

New Orleans Public Schools

IT Performance Standards Recommendations

IT Performance Standards and Recommendations

Table of Contents

Tab 1	Executive Summary
Tab 2	P-700 Technology Systems
Tab 3	P-701 Technology Space Requirements
Tab 4	P-800 Electrical Systems
Tab 5	Appendix – Technology
Tab 6	Appendix – Electrical
Tab 7	Additional Items to be Commissioned
Tab 8	E-Rate Implications

Executive Summary

P-700 Technology Systems

PREVIOUS SECTION DATED 2008 HAS BEEN DELETED AND REPLACED WITH THE FOLLOWING SECTION.

TECHNOLOGY SYSTEMS

DEFINITIONS

Technology Designer - Design Professional

BICSI - Building Industry Consulting Services International

RCDD - Registered Communications Distribution Designer

Installing Contractor - Sub-contractor to the general construction contractor.

ER- Equipment Room, Main Distribution Frame (MDF), Main Communications Center (MCC)

TR- Telecommunication Room, Intermediate Distribution Frame (IDF), Intermediate Communications Closet (ICC)

Drop - One RJ45 connector and cable. Drops may be ganged together on a single faceplate in multiples of 2 or 4.

Rack – all racks to be used for mounting network electronics shall be 4 post open racks, with cable management and power strips

1.01 INTRODUCTION

- A. The Technology Systems Plans and Specifications shall be prepared in accordance with the latest edition–of the BICSI Telecommunications Distribution Methods Manual (TDMM) and shall be designed and approved by an RCDD with a minimum of 3-years experience or equivalent experience such as registered professional electrical engineer with 5 or more years of experience in the design of technology systems.
- B. The Technology System Plans shall consist of the following minimum Telecommunications Drawings, as required. In addition, the Technology Designer shall include “basic” versions of the items indicated in paragraphs 1 through 4 in the Construction Documents. The Installing Contractor shall include detailed versions as part of their Submittals requirements (Document number shall be at the discretion of the Technology Designer):
1. ER/TR - Plan Views - Elevations - Racks and Walls Elevations. Detailed views of Technology rooms. Drawings to indicates technology layout (racks, cable trays, etc.), mechanical/electrical layout, rack elevations and backboard elevations.
 2. Faceplate & Cable Labeling details, Fire stopping details. Detailed drawings of symbols and installation such as faceplate labeling, faceplate types and layouts, detailed system layouts and wiring diagrams, detailed racks and equipment layouts, raceways, and network riser diagrams.
 3. Site Plans - Exterior Pathways and Inter-Building Backbones. Drawings to show physical and logical connections from the perspective of an entire campus, such as actual building locations, exterior pathways and inter-building backbone cabling on plan view drawings and major system nodes and related connections on the logical system drawings.
 4. Layout of complete building per floor - Serving Zone Boundaries, Backbone Systems, and Horizontal Pathways. Layout of complete building per floor. The drawings shall indicate location of serving zones, technology equipment rooms, access points, pathways and other systems that need to be viewed from the complete building perspective.

5. Miscellaneous Drawings. Additional drawings to be used in conjunction with the drawings listed above.
- D. The Technology Designer should make every attempt to reduce the quantity of TRs. As an example, in a multi-story building, place a TR on the second floor and serve the 1st, 2nd and 3rd floors from the same closet. TR's should not be placed more than 200 feet horizontal from each other. In a multi-story building, ER's must be located on the second floor. ERs and TRs MUST be individual rooms containing NO other equipment except the a/c and electrical equipment serving only that room. TRs shall have no windows, have independent cooling source to ensure the room stays below 72 degrees (room temperature shall be maintained at 68 to 72 degrees). TR's do not have heating units. TR's shall be accessible from a main or central hallway. The room SHALL NOT be accessed from any other room except a corridor. It SHALL HAVE a card accessible, CCTV monitored, outward swinging door. It shall be air conditioned by a stand-alone d/x a/c system backed-up by generator.
- E. The Technology Designer must locate the ER and as many system components as possible above the potential flooding elevation.
- F. Because many of the Technology Systems must be operational for life-safety purposes and building evacuation purposes, the Technology Designer is to connect these systems and their associated UPS units to the Building's Emergency Generator System when available. Coordinate the Generator capacity with the Electrical Design Professional.

1.02 TECHNOLOGY SYSTEMS

- A. Each Construction Project for new and remodeled facilities shall provide the baseline Technology systems.

Systems provided by contractor are as follows:

1. ER and TR Rooms

Dimensions of ER and TR rooms shall be compliant with BICSI standards. Minimum ER size of 12' x 16' for up to (4) rack arrangement. Minimum TR size of 8' x 10' for up to (2) racks arrangement.

- a. Racks for mounting network equipment in all ER and TRs with appropriate patch panels and wire management.
- b. One uninterruptible power source per equipment rack capable of maintaining 3000 watts for a minimum of 10 minutes utilizing a 220v 30amp twist lock outlet.
- c. A minimum of one rack for service providers in addition to a quantity of racks appropriate for housing the number of switches needed for the number of data drops served by the room.
- d. Cable Trays
- e. Conduits
- f. Entrance Conduits
- g. Telecom Grounding
- h. Backboards
- i. Power
 - 1) Includes a 208v 30amp twist lock electrical outlet for each rack provided
- j. Copper patch cables, one for every drop, equal quantities of 3, 5 and 7 foot lengths.

2. TECHNOLOGY CABLING

- a. Technology Data Cabling based on single-mode fiber and CAT-6a cabling systems
- b. Fiber Patch Panels
 - 1) Patch Panels with LC fiber connectors
 - 2) Single-Mode fiber cable with LC connectors utilized
- d. Copper and fiber Backbone Cabling
- c. Includes Cat 6a patch Panels with RJ45 jacks for patch cables and 110 blocks for permanent cable.
- g. Includes testing with reports in a digital format
- h. Includes labeling on patch panels, cables and faceplates in the BICSI standard naming format

3. NETWORK ELECTRONICS – Provided by Owner, indicated for reference only

- a. Includes the Network Electronics to be included as the Project Design requires
 - 1) L-3 Core Switch
 - 2) 24 port, POE, Gigabit Switch with 4 gigabit uplinks
 - a. quantity will be determined by number needed to patch 75% of actual data port count
 - 3.) Wireless Access Points (WAPs)
 - a. 802.11abgn with sufficient quantity to provide full building coverage
 - b. Mountable units
 - 4.) Wireless Controller/ Switches
 - a. Includes Central Wireless Controller, Control Software and Server Appliance.
 - 5.) Radius Authentication Server
 - a. Includes Radius Server and Software for Authentication

4. Voice over IP Telephone System – Provided by Owner, indicated for reference only

- a. VoIP Phone System
- b. Digital Display Speaker VoIP Phones
- c. Wireless Phones
- d. Attendant Consoles
- e. Power Failure Transfer Unit (PFT)
- f. Interconnect Cables
- g. Analog Trunk Interfaces
- h. Analog Station Interfaces
- i. PRI interfaces
- j. Voice Mail
- k. IP Trunking
- l. POE Switches

5. IP Based Video, Surveillance Systems and Intrusion Systems

- a. Provide:
 - 1) Interior Cameras
 - 2) Exterior Cameras
 - 3) Cat. 6A Cabling from each camera to nearest TR

4) Testing and Commissioning

b. Camera Locations

- 1) Exterior building entries
- 2) Exterior loading docks
- 3) Exterior dumpsters
- 4) Exterior ground level mechanical/electrical equipment locations
- 5) Exterior playgrounds
- 6) Exterior parking lot
- 7) Exterior portion of buildings not visible from public street (e.g. courtyards)
- 8) All interior corridors, maximum 80 feet between cameras, each camera in view of at least one other camera
- 9) Interior of all doors leading to exterior
- 10) All stairwell interiors, including floor landings and intermediate landings
- 11) Entry to all stairwells from corridor
- 12) Student restroom entries from corridors
- 13) Cafeteria serving lines
- 14) Cafeteria POS stations
- 15) Kitchen dry food storage
- 16) Kitchen walk-in freezers/coolers
- 17) Gymnasium, minimum four cameras
- 18) Student locker room entries from corridors
- 19) Administration Office visitors entrance
- 20) Entry vestibules
- 21) Computer laboratories
- 22) Safe in Administration Area

6. PAGING & CENTRAL SOUND SYSTEM (stand-alone system)

- a. A low voltage amplified intercommunications and Speaker-system connected via a multi-zone paging adapter.
- b. The Central Office CD/USB/MP3/FM Tuner connected to the-Paging System.
- c. Capable of connecting to a Central Emergency Evacuation Switch and Tone Generator.
- d. FM Antenna system for feeding various FM tuners located in the building.
- e. The Central Bell/Clock system connected to the paging-system.
- f. Multi zone paging system
 - 1) Paging Speakers.
 - a) Includes intercommunications call boxes with speakers and handsets; and paging horns as –required.
 - 2) Paging Adapter
 - 3) Paging Blocks
 - 4) Paging Power Supplies
 - a) connected to UPS/Generator
 - 5) Tone Generator
 - 6) Emergency Switch
 - 7) Central FM Tuner
 - 8) Central CD/MP3 Player
 - 9) FM Antenna
 - 10) Administration Control
 - 11) Call-in Stations
 - 12) Volume control
 - 13) Programming

- 14) Training
- 15) Testing

7. WIRELESS CLOCK SYSTEM (Shall be included as part of the PA System)

- a. Self-adjusting atomic or satellite wireless clocks.
 - 1) Single sided in rooms, double sided in hallways
 - 2) Wireless Clock Guards as required --Gym areas, etc.
- b. Wireless Transmitter and Receiver and Antennas
- c. Wireless Tone Generator and Scheduling System

8. CLASSROOM A/V SYSTEMS

- a. Interactive Whiteboard
 - 1) one board, wall mounted, in every classroom
 - 2) additional boards in rooms where instruction is likely to occur including but not limited to conference, library, music...
 - 3) Shall include speakers for unit
 - 4) Include mobile interactive whiteboards as necessary.
- b. Owner-provided Media Center Mobile Cart
 - 1) Remote Origination Carts with Cameras, Tripod, Cabinet, Microphone, etc.

