HCS Infrastructure Guidelines

GENERAL CABLING INFORMATION:
No cables are to be installed such that they lay on top of ceiling tiles without support of either cable tray or J-hooks.

No cables are to be run through building joists. All cabling is to be supported by either cable tray or J- hooks.

PART 1 – PATHWAY INSTALLATIONS

1.1 INSTALLATIONS

A. Comply with TIA/EIA-569-A, NEC, and CEC.

B. Shall be installed in accordance with NEC Article 314 and Article 800.51 (J), (K), or (L), as applicable, and installed in accordance with Articles 362.24 through 362.56, where the requirements applicable to electrical nonmetallic tubing apply.

C. Conceal interior conduit within finished walls, ceilings, and floors (conduit in floors or under slab will need approval from HCS Personnel) where possible.

D. Keep conduit minimum 6 inches away from parallel runs of electrical power equipment, flues, steam, and hot water pipes.

E. Install conduit parallel with or at right angles to ceilings, walls, and structural members where located above accessible ceilings and where conduit is visible after completion of project.

F. No communication conduits are to be installed in crawl spaces or under floor slabs. All data cabling is to be done above ceiling unless written permission is given by Horry County Schools.

G. Install no more than two 90-degree bends for a single horizontal cable run. If run requires more than two 90 degree bends, then a 4 inch x 4 inch “pull box” must be installed.

H. Run raceway as determined by site survey.

I. Provide Pull boxes with “Seal tight” flex conduit only where flexible connections are required. HCS approval required prior to all “Seal tight” flex conduit installations.

J. Provide all coring, patching, and painting as needed for Intra-Building and Inter-Building pathways. Caulking is not an acceptable patching method for conduit penetrations into exterior walls. Coordinate with HCS for acceptable patching methods.

K. 1 inch Conduit used from cable tray to location unless otherwise noted (Projector cabling installation 1 ¼ Inch noted per drawing.)

1.2 GROUND BOXES AND PULL BOXES

A. Ground boxes shall be made of concrete and the minimum size shall be 35½” x 17½” x 12”. Ground box covers shall be rated for traffic (type T.05) and shall be marked communications. Metal covers shall be used in all locations subject to vehicle traffic.

B. Ground box covers shall be rated for traffic (type T.05) and shall be marked communications.

C. Metal covers shall be used in all locations subject to vehicle traffic.

D. Gravel shall be installed below all ground boxes for drainage.

E. Ground boxes and pull boxes shall not be placed in areas subject to flooding.

F. Unless otherwise noted, exterior pull boxes shall have minimum dimensions of 20" x 20" x 6".
   1. Interior pull boxes shall consist of 16 gauge steel minimum, unless otherwise noted on plans.
   2. Indoor enclosures shall conform to NEMA Type 4, unless otherwise noted.
   3. Size pull boxes to not less than minimum Code requirements. Increase size above Code requirements where necessary to provide space for pulling, racking, or splicing enclosed conductors, or where specified or indicated dimensions exceed Code requirements.
   4. Exterior metal pull boxes exposed to weather (and not installed in or below grade) shall be equipped with rain tight or weatherproof-hinged doors.
   5. Exterior pull boxes shall have 16 gauge steel bodies and 14 gauge steel doors.
   6. Exterior pull boxes shall be equipped with external mounting feet. Stainless steel continuous hinge pin.
   7. Exterior pull boxes shall be equipped with stainless steel door clamps on three sides and a removable
   8. Exterior pull boxes shall be equipped with a hasp and staple for padlocking.
   9. Enclosures installed on vertical exterior walls shall conform to NEMA Type 3R.
   10. Enclosures installed on exterior horizontal surfaces such as rooftops or breezeways shall conform to NEMA Type 4 unless otherwise noted.
   11. Rain tight or weatherproof boxes shall use threaded watertight hubs for top or side entry and may use knockout for bottom entry only.
   12. Exterior pull boxes shall conform to these industry standards:
      i. UL 508 Type 4
      ii. NEMA/EEMAC Type 3, Type 4, Type 12, Type 13
      iii. JIC standard EGP-1-1967
      iv. CSA Type 4IEC 529, IP66
   13. Tamper resistant screws shall be used on all exterior, aboveground junction/pull boxes that are exposed to public/student areas.
   14. Exterior pull boxes shall be manufactured by Hoffman or HCS approved equal.

1.3 TRENCHES

A. All underground trenches shall be 24" wide by 30" deep.

B. Trenches shall be back-filled at 95% compaction.

C. Contractor shall restore surface to same or better condition.

D. Contractor shall contact appropriate Utilities a minimum of 72 hours prior to excavation to verify the location of existing underground utilities.

E. Modifications to pathway design may be dictated by field conditions subject to approval by HCS.

F. Compaction testing notification must be provided to the District 72 hours prior to testing so that a District inspector may be present.

G. Slurry fill trenches to within three inches (3”) of finished grade whenever crossing paved areas. “Two Sack” slurry shall be used with an overlay of 10 feet on either side.

1.4 CONDUIT

A. Underground conduit shall consist of Schedule 40 PVC – 2 inch inside diameter or type C telephone conduit - 2 inch inside diameter (if concrete encased).
   1. Inner duct, where specified, corrugated, or splined (inside and outside) flexible orange inner duct, 1 inch in diameter, riser rated, will be placed for fiber optic cable protection.
   2. One (1) inner duct shall be placed in a 2-inch conduit. Inner ducts are to be equipped with 1/8" pull ropes.
   3. Conduit shall have a factory formed bell on one end for interconnecting segments.
   4. Conduit located under heavy use highways or railroad rights-of-ways shall be encased in steel casing consistent with the AASHTO or AREA specifications. The thickness of the steel casing shall be engineered for each specific application. This may vary based on campus codes.
   5. Spacers: High impact spacers shall be used in all multi-duct systems, for either solely owned or joint telecommunications/power construction. They shall conform with NEMA TC-2, TC-6, TC-8, and ASTM F 512 dimensions.
   6. All fittings shall be designed specifically for use with the type of conduit placed.
   7. All conduits shall be equipped with seal plugs in all ground boxes and expansion rubber seal plugs within all buildings.
   8. A horizontal and vertical separation of 1 inch shall, between the ducts, be maintained by installing high impact spacers with horizontal and vertical locking intervals of ten feet.

B. All communications conduits shall be placed in a uniform manner between ground boxes and pull boxes. Conduit in position #1 at one ground box or pull box shall maintain its position within the duct run and terminate in the #1 position at the next box. The position of all conduits between ground boxes and pull boxes shall be maintained.

C. Long radius bends (over 30 feet) shall be used whenever possible to make changes in direction. If it is found to be necessary to place a 90-degree bend in the conduit run, a factory-made sweep of no less than 60-inch radius shall be used.

D. No conduit run shall exceed a total of 180 degrees of bend between any two points (such as manholes or buildings) considering both vertical and horizontal sweeps.

E. Cold-formed trench bends shall have a radius of not less than 60 inches and shall pass mandrel integrity. Bend radius criterion is 2" or less 6 times the diameter of the conduit and any conduit larger than 2" is 10 times the diameter of the conduit.

F. The length and destination of all conduits shall be identified in each ground box, pull box, and building. Embossed metal or heavy plastic tags strapped to each conduit shall be used.

G. After installation of communications conduits, the contractor shall prove all conduits by pulling a mandrel with a diameter ¼ inch smaller than the conduit and 6 inches long through each conduit end-to-end. An inspector designated by the contractor and HCS shall be notified 24 hours before this procedure. Each conduit shall be cleaned with a bristle brush to remove any debris.

