

DIVISION 13 – SPECIAL CONSTRUCTION

This division contains the following elements:

- 1.1 General.
- 1.2 Utility Provisions for Future Expansions.
- 1.3 Telecommunications Systems.
- 1.4 Intercom and Clock/Bell System.
- 1.5 Technology Centers.
- 1.6 Instructional Technologies (Interactive Whiteboards, Digital Projectors, Interactive Projectors, and Classroom Sound Systems)
- 1.7 Instructional TV (ITV) System (Also known as Closed Circuit Television (CCTV)).
- 1.8 Sound Reinforcement Systems.
- 1.9 Intrusion Alarm System.
- 1.10 Card Access Control System.
- 1.11 Security Camera System (SCS).
- 1.12 Energy Management System (EMS).

1.1 GENERAL

- A. Telecommunication system shall be defined as the combination of telephone and data systems
- B. Coordinate electrical and communication connections with architectural and other elements to eliminate omissions and field conflicts.
- C. Power for communications, security, and fire alarm systems, shall be connected to the appropriate emergency power source as identified in Division 16 – Electrical.
- D. Electrical design shall comply with the following:
 - 1. National Electrical Code (NEC) – (NFPA 70)
 - 2. Florida Building Code (FBC).
 - 3. All applicable codes and standards.
- E. Not all code requirements are listed within this M-DCPS Design Criteria section. Selected code requirements are included in this section for clarification or emphasis only.
- F. Consult M-DCPS Information Technology Services - Infrastructure and Systems Support (ITS/ISS) to verify status, and coordinate technology projects, currently active at various school sites.
- G. Training of M-DCPS personnel for operation and maintenance of security and energy management systems shall be included in project specifications and shall be scheduled with the M-DCPS Project Manager to occur at the project site within two weeks after Substantial Completion.
- H. Include the costs for providing temporary provisions to continue use of existing communication, data, security, and energy management systems during construction at existing facilities, in the construction cost estimate.

1.2 UTILITY PROVISIONS FOR FUTURE EXPANSIONS

- A. Unless otherwise directed in writing by M-DCPS Project Manager, the design of all new schools shall identify an area located adjacent to the new facility, for placement of a “future classroom expansion” building. Prior to Phase I Design Development, the A/E shall confirm with the M-DCPS Project Manager if this requirement is applicable to the Project.
- B. The design of all new schools shall also provide all utility needs for the future classroom expansion and shall provide utility stub-outs from the new school building, in the direction of the future expansion area. Coordinate quantity, and sizes of all conduits for the future expansion building, according to requirements noted in this Design Criteria.
- C. The future expansion shall consist of a prescribed number of classrooms as directed in writing by the M-DCPS Project Manager, or at a minimum, the following number of classrooms:
 - 1. Elementary Schools - 8 additional classrooms.
 - 2. K-8 Centers - 18 additional classrooms.
 - 3. Middle Schools - 18 additional classrooms.
 - 4. Senior High Schools - 30 additional classrooms.
- D. Utility stub-outs shall be extended beyond sidewalks and other permanent construction toward the area designated to accommodate the future classroom expansion building. Provide the following minimum size requirements for the appropriate new or existing school type unless otherwise directed by M-DCPS Project Manager.

<u>PROVISIONS</u>	<u>ELEM.</u>	<u>MID & K-8</u>	<u>SR. HIGH</u>
1. Sanitary: Minimum diameter of cast iron pipe or PVC with 1/8" per foot minimum slope.*	4"	4"	4"
2. Domestic Water: Minimum diameter of type “L” or “K” copper or PVC. */ **	2"	2"	2-1/2"
3. Electrical Load: Minimum number of Portable single classrooms, with 120/208V. single phase, 9 KW demand each.	8	18	30
4. Switchboard: Number of blank spaces for Future 400 amp breaker labeled “FUTURE EXPANSION”	1	1	2
5. Fire Alarm: Panel with number of sets of spare zone modules.***	2	4	6

6.	Intercom: Console rated for number of additional classrooms and with space for equal number of future clocks, speakers and call buttons	8	18	30
7.	ITV: Terminal able to be tapped and transmit the signal though number of feet.	250 feet	400 feet	400 feet
8.	Telecommunication: Telephone frame/data cabinet with capacity for number of classrooms.	8	18	30
9.	Intrusion Detection: Panel with minimum number of spare zones, half for doors and half for motion detectors.	10	23	38
10.	Energy Management: Panel with number of spare control points.	1	2	3
11.	Empty Conduits: Number of conduits from each related board or equipment, to future classroom expansion.	1	2	3
a.	Power: Number of 4"conduits from main switchboard to underground junction box.	1	1	2
b.	Audiovisual: Number of 2" conduit for clocks, speakers, call buttons.	1	2	3
c.	ITV and security from the intercom console connected also to ITV terminal rack.	1	1	1

2. The sizes and runs of conduit and cable trays, outlet boxes, pull-boxes, device boxes/enclosures, dedicated equipment spaces for the telecommunication system, and power for these systems shall be indicated on drawings and furnished and installed by the Contractor.
 3. Provide a flexible cost-effective system for distributing the interconnecting wiring between the various devices in this section.
 4. In retrofits of existing buildings, or in additions projects, coordinate with ITS/ISS the use of the existing telecommunication equipment rooms, to avoid the rewiring of the entire facility. Each added/remodeled space shall have adequate telecommunication and infrastructure provided to permit ITS telecommunication wiring to be connected to the existing telecommunication room and to new and/or existing satellite wiring closets.
 5. Systems shall comply with FBC and shall be listed by an OSHA approved Nationally Recognized Testing Laboratory (NRTL).
- B. Consult with ITS/ISS, (305) 995-3332, regarding all the necessary requirements for telecommunication systems. ITS/ISS will assign a coordinator for each project.
- C. Telecommunication system at addition, renovation, or remodeling projects shall be evaluated by the A/E with consultation with the ITS/ISS staff to determine if the existing system is usable, expandable, and complies with FBC and M-DCPS Design Criteria requirements. If the existing system needs to be modified or replaced, ITS/ISS will review and approve the scope of work.
- D. Submittals and Review Requirements.
1. During Phase I/II, coordinate the locations and methods of connecting all telecommunications equipment rooms and raceway systems including number & sizes of spare raceways with ITS/ISS and the M-DCPS Project Manager.
 2. The Phase I /II power/telecommunication systems drawings shall be submitted to ITS/ISS for their review and approval. These drawings shall include, but not be limited to the following:
 - a. Conduit layout at 1/8" scale floor plans with conduit sizes noted.
 - b. Main telecommunications room and satellite wiring closets located on minimum 1/4" scale floor plans.
 - c. Conduit layout on an overall site plan showing each existing and future building, telephone service to site, conduits between the main telecommunications room and satellite wiring closets, and conduits between the intercom equipment racks and satellite closets.
 - d. Electrical legends for all devices, included but not limited to speakers, clocks, bells, call buttons and telecommunication outlets.
 - e. Electrical power legend for all electrical outlets in the main telecommunications room and satellite wiring closets.
 - f. Location of the dialer for all fire alarms, security and card access systems panels, as well as other panels needing telecommunication/network connectivity.
 3. Phase III power/telecommunication system drawings including all FF &E layout drawings shall be submitted to M-DCPS ITS/ISS personnel for their review and approval. The Phase III Documents shall reflect the final Florida Inventory School House (FISH) room numbering scheme approved by M-DCPS, and shall include but not be limited to the following requirements:
 - a. Revised drawings and written response to review comments in all previous Phases.

- b. Complete electrical specifications.
 - c. Complete, detailed, and itemized construction cost estimate according to Contract requirements.
 - d. Completed electrical drawings coordinated with plans and specifications of structural, architectural, electrical, civil, laboratory equipment supplier, kitchen equipment supplier, and Not-In-Contract (NIC) FF &E items.
 - e. Complete riser diagram showing the location of every telecommunication outlet and conduit sizes from the various wiring closets to the outlets. This shall include the conduits between the wiring closets and the main telecommunications room, and locations/sizes of all pull boxes and junction boxes uses in the conduit system.
 - f. Location of the dialer for all fire alarms, security, card access systems panels as well as other panels needing telecommunication/network connectivity.
- 4. All Telecommunication systems shop drawings shall be submitted, through the M-DCPS Project Manager, to ITS/ISS for review, coordination, comments, and acceptance.
 - 5. Once the project is in construction, any new revisions to previously approved drawings pertaining to the telecommunication systems shall be submitted to ITS/ISS for their review, as this may affect their Not-In-Contract wiring bid process.

E. Telecommunication Systems Requirements:

- 1. All telecommunication system conduits shall be provided with pull-strings that are properly identified and are of adequate length and pulling strength capabilities.
- 2. All telecommunication systems conduits penetrations shall be properly fire-caulked.
- 3. Provide for a system of “homerun” conduits from the nearest satellite wiring closet, to all large-group areas including the Administration, Student Services, Media Center, Dining Room, Auditorium, Exterior Covered Dining and open courtyards, in order to provide wireless connectivity to these areas. For each of these areas, terminate the “homerun” conduit at a centrally located 18" L x 18" W x 6" D junction box with screw-on cover plate mounted above the ceiling. For exterior locations, the 18" L x 18" W x 6" D junction box shall be located above the ceiling of an interior space that has a common wall with the exterior area. At these locations, the interior mounted 18" L x 18" W x 6" D junction box shall also be connected to an exterior wall-mounted 4" L x 4" W x 4" D weather tight junction box with screw-on cover plate, located on the exterior side of the wall. The A/E shall coordinate the location of all wireless connectivity raceway system with M-DCPS ITS/ISS personnel during the Phase III Matrix Review process. All homerun conduits from a single telecommunication outlet shall be based on four (4) telecommunication cables per outlet.
- 4. Provide a minimum of two (2) 4-inch underground conduits for the AT&T/Florida service entrance. Conduits shall extend from the property line to the main telecommunications room. Conduits shall be incased in concrete the full length and shall be terminated at the main telecommunications room, against the lower left hand corner of one of the walls that does not contain the entrance door, and at the property line, within a 24" W x 36" L x 30" D traffic rated hand-box with screw on cover lid, containing a minimum of a 12-inch layer of 3/4" crushed stone at the bottom of the box for drainage. The A/E shall coordinate the location and installation requirements for these conduits with AT&T/Florida.

5. Coordinate the installation and all power requirements of all AT&T equipment to be located in the Main Telecommunications room with AT&T/Florida Building Industry Consultant Services (BICS).
6. Provide each office and instructional space with a minimum of one telephone outlet or more according to program requirements, with appropriate conduit with pull strings.
7. Provide an empty conduit system from the nearest satellite wiring closet to the following locations, for the installation of ITS wiring according to program requirements:
 - a. Telecommunication Locations:
 - 1) All Instructional spaces (classrooms and labs). Coordinate layouts of devices with M-DCPS ITS/ISS.
 - 2) Administration and Student Services areas:
 - a) All staff offices.
 - b) All conference rooms.
 - c) All secretarial stations.
 - d) Clinic.
 - e) Student activities and student careers rooms.
 - f) Production workroom (for NIC copiers).
 - g) Student records (for NIC copiers).
 - h) At each reception counter area.
 - 3) Media center:
 - a) Media center director's office.
 - b) Reading Room (for NIC copiers).
 - c) Electronic catalog carrels.
 - d) Circulation desk.
 - e) Provide telecommunication outlets in the Reading Room for "Bring-Your-Own-Device" student program. Each telecommunication outlet shall be accompanied by a 120V duplex receptacle.
 - 4) Food Service Areas:
 - a) Two (2) outlets at the Food Service Manager's office.
 - b) At each Point-of-Sale (POS) cash register. See Educational Specifications for actual number of POS stations.
 - c) At each food-cart alcove. See Educational Specifications for actual number of food-cart alcoves.
 - d) Provide telecommunication outlets in the Cafeteria and exterior student dining areas for "Bring-Your-Own-Device" student program. Each telecommunication outlet shall be accompanied by a 120V duplex receptacle.
 - 5) Teachers' Lounge.
 - 6) Custodial central receiving.
 - 7) Zone mechanic's office.
 - 8) Auditorium stage and control booth.
 - 9) Cafetorium stage and control booth.
 - 10) Language Arts Lab (Little Theater) control booth.
 - 11) Network Server rooms.
 - 12) Teacher planning rooms.
 - 13) Concession booths at Auditorium and Gymnasium.
 - 14) Irrigation control system controller.

