduit.
- B. Electric Metallic Tubing (EMT) may be installed in interior locations only. Locknuts, bushings, and other fittings tight compression type. Below grade and in concealed locations above grade, conduit shall be either hot dip galvanized rigid steel or PVC. PVC shall not be installed inside buildings.

- C. Underground conduit shall be installed a minimum of 2'-0" below grade. Marker Tape shall be installed at 18" below grade, directly over underground conduit.
- D. For replacement of an existing Fire Alarm System, conduit may be reused if of adequate diameter and only new conductors for Fire Alarm System are run within same conduit. Remove all existing wiring from used conduit and clean interior. Additional supports shall be added to be comparable to that specified for new conduit. Remove and properly dispose of all unused wiring.

6. SYSTEM TEST

The Construction Manager shall insure certification inspections are completed by factory trained technicians. The technician will insure that that all NFPA 72 requirements are met. A copy of NFPA 72 Certificate of Completion shall be left at the fire alarm panel, along with a "Fire Alarm Life Safety Systems Maintenance and Certification Log".

7. CLOSE OUT DOCUMENTS

Provide close-out documents, in CD-ROM format, in accordance with the close-out requirements specified elsewhere, to include the following:

- A. Operating Manual
- B. Service Manual
- C. Technical Manuals and Schematics
- D. Maintenance Instructions
- E. Parts Listings
- F. As-Built Drawings including location, identification, and address of each device.
- G. Full software program with any required hardware interfaces between a windows-based laptop computer and control panel. An electronic copy shall be submitted to the Owner with the close-out documents.
- H. Operating instructions and demonstration for school-based staff
- I. The minimum number of hours of technical training for Communications and Electronics technicians to become factory certified in the maintenance of this system at no additional expense to the Owner.
- J. Fire Alarm Certification which indicates installation meets HCSD Standards, NFPA 72, NFPA 70 and current ADA Standards.

8. TRANSIENT VOLTAGE PROTECTION

Protectors shall be installed on all fire alarm system circuits and cables on points of entry and exit from separate buildings, and other locations where direct exposure to lightning occurs. Protectors shall meet the following criteria:

- A. Must be UL-497B listed and labeled.
- B. Multi-stage hybrid protection design.
- C. Plug-in replaceable system design or individually mounted units.

- D. Fail-short/fail safe mode.
- E. Surge Capacity: 3,000 amp (8/20 μ s waveform).
- F. Clamp Voltage: 150% of circuit peak operating voltage (2,000 A, 8/20 μ s waveform).
- G. Maximum Continuous Operating Voltage: At least 125% of peak operating voltage.
- H. Acceptable Manufacturers:
 - (1). Atlantic Scientific
 - (2). EDCO
 - (3). DITECK

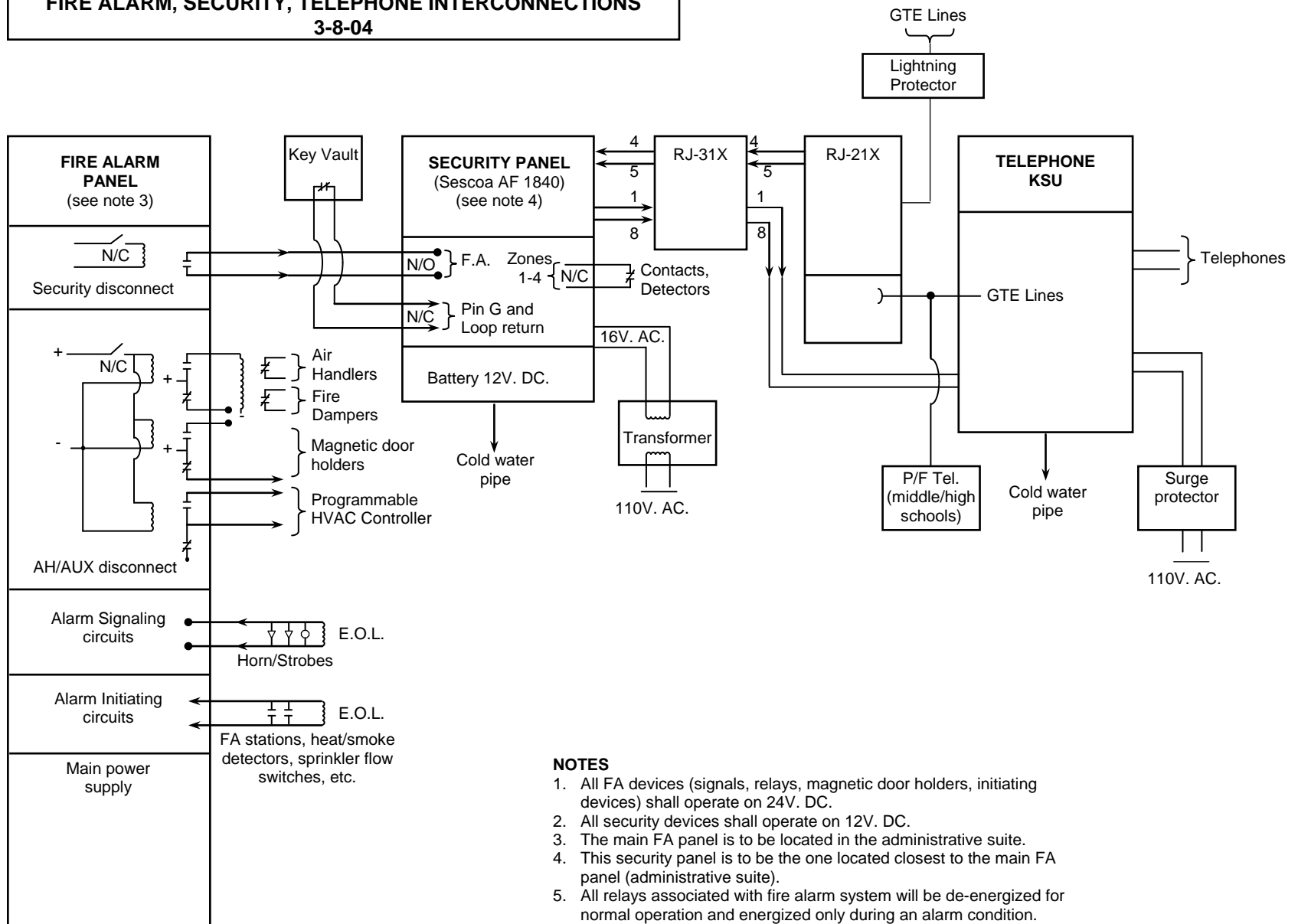
9. WARRANTY

Manufacturer/Installer to provide a minimum of five (5) year warranty on materials and workmanship. Warranty period shall commence upon the date of Substantial Completion.

END OF SECTION

FIRE ALARM, SECURITY, TELEPHONE INTERCONNECTIONS

3-8-04



NOTES

1. All FA devices (signals, relays, magnetic door holders, initiating devices) shall operate on 24V. DC.
2. All security devices shall operate on 12V. DC.
3. The main FA panel is to be located in the administrative suite.
4. This security panel is to be the one located closest to the main FA panel (administrative suite).
5. All relays associated with fire alarm system will be de-energized for normal operation and energized only during an alarm condition.

INTERCOM SYSTEM REQUIREMENTS

04-16-13

1. SPECIAL REQUIREMENTS

- A. The Intercom System herein specified shall be furnished by a manufacturer of Intercom Systems who has been conducting business in the Tampa Bay area for at least three (3) years. A complete stock of parts for the systems furnished shall be in inventory at the local facilities of the supplier. The equipment manufacturer shall have service facilities within a fifty (50) mile radius with parts in stock and trained service personnel.
- B. Trained service personnel shall be onsite within twenty-four (24) hours after receiving a service request during the warranty period, and onsite within four (4) hours for an emergency request.
- C. Installation shall be performed only by Manufacturer's authorized installer.
- D. For projects at existing sites, the Contractor shall be responsible for maintaining existing system operation during all phases of construction, unless directed otherwise in writing by the Owner.

2. INTERCOM EQUIPMENT

- A. General: The contractor shall furnish, install, and place in operation a multi-channel, microprocessor-controlled communications system. The Intercom and Program Clock System shall provide a comprehensive communication network between administration and classroom locations. Equipment shall consist of a control unit, three (3) master (administrative) stations, speakers in common areas, exterior paging speakers, a dual tone multi-frequency (DTMF) compatible handset that conforms to standard telephone practices and speaker in each location shown, and a multi-tone generator for scheduled class changes, all located as shown on the plans and wired in accordance with the manufacturer's instructions to make a complete and workable system as described herein.

Note: Providing a fiber optic option is permitted once you receive written permission from the Owner.

- B. System Operation: The Intercom System shall have a minimum of two program channels for distribution of AM/FM tuner, cassette, phonograph, and compact disc from the Media Center to any speaker, group of speakers, or all speakers simultaneously. Each master station shall be capable of communicating with all other speaker locations individually, and between each master station. The Administration master shall have the capability of manually initiating program bells through the master program clock. Each master station shall have an associated remote wall digital display.
- C. Control Unit: The central processor and switching unit shall be of the modular plug-in printed circuit board type. The system shall be capable of the following:
 - (1). Simultaneously processing Sound/Intercom, program, and page distribution using standard speakers and call-switches
 - (2). The system shall have a minimum capacity of 225/250 stations.