H. Utility marking tape (see 4.2.2.3) shall be buried 12 inches below the surface directly above the conduit.

I. Where communications and power conduits occupy the same trench, all conduit structures shall be built with the telecommunications conduits placed above the power conduits and separated by a minimum of 12” of compact earth or 3” of concrete encasement, unless otherwise called out on the construction drawings and approved by HCS. If this type of construction is required, it shall receive the prior approval of the contractor and HCS.

J. Electrical Contractor will install new ¼” pull rope in all conduits placed.

K. All conduit and raceway installations shall be the responsibility of the electrical contractor.

1.5 OVERHEAD CONDUIT

A. Where overhead conduit is required between or within buildings, Contractor shall utilize EMT conduit with an inside diameter of 3”, unless otherwise specified.

B. All fittings shall be compression type connectors and couplers designed specifically for use with the type of conduit placed.

C. All fittings shall be watertight. Fitting types shall be pre-approved by the designated District representative. Unless pre-approved by the designated District representative, all conduits shall be installed by a qualified electrical contractor who has at least five year’s experience in similar installations.

D. Contractor shall install conduit at roof locations utilizing the current District approved methodology and process. All conduit pathways and locations must be approved by HCS prior to installation.

E. All roof penetrations must be approved by HCS prior to installation.

F. Electrical Contractor will install new ¼” pull rope in all conduits placed.

G. All conduit and raceway installations shall be the responsibility of the electrical contractor.

1.6 COMMUNICATIONS ENTRANCE CONDUIT

A. To prevent shear, all inter-building conduit (either underground or aerial) shall transition from PVC or metal to Sealtight flex conduit when attaching to a permanent structure. The contractor and HCS shall determine the placement of all entrance conduit. All applicable standards shall be adhered to, i.e., HCS, NEC, BICSI, or G.O. 128.

B. Sealtight flex conduit lengths shall not exceed 24”, unless approved by HCS.

C. Sealtight flex conduit may be used between adjacent bungalows within 24” of one another using District approved connectors and methods. Use of Sealtight flex conduit between bungalow locations beyond the 24” distance shall require written authorization (email) from HCS.

D. Contractor shall install new ¼” pull rope in all conduits placed.

E. All conduit installation shall be the responsibility of the electrical contractor.

1.7 DUCT-BANK LOCATING CABLE

A. Warning tape shall be a minimum of 3" wide, orange in color, and shall have a nondegradable imprint as follows:
    1. “Caution Fiber Optic Cable Buried Below”
    2. The tape shall be electronically detectable.

1.8 PULL ROPE

A. Pull rope shall be new ¼" polypropylene over polyester rope with a minimum 1700 lb. Tensile strength.

B. Pull rope shall be new material that is free of knots, kinks, and abrasions and shall be placed as a single continuous length in every new conduit.
C. All pull rope shall be the responsibility of the conduit installer. D. Pull rope shall be secured at each end.

PART 2 – COMMUNICATION ROOMS

2.1 MDF

A. Minimum MDF room size shall be 12’ x 10’

B. Two quad 20 amp power outlets shall be provided on a minimum of 3 walls and on a minimum of two separate circuits and placed on emergency power.

C. One 208v, NEMA L6-30R, outlet shall be provided.

D. Room shall be provided with conditioned air on its own thermostat. Room must maintain a temperature between 68 F and 72 F.

E. E. 7’ x 19” open bay equipment racks shall be used and securely mounted to the floor. Rack #1 shall be for Data. Rack #2 for POE (power over Ethernet) devices. Separate Patch Panels for the POE devices shall be provided. Video/Panel/TV shall coexist on rack with POE devices with prior approval from HCS-Technology and where it would be cost effective. Ladder rack shall be used as a transition from wall to open bay rack. Must have 3 ft. of unused/open space measure from the bottom of each rack. A third rack may be required due to capacity needs when approved by HCS Technology.

F. Panduit wire management or equivalent with prior HCS approval shall be used and shall be mounted on each side of rack (8 inch minimum on sides, front and rear) and in between each patch panel front and rear.

G. An additional 7’x19” open bay enclosed and lockable equipment shall be installed and securely mounted to the floor for the mounting of servers.

H. Pathway from the MDF to the outside for accepting Public phone, CATV, etc. will be provided. Coordination with District phone/CATV provider may be necessary.

The Following shall be provided by Electrical contractor…

A. *All MDF Racks shall be installed with a Telecommunications Grounding Busbar (TGB) and the TGB shall be installed in accordance with TIA/EIA-607-A. Grounding source shall be provided by another contractor. (Electrical Contractor).*

B. *The TGB shall be grounded to a grounding system as provided by electrical contractor and described below…*

"Building ground is identified as cold water pipe, building structural steel, or ground rod. Gas pipes and electrical conduits are not acceptable ground attachment points.

Ground conductors are not to exceed 40'. If building ground connection is beyond 40', contractor is to install a new ground round at the nearest outside location. Ground rod location shall be approved by HCS prior to installation.

Provide ohms testing for ground. Ground connections shall not exceed 5 ohms.

Fargo clamp shall be cast from copper, silver-plated, and furnished with copper bolt. Ground rod shall be manufactured of high strength high carbon steel, with electrolytically bonded jacket of copper on surface, and meet UL spec. 467 and ANSI C-33.8-1072.

Two quad 20 amp power outlets shall be provided on a minimum of 3 walls and on a minimum of two separate circuits and placed on emergency power."

All wiring penetrations, including low voltage wiring, shall be the responsibility of the Electrical Contractor.

2.2 ESSENTIAL COMMUNICATION CONNECTIONS/DEMARC

It will be the responsibility of the architect and/or contractor to assure that essential communication lines remain operational during construction. This may include communications between MDF and IDFs and Demarcation from service providers. It will be the responsibility of the architect and/or contractor to do any line locations necessary. It will also be the responsibility of the architect and/or contractor to coordinate with appropriate vendors or service providers in securing and relocating these communication lines. Any damaged lines will be repaired by the contractor or subcontractor at no cost to Horry County Schools.

2.3 IDF ROOMS & RACKS

A. Minimum IDF room size shall be 8' x 10'.

B. Room shall be provided with conditioned air on its own thermostat. Room will maintain a temperature between 68 F and 72 F.

C. 7' x 19" open bay equipment racks shall be used and securely mounted to the floor. Rack #1 shall be for Data and non-POE devices. Rack #2 for POE (power over Ethernet) devices. Separate Patch Panels for the POE devices shall be provided. Video/Panel/TV shall coexist on rack with POE devices with prior approval from HCS-Technology and where it would be cost effective. Ladder rack shall be used as a transition from wall to open bay rack. (See Supplemental 1 at end of Document) Allow three feet of unused/open space as measured from the

Bottom of each rack.

D. Panduit wire management or an HCS approved equivalent shall be used and shall be mounted on each side of rack and in between each patch panel front and rear. (See Section 2.11 & Diagram B at end of Document) Oversized width Panduit 7' wire vertical management or equivalent is to be used. Panduit horizontal wire management or equivalent shall be double-sided to accommodate patch cords on the front and horizontal/backbone cabling on the rear.

E. E. 12 strands 50/125 µm Multimode Optical Fiber Cabling shall be run between each IDF to the MDF. Fiber will be terminated with LC connectors. 10 GIG Compliant.