9. ACCESS CONTROL AND INTRUSION DETECTION

- a. Provide
 - 1) Proximity – type card readers
 - 2) Electric Strikes
 - 3) Magnetic locks
 - 4) Door contacts
 - 5) Motion detectors for exiting
 - 6) Installation of Owner-furnished Cisco controllers (one per door)
 - 7) Cabling from controller to components
 - 8) Cat 6a cabling from each controller to nearest TR
 - 9) Testing and commissioning
- b. Provide card readers and associated equipment at:
 - 1) Exterior of main entry (same leaf as handicap operator)
 - 2) Interior vestibule door of main entry (same leaf as handicap operator)
 - 3) Exterior of all doors capable of entry to building
 - 4) Corridor doors intended to limit access to portions of the building after hours
 - 5) Technology Main Equipment Room (ER) and all Telecommunications Room (TR)
 - 6) Mechanical Rooms
 - 7) Electrical Rooms

END OF SECTION

P-701 Technology Space Requirements

Purpose The purpose of this section is to provide a guide to designers for selecting appropriate educational technology in spaces. All final product selections listed below and others not included shall be reviewed with the Louisiana Recovery School District and OPSB

CLASSROOMS (Standard)		
	Data	(8) data drops w/necessary components for student work stations. (2) data drops w/necessary components for the teacher's location. (1) data w/necessary components for the interactive whiteboard with video projector (Promethean ActiveBoard +2) (1) data drop near ceiling for WAP
	Other Wiring	(1)VGA drop and (1) USB drop from the IWB (Promethean ActiveBoard+2) to the teacher's location.
	Equipment	(1) PA/Intercom call box with handset (1) 78" interactive whiteboard, Promethean ActiveBoard+2 (with speakers and video projector) (1) 12-inch wireless battery-operated clock
COMPUTER LABS		
	Data	(30) data drops w/necessary components for student work stations (2) data drops w/necessary components for teacher workstation. (1) data drop w/necessary components for the interactive whiteboard. (Promethean ActiveBoard+2) (1) data drop near ceiling for WAP. (2) data drop w/necessary components for printers.
	Other Wiring	(1) VGA drop and (1) USB drop from the IWB (Promethean ActiveBoard +2) to the teacher's location.
	Equipment	Intercom/PA call box with handset (1) 78" interactive whiteboard, Promethean ActiveBoard+2 (with speakers and video projector) (1) 12-inch wireless battery-operated clock

MEDIA CENTERS/Library		
	Data	Adequate number of data drops (Minimum of 16) (4) data drops for checkout counter Adequate number of data drops for each research station (minimum of 2 at each location) (2) data drops for each printer (2) data drops near ceiling for WAPs (2) data drops and 20A, 120V outlet for LCD Televisions
	Equipment	(1) Intercom/PA call box (1) 78" interactive whiteboard, Promethean ActiveBoard+2 (with speakers and video projector) (1) 12-inch wireless battery-operated clock (2) 47-inch LCD televisions (2) articulated LCD television mounts
OFFICES		
	Data	(4) data drops
CONFERENCE ROOM		
	Data	(4) data drops (1) data drop near ceiling for WAP
RECEPTIONIST		
	Data	(8) data drops for staff workstations, printer and Fax machine. (1) data drop near ceiling for WAP (1) RJ11 drop for POTs line
	Equipment	Main Intercom/paging console
GYMNASIUM		
	Data	2 drops for WAPs
	Equipment	Gymnasium sound system 15-inch wireless battery-operated clocks w/wire guards Wall-mounted speakers for intercom/paging system
MAIN ENTRANCE & SECURITY GUARD STATION		
	Data	(2) data drops
	Equipment	Annunciators for -Fire Alarm -Generator -Area of Refuge Master Station

CAFETERIA/DINING		
	Data	(2) data drops near ceiling for WAPs (2) data drops for LCD televisions
	Equipment	15-inch wireless battery-operated clock Speakers for the school intercom/paging system. (2) 47" LCD televisions. (2) Articulated LCD television mounts.
TELECOMMUNICATIONS ROOM (TR)		
	Data	Fiber/copper patch panels
	Equipment	(1 minimum) Server & telecommunication equipment rack with cable management hardware and plug strips. Additional racks as necessary to accommodate quantity of data drops and additional hardware furnished by owner UPS that can maintain 3000 watts per rack for 10 minutes utilizing 220 volt 30 amp outlet, 1 per rack.
	AC	Sufficient stand alone air-conditioning unit to maintain 68 degrees based on 3000 watt equipment load per rack, connected to standby generator
CORRIDORS		
	Data	(1) data drop near ceiling, every 50 to 60 ft for wireless access points
	Equipment	(1) speaker, every 25 to 28 feet for paging system. (1) Minimum per corridor with a max of 100 ft apart, 12 inch wireless battery-operated clocks Cable tray above ceiling
EXITS		
	Equipment	Video surveillance cameras at each exit
KITCHENS		
	Data	(4) data drops in two 2-gang receptacles with face plates for POS machines. If the POS station is floating within the room, the drops should be flush mounted in a floor box.
	Equipment	Ceiling paging speakers

EQUIPMENT ROOM (ER)		minimum room size shall meet BICSI Standard, minimum 12' x 16' for (4) racks.
	Equipment	(4 minimum) equipment racks Uninterruptable power supply (UPS) that can maintain 3000 watts of power for 10 minutes, utilizing 220v/30a outlet, 1 per rack
	AC	Sufficient stand alone air-conditioning unit to maintain 68 degrees based on 3000 watt equipment load per rack, connected to standby generator.
AUDITORIUM/STAGE/ CONTROL ROOM		
	Data	(4) data drops in control room (2) data drops for WAPs (2) data drops and a 120 volt 20 Amp outlet for LCD TV in High Schools
	Equipment	High lumens output video projector (6,000 lumens) (1) universal precision gear video projector mount (1) anti-vibration absorber ceiling video projector support Local control on stage Auditorium sound system (2) 47 inch LCD televisions (in High Schools) (2) Articulated LCD televisions mounts (in High Schools) Audio/video control system
EXTERIOR		
	Equipment	Intercom/paging speakers
MUSIC PERFORMANCE/DANCE ETC		
	Data	(6) data drops (1) data drop for Wireless Access Point
	Equipment Sound System	Intercom/paging call box

P-800 Electrical Systems

1.01 ELECTRICAL DISTRIBUTION

- A. Electrical systems distributed throughout the building shall be based upon the 480-volt or 208-volt, three-phase configuration.
- B. Electrical distribution equipment shall not be located below the established flood elevation. Verify this elevation prior to design.
- C. Surge protection devices and lightning arrester devices shall be located on main service distribution equipment. Surge protection devices shall be provided on all branch distribution electrical equipment.
- D. Current carrying conductors shall be a minimum No. 12 American Wire Gauge. Conductor size No. 12 and No. 10 shall be solid type, copper. Conductors larger than No. 10 shall be stranded. Copper/Aluminum rated lugs for terminating aluminum conductors are acceptable. Conductor sizes 1/0 (copper equivalent) and larger may be compact stranded aluminum.
- E. Current carrying conductors shall be installed in conduit systems conforming to the National Electrical Code.
- F. Continuous equipment grounding conductors shall be installed in all circuits bonded to all ground lugs, bussing, switches, receptacles, equipment frames, etc., per the National Electrical Code.
- G. Electrical systems main service equipment shall be designed with a 15 percent spare amperage capacity and 30 percent spare space capacity at the end of design phase. Panel boards shall be designed up to 80 percent of capacity and be provided with 30% spare space or a minimum of six (6) spare over current protection devices, whichever is greater, at the end of design phase. Provide spare over current protection devices in branch distribution panelboards. Aluminum bus is allowable for all electrical service and distribution equipment, including panelboards.
- H. Electrical energy distribution equipment shall be located in dedicated electrical rooms or on mechanical decks. Branch circuit distribution panelboards recessed in corridor walls will not be acceptable.
- I. All electrical equipment rooms shall be located with direct access from corridor or exterior. It shall not be required to pass through another room or space to enter an electrical equipment room, nor shall it be required to pass through an electrical equipment room to enter another room or space. Other rooms or spaces include rooms or spaces containing Technology Systems equipment. Electrical distribution equipment and Technology Systems equipment shall not be located in the same room or space except for branch circuit panelboards that serve only the Technology Systems equipment in a Technology Systems room.

Main electrical rooms shall be located as close to major equipment loads (usually main mechanical equipment) and Utility Company transformer as possible. Generators should also be located in close proximity to main electrical room. Consideration should be given to an independent fire pump electrical service if fire pump is remote from main electrical room. Utility company transformer pad shall be located as close to building as possible while maintaining all Utility Company clearance and access requirements.

Electrical closets for transformers and branch circuit panelboards shall be located and sized so that secondary (208/120 volt) feeder runs are as short as practical. Electrical closets should be stacked to the extent practical and consideration shall be given to the routing of branch circuits emanating from the closet (avoid stairwells, elevators, mechanical shafts, etc).

- J. Dry type transformers shall be NEMA Premium compliant based on the total demand load the transformer serves.
- K. Life safety and standby power shall be delivered by an on-site natural gas fired, standby power generator. Provide emergency power distribution to serve required systems per the NEC and the State Building Code including:
 - 1. Life Safety Equipment:
 - a. Emergency egress and exit lighting systems indicated in section 1.02.
 - b. Fire alarm system
 - c. Pre-action fire suppression equipment
 - 2. Standby Equipment Loads
 - a. Elevators
 - b. Central sound system (Intercom/PA)
 - c. Minimum of 2 receptacles in main mechanical and electrical equipment rooms.
 - d. Main IT Equipment Room (ER) equipment including air conditioning.
 - e. Telecommunications Room (TR) equipment including air conditioning
 - f. Security systems (CCTV, access control)
- L. Coordinate standby circuit locations, UPS electrical requirements, and electrical loads with the Technology Designer.
- M. The overall electrical distribution system power factor as seen by the local electric utility company shall be greater than the minimum factor established by local electric utility serving the building.

1.02 LIGHTING

- A. Classroom Lighting and Controls
 - 1. Classroom Lighting, including Laboratories shall be 3 lamp direct/indirect linear pendants where possible.
 - a. Lamp/Ballasts to be T8 Programmed Rapid Start.
 - b. Outer lamps (direct/indirect) shall be switched separately from inner lamps (direct). Provide necessary shielding of lamps.

- c. Pendant Lighting shall be suspended at least 12" and preferably 18"-24" from ceilings. Bottom of fixtures shall be no lower than 8'- 6" AFF.
- d. Provide separate lighting for markerboards in classrooms.
- e. Downlight component should minimize light spilled on interactive white boards when in use.
- f. Orient rows Parallel to walls with daylight exposure where possible.
2. Classrooms, including labs shall utilize daylighting controls on the rows of lighting receiving daylight exposure. Daylighting shall be accomplished by a photocell controlling dimming ballasts in the uplight portion of these rows.
3. Teacher Controls – There shall be a single, control station at the front teaching position of the classroom for control of the following functions:
 - a. General mode – Uplight portion of direct/indirect lighting
 - b. A/V mode – Downlight portion of direct/indirect lighting
 - c. Markerboard – switches markerboard fixture where used.
 - d. All Off
4. Modes – System must be programmed/setup such that General and A/V modes are never allowed to be on concurrently.
5. Controls at door – Provide a control at each door to allow the following control:
 - a. General Mode ON
 - b. All OFF
6. Occupancy Sensors – Classrooms shall utilize Dual Technology Sensors where practical. Corner mounted sensors are preferred due to resistance to airflow and other obstructions encountered with 360 degree ceiling mounted sensors. Ensure that sensor provides adequate coverage of classroom occupants. If ceiling mounted units must be used, ensure that they are located at least 4 feet from any HVAC registers (supply or return).
 - a. Manual On (Vacancy sensor) – Sensors shall not be used to turn the lights on when occupant enters room.
 - b. Sensor Time Delay shall be set initially to at least 20 min and no greater than 30 min.
7. Network Control – Where possible, utilize the classroom occupancy sensor to supply occupancy status to the HVAC system for control of VAV or Fan controls in space. Utilize Native BACnet interface from local lighting controller to Building Automation System where available. Network control shall allow setting of room sensor and photocell parameters by BAS system. For those areas without local lighting controller, provide additional occupancy sensor contacts for use by BAS.