- (3). The unit shall be programmable from both an administrative station and a P.C. Laptop. A copy of the programming software shall be provided on a CD-ROM and stored in a protective plastic sleeve, at the main console.
- (4). The central equipment shall be housed in a standard 19" rack. The system designer shall determine appropriate size. Equipment rack should be located in the Media Center, or in a well ventilated and air-conditioned electrical or data room.
- (5). All-call feature from each master station. As an added Security/Safety measure, up to three (3) intercom handsets may be programmed for "All-Call." These handsets shall be located in teacher planning areas or teacher lounges, strategically located throughout the campus.
- (6). Supervisory or privacy tone signal which will sound through the speaker when the individual speaker station is being monitored
- (7). Capability for each call-in device to initiate calls to any two master stations simultaneously. Emergency calls shall override normal calls and shall annunciate with the letters distinguishing it from a routine call, the calling station number, and a separate distinct tone. Provide capability for initiation of an emergency call by dialing any Owner determined three-digit number, or by a hook flash sequence.
- (8). Intercommunication with master stations shall be through the classroom speakers and classroom intercom handsets
- (9). Provide remote AM/FM tuner with compact disc in master rack.
- (10). The system shall provide for a minimum of two (2) intercommunication channels to permit simultaneous operations. Example: two (2) master stations conversing with two (2) classrooms or other master station at the same time.
- (11). Install one (1) rack-mounted U.P.S. in central equipment rack (A.P.C. SU1400RMXLNET or equal).
- (12). The main microprocessor shall be located with the sound/intercom central equipment in the Main Systems Room.
- (13). Provide interconnection with telephone KSU to allow for telephone stations in offices to access all-call and office-to-room communications.
- (14). Provide capability for room-to-room communications.
- (15). No interconnection with outside telephone lines shall be permitted at this time.
- (16). Provide interconnection with the Closed Circuit Television System to provide program audio material through all Intercom zones.

D. Administrative:

- (1). Provide three (3) master stations to be located in the Administration Reception, Assistant Principal's Reception, and Media Center Technical Processing Room for middle and high schools.

- (2). Provide three (3) master stations to be located in the Administration Reception, Principal's office, and Media Center AV Storage Room for elementary schools.
 - (3). Speakers in Offices and other staff spaces, as required, are to be 8" speakers, flush-mounted in ceiling, tapped at ½ watt.
 - (4). Provide speaker volume control devices on wall, in offices and conference rooms. Bogen AT-10A Attenuator or equivalent.
- E. Other areas:
- (1). General, including speakers in interior corridors: 8" speakers flush-mounted in the ceiling, tapped at 1 Watt.
 - (2). Speakers in Gymnasiums and Auditoriums are to be wall mounted, tapped at 4 Watts.
 - (3). Wall mounted handsets, with keypad, shall be used for call-in. Handset operation will disable the speaker except for all-call announcements and program tone generator (tones). Handsets shall be mounted with a locking wall-mount.
 - (4). Where required by the plans, exterior student walkways, courtyards, and PE areas shall be provided with exterior wall-mounted or flush soffit-mounted weatherproof speakers/horns: Atlas Sound VT-152UCN or equivalent. Exterior speakers/horns shall be mounted using tamper-proof screws. Speakers/horns located on the outer perimeter of the campus shall be protected with cages.
 - (5). Auditoriums and Gymnasiums shall utilize a call-in switch in lieu of a handset.
 - (6). Bus ramps, parent pick-up areas and P.E. areas shall each have one wall-mounted handset, with keypad. Handsets in such locations shall be mounted in weatherproof enclosures, with modular wall telephone jacks. GAI-Tronics Industrial Telephone Enclosure, Model 255-001, or equivalent. Handsets area to be programmed for Zone "All-Call," to speakers/horns specifically identified for that area.
 - (7). The Kitchen/Servery area shall have a separate intercom system, allowing two-way communication between the serving line cashier and the kitchen manager's office.
- F. EMI/Lightning Protection: Provide adequate transient voltage/surge suppression on all power and communication circuits at each entry and exit of a building and at the main Intercom System Control Panel. Examples include: EDCO Model OPX48V Surge Protection for every Call-in circuit, speaker circuit, Porta Systems 581P2 25GT gas arrestor, or approved equal.
- G. Provide a listing of all rooms with corresponding station numbers. Provide a separate list of the locations, by building and room number, of all junction boxes. These lists should be located at the intercom main console.

3. OTHER INTERCOM SYSTEMS

- A. An Area of Refuge/Rescue Assistance for Handicapped audio/visual system shall be provided if required.
 - (1). Per code requirements, a complete audio/visual system shall be provided.
 - (2). An emergency intercom audio/visual call system between "Areas of Refuge/Rescue Assistance" and the Master Attendant Constrol Station located in the Administration Reception Area shall be provided where required. Master Station shall be desk type or flush wall-mounted type, and remote intercom slave station shall be flush wall-mounted type.
 - (3). Illuminated symbol sign to read "To Area of Rescue Assistance" with blue letters on white background shall be provided to direct handicapped to the rescue areas.
- B. A separate multi-channel sound system for the Gymnasium, Auditorium, Student Dining Room, Multi-purpose Room (where applicable) and all Athletic Fields shall be provided.
- C. A separate intercom system shall be provided for the following areas, if required:
 - (1). Two-way communication from the CCTV Studio to the CCTV Control Room.
 - (2). One-way communication from the Stage Manager's position (sidewall of stage) to each Dressing Room.
 - (3). Two-way communication from the Stage Manager's position (sidewall of stage) to the Control Booth and to the Catwalk in the Auditorium (where applicable).
 - (4). Two-way communication from the Home Press Box to the Home sideline area and from the Visitor Press Box to the Visitor sideline area at the track/football field (where applicable).

4. SUBMITTAL DATA

- A. General: format and distribution of submittals is specified elsewhere.
- B. Catalog Data
 - (1). Control Panel
 - (2). U.P.S.
 - (3). AM/FM Tuner with Compact Disc
 - (4). Master (administrative) stations
 - (5). Handset
 - (6). Ceiling-mounted speaker
 - (7). Wall-mounted speaker (if applicable)
 - (8). Multi-tone generator (if separate)
 - (9). Exterior paging speakers

- (10). Wall-mounted volume controls
- (11). Transient voltage/surge suppression
- (12). Weatherproof Boxes
- (13). Cabling
- (14). Terminal Cabinets
- (15). All other systems installed

C. Shop Drawings

- (1). All equipment specified above.

5. WIRING

A. Main Intercom System cabling shall be provided from the Main Systems Room to the Systems Room in each building or wing. This cable may be multi-pair feeder cable (if allowed by manufacturer). For all other systems, provide cabling as required.

- (1). Feeder cable run between buildings shall be in conduit.
- (2). Cable from IDF to device may be run without conduit in ceiling, if allowed by documents.
- (3). All cabling run in walls shall be in conduit. In-wall conduit to be a minimum of 3/4".
 - (a). Conduit stub-outs are to be bushed on the open end, and labeled with end-point.
 - (b). During retrofitting, if exposed conduit is allowed, non-metallic surface raceway with all associated fittings is acceptable: Wiremold 2800 or equivalent.
 - (1) Raceway shall be neatly installed in straight lines parallel and perpendicular to building construction. Proposed routing to be submitted and approved prior to installation.
 - (2) Raceway run on ceiling shall be run at corner near wall wherever possible.

B. The telecommunication wiring system specification should be in accordance with the requirements specified in ANSI/EIA/TIA-568.

C. Station wire shall be of two (2) types, inside and outside, and shall consist of No. 20 AWG or larger twisted copper conductors, as specified by manufacturer.

- (1). Inside station wire shall be of (3) types: Standard, Air Plenum and Riser.
 - (a). The Standard type shall be suitable for installation in conduit and shall have conductors insulated with a color-coded thermoplastic insulation and enclosed with a thermoplastic jacket.

- (b). The Air Plenum type shall be wire suitable for installation without conduit in ceiling spaces that serve as a return air plenum.
- (c). The Riser type shall be suitable for installation in vertical riser shafts without conduit.
- (2). Connecting blocks shall be Siemon Co. S66M1-50 or equivalent. Each block shall be labeled with Block Number and Room Phone Extensions.
- (3). All field junction points shall be in lockable terminal cabinets, all keyed the same. [ALL keys are to be turned over to the C&E representative, at the time of the Substantial Completion inspection.](#)
- (4). The Sound/Intercom System Installation shall comply fully with all Local, State, and National Codes, and the Local Authority Having Jurisdiction (AHJ).

6. RACEWAYS AND FITTINGS

- A. Conduit sizes shall be in strict accordance with National Electric Code allowances on percentages fill.
- B. Electric Metallic Tubing (EMT) may be installed in interior locations only. Locknuts, bushings, and other fittings tight compression type. Below grade and in concealed locations above grade, conduit shall be either hot dip galvanized rigid steel or PVC. PVC shall not be installed inside buildings.
- C. Underground conduit shall be installed a minimum of 2'-0" below grade.
- D. For replacement of an existing Sound/Intercom System conduit may be reused if of adequate diameter and only new conductors for Sound/Intercom System are run within same conduit. Remove all existing wiring from used conduit and clean interior. Additional supports shall be added to be comparable to that specified for new conduit.

7. SYSTEM TEST

- A. Upon completion of installation of system specified, they shall be completely verified and tested in the presence of the installing contractor and owner's representative by a factory authorized representative. Results of the verification and testing shall be reported in writing to the A/E. The review and acceptance of the written report shall be a prerequisite to the acceptance of the work.
- B. Provide close-out documents and Owner training, in CD-ROM format, in accordance with the close-out requirements specified elsewhere, to include the following:
 - 1. Operating Manual
 - 2. Service Manual
 - 3. Technical Manuals and Schematics
 - 4. Maintenance Instructions
 - 5. Parts Listings
 - 6. Record Drawings

7. Keys to terminal cabinets
8. Software interface (with any required hardware interfaces between a laptop computer and control panel) with an electronic copy of the final program to be submitted to the Owner with the close-out documents.
9. Operating instructions and demonstration for school-based staff. Maintain a record of the date, duration and attendee sign-in sheet for submittal to the Owner with the close-out documents.
10. Provide the minimum number of hours of technical training for the Owner's designated C&E technicians to become factory certified in the maintenance of this system, at no additional expense to the Owner.

8. WARRANTY

Manufacturer/Installer to provide a minimum of five (5) year warranty on materials and workmanship. Warranty period shall commence upon the date of Substantial Completion.

END OF SECTION

CLOCK SYSTEM REQUIREMENTS

05-28-14

1. SPECIAL REQUIREMENTS

A. Program Clock: An internal program clock providing a minimum total of 1024 user-programmed events shall be provided as part of the Intercom System.

- (1). There shall be a minimum of eight time signaling schedules.
- (2). There shall be a minimum of eight time-signaling zones having independently programmable 'tone duration' settings.