The Following shall be provided by Electrical Contractor…

"IDF racks shall be installed with a telecommunications grounding busbar (TGB). The TGB shall be installed in accordance with TIA/EIA-607-A. The TGB shall be grounded to the nearest building ground with a #6 AWG insulated conductor.

Building ground is identified as cold water pipe, building structural steel, or ground rod. Gas pipes and electrical conduits are not acceptable ground attachment points.

Ground conductors are not to exceed 40'. If building ground connection is beyond 40', contractor is to install a new ground round at the nearest outside location. Ground rod location shall be approved by HCS prior to installation.
Provide ohms testing for ground. Ground connections shall not exceed 5 ohms.

Fargo clamp shall be cast from copper, silver-plated, and furnished with copper bolt. Ground rod shall be manufactured of high strength high carbon steel, with electrolytically bonded jacket of copper on surface, and meet UL spec. 467 and ANSI C-33.8-1072.

One dual - 20 amp power outlet shall be provided on a minimum of 3 walls on a minimum of two separate circuits and placed on emergency power."

All wiring penetrations, including low voltage wiring, shall be the responsibility of the Electrical Contractor.

PART 3 – DATA SYSTEM LABELING

3.1 LABELING PROCEDURES

A. The labeling shall be in accordance with the TIA/EIA-606-A standards for data.

B. The labeling shall be computer software generated and printed with readable fonts and black ink.

C. The ink and label shall be water and smear-proof for both indoor and outdoor use.

D. Samples of each type of media showing label type, labeling format, font size, and ink shall be submitted for HCS approval prior to application.

E. Hand written labels are unacceptable.

F. Room numbers will be assigned by the District's Energy Management Department. The room numbers on the architectural plans are not to be used. Translation between architectural drawing and formal room numbers will be done by District's Energy Management Department.

PART 4 – CABLING REQUIREMENTS

4.1 INSTRUCTIONAL AREAS (CLASSROOMS)

A. Teacher Area
   1. Two Cat 6 cables shall be installed at the teacher location. One Cat 6 will be located at 48 inches (red jack) for phone with appropriate metal face plate to accommodate a wall mounted phone. Location shall be unobstructed by marker boards or any other objects (an 8x11 sheet of paper, horizontally should fit in this area). One Cat 6 cable shall be installed at 18 inches AFF (blue jack). Cables may be installed in the same conduit. Cables shall be properly terminated and tested.

B. Student Area
   1. Two Cat 6 data jacks shall be provided in the student computer area. Data drops shall be divided into 2 single gang boxes. Separate conduit will be used for each single gang boxes. Install height shall be 18 inches AFF unless approved change by HCS. Cables shall be properly terminated and tested.

C. Panels
   1. Data cable shall have 1.25 inch conduit to the cable tray. Conduit from panel to Teacher location through junction box shall not exceed 30 feet. HDMI shall have 1 inch conduit to the teacher single gang box location. Cabling will be done by other vendor. (See Appendix)
   2. One Cat6 purple data jack shall be provided at panel location.

D. One 2 conductor 18 gauge (shielded) stranded wire for a ceiling mount speaker.

E. A Cat 6 data jack shall be provided above ceiling as per drawings for wireless.

F. All communication drops shall be placed in conduit to the cable tray. If drops are run to a central box and then a single conduit is ran from this central box to the cable tray, that conduit shall be no less than 2 inches.

4.2 OFFICES

A. Three Cat 6 2 data/1 voice cables shall be installed in each office area.

B. One 2-conductor 18 gauge stranded wire for a ceiling mount speaker as indicated on the electrical drawing.

C. Principal Office shall also have a Cat 6 cable, as per drawings, above ceiling for wireless.

4.3 MULTIPPURPOSE ROOM

A. One Cat 6 cable housed in a recessed box and terminated on an RJ45 wall jack for an IP Telephone as indicated on the electrical drawings. The height of this outlet will be at 48 inches.

B. Two Cat 6 data cables. The exact location will be determined from the electrical drawings and through discussions with the Horry County School District's Technology department. The height of this outlet will be at 18 inches. Termination shall be at the nearest MDF/IDF.

C. (IF REQUIRED) Two Cat 6 video\data cable and electrical power shall be installed for each location as per drawings for accommodating flat screen TV. Height shall be at 66 inches. Contact HCS-Technology for space requirements for flat panel TV.

D. One 2-conductor 18 gauge stranded cable will be run to each speaker.

E. An auxiliary sound system will be required as indicated on the electrical drawings. HCS Technology will be responsible for AV sound system infrastructure and design.

F. One Cat 6 shall be installed above ceiling for wireless as shown on drawings.

G. All communication drops shall be placed in conduit to the cable tray. If drops are run to a central box and then a single conduit is ran from this central box to the cable tray, that conduit shall be no less than 2 inches.

4.4 COMMONS AREAS

A. Cat 6 data cables shall be installed at each POS location in the cafeteria. Each POS outlet will receive two cables run to the nearest MDF/IDF. Modify the RJ-45 patch cord in the Cafeteria Office to comply with the POS system. If POS conduit is under slab, use flooded type underground rated cable.

B. One Cat 6 video\data cable and electrical power shall be installed for each location as per drawings for accommodating flat screen TV. Height shall be reflected on the drawings. Contact HCS-Technology for space requirements for flat panel TV.

C. Cat 6 data cables shall be installed for wireless as determined by HCS Personnel and as defined on drawings.

D. Camera outlets throughout building project, Cat 6, will be determined on each project and will be reflected in the drawings for locations and heights.

4.5 MEDIA CENTER

A. One Cat 6 cable terminated on a RJ45 jack for each IP Phone as indicated on the electrical drawings.

B. Cat 6 data cables will be required for student use. Three Cat 6 data cables will also be required at all administration jacks indicated on the electrical drawings. The height of these outlets will be at 18 inches.

C. One Cat 6 Video\data cable and electrical outlet shall be installed at 66 inches AFF where indicated on drawings for TV connections.

D. One 2-conductor 18 gauge stranded cable will be run to each speaker.

E. A minimum of two Cat 6 cables shall be terminated on RJ45 jack above ceiling and terminated at the nearest MDF/IDF. One jack per single gang box. (wireless)

F. Cat 6 Data Cables (camera) shall be installed in Media Center as noted on drawings. The data drops shall be 10 ft. AFF or above ceiling if ceiling is less than 10 ft. Termination shall be at the nearest MDF/IDF. One cable per single gang box.

G. All communication drops shall be placed in conduit to the cable tray. If drops are run to a central box and then a single conduit is ran from this central box to the cable tray, that conduit shall be no less than 2 inches.

4.6 HIGH SCHOOL AND MIDDLE SCHOOL GYMNASIUMS

A. One Cat 6 cable terminated in a recessed box on a RJ45 jack at 48 inches above floor level for wall-mounted IP phone. May need to install a separate wall box to mount IP phones, but phone must cover both boxes. Phone area must also be recessed into the wall.

B. Two Cat 6 data cables at 18 inches above floor level at each end of Gymnasium.

C. One 2 conductor 18 gauge stranded cable will be run to each speaker indicated on the prints.

D. One Cat 6 cable shall be installed for each wireless access points at a location and height as determined by HCS-Technology. Minimum of 2 APs drops are required.

E. General Contractor shall be responsible for the installation of any and all auxiliary sound systems.

F. All communication drops shall be placed in conduit to the cable tray. If drops are run to a central box and then a single conduit is ran from this central box to the cable tray, that conduit shall be no less than 2 inches.