- 15) Card Access control panels.
 - 16) Intrusion alarm panels.
 - 17) Fire Alarm Digital Alarm Communicator Transmitter (DACT) (for two separate telephone outlets per NFPA 72).
 - 18) Security Camera System Control Room.
 - 19) Energy Management System Control panel.
 - 20) CCTV Room (at center of Chroma-key wall).
 - 21) ITV Production Studio (at center of Chroma-key wall).
 - 22) ITV Distribution Center Room (on wall behind distribution equipment racks).
 - 23) ITV Control Room (on wall behind production control equipment racks).
 - 24) Elevator equipment rooms.
 - 25) Outdoor marquee school sign.
 - 26) Electric utility meter room.
 - 27) At each visitor's entrance area, provide one data outlet and one quadruplex 120V electrical outlet for use with an NIC "Visitors Identification scanning system".
 - 28) Pay telephones locations.
 - 29) Fuel islands.
 - 30) Other spaces as may be required by the Educational Specifications and/or school building staff.
8. Provide at least one pull-box for every 100 feet of conduit run.
 - a. Install additional pull/junction boxes in runs exceeding 100 feet.
 - b. Conduit runs shall not have more than two 90-degree bends or equivalent. Provide additional pull-boxes regardless of length to meet this requirement.
 - c. Each conduit run from the main telecommunications room or satellite wiring closets to each telecommunications station shall not be longer than 250 feet.
 9. Use center hung cable tray systems when appropriate and cost effective, with routings following corridors to the main telecommunication room and satellite wiring closets for telecommunication and intercom wiring distribution.
 10. When cable trays are used, specify a dedicated cable tray for sole use by ITS/ISS. Provide the dedicated cable tray in each building leading from the main telecommunication room and each communication satellite wiring closet and running the entire length of the corridors. Specify that under no circumstance shall the Contractor use the ITS/ISS dedicated cable trays for placement of any other in-contract wiring.
 11. All cable trays shall comply with the following:
 - a. Provide properly sized metallic conduit with pull string, from the cable tray to each piece of equipment, device, or telecommunications outlet.
 - b. Cable trays shall be concealed above fully accessible ceilings. Cable trays in exposed locations or above plaster, metal, concealed spine, or any other inaccessible ceilings are not allowed.
 - c. Cable trays shall not run at exterior covered walkways
 - d. Cable trays shall not obstruct light fixtures, access panels, damper controls, piping valves, or other equipment requiring access.
 - e. Maintain fire ratings when conduits or cable trays penetrate fire rated assemblies.
 - f. Size cable trays for 140 percent of required capacity and specify positioning of hangers with adequate clearance to allow an installation of a future second tray.
 - g. Cable trays shall be grounded by 1 #6 AWG copper ground wire.

12. Mount telecommunication outlets according to the following:
 - a. Telecommunication outlets shall be provided flush mounted on the wall, 18 inches above finish floor to center of outlet, unless otherwise indicated in this Division or the Educational Specifications issued for the project.
 - b. Secretarial stations: 18 inches above finish floor to center of outlet or in an appropriate floor outlet depending on the design layout. Floor outlets shall be avoided if possible.
 - c. Computer labs: In addition to the requirements for instructional areas, provide each computer lab with the following:
 - 1) A 2-piece, 2-compartment raceway system using one (1) duplex receptacle per data outlet. See Appendix "Computer Lab" Layout for details. Data outlet covers to be provided by the Contractor. Extend appropriately sized conduit from the raceway to a satellite closet. Each computer lab outlet box requires one 4-pair cable. Size conduit as follows:

Conduit Size	<u>Number of Cables When Pulled Together (interior, dry locations)</u>
1/2" (minimum)	2
3/4" (minimum)	4
1"	7
1-1/4"	12
1-1/2"	19
2"	30
2-1/2"	54
3"	80

- d. Food Service Areas:
 - 1) Manager's office strobe/bell: Provide a 1/2" conduit from the nearest satellite wiring closet to a junction box outside the office in the kitchen for a M-DCPS provided strobe light/bell unit. Locate the kitchen junction box centerline 7'-6" above finished floor in an unobstructed visible location.
 - 2) Point-of-Sale (POS) System:
 - a) Provide each POS cashier station one (1) telecommunication outlet, and one (1) 120V duplex outlet on a 20-Amp dedicated circuit.
 - b) Telecommunication lines for POS cashier stations shall be terminated at the nearest satellite wiring closet and shall not exceed 300 feet in total length (includes all vertical and horizontal runs). Daisy-chaining data wiring between POS stations is not permitted.
 - c) Data and electrical outlets serving POS cashier station at interior and exterior serving bays shall be located in an easily accessible area underneath each POS cashier station, a minimum of one foot above the finish floor to center line, and in a manner that when connected to the POS cash register, the exposed data and electrical wiring will not create a trip hazard for students and employees.
 - d) Verify placement and specifications for all telecommunication wiring within the food service area with M-DCPS Food Service and ITS/ISS personnel.

- 3) At the manager's office, provide two (2) telecommunication outlets, dedicated to the POS system, and connected directly to the main telecommunication room with a 3/4" conduit with pull string.
 - e. Floor mounted telecommunication outlets shall have a mounting frame for a duplex receptacle, a brass cover with brass screws, and two hinged lids to allow the use of either or both outlets.
 - f. Provide a 3/4" conduit homerun to the nearest communication closet for each floor mounted telecommunication outlet. Wiring of floor-mounted outlets in a "daisy-chain" fashion is not permitted.
13. Main Telecommunications Room and Satellite Wiring Closets.
 - a. Provide a main telecommunications room and satellite wiring closets for installation of all telecommunication equipment and wiring as indicated in this Division. Main telecommunication room and satellite rooms shall be located not to exceed the maximum allowable length of 250 feet for communication cables.
 - b. The main telecommunications room and satellite wiring closets shall be designed without any columns or beams interrupting these spaces, and with a minimum unobstructed clear ceiling height of 10 feet AFF.
 - c. Design the entry doors to the main telecommunication room and all satellite wiring closets to swing out, to permit maximum use of the interior space for these rooms.
 - d. Locate main telecommunication room and satellite wiring closets away from generators, compressors, electrical switchboards, transformers, panelboards, and any other potential sources of radiated or conducted electrical interference, as electrically generated magnetic fields.
 - e. Electrical panels, transformers, switches, or any other similar electrical equipment shall not be located in the main telecommunications room or any of the satellite wiring closets.
 - f. HVAC ducts, water, sewer, air-conditioning chilled water, or other similar piping shall not enter or pass through the main telecommunications room or any of the satellite wiring closets.
 - g. Walls in the main telecommunications room and in all satellite wiring closets shall be covered from floor to ceiling with 3/4" thick plywood backboards painted with fire retardant gray paint. Data conduits entering/exiting these rooms shall be terminated at the top or bottom edge of these backboards and all penetrations shall be fire rated.
 - h. The floor for main telecommunications room and all satellite wiring closets shall be designed for a minimum live load of 150 pounds per square foot.
 - i. The flooring for the main telecommunications room and all satellite wiring closets shall be finished with pigmented concrete sealer or pigmented concrete stain prior to the installation of any communications equipment.
 - j. The main telecommunications room and all satellite wiring closets shall be provided with a supplemental 24/7 HVAC system in accordance with M-DCPS Design Standards. For details see Design Criteria, Division 15 - Mechanical. For each Project, the A/E shall coordinate with ITS personnel to confirm the heat load for the actual NIC equipment that will be designated for each of these spaces.
 - k. See Design Criteria Appendix for main telecommunications room and satellite wiring closet layouts.
14. Main Telecommunications Room.

- a. Minimum room dimensions shall be 11 feet deep, 29 feet wide, and 10 feet high, with a 3 feet x 7 feet high metal door, with "MAIN TELECOMMUNICATIONS ROOM" signage (and also including the FISH room number, with Braille, mounted at a location accessible to the disabled, in accordance with FBC).
 - b. In new construction, the main telecommunications room shall be a separate room located adjacent to the Administration area.
 - c. Provide 2 separate isolated grounds, one of which shall be dedicated for the telecommunication system only.
 - d. All interior walls of the Main telecommunication room shall be fully covered with 3/4" fire retardant plywood from floor to 10 feet above finished floor.
15. Satellite Wiring Closets.
- a. Minimum satellite room size shall be 11 feet deep, 15 feet wide, and a minimum of 10 feet clear height.
 - 1) Access shall be provided from an enclosed interior corridor using a 3'-0" wide x 7'-0" high metal door swinging out and containing a properly rated bottom-louvered section 12" high x 24" wide (where the fire rating/label requirement of the door precludes the use of louvers, an alternate means of ventilating the closet must be designed) and signage indicating "TELECOMMUNICATIONS ROOM" (and also including the FISH room number, with Braille, mounted at a location accessible to the disabled, in accordance with FBC).
 - 2) All interior walls of the satellite wiring closets shall be fully covered with 3/4" fire retardant plywood from floor to 10 feet above finished floor.
 - b. Satellite Wiring Closet Locations.
 - 1) Locate in a separate room adjacent to electrical rooms.
 - 2) Shall not exceed a 300-foot maximum wire run between satellite wiring closets and the main telecommunications room.
 - 3) Shall not exceed a 250-foot maximum wire run between satellite wiring closet and telecommunication outlets.
 - 4) In multistory buildings, stack satellite-wiring closets vertically and connect with a minimum of three 4" sleeves through the slab. The first floor of the stacked wiring closet shall be fed by four (4) 4" diameter conduits back to the main telecommunications room. When stacking is not possible, or for isolated conditions, provide a minimum of three (3) 3" diameter conduits between each satellite wiring closet and the main telecommunications room.
16. Electrical requirements for the main telecommunications room and satellite wiring closets shall include but not be limited to the following:
- a. Provide grounding and bonding in accordance with ANSI/TIA/EIA-607 and as follows:
 - 1) At the main telecommunications room provide one (1) 4" high x 20" long x 1/4" thick solid copper ground busbar at the lower hand corner of each backboard wall (minimum of three).
 - 2) At each satellite wiring closet provide one (1) 2" high x 10" long x 1/4" thick solid copper ground busbar at the lower hand corner of each backboard wall (minimum of three).
 - 3) All ground busbars shall be listed by an OSHA approved Nationally Recognized Testing Laboratory (NRTL).
 - 4) Ground busbars shall be installed 10 inches above finish floor to bottom.

- 5) Each ground bar shall have at least 12 branch terminals and be connected by #6 AWG copper to one of the following building grounds.
 - a) The metal frame of the building if effectively grounded.
 - b) A buried metal water pipe system not less than 10 feet long.
 - c) An electrode with at least 2" thick concrete encasement located within and near the bottom of a concrete foundation in direct contact with earth. The foundation shall have at least 20 feet of either bare solid copper wire not less than #4 AWG or one or more steel bars of not less than 1/2" diameter.
 - d) A ground ring of at least 20 feet of not less than #2 AWG bare copper conductor in direct contact with earth and buried at least 2-1/2 feet encircling the building or structure and with a # 6 AWG wire attached to the permanent power ground.
- 6) Ground conductors shall utilize their own dedicated conduits and not share any of the telecommunication conduits, cable trays or raceways.
- b. Provide 120V quadraplex electrical outlets 4-feet on-centers around entire perimeter of the main telecommunications room and all satellite wiring closets. Each electrical outlet shall be on a 20-Amp dedicated circuit.
- c. At the main telecommunications room provide two (2) 240V L6-30 twist-lock type electrical outlets each on 30-Amp dedicated circuits.
- d. Coordinate the exact location of all outlets with ITS/ISS personnel.
- e. All electrical outlets located within the main telecommunications room, shall be wired to emergency power service panel.
- f. Provide lighting with a minimum of 30 foot-candles measured at 3'-0" above finished floor level. Use Radio Frequency Interference (RFI)/Electromagnetic Interference (EMI) suppressed fluorescent lighting. Electronic ballasts for fluorescent fixtures shall comply with FCC-47 CFR Part 18, Non-Consumer limits for commercial applications limiting the effects of EMI/RFI.
- g. All equipment mounted outdoors shall be placed in water tight enclosures.
- h. Size system to meet all M-DCPS ITS/ISS requirements future expansion.