B. All secondary clocks shall have the following:

- (1). Quartz self powered (battery operated)
- (2). 12"-14" size
- (3). 12 hour dial face – white in finish
- (4). Concealed mounting brackets
- (5). Sweep second hand
- (6). Run by 1 – AA Battery
- (7). Lens shall be shatter resistant – blemish free
- (8). Accuracy \pm 2 Minutes per Year

C. Acceptable clocks include the following:

- (1). Tempus Auto-Adjust Daylight Savings Time 14" clock, chrome (available at Office Depot), or equivalent.
- (2). Valcom IP PoE surface mount analog clock, 12" round (model VIP-A12), or equivalent.

Clocks in Gymnasiums and Student Dining Areas shall have self powered quartz movements. Gymnasium clocks shall be covered with cages or some other type of protective cover.

Refer to the Educational Specification for locations requiring wire guards.

Note: Currently looking at wireless technology to replace outdated equipment. More to follow.

END OF SECTION

SECURITY SYSTEM REQUIREMENTS

04-16-13

1. SPECIAL REQUIREMENTS

- A. The Security System herein specified shall be furnished by a licensed Security Alarm Systems installer who has been conducting business in the Tampa Bay area for at least three (3) years. A complete stock of parts for the systems furnished shall be in inventory at the local facilities of the supplier. The equipment manufacturer shall have service facilities within a fifty (50) mile radius with parts in stock and trained service personnel.
- B. Trained service personnel shall be onsite within twenty-four (24) hours after receiving a service request during the warranty period, and onsite within four (4) hours for an emergency request.
- C. For projects at existing sites, Contractor shall be responsible for maintaining existing system operation during all phases of construction, unless directed otherwise in writing by the Owner.

2. SECURITY SYSTEM EQUIPMENT

A. General:

- (1). Equipment shall consist of an Ademco Vista-20P (or current version) control panel with a fully-programmable alpha keypad, detection components, and all interconnections and accessories, wired in accordance with the manufacturer's instructions, the National Electrical Code, and Hillsborough County Public Schools (HCPS) standards, to make a complete and workable system.
- (2). Provide properly selected and located detection devices, assuring adequate security coverage, as follows:
 - (a). Administration and Other Office Spaces
 - (i) Accessible window – dual technology motion detectors
 - (ii) Without windows – door contacts
 - (iii) Reception Area(s) – dual technology motion detectors
 - (b). Instructional Spaces
 - (i) Accessible window – dual technology motion detectors
 - (ii) Without windows – door contacts
 - (iii) Mechanical and electrical rooms, and roof access hatches shall be protected with door contacts.
 - (iv) Wall mounted [Public Address](#) speakers in [cafeterias/multi-purpose rooms without motion detectors](#) shall have a breakaway-type detector attached.
 - (v) Flammable Storage Area shall have an "explosion proof" door contact to be connected to the nearest Security Panel.

- B. System Programming: C&E Maintenance shall complete final programming, once notified that the system is fully wired (all zones properly terminated on the panel), each zone labeled, and fully "walk" tested.

C. System Operation:

- (1). Each building of the project shall have a *separate* Security Panel. (Some consolidation to a single panel, of closely grouped structures, with one or two zones each, will be considered, but must be approved by the Owner in advance.)

- (2). The Kitchen shall have a separate Security Panel, located in the Kitchen Manager's office. This panel is to control the devices located in the Kitchen and Kitchen Storage areas only. (Shall not include dining areas or any other spaces).
- (3). The Security Panel communicates with the Central Receiver by sending various signals. These signals are comprised of a code and a zone. The format for this data shall be "ADEMCO Contact ID" reporting.
- (4). The burglar alarm zone shall consist of *contiguous* areas only. (The primary entrances to a building shall have separate zones, additionally, interior and exterior locations shall never share a zone. i.e. exterior door contact on a mechanical room and an interior motion device in a classroom can not be on the same zone.)
- (5). The Security Panel and Keypad shall be located together within the physical area that is identified as burglar alarm Zone #1, and shall be located in electrical, data, or mechanical systems rooms, unless otherwise directed. (i.e. kitchen panel or if the keypad is to be located near the main office entrance door). The installation of a security panel / keypad in a "student occupied" area is *not acceptable*, except where no other viable option exists, and must be approved in advance by the Owner.
- (6). There shall be no more than *two* (2) motion detectors OR four (4) door contacts per burglar alarm zone. Motion detectors shall not share zones with door contacts.
- (7). A burglar alarm zone shall not cover more than *four* (4) contiguous rooms.
- (8). The Security Panel nearest the Main Fire Alarm Control Panel (MFACP) shall have the Main Fire Alarm Control Panel connected so as to be able to program the Fire Alarm Control Panel Zone #7 of an eight zone panel (or Zone #15 of a sixteen zone panel), *where the key vault zone exists on the last zone*. Otherwise, the Fire Alarm zone shall be Zone #8 or Zone #16.
- (9). The Security Panel that is located nearest the key vault shall have the key vault connected so as to be able to program the key vault as a 24-hour burglar alarm, Zone #8 of an eight zone panel (or Zone #16 of a sixteen zone panel).
- (10). Each burglar alarm zone shall be labeled so as to indicate each area that is connected to that burglar alarm zone (i.e. Burglar Alarm Zone 1 – Rooms 101, 102, 103, 104; Burglar Alarm Zone 2 – Rooms 105, 106; etc.). These labels shall be located on both the panel and the corresponding cable.
- (11). No single security alarm panel shall have more than sixteen (16) zones. If the number of required zones exceeds sixteen, then a second or third security panel location shall be designated. The *expander circuit board* shall be installed next to the Security panel box, in a *separate* panel box. The auxiliary 12vdc power supply, and 12v, 7AH battery *shall be installed in a separate box, next to the security panel box*.
- (12). Security panel and/or keypad shall be located on the "ground" or first floor of the building. Travel distance from the designated entry/exit point to the panel and/or keypad shall not exceed 100'.

D. Control Unit

- (1). The control unit shall be an Ademco Vista-20P (or current version) system consisting of the following:
 - (a). Ademco Vista-20P panel

- (b). Ademco 6160 keypad
 - (c). Ademco 4219 zone expander panel (if required) shall be installed in security panel box. The required auxiliary 12vdc power supply, & 12v, 7AH battery will be located in a separate Auxilliary box, next to the security panel box.
 - (d). YUASA NP7-12 12Volt 7AH battery
 - (e). DITEK MRJ31X surge protector
 - (f). RJ31X phone jack
 - (g). Telephone cord
- (2). For New Contruction: The control unit shall be mounted in a Square "D" flush mounted cabinet when located in occupied areas such as the Kitchen Office. All other panels are to be located in electrical or communications rooms in a surface mounted Square "D" cabinet. The cabinet shall be labeled "SECURITY SYSTEM".
- (3). The keypad shall be mounted on the door of the control panel. However, if the security panel is located in a room that is not readily accessible, provide a remote keypad instead, at a location designated by the Owner.

E. Detection Devices:

- (1). GE Surface Mount 1085T Magnetic Contact. Rivets shall not be used. Provide handy box and in-wall conduit to junction box above the ceiling. Provide a minimum of eighteen (18) inches of slack wire in junction box above ceiling. Provide sufficient service loop for removal of contact for maintenance.
- (2). Motion Detectors:
- (a). Motion detectors shall provide uniform detection capability throughout pattern, with optimum field of view for man-size targets. Dynamic Data Discrimination Signal processing shall be used to reduce the likelihood of false alarms caused by rapid temperature change of a fixed object. An LED on the device shall indicate when it is in alarm condition. Field coordinate exact configuration with the Owner.
 - (b). Long-range motion detectors shall be the same as item "a" except shall be capable of providing coverage up to eighty (80) feet from the sensor. (GE Sentrol SR-AP633A or equal as pre-approved by Owner.)
 - (c). Single mounted 360-degree detectors shall use dual technologies, microwave and infrared (PIR) in configuration where both must detect intrusion before an alarm is generated. Microwave detector shall follow PIR detector. Microwave shall remain idle until PIR senses a change in ambient temperature. Once temperature change is detected, microwave shall activate to verify alarm condition. Device shall be mounted in the center of the room, away from active air vents, but still capable of detecting intrusion at the windows and doors, and no higher than nine (9) feet. (RISCO RK150T, Visonic Duo-240, or equal as pre-approved by Owner, with sensitivity properly adjusted to provide the acceptable protection required in a given area.)

- (d). Curtain detector shall sense changes in the level of infrared radiation within their field of detection. Balanced detection feature shall reduce the likelihood of false alarms caused by events such as rapid temperature change in a fixed object. An LED on the device shall indicate when it is in an alarm condition. Coordinate exact configuration and mounting type (flush or surface) with the A/E and HCPS. (Honeywell, Dual Tec DT-450T with SMB-10 Swivel Mount Bracket or equal as pre-approved by Owner.)
- (e). Use appropriate devices for coverage of large areas: Media centers, Cafeterias, Auditoriums, All Purpose Rooms and rooms with ceilings higher than (9) feet. (Honeywell CK-DT6360STC (for 360-degree), GE Sentrol SR-AP633A or equal as pre-approved by Owner, with sensitivity properly adjusted to provide the acceptable protection required in a given area.)

3. WIRING

- A. Conduit and Conductors: Wiring shall be Genesis Cable Systems WG-11041101 (or pre-approved equal) for device cable installed in separate conduit, maximum forty percent (40%) full. All splices in field wiring shall be made in U.L. listed electrical junction boxes. All electrical junction boxes shall be labeled "SECURITY SYSTEM" with decal or other approved markings. The Security System Installation shall comply fully with all Local, State, and National Codes, and the Local Authority Having Jurisdiction (AHJ), in this case the HCSD.
 - (1). For New Construction: Provide complete wiring and conduit between all equipment. Conduits of proper size shall be installed from the Control Panel Equipment to field devices. All field devices shall be mounted upon U.L. listed electrical junction boxes.
- B. Wiring shall be color coded as follows:
 - (1). Device Cable

(a).	Black	Negative
(b).	Red	Positive
(c).	Green/White	Loop
- C. Provide a building ground connection, and a telephone line terminated on an RJ31X connector *outside* the control panel at each control panel.
 - (1). The ground wire shall be green in color and a minimum of #6 AWG wire terminated on a barrier strip and properly connected to the security panel, expansion module, and the telephone line surge protector. [Install an eight \(8\) foot copper grounding rod if proper ground cannot be found.](#)
 - (2). For New Construction: Provide a duplex power outlet. Telephone line termination (on an RJ31X connector) and ground wire termination shall be *inside* the Square "D" box. The duplex outlet shall be installed so as to allow the transformer to be attached and still close the door of the Square "D" box.
 - (3). The telephone line shall be connected to the CO line to seize the line *in front* of the Telephone KSU system, but still allow the line to be used by the Telephone KSU system when not in use by the Security System. The line shall *not* be connected to any *incoming telephone* line. The line shall be *connected to out-dial lines only*. Each panel shall be connected to a separate telephone line where possible.
- D. Provide a normally closed circuit to the Knox Key-Vault (HCPS supplied) to be connected to the internal switch of the key-vault.

