MONTGOMERY COLLEGE ▪ OFFICE OF BUSINESS SERVICES
REQUEST FOR PROPOSAL TITLE: IT INFRASTRUCTURE CABLING PRODUCTS & SERVICES
RFP NUMBER: E523-012
RFP CLOSING DATE AND TIME: April 21, 2023 @ 3:00 PM

MONTGOMERY COLLEGE

ADDENDUM #1

Issued: April 18, 2023

ADDENDUM FOR THE PURPOSE OF:

- To provide answers to vendor questions

All other specifications, terms and conditions remain unchanged.

Patrick Johnson, MBA
Director of Procurement

Please **sign** below to acknowledge receipt of this Addendum and return with the proposal. Failure to return this Acknowledgement of Addendum may deem a proposal nonresponsive.

NOTE: All proposals MUST BE RECEIVED **electronically** by 3:00pm Eastern Daylight Time on **April 21, 2023**.

Electronic proposal and addendum or addenda shall be sent to the following email address prior to the submittal deadline date and time at vendor.proposals@montgomerycollege.edu. **No responses will be accepted after this date and time.**

_____	_____
Company Name	Authorized Signature
_____	_____
Date	Printed/Typed Signature

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ADDENDUM #1

Question	Montgomery College Answer
The link for the MC cabling standards is broken, can you look into this and update me please?	See attached hardcopy Montgomery College cabling standards.
Is it possible to get part numbers for items listed on price proposal?	Part numbers are listed in the College's cabling standards document.
If Molex certification is underway at time of bid, would that be acceptable, or would the certification need to be in place before submitting bid?	Molex certifications are included in the proposal evaluation process, and must be submitted with proposal.

**********END OF QUESTIONS AND ANSWERS**********

Standard: IT Cabling
Effective Date: 4/2023
Version No.: 25.00

Montgomery College

Office of Information Technology

Voice/Data/Video Cabling
MDF / IDF Communications Room
Standard

TABLE OF CONTENTS

1. DOCUMENT OVERVIEW ***4***

2. STANDARDS ORGANIZATION ***4***

3. DOCUMENTATION DELIVERABLES ***5***

3.1 AS-BUILT DRAWINGS (TWO COPIES REQUIRED) 5
3.2 CABLING SUMMARY REPORTS (TWO COPIES REQUIRED) 5
3.3 LABELING SAMPLE 5
3.4 TEST RESULTS 6

4. MEETING DELIVERABLES ***6***

4.1 ARCHITECT AND ENGINEER DESIGN MEETING 6
4.2 PRECONSTRUCTION CONFERENCE 6

5. CABLING INSTALLATION COMPLIANCE AND APPROVALS ***6***

5.1 INSTALLATION COMPLIANCE 6
5.2 INSTALLATION APPROVAL 6
5.3 MANUFACTURER WARRANTY 6

6. HORIZONTAL CABLING ***6***

6.1 HORIZONTAL DATA CABLE 7
6.2 HORIZONTAL VOICE CABLE 7
6.3 HORIZONTAL VIDEO CABLE (COAX) 8
6.4 SMART INSTRUCTOR WORK STATIONS 8