B. Common Area Controls

1. Daylighting – Daylight compensation dimming and daylight compensation switching may be considered provided such dimming/or switching results in a simple payback of 10 years or less based on energy savings. Generally, daylight compensation control is only effective within thirty feet of daylight, window exposure. Pay careful attention to the impact of room darkening devices (shades, blinds) as they may have negative impact on the efficiency operation of daylight compensation controls.
2. Corridors shall be controlled by the Building Automation System via BACnet based lighting control panels or relay/contactors.
 - a. Provide a switch at entrance to each area to allow the lighting to be turned on at beginning of day or after hours without requiring key. Lighting shall be able to be turned off by BAS system.

- b. Manual On/Scheduled Off scheduling shall be used where possible to minimize necessary schedule revisions by owners.
 - 3. Restrooms
 - a. Provide local control via Occupancy Sensor/Vacancy Sensor and local switch. Use manual on wherever possible, except group restrooms shall be auto on. No user accessible switch shall be used in the group rest rooms.
 - 4. Break Rooms, Conference Rooms, Offices
 - a. Provide local control via Occupancy Sensor/Vacancy Sensor and local switch. Use manual on wherever possible.
 - b. Dual Level Switching - Utilize dual level switching wherever possible.
 - 5. Cafeterias, Libraries
 - a. Dual Level Switching - Utilize dual level switching of all lighting.
 - b. Controls – Control lighting via local switching connected to lighting control panel controlled by BAS for “all off” sweep.
 - c. Where a stage is provided, provide a simple theatrical control system to allow productions appropriate to the area, controlled by BAS for “all off” sweep.
 - 6. Gymnasiums
 - a. Utilize linear fluorescent lighting via compact fluorescent high bays where possible.
 - b. Provide multi-level switching scheme to allow High, Medium, and Low light levels in each area that can be separated by curtain walls.
 - c. In Gymnasiums that have provisions for a stage, provide controls for daylighting (shades/shutters) to allow darkening of space for productions.
 - d. Provide photocell controlled multi zoned switching of at least 1/3 of lighting when adequate daylighting is provided.
 - e. Lighting shall be controlled via lighting control panel connected to the BAS for “all off” sweep.
 - 7. Music Performance Area
 - a. These spaces are partitioned into 2 classrooms and a common stage area.
 - b. The classrooms shall have lighting requirements similar to the other classrooms, except for the following:
 - i. Provide adequate track lighting for the stage area to allow simple productions.
 - ii. Provide a wall control at the side of the stage area to allow dimmable control of the track lighting as well as ability to switch the lighting in each of the classrooms from this common location.
- C. The minimum illumination (footcandle) levels shall conform to the established Illuminating Engineering Society guidelines and Louisiana State Sanitary Code Part XVII – “Public Buildings, Schools, and Other Institutions”. See illumination chart at the end of this section. Footcandle calculation shall be developed by using the room cavity ratio method with work plane surface being 30 inches above the floor. Ceiling, wall, and floor material reflectances shall be verified with the Electrical Design Professional. Lighting power densities shall conform to “AEDG for K-12 Schools” (1.2W/sf for daylight option, 1.1W/sf for non-daylit option) and LEED for Schools 2009.

- D. Emergency means of egress lighting shall be provided per local and State Building Code requirements. The following areas shall have emergency illumination whether having natural illumination or not:
1. Exits and exit access corridors.
 2. Small and large assembly areas.
 3. Locker rooms.
 4. Student and adult restrooms.
 5. Main and other dedicated electrical rooms.
 6. Main mechanical room and other mechanical decks.
 7. Emergency power equipment location.
 8. Kitchen/student dining.
 9. Interior instructional space without natural illumination.
 10. Rooms with occupant load over 50 people.
 11. Exterior side of exterior exit doors including stairs, ramps, and walkways leading to public way.
- E. Light fixtures shall be controlled by switches on a per room basis where fixtures are located. Circuit breakers will not be acceptable for turning lighting "on" and "off".
- F. Exterior parking areas shall be illuminated with LED or high-intensity discharge lamp type light fixtures with guards for security and protection, where appropriate.
- G. Exit signs shall be wall mounted, where possible, in lieu of ceiling mounted.
- H. Art rooms and display areas shall be provided with supplemental incandescent track lighting.

Room Type Classification	Direct Lighting Footcandle Levels (1)			Indirect Lighting Footcandle Levels (2)		
	Maximum	Average	Minimum	Maximum	Average	Minimum
Administrative Areas						
Offices/Receptionist	75	50	25	60	40	20
Storage Rooms	38	25	13	38	25	13
Restrooms	38	25	13	38	25	13
Conference/Resource Rooms	75	50	25	60	40	20
Healthcare Area	75	50	25	60	40	20
Teacher Prep/Work Area	75	50	25	60	40	20
Classrooms						
General Classrooms	75	50	25	60	40	20
Visual Arts Rooms	75	50	25	60	40	20
Modular Technology Labs	75	50	25	60	40	20
Computer Aided/Drafting Labs	45	30	15	45	30	15
Industrial Arts Rooms	90	60	30	90	60	30
Computer Labs	60	40	20	60	40	20
Graphics Labs	75	50	25	60	40	20
Life Skills Labs	75	50	25	75	50	25
Science Rooms/Labs	75	50	25	75	50	25
Laundry Rooms	38	25	13	38	25	13
Music Rooms	75	50	25	60	40	20
Large Group Instruction Rooms	75	50	25	60	40	20
Media Center						
Active Areas	75	50	25	60	40	20
Inactive Areas	60	40	20	60	40	20
Student Dining/Auditoriums						
Assembly	30	20	10		N/A	
Stage/Work Lights	30	20	10		N/A	
Makeup/Dressing Rooms	75	50	25	75	50	25
Theatrical Control Room	45	30	15	45	30	15
Kitchen	60	40	20		N/A	
Dining Areas	60	40	20	60	40	20
Athletic Areas						
Gymnasium-Elementary School	75	50	25		N/A	
Gymnasium-Middle School	75	50	25		N/A	
Gymnasium-High School	90	60	30		N/A	
Multi-use Physical Education Rooms	75	50	25		N/A	
Locker Rooms	38	25	13	38	25	13

Circulation						
Hallways	30	20	10	30	20	10
Stairwells	30	20	10	30	20	10
Maintenance Areas						
Custodial Closets	45	30	15	45	30	15
Mechanical Rooms	45	30	15	45	30	15

(1) Direct lighting refers to light that is being directed in a downward direction towards the surface being illuminated.

(2) Indirect lighting refers to light that is directed at least partially in an upward direction or is reflected in some manner towards the surface being illuminated.

General Notes:

For design in new and significantly renovated schools, the designer shall utilize Illuminating Engineering Society of North America (IESNA) Lighting Handbook

Enforcement of these standards is based on on the average illumination level in each room.

For instructional spaces utilizing digital "smart boards" or outfitted for audio-visual presentations, the designer should consider the installation of lighting controls readily accessible to the instructor having the capability to reduce the illumination on the screen to seven footcandles or less, while maintaining an average of 20 footcandles within the remaining functional areas of the space.

For instructional spaces utilizing dry-erase whiteboards, the designer should consider the installation of separately controlled, dedicated luminaires mounted parallel to the whiteboard, providing 30 footcandles average on the vertical plane of the whiteboard.

1.03 WIRING DEVICES

- A. General purpose use specification grade, 120-volt duplex receptacles shall be of standard grounded type. For vertical installation, ground shall be on bottom. For horizontal installation, ground shall be on the right.
- B. Electrical devices located on the first floor of buildings whose first floor elevations are below Base Flood Elevation shall be installed at 48" above the floor to prevent flood-water intrusion, unless required otherwise.
- C. Appropriately located flush floor boxes shall provide distribution to equipment/furniture in areas in the middle of rooms not capable of being served from walls. Floor boxes in slab on grade applications shall be poured in place type. Floor boxes on upper floor may be poured in place type or poke through type as appropriate to the individual application.
- D. Instructional spaces shall be provided with a minimum of four (4) general use receptacles.
- E. Each space or room shall be provided with a minimum of one, 120-volt receptacle, including mechanical service areas.
- F. General purpose receptacles in corridors shall be spaced a maximum of 50 feet apart and a maximum of 25 feet from end of corridor.
- G. Office areas, conference rooms, teacher workrooms, and areas designated for voting machines shall be provided with a minimum of four (4) receptacles.
- H. Duplex receptacles within 6 feet of plumbing fixture units shall be ground fault protected. These receptacles shall be protected by a ground fault circuit breaker or an integral ground fault device.
- I. In computer laboratories, a maximum of four (4) computers shall be on a single 20-amp, 120-volt grounded electrical circuit.
- J. Provide an exterior, weatherproof ground fault protected duplex receptacle outside each main exterior door.
- K. Electrical receptacles serving food service equipment not located against walls shall be mounted above the floor line on pedestal-type mountings.

- L. Pre-kindergarten/kindergarten classrooms and their auxiliary spaces shall have duplex, tamper-resistant receptacles installed and switches mounted at 40" above finished floor.
- M. Interior lighting shall be controlled by occupancy sensors, local off override automatic timed lighting controlled by lighting control system, Building Automation System or a combination of both to comply with ASHRAE 90.1. Exterior lighting shall be controlled by photo-sensor or astronomical time clock or Building Automation System to comply with ASHRAE 90.1 that will automatically turn lighting off when sufficient daylight is available.