1.4 INTERCOM AND CLOCK SYSTEM

A. Intercom System.

1. Provide a fully integrated digital intercom and clock system with centrally located gateway terminals utilizing fiber optic, CAT5/6, copper cabling or as recommended by manufacturer in accordance with M-DCPS Design Standards.
2. The intercom system shall connect the administration and student services areas, with all student occupied areas and other spaces as indicated in this document and in the "General Consideration" section of the Educational Specifications for the Project.
3. At new additions or remodeling projects, coordinate with M-DCPS Facilities Operations / Maintenance to ensure that the scope of work and the proposed new equipment is fully compatible with the existing intercom systems.
4. The intercom system shall be listed by an OSHA approved Nationally Recognized Testing Laboratory (NRTL).
5. The intercom system shall consist of remote 8-Ohm speakers with 25-volt transformers connected via conduit to an intercom control main console with two-way voice communication capability.

- a. Provide conduit and enclosure boxes as required in this Design Criteria.
 - b. Speaker design, wiring and/or or layout shall prevent adjacent rooms from being inoperative during speaker component failure.
6. Intercom and clock system shall be provided as follows:
- a. Provide two-way call buttons, clocks and speakers at the following locations:
 - 1) All Instructional spaces (classrooms, labs, multipurpose rooms, etc.). Locate clock/speakers away from area above the NIC interactive whiteboard.
 - 2) All administration and student services secretarial areas.
 - 3) Auditorium/Cafetorium stage, CCTV Room, ITV Production Studio, ITV Distribution Center Room, and ITV Control Room. The intercom speakers in these areas shall be provided with a key-operated volume control (on-off) switch properly labeled and located in an accessible area at 48" AFF.
 - 4) P.E. Storage rooms when located directly adjacent to a P.E. covered play area (shelter).
 - 5) At all self-contained administrative offices. At the Principal's and all Assistant Principals offices, the intercom speaker shall be provided with a volume control (high-low) switch mounted 48" AFF adjacent to the Staff's technology center.
 - 6) At Media Center adjacent to circulation desk.
 - 7) At all teacher planning rooms.
 - 8) Other areas as may be required by the Educational Specifications developed for the project.
 - b. Provide clock and speakers at the following locations:
 - 1) Administration Production Workroom.
 - 2) Conference rooms serving the Administration and Student Services areas.
 - 3) Supplementary Instruction offices.
 - 4) Careers Rooms.
 - 5) Student Services office.
 - 6) Student Activities office.
 - 7) Clinic.
 - 8) Teachers' Lounge.
 - 9) Media Center reading room, technical processing/media director's office, and media resource/production center.
 - 10) Food Service including but not limited to Food Prep area, Interior Dining, Serving areas (interior and exterior serving bays) and food service manager's office.
 - 11) Physical Education areas including the Gymnasium, Locker rooms, Training Rooms, Concessions, Ticket Booth and other related spaces.
 - 12) Auditorium including Concessions and Ticket Booth areas.
 - 13) Stage related spaces including Dressing Rooms and Control Booth.
 - 14) Custodial Receiving area.
 - 15) Other areas as specify in the Educational Specifications developed for the Project.
 - c. Provide intercom speakers at the following locations:
 - 1) Group toilet rooms.
 - 2) Interior and exterior corridors and courtyards.
 - 3) Physical Education shelters and exterior hard-court areas.
 - 4) Exterior dining shelter.

- 5) Bus drop-off covered area.
- 6) Specify placement of exterior speakers so as to avoid sound generated by speakers from becoming a nuisance to occupants of neighboring properties.
- d. Provide two-way communications at areas for emergency rescue assistance, in conformance with FBC.
7. Use the intercom system to replace fire alarm pull-stations if allowed by FBC and the Florida Fire Prevention Code.
 - a. Provide a two-way communicating system between all normally occupied spaces and a manned location where a general alarm can be sounded.
 - b. Omit the manual pull-stations, except at the manned location and in spaces with a capacity of one hundred (100) or more occupants or in other spaces as required by FBC and the Florida Fire Prevention Code, provided the following conditions are met:
 - 1) The communication system shall be a two-way system with the capability of originating calls from any station.
 - 2) Stations shall be located in all student-occupied areas.
 - 3) The communication system shall be connected to emergency power.
8. The sizes, runs of conduit, cable trays, outlet boxes, pull-boxes, intercom speaker/clock back boxes device box/enclosures, dedicated equipment spaces and power for these systems shall be indicated on drawings and provided and installed within the general construction contract.
9. Connect the intercom system and the clock/bell system to the Facility's emergency generator power supply.
 - a. Specify an uninterruptible power supply system (UPS) as a secondary backup source of emergency power with sufficient capacity to operate the complete intercom system, including two-way communication, under idle load for 24 hours plus all speakers at full load for a continuous period of 5 minutes. Submit battery load calculations to Building Code Consultant (BCC).
 - b. Specify a point of connection to notify M-DCPS District Communication Management (DCOM) (305) 995-1550, (a division of M-DCPS Districts Inspections, Operations, and Emergency Management), when the system is on emergency power.
10. At new Facilities, locate the intercom main control console and UPS power backup components within the Media Center Director's Office/Technical Processing Room.
 - a. Intercom functions shall be controlled by intercom administrative telephone units, each containing a built-in display or a desk-mount display, and located as follows:
 - 1) One (1) at the Principal's office,
 - 2) One (1) in the administration secretarial area adjacent to the F/A panel,
 - 3) One (1) at the media center adjacent to the intercom console,
 - 4) If the facility is an Enhanced Hurricane Protected Area (EHPA), provide one (1) intercom administrative telephone within the EHPA Manager's Office.
 - 5) Specify that all intercom administrative telephones shall be capable of operating to make normal and emergency intercom announcements.
 - b. Provide a highly visible (flush or surface) wall-mounted emergency visual display directly above the administrative telephone located in the Administration secretarial area.
 - c. The digital base intercom system wiring is based on CAT 5/6 cabling. Specify all communication system wiring shall be terminated at a punch-down metal

enclosure located directly behind the main intercom control console. Enclosure shall be 48" W x 72" H x 10" D and shall have hinged doors with locking mechanism. Interior of enclosure shall have surge protection devices for the intercom system and punch-down blocks at least 3 inches apart and at least 3 inches from the sides of the cabinet. This cabinet shall be provided a minimum of 3 feet clearance in front of cabinet for maintenance purposes. From this enclosure provide for each building, a minimum of two (2) 2" dedicated conduits with pull strings and/or cable trays (sized to meet NEC requirements plus 25% for future expansion), terminating at a 24" W x 24" L x 10" D cabinet, with screwed-on cover, located within a satellite wiring closet in each building. From each of these wiring cabinets provide selected raceways terminating at each audio device within each building.

- d. Provide one (1) 2" conduit from the intercom punch-down enclosure located behind the head-end unit, to the Main Telecommunications Room with pull strings.
 - e. Provide transient/surge protection on all incoming and outgoing data circuits.
11. The two-way voice communications from instructional spaces will be accessed through a normal/emergency call button outlet box located adjacent to the Instructor's technology center at 48" AFF:
 - a. Normal call – neutral color button.
 - b. Emergency call – red button.
 12. The intercom speakers shall be wall mounted in a standard clock/speaker assembly. See "Clock System" section for mounting locations.
 13. Toilet rooms, hallways and normally unoccupied spaces other than storage rooms shall have ceiling speaker enclosure boxes installed for intercom purposes.
 14. The dining room, kitchen food prep area, auditorium/cafetorium, gymnasium, and large group meeting areas shall have additional speakers and enclosure boxes. Determine speaker quantity based on speaker type, room size, configuration, and acoustical characteristics, including space ambient noise.
 15. Locate speakers and exterior horns as may be necessary to comply with sound level requirements for interior and exterior spaces.

B. Clock System.

1. Provide a fully synchronized digital based master-clock system. Master clock unit shall have a digital display and be located adjacent to the P/A intercom console. Secondary clocks shall be analog. Digital clocks may be used with written permission from M-DCPS Facilities Design and Standards on a per project basis, Provide an integrated bell system as part of the master clock system.
2. Provide flush-mounted clock/speaker enclosure boxes 7'-6" above finish floor to clock centerline, on a wall providing glare-free and unobstructed viewing in instructional spaces, administration offices, student support services, custodian and cafeteria offices, and other occupied spaces. At instructional areas do not locate the clocks/speaker directly above the location of the interactive whiteboard. Refer to the Appendix section of these Design Criteria for other requirements.
3. Clock/speaker assemblies may be surface mounted in retrofit applications.
4. Speaker wiring conduit shall be at least 1/2" and according to manufacturer's requirements.
5. When the clock system is a conventional hard-wired (that is to say that it is not a "reduced-wire" or a "wireless" clock system) the clock wiring shall be in a separate

conduit from all other wiring. Conduit branching to each clock shall be in at least 1/2" conduit.

C. Wiring and Conduits - General Requirements:

1. Intercom and Clock wiring shall be installed in separate dedicated conduit systems that comply with the following:
 - a. Provide at least one pull-box for every 100 feet of conduit run.
 - b. Conduit runs shall not have more than two 90-degree bends or equivalent. Provide additional pull-boxes regardless of length to meet this requirement.
 - c. Specify a junction box at each point in the clock conduit system for connecting the clock wiring buss in the conduit to each clock by tapping a branch-wiring run from the buss to the clock.
 - d. Use the clock section of the back-box as the junction box and wiring the clock buss, with some slack in each box, from the clock to clock in a daisy chain fashion.
 - e. Size all conduits to meet NEC requirements plus 25% for future expansion.
2. Cable tray systems, when appropriate and cost effective, may be used for the intercom wiring raceway system. All cable trays shall be grounded. Under no circumstance shall clock wiring be installed on cable trays.
3. Underground wiring between buildings and portables shall be aquaseal type with no splices.

1.5 TECHNOLOGY CENTERS

- A. The technology center organizes the electronic access functions within a room, at a centralized location.
- B. All occupied spaces shall be provided with a technology center.
- C. Technology centers shall be located within easy access, control, and use by the instructor or staff, and away from egress doors and egress path.
- D. Locate all Technology Center devices, including but not limited to the normal call /emergency call buttons, telecommunication outlets, ITV coaxial outlet, electrical outlets and all empty conduits and outlet boxes serving communication wiring for NIC instructional technology equipment, according to the appropriate configuration reflected in the Appendix section of these Design Criteria, and the program requirements contained in the Educational Specifications developed for the project.

1.6 INSTRUCTIONAL TECHNOLOGIES (Interactive Whiteboards, Digital Projectors and Classroom Sound Systems)

- A. Instructional spaces (classrooms and labs) shall be provided with an interactive whiteboard system centrally located at the front wall of the classroom. Refer to M-DCPS Educational Specifications for different configuration options and their related infrastructure requirements.
- B. Spaces designated to receive an NIC interactive whiteboard will also receive an NIC digital projector that will be either wall-mounted or ceiling-mounted. Coordinate with M-DCPS

Facilities Design and Standards to confirm the type of NIC digital projector that will be provided at each location.