7. VERTICAL CABLING ***8***

7.1 VERTICAL DATA CABLE 9
7.2 VERTICAL ANALOG VOICE CABLE 9
7.3 VERTICAL COAX RISER CABLE 9

8. CAMPUS BACKBONE CABLING ***9***

8.1 CAMPUS BACKBONE CABLE 10
8.2 OUTSIDE EMERGENCY PHONES 10

9. MAIN DISTRIBUTION FRAME & INTERMEDIATE DISTRIBUTION FRAME ***11***

9.1 INTERMEDIATE DISTRIBUTION FRAME IDF 12

10. MDF AND IDF POWER FOR STAND ALONE AND UPS RACK EQUIPMENT SYSTEM AND HVAC REQUIREMENTS ***12***

10.1 UNINTERRUPTIBLE POWER SUPPLY (UPS) EQUIPMENT RACKS ***13***

10.2 20KW (FOR LOWER POWER REQUIREMENTS) ***13***

10.3 30KW/40KW (FOR HIGHER POWER REQUIREMENTS) ***14***

11. MDF AND IDF HVAC REQUIREMENTS: ***14***

12. TELECOM EQUIPMENT RACKS ***14***

12.1 LADDER RACK, CABLE TRAYS, 'J' HOOK, AND BEAM CLAMPS ***15***

13. CONDUITS AND CORE DRILLS ***17***

13.1 UNDERGROUND CONDUIT 17
13.2 BUILDING ENTRANCES 17

13.3 INTRA-BUILDING CONDUIT ***18***

14. CABLES (FIBER/COPPER/COAX) ***18***

14.1 FIBER OPTIC CABLING 18
14.2 COPPER CABLING 19
14.3 COAX CABLING 19

15. CABLE TV: ***19***

16. INSTALLATION OF CABLES FOR CLASSROOM ***19***

17. LABELING ***22***

18. CABLE TESTING ***25***

APPENDIX A: TELECOMMUNICATION TRADE CONTRACTOR QUALIFICATION STATEMENT ***27***

APPENDIX B: SAMPLE OF A CUT SHEET ***29***

APPENDIX C: MATERIAL LIST ***30***

1. Document Overview

The purpose of this document is to identify Montgomery College ("College") Office of Information Technology (OIT) Voice, Data, and Video Cabling Standards. The content within this document describes the minimum standards that must be met by vendors contracted by the College to complete new construction, renovation, and upgrade cabling projects.

The standards outlined in this document augment industry standards and do not replace them. All installations must follow BISCI and other industry standards as defined in Section 1.2. Standards Organizations in addition to the outlined methodologies and specific standards, and practices outlined within this document.

This standard is reviewed periodically and updated accordingly to meet the most current College requirements, industry standards and technological advancements.

This document categorizes cabling standards as follows:

- Project deliverables and requirements
- Horizontal cabling (telecommunications closet to desktop),
- Vertical cabling (communication closet to communication closet),
- Campus cabling (building to building) and
- Communications parts and equipment. Each cabling group is sub-divided by application: Data, Voice, and Video.

Additional information is provided as follows:

- Telecommunication Trade Contractor Qualification Statement (Appendix "A")
- Cable Cut Sheet (Appendix "B")
- Material List (Appendix "C")
- IT Telecom Manhole Diagram (Appendix "E")

2. Standards Organization

The College follows many building industry and Information Technology standards. All designs and implementations of Data, Video and Voice systems must abide by the following standards.

BICSI	Building Industry Consulting Service International
BellCore	Bell Communications Research
NEC	National Electric code
TIA	Telecommunications Industry Association
EIA	Electronics Industries Alliance
TIA/EIA-568-B.2-1	Commercial Building Telecommunications Cabling Standard
TIA J STD 607	Commercial Building Grounding and Bonding Requirements for Telecommunications
NFPA	National Fire Protection Association

3. Documentation Deliverables

3.1 As-Built Drawings (two copies required)

As-Built drawings should be provided to the College's IT project manager upon completion of all cable plant installations.

Drawings shall reflect all elements of the telecommunications infrastructure or cable plant.

Conceptual drawings are used to convey the proposed design intent. They do not include the elements and identifiers and do not necessarily have to become part of the administration documentation.

Installation drawings are more detailed than the conceptual drawings and are used to document the telecommunications infrastructure to be installed. They should include the infrastructure elements and may also describe the installation methods. It is not necessary to provide identifiers on these drawings.

Red Line or As-Built drawings document the installed telecommunications infrastructure. The As-Built drawings must be delivered to the IT Project Manager before the conclusion of the project. The drawings must be delivered in both CAD and PDF formats.

Red Line or As-Built drawings are site-specific and will have identifiers assigned to key elements. There may be separate drawings for other portions of the infrastructure such as pathways and spaces depending on how complex the installation is.

Drawings shall include:

- All IDF and MDF rooms
- Plan and elevation views of all IDF and MDF rooms
- Show major pathways of cable runs
- Equipment closets
- Locations of the conduit pull boxes
- Wall penetrations
- The location of all cable terminations
- The location of all backbone cables
- The jack number shall appear on the drawing
- The location of all telecommunications outlets on the floor plans

3.2 Cabling Summary Reports (two copies required)

A cable summary report (spreadsheet format) also called a Cut Sheet is required and at a minimum should show: See appendix B for examples.

- Cable type or function
- Cable starting location i.e. room number and jack number
- Cable number
- Terminating location positions i.e. IDF/closet number, rack number, patch panel position
- Associated termination positions or cross-connected to the termination.

3.3 Labeling Sample

- A sample faceplate using the College IT labeling standards as documented and in Section 17 page 21 of this document is required for review by the IT Project Manager and the assigned cabling team member before the start of the labeling effort.

3.4 Test Results

- Two copies of all cabling test results in both CD (electronic) and hard copy format are required on completion of cabling the installation.

4. Meeting Deliverables

4.1 Architect and Engineer Design Meeting

The Architect and Engineer (A&E) team shall contact the IT Project Manager through the College Central Facilities Office to engage appropriate College OIT resources to meet during the planning and design phases of the project. The purpose of the meetings is to resolve design and integration issues before reaching the construction phase.