1.04 DEVICE LOCATIONS

ELECTRICAL DEVICE TYPE	Mounting Height Above Floor to Bottom of Outlet (Device) Box
Receptacle outlets, microphone outlets (jacks), equipment outlets (jacks), television outlets (jacks), portable telephone outlets, computer outlets, etc. * General throughout, except First Floor 20" * First Floor (for Facilities with First Floor elevations at or below flood levels) 46" * Mechanical equipment rooms 46" * Above counter tops 30"H 36" * Above counter tops 36"H 44" * Above counter tops 48"H 54" * Above backsplash top 2" minimum * Above or adjacent to lavatories 42" * Behind domestic refrigerators 52" * Behind domestic washers and dryers 44" * Serving domestic dishwashers 20" * Wall-mounted telephone outlets 44" * Telephone/video control 44"	
Toggle switches	44"
Recessed motor controllers	60"
Electric panels, terminal cabinets, etc.,	48"
Clocks	Near ceiling, or 8' – 6" maximum
Pull stations (fire alarm)	44"
Volume controls, call-in switches	44"
Horn/strobes (fire alarm)	80"

1.05 FIRE ALARM SYSTEM

- A. Fire alarm systems shall be of addressable type, incorporating activation devices such as pull stations, smoke detectors, flow switches, duct detectors, etc., and audio visual devices such as horns and strobes.
- B. System shall comply with the local Building Code, State Building Code, National Fire Protection Association, and the Americans with Disabilities Act.
- C. Main control panel shall be located in the Technology Equipment Room or in a second floor Telecommunications Room. with remote annunciator stations at main entries and Administration area, conforming to local jurisdiction requirements.
- D. Strobe devices shall have their candela light intensity discharge conforming to the Americans with Disabilities Act and local codes.
- E. Visual devices shall be located in spaces occupied by students, instructors, and the public. Audible devices shall be located so device delivers sounds levels that are 15 dB over ambient noise levels in areas occupied by students, instructors, or public to conform to State Building Code. Devices to be wall or ceiling mounted conforming to Americans with Disabilities Act and applicable codes.
- F. System shall be connected electronically to local Fire Department via a DACT dialer utilizing two analog telephone lines.
- G. A manual pull station with Americans with Disabilities Act compliant cover shall be provided in food service areas, at each exterior door used as means of egress, and at other locations conforming to State Building Code, National Fire Protection Association, and other local codes.
- H. Provide a two-way communication system in spaces designated by the Design Professional as "area for a rescue". Communication system shall conform to the Americans with Disabilities Act.
- I. Provide audible alarm devices in high ambient noise areas such as technology production labs, vocal rooms, and instrumental rooms.
- J. Protect fire alarm devices located in gymnasiums, auxiliary gymnasiums, shops, and locker rooms with wire guards.
- K. Wall mounted devices shall be flush mounted in the wall not surface mounted.

1.06 LIGHTNING PROTECTION

- A. Provide an Underwriter's Laboratory (UL) Master Label listed and certified lightning protection system.

1.07 ENERGY USAGE

- A. All systems shall be designed in compliance with ASHRAE Standard 90.1-2007 "Energy Standard for Building Except Low-Rise Residential Buildings", the energy usage requirements prescribed by the State Building Code and "Advanced Energy Design Guide for K-12 School Buildings".

1.08 LEED CERTIFICATION

- A. Design Professional shall follow and acquire LEED points as established by the Project Team Administrator and the owner.

1.09 SECURITY SYSTEMS

- A. Within the base building electrical system, provide the following basic security system provisions. Specific system information is provided elsewhere in these Performance Standards.
- B. Provide for card reader locations, motion sensors, door contacts, electric strikes, magnetic locks, and Owner-furnished control panels. Route all door component conduits to an accessible ceiling area where control panels are located. Coordinate conduit routing and quantities with the Security Technology Designer.
 - 1. Access control provisions for doors to include strike or magnetic lock connections at latch or hinge side, card reader, wall box for push to exit and/or motion sensor, and door contacts for status.
- C. Provide POE fixed-mount surveillance cameras on exterior and in interior of building.
 - 1. Interior and exterior wall boxes with conduit for wall mounted cameras

1.10 TECHNOLOGY

- A. Provide the following basic electrical infrastructure for Technology systems. Specific Technology systems information is provided elsewhere in these Performance Standards. Coordinate the placement of all Technology conduits, boxes and outlets with the Technology Design Professional.
- B. Provide Telecommunications cable tray above corridor ceilings throughout building.
 - 1. Cable tray shall connect between all Telecommunications Rooms (TRs) and the Main Equipment Room (ER).
 - 2. Provide a continuous path from all Telecommunications Rooms (TRs) back to Main Equipment Room (ER) using 4-inch Conduits, cable trays or a combination of both, as required by conditions.

3. Provide a continuous cable-tray route into the main Equipment Rooms (ER) and associated Telecommunications Rooms (TRs). As an option, in areas where wall penetrations by cable tray are problematic provide 4-inch conduits, in lieu of cable tray through ER and TR walls. In either case, ensure a continuous cable support system to Equipment racks and cabinets. Provide plywood on walls of TRs and ER.
 4. Provide continuous bonding conductor (minimum #4 AWG), in accordance with NEC-250 and TIA/EIA-607, in all cable trays and bond to associated Telecommunications Grounding Busbar (TGB).
 5. J-Hooks and similar support mechanisms are not to be used for main and secondary corridors.
- C. Junction boxes used for data/voice/video outlets shall be 2-gang, 3 1/2" deep boxes and equipped with a minimum of a 1" conduit, home run to the associated Telecommunications Cable Tray, except where noted by the Telecommunications Design Professional.
- D. Telecommunications Rooms (TRs) and the Main Equipment Room (ER) shall be provided with a minimum of one 208 volt, 30 Amp circuit for powering rack mounted UPS Units. Quantity and location of circuits will depend upon requirements of Technology Design professional. If the building has a standby Generator, these circuits shall be attached to the standby power. General use receptacles, as well as double duplex receptacles shall be provided next to computer/video technologies ports and throughout TRs and ER.
- E. Provide a minimum of two four (4) inch riser conduits between floors for Telecommunications cables. Coordinate location and quantities with Technology Designer.
- F. Fire-stop all penetrations.
- G. LCD/TV
1. For rooms requiring a LCD monitor/TV, provide one (1), 2-gang, 3-1/2" deep box and one (1) quad power outlet at 96" AFF unless indicated otherwise. Provide circuit from the local panel.
- H. Computer Labs
1. Provide a minimum 4-3/4 inch high center-divided surface-applied metal raceway in computer labs to serve perimeter computer stations.
- I. Classrooms
1. Provide a minimum 4-3/4 inch high center-divided surface-applied metal raceway on three walls in classrooms (primary teaching wall, secondary teaching wall, window wall) to serve perimeter computer stations and to provide general power and data distribution above counters.

- J. Classroom Intercommunications
1. Provide one (1) 1-gang, 3-½" deep box at 48" AFF on wall by Instructor Location for Classroom Intercommunications Call Station.
 2. Provide one (1), home run, ¾". conduit from the Intercommunications Station Phone box to the associated Telecommunications Cable Tray.
- K. Wall-mounted Phones
1. Provide one (1) 1-gang, 3-½" deep box at 48" AFF on wall for wall-mounted Phone Instrument.
 2. Provide one (1), home run, ¾". conduit from the Phone box to the associated Telecommunications Cable Tray.
- L. Mechanical Room – Building Automation
1. Provide one (1) 1-gang, 3-½" deep box at 48" AFF on wall for HVAC and Building Automation Equipment in Mechanical rooms. Coordinate Box location with Building Automation System Designer.
 2. Provide one (1), home run, ¾". conduit from the Building Automation System box to the associated Telecommunications Cable Tray.
- M. Elevator Room – Elevator Phone
1. Provide one (1) 1-gang, 3-½" deep box at 48" AFF on wall in Elevator Equipment Room for Servicing Elevator Phone Equipment. Coordinate Box location with Elevator System Designer.
 2. Provide one (1), home run, ¾". conduit from the Elevator Equipment Room box to the associated Telecommunications Cable Tray.
- N. Electrical and Mechanical Room Phones
1. Provide one (1) 1-gang, 3-½" deep box at 48" AFF on wall in all Electrical and Mechanical Rooms for a Wall-Mounted Telephone. Coordinate final location with Designer.
 2. Provide one (1), home run, ¾ in. conduit from the Electrical and Mechanical Room Telephone boxes to the associated Telecommunications Cable Tray

O. External Paging Horns

1. Provide external junction box for Paging Horn mounting on Building. Coordinate Locations with Paging Technology Designer. Stub $\frac{3}{4}$ in. conduit from junction box to the associated Telecommunications Cable Tray.

P. A/V Cabinets

1. Provide all wall-mounted, A/V cabinets and Specialized Audio Cabinets with a quad electrical outlet located inside of associated cabinet.
2. Provide one (1), home run, $\frac{3}{4}$ " conduit from the AV cabinet to the associated Telecommunications Cable Tray.
3. Provide a minimum of one (1), 2" Conduit stubbed from the wall-mounted A/V cabinet to above the ceiling for routing of A/V and Speaker cables. Install bushings on both ends of stub conduit. Coordinate requirements with Technology Designer.

Q. Service Providers

1. Provide one (1), 4" conduit for cable television (CATV) from the Main Telecommunications Equipment Room (ER) to the property line.
2. Provide two (2), 4" conduit for telephone/data from the Main Telecommunications Equipment Room (ER) to the property line.
3. Stub all Entrance conduits up at associated Utility Poles.
4. Note that all Entrance conduits may not terminate at same Service Provider Pole. Coordinate location with Service Providers.
5. Provide nylon pull-ropes in all Entrance Conduits.
6. When the Entrance Facility is not located in the Main Technology Equipment Room (ER), (Remodels, for example), provide a minimum of two (2), 4" conduits from the Service Provider Entrance (DEMARC) to the Main Telecommunications Equipment Room (ER).
9. Provide outside system plant (OSP) infrastructure to comply with current BICSI COOSP Standards and Practices. Coordinate specific requirements with each Service Provider.

R. Low Voltage Sleeves

1. Provide one (1), 2 in. sleeve, with bushings, in all block walls, for telecommunications cables, as required.

2. Note: not all of the Telecommunications cables are run in conduits, for example, paging speaker cables are installed using J-Hooks, etc. and require sleeves to enter all rooms.

1.11 TELECOMMUNICATIONS GROUNDING

- A. Within the base building electrical system cost, provide Telecommunications Grounding/Bonding System in accordance with NEC-250 and TIA/EIA-607 using approved Grounding Hardware. CAD Weld Bonding Conductors to Building Steel.
- B. Provide Telecommunications Main Grounding Busbar (TMGB) in Main Equipment Room (ER).
 1. All TMGB Connections to be made with double-bolted, Compression style, Grounding Lugs.
 2. As a minimum, Bond TMGB to following:
 - a. Building Steel (minimum #2 AWG insulated copper bonding conductor).
 - b. Main Electrical Service Ground (minimum #2 AWG insulated copper bonding conductor).
 - c. Local Service Panel Ground (minimum #4 AWG insulated copper bonding conductor).
 - d. Telecommunications Bonding Backbone (TBB) that connects TMGB to other TGBs (minimum #2 AWG insulated copper bonding conductor).
 - e. Associated Telecommunications Cable Tray(s) (minimum #6 AWG insulated copper bonding conductor).
 - f. Telecommunications Conduit(s) Entering ER (minimum #6 AWG insulated copper bonding conductor).
- C. Provide Telecommunications Grounding Busbar (TGB) in all Telecommunications Rooms (TRs) and AV Equipment Cabinets.
 1. All TGB Connections to be made with double-bolted, Compression style, Grounding Lugs.
 2. As a minimum, Bond TGB to following:
 - a. Building Steel (minimum #2 AWG insulated copper bonding conductor).
 - b. Local Service Panel Ground (minimum #4 AWG insulated copper bonding conductor).
 - c. Telecommunications Bonding Backbone (TBB) that connects TGB to other TGBs and TMGB (minimum #2 AWG insulated copper bonding conductor).