4.6 AUDITORIUM

A. Projection Room
   1. One Cat 6 cable terminated on a RJ45 jack for phone. The height of this outlet will be 18 inches above floor level.
   2. Two Cat 6 data cables at 18 inches above floor level.

B. In Auditorium
   1. One Cat 6 Video\data cable and electrical power shall be installed at each TV locations as noted on drawings. The height will be 72 inches AFF. Contact HCS-Technology for space and bracket requirements for flat panel TV.
   2. One Cat 6 data drop shall be installed on the front and at each end of the stage area.
   3. One Cat 6 cable is to be installed at a location designated on drawing for each wireless access point.

4. LCD Projector and sound system shall be provided by HCS Technology.
5. *All communication drops shall be placed in conduit to the cable tray. If drops are run to a central box and then a single conduit is ran from this central box to the cable tray, that conduit shall be no less than 2 inches.*

4.7 COMPUTER LABS

A. Each computer lab will be designed per HCS Technology approved drawings. Three data drops will be installed at the teacher area. Two data (blue jack - data) will be at 18 inches AFF and one at 48 inches (red jack - Phone) with phone faceplate. All other typical classroom wiring applies.

B. All communication drops shall be placed in conduit to the cable tray. If drops are run to a central box and then a single conduit is ran from this central box to the cable tray, that conduit shall be no less than 4 inches.

4.8 VIDEO SURVEILLANCE CABLING & CAMERA INSTALLATION

A. Each camera location indicated on the electrical drawing will require one Cat 6 cables. The Cat 6 will be terminated at the nearest MDF/IDF. All Cat 6 cables will be properly terminated and tested from each camera location. One inch conduit shall be provided to each outdoor camera location from cable tray. Color of jacks will be yellow and terminated on appropriate patch panel.

4.9 WIRELESS ACESS POINT

A. One Cat 6a data cable shall be provided to all Wireless Access Points as indicated on the electrical drawings. All Cat 6a cables will be properly terminated and tested from each Access Point location to the nearest MDF/IDF. The location of these outlets will be above ceiling in corridors and/or common walls in classrooms as determined by HCS Technology. Access Point locations shall be clearly marked on ceiling grid. Color of jacks shall be Green and termination shall be on appropriate patch panel.

4.10 CLIMATE CONTOL

A. One Cat 6 data cable shall be provided in the climate control location. Cable shall be properly terminated and tested to the nearest MDF/IDF. Contact HCS Energy Management for location.

PART 5 – REMOVAL OF OLD CABLING

5.1 PROCEDURES

A. Contractor shall be responsible for the removal of all cabling not in use. This shall include, but not be limited to, phone cables, data cables, and CATV cables.

B. Contractor shall identify cables using a method which will assure that current working cabling remains intact.

C. Working cabling which is removed purposely or accidentally shall be replaced by the contractor at no additional cost to Horry County Schools

Appendix

PART 1 – MDF/IDF AND BUILDING LAYOUT

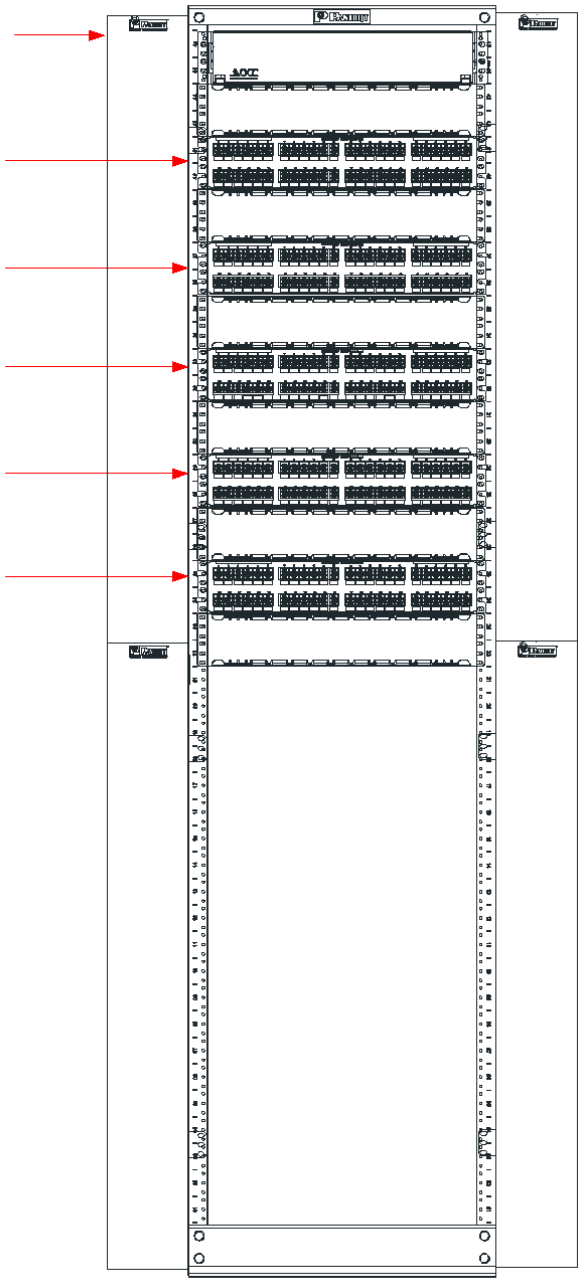
1.1 MDF & IDF Cabling Rack Installation:

A. Install Rack-mounted Fiber cabinets at the top of the rack.

B. Leave 2RU (two rack units) of open space between a Rack-mounted Fiber Cabinet and the first horizontal wire manager for copper cabling on patch panels.