4.2 Preconstruction Conference

The Contractor MUST contact the IT Project Manager to schedule a mandatory pre-construction conference before any cable installation work commencing. The conference shall include contractors, College Facilities and OIT personnel and review scope of work, milestones, timelines, and other items as appropriate.

5. Cabling Installation Compliance and Approvals

5.1 Installation Compliance

- New installations of voice, data and video cabling must comply with this standard.
- Refurbishment and upgrades of existing cabling must comply with this standard.
- All cable installations and upgrades must be properly documented as per this standard.

5.2 Installation Approval

The IT Project Manager will collect all appropriate operational group approvals before any cable installation work commencing.

5.3 Manufacturer Warranty

- The College requires the cable vendor to provide to the College a manufacturer's warranty certificate in the college name for a twenty-five (25) year warranty on all Molex copper cable plant infrastructures installed as a part of this project.
- The College requires the cable vendor to provide to the College a manufacturer's warranty certificate in the college name for a twenty-five (25) year warranty on all Sumitomo Future FLEX Air Blown Fiber (ABF) cable plant infrastructure installed as a part of this project.

6. Horizontal Cabling

Horizontal cables are the cables that extend from the work area outlet, horizontally through the wall/ceiling/floor and then to the appropriate patch panel, termination block, or video amplifier in the Intermediate Distribution Field (IDF) room or the Main Distribution Field (MDF). These rooms may also be referred to as Telecommunication rooms or Equipment rooms. Horizontal cabling also includes the patch cords at the work area outlet and patch cords in the MDF/IDF.

6.1 Horizontal Data Cable

Data cable selection is dependent upon the network technologies utilized. The College standard for *horizontal data cable is plenum rated blue jacketed category 6 cable which supports the following* Ethernet standards: 10Base-T, 100Base-T and 1000Base-T, and meets or exceeds the warranty requirements of Molex Premise networks.

The quality of the data transmission depends upon the performance of the components of the channel. All cable components (including jacks, patch cables, patch panels, and cross-connects) must meet Cat6 specs.

Data cabling shall be routed through the horizontal installation pathway via wire trays, ladder racks, 'J' hooks, conduits (standard conduit size ¾" EMT to a single gang communication drop) or ceiling straps.

The following must be observed when installing category CAT6 cable:

- All horizontal copper data cable runs shall be continuous runs, with no splices, with no length exceeding 295 feet or 90 meters.
- All cable runs must maintain 10-foot service loops at both ends of the cable. The service loops at the work area end of the cable is placed in the ceiling.
- Service loops in the MDF or IDF must be neatly coiled and tied to the vertical wire manager.
- All cables must be labeled according to the labeling section of this document.
- WIFI Access Points require 2 Cat6 blue cables terminated in a white two-port surface mount box with 2 blue data jacks and 1 white Cat6 patch cord at the access point location.
- All WIFI Access Points will require a single gang box in the ceiling tile for installation that is provided by the General Contractor.
- CCTV (cameras) requires one Cat6 pink cable from the telecom closet to the camera located in a white two-port biscuit box with 1 blue date jack and one white blank with a pink Cat6 patch cord at both ends.
- Mass(emergency) Notification System (message boards) require one Cat6 pink cable from the telecom closet to the message board location in a white synergy two-port faceplate with 1 blue date jack and one white blank with a pink Cat6 patch cord at both ends.
- Building Automation System (BAS) requires one Cat6 green cable from the telecom closet to the BAS I/O panel which may be in another location in the building.
- Staff and faculty receive 2 Cat6 blue data drops in office.
- Academic computers receive 1 Cat6 blue data drop per PC.
- Flat panels in public areas receive 1 Cat6 blue data drop.
- SIWS receive 2 Cat6 blue data drops.
- Wall phone receives 1 Cat6 white data cable.

6.2 Horizontal Voice Cable

The College standard for horizontal voice cable is plenum rated white-jacketed category 6 cable.

All cable components must meet CAT6 specs including jacks, patch cables, rack mount 110 blocks, rack mount 48 port patch panels, and cross-connects. Voice cabling shall be routed through the horizontal installation pathway via wire trays, ladder racks, 'J' hooks, conduit, or ceiling straps.

The following must be observed when installing category 6 cable for voice systems:

- All horizontal copper voice cable runs shall be continuous runs, with no splices, with no length exceeding 295 feet or 90 meters.