- d. Associated Telecommunications Cable Tray(s) (minimum #4 AWG insulated copper bonding conductor).
 - e. Telecommunications Conduit(s) Entering TR (minimum #4 AWG insulated copper bonding conductor).
 - f. Provide Telecommunications Bonding Backbone (TBB) between all TGBs and the TMGB.
 - g. The TBB shall be a minimum of #2 AWG insulated copper bonding conductor. See sizing chart in associated specification section.
 - h. All TGB Connections to be made with double-bolted, Compression style, Grounding Lugs.
- D. As a minimum, bond the following devices to the associated TMGB and TGBs using a minimum #4 AWG insulated copper bonding conductor using compression style lugs:
- 1. Equipment Racks and Cabinets
 - 2. TR Cable Tray
 - 3. CATV Equipment
 - 4. Lightning and Surge Protectors
 - 5. Telecommunications Devices
 - 6. Coupled Bonding Conductors (CBCs)
 - 7. Backbone Cable Shields
 - 8. Telecommunication and Fiber Cable Shields
 - 9. Antenna Cable Shields
 - 10. Raised Floors
 - 11. Antenna Masts

END OF SECTION

Appendix-Technology

PURPOSE

The purpose of this section is to provide a guide to designers for selecting appropriate building technology. All product selections listed below and those not included shall be reviewed with the Louisiana Recovery School District and New Orleans Public Schools (Owner). The Owner will consider other materials if justified and appropriate.

Telecom Ground & Bonding		
	Use	Grounding and bonding of the telecommunication room and main equipment room to the building grounding system.
	Product	Grounding busbar #4 ground cable Two-hole ground lug
	Manufacturer	Any manufacturers meeting Performance Requirements
	Notes	Provide ground busbar in each Telecommunications Room (TR). Provide main ground busbar in the main equipment room (ER). Connect each Telecommunications Room ground busbar to the main equipment room ground busbar. Connect each equipment cabinet or rack to the ground busbar. Connect the main equipment room ground busbar to the building electrical grounding system.
Equipment Open Racks		
	Use	To house network electronics, patch panels, UPS, etc.
	Product	Four-post open equipment rack shall be 22-1/2"W x 31"D x 84"H with integrated dual plug strip and cable management.
	Manufacturer	Middle Atlantic, Hubbell, Panduit, CPI
	Notes	Provide open racks in Equipment Room (ER) and each Telecommunications Room (TR). (Minimum of one in each room.)

Uninterruptible Power Supply		
	Use	To protect the technology/communications/security equipment from power outages.
	Product	UPS shall have an output voltage of 120 volts. UPS shall have an input voltage of 208 volts, utilizing a 30A, twist lock plug. UPS shall have 20A receptacles and 30 amp receptacles. UPS shall be 3,000VA at 120 volts. UPS shall have internal battery cabinets.
	Manufacturer	Emerson, PowerWave, Minuteman, Tripplite, APC
	Notes	Provide one rack mounted 3,000 VA UPS w/internal battery for each equipment rack in each Equipment Room and each Telecommunications Room (ER, TR).
Cable Tray		
	Use	To be used for cable management in corridors, Telecommunications Rooms and Equipment Room.
	Product	Cable tray shall be 12", 24", or 36" wide (based on cable fill requirements) ceiling or wall-hung tray, with fittings and hangers etc.
	Manufacturer	Flex tray, B-Line, Cablofil, Hubbell, Panduit, Mono Systems, Chatsworth
	Notes	Provide cable tray in all corridors. Extend cable tray in each Telecommunications Room. Extend cable tray in the Equipment Room. Provide cable tray above each equipment rack. Extend cable tray to the telephone terminal board.

Communications Optical Fiber Backbone Cabling		
	Use	Interconnectivity between the Equipment Room and each Telecommunications Room for all Ethernet networking systems.
	Product	Plenum-rated, 8.7/125 micron, single-mode fiber optic cable to support 10 Gb/s at 10,000/40,000 meters. Single-mode fiber optic patch panels w/bulkheads/adaptor LC connectors. Single-mode patch cords. Plenum-rated innerduct for all single-mode fiber cables.
	Manufacturer	(Cable) Belden, General Cable, Corning, Berktek (Connectivity) Belden, Panduit, Hubbell
	Notes	Provide a minimum of 12-strand single-mode fiber from the Equipment Room to each Telecommunications Room. Provide single-mode fiber from the Equipment Room to the building entrance (demarcation), if not co-located in ER. All fiber optic cable shall be installed in innerduct. Terminate all fiber optic cable on patch panels. Provide one fiber optic patch cord for each patch panel port. Equal quantities of 3', 5' & 7' patch cords.

Communications Copper Horizontal Cabling (Augmented CAT 6 Cable)		
	Use	To provide connectivity to each data jack, voice jack, and any other Ethernet systems.
	Product	<p>RJ45 modular data jack, 8 positions. One-gang (for up to two drops) or two-gang (for up to four drops) coverplate, stainless steel coverplate Stainless steel one or two-gang coverplate Plenum-rated, Category 6A, 4 pair unshielded twisted pair (UTP), 23 AWG, solid base copper, FEP insulated on all four pairs for 10 Gb/s. Color Code: Pair #1 – white/blue & blue Pair #2 – white/orange & orange Pair #3 – white/green & green Pair #4 – white/brown & brown 48-port RJ45 patch panels distributed in racks such that Owner-furnished switches may be installed between patch panels.</p>
	Manufacturer	Belden, Panduit, Hubbell, ADC
	Notes	<p>Provide one, two, three, or four data drops at each rough-in location to the nearest Telecommunications Room. Each drop to consist of one, four pair cable Provide stainless steel coverplates. Drops for WAPs shall be wall mounted at 6" below ceiling, with a maximum height of 10'. All cabling shall be terminated on RJ45 jacks at one end, and on copper patch panels in the Telecommunications Room on the other end. All jacks shall be installed in coverplates. All coverplates and both cable ends shall be labeled. Provide patch panels. Test each and every cable. Provide one patch cord for every location with 20% spare. Patch cords shall be equal quantities of 3', 5' & 7' lengths.</p>

Communications Audio-Video Horizontal Cabling		
	Use	To provide connectivity between the interactive whiteboard audio-video devices and the teacher's location
	Product	Plenum-rated multi-conductor VGA with male connector at projector end and female connector at teacher's video input end, cable shall be a fourteen conductor. (3 – 26 AWG for RGB, 7 – 26 AWG for ID bits, 4 – 26 AWG for video sync) (as needed). Plenum-rated multi-conductor USB 2.0 cable with male connector at projector and female connector at teacher's input end.
	Manufacturer	COVID, Liberty Tenec, Belden, Panduit
	Notes	Provide 1 VGA cable from the teacher's video input to the video projector (as needed). Provide 1 USB cable from the teacher's input to the projector. Teacher's input to be terminated in one gang stainless steel faceplate.
Communications Audio-Video Mounts		
	Use	To provide supports for all audio-video display devices
	Product	Articulated wall brackets for LCD televisions Universal tilt wall mounts for LCD televisions Vibration absorber ceiling mount with rubber bumpers, uni-strut, and cord wrap Escutcheon rings Ceiling truss adapters
	Manufacturer	Peerless, Bretford, Chief, Lucasey
	Notes	Provide articulated wall brackets for all LCD televisions. Provide universal tilt wall mounts, in areas that do NOT require articulation. Provide vibration absorber ceiling mount w/escutcheon rings for all ceiling-mounted video projectors.

Video Display Devices		
	Use	To provide images in locations required.
	Product	42-inch LCD television, capable of up to 1080P HDTV resolutions 16:9 aspect ratio, ATSC/NTSC/QAM tuner, RGB-in, 1/8-inch PC stereo sound, composite video, DVD/DTV component, audio, S-video, RS232 in remote.
	Manufacturer	(Television) LG, Sony, Panasonic, RCA
	Notes	Provide LCD television in each room, as outlined in the technology space requirements. Test and focus all audio/video devices.

Proposed 2011

Audio-Video Miscellaneous Equipment		
	Use	To provide audio/video equipment to aid the teachers in their classrooms.
	Product	Interactive whiteboard, 78"Diagonal, wall-mounted, pen tray, power supply, USB – Potable cable, wireless Bluetooth, speakers, etc.
	Manufacturer	(IWB) Promethean Activeboard+2 300 Pro Range, Polyvision, Smart Technologies, Egon
	Notes	Provide interactive whiteboard, as outlined in the technology space requirements.

Proposed 2011

Public Address and Mass Notification Systems		
	Use	To provide sound systems in student dining/cafeteria, gymnasium sound, auditorium, music room, etc.
	Product	<p>Loudspeakers: 2-way 60 x 45 full-range, 12-inch cone, 70-20 MHz</p> <p>Loudspeakers: 2-way 60 x 60 full-range, 12-inch cone, 70-20 MHz</p> <p>Loudspeakers: 200-watt, 2-way, 65 x 65 full-range, 12-inch cone, 25 MHz, 8 ohm input impedance</p> <p>Loudspeaker: 300-watt, 2-way, 65 x 65, full-range, 12-inch cone, 65-25 MHz, 8 ohm input impedance</p> <p>Ceiling Speakers: 4-inch, 8-inch, 12-inch coaxial loudspeakers with transformers, 4-inch cone, 8-inch cone, 12-inch cone, 8 ohm impedance, 10-ounce magnet weight, 70-20 KHz, round, 70-volt transformer, 1, 2, or 3 cubic feet enclosure</p> <p>AM/FM digital tuner</p> <p>CD/MP3 player</p> <p>Power supplies</p> <p>Single channel digital audio processor</p> <p>Single channel digital audio processor with feedback reduction</p> <p>Two single channel digital audio processors</p> <p>4-input, 8-output audio processor</p> <p>Graphic equalizer</p> <p>Microphone/live mixers</p> <p>Stereo microphone/live mixers</p> <p>Automatic microphone/live mixers</p> <p>Automatic mic/line mixer, 8 channel,</p> <p>Mixing console, 32 input, 16 bus, 32 mono input channels, 31 band equalizer, 48 volt phantom power, 4 stereo input channels.</p> <p>Ensemble microphones</p> <p>Vocal microphones</p> <p>Stereo microphones</p> <p>Stage floor boundary microphone</p> <p>Suspended ceiling choir microphone</p> <p>Wireless microphones</p> <p>Sound system cabinets</p> <p>Miscellaneous sound system equipment, outlets, patch cable, etc.</p>
	Manufacturer	<p>Atlas, Altec, Electro-Voice, JBL (Speakers)</p> <p>TOA, Denon, Marantz, TASCAM, (Program Sources)</p> <p>Crown Electro-Voice, Peavey, TOA (Power Amplifiers)</p> <p>Shure, Rane, Ashly, ASC (Audio Signal Processors)</p> <p>Ashly, Rane. Yamaha (Graphic Equalizers)</p> <p>Ashly, Peavey, TOA, Rane, Shure (Microphones)</p>