- E. Provide a normally open circuit to the Fire Alarm Control Panel to be connected by the Fire Alarm Subcontractor to the Fire Alarm Control Panel.
- F. EMI/Lightning Protection: Provide adequate transient voltage/surge suppression on all power and signal circuits at each entry and exit of a building and at the main Security Control Panel.

4. SUBMITTAL DATA

A. General

- (1). Submittals shall be made in accordance with the general requirements of the contract.

B. Catalog Data

- (1). Motion Detectors
- (2). Door Contacts

C. Shop Drawings

- (1). All equipment specified above.

5. RACEWAYS AND FITTINGS

- A. Electric Metallic Tubing (EMT) may be installed in interior locations only, with locknuts, bushings, and other fittings tight compression type. Elsewhere, conduit shall be hot dip galvanized rigid steel (or PVC if below grade). PVC conduit is acceptable in exterior enclosed canopies only. PVC shall not be installed inside buildings.
- B. Where underground conduit is allowed, it shall be installed a minimum of 2'-0" below grade. Marker tape shall be installed at 18" below grade, directly over the underground conduit.
- C. For replacement of an existing Security System, conduit must be installed where raceway is visible; "J" hooks may be used above the ceiling. Existing conduit may be reused if of adequate diameter and only new conductors for Security System are run within same conduit. Remove all existing wiring from used conduit and clean interior. Additional supports shall be added to be comparable to that specified for new conduit.

6. SYSTEM TEST

- A. Upon completion of installation of system specified, they shall be completely verified and tested in the presence of the installing contractor and the HCPS representative. Results of the verification and testing shall be reported in writing to the A/E. The written report shall precede or accompany the Contractor's request for acceptance of the work.
- B. Provide HCPS with three (3) copies, in CD-ROM format, of the following:
 - (1). Operating Manual
 - (2). Service Manual
 - (3). Technical Manuals and Schematics
 - (4). Maintenance Instructions

- (5). Parts Listings
- (6). As-built drawings indicating each security device, labeled by panel and zone. (three (3) copies per security panel)
- (7). Software interface (with any required hardware interfaces between a laptop computer and control panel) with a copy of the final program.
- (8). Operating instructions and demonstration for school-based staff.
- (9). Provide the minimum number of hours of technical training for two (2) of the Owner's technicians to become factory certified in the maintenance of this system, at no additional expense to HCPS.

7. WARRANTY

Manufacturer/Installer to provide a minimum of one (1) year warranty on materials and workmanship. Warranty period shall commence upon the date of Substantial Completion.

END OF SECTION

PUBLIC ADDRESS (P/A) SYSTEM REQUIREMENTS

10-26-10

PART 1 - DESIGN REQUIREMENTS

A. ELEMENTARY SCHOOL MULTI-PURPOSE ROOM

- (1) P/A Equipment: Refer to *Part 2 - Equipment Requirements* for component specifications.
- (2) Provide **portable** rack for P/A system with exterior connections for speakers and microphones, and extra space within rack for future expansion of P/A system.
- (3) Provide four speakers with wall mounts in **front** and **rear** of multi-purpose room with connections feeding back to main P/A system.
- (4) Provide two monitor speakers with **wall** mounts, located stage left and stage right interior walls, 7'-0" clear height above finish floor, with connections feeding back to main P/A system.
- (5) Provide **two** drop microphones equally positioned over front center stage with connections feeding back to main P/A system.
- (6) Provide **two** microphones with two 25' microphone cables and stands.
- (7) Provide two speaker connections (one for left two speakers and one for right two speakers), two monitor speaker connections (wired to monitor speakers on stage), and **three** female XLR microphone connections (one wired to the dual female XLR jacks on stage left, one wired to the dual female XLR jacks on stage right, and one wired to the drop microphones) on multi-purpose room wall, 7'-0" clear height above finish floor, for P/A system hookup.

NOTE: P/A system will not be placed on stage.

- (8) Provide a dual female XLR microphone connection on the interior front stage wall on each side of the stage (one dual female XLR connection on stage left and one dual female XLR connection on stage right), thus providing 4 microphones on two separate channels.

B. MIDDLE SCHOOL MULTI-PURPOSE ROOM OR AUDITORIUM

- (1) P/A Equipment: Refer to *Part 2 - Equipment Requirements* for component specifications.
- (2) Provide a dual female XLR microphone connection on the interior front stage wall on each side of the stage (one dual female XLR connection on stage left and one dual female XLR connection on stage right) thus providing 4 microphones on two separate channels, with connections feeding back to main P/A system.
- (3) Provide two portable **floor** style monitor speakers with flush mounted floor connections in the center of the stage, no more than 2 feet from the front edge of the stage, and a quad female XLR microphone connection (two female XLR microphone connectors per channel) accompanying the monitor speaker floor connections, thus providing 4 microphone connections and 2 monitor speaker connections in one floor box (equal or comparable to the FL-1500 floor box by RCI Custom Products), with all connections feeding back to main P/A system.
- (4) Provide **two** drop microphones equally positioned over front center stage with connections feeding back to main P/A system.

- (5) Provide four speakers with wall mounts in **front** and **rear** of multi-purpose room with connections feeding back to main P/A system.
- (6) Provide four speakers with wall mounts in **front** and **middle** of auditorium with connections feeding back to main P/A system.
- (7) Provide two speaker connections (one for left two speakers and one for right two speakers), two monitor speaker connections (wired to monitor speakers on stage), and **five** female XLR microphone connections (one wired to the dual female XLR jacks on stage left, one wired to the dual female XLR jacks on stage right, one wired to the drop microphones, and two wired to the quad female XLR jacks on center stage) in one floor box (equal or comparable to the FL-1500 floor box by RCI Custom Products) located in the middle of the rear wall, 24" above finish floor, for P/A system hookup.

NOTE: P/A system will not be placed on stage.

- (8) Provide **portable** rack for P/A system with exterior connections for speakers and microphones, and extra space within rack for future expansion of P/A system.
- (9) Provide **two** microphones with two 25' microphone cables and stands.

C. MIDDLE AND HIGH SCHOOL GYMNASIUM

- (1) P/A Equipment: Refer to *Part 2 - Equipment Requirements* for component specifications.
- (2) Provide **stationary** rack for P/A system with exterior connections for speakers and microphones, and extra space within rack for future expansion, located on adjacent wall in Training/First Aid room with direct access from Gymnasium. (Refer to space relationship diagram in HCPS Educational Specifications for High School, Physical Education.)
- (3) Provide four speakers with wall mounts positioned on sidewalls in front of home and visitor bleachers (two speakers on opposite walls of each other facing home bleachers and two speakers on opposite walls of each other facing visitors bleachers), feeding back to main P/A system.
- (4) Provide a dual female XLR microphone connection flush mounted on wall behind primary basketball hoops (no lower than 18" and no higher than 24" above floor level, in accordance with HCPS standards) on each side of court (one dual female XLR connection on Home side and one dual female XLR connection on Visitors' side) thus providing 4 microphones on two separate channels, with connections feeding back to main P/A system.
- (5) Provide a dual female XLR microphone connection in a flush mounted floor box located at mid-court, adjacent to the first bleacher riser (Home side) feeding back to main P/A system.
- (6) Provide one microphone and one 25' microphone cable and one **desktop** microphone stand.

D. HIGH SCHOOL AUDITORIUM

- (1) P/A Equipment: Refer to *Part 2 - Equipment Requirements* for component specifications.
- (2) Provide a dual female XLR microphone connection on the interior front stage wall on each side of the stage (one dual female XLR connection on stage left and one dual female XLR connection on stage right) thus providing 4 microphones on two separate channels, with connections feeding back to main P/A system.

- (3) Provide two portable **floor** style monitor speakers with flush mounted floor connections in the center of the stage, no more than 2 feet from the front edge of the stage, and a quad female XLR microphone connection (two female XLR microphone connectors per channel) accompanying the monitor speaker floor connections, thus providing 4 microphone connections and 2 monitor speaker connections in one floor box (equal or comparable to the FL-1500 floor box by RCI Custom Products), with all connections feeding back to main P/A system.
- (4) Provide **four** drop microphones equally positioned over front center stage with connections feeding back to main P/A system.
- (5) Provide four speakers with wall mounts in **front** and **middle** of auditorium with connections feeding back to main P/A system.
- (6) Provide two speaker connections (one for left two speakers and one for right two speakers), two monitor speaker connections (wired to monitor speakers on stage), and **six** female XLR microphone connections (one wired to the dual female XLR jacks on stage left, one wired to the dual female XLR jacks on stage right, two wired to the drop microphones, and two wired to the quad female XLR jacks on center stage) in one floor box (equal or comparable to the FL-1500 floor box by RCI Custom Products) in the audio/lighting booth located at the rear of the auditorium above the exit doors, for P/A system hookup.
- (7) Provide **stationary** rack for P/A system with exterior connections for speakers and mixer, and extra space within rack for future expansion of P/A system.
- (8) Provide **four** microphones with four 25' microphone cables and stands.

E. HIGH SCHOOL FOOTBALL STADIUM

- (1) P/A Equipment: Refer to *Part 2 - Equipment Requirements* for component specifications.
- (2) Provide **stationary** P/A system rack with room for future expansion, located on back wall in main press box area.
- (3) Provide a dual female XLR microphone connection (dual female microphone connection being fed to one channel on mixer) above the countertop at the announcers location, feeding back to main P/A system.
- (4) Provide a single female XLR microphone connection in a weatherproof hinged box in the center of the bottom underside bleachers flush with the front of the bleachers on both Home and Visitors sides of the football field, feeding back to main P/A system.
- (5) Provide speakers located 35' above grade at each of the light poles around the football field, feeding back to main P/A system.
- (6) Provide a speaker at each concession stand on outside front wall 15' above grade, feeding back to main P/A system.
- (7) When meeting height requirements, ensure speakers are not accessible (within reach) from any adjacent structure, e.g. bleachers, press box, etc.
- (8) Provide one microphone with one 25' microphone cable and **desktop** microphone stand.