1. In areas where the NIC projector is to be wall-mounted, include flat-metal blocking at the wall location where the NIC projector bracket will be installed. Coordinate with M-DCPS Office of Facilities Design and Standards (FF&E Staff) to obtain information on the brand and model of the NIC wall-mounted projector that will be installed in each location in order to determine the size and configuration for the wall blocking required at each location.
2. In areas where the NIC projector is to be ceiling-mounted, the NIC projector bracket will be secured to the underside of the structure at 7'-6" to 9'-4" in front, and along the vertical center line of the NIC interactive whiteboard. In these spaces, the A/E shall ensure that the area above and below the acoustical ceiling from 7'-0" to 11'-0" in front of the NIC interactive whiteboard, is clear of any obstacles that may prevent proper placement and alignment of the NIC ceiling mounted bracket and projector.
3. Refer to the "Technology Center" section of this Division, for detail on additional requirements.

1.7 INSTRUCTIONAL TV (ITV) SYSTEM

- A. At New Facilities: Specify the installation of a complete Instructional TV (ITV) System capable of receiving and distributing ITV programming throughout the Facility.
- B. At New Additions, Remodeling and/or Renovations projects:
 1. When the facility has an operational ITV system, A/E shall specify that all appropriate new spaces be connected to the existing ITV system in accordance with M-DCPS design standards.
 2. When the project includes the installation of new NIC ITV production/distribution equipment, A/E shall specify that all appropriate spaces be connected to the new NIC ITV distribution system in accordance with M-DCPS design standards. This shall include existing spaces and spaces that are new or that are being renovated and/or remodeled. During the preliminary design phase of the project, A/E shall verify if existing ITV infrastructure components (i.e., coaxial cables, amplifiers, directional couplers, splitters, etc.) are compatible with the new NIC ITV equipment being installed. If it is determined that existing components are not compatible and may prevent proper transmission/reception of ITV signal throughout the facility at levels required by M-DCPS Design Standards, the A/E shall notify M-DCPS Project Manager and M-DCPS Facilities Design and Standards to discuss how the A/E proposes to remediate this condition.
- C. The ITV system includes both In-Contract and Not-In-Contract FF & E components. The In-Contract components shall include but not be limited to the following:
 1. All conduits, junction boxes, splitters and directional couplers, coaxial cables and coaxial cable TV outlets.
 2. All Broad Band Radio Frequency (RF) Amplifiers.
 3. The ITV equipment Vertical Racks located in the Distribution Room at Senior High Schools only.
 4. The Instructional Television Fix Services (ITFS). This includes the ITV Antenna with support structure, complete with downconverter and all accessories necessary for the

reception of Educational Broadband Services (EBS); Group A4 digital channel 36, and D4 digital channel 39, both within the frequency range of 2572-2614 MHz, 64 QAM ITU j.83 Annex B signal format. This signal shall go through the final Not-in-Contract "Radio Frequency Combiner" that will be provided by others.

5. The CATV services within the frequency range of 49-860 MHz, 256 QAM, ITU j.83 Annex B signal format provided by local Cable Operator. This service shall be terminated at the ITV "Hub" located in the CCTV Room at Elementary Schools, Middle Schools and K-8 Centers, and in the Distribution Room at Senior High (S.H.) Schools.
6. Refer to M-DCPS Master Specifications and the Appendix "A" of the Design Criteria for details and other ITV related requirements.

D. ITV coaxial outlets shall be provided throughout the facility as follows:

1. One in each instructional space (classrooms and labs) located by the Instructor's Technology Center, at 18" AFF.
2. One (1) in each office located within the administration and student services areas. Locate ITV coaxial outlet adjacent to the technology center for each office, at 18" AFF.
3. One (1) in the Principal's office. Locate ITV coaxial outlet at 60" AFF, and on a wall where occupants within the room have a clear line-of-sight to a NIC flat-panel TV installed adjacent to this outlet.
4. One (1) in each conference room serving the student services and administration areas. Locate ITV coaxial outlet at 18" AFF and directly below the NIC interactive whiteboard designated for these spaces.
5. One (1) in each reception area serving the administration and student services areas. Locate ITV coaxial outlet so as to maximize viewing from the visitors waiting area. Coordinate exact location of ITV outlets with M-DCPS Facilities Design and Standards.
6. Six (6) in the Senior High School Auditorium seating area. Locate all ITV coaxial outlets a minimum of 9'-0" AFF, and evenly spaced throughout the auditorium. From this allocation provide one (1) ITV coaxial outlet on each side of the proscenium wall opening.
7. Eight (8) in the Senior High School dining area. Locate all ITV coaxial outlets a minimum of 9'-0" AFF, and evenly distributed throughout the dining room. When the dining room serves as a Cafetorium, provide from this allocation one (1) ITV coaxial outlet on each side of the stage proscenium wall opening.
8. Six (6) in Cafeteriums serving Elementary Schools, K-8 Centers and Middle Schools. Locate ITV coaxial outlets a minimum of 9'-0" AFF, and evenly distributed throughout the dining room. Provide from this allocation one (1) ITV coaxial outlet on each side of the stage proscenium wall opening.
9. One (1) inside the Auditorium/Cafetorium Control Booth, located above the counter in close proximity to the Audio board.
10. One (1) in the Teachers' Dining Lounge, located at 7'-0" AFF and on a wall where occupants within the room have a clear line-of-sight to a NIC flat-panel TV installed adjacent to this outlet.
11. One (1) in each teacher planning space greater than 300 NSF, mounted at 7'-0" AFF and on a wall where occupants within the room have a clear line-of-sight to a NIC flat-panel TV installed adjacent to this outlet.

12. One (1) in TV Production Control room inside I/O junction box (j-box). Cable shall be terminated with "F" male connector.
13. One (1) in TV Production Studio side by side with I/O j-box next to Chroma-key wall.
14. In the Media Center Suite, provide ITV coaxial outlets in accordance with the General Considerations section of the Educational Specifications.
15. At other locations as may be required by the Educational Specifications.
16. Adjacent to all ITV coaxial outlets located above 18" AFF, provide one (1) 120V duplex outlet on a 20-Amp dedicated circuit. In addition, provide metal blocking (minimum 18" H x 32" W) secured to a minimum of three wall studs, to provide support for a NIC flat-panel TV that will be provided by others, at each of these locations.
17. Show location of all ITV coaxial outlets and related electrical outlets on the Plans.
18. Provide elevation of each wall where ITV outlets are required, showing vertical and horizontal measurements at 1/4" scale.

E. ITV Signal Strength Testing:

1. During Phase II, and prior to Phase II/III - 50% design portion of the project, the AE shall employ the services of a qualified telecommunications firm with professional experience in measuring electromagnetic (microwave) emissions to determine if a clear line-of-sight radio path exist between the proposed the ITV antenna location at the site, and the transmitter antenna located 800 feet above grade level (AGL) at 3300 SW 52 Avenue, Pembroke Park, FL 33023 (coordinates 25° 58' 47.0" North and 80° 11' 45.0" West). The analysis shall include a Line-of-Sight Signal Strength Report that the A/E shall use to identify the location, height and type of support structure on which the ITV antenna shall be mounted to.

F. ITV Antenna Support Structure:

1. The ITV antenna support structure shall be either a galvanized steel pipe mast secured to the building parapet or a free-standing galvanized steel tapered monopole, in accordance with M-DCPS Design Standards. The A/E shall select the type of antenna support structure based on the results of the Line-of-Sight Signal Strength Report developed for the project as specified in this document.
2. Design of the ITV antenna support structure shall comply with Florida Building Code and ASCE-7. A/E shall submit to the Building Code Consultant (BCC) calculations signed and sealed by a Florida registered professional engineer establishing that the design of the antenna support structure is in compliance with applicable requirements of the FBC.
3. The design of the ITV antenna support structure shall include but not be limited to:
 - a. Antennas, down converter, cables, and accessories as noted in M-DCPS Design Standards.
 - b. Proper grounding in accordance with NEC.
 - c. Lightning protection in accordance with NFPA 780.
 - d. When a metal monopole structure is required, the design shall include:
 - 1) Safety climbing cable beginning at 20 feet above finish grade and terminating at the top of pole, with mid position latches located 25 feet on-centers.
 - 2) One (1) 36" L x 24" W x 8" D - NEMA 3R weatherproof enclosure containing an oval-shape hinged access-panel a minimum of 30" high x 10" wide.

Enclosure shall be mounted to the base of the monopole so that the bottom of the enclosure is 36" above finish grade. Mounted on the lower right-hand corner within the enclosure, provide one (1) 120V GFI quadruplex outlet to a 20-Amp dedicated circuit.

- e. When a parapet-mounted steel mast is specified, the required down converter shall be mounted to the steel mast at 24" above the finish roof elevation.
 4. Provide a copy of the ITV antenna support structure design (height, type, location, etc.) and a copy of Line-of-Sight and Signal Strength Testing report to M-DCPS Media Programming (WLRN) - Field Engineering Office (305) 995-1717, for their review and acceptance prior to submitting final design documents to the Building Code Consultant (BCC) for permitting purposes.
 5. Refer to M-DCPS Master Specifications and the Appendix section of these Design Criteria for other ITV related requirements.
- G. Cable TV (CATV) Service:
1. A/E shall coordinate with the appropriate Cable TV (CATV) service-provider the location for the CATV raceway, from the off-site point of connection to the point-of-termination at the ITV "Hub".
 2. A/E shall specify the installation of a fully operational "turnkey" Cable TV system, from the point of connection at the property line, to the point of termination at the ITV "Hub". This installation includes three (3) digital television adapters (DTA's) activated and provided free of charge by the local TV Cable service provider as per State Contract w/Commercial Cables Operator.
 3. At the property line, provide a 36" L x 36" W x 36" D traffic-rated concrete vault with a lockable hinged cover. This concrete vault shall serve as the CATV service entry point and shall be connected to the ITV "Hub" as specified in this document.
 4. Refer to M-DCPS Master Specifications and the Appendix section of these Design Criteria for other ITV related requirements.
- H. ITV Production/Distribution Equipment – Infrastructure and Other Requirements:
1. At Elementary Schools and K-8 Centers:
 - a. Provide the CCTV Room with a supplemental 24/7 HVAC system in accordance with M-DCPS Design Standards. See Design Criteria, Division 15 – Mechanical, for details.
 - b. The Not-in-Contract ITV production/distribution equipment and racks will be located within the CCTV Room. The equipment racks will be arranged in a gangable configuration with one end of the assembled racks placed against a wall. Remaining three sides shall be provided a minimum of 36" clearance in order to properly service ITV equipment mounted on the racks. Refer to Appendix - A of the Design Criteria for equipment layout and other details.
 - c. At the rear of the NIC ITV distribution/production equipment racks, and directly on the wall these racks will be placed against, provide a surface mounted 36" L x 36" W x 8" D junction box with a hinged door. The bottom of the junction box shall be placed at 24" AFF. This junction box will be identified as the ITV "Hub". Directly below the ITV "Hub" provide four (4) side-by-side 120V duplex outlets mounted 18" AFF. Each outlet shall be on a separate 20-Amp dedicated circuit.