		<p>Yamaha IS9-32, Allen & Heath, Soundcraft , Intelix, Ashley, Peavey, Rane, Shure, TOA (Auto Mixers)</p>
	<p>Notes</p>	<p>Provide auditorium sound system as follows:</p> <ol style="list-style-type: none"> 1. Main Loudspeakers: Quantity of (six) 2-way 60 by 45 full-range loudspeakers and two 15-inch subwoofer loudspeakers. 2. Monitor Loudspeakers: Quantity of (two) 300 W 2-way 65 by 65 full-range loudspeakers, polymeric housing. 3. 32-input, self-contained digital mixing console, quantity of (one): <ol style="list-style-type: none"> a. 32 mono input channels, balanced XLR-type microphone inputs and balanced/unbalanced TRS-type line inputs. b. Two-track USB memory recording and playback. c. Internal 31 band graphic equalization. d. 48 V phantom power. e. 4 stereo input channels. f. 16 mix buses, 8 matrix buses, 1 stereo bus, 1 mono bus. g. 100-mm faders. h. Hard shell, foam lined storage case. i. Dust cover. 4. Equipment Cabinet ASSC No. 1: Fixed freestanding equipment cabinet to house the following: <ol style="list-style-type: none"> a. Main Amplifiers: Quantity of (six) dual-channel, 275 W into 8 ohms per channel. b. Subwoofer Amplifier: Quantity of (one) dual-channel, 1200 W into 4 ohms per channel. c. Monitor Amplifier: Quantity of (one) amplifiers, 275 W into 8 ohms per channel. d. Audio Processors: Quantity of (one) 4-input, 8-output audio processor with feedback reduction. e. Automatic Mic/Line Mixer: Quantity of (one) mic/line mixer. f. Provide all mounting hardware. g. Provide power strips. 5. Equipment Cabinet ASSC No. 2: Portable equipment cabinet on casters to house the following: <ol style="list-style-type: none"> a. Wireless Microphone Receivers: Quantity of (six) with handheld and lapel microphones. b. Assistive Listening Transmitter: Quantity of (one) transmitter, 35 receivers, and 9 telecoils. c. CD Recorder with MP3 Playback: Quantity of (one). d. 5-Disc CD Player: Quantity of (one). e. All mounting hardware. f. Power strips 6. Wired Microphones: <ol style="list-style-type: none"> g. Ensemble Microphones: Quantity of (two) with accessories h. Vocal Microphones: Quantity of (two) i. Stage Floor Boundary Microphones: Quantity of (two) j. Suspended Choir Microphones: Quantity of (six)

		<p>7. All sound system cabling.</p> <p>Provide student dining/cafeteria sound system as follows:</p> <ol style="list-style-type: none"> 1. Main Loudspeakers: Quantity of (20) 12-inch coaxial loudspeakers, or as room geometry dictates. 2. Equipment Cabinet CSSC No. 1: Fixed freestanding equipment cabinet to house the following: <ol style="list-style-type: none"> a. Main Amplifiers: Quantity of (one) dual-channel, 300 W, 70.7 V per channel. b. Audio Processors: Quantity of (one) 2-channel audio processor with feedback reduction. c. Automatic Mic/Line Mixer: Quantity of (one). <ol style="list-style-type: none"> 1) Standard, Last-Mic-On, or First-Come-First Served modes of automatic operation. 2) Filibuster override. 3) Low-cut filter. 4) Balanced inputs and outputs. 5) 48 V phantom power. 6) RS232 controlled. 7) Frequency: 20 – 20kHz 8) Rack-Mount Bracket: TIA/EIA-310-D, standard 19-inch. d. Wireless Microphone Receivers: Quantity of (one) with handheld and lapel microphones. e. Assistive Listening Transmitter: Quantity of (one). f. 5-Disc CD Player: Quantity of (one). g. MP3 Player: Quantity of (one). h. AM/FM Radio Receiver: Quantity of (one). i. All mounting hardware. j. Quantity of (1) 2,000 VA rack mounted UPS. k. Power strips. 3. Wired Microphones: <ol style="list-style-type: none"> Vocal Microphones: Quantity of (two). 4. All sound system cabling. <p>Provide gymnasium sound system as follows:</p> <ol style="list-style-type: none"> 1. Main Loudspeakers: Quantity of (20) 12-inch coaxial loudspeakers, or as room geometry dictates. 2. Equipment Cabinet GSSC No. 1: Fixed freestanding equipment cabinet to house the following: <ol style="list-style-type: none"> a. Main Amplifiers: Quantity of (one) dual-channel, 300 W, 70.7 V per channel. b. Audio Processors: Quantity of (one) 2-channel audio processor with feedback reduction. c. Automatic Mic/Line Mixer: Quantity of (one). d. Wireless Microphone Receivers: Quantity of (one) with handheld and lapel microphones. e. Assistive Listening Transmitter: Quantity of (one). f. 5-Disc CD Player: Quantity of (one). g. MP3 Player: Quantity of (one). h. AM/FM Radio Receiver: Quantity of (one). i. All mounting hardware. j. Power strips. 3. Wired Microphones:
--	--	---

		<p>Vocal Microphones: Quantity of (two).</p> <p>4. All sound system cabling.</p> <p>Provide music room, music/performance room band room, and choir room sound systems as follows:</p> <ol style="list-style-type: none"> 1. Main Loudspeakers: Quantity of (2) 200W, 2-way, 65 by 65 full range loudspeakers, polymeric housing. 2. Equipment Cabinet MSSC No. 1: Portable equipment cabinet on casters to house the following: <ol style="list-style-type: none"> a. Main Amplifier: Provide quantity of (1) dual-channel, 275 W into 8 ohms, per channel. b. Audio Processor: Provide (1) 2-channel audio processor with feedback reduction. c. Graphic Equalizer: Provide quantity of (1). d. Wireless Microphone Receivers: Provide quantity of (1) with handheld and lapel microphones. e. CD Player: Provide quantity of (1). f. CD Recorder with MP3 Playback: Provide quantity of (1). g. All mounting hardware. h. Power strips. 3. Wired Microphones: <ul style="list-style-type: none"> Vocal Microphones: Quantity of (2). Suspend choir microphone. Quantity of (6). 4. All sound system cabling. <p>Provide testing and training.</p>
Central Sound and Program System		
	Use	<p>To provide two-way communication between office and classrooms.</p> <p>To provide class bell changes.</p> <p>To provide all page.</p> <p>To provide emergency notifications.</p>
	Product	<p>Microprocessor-based, two-way intercom/paging/program base Central Sound and Program System</p> <p>Master Administration Console</p> <p>Miscellaneous program sources, microphone, speakers, weather radio, call-in switch with handset, volume control, amplifiers, outdoor speakers</p>
	Manufacturer	<p>Bogen, Dukane, Rauland-Borg, Telecor, Valcom, SimplexGrinnell</p>
	Notes	<p>Provide speakers as outlined in the technology space requirements.</p> <p>Provide call-in switch with handset as outlined in the technology space requirements.</p> <p>Provide corridor speakers as outlined in the technology space requirements.</p> <p>Provide Central Sound and Program System cabinet in Equipment Room.</p> <p>Provide the master administration console in the receptionist area.</p> <p>Provide testing and training.</p>

Clocks		
	Use	To provide accurate time in the building.
	Product	Wireless master clock transceiver and antenna, GPS, 120 volts, 10/100/1000 Ethernet port Wireless repeaters Wireless analog secondary clocks Wireless digital secondary clocks
	Manufacturer	Bogen, Lathem, Primex, Sapling, Spectracom, Pyramid, American Time & Rauland
	Notes	Provide wireless master clock transceiver in the Equipment Room. Provide 1 wireless repeater in each Telecommunications Room, as needed for full coverage. Provide wireless secondary clocks, as outlined in the technology space requirements.

Proposed 2011

Access Control System		
	Use	To provide secure access to the building. To provide security protection after hours.
	Product	Door access control panel (Cisco product to be supplied by Owner) Proximity Card readers Door contacts Request for (exit motion detectors at Code required exits, pushbuttons at other doors) Cabling
	Manufacturer	Cisco, RS2, Continental Access, Bosch Security Systems, DSX Access Systems, Galaxy Control Systems, IDenticard
	Notes	Owner to furnish and contractor to install 1 door access control panel above each door. Provide 1 proximity card reader at each entry/exit. Provide 2 door contacts at each double door. Provide 1 "request for exit" at each double door. Provide cabling as needed. Interlock with the automatic door operator. (ADO) Provide testing and training.

Video Surveillance System		
	Use	To provide video recording of events during occupied and non-occupied time.
	Product	Indoor dome IP-based color cameras. Fixed focus, NTSC, 720p resolution, 30 fps progressive scan, POE IEEE 802.3af, 0.25 lux minimum illumination. Outdoor dome IP-based color cameras, fixed focus, NTSC 720p resolution, 30 fps progressive scan, POE IEEE 802.3 af, 0.25 LUX minimum illumination. 4 PR UTP cable Indoor housing Outdoor housing Licenses
	Manufacturer	Sony, Axis, Panasonic, Bosch, Pelco
	Notes	Provide cameras as outlined in the technology space requirements. All cameras must be compatible and integrate with Owner furnished Cisco Physical Security Video Surveillance Manager (VSM) 6.3 IP based surveillance system. Provide one 4PR UTP to each camera. Provide testing and training.

Notes:*Technology Quality Assurance**

1. All products shall be UL listed.
2. All equipment shall comply with the latest edition of ANSI NFPA 70 National Electric Code.
3. All equipment shall comply with the latest BICSI Telecommunications Distribution Methods Manual (TDMM)
4. All equipment shall comply with the latest ANSI-J-STD-607 Commercial Building Grounding.
5. All equipment racks and cabinets shall comply with the latest ANSI/EIA-310 Cabinet and Associated Equipment Standards.
6. All equipment shall comply with the latest ANSI TIA/EIA-568,569,606, 607, and 862 Standards.
7. All cabling shall comply with the latest ANSI/ICEA S-98-688/S-99-689 twisted pair cable standard.
8. All fiber optic cable shall comply with ANSI/TIA/EIA-492 AAAB standard.
9. Sound System Engineering (Davis and Patronis)-3rd Edition 2006.
10. Audio System Design and Installation (Giddings) 1990
11. Federal Communications Commission Part 15
12. Americans with Disabilities Act (ADA)
13. Access control system shall comply with SIA DC-03 and SIA DC-07.
14. Cameras shall meet ICES 003 and MPEG standard.
15. Cameras shall meet IEEE 802-3 af (POE) standards.