F. HIGH SCHOOL BASEBALL AND SOFTBALL FIELDS

- (1) P/A Equipment: Refer to *Part 2 - Equipment Requirements* for component specifications.
- (2) Provide **stationary** P/A system rack with room for future expansion, located on back wall in main press box area.
- (3) Provide a dual female XLR microphone connection (dual female microphone connection being fed to one channel on mixer) above the countertop at the announcers location, feeding back to main P/A system.
- (4) Provide speakers located 35' above grade at each of the light poles around the field, feeding back to main P/A system.
- (5) Provide a speaker at each concession stand on outside front wall 15' above grade, feeding back to main P/A system.
- (6) When meeting height requirements, ensure speakers are not accessible (within reach) from any adjacent structure, e.g. bleachers, press box, etc.
- (7) Provide one microphone with one 25' microphone cable and **desktop** microphone stand.

G. HIGH SCHOOL DRIVERS EDUCATION

- (1) P/A Equipment: Refer to *Part 2 - Equipment Requirements* for component specifications.
- (2) Provide **stationary** P/A system rack in lower level of Drivers Education range tower with room for future expansion.
- (3) Provide a single female XLR microphone connection with waterproof duplex flap on upper level of Drivers Education range tower and a single female XLR microphone connection with waterproof duplex flap on lower level outside wall of Drivers Education range tower with connections feeding back to main P/A system.
- (4) Provide two speakers on upper level in the front of Drivers Education range tower (one speaker on each side), with connections feeding back to main P/A system.
- (5) Provide one microphone with one 25' microphone cable.

H. HIGH SCHOOL DANCE AND MUSIC

- (1) P/A Equipment: Refer to *Part 2 - Equipment Requirements* for component specifications.
- (2) Provide two speakers with **wall** mounts at opposite ends of the room, with connections feeding back to a main P/A system wall connection.
- (3) Provide **portable** rack for P/A system with exterior connections and wires for speakers and microphones, and extra space within rack for future expansion of P/A system.

PART 2 - EQUIPMENT REQUIREMENTS

A. SPECIFICATIONS

- (1) Specifications shall be written in strict accordance with the following approved equipment list.

- (2) All requests for substitution of alternate style, brand, capacity or other deviation from the approved equipment list must be submitted to the Owner prior to bidding, in writing, with the appropriate technical data, reason for substitution, and any additional costs.
- (3) Approval of any request for substitution may be granted by the Communications & Electronics Department Manager only, and shall be communicated through the assigned project coordinator. Such approval shall be applicable only to the specific project for which the request is made and shall not be assumed to be a "blanket" approval for future projects.

B. APPROVED EQUIPMENT LIST

(1) ELEMENTARY SCHOOL – MULTI-PURPOSE ROOM

- (a) Mixer / Amp Combination: Peavey, XR-8600
- (b) Speakers
 - (i) Main Room: Peavey, PV115, PV112
 - (ii) Stage Monitor: Peavey, PV12M
- (c) Microphones
 - (i) Wired: Shure 588SDX, or currently approved item on Lawson AV Bid List
 - (ii) Drop: Avlex, HM81BC-60; Shure, Easyflex, EZ0/G or /W (Shure, Palm-Size Mixer, MMB-4 (to combine drop microphones)
 - (iii) Wireless: Shure PGX 58 Vocal System
- (d) CD Player: Tascam CDA500 or currently approved item on Lawson AV Bid List

(2) MIDDLE SCHOOL MULTI-PURPOSE ROOM OR AUDITORIUM

- (a) Mixer / Amp Combination: Peavey XR-600G, XR-8600
- (b) Speakers
 - (i) Main Room: Peavey, PV115, PV112
 - (ii) Stage Monitor: Peavey, PV12M
- (c) Microphones
 - (i) Wired: Shure 588SDX, or currently approved item on Lawson AV Bid List
 - (ii) Drop: Avlex, HM81BC-60; Shure, Easyflex, EZ0/G or /W (Shure, Palm-Size Mixer, MMB-4 (to combine drop microphones)
 - (iii) Wireless: Shure PGX 58 Vocal System
- (d) CD Player: Tascam CDA500 or currently approved item on Lawson AV Bid List

(3) MIDDLE SCHOOL AND HIGH SCHOOL GYMNASIUM

- (a) Mixer / Amp Combination: Peavey, XR-8600
- (b) Speakers: Peavey, PV115, PV112
- (c) Microphones
 - (i) Wired: Shure 588SDX, or currently approved item on Lawson AV Bid List
 - (ii) Wireless: Shure PGX 58 Vocal System
- (d) CD Player: Tascam CDA500 or currently approved item on Lawson AV Bid List

(4) HIGH SCHOOL AUDITORIUM

- (a) Mixer: Peavey, 24FX or PV(R) 20 USB
- (b) Amplifier: Crest CM2204
- (c) Speakers:
 - (i) Main Room: Peavey, PV115, PV112
 - (ii) Stage Monitor: Peavey, PV12M
- (d) Microphones
 - (i) Wired: Shure 588SDX, or currently approved item on Lawson AV Bid List
 - (ii) Drop: Avlex, HM81BC-60; Shure, Easyflex, EZ0/G or /W (Shure, Palm-Size Mixer, MMB-4 (to combine drop microphones)
 - (iii) Wireless: Shure PGX 58 Vocal System
- (e) CD Player: Tascam CDA500 or currently approved item on Lawson AV Bid List

(5) HIGH SCHOOL FOOTBALL STADIUM

- (a) Mixer: Peavey, PV8
- (b) Amplifier: Crest CM2204
- (c) Speakers:
 - (i) Field: University Sound, CobraFlex III, with ID60DT Driver
 - (ii) Concession Stand: University Sound, CobraFlex II, with ID60DT Driver
- (d) Microphones
 - (i) Wired: Shure 588SDX, or currently approved item on Lawson AV Bid List
 - (ii) Wireless: Shure PGX 58 Vocal System
- (e) CD Player: Tascam CDA500 or currently approved item on Lawson AV Bid List

(6) HIGH SCHOOL BASEBALL AND SOFTBALL FIELDS

- (a) Mixer / Amp Combination: Peavey, XR-8600, XR-8300
- (b) Speakers: University Sound, CobraFlex II, with ID60DT Driver
- (c) Microphones
 - (i) Wired: Shure 588SDX, or currently approved item on Lawson AV Bid List
 - (ii) Wireless: Shure PGX 58 Vocal System
- (d) CD Player: Tascam CDA500 or currently approved item on Lawson AV Bid List

(7) HIGH SCHOOL DRIVER EDUCATION

- (a) Mixer / Amp Combination: Peavey XR-8600, XR-8300, PVI-4B
- (b) Speakers: University Sound, CobraFlex II, with ID60DT Driver

- (c) Microphones
 - (i) Wired: Shure 588SDX, or currently approved item on Lawson AV Bid List
 - (ii) Wireless: Shure PGX 58 Vocal System
- (d) CD Player: Tascam CDA500 or currently approved item on Lawson AV Bid List

(8) HIGH SCHOOL DANCE OR MUSIC

- (a) Mixer / Amp Combination: Peavey, XR-8300, PVI-4B
- (b) Speakers: Peavey, PV115, PV112; Alto, Elvis 12, Elvis 15
- (c) Microphones
 - (i) Wired: Shure 588SDX, or currently approved item on Lawson AV Bid List
 - (ii) Wireless: Shure PGX 58 Vocal System
- (d) CD Player: Tascam CDA500 or currently approved item on Lawson AV Bid List

END OF SECTION

STAGE LIGHTING SYSTEM REQUIREMENTS

03-02-09

ELEMENTARY OR MIDDLE SCHOOL MULTI-PURPOSE ROOM

A. LIGHTING CONSOLE AND ACCESSORIES

(1) GENERAL

- (a) The lighting control console shall be a microprocessor based system specifically designed to provide complete control of stage lighting systems. The console shall be selected to be "size appropriate" for each individual stage area. In most cases this will comprise either an eight (8) or sixteen (16) channel controller.
- (b) The system shall provide control of all DMX512 controlled dimmers or devices on the control channels. Any or all of the DMX512 outputs may be controlled by a channel, and patched at a proportional level. DMX outputs may also be distributed over an Ethernet network.

(2) DIMMER PACKS

- (a) Dimmer packs shall be wall mounted, with four (4) individual relay channels, with external fusing for each individual channel, eight (8) auto sequence control programs, and provide control channel status LED indicators. The dimmer shall indicate "power on" status with LED. Connections for NSI 128 Channel MicroPlex (3 pin XLR), DMX 512 Digital Control (5 pin XLR), and 15 or 20 Amp power supply cords shall be available.
- (b) Quantity – 1, 2, or 4.

(3) LIGHTING UNITS

- (a) Front lighting, consisting of eight (8) to ten (10), bar mounted lamps of up to 750 watts each, adjustable from "spot" to "flood", with a twenty-five (25') foot throw.
- (b) Strip lighting, directly above the stage or as foot lights (if required) shall consist of medium screw sockets, on six (6") inch centers, with three 36" lead wires per circuit. Lamp coloration provided by combination glass/gel sheets, held in place spring loaded frame holders, and compartmented by circuit. Hanging mount hardware as needed.

(4) ELECTRICAL

As required to suit requirements listed above.

MIDDLE SCHOOL AUDITORIUM

A. LIGHTING CONSOLE AND ACCESSORIES

(1) GENERAL

- (a) The lighting control console shall be a microprocessor based system specifically designed to provide complete control of stage, studio, and entertainment lighting systems. The console shall be selected to be "size appropriate" for each individual stage area.
- (b) The system shall provide control of all DMX512 controlled dimmers or devices on the control channels. Any or all of the DMX512 outputs may be controlled by a channel, and patched at a proportional level. DMX outputs may also be distributed over an Ethernet network.
- (c) A trackpad shall be provided for level and rate control or simultaneous control of linked channel groups for control of color changers and moving lights.
- (d) System status information, including current channel intensities, cue information, and system configuration shall be displayed on a single high resolution VGA monitor, if required.
- (e) The system shall direct user input through on-screen dynamic prompts and integral LEDs on console keys indicating current operating mode. A context sensitive on-line Help feature shall be provided to explain and provide an example of the operation of each feature of the system.