C. Horizontal wire managers are to be installed above the first copper patch panel in a rack.

D. Diagram A:

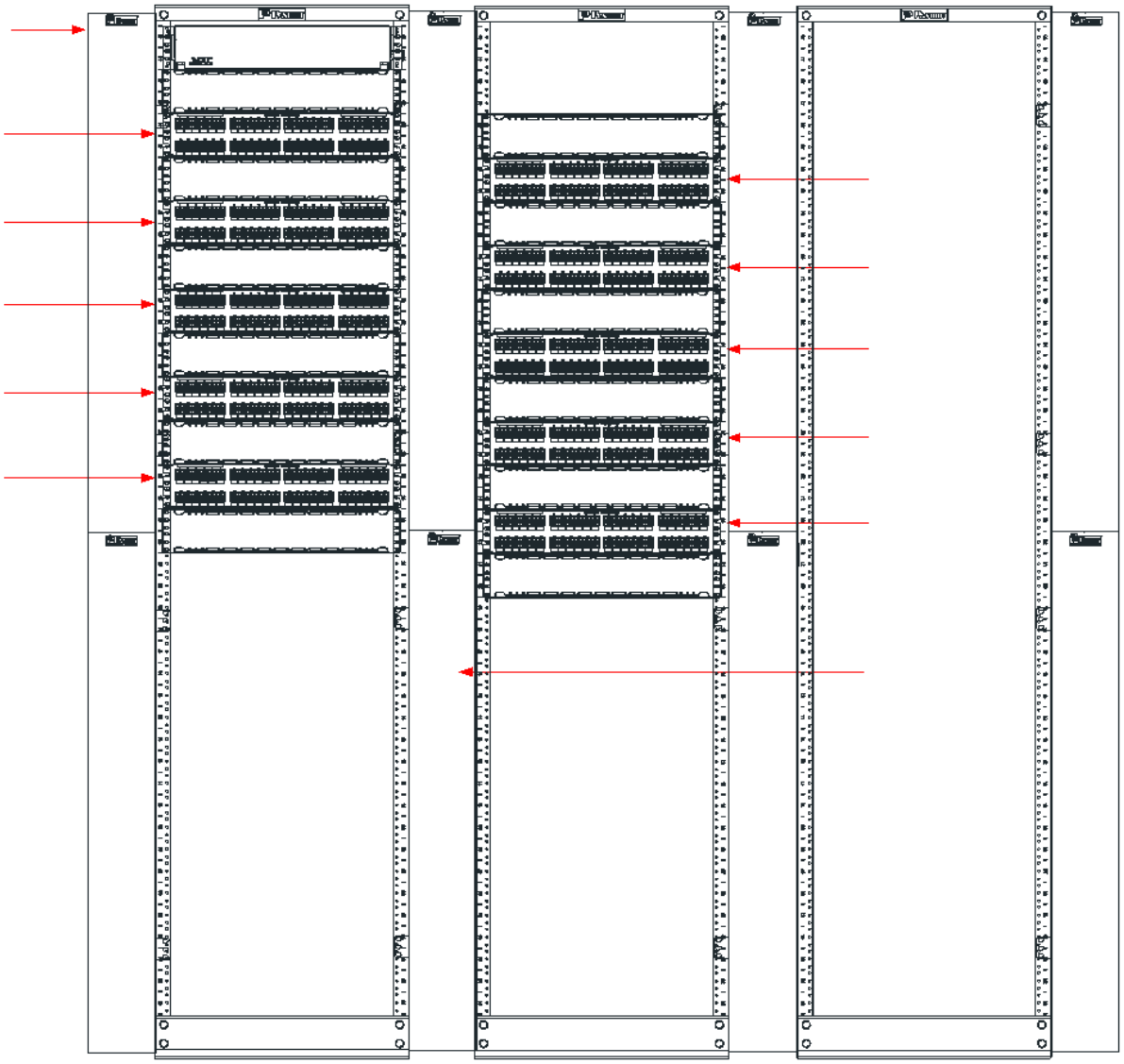


1.2 MDF & IDF Design

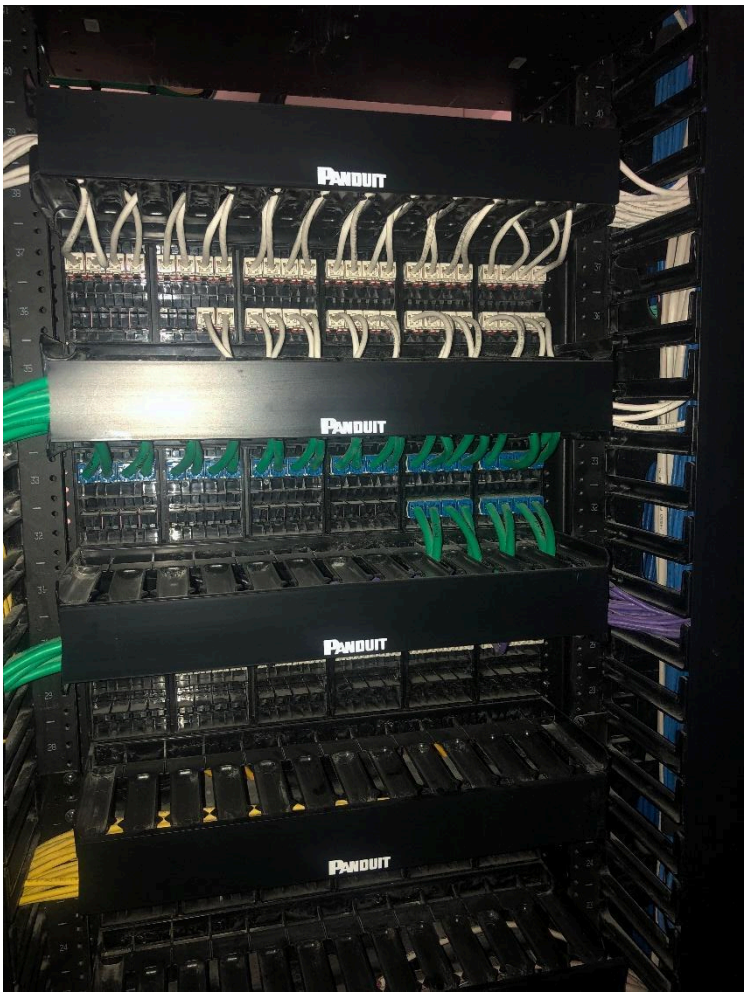
A. Leave the three feet of unused rack space as measured from the floor up

B. Third rack may be optional if space not allowed in second rack.

C. Diagram A:



D. Diagram B: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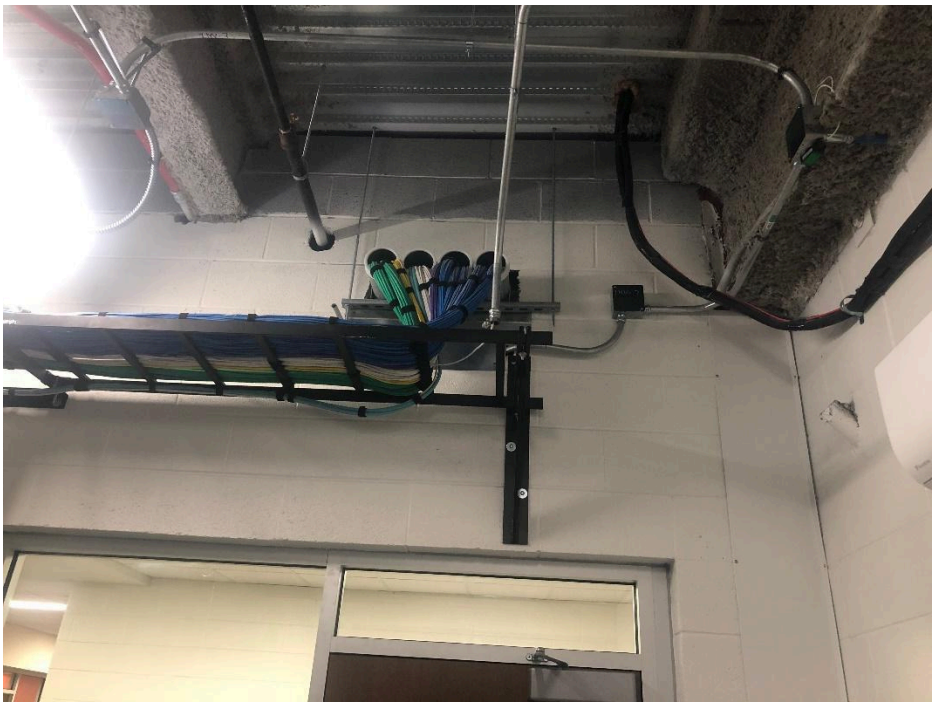


1.3 Faceplate Port Numbering Scheme

A. Faceplates are to be numbered/counted from:
    1. The leftmost port to the rightmost port on the first row of a faceplate.
    2. Continuing with the leftmost port to the rightmost port on the second row

B. Diagram A:

1.4 Fiber Cabinet Labeling Scheme

A. All rack-mounted and wall-mounted optical fiber cabinets are to be labeled. The labels shall indicate:
    1. the closet room number of the other end of the cable goes to,
    2. and the port numbers the connectors are installed in.