Scanner Certification Report

Circuit ID: Scanner: Remote:
 Project: SW:
 Owner: Adapter Adapter
 Autotest Type:
 Cable Type: Adapter Adapter
 NVP:
 Site:
 Building:
 Floor:
 Closet:

Length Limit 12 36 45 78
 Delay (ns):
 Resistance (Ohms):

Wiremap Scanner:	Expected	Actual	Skew(ns):											
Remote:	Overall Margin (dB)		Bandwidth(MHZ)			Overall Margin (dB)								
Attenuation Scanner	Pairs	dB	Margin	MHZ	Next Scanner	Pairs	dB	Margin	MHZ	Remote	Db	Margin	MHZ	
	12				12									
	36				36									
	45				45									
	78				78									
RETURN LOSS Scanner	Pairs	dB	Margin	MHZ	ACR Scanner	Pairs	dB	Margin	MHZ	Overall Margin	Remote	Db	Margin	MHZ
	12/36				12/36									
	12/45				12/45									
	12/78				12/78									
	36/45				36/45									
	36/78				36/78									
	45/78				45/78									

ELFEXT		Overall Margin (dB)			Remote			PSNEXT		Overall Margin (dB)			Remote	
Pairs	dB	Margin	MHZ	dB	Margin	MHZ	Pairs	dB	Margin	MHZ	dB	Margin	MHZ	
12/36							12							
12/45							36							
12/78							45							
							78							
36/12														
36/45														
36/78														
PSELFEXT		Overall Margin (dB)			Remote		Scanner		Overall Margin (dB)		Remote			
Pairs	dB	Margin	Pairs	dB	Margin	Pairs	dB	Margin	Pairs	dB	Margin	Pairs	dB	
12			12			12			12			12		
36			36			36			36			36		
45			45			45			45			45		
78			78			78			78			78		
78/12														
78/36														
78/45														
PSACR		Overall Margin			Remote		Scanner		Overall Margin (dB)		Remote			
Pairs	dB	Margin	Pairs	dB	Margin	Pairs	dB	Margin	Pairs	dB	Margin	Pairs	dB	
12			12			12			12			12		
36			36			36			36			36		
45			45			45			45			45		
78			78			78			78			78		

Appendix – Electrical

PURPOSE

The purpose of this section is to provide a guide to designers for selecting appropriate electrical equipment. All final product selections listed below and those not included shall be reviewed with the Louisiana Recovery School District and New Orleans Public Schools (Owner). The Owner will consider other materials if justified and appropriate.

Low Voltage Electrical Power Conductors and Cables		
	Use	Building wires and cables rated 600V and less
	Product	Solid copper wiring for sizes #12 & #10, all larger sizes to be stranded. Compact stranded aluminum conductors may be utilized for conductor sizes 1/0 (copper equivalent) and larger. CU/AL rated bolted lugs may be used for the termination of compact stranded aluminum conductors. Copper pigtails must be utilized for terminations at utility service input, transformers and all rotating/vibrating equipment. Maximum conductor sizes shall be 600 MCM copper (900 MCM compact stranded aluminum).
	Manufacturers	Products to comply with NEMA WC 70
	Notes	-All conductors shall be installed in conduit. -MC cable may be used in all concealed areas or exposed in electrical equipment rooms, where allowed by Code. All MC cable must be adequately supported and installed in a workmanlike manner at right angles, neatly arranged and bundled with appropriate bridle rings, supports, hangers and clamps. -Voltage drop calculations shall be conducted for feeders between the service entrance equipment and the branch-circuit distribution equipment to verify conformance to the requirements of ASHRAE Standard 90-1
Grounding and Bonding for Electrical Systems		
	Use	Grounding and bonding of electrical systems and equipment
	Product	Grounding system to consist of copper grounding electrodes and copper ground wiring bonded together meeting the National Electric Code
	Notes	-Continuous equipment grounding conductors to be installed in all circuits bonded to all ground lugs, bussing, switches, receptacles, equipment frames etc, per the National Electric Code.

Raceway and Boxes for electrical systems		
	Use	Routing method and termination points for electrical conductors
	Product	"EMT" Electrical metallic tubing "FMC" flexible metal conduit "IMC" intermediate metal conduit "LFMC" Liquid tight flexible metal conduit "RMC" Rigid metallic conduit "RNC" Rigid nonmetallic conduit
	Manufacturers	Metal conduit shall conform to one of the following: ANSI C80.1., ANSI C80.6., ANSI C80.3. Nonmetallic conduit shall conform to NEMA TC 2
	Notes	All conductors shall be installed in conduit in conformance with the National Electric Code. Placement and support of conduit shall also be in conformance with the National Electric Code. Underground conduits shall be Schedule 40 (minimum) PVC. Unless required otherwise by Utility Company or other Authority Having Jurisdiction, underground conduits may be direct buried without concrete encasement. Wherever underground conduits are located below concrete slab, stainless steel hangers shall be installed to anchor conduits to slab above. Rigid steel elbows and rigid steel conduit slab penetrations shall be utilized throughout underground conduit system.

Lighting Control Devices		
	Use	Devices to control lighting fixtures for energy savings and to comply with ASHRAE 90.1-2007.
		Ceiling or wall mounted control devices with associated power packs or relay panels connected between the room light switch and light fixture for automatic control. UL Listed Interface with BAS as required.
	Manufacturers	Hubbell, Novitas, Inc., Sensor Switch, Inc, Wattstopper, Lutron, Leviton, Douglas Lighting Controls
	Notes	Rooms with exterior windows shall have a lighting system connected to photo-electric cells sensing sunlight for automatic illumination level control for daylight harvesting. Interior rooms lighting to be controlled by wall switch and occupancy sensor, automatic timed lighting system or a combination of each to conform with ASHRAE 90.1-2007. Exterior lighting to be controlled by photo-sensor and/or Astronomical time clock to comply with ASHRAE 90.1-2007. Refer to LEED for schools 2009 requirements.
		See Lighting and Controls portion of Section P800 – Electrical Systems
Low Voltage Dry type Transformers		
	Use	Transforming power from 480v three phase to 208V three phase
	Product	Wall or pad mounted metal enclosed, vented, dry type transformers rated 600v and less with capacities up to 1000kva. UL Listed
	Manufacturers	Eaton Corporation, Square D, Siemens, Power Smiths, General Electric
	Notes	-Transformers shall be NEMA-premium based on total demand of the load the transformer serves. -Provide transformer with voltage taps -Transformer to be 3R rated if located outdoors -Provide transformer with vibration mountings

Switchboards		
Switchboards	Use	Electrical Equipment used as the first point of connection from the utility company and to distribute power
	Product	Metal enclosed electrical switchboard with dead back and main switch for building main service electrical device. UL Listed
	Manufacturers	Eaton Corporation, Square D, Siemens General Electric.
	Notes	<p>Switchboards to be designed with 15% spare capacity and 30% spare space at the end of design phase.</p> <ul style="list-style-type: none"> -The main electrical service equipment shall be located in a dedicated electrical room above the established flood elevation -Distribution equipment to be located in a dedicated room or on mechanical decks. -Provide switchboard with Lightning arrester devices and surge protection device for protection -Provide switchboard with an electronic metering device linked to the building automation system for monitoring -Switchboard shall have fusible switches or breakers -fault current rating shall be coordinated with the Utility Company
Panelboards		
Panelboards	Use	Electrical equipment used to distribute individual electrical circuits to electrical equipments, lights, receptacles, etc.
	Product	Metal enclosed 42 or 60 circuit breaker panel rated 600v or less with main breaker or main lugs as required by code. UL Listed
	Manufacturers	Eaton Corporation, Square D, Siemens, General Electric.
	Notes	<ul style="list-style-type: none"> -Panelboards to be designed up to 80% of capacity and be provided with 30% spare space and a minimum of (6) spare over current protection devices, whichever is greater, at the end of design phase. -Breakers shall be bolt on type -Distribution equipment to be located in a dedicated room or on mechanical decks. -Provide panels with surge protection device -Panel to have lockable hinged doors

Wiring Devices		
	Use	Receptacles and switches to provide and control power to devices
	Product	Specification grade 20amp 120 or 277 volt receptacles or switches. Provide special purpose receptacles as required. UL Listed
	Manufacturers	Pass & Seymour, Cooper, Hubbell, Leviton
	Notes	<p>Receptacles to be 20 amp 120v specification grade with ground with the following requirements:</p> <ul style="list-style-type: none"> -mounted at 48" A.F.F. or as required otherwise on the first floor where first floor elevations are below Base Flood Elevation. -single duplex receptacles for general use. -Duplex receptacle every 50' in corridors - (4) Receptacles to be provided in offices, conference rooms, teacher work rooms and areas designated for voting. -Receptacles to be ground fault protected (GFI) as per the National Electric Code. -Exterior rated GFI receptacle located outside of each main exterior door. -Floor outlets where necessary. -Receptacles in a kitchen located away from the walls shall be pedestal type. -Pre-kindergarten room receptacles to be tamper resistant type. Receptacles in a science lab to be mounted above the back splash. -Provide devices with stainless steel wall plates -Where practical locate outlets on adjacent walls rather than near or above sinks. -Switches shall be 20 amp 120 or 277 volt specification grade. -Provide devices with stainless steel wall plates and cover screws -On exterior provide GFCI protected outlets at each exterior door, at 100' maximum spacing around perimeter and within 15' of all serviceable mechanical equipment. -Provide outlets for future book security systems at doors nearest circulation desk in Media Centers -Provide outlets at all potential public entrances for future metal detector system. Provide weatherproof 208 volt outlet accessible at driveway or bus drop-off for visiting non-profit service provider buses.