(2) DIMMER MONITORING

The lighting control system shall provide communication with the dimming system. This communication shall allow monitoring of dimming system, rack and individual dimmer information from the console. This information may be filtered by the user, allowing only critical information to be posted. Dimmer status may be changed and backup looks recorded from the console and sent to the dimming system via the network.

(3) INTERFACE OPTIONS

The full console shall support a variety of standard peripheral devices and shall provide connectors for the following:

- (a) AC input for external power supply
- (b) DMX512/1 990 outputs (three connectors)
- (c) Parallel printer
- (d) Remote Focus Unit
- (e) Remote Macros/Remote Trigger
- (f) VGA video output (one connector)

(4) PHYSICAL

- (a) All controls and console electronics for a standard system shall be housed in a single desktop console. Console power shall be 90 — 240V AC at 50 or 60Hz, supplied via an external power supply.

B. INSTALLATION DIMMER RACK

(1) GENERAL

The installation rack shall be the Sensor as manufactured by Electronic Theatre Controls, Inc., or equal. The fully digital dimmer rack shall consist of appropriate number dimming modules (with up to two dimmers per module). The rack system shall be UL Listed and GSA Approved, and shall be so labeled when delivered to jobsite.

(2) ELECTRICAL

(a) The dimming rack shall operate at up to 120/208V, three phase, four wire plus ground, 47 to 63 Hz at 800 amps max. Provisions shall be made for optional amp trap devices for fault current protection. Standard A/C fault current protection shall be 10,000, with up to 100,000 available optionally.

(b) All load and neutral terminals shall accept up to a #2 AWG wire.

(3) ELECTRONICS

(a) Dimmer control electronics shall be contained in one plug-in Control Electronics Module (GEM). Each GEM shall contain no discrete wire connections, and be housed in a formed steel body with an injection-molded face panel.

(b) The dimming rack shall be fully loaded with dual 15A GEM's and 20A GEM's.

(c) The Owner shall be provided with 10% spare of each type of GEM installed.

(4) PHYSICAL

(a) The dimmer rack shall be a freestanding, dead front switchboard, substantially framed and enclosed with 16-gauge, formed steel panels. All rack components shall be properly treated, primed and finished. Exterior surfaces shall be finished in fine texture, scratch resistant, epoxy paint. Removable top and bottom panels shall facilitate conduit termination on the rack.

(b) Racks shall be designed for front access to allow back-to-back or side-by-side installation.

(c) Racks shall be designed to allow easy insertion and removal of all modules without the use of tools. Supports shall be provided for precise alignment of dimmer modules into power and signal connector blocks. With modules removed, racks shall provide clear front access to all load, neutral and control terminations. Racks that require removable panels to access load, neutral or control terminations shall not be acceptable.

(d) An optional bus bar kit shall be available from the factory to allow adjacent racks to be powered by a single line feed. No hard, rack-to-rack wiring shall be required. Racks that require discrete cabling to connect adjacent racks shall not be acceptable.

(e) Module spaces shall be mechanically keyed to accept only the module type (15A or 20A) specified for that space. Racks that allow modules of varying wattages to plug into the same space shall not be acceptable. The rack shall be configurable to accept mixed dimmer types and sizes throughout the rack.

(f) Each rack shall provide a lockable full-height door containing an integral electrostatic air filter that shall be removable for easy cleaning. A single low-noise fan shall be located at the top of

each rack. The fan shall draw all intake air through an integral electrostatic air filter, over the surfaces of the module housing and out the top of the rack. The fan shall maintain the temperature of all components at proper operating levels with dimmers under full load, provided the ambient temperature of the dimmer room does not exceed 40°C/104°F. Dimmer racks that do not employ both locking doors and electrostatic air filters shall not be acceptable. The fan shall turn on whenever any dimmer in the system is activated. In the event of an over-temperature condition, only the affected dimmer module(s) shall shut down and a message shall appear on the control module LCD. The fan shall remain on during thermal shutdown of individual dimmer modules.

- (g) An airflow sensor shall be provided. In the event of inadequate airflow, the affected rack shall shut down until the error is corrected.
- (h) If the ambient room temperature drops below 0°C/32°F or rises above 40°C/104°F, a warning shall appear on the dimmer rack LCD. If the temperature rises above 46°C/115°F, the rack shall shut down until the condition is corrected.
- (i) A 3 x 0.5-inch LED status indicator (beacon) shall be mounted in the rack door. The beacon shall be visible throughout a wide viewing angle. In normal operation conditions, this LED is illuminated. If the rack's control module senses an error condition, the beacon shall flash until the error is corrected. An optional indicator shall be available for remote locations.

C. HOUSE LIGHT CONTROLS

(1) MECHANICAL

(a) Preset/Fader Stations

- (i) Preset/Fader stations shall operate using up to twelve programmable buttons and sixteen programmable faders with integral LEDs.
- (ii) Fader stations shall utilize standard 45 millimeter slide potentiometers.
- (iii) All Preset and Fader stations shall be ivory faceplates, fader knobs, and buttons. All faceplates shall be designed for surface mounting.
- (iv) Station faceplates shall be constructed of ABS plastic and shall use no visible means of attachment.
- (v) The manufacturer shall supply back boxes for all surface mounted stations.

(b) LCD Stations

- (i) LCD stations shall consist of a backlit liquid crystal display (LCD) with a touch screen interface. The LCD station shall operate using graphic buttons, faders and other images on up to 30 separate programmable control pages.
- (ii) Surface wall mounted stations shall be ivory faceplates.
- (iii) Station faceplates shall be constructed of ABS plastic and shall have no visible means of attachment.
- (iv) The manufacturer shall provide back boxes for all LCD stations. Surface back box dimensions shall be 5.75H x 9.12W x 3.25D.

(2) LIGHTING UNITS

- (a) Front lighting, consisting of eight (8) to ten (10), bar mounted lamps of up to 750 watts each, adjustable from "spot" to "flood", with a twenty-five (25') foot throw.
- (b) Strip lighting, directly above the stage or as foot lights (if required) shall consist of medium screw sockets, on six (6") inch centers, with three 36" lead wires per circuit. Lamp coloration provided by combination glass/gel sheets, held in place spring loaded frame holders, and compartmented by circuit. Hanging mount hardware as needed.

(3) ELECTRICAL

As required to suit requirements listed above.

HIGH SCHOOL AUDITORIUM

A. LIGHTING CONSOLE AND ACCESSORIES

(1) GENERAL

- (a) The lighting control console shall be a microprocessor based system specifically designed to provide complete control of stage, studio, and entertainment lighting systems. The console shall be the Express 48/96 as manufactured by Electronic Theatre Controls, Inc., or equal.
- (b) The system shall provide control of 1,024 DMX512 controlled dimmers or devices on a maximum of 192 control channels. Any or all of the DMX512 outputs may be controlled by a channel, and patched at a proportional level. DMX outputs may also be distributed over an Ethernet network.
- (c) A maximum of 600 cues, 500 groups, 100 Focus Points and 2,000 macros may be contained in non-volatile electronic memory.
- (d) Two pile-on playback fader pairs shall be provided, with highest level operation between pair and last action operation within each pair. Each fader pair may execute a cross-fade, cue, an all-fade, cue, a multipart cue, a subroutine cue or an effect cue. Dynamic rate control shall be provided for all cues. Cue Only or Track options shall be available for cue recording.
- (e) 96 overlapping additive channel sliders shall provide access to individual channels. The console shall provide two modes of operation: two-scene operation and single-scene operation. In two-scene mode, the console shall provide two scenes of 48 control channels each. In single-scene mode, the console shall combine the two-scene channel fader controls into one scene of 96 control channels. Selection of the operating mode shall be a menu option under the System Setup Display.
- (f) 24 additional submasters on the control portion of the console, with 10 pages of stored information and rate control, shall provide access to additive looks or effects. The submasters may also be recorded as inhibitive.
- (g) A trackpad shall be provided for level and rate control or simultaneous control of linked channel groups for control of color changers and moving lights.
- (h) System status information, including current channel intensities, cue information, and system configuration shall be displayed on a single high resolution VGA monitor.

- (i) The system shall direct user input through on-screen dynamic prompts and integral LEDs on console keys indicating current operating mode. A context sensitive on-line Help feature shall be provided to explain and provide an example of the operation of each feature of the system.
- (j) Console software upgrades shall be made by the user via 3.5 inch diskettes; changing internal components shall not be required. Software for control of remote video, network interfaces, and other optional equipment shall also be upgraded from the 3.5 inch diskette drive.
- (k) Systems that do not provide the above capabilities shall not be acceptable.

(2) CONTROLS AND PLAYBACK

The console shall provide, but not be limited to, the following:

(a) Programming Section

- (i) The console keyboard shall be grouped by function. Major groupings shall be cue, group, and submaster record functions, numeric keys, level assignment functions, display functions and display controls, soft keys, and macro key. Integral LEDs shall be associated with selected function keys for visual feedback.
- (ii) A trackpad shall be associated with the keypad for proportional intensity control over selected channels or groups and for control of cue and submaster playback timing. The trackpad may also be used to simultaneously control two groups of linked channels. Two buttons shall be associated with the trackpad to control its sensitivity (Coarse/Low and Fine/High).

(b) Playback Section

(i) Operation

1. The playback faders shall consist of A/B and C/D pair on automatic timed faders, each with [Go], [Hold], [Back], [Rate], and [Clear] keys and two 60mm potentiometers for manual override of the up and down fades.
2. It shall be possible to instantaneously halt an active cue, manually override the fade, and release it. Each fader may be assigned to the trackpad for proportional modification of cue timing. The actual modified time value for the cue shall be dynamically displayed as the rate is altered. The modified rate may then be recorded as an attribute of the cue.