B. Example: For a 6-strand fiber cable installed from MDF Room #222 to IDF Room #333, the labeling on each end is as follows:
    1. In the MDF, the label reads: IDF Room 333 Ports 1-6
    2. In the IDF, the label reads: MDF Room 222 Ports 1-6

1.5 Horizontal Cable Labeling Scheme

A. Device Function Abbreviations:

V = Voice	W = Wireless
C = Camera	P = Panels
D = Data	POS = Point of Sales

B. For cameras and wireless outlets in hallways, use P-Touch or other label printer to make a label that can be fastened to the ceiling grid at the location of the device. Attach this label to the media ceiling grid, not the ceiling tile. This label shall be in the addition to the faceplate label located in the ceiling at the point of termination.

C. At the rack end, camera and wireless labeling for devices in hallways or outdoors shall be:
    1. Wireless in hallways gets the designation WH followed by the hallway/corridor number. Ex. 300.W.H
    2. A camera in a hallway receives the designation CH followed by the hallway/corridor number. Ex. 200.C.H

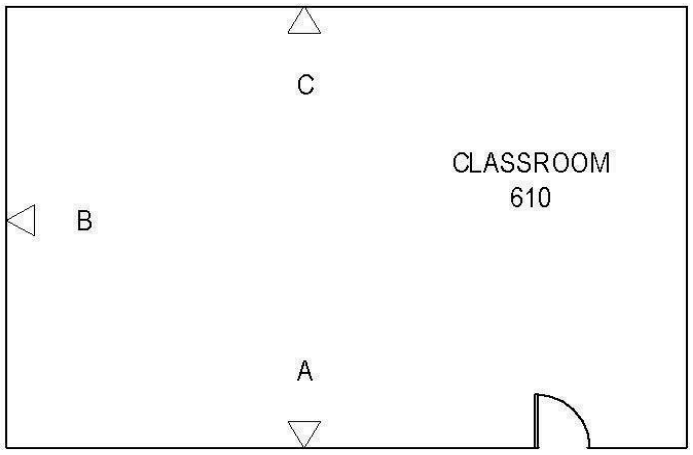
3. Cameras located outdoors will have the letter B (for Breezeway Location) or O (for general outdoor location not in breezeway) and will have the number of the nearest room to identify their location.
    i. Ex. A camera in a breezeway near Lobby Room 100 = 100.C.B
    ii. Ex. A camera outside location near

D. Labeling for cameras and wireless outlets located inside the building are to use the usual labeling scheme for all horizontal cabling.

1.6 Room Outlet Configurations

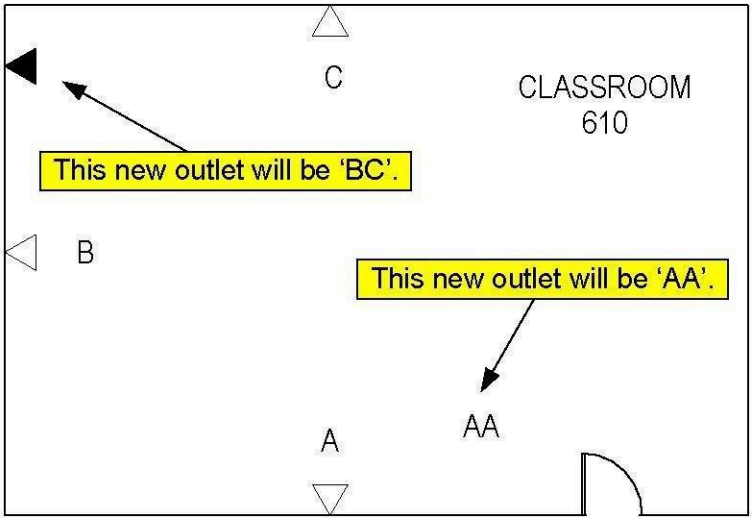
A. The first outlet to the left of the door is designated “A”. The alphabetical naming then continues clockwise from “A” around the room back to the door.

B. Diagram A:



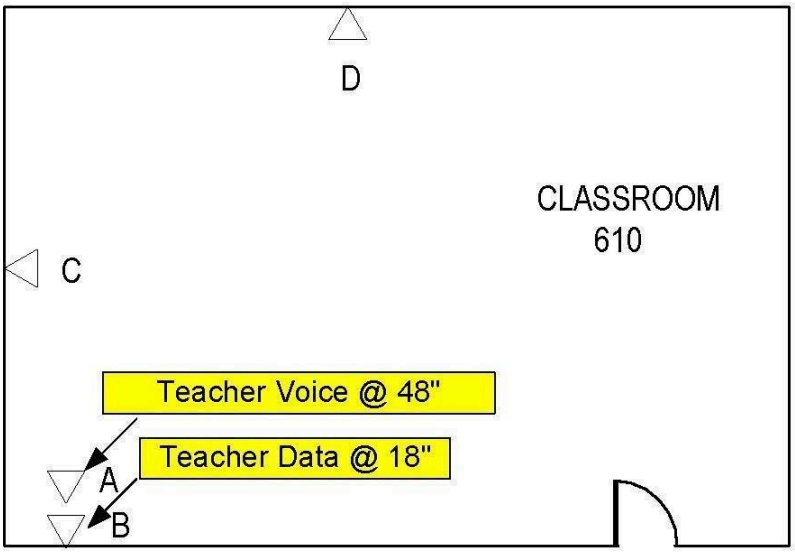
C. When adding cabling to an existing room, the outlet is labeled using two letters. The first letter is that of the nearest outlet to the door from the new add. The second letter is that of the next existing outlet in a clockwise motion from the door.

D. Diagram B:



E. When a "Teacher Outlet" has the voice in a wall-phone plate and the data 18" AFF, the Teacher voice outlet is designated "A", the teacher data outlet is designated "B", and then C, D, etc. follow as clockwise around the room.

F. Diagram C:



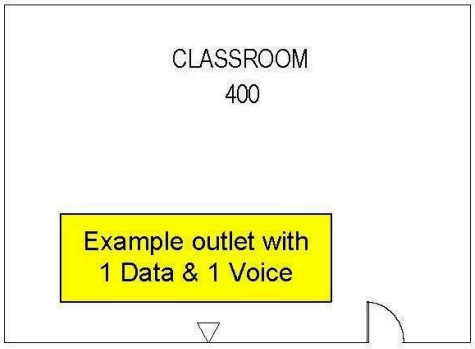
1.7 Horizontal Cable Labeling Scheme

A. In the closet, each patch panel port is labeled to the corresponding room number the cable resides in, the faceplate letter, faceplate port number, and device/function at the other end of the cable.

1. Room #, Faceplate Letter, Faceplate Port (Ex. 400.A.1.D)

B. At the faceplate, each jack is labeled with the telecom closet room number, the rack number is the closet, the patch panel number in the closet, and the port number of the patch panel.
   1. Telecom Room #, Rack #, Patch Panel #, Port # (Ex. 201.1.A.24)

C. Diagram A:



At this end of the cable, the lable reads:

210.Rack #.Patchpanel #,Port #.