Enclosed switches and circuit breakers		
	Use	Electrical devices used to disconnect electrical equipment
	Product	Metal enclosed disconnect, device shall be fusible, non-fusible or circuit breaker type UL Listed
	Manufacturers	Eaton Corporation, Square D, Siemens, General Electric.
	Notes	-Devices shall be heavy duty rated -Nema 3R rating when located outside -Nema 4X rating in kitchens -Size disconnect for the device it is serving -Provide fusing or breaker as required by manufacture or code
Enclosed Controllers		
	Use	Electrical device used to start/disconnect electrical equipment
	Product	Metal enclosed fusible disconnect/starter device UL Listed
	Manufacturers	Eaton Corporation, Square D, Siemens, General Electric.
	Notes	-Device shall be heavy duty rated -3R rated when located outside -Starters to have phase loss protection for motors over 5 hp -Controller to have a hand/off/auto switch -Size controller/starter for the motor it is serving. -Motor Control Centers are permitted
Fuses		
	Use	Over current device used to protect wiring
	Product	Cartridge Fuses rate 600v and less
	Manufacturer	Little Fuse, Cooper Bussman, Ferraz Shawmut
	Notes	-Provide a spare fuse cabinet -coordinate fuse size rating with utilization equipment nameplate -fuses to comply with NEMA FU 1 and NFPA 70

Engine Generators		
	Use	To provide life safety and stand-by power
	Product	Pad mounted Natural Gas generator
	Manufacturers	Kohler, Caterpillar, Cummins, Generac
	Notes	<p>Life Safety Equipment:</p> <ul style="list-style-type: none"> -Emergency egress and exit lighting -Fire Alarm -Pre-action fire suppression equipment -Fire pump <p>Stand-by Equipment:</p> <ul style="list-style-type: none"> -Central Sound system -Technology Equipment -Telephone System Switch -Security System -Minimum of 2 receptacles in the main mechanical and electrical equipment rooms. -Other devices as indicated by the Owner -Provide with a critical silence lockable enclosure and muffler. -Locate generator above established flood elevation -Provide remote annunciator at main entrance. -Size generator and transfer switches for load applied

Surge Protection Devices		
	Use	To provide electrical surge protection
	Product	Integral or independent Surge protection device (SPD) listed to UL 1283 and UL 1449, 3rd Edition.
	Manufacturers	Eaton, LEA, Liebert, Current Technology, Thomas & Betts Power Solutions
	Notes	<p>Product shall be in compliance with UL 1283 and UL 1449 3rd Edition.</p> <p>Surge Protection devices (SPD) shall be incorporated as follows:</p> <ul style="list-style-type: none"> -Main Service Switchgear SPD shall be solid state, parallel-connected modular design with field replaceable modules, sine-wave-tracking suppression and filtering, with individually fused MOVs matched within 1 percent. -Distribution panelboards SPD shall be solid state, parallel-connected non-modular design, sine-wave-tracking suppression and filtering, with individually fused MOVs matched within 1 percent. -SPD may be integral or independently mounted at switchboards and panelboards -Provide SPD with indicator lights

Interior Lighting	Use	Artificial illumination of interior areas
	Product	Combination of fluorescent, metal halide and incandescent lighting fixtures.
	Manufacturers	Interior Lighting: Cooper, Philips/Day-brite, Finelite, Lithonia (Acuity), LSI Industries, Juno Lighting Group, Lightolier
	Notes	<p>Classrooms: Wall switch & occupancy sensor controlled Direct/Indirect 3 lamp T8 pendant fixtures (where feasible) with automatic daylight dimming for row nearest windows and teacher controls for general and A/V modes, markerboard and all off.</p> <p>Interior Support and Administrative areas: High efficient fluorescent fixtures with electronic ballasts and lamps. Automatic Daylight dimming where applicable with switch and occupancy sensor controlled.</p> <p>High Volume Spaces; (gymnasium, student dining, etc.) High bay fluorescent fixtures. Provide all fixtures with wire guards in the gymnasium with multi-level switching and automatic daylight compensation switching where appropriate.</p> <p>Types of lamps are to be minimized.</p> <p>Minimum illumination levels shall conform to (IES) Illuminating Engineers Society & LA State Sanitary Code. -Lighting design shall conform to ASHRAE 90.1 - 2007</p>
Emergency Egress Lighting		
	Use	Lighting fixtures used to direct people safely out of a building
	Product	Wall or ceiling mounted exit light or means of egress light connected to a battery pack or an on site generator to provide means of egress lighting and directional lighting out of a building.
	Manufacturers	Cooper, Philips/Day-brite, Lithonia (Acuity), Lightolier
	Notes	<p>-Exit lights or means of egress lights to have a wire guard in any area subject to damage.</p> <p>- Exit lights or means of egress lights shall be connected to an emergency generator or be connected to a battery pack to provide a minimum of 90 minutes of emergency illumination per code.</p>

		-Means of egress lights shall have (2) emergency lamps and ballasts as required by code. -Exiting light illumination levels shall conform to all local and state codes
Theatrical Lighting		
	Use	Providing additional controlled illumination for a performance
	Product	Ceiling track lights or bar supported ellipsoidal, fresnel and spot lights controlled by a dimming system
	Manufacturers	Strand, ETC, Lehigh, and Altman
	Notes	<p>Theatrical Lighting Per Grae Level</p> <p>Elementary: Gymnasium, Cafetorium, Music Room, etc.)</p> <p>Lighting system for the stage/platform area to be a two circuit track light system with incandescent light heads controlled by independent dimmers.</p> <p>High School Auditorium</p> <p>Suspended front of stage lighting bar with theatrical grade ellipsoidal, Fresnel and Spot lights. The stage area to have front and rear electrics. Seating area to have aisle lighting and a separate dimmable house lighting system. Two follow spot locations to highlight performers. Auditorium to have two control areas for the lighting systems, one in the main control booth and a secondary control area located at the back of the performance area. Theatrical dimming racks and control system will be required in this area.</p>

Exterior Lighting		
	Use	Illuminating the exterior area of the building and parking lots for exiting and safety
	Product	Exterior building mounted or pole mounted LED, CFL, or High Intensity Discharge lighting fixtures for exterior illumination
	Manufacturers	Cooper, Philips/Day-brite, Lithonia (Acuity), LSI Industries, Juno Lighting Group, Lightolier
	Notes	<ul style="list-style-type: none"> -Exterior building mounted fixtures to be high abuse type. -Pole mounted fixtures to be mounted on a 15'-0" to 30'-0" pole depending on location, coordinate proper base requirements -Provide poles rated for the wind gusts of the area and with internal vibration isolators -Pole configuration to be square straight steel with base cover and hand hole -Exterior means of egress lights shall have (2) lamps and (2) ballasts per code.
Fire Alarm System		
	Use	To notify the occupants of a fire alarm for the evacuation of the building and to contact the fire department.
	Product	Fire alarm system to be digital, intelligent, non coded addressable type UL listed
	Manufacturers	Edwards, Notifier, Fike, Simplex Grinnell, Fire-Lite, Siemens, TEPG/Secutron
	Notes	<ul style="list-style-type: none"> -Fire alarm to be addressable -System to comply with all local and state building codes and the National Fire Protection Association and Americans with Disabilities Act -Horn and strobe devices located per code -Main control panel to be located in Telecommunications Equipment Room (ER) -Remote annunciator stations located at the main entrances and Administration area -Two way communication at all "Areas of Rescue" -Fire alarm system to provide notification to Fire Department via analog telephone line -Voice evacuation devices and system to be provided as required by code

Additional Items to be Commissioned

ADDITIONAL ITEMS TO BE COMMISSIONED

This committee recommends that the Commissioning Agent's scope of services be expanded to include the following, in addition to those systems presently being commissioned for the purposes of LEED certification. The reasoning behind this recommendation is that the Owner will cost-effectively benefit from the assurance that this commissioning effort provides. The Commissioning Agent will review design documentation to confirm inclusion of the commissioning process into the design, observe contractor demonstrations to verify that the systems function as they are intended and that the interfaces between the various systems are properly installed. In addition, it is intended by the proposed revisions to the Performance Specifications that there be significant integration among these various systems and equipment to be provided by the Owner, and the commissioning process will verify that this integration occurs. Lastly, the Commissioning Agent will assure that the Operations and Maintenance documentation required by the contract is thorough and concise and that staff training is adequate and documented (video recording) in such a way that it can be useful for future generations of staff.

Additional items recommended to be commissioned include:

1. Fire Alarm System and its interfaces to any smoke control, access control or other mechanical systems.
2. Lighting Controls
 - Occupancy (vacancy) sensor delay and sensitivity settings
 - Daylight sensor sensitivity and coverage settings
 - Functionality (e.g. normal and A/V settings in classrooms)
 - Interface with BAS
3. Confirmations that all fiber optic and Cat 6A cables are tested and are certified (including Cat 6A cabling used by systems other than IT, such as CCTV and access control.)
4. CCTV system within a given school
 - (This must be coordinated with the Owner so that the Owner provides local server hardware and/or centralized district-wide server prior to final commissioning acceptance. For interim commissioning, functionality from the camera through to the patch panel upon which the camera's Cat 6A cable is terminated can be demonstrated.)
5. Access Control System
 - Verify the operation of the entire system (card readers, electric strikes, magnetic locks, door contacts, Owner-furnished door controllers, cabling, etc.), including interfaces with fire alarm system. (This must be coordinated with the Owner so that the Owner provides not only the door controller hardware but also the local server hardware and/or centralized

district-wide server. For interim commissioning, functionality from the remote devices (card readers, electric strikes, magnetic locks, door contacts, etc.) through the door controllers to the patch panel upon which that door's Cat 6A cable is terminated can be demonstrated.)

6. All "Technology" Systems
 - a. Interactive white boards
 - b. Intercom/Paging and clocks
 - c. Sound reinforcement systems in gymnasias, cafeterias, auditoriums, etc.

E-Rate Implications

E-RATE IMPLICATIONS

In order for the State Board of Education to receive funding through the Schools and Libraries Program of the Universal Service Fund, which is administered by the Universal Service Administration (USAC) under the direction of the Federal Communications Commission, commonly known as E-Rate, the following information and requirements must be included as part of the Construction Documents. The program provides discounts to assist most schools and libraries in the United States (and U.S. territories) to obtain affordable telecommunications and Internet access. It is one of four support programs funded through a Universal Service fee charged to companies that provide interstate and/or international telecommunications services.

The Schools and Libraries Program supports connectivity - the conduit or pipeline for communications using telecommunications services and/or the Internet. Funding is requested under four categories of service: telecommunications services, Internet access, internal connections, and basic maintenance of internal connections. Discounts for support depend on the level of poverty and the urban/rural status of the population served and range from 20% to 90% of the costs of eligible services. Eligible schools, school districts and libraries may apply individually or as part of a consortium.

Applicants must provide additional resources including end-user equipment (e.g., computers, telephones, etc.), software, professional development, and the other elements that are necessary to utilize the connectivity funded by the Schools and Libraries Program.

The Construction Documents and Construction Contract must include:

1. Provide language in the “front end” bidding and contract documents requiring that any contractor bidding the construction project must:
 - a. Obtain a Service Provider Identification Number from the Universal Service Administration Company (USAC) (<http://www.usac.org/sl/>)
 - b. file the *Service Provider Annual Certification Form* (Form 473) with USAC each year that they provide services under the program
 - c. Submit a Service Provider Invoice (SPI) form 474.9 to USAC.
 - i. Should the contractor receive payment from USAC subsequent to being paid for the same scope of work from RSD or OPSB, the contractor must refund any duplicate payments to RSD or OPSB.
2. Provide a “line item” price or an “Alternate” price for those portions of the Technology infrastructure that qualify for OPSB and RSD E-Rate submissions. These items include:
 - a. Fiber optic and Cat. 6A cabling systems to support all Technology applications, including inner-ducts, raceways, cable trays, conduits, and all appurtenances required for the installation of these cabling systems.

- b. Equipment racks, patch panels, patch cables, backboards, supports, etc. located in Technology Equipment Room and in Telecommunications Closets.
- c. Cat. 6A cabling systems and appurtenances for CCTV systems.
- d. Cat. 6A cabling systems and appurtenances for Card Access systems.