From the ITV "Hub" provide the following system of conduits, junction boxes, cables, etc:

- 1) Connection to the TV Antenna:
 - a) When the antenna support structure is a free-standing tapered monopole, provide one (1) 4" conduit connected to a 36" L x 24" W x 8" D NEMA 3R enclosure mounted at the base of the monopole. This conduit shall be provided with one (1) RG-11 cable (rated for wet-locations), with 75 Ohm type "F" male connectors on both ends. See the "ITV Antenna Support Structure" section under this Division for additional requirements on the NEMA 3R enclosure. **NOTE:** If the total distance from the base of the ITV antenna support structure to the ITV "Hub" exceeds a total of 300 feet, replace the RG-11 cable with a 75 Ohm coaxial cable Model No. PIII-700 JCASS as produced by CommScope or M-DCPS approved equal. This cable shall be installed with no splices along its entire length and shall be terminated with 75 Ohm type "F" female connectors on both ends. Provide pull-boxes at a maximum "on-center" distance of 150 feet along the entire raceway. At exterior areas, provide Brooks Products Model No. 66 (30" L x 17" W) traffic rated pull-boxes w/covers, or approved equal. At interior areas provide a standard 18" L x 18" W x 8" D lockable metal junction box with hinged door cover.
 - b) When the antenna support is a parapet-mounted pole, provide a 1" conduit, complete with weather-head, to the base of the steel mast. This conduit shall be provided complete with one (1) RG-11 cable (rated for wet-locations) with 75 Ohm type "F" male connectors on both ends.
- 2) One (1) 4" conduit with coaxial cable, terminating at the 36" L x 36" W x 36" D concrete vault referenced in this document as the CATV service entry point. The conduit shall have a maximum of 180° turns along its entire length and shall be provided with manhole pull-boxes at interval required by the CATV service provider. The coaxial cable shall be 75-Ohm Model No. PIII - 700 JCASS.
- 3) One (1) 2" conduit complete with pull string, connected to a 12" L x 12" W x 6" D wall-mounted recessed junction box located on one of the walls in the CCTV Room that is perpendicular to the Chroma-key wall. Junction box shall have a lockable hinged door and bottom of junction box shall be at 18" AFF. Locate junction box away from main egress path. This junction box will be identified as the "I/O" junction box. Adjacent to this junction box provide one (1) 120V quadruplex outlet on a 20-Amp dedicated circuit.
- 4) One (1) 2" conduit complete with RG-11 cable, terminating at the sound-equipment rack serving the school Cafetorium. From the sound-equipment rack, provide one (1) 1" conduit, complete with one (1) RG-6 cable, terminating at a wall-mounted 8" L x 8" W x 6" D recessed junction box located at 18" AFF, on the front "apron" of the Cafetorium stage, facing the Cafetorium seating area. This junction box shall have a lockable hinged door and one (1) 120V quadruplex outlet on a 20-Amp dedicated circuit, located adjacent to it.
- 5) Each building designated to receive ITV signals, shall be provided an ITV "trunk line" dedicated for that building (e.g., 6 buildings = 6 separate trunk

lines). Each trunk line shall consist of one (1) 2" conduit, with RG-11 cable, extending from the ITV "Hub" to the nearest telecommunication room for each building. Within the telecommunication room, the conduit shall be terminated at a 24" L x 24" W x 8" D junction box, with lockable hinged door and ventilated for heat dissipation, that contains a signal amplifier, a signal splitter and a 120V duplex outlet on a 20-Amp dedicated circuit. A maximum of one (1) amplifier is permitted per building. From this junction box, the ITV signal shall be distributed throughout the building using a series of "sub trunk lines". A maximum of six (6) sub trunk lines are permitted per amplifier. Each sub trunk line shall consist of the following:

- a) One (1) 1" conduit with RG-11 cable, connected to a series of 8" L x 8" W x 8" D junction boxes with screw-on cover, each containing a directional coupler. A maximum of five (5) directional couplers are permitted on each "sub trunk line".
- b) From each directional coupler, the ITV signal shall be extended to each designated space using a TV drop. Each TV drop shall consist of a 3/4" conduit with RG-6 cable, a junction box and TV cable wall plate. A maximum of four (4) drops are allowed for each directional coupler.
- c) See Design Criteria – Appendix A for details.
- d. Within the CCTV Room, provide two (2) wall-mounted data outlets; one at the center of the Chroma-key painted wall, and the other on the opposite wall next to the ITV "Hub". Data outlets shall be located at 18" AFF. Adjacent to each data outlet, provide a 120V duplex outlet on a 20-Amp dedicated circuit.
- e. Refer to M-DCPS Master Specifications and the Appendix section of these Design Criteria for other related requirements.

2. At Middle Schools:

- a. Provide the CCTV Room with a supplemental 24/7 HVAC system in accordance with M-DCPS Design Standards. See Design Criteria, Division 15 – Mechanical, for details.
- b. The Not-in-Contract ITV production/distribution equipment and racks will be located within the CCTV Room. The equipment racks will be arranged in a gangable configuration with one end of the assembled racks placed against a wall. Remaining three sides shall be provided a minimum of 36" clearance in order to properly service ITV equipment mounted on the racks. Refer to Appendix - A of the Design Criteria for equipment layout and other details.
- c. At the rear of the NIC ITV distribution/production equipment racks, and directly on the wall these racks will be placed against, provide a surface mounted 36" L x 36" W x 8" D junction box with a hinged door. The bottom of the junction box shall be placed at 24" AFF. This junction box will be identified as the ITV "Hub". Directly below the ITV "Hub" provide four (4) side-by-side 120V duplex outlets mounted 18" AFF. Each outlet shall be on a separate 20-Amp dedicated circuit. From the ITV "Hub", provide the following system of conduits, junction boxes, cables, etc.:
 - 1) Connection to the TV Antenna:
 - a) When the antenna support structure is a free-standing tapered monopole, provide one (1) 4" conduit connected to a 36" L x 24" W x 8" D NEMA 3R enclosure mounted at the base of the monopole. This conduit shall be

provided with one (1) RG-11 cable (rated for wet-locations), with 75 Ohm type "F" male connectors on both ends. See the "ITV Antenna Support Structure" section under this Division for additional requirements on the NEMA 3R enclosure.

NOTE: If the total distance from the base of the ITV antenna support structure to the ITV "Hub" exceeds a total of 300 feet, replace the RG-11 cable with a 75 Ohm coaxial cable Model No. PIII-700 JCASS as produced by CommScope or M-DCPS approved equal. This cable shall be installed with no splices along its entire length and shall be terminated with 75 Ohm type "F" female connectors on both ends. Provide pull-boxes at a maximum "on-center" distance of 150 feet along the entire raceway. At exterior areas, provide Brooks Products Model No. 66 (30" L x 17" W) traffic rated pull-boxes w/covers, or approved equal. At interior areas provide a standard 18" L x 18" W x 8" D lockable metal junction box with hinged door cover.

- b) When the antenna support is a parapet-mounted pole, provide a 1" conduit, complete with weather-head, to the base of the steel mast. This conduit shall be provided complete with one (1) RG-11 cable (rated for wet-locations) with 75 Ohm type "F" male connectors on both ends.
- 2) One (1) 4" conduit with coaxial cable terminating at the 36" L x 36" W x 36" D concrete vault referenced in this document as the CATV service entry point. The conduit shall have a maximum of 180° turns along its entire length and shall be provided with manhole pull-boxes at interval required by the CATV service provider. The coaxial cable shall be 75-Ohm Model No. PIII - 700 JCASS.
- 3) One (1) 2" conduit complete with pull string, connected in series to two (2) 12" L x 12" W x 6" D wall-mounted recessed junction boxes. The junction boxes shall be located in the CCTV room, opposite to each other, on walls that are perpendicular to the Chroma-key wall. Each junction box shall have a lockable hinged door and bottom of junction box shall be at 18" AFF. Locate junction boxes away from main egress path. These junction boxes will be noted as the "I/O" junction boxes. Adjacent to each junction box provide one (1) 120V quadruplex outlet, each on a 20-Amp dedicated circuit.
- 4) One (1) 2" conduit complete with RG-11 cable, terminating at the sound-equipment rack serving the school Cafetorium. From the sound-equipment rack provide one (1) 1" conduit complete with one (1) RG-6 cable, terminating at a wall-mounted 8" L x 8" W x 6" D recessed junction box located at 18" AFF, on the front "apron" of the Cafetorium stage, facing the Cafetorium seating area. This junction box shall be provided with a lockable hinged door and one (1) 120V quadruplex outlet on a 20-Amp dedicated circuit, located adjacent to it.
- 5) One (1) 2" conduit complete with one (1) RG-11 cable, terminating at the sound-equipment rack serving the Language Arts Labs (Little Theater). From the sound-equipment rack provide one (1) 1" conduit, complete with one (1) RG-6 cable, terminating at a wall-mounted 8" L x 8" W 6" D recessed junction box (complete with BNC female connectors and wall plate) located below the observation window of the control booth at 18" AFF, and facing the Language Arts Labs. This junction box shall be provided with a lockable

- hinged door, and one (1) 120V quadruplex outlet on a 20-Amp dedicated circuit, located adjacent to it.
- 6) Each building designated to receive ITV signals, shall be provided an ITV “trunk line” dedicated for that building (e.g., 6 buildings = 6 separate trunk lines). Each trunk line shall consist of one (1) 2" conduit, with RG-11 cable, extending from the ITV “Hub” to the nearest telecommunication room for each building. Within the telecommunication room, the conduit shall be terminated at a 24" L x 24" W x 8" D junction box, with lockable hinged door and ventilated for heat dissipation, that contains a signal amplifier, a signal splitter and a 120V duplex outlet on a 20-Amp dedicated circuit. A maximum of one (1) amplifier is permitted per building. From this junction box, the ITV signal shall be distributed throughout the building using a series of “sub trunk lines”. A maximum of six (6) sub trunk lines are permitted per amplifier. Each sub trunk line shall consist of the following:
 - a) One (1) 1" conduit with RG-11 cable, connected to a series of 8" L x 8" W x 8" D junction boxes with screw-on cover, each containing a directional coupler. A maximum of five (5) directional couplers are permitted on each “sub trunk line”.
 - b) From each directional coupler, the ITV signal shall be extended to each designated space using a TV drop. Each TV drop shall consist of a 3/4" conduit with RG-6 cable, a junction box and TV cable wall plate. A maximum of four (4) drops are allowed for each directional coupler.
 - c) See Design Criteria – Appendix A for details.
 - d. Within the CCTV Room, provide two (2) wall-mounted data outlets; one at the center of the Chroma-key painted wall, and the other on the opposite wall next to the ITV “Hub”. Data outlets shall be located at 18" AFF. Adjacent to each data outlet, provide a 120V duplex outlet on a 20-Amp dedicated circuit.
 - e. Refer to M-DCPS Master Specifications and the Appendix section of these Design Criteria for other related requirements.
3. At Senior High Schools:
- a. The ITV Distribution Center room and the ITV Control Room shall be located in close proximity to each other.
 - b. Provide the ITV Distribution Center Room and the ITV Control Room with a supplemental 24/7 HVAC system in accordance with M-DCPS Design Standards. See Design Criteria, Division 15 – Mechanical, for details.
 - c. The In-Contract ITV distribution equipment racks will be located within the ITV Distribution Center room. These racks will contain both In-Contract and Not-In-Contract ITV equipment. See Design Criteria – Appendix “A” for equipment layout and additional details. ITV distribution equipment racks will be arranged in a gangable configuration with one end of the assembled racks placed against a wall. The remaining three sides shall be provided a minimum of 36" clearance in order to service ITV equipment mounted on these racks.
 - d. At the rear of the ITV distribution equipment racks, and directly on the wall these racks are placed against, provide a surface mounted 36" L x 36" W x 8" D junction box with lockable hinged door. The bottom of this junction box shall be mounted 24" AFF. This junction box will be identified as the ITV “Hub”. Below the ITV “Hub”, provide four (4) side-by-side 120V quadruplex outlets at 18" AFF. Each

outlet shall be on a separate 20-Amp dedicated circuit From the ITV “Hub”, provide the following conduits, junction boxes, cables, etc.:

- 1) Two (2) 2" Greenfield conduits with pull string connected to the rear of the distribution racks to run communications wiring thought.
- 2) One (1) 2" conduit with pull string, connected to the 36" L x 36" W x 8" D junction box located in the ITV Production Control Room and referenced in this document as the I/O junction box. See Design Criteria – Appendix “A” for additional details
- 3) Connection to the TV Antenna:
 - a) When a stand-alone steel monopole antenna is specified, provide one (1) 4" conduit connected to a 36" L x 24" W x 8" D NEMA 3R enclosure located at the base of the monopole. This conduit shall be provided complete with one (1) wet-location rated RG-11 cable with 75 Ohm type “F” male connectors on both ends. See “ITV Antenna Support Structure” section under this Division for additional requirements on the NEMA 3R enclosure. If the total distance from the base of the ITV antenna support structure to the ITV “Hub” exceeds a total of 300 feet, replace the RG-11 cable with a 75 Ohm coaxial cable Model No. PIII -700 JCASS as produced by CommScope or M-DCPS approved equal. This cable shall be installed with no splices along its entire length and shall be terminated with 75 Ohm type “F” female connectors on both ends. Provide pull-boxes at a maximum “on-center” distance of 150 feet along the entire raceway. At exterior areas, provide Brooks Products Model No. 66 (30" L x 17" W) traffic rated pull-boxes w/covers, or approved equal. At interior areas provide a standard 18" L x 18" W x 8" D lockable metal junction box with hinged door cover.
 - b) When a parapet-mounted steel pipe mast antenna is specified, provide a 1" conduit, complete with weather-head, to the base of the steel mast. This conduit shall be provided complete with one (1) RG-11 cable (rated for wet-locations), with 75 Ohm type “F” male connectors on both ends.
- 4) One (1) 4" conduit and coaxial cable, terminating at the 36" L x 36" W x 36" D concrete vault referenced in this document as the CATV service entry point. The conduit shall have no more than two (2) 90° long-sweep elbows (maximum of 180° turn) along its entire length and shall be provided with manhole pull-boxes at interval required by the CATV service provider. The coaxial cable shall be 75-Ohm Model No. PIII -700 JCASS.
- 5) Each building designated to receive ITV signals, shall be provided an ITV “trunk line” dedicated for that building (e.g., 8 buildings = 8 separate trunk lines). Each trunk line shall consist of one (1) 2" conduit, with RG-11 cable, extending from the ITV “Hub” to the nearest telecommunication room for each building. Within the telecommunication room, the conduit shall be terminated at a 24" L x 24" W x 8" D junction box with lockable hinged door and ventilated for heat dissipation, and contains a signal amplifier, a signal splitter and a 120V duplex outlet on a 20-Amp dedicated circuit. A maximum of one (1) amplifier is permitted per building. From this junction box, the ITV signal shall be distributed within the building using a series of “sub trunk lines”. A maximum of six (6) sub trunk lines are permitted per amplifier. Each sub trunk line shall consist of the following:

- a) One (1) 1" conduit with RG-11 cable, connected to a series of 8" L x 8" W x 8" D junction boxes with screw-on cover each containing a directional coupler. A maximum of five (5) directional couplers are permitted on each "sub trunk line".
- b) From each coupler, the ITV signal shall be extended to each designated space using a TV drop. Each TV drop shall consist of a 3/4" conduit with RG-6 cable, a junction box and TV cable wall plate. A maximum of four (4) drops are allowed for each directional coupler.
- c) See Design Criteria – Appendix A for details.
- e. The Not-in-Contract ITV production equipment and consoles will be located in the ITV Control Room. These consoles will be arranged in a side-by-side configuration with one end of the consoles placed against a wall. The remaining three sides shall be provided a minimum of 36" clearance in order to service ITV equipment mounted on these consoles. See Design Criteria Appendix "A" for equipment layout and additional details.
- f. At the rear of the NIC ITV production equipment console, and directly against the wall that the racks will be placed against, provide a surface mounted 36" L x 36" W x 8" D junction box with a lockable hinged door. Bottom of j-box shall be 24" AFF. This junction box will be noted as the ITV "I/O". Directly below the ITV "I/O" junction box, provide four (4) side-by-side 120V quadraplex outlets mounted 18" AFF. Each outlet shall be on a separate 20-Amp dedicated circuit. From this junction box, provide the following conduits, junction boxes, and cables, etc.:
 - 1) Two (2) 2" Greenfield conduits connected to the rear of the production equipment racks to run audio/video wiring thought.
 - 2) One (1) 1" conduit with pull string, terminating at a wall-mounted 4" L x 4" W x 4" D recessed junction box with screw-on-cover located in the Production Studio directly opposite the Chroma-key wall and at 18" AFF. This box will be used for the video program-out monitor. Directly adjacent to this junction box provide one (1) 120V duplex outlet on a 20-Amp dedicated circuit.
 - 3) One (1) 4" conduit with pull string, terminating within the ITV Production Studio, at a surface mounted 12" L x 12" W x 8" D junction box, with lockable hinged door, mounted at 18" AFF and on the wall directly opposite the Chroma-key wall.
 - 4) One (1) 1" conduit with pull string, terminating at a wall-mounted 4" L x 4" W x 4" D junction box with screw-on cover, located in the Production Studio directly opposite the Chroma-key wall and at 7'- 0" AFF. This box will be used for connection of the countdown clock and speakers. Directly adjacent to this junction box provide one (1) 120V duplex outlet on a 20-Amp dedicated circuit.
 - 5) One (1) 2" conduit with pull string, terminating at a wall-mounted 12" L x 12" W x 4" D recessed junction box, with a lockable hinged door, located within the ITV Production Studio at 18" AFF and adjacent to one of the curved corners of the Chroma-key wall. This box will be used for connection of the microphone jacks. Directly adjacent to this junction box provide a 120V quadruplex outlet on a 20-Amp dedicated circuit.
 - 6) One (1) 2" conduit with pull string, terminating at a recessed wall-mounted 8" L x 8" W x 4" D junction box located within each Editing Room, at 18"

- AFF. (Total of two). Directly adjacent to each junction box provide a 120V quadruplex outlet on a 20-Amp dedicated circuit.
- 7) One (1) 2" conduit with pull string, terminating at the sound-equipment rack serving the Gymnasium. From the sound-equipment rack, provide one (1) 2" conduit with pull string, terminating at a wall-mounted 8" L x 8" W x 8" D recessed junction box that is located 18" AFF, and on a clear section of wall that faces the main play area of the Gymnasium floor. This junction box shall have a lockable hinged door. Directly adjacent to this junction box provide one (1) 120V quadruplex outlet on a 20-Amp dedicated circuit.
 - 8) One (1) 2" conduit complete with pull string, terminating at the sound-equipment rack serving the Language Arts Labs (Little Theater). From the sound-equipment rack provide one (1) 2" conduit with pull string, terminating at a wall-mounted 8" L x 8" W x 8" D recessed junction box located below the observation window of the control booth at 18" AFF, and facing the main area of the Language Arts Labs. This junction box shall have a lockable hinged door. Directly adjacent to this junction box provide one (1) 120V quadruplex outlet on a 20-Amp dedicated circuit.
 - 9) One (1) 4" conduit with pull strings, terminating at a wall-mounted 12" L x 12" W x 8" D recessed junction box located below the observation window of the Control Booth in the Cafetorium/Auditorium. This junction box shall have a lockable hinged door and shall be located at 18" AFF facing the audience seating area. Along the entire length of this conduit, provide adequate number of 12" L x 12" W x 8" D pull-boxes, each with a screw-on-cover, to restrict the total number of "bends" along the entire length of this conduit to 180°. From the 12" L x 12" W x 8" D junction box located below the observation window, provide the following:
 - a) One (1) 2" conduit with pull string, terminating at a wall-mounted 12" L x 12" W x 8" D recessed junction box, located 18" AFF at the center of the stage "apron", facing the Auditorium/Cafetorium seating area. This junction box shall have a lockable hinged door. Adjacent to this box, provide one (1) 120V quadruplex outlet on a 20-Amp dedicated circuit.
 - b) Two (2) 2" conduits, each terminating at wall-mounted 12" L x 12" W x 8" D recessed junction boxes located on opposite walls, along the side walls of the Auditorium/Cafetorium seating area, at 18" AFF and approximated 30 feet from the front of the Stage. Each junction box shall have a lockable hinged door and one (1) 120V quadruplex outlet on a 20-Amp dedicated circuit, located adjacent to it.
 - c) One (1) 1" conduit terminating adjacent to the Audio rack located within the Control Booth.
 - g. Within the ITV Production Studio, provide two (2) wall-mounted data outlets; one at the center of the Chroma-key painted wall, and the other on the opposite wall. Mount outlets at 18" AFF. Adjacent to each data outlet, provide a 120V duplex outlet each on a 20-Amp dedicate circuit.
 - h. Refer to M-DCPS Master Specifications, and the Appendix section of these Design Criteria for other ITV related requirements.

1.8 SOUND REINFORCEMENT SYSTEMS

- A. Provide a sound reinforcement system in the Auditorium/Cafetorium, cafeteria, gymnasium, theater lab (language arts), and other locations as may be required by the Educational Specifications. Sound reinforcement system shall have the following operational capabilities:
 - 1. Sound reinforcement for live presentations.
 - 2. Recording of live performances and reproduction of prerecorded cassettes and compact disks.
 - 3. Stage monitor system for future portable speakers suitable for audio monitoring and sound effects.
 - 4. Provide for external recordings, radio, television, and other media feed outputs.
 - 5. Properly matched projector input.
 - 6. Cue headset systems with inputs noted.
- B. See Design Criteria Appendix for sound reinforcement system riser diagrams.

1.9 INTRUSION ALARM SYSTEM:

- A. Specify an intrusion detection system that is listed by an OSHA approved Nationally Recognized Testing Laboratory (NRTL), and is complete with control panel(s), keypads, extended zone modules, and supervised remote power supplies.
 - 1. Show component locations on construction documents.
 - 2. In addition to standard functions, include the capability to bypass any zone or use time delay operation.
 - 3. The system shall be hardwired in its entirety.
 - 4. Provide system with electric transient surge protection.
 - 5. Provide all electrical components with electric transient surge protection.
 - 6. See Appendix – Security Alarm Systems for riser diagram.
- B. The intrusion alarm system shall be zoned to annunciate the location of activated device within the facility initiating the signal.
- C. The security system wiring shall run in cable trays, whenever feasible, with connections from the cable tray to any device or equipment in dedicated metallic conduit. All cable trays shall be grounded as per NEC requirements.
- D. The security wiring shall be:
 - 1. Power: 1 pair (stranded size varies with load and distance)
 - 2. Signal: 1 pair (3 #22 AWG stranded loop system)
- E. Specify that the activation of any device that occurs during non-student-occupied hours shall alert the Schools Administration area, and M-DCPS District Communication Management (DCOM) (a division of M-DCPS Districts Inspections, Operations, and Emergency Management).
- F. Specify that the programming and interface to DCOM shall be provided by the Contractor.
- G. Door Contacts.

1. Provide door contacts and related devices at the following locations:
 - a. At all exterior doors, roof hatches, and smoke vents.
 - b. At all interior doors controlled by the Card Access Control System.
 - c. At all interior doors to high security spaces including but not limited to student records vault, Media Center audiovisual storage, CCTV Room, ITV Studio, ITV Control Room, ITV Distribution Center Room, computer equipment rooms, flammable and hazardous storage rooms, and facility operation and management equipment rooms.

- H. Motion Detectors.
 1. At the ground floor and other spaces at floors with potential access from adjacent roofs, covered walkways or overhangs, provide motion detectors in each area or space with windows, fixed glass, or glass block to the exterior and any room with vision panels.
 2. Provide motion detectors at enclosed stair towers at the floors above the ground floor to protect the egress doors to the stairs.
 3. Provide motion detectors at exterior accessed storage rooms.
 4. Provide individual zones for each motion detector.
 5. Motion detectors shall be dual technology (PIR/ microwave).

- I. The system shall provide for the separate partitioning of cafeterias, cafeteriums, auditoriums, food service areas, gymnasiums/locker rooms, media centers, administration areas, music rooms, little theaters, and other areas when specified in the Educational Specifications developed for the project. A building may have multiple partitions, but one partition should not include multiple buildings.

- J. A maximum of 4 associated door switches may be grouped in a zone. Provide independent wiring to each switch from a junction box located next to the expansion zone module (EZM) before converting to a zone.

- K. Provide an intrusion detection keypad within 5 feet from any door controlled by the card access control system. Keypad shall be located on the inside of the controlled area

1.10 CARD ACCESS CONTROL SYSTEM:

- A. Provide a network ready, and web browser-based card access control system in all new construction and designated renovation projects, to monitor and control access to designated areas.

- B. Access control systems shall be stand-alone and shall have the ability to integrate with the fire alarm, intrusion detection and security camera systems.