(ii) Two-Scene Preset Operation

1. Fading between scenes shall be accomplished with the AB fader pair. Each cross-fader may be operated manually in real time or may be assigned a time. Timed cross-fades are assigned using [Rate] for proportional modification of cue timing. The actual modified time value for the cue shall be dynamically displayed as the rate is altered.
2. The AB fader's [Go] and [Hold] buttons shall allow basic control of the timed fade. [Back] and [Clear] shall allow for quick stepping between the two scenes, ignoring the set times.

(c) Channel Faders

- (i) 96 proportional, fully overlapping faders shall be provided with 45mm potentiometers and bump buttons. Bump buttons may be enabled or disabled. Removable write-on strips shall be provided.
- (ii) The 96 faders shall provide direct manual control of the first 96 channels. Channel levels may be affected at any time by the individual channel sliders, by the keypad, by submasters or by recorded cue level.

(d) Submasters

- (i) 24 proportional, fully overlapping submasters shall be provided with 45mm potentiometers and bump buttons. Bump buttons may be enabled, disabled or placed in solo mode. Ten pages of submaster memory shall be provided. Removable write-on strips shall be provided.
- (ii) Cues (either cross fade or effect) and groups may be individually or bank loaded to submasters. The current stage look or a subset thereof may be recorded directly to a submaster. Each submaster may be assigned an up-fade and down-fade time of up to 99:59 and a dwell time, which may be manual, held or up to 99:59. The fade action may be initiated by pressing the submaster bump button or executing a macro that activates the submaster bump button.
- (iii) Changes in submaster status between additive or inhibitive, or when changing pages, shall not become effective until the submaster is set to its home position. Submaster LEDs shall flash to indicate submasters in a "loading" state.
- (iv) A submaster may have an effect recorded into it. When the effect is activated either by pressing the submaster bump button or by moving the submaster fader, the up-fade time shall correspond to the fade-in time for the running effect, and the down-fade time for the fade-out time of the effect. Effects may be left running indefinitely, to be faded out by a second depression of the submaster bump button or by moving the fader back to the home position.
- (v) Submaster timing may be modified by the trackpad. Modifications to rates shall be automatically recorded as an attribute of the submaster.

(e) Master Fader and Blackout Key

- (i) A 45mm potentiometer shall be provided that shall be user-selectable as a Grandmaster, a Sub Grandmaster or disabled. An alternate action Blackout key shall be located near the Master fader. It may be disabled in the Setup Menu.

(3) OPERATING MODES

All operating modes shall have soft key access to functions specific to that mode. The system shall provide, but not be limited to, the following functions:

(a) STAGE MODE – Used to allow live changes

- (i) Channel lists may be constructed using the And, Thru and Except keys. Levels may also be set with the keypad or trackpad. "Selected" channels shall be those last

addressed and under wheel or keypad control. "Captured" channels shall be those whose current level has been set with the keypad.

- (ii) Channels may be controlled by the touchpad, as determined by the Channel Link map. Accessing a linked channel shall place it on the appropriate axis and shall place its linked channel(s) on the opposing axis. Any channel may be assigned independent status and will not be effected by the Master, blackout, flash and solo operations.
- (iii) Channels may be set at a user defined default level using the Level key.
- (iv) The Release key shall be used to restore selected channels, captured channels and then independent channels to current playback levels.
- (v) Selected channels may be set at a level or held to current values while all other channels are set to zero using Solo. Toggling Solo shall restore all unselected channels to original levels.
- (vi) Sneak shall fade a channel(s) from its current setting to a specified level or a level set by fader or submaster input. Channels may fade-in a user-defined default time or be given a specific time by the operator.
- (vii) A non-independent channel may be isolated and flagged between its current value and full or zero using Flash.
- (viii) Channels may be recorded into groups at proportional levels for fast recall of commonly used looks. 500 groups shall be available. Groups may then be used as building blocks for cues, submasters and other groups.
- (ix) The recorded contents of submasters and cues may also be accessed as groups allowing numerous discrete looks to be compiled quickly.
- (x) 600 cues may be recorded in any order. Each cross-fade or all-fade cue may have up to eight parts. Up to nine decimal cues may be inserted between any two whole number cues. It shall be possible to record cues with the following information:
 - 1. Fade time of up to 99 minutes 59 seconds, with split up and down as required
 - 2. Wait time for the up or down fade of up to 99 minutes 59 seconds
 - 3. Link to Cue or Link to Macro command
 - 4. Follow times of up to 99 minutes 59 seconds
 - 5. Menu-definable default fade time
 - 6. A modified rate
- (xi) Any cue number may be recorded as an effect or a subroutine cue.
- (xii) Channel levels may be specified to track or not track when modifications are made to existing cues.
- (xiii) The Only key shall allow specific parameters to be adjusted for several selected elements such as groups or categories.

- (xiv) The Except key may be used during recording to exclude cues, submasters, groups, or channels from the record destination.
 - (xv) Update may be used to selectively add modified channel levels to the designated cue, cue part, group, Focus Point or submaster without recording other stage information.
 - (xvi) Quickstep shall provide a means to run through a show, checking all cues, without having to wait for fades. When Quickstep is active, the faders shall ignore all up-fade, down-fade and wait times. Quickstep shall be accessible in Stage or Fader modes.
 - (xvii) About shall allow the operator to access information about a selected dimmer or a selected channel. About Show shall provide memory capacity information. About shall be accessible in any mode.
 - (xviii) The Learn feature, accessible in any mode, shall allow the user to record macros in real time, using any key on the console.
 - (xix) A context sensitive On-line Help feature shall describe each key and fader function (including soft keys). It shall also provide a simple example of how each is used in the context of the current display. This feature shall be accessible in any mode.
 - (xx) Dimmer check and channel check functions shall be provided. Additionally, dimmers channels and groups may be “parked” at levels. Those levels are not added to any live record operations, nor may they be changed until the parked element is “unparked”.
- (b) BLIND MODE – Used to allow modification of elements such as cues, groups, submasters, focus points, effects, and subroutines without affecting stage levels.
- (i) The Blind displays shall allow preview, creation, deletion and modification of the above elements. Modifications may be recorded in a “Cue Only” or “Tracking” manner. All attributes may be changed in this mode.
 - (ii) List displays shall show the recorded elements with all associated attributes. Range editing shall be possible in these displays. The List displays available shall be: Cue List, Group List, Submaster List, and Focus Point List. Spreadsheet shall allow simultaneous viewing of multiple elements and their associated channels. Range selection and editing shall be possible. Replace Level and Delete commands shall be provided.
 - (iii) Effect cues and submasters shall be created and edited in the Blind Effect Mode.
 1. Any cue or submaster may be programmed as an effect. Effect channels operate in a “last action” manner when run through a fader, and are “highest level” when accessed through a submaster.
 2. An effect may contain 100 steps. Each step may contain any channel or group at any level.
 3. Each step may contain a step time, fade-in, dwell and fade-out time, high and low level. Range editing of steps shall be provided.
 4. Each effect may be recorded with overall fade, dwell and fade out times. The dwell time may be “held”, allowing the operator to manually initiate the fade out of the effect. The timing values shall be associated with the submaster bump button when an effect cue is loaded to a submaster.

5. Effects attributes may be assigned in a variety of combinations. Attributes shall include positive, negative, reverse, bounce, build, alternate and random. A random rate may be assigned to any effect.
 6. Steps may be edited with [+] and [-] commands. Steps may be inserted and deleted, with subsequent steps automatically renumbered.
 7. During effect cue playback, the left fader shall become a level master and the rate may be controlled by the trackpad. The rate may then be recorded as an attribute of the effect. Effects which are moved to a background fader, use background overrides for rate and level control.
 8. The level of an effect loaded on a submaster shall be controlled by the submaster and the rate shall be controlled by the trackpad. The proportional time value shall be automatically recorded as a submaster attribute.
- (iv) Subroutines shall be created and edited in the Blind Subroutine Mode.
1. Subroutines are special cues that control the playback of a series of existing cues, similar to an effect. Subroutines shall allow modification of each cue's fade time and cross-fade level without changing those elements in the base cue. Any cue may be recorded as a subroutine and any cue (other than a subroutine cue) may be placed in a subroutine.
 2. Subroutines may contain up to 100 steps, each of which may control a cue, its cross-fade level, up and down fade time, follow time and fade type. Any step may also be programmed to loop back, bounce, hold for go command, or jump to a specified cue when the follow time has elapsed.
 3. Subroutine steps may be inserted and deleted, with subsequent steps automatically renumbered. Range editing is also provided.
 4. During subroutine playback, the left fader shall become a level master and the rate may be controlled by the trackpad.
- (c) PATCH MODE – Used to display the system control channels with their associated dimmer assignments, proportional level and profiles. A dimmer may be assigned a proportional level and one of thirty-two user definable profiles.
- (d) SETUP MODE – Used to access system configuration information and provide access to memory functions.
- (i) The Setup menu shall allow access to a number of secondary operations and sub-menus. The date and time shall be set in the Setup menu.
 - (ii) The Systems Settings menu shall allow access to system defaults, including:
 1. Number of system channels and dimmers
 2. Default up and down fade times
 3. Default level
 4. Default fader clear time
 5. Default Sneak time

6. 12/24 hour clock option
 7. Record Lockout option
 8. Master function selection
 9. Blackout button option
 10. Single Scene/Two Scene Operation selection
- (iii) The Input/Output menu shall be used to define the starting DMX number for each DMX output port. The DMX transmission speed may be varied to accommodate a variety of DMX receivers.
 - (iv) The Diskette Functions menu shall provide access to disk procedures, including formatting, storing to and loading from a 3.5 inch diskette. It shall be possible to load all show data from a disk. Each show shall be date and time stamped.
 - (v) The Clear Functions menu shall allow clear memory functions. It shall be possible to clear the entire memory, or to clear specified sections as required.
 - (vi) The Print Menu shall allow hard copy printouts of selected parts of the show memory. Printing shall be a background task, and shall not prohibit other functions of the console.
 - (vii) Macro Menu shall provide a method to record, view and edit system macros. A maximum of 2,000 macros may be recorded, either in this display or in Learn mode. Macros may contain up to 50 keystrokes each. Most console keys may be programmed into macros. Macro Wait and Link macro commands shall be provided.
 - (viii) A Dimmer Monitoring display shall be provided for feedback from the dimming system. This shall provide information about the system, individual racks and individual dimmers, as required.
 - (ix) A Channel Attributes display shall allow channel attributes to be programmed.
 1. A channel may be programmed for independent operation. Independent channels are not affected by the Grandmaster, Blackout, solo or flash.
 2. A channel may also be assigned a "lip" attitude, which places an inverse profile on the dimmers controlled by that channel.
 3. The Channel Link feature shall allow channels and groups to be linked together and assigned to appear on the touchpad. When one or more linked channels are selected, their respective channels shall be automatically assigned to the appropriate axis.