At this end of the cable, the label reads:

400.A.1.D
400.A.2.V

1.8 Jack Color Scheme

A. Colored jacks to identify outlet function are to be installed in new projects as well as for MAC (move/add/change) work

B. Colors to be used are as follow:

Jack Color	Purpose	Cable Color
Red	Voice	White
Yellow	Camera	Yellow
Blue	Data	Blue
Green	Wireless	Green
Purple	TV/Panels	Purple
White	POS/Building Control's	Blue

1.9 As-Built Drawings

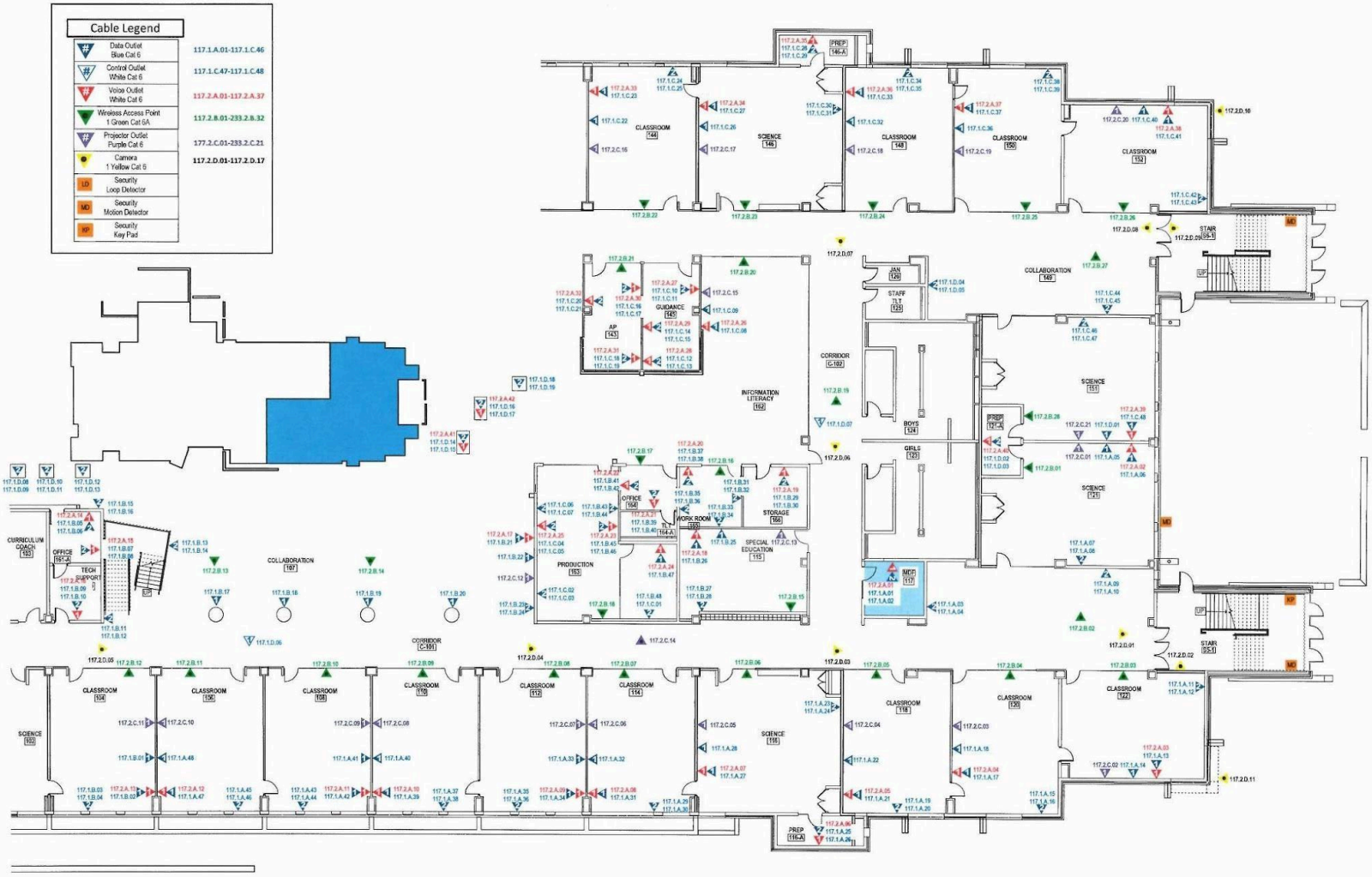
A. Drawings for the entire project performed are to be laminated and located in MDF.
   1. If the MDF was not the source of the cabling work performed (such as MAC work), the drawings for any and all closets are still to be located in the MDF. Both floor plan drawings and rack layout drawings are to be included. The laminated drawings are to be hole-punched and chained to the rack so that they remain in the MDF.

B. Each IDF Closet is to have a laminated copy of its area/wing floor plan and rack layout drawing hole punched and chained to the rack so that they remain in the IDF.

C. Additional copies of the drawings are to be delivered to HCS Technology along with the test results. Payment will not be rendered without as-built documentation and warranty.

D. Blue lettering/text is to be used for jack and port numbers on as-built drawings rather than black which is difficult to distinguish from room numbering.

E. Diagram A:



NETWORK CABLING INFRASTRUCTURE FOR:

HORRY COUNTY SCHOOLS

CAROLINA FOREST MIDDLE SCHOOL

150 REVOLUTIONARY WAY, MYRTLE BEACH, SC 29479

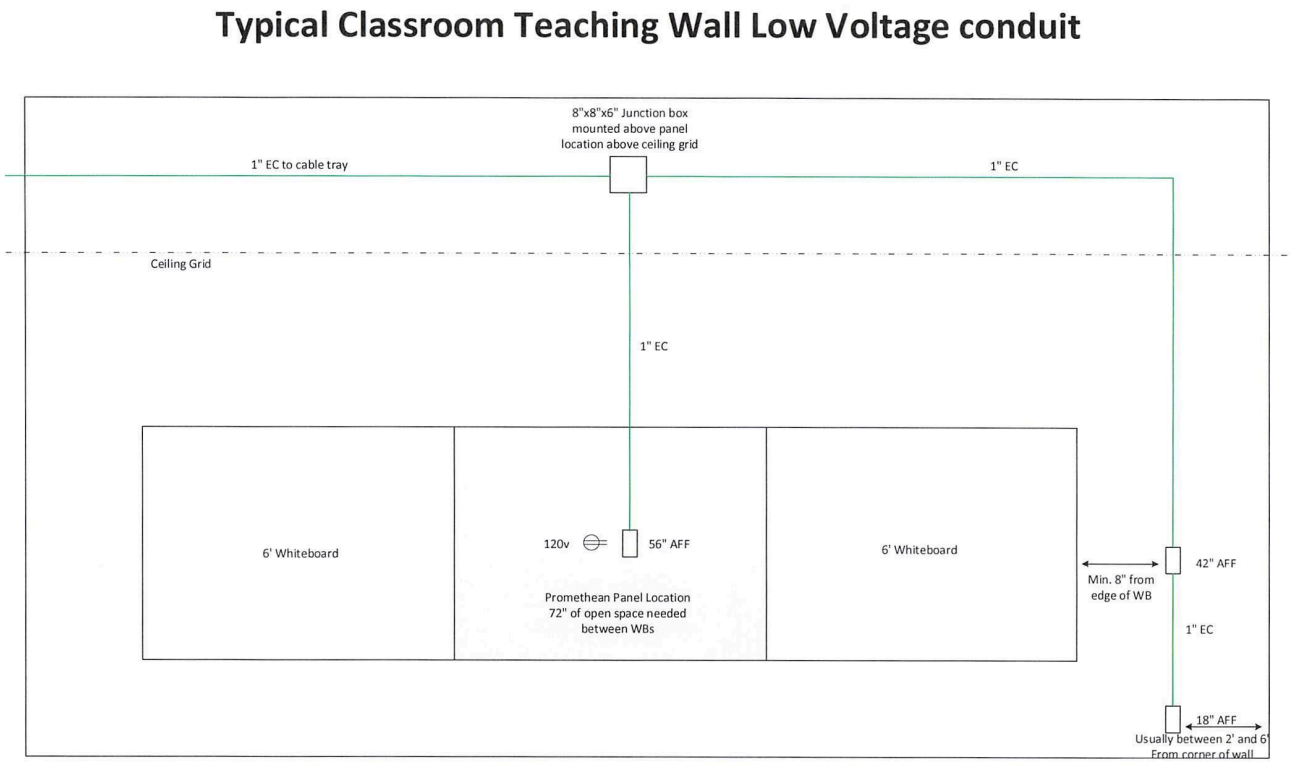
MDF117
1st Floor

Version 3

11/23/2016

PART 2 – TYPICAL CLASSROOM TEACHING WALL LOW VOLTAGE CONDUIT

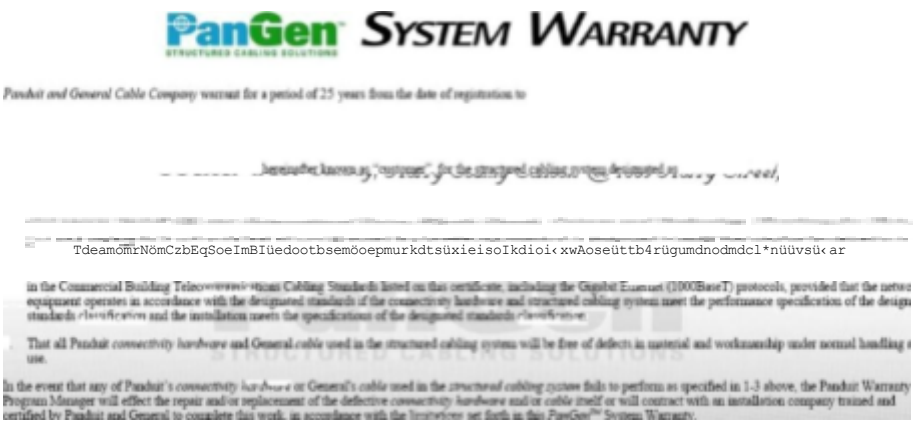
1.1 Diagram:



PART 3 – PANDUIT WARRANTY OR EQUIVALENT

1.1 Panduit Warranty Certification Example

A. Diagram A:



PanGen SYSTEM WARRANTY

Panduit and General Cable Company warrant for a period of 25 years from the date of registration to

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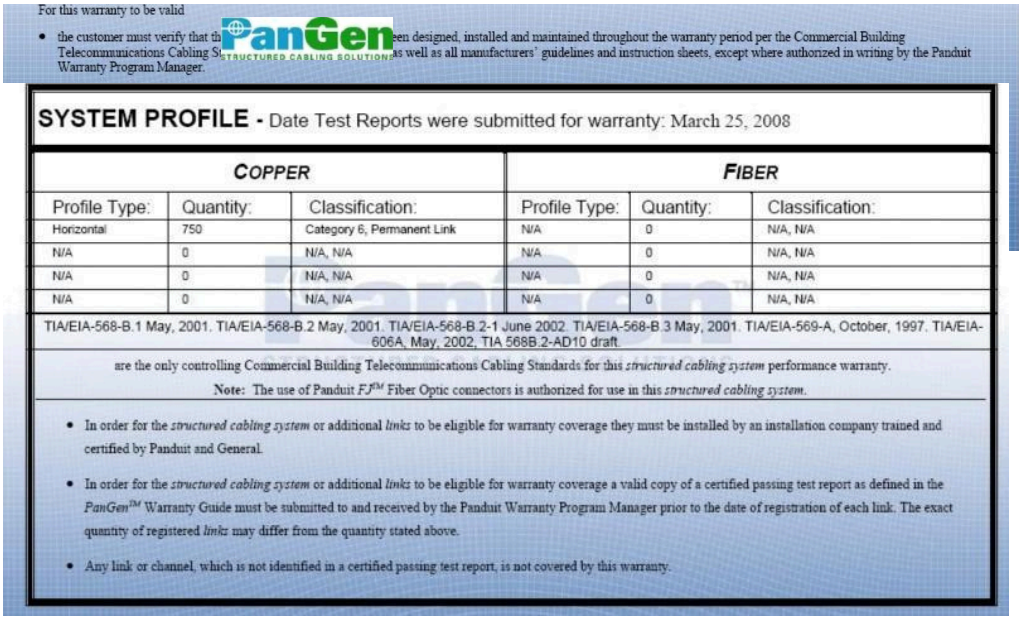
in the Commercial Building Telecommunications Cabling Standards listed on this certificate, including the Gigabit Ethernet (1000BaseT) protocols, provided that the netwo equipment operates in accordance with the designated standards if the connectivity hardware and structured cabling system meet the performance specification of the design standards classification and the installation meets the specifications of the designated standards classification.

That all Panduit *connectivity hardware* and General *cable* used in the structured cabling system will be free of defects in material and workmanship under normal handling use.

In the event that any of Panduit's *connectivity hardware* or General's *cable* used in the *structured cabling system* fails to perform as specified in 1-3 above, the Panduit Warranty Program Manager will effect the repair and/or replacement of the defective *connectivity hardware* and/or *cable* itself or will contract with an installation company trained and certified by Panduit and General to complete this work, in accordance with the limitations set forth in this PanGen™ System Warranty.



For this warranty to be valid

- the customer must verify that th PanGen STRUCTURED CABLING SOLUTIONS en designed, installed and maintained throughout the warranty period per the Commercial Building Telecommunications Cabling St as well as all manufacturers' guidelines and instruction sheets, except where authorized in writing by the Panduit Warranty Program Manager.

SYSTEM PROFILE - Date Test Reports were submitted for warranty: March 25, 2008

COPPER			FIBER		
Profile Type:	Quantity:	Classification:	Profile Type:	Quantity:	Classification:
Horizontal	750	Category 6, Permanent Link	N/A	0	N/A, N/A
N/A	0	N/A, N/A	N/A	0	N/A, N/A
N/A	0	N/A, N/A	N/A	0	N/A, N/A
N/A	0	N/A, N/A	N/A	0	N/A, N/A

TIA/EIA-568-B.1 May, 2001. TIA/EIA-568-B.2 May, 2001. TIA/EIA-568-B.2-1 June 2002. TIA/EIA-568-B.3 May, 2001. TIA/EIA-569-A, October, 1997. TIA/EIA-606A, May, 2002, TIA 568B.2-AD10 draft.

are the only controlling Commercial Building Telecommunications Cabling Standards for this *structured cabling system* performance warranty.

Note: The use of Panduit *FJ™* Fiber Optic connectors is authorized for use in this *structured cabling system*.

- In order for the *structured cabling system* or additional *links* to be eligible for warranty coverage they must be installed by an installation company trained and certified by Panduit and General.
- In order for the *structured cabling system* or additional *links* to be eligible for warranty coverage a valid copy of a certified passing test report as defined in the *PanGen™* Warranty Guide must be submitted to and received by the Panduit Warranty Program Manager prior to the date of registration of each link. The exact quantity of registered *links* may differ from the quantity stated above.
- Any link or channel, which is not identified in a certified passing test report, is not covered by this warranty.