- C. The design shall include necessary components, wiring, for power and control to sensors, card access controls, locks, and other door hardware items or devices required for a complete operable and fully integrated system.

- D. Provide an uninterruptible power supply system (UPS) for the card access control system.

- E. Provide all interior and exterior perimeter doors leading to each Card Access control area a door-contact that is monitored by the Facilities Intrusion Alarm System.

- F. Card access control systems shall be referenced and properly coordinated between all construction disciplines such as architectural, structural and electrical, and shall be noted in the door schedule, hardware schedule and hollow metal door specifications.
- G. Card Access design, showing the location of all card-readers shall be submitted to M-DCPS Police, the School Principal, Facilities Operations Maintenance Capital Task Force personnel and the appropriate RMC's Audio-Video Foreperson, for their review and approval during the Phase I/II Matrix Review, and again at the Phase III Matrix Review Meeting.
- H. The Card Access Control System shall include but not be limited to the following:
1. A proximity card-reader installed adjacent to the primary entrance to each card accessed control area.
 2. An intrusion detection keypad located within 5 feet on the interior side of each card access control entry point.
 3. All doors located along the perimeter of all Card Access Control area (i.e. primary entrance door, emergency entrance door, remaining entry doors) shall be provided with all applicable hardware as called for under Division 8 of M-DCPS Design Criteria.
 4. A LAN/WAN connection at each card access panel, meeting the manufacturer's requirements and compatible with M-DCPS District Communications Operations Management (DCOM).
 5. Provide a 1" diameter conduit with pull string from each card access control panel to the SCS Control Room and a 1" diameter conduit from each card access control module to the nearest SIDF dedicated wall area.
 6. Provide a grounding system to protect all electronic equipment in the SCS control room.
 7. A/E design shall include all necessary conduits, cabling and infrastructures for all components, including modules, controllers, sensors, power supplies, and door hardware.
 8. The card access control system shall be connected to an emergency power source necessary to operate all system components.
 9. Provide fire-seal to all conduit penetrations.
 10. Refer to the Door Hardware section of Division 8 of the Design Criteria for additional details on the door hardware for the card access control system.
- I. Card access control points shall include, but are not limited to the following:
1. Main entrance to the Administration and Student Services areas. (*), (**)
 2. Food services kitchen receiving door. (*), (**)
 3. Media center main entrance door. (*), (**)
 4. Auditorium main entrance door. (*), (**)
 5. Music band room. (*)
 6. Security Camera System Control Room. (*), (**)
 7. At an exterior door providing direct access the Physical Education locker rooms. (*)
 8. Main Telecommunication Room. (***)
 9. Testing Materials Storage Room as identified by Administrative Staff. (***)
 10. Other spaces as designated by the Educational Specifications. (*), (**)

(*) Exterior doors to these areas require magnetic door locks.

(**) Interior doors to these areas require electric door strikes.

(***) Entry door to these rooms require magnetic door lock regardless of their location.

- J. All magnetic door locks and door strikes shall be installed to fail safe. Refer to Door Hardware section in Division 8 for additional details on door hardware for the card access control system.
- K. Provide a surge protective device (SPD) to protect all phases of the electrical panels supplying power to the card access control system.
- L. All modules and components of the access control system shall be powered from the emergency power source.

1.11 SECURITY CAMERA SYSTEM (SCS):

- A. All projects involving the construction of a new Facility or a major addition will be provided with a NIC Security Camera System (SCS) installed by M-DCPS Facilities Operations - Maintenance Capital Task Force (Security Cameras Dept.). The A/E design shall include all necessary infrastructures to support all NIC SCS equipment, including but not limited to, all raceways (conduits and cable-trays), dedicated electrical power and wiring, and the construction of all spaces necessary for the proper operation and secure storage of the SCS equipment.
- B. The quantity of NIC security cameras required for each Facility will vary depending on the scope of work and the design layout developed by the A/E. During the Phase II and Phase III Matrix Design Review Meetings, the A/E shall coordinate with M-DCPS Police, School Principal, and M-DCPS Facilities Operations - Maintenance Capital Task Force (Security Cameras Dept.), to obtain approval of the exact location for each NIC security camera to be provided at the Facility.
- C. During Phase II submittal, the A/E shall submit M-DCPS Facilities Operations - Maintenance Capital Task Force (Security Cameras Dept.), a security camera system riser diagram for their review and approval.
- D. Camera locations shall complement exterior building aesthetics. Landscaping materials (i.e., trees, shrubs, etc.) shall be selected and placed so as to avoid obstructing the view of areas of the school site being monitored by the security camera system.
- E. In all new Facilities, provide a dedicated SCS control room meeting the following requirements:
 - 1. The SCS control room shall be a minimum of 8'-0" W x 12'-0" L x 9'-0" clear ceiling height.
 - 2. The SCS control room shall be located adjacent to the School's main Administration area and shall have the same finishes as the Administration Secretarial areas.
 - 3. The SCS control room shall have no windows or vision panels and all perimeter walls shall extend to the underside of the structure.
 - 4. Entrance to the room shall have a steel door and frame, complete with a high security lock, and a card access control system in compliance with Division 13 of these Design Criteria.

5. The SCS control room shall be provided with a supplemental 24/7 HVAC system in accordance with M-DCPS Design Standards. For details see Design Criteria, Division 15 - Mechanical.
 6. Within the SCS control room, provide an 8'-0" wide clear wall area (floor to ceiling) dedicated for the installation of the SCS racks and other SCS wall-mounted equipment. Locate this wall area away from the entrance to this room or any path of egress.
 7. Within the SCS control room, provide one (1) 120V (SPD) duplex outlet on a 20-Amp dedicated circuit, for every thirty-two (32) NIC security cameras to be installed at the Facility. In addition, provide two (2) 120V (SPD) duplex outlets each on 20-Amp dedicated circuits, to serve other NIC SCS equipment shall be clustered in a linear fashion, on the same wall as the NIC SCS equipment rack. A/E shall coordinate with personnel from M-DCPS Facilities Operations - Maintenance Capital Task Force (Security Cameras Dept.) to identify exact location for the SCS equipment rack.
 8. Provide one (1) 1-1/2" diameter conduit with pull string from the SCS Control Room to the School's Main Server room.
 9. Provide one (1) telephone outlet along wall dedicated for the SCS equipment rack.
 10. Provide a grounding system to protect all electronic equipment located in this room. Coordinate with personnel from M-DCPS Facilities Operations - Maintenance Capital Task Force for specific equipment requirements.
- F. All SCS security cameras will be wired to a NIC Security Intermediate Distribution Frame (SIDF) equipment located within a nearby telecommunications wiring closet. The A/E shall coordinate with M-DCPS Security Camera personnel, to identify the location of each SIDF, and all the security cameras that each serve. The A/E shall ensure that the cable distance from the SIDF to each camera that it serves does not exceed 250 feet. The A/E design shall include the following power supply and wiring raceways to support the SCS:
1. Provide a conduit or a "common-use" cable-tray from each security camera location to the nearest SIDF. Provide one (1) 3/4" diameter conduit with pull string from every two (2) security cameras, or one (1) 1" diameter conduit with pull string from a maximum of four (4) cameras "cascaded" together. When a "common-use" cable-tray is used, provided a conduit path from the cable-tray to the SIDF to permit installation of the NIC SCS wiring.
 2. At each SIDF location, provide a 4'-0" wide clear wall area (floor to ceiling), with a 5'-0" clearance from any adjacent wall or other non-SCS equipment. This wall area shall be dedicated for SCS equipment only. Centered on this wall area, provide one (1) 120V (SPD) duplex outlet on a 20A dedicated circuit. As part of the design, the A/E shall consider the NIC SIDF rack to have a footprint of 30" x 30", and an unobstructed maintenance clearance space of 36" in front of the rack.
 3. Provide one (1) 1" diameter conduit with pull string from each intrusion alarm panel to the SCS Control Room.
 4. Provide one (1) 1-1/2" diameter conduit with pull string from each SIDF to the SCS control room.
 5. Provide one (1) 1" diameter conduit with pull string from each intrusion alarm zone module to the nearest SIDF.
 6. Provide a 1" diameter conduit with pull string from each card access control panel to the SCS Control Room. (See Division 13 of these Design Criteria for additional requirements on the card access control system).

7. Provide a 1" diameter conduit from each card access control module to the nearest SIDF. Terminate the conduit at the wall area dedicated for the security camera system.
 8. Unless required by Code or otherwise indicated in this document, all underground conduits serving the SCS shall be a minimum of 1" diameter with pull string.
 9. All electrical outlets serving the SCS shall be connected to the Facility's emergency-power supply.
 10. Provide a Surge Protective Device (SPD) system to adequately protect all phases of electrical panels supplying power to the SCS.
 11. All conduits terminating at the SIDF or the SCS control room shall be terminated against the wall designated for the SCS camera equipment.
 12. All empty conduits shall be provided with pull-strings and proper identification.
 13. All empty conduits serving the SCS shall be provided with necessary junction boxes and long-sweep ells to accommodate the use of fiber-optic cable in these conduits.
 14. All video locations must have a clear path to the terminating IDF or MDF room. All conduits shall contain pull strings and be marked at both ends indicating each location.
 15. It is desirable, but not mandatory, to provide each SIDF and IDF location, an HVAC system capable of maintaining a constant temperature of 75 degrees F. and a relative humidity of 50 percent, continuously (24/7).
- G. Camera locations will vary depending on the scope of work and the A/E design solution for the facility. At a minimum, provide all necessary infrastructures to support the installation of NIC security cameras at the following locations:
1. All major points of congregation, including but not limited to auditoriums, cafeteriums, gymnasiums, media centers, court yards, vestibules, and spill-out areas, etc.).
 2. Building perimeter, including all building entrances and exits.
 3. All stairwells and landings.
 4. At all corridors in quantities to ensure continuous line-of-sight monitoring of the entire length of the corridor. Provide a minimum of one (1) camera location for every 150 LF of "straight" section of corridor and one (1) camera location within each section of corridor contained by smoke-doors.
 5. Outside each student group restroom vestibule.
 6. At all elevator lobbies.
 7. At the exterior of the door to the Security Camera System Control Room.
 8. At Administration and Student Services areas to monitor reception counters.
 9. Central and kitchen receiving areas.
 10. Physical Education courts and fields.
 11. At all walkways and breezeways.
 12. Parking lots (driving lanes), parking lot entrances and service drive entrances.
 13. Parent drop-off and bus drop-off areas.
 14. At all vending machine locations.
 15. Entrance to the emergency generator room, main telecommunications room and security camera control room.
 16. Each aboveground fuel storage tanks and gas meter location.
 17. Cameras are not allowed in instructional spaces, locker rooms, toilet rooms, or any other locations prohibited by statute.
 18. Camera locations shall be determined so as to provide an overlap of the designated field of vision and eliminate blind spots.