(4) DIMMER MONITORING

The lighting control system shall provide communication with the dimming system. This communication shall allow monitoring of dimming system, rack and individual dimmer information from the console. This information may be filtered by the user, allowing only critical information to be posted. Dimmer status may be changed and backup looks recorded from the console and sent to the dimming system via the network.

(5) INTERFACE OPTIONS

The full console shall support a variety of standard peripheral devices and shall provide connectors for the following:

- (a) AC input for external power supply
- (b) DMX512/1 990 outputs (three connectors)
- (c) Parallel printer
- (d) Remote Focus Unit
- (e) Remote Macros/Remote Trigger
- (f) VGA video output (one connector)

(6) PERIPHERAL DEVICES

The Remote Focus Unit (RFU) shall provide a small, portable control panel containing a limited set of control keys. The RFU's keys shall function identically to the same keys on the Full Console. The RFU shall allow the user to record and use cues, submasters, macros and groups.

(7) PHYSICAL

All operator controls and console electronics for a standard system shall be housed in a single desktop console. Console power shall be 90 — 240V AC at 50 or 60Hz, supplied via an external power supply.

B. INSTALLATION DIMMER RACK

(1) GENERAL

The installation rack shall be the Sensor as manufactured by Electronic Theatre Controls, Inc., or equal. The fully digital dimmer rack shall consist of 48 dimming modules (with up to two dimmers per module). The rack system shall be UL Listed and GSA Approved, and shall be so labeled when delivered to jobsite.

(2) ELECTRICAL

- (a) The dimming rack shall operate at up to 120/208V, three phase, four wire plus ground, 47 to 63 Hz at 800 amps max. Provisions shall be made for optional amp trap devices for fault current protection. Standard A/C fault current protection shall be 10,000, with up to 100,000 available optionally.
- (b) All load and neutral terminals shall accept up to a #2 AWG wire.

(3) ELECTRONICS

- (a) Dimmer control electronics shall be contained in one plug-in Control Electronics Module (GEM). Each GEM shall contain no discrete wire connections, and be housed in a formed steel body with an injection-molded face panel.
- (b) The dimming rack shall be fully loaded with dual 20A GEM's and 50A GEM's.
- (c) The Owner shall be provided with 10% spare of each type of GEM installed.

(4) PHYSICAL

- (a) The dimmer rack shall be a freestanding, dead front switchboard, substantially framed and enclosed with 16-gauge, formed steel panels. All rack components shall be properly treated, primed and finished. Exterior surfaces shall be finished in fine texture, scratch resistant, epoxy paint. Removable top and bottom panels shall facilitate conduit termination on the rack.
- (b) Racks shall be designed for front access to allow back-to-back or side-by-side installation.
- (c) Racks shall be designed to allow easy insertion and removal of all modules without the use of tools. Supports shall be provided for precise alignment of dimmer modules into power and signal connector blocks. With modules removed, racks shall provide clear front access to all load, neutral and control terminations. Racks that require removable panels to access load, neutral or control terminations shall not be acceptable.
- (d) An optional bus bar kit shall be available from the factory to allow adjacent racks to be powered by a single line feed. No hard, rack-to-rack wiring shall be required. Racks that require discrete cabling to connect adjacent racks shall not be acceptable.
- (e) Module spaces shall be mechanically keyed to accept only the module type (15A, 20A, or 100A) specified for that space. Racks that allow modules of varying wattages to plug into the same space shall not be acceptable. The rack shall be configurable to accept mixed dimmer types and sizes throughout the rack.
- (f) Each rack shall provide a lockable full-height door containing an integral electrostatic air filter that shall be removable for easy cleaning. A single low-noise fan shall be located at the top of each rack. The fan shall draw all intake air through an integral electrostatic air filter, over the surfaces of the module housing and out the top of the rack. The fan shall maintain the temperature of all components at proper operating levels with dimmers under full load, provided the ambient temperature of the dimmer room does not exceed 40°C/104°F. Dimmer racks that do not employ both locking doors and electrostatic air filters shall not be acceptable. The fan shall turn on whenever any dimmer in the system is activated. In the event of an over-temperature condition, only the affected dimmer module(s) shall shut down and a message shall appear on the control module LCD. The fan shall remain on during thermal shutdown of individual dimmer modules.
- (g) An airflow sensor shall be provided. In the event of inadequate airflow, the affected rack shall shut down until the error is corrected.
- (h) If the ambient room temperature drops below 0°C/32°F or rises above 40°C/104°F, a warning shall appear on the dimmer rack LCD. If the temperature rises above 46°C/115°F, the rack shall shut down until the condition is corrected.
- (i) A 3 x 0.5-inch LED status indicator (beacon) shall be mounted in the rack door. The beacon shall be visible throughout a wide viewing angle. In normal operation conditions, this LED is illuminated. If the rack's control module senses an error condition, the beacon shall flash until the error is corrected. An optional indicator shall be available for remote locations.

C. HOUSE LIGHT CONTROLS

(1) MECHANICAL

(a) Preset/Fader Stations

- (i) Preset/Fader stations shall operate using up to twelve programmable buttons and sixteen programmable faders with integral LEDs.
- (ii) Fader stations shall utilize standard 45 millimeter slide potentiometers.
- (iii) All Preset and Fader stations shall be ivory faceplates, fader knobs, and buttons. All faceplates shall be designed for surface mounting.
- (iv) Station faceplates shall be constructed of ABS plastic and shall use no visible means of attachment.
- (v) The manufacturer shall supply back boxes for all surface mounted stations.

(b) LCD Stations

- (i) LCD stations shall consist of a backlit liquid crystal display (LCD) with a touch screen interface. The LCD station shall operate using graphic buttons, faders and other images on up to 30 separate programmable control pages.
- (ii) Surface wall mounted stations shall be ivory faceplates.
- (iii) Station faceplates shall be constructed of ABS plastic and shall have no visible means of attachment.
- (iv) The manufacturer shall provide back boxes for all LCD stations. Surface back box dimensions shall be 5.75H x 9.12W x 3.25D.

(2) ELECTRICAL

As required to suit requirements listed above.

ACCESS CONTROL SYSTEM REQUIREMENTS

05-28-14

1. GENERAL DESIGN CRITERIA

- A. In an effort to streamline the access control process, all installations will consist of, at a minimum:
 - 1.) A door station to include:
 - a. Camera
 - b. IntercomCard
 - c. Reader
 - d. Call Button
 - 2.) A master station to include:
 - a. Video Monitor
 - b. Intercom
 - c. Door Release
 - 3.) Electric door lock similar but not limited to:
 - a. Electrified crash bar, or
 - b. Electric strike, or
 - c. Magnetic lock to include a passive infrared motion detector, exit release button and fire alarm system tie-in.
- B. Design requirements may vary for each installation, however all will build from the basic design concept.
- C. Any substitutions or deviations from approved equipment list will be reviewed by Communications & Electronics personnel prior to installation. Substitutions must be of equal or higher quality than specified.
- D. Installations will be performed by licensed and trained personnel only.

2. REQUIREMENTS

- A. If an Internet Protocol (IP) based access control system is installed, IP addresses will be required. These can be obtained from CCTV/LAN by providing a site drawing showing the controlled entry point location and location of the master and substation controls.
- B. CCTV/LAN will indicate the Intermediate Distribution Frame (IDF) to use, by room number, switch number(s), and port number(s).
- C. This will also allow CCTV/LAN to confirm multicast and PoE capabilities are in place.
- D. Installation of a magnetic lock will require the additional installation of the following:
 - 1.) Passive Infrared motion sensor to interrupt magnet power,
 - 2.) Emergency exit push button,
 - 3.) Relay, connected to the fire alarm system, to disconnect power to the magnet, in the event of a fire alarm activation. Relay wiring and connection to fire alarm panel will be provided by a licensed fire alarm contractor. Communications & Electronics will determine the contractor to be used.

- 4.) It is recommended that an electronic keypad be installed, in conjunction with the magnetic lock. This will allow access by School Security personnel after hours, once the key lock has been opened. A separate code can be used to facilitate their entry.

E. Master monitor station

- 1.) Connections for multiple video door stations.
- 2.) Connections for multiple sub monitors.
- 3.) Color monitor.
- 4.) Talk button for PTT or VOX activate communications.
- 5.) Door release button.
- 6.) Door chime and communication volume control.
- 7.) Brightness control.
- 8.) Built-in picture memory unit to record multiple images of visitors.

F. Door Station

- 1.) Vandal resistant with stainless steel faceplate.
- 2.) Proximity card reader with standard Wiegand output.
- 3.) Color CCD camera.
- 4.) Speaker and microphone.
- 5.) Metal call button.

G. Access control card reader panel

- 1.) Capable of multiple access control readers.
- 2.) Support card readers that use the Wiegand Reader Interface.
- 3.) Supports simultaneous users.

H. Wiring

- 1.) Equipment manufacturer's recommendations should be followed .
- 2.) When not specified, wiring shall be solid, non-shielded, 18 AWG, 2 and/or 6 conductor plenum cable.
- 3.) Splices are not allowed. Wire runs should be continuous runs from termination to termination.

I. Raceways and fittings

- 1.) All exterior exposed cabling must be concealed in EMT conduit.

- 2.) All interior cabling must be concealed above ceilings or within walls, where possible.
- 3.) Where interior cabling is exposed, EMT conduit or raceway will be used.
 - a. Conduit will be painted to match existing building.
 - b. All raceway runs will utilize the proper fittings, connections and boxes, to provide a professional appearance.
- 4.) Wall penetrations shall be caulked, patched and painted to match existing building.
- 5.) Cabling run above ceilings shall utilize hangers/hooks attached to beams or rafters. Plenum cabling should be used.

END OF SECTION