19. When necessary, camera locations shall be off-set to avoid line-of-sight interference caused by adjacent exit-signs and other ceiling mounted obstructions.
- H. Exterior mounted Security Cameras:
1. Whenever possible, exterior camera mountings shall be placed at least 14 feet above finish grade to provide protection from vandalism.
 2. For cameras that will be mounted to the exterior perimeter of buildings, the connection junction box shall be located immediate interior to the camera location and have a 3/4" threaded nipple w/cap, penetrating the perimeter wall at the location where camera will be located.
 3. Coordinate placement of landscaping to ensure that security cameras have unobstructed view of designated areas after trees and shrubs have reached their full matured height.
 4. A/E shall ensure that site lighting does not interfere with camera viewing capabilities.
 5. All pole-mounted and roof-mounted exterior cameras shall be provided TVSS and lightning protection. In retrofit projects, provide re-certification of existing lighting protection systems to include exterior mounted cameras.
 6. At each pole where a security camera will be mounted, provide the following:
 - a. From the nearest SIDF room, provide a 1" conduit to an in-ground Brooks box located 36" from the base of the pole. From this Brooks box, run a 1" conduit to a 6" x 6" x 6" NEMA 4 junction box (with screw-on cover), secured to the pole at 14'-0" above finished grade. Provide a pull string for the NEMA 4 box to the SIDF room.
 - b. Provide a 120V duplex outlet on a 20-Amp dedicated circuit, within a 6" x 6" x 6" NEMA 4 junction box (with screw-on cover) secured to the pole at 14 feet above finish grade. Power for the dedicated outlet will be provide from the nearest emergency electrical panel. For easy of service, provide along the path of the conduit feeding this service, an in-ground Brooks box 36" from the base of the pole
- I. In new additions and remodeling projects, A/E shall coordinate with personnel from M-DCPS Facilities Operations - Maintenance Capital Task Force (Security Camera Dept.) to determine specific requirements for interconnecting the new security camera system with the existing equipment. In these projects, provide a 1-1/2" diameter conduit, with pull string, from all new intrusion alarm panels, and terminate them adjacent to the intrusion alarm panel at the existing facility.
- J. Not-in-Contract (NIC) Security Camera Equipment requirements.
1. Cameras will consist of fixed position having variable-focal lens, fixed position with telephoto lens remotely controlled, fixed-position 180-360 degree viewing lens, and pan-tilt-zoom remotely controlled units.
 2. Exterior pan-tilt-zoom units will be configured to match the surrounding atmospheric conditions.
 3. Controllable cameras will be programmed according to the facilities schedule to preset positions.
 4. Lenses will be specified according to the field of view, distance, and light conditions.
 5. All cameras will be provided with an M-DCPS accepted vandal resistant weatherproof housing and thermostatically controlled fan.
 6. All cameras will be placed to provide an overlap of the designated field of vision and eliminate blind spots.

7. Video modules, connector panels and communication devices shall be used for the transmitting of video signals from each camera to the SIDF and SCDF rooms.
8. Equipment racks and stands shall be used for SCS equipment and devices in the SCDF and SIDF rooms.
9. Recording / Archiving machines shall be used for storing video recordings.
10. Video monitoring systems shall be used in the SCDF and or SIDF for local live monitoring and video retrieval.
11. The use of covert or dummy cameras is not allowed.

1.12 ENERGY MANAGEMENT SYSTEM (EMS)

A. General:

1. All new Facilities shall be provided with an Energy Management System (EMS).
2. At existing facilities with an operational EMS, all new work or renovations shall be provided with an EMS that is compatible with the existing EMS. Coordinate with M-DCPS District Inspections, Operations and Emergency Management (DIOEM) (305-995-1550), to determine the extent and scope of the EMS to be provided.
3. EMS design shall focus on reducing the energy consumption of the new Facility as well as minimizing operational servicing and repairs. A critical aspect of the overall design shall give serious considerations to the installed cost, based on the size and function of the Facility.
4. The EMS design shall comply with:
 - a. Florida Building Code (FBC)
 - b. Enhanced Hurricane Protection Area (EHPA) as defined in FBC
 - c. National Fire Protection Association (NFPA) 70
 - d. National Electric Code (NEC)
 - e. ASHRAE 135
 - f. FCC Regulation, Part 15- Governing Frequency Electromagnetic Interference.
 - g. Underwriters Laboratories UL 916, "Standards for Energy Management Equipment" or other similar standards from an OSHA approved Nationally Recognized Testing Laboratory (NRTL).
 - h. Section 255.257 of Florida Statutes.
 - i. M-DCPS Master Specifications Section 13810.
5. The EMS design shall be a fully integrated, communication network system, configured in a "Triad" and comprising the on-site Facility EMS Center, the Regional Maintenance Center (RMC) EMS Station, and the School Board Administration Building (SBAB) Energy Management Terminal LAN communication network.
6. The A/E shall submit the design of the Energy Management System (EMS) to the Office of the District Inspector Operations Emergency Management for review and approval.
7. The EMS design shall provide a backup power source for the EMS Center Console, all Building Controllers and controllers serving all major electro/mechanical equipment. During power interruptions, the backup power source shall be capable of maintaining the contents of the EMS functional parameters that are stored in volatile memory (e.g., RAM memory) for a minimum of seventy-two (72) hours.
8. See Design Criteria Appendix for additional information.

B. Functional Configuration:

1. The District EMS Network basic functional design shall achieve remote monitoring and programming of the following:
 - a. HVAC parameters modulation.
 - b. HVAC equipment auto start/stop.
 - c. Timely activation of selective interior and exterior building lighting.
2. The EMS shall have a Triad in tandem configuration, comprised of separate but, concurrently interacting control loops:
 - a. On-site EMS Control Subsystem Loop: It shall be the functional core of the School EMS Center. It shall be dedicated to local mode activation and control of diverse equipment confined within the school campus. It shall act independently and be exclusive from any pre-set EMS automation program established by others, to regulate the levels of ambient comfort in occupied spaces. It shall be achieved by means of a centralized console having a “touch screen” monitor depicting a descriptive digital display identifying the actual status of the physical plant performance parameters. The School EMS Center infrastructure shall contain built-in temperature range limiting features. On-site operational control programming shall make the School EMS Center to be self-standing and able to be connected to work simultaneously in conjunction and parallel with the corresponding RMC’s EMS Station and/or the SBAB EMS Terminal. The School EMS Center console display shall be installed in a secure area within the Administration area visible from the Principal's office. Installation shall be flush mounted, so that the bottom edge of the status display window appears at 4'-0" above finish floor, unless otherwise required by applicable accessibility Codes.
 - b. Off-site EMS Control Subsystem Loop: It serves to concurrently access each active School EMS Center microprocessor from its corresponding RMC EMS Station. It shall be able to establish operational dialogues by interconnecting in tandem with assigned schools via electronic communication means. It shall act mainly as a “partner”, dedicated to assist by remote mode in the activation and proper performance of the physical plant machinery, buildings controllers programming and network general conditions monitoring. It shall be capable of remote graphic displays and depicting individual EMS network components working status in real time.
 - c. The SBAB EMS Terminal represents the third operational element of the District’s EMS Triad It shall perform diverse supplementary tasks, in particular physical plant equipment start/stop and on/off power activation scheduling, personnel training, and assist in emergency communications response.

C. EHPA - Emergency Shelter Manual Override

1. EHPA Manual Override Panel: At Facilities designated by M-DCPS as an EHPA, provide one EHPA manual override panel for use by authorized Staff to activate manual override of cooling, ventilation and lighting systems serving the designated EHPA zones. Installation of the EHPA Override Panel shall comply with the following:
 - a. Install the EHPA Override Panel in the EHPA Emergency Shelter Director’s office. The cabinet shall be labeled “EMERGENCY SHELTER - MANUAL OVERRIDE PANEL LOCATED INSIDE”.
 - b. Override-panel shall be operated with a single push button switch and shall have a status light labeled “EMERGENCY SHELTER MANUAL OVERRIDE”, to signal activation.

- c. Upon activation, the EMS shall convert its operating mode to “SHELTER ACTIVE MODE”, providing 24/7 mechanical cooling and ventilation, including lighting, to the designated EHPA zones.
- d. In the “SHELTER ACTIVE MODE”, the system shall override all EMS “time-schedules”, demand-limiting, or energy-saving programs that may compromise the use of the Facility as an EHPA.
- e. The EHPA Emergency Shelter Director’s Office air conditioning, EHPA ventilation and life safety systems shall be connected to emergency power:
 - 1) As long as commercial power is available, the facility’s HVAC system shall operate normally.
 - 2) If commercial power is lost the EHPA systems listed above shall operate on emergency power.
- 2. Refer to the EHPA Design Criteria Manual for additional details and requirements.

D. Physical Integration:

- 1. The physical integration of the District wide EMS network shall facilitate the efficient performance control of prime energy users throughout the physical plant. The scope of this provision shall include all electrical and mechanical equipment, water heaters (“boilers”) and overall campus lighting; besides the status of critical alarm systems.
- 2. Specify a fully integrated EMS Web-enabled hardware and software package with high-speed, peer-to-peer network of Direct Digital Controller (DDC) controllers and operator workstations.
- 3. Specify that the EMS software shall be a complete Web enabled package including interactive graphics that shall support multiple users utilizing Internet Explorer or other M-DCPS accepted Web browser.
- 4. EMS wiring shall be installed in conduits separate from any other system.
- 5. In new schools the EMS design shall include the installation of a dedicated site KW meter to measure, track and record, in real time, the facility’s energy usage and transmit plots of the physical plant electricity consumption data for quantification, monitoring, tracking, and load shedding programs and display at the school’s EMS Center Performance Portal.
- 6. Exterior lighting circuits shall be interlocked with the EMS. The interlock shall provide for lighting circuits to remain energized (fail-safe) in case of total EMS failure. Full illumination shall be affected only during periods of scheduled evening occupancy. Control of “spot” illumination shall be provided for security purposes where required. Exterior perimeter illumination and artificial lighting of parking lots, and other open areas shall be activated by means of sunlight-exposed photocells and time-of-day controls wired in-series. All EMS outputs for lighting controls shall originate from EMS controllers that are located within 20-gauge panel enclosures wall mounted 54" AFF and located at electrical/mechanical rooms.
- 7. Exterior lighting circuits shall provide two (2) levels of illumination:
 - a. Full illumination - shall be provided only during periods of scheduled evening occupancy.
 - b. Reduced illumination - shall be provided for security reasons when the facility is un-occupied; provide for at least the minimum lighting levels set forth in FBC.
- 8. The on/off switching of buildings’ interior lights shall not be affected by pre-set EMS automatic timing.
- 9. Exhaust and ventilation fans shall be interlocked with corresponding air handling units.

E. Triad:

1. The EMS Triad is a computer / microprocessor based operational command signals network, comprised of solid state printed circuits components, subsystems, accessories and devices, electronically integrated for the quantification, control and reduction of energy consumption in M-DCPS facilities.
2. The Triad seeks as effective synergy by the complementary interaction of 1) District School Facilities, 2) Regional Maintenance Centers, and 3) M-DCPS Energy Management Network, to attain a cost effective physical plant operation, utilizing an EMS-LAN communication network. See M-DCPS Design Criteria – Appendix for additional EMS information.

F. Other Requirements:

1. The EMS design shall comply with Section 255.257, F.S., with emphasis on the Energy/Star Program established by the U.S. Department of Energy, Department of Education and the Environmental Protection Agency (EPA).
2. The indoor ambient comfort level modulation range of sensible temperature shall be bounded to 68-78°F, throughout the year.
3. Prior to bidding, the EMS design documentation shall be submitted to M-DCPS DIOEM - Energy Management Staff, for review and acceptance.
4. Building Controller shall be appropriately located within the Main Telecommunication room at 4'-0" AFF. The PC portion of the school's EMS Center Console equipment shall also be located within the Main Telecommunication room.
5. Specify that all EMS equipment shall be located in a manner that will permit easy access for performing routine maintenance.
6. Electrical Transient Protection (ETP) shall be provided for equipment according Division 16 of M-DCPS Master Specifications and Section 13810 - EMS.
7. The EMS Triad shall exhibit common sets of tandem graphical displays that provide real-time information on the operational status of the District's EMS. See Design Criteria Appendix for additional information.
8. EMS design shall include all necessary power wiring to all DDC controllers including terminal box controllers and control valves.
9. EMS design shall include a minimum of one (1) 120V duplex outlet on a 20-Amp dedicated circuit, adjacent to each EMS AHU controller.
10. Critical alarms shall be sent via e-mail to the appropriate RMC serving the school, and to a designated maintenance printer. Critical alarms shall include but not be limited to the following:
 - a. Chiller failure
 - b. Pump failure
 - c. AHU failure
 - d. CO₂ over limit
 - e. Variable Speed Drive Failure
 - f. Cooling tower water Alarm
 - g. EHPA activation
11. Control points shall include, but not limited to:
 - a. HVAC: chillers, pumps, cooling tower fans, and ventilation and exhaust fans.
 - b. Boiler and water heaters.
 - c. Interior and exterior lighting.

END OF DIVISION