- All cable runs must maintain 10-foot service loops at both ends of the cable. The service loops at the work area end of the cable are placed in the ceiling. Service loops in the MDF or IDF must be neatly coiled and tied to the vertical wire manager.
- All cables must be labeled according to the labeling section of this document.
- Horizontal voice cabling shall be terminated onto 110 rack-mounted style blocks meeting the Category 6 standard.
- VOIP wall-mounted telephone instruments– should be terminated on to a 48 port Cat6 patch panel in the telecom closet.

Figure 1 Service Loop

6.3 Horizontal video Cable (coax)

- All horizontal coax cable runs shall be continuous runs, with no splices, with no length exceeding 295 feet or 90 meters.
- All cable runs must maintain 10-foot service loops at both ends of the cable. The service loops at the work area end of the cable are placed in the ceiling. Service loops in the MDF or IDF must be neatly coiled and tied to the plywood walls.
- All cables must be labeled according to the labeling section of this document.
- Horizontal coax cabling shall be terminated onto Blonder-Tongue 8 port tap. Terminations tap to be mounted on the plywood wall.

6.4 Smart Instructor Work Stations

New construction or major renovations should plan for installation of (2) 1 and ½ inch conduits between the Smart Instruction Work Station location and the ceiling-mounted video projector location. A 3rd one-inch conduit for data must stub out into the ceiling, but does not need to reach to the projector location. The conduits should stub out a minimum of 6 inches into the plenum ceiling space towards the projector location and proceed down through the partition wall and floor deck to a point immediately below the teaching station where it will come up through the floor deck to end flush with the finished floor. This conduit conveying cabling between the SIWS and the video projector eliminates the need to use a heavy stiff plenum rated cable. The third 1-inch conduit for data should stub into the classroom ceiling space. See figure 1 below for AV wall mounted gang boxes.

For the poke-through floor applications – follow a similar path as above, except cables, need to turn back up through the floor deck entering into the partition wall above. Once in the partition wall, the path remains the same above.

A wall mount phone is required to be installed.

SIWS and video projectors should be placed on the same dedicated electrical circuit to prevent problems with ground loops and phase synchronization.

A cabling path from the wall video control panel to the projector must be provided to provide feeds to the projector from alternate video and sound sources.

7. Vertical Cabling

Vertical cable systems provide interconnections between IDF rooms and MDF rooms within a building It includes backbone cables, cross-connects, mechanical terminations, and patch cords or jumpers used for backbone-to-backbone cross-connections. Vertical cabling is commonly referred to as “riser cable.”

Vertical cabling will be laid out in the star topology so that each IDF room is connected to the MDF room.

7.1 Vertical Data Cable

The College standard for vertical data communication cable is multi-mode fiber optic cable (50-micron 10GB) terminated with "SC" connectors.

- Data cabling will be routed through the vertical installation pathway via wire trays, ladder racks and/or conduit.
- Vertical fiber optic tube cabling will terminate in a Sumitomo Terminal Distribution Unit (TDU). Clear tubing will run between the TDU and a Sumitomo Fiber Panel (LIU).
- Vertical fiber will terminate in a 6 or 12 ports Sumitomo adapter plate.
- All vertical cabling must be labeled as defined in the labeling section of this document.

7.2 Vertical Analog Voice Cable

Vertical Analog Voice riser cabling is the cable that extends from MDFs to IDFs. The College standard for vertical cabling of MDF's to IDF's for voice communications is bundled Category 5e unshielded twisted pair cabling in 25 pair bundles.

- The analog tie cable between floors should be Cat5e 25 pair bundles.
- All vertical analog voice cabling must be terminated in CAT5 cat5e rack mount 110 blocks.
- All cable runs must maintain 10-foot service loops at both ends of the cable. Service loops must be neatly coiled and tied to the vertical wire manager.
- All analog voice cable runs shall be continuous runs, with no splices, with no length exceeding 295 feet or 90 meters.
- To relieve stress on the cable and to support the weight, all riser cables shall be tied to supports at each floor according to industry standards (See Section 2.4.4).

7.3 Vertical Coax Riser Cable

Vertical Coax Riser cabling is the cable that extends from MDFs to IDFs. The College standard for vertical cabling of MDF's to IDF's for coax communications is RG11.

- Vertical Coax riser will be terminated on the plywood wall in close proximity to the vertical conduit chase.
- All cable runs must maintain 10-foot service loops at both ends of the cable. Service loops must be neatly coiled and tied to the plywood wall.
- All coax cable runs shall be continuous runs, with no splices, with no length exceeding 295 feet or 90 meters.
- To relieve stress on the cable and to support the weight, all riser cables shall be tied to supports at each floor according to industry standards (See Section 2.4.4).

8. Campus Backbone Cabling

The function of campus cabling is to provide connections between building MDF rooms to the campus Point of Presence (POP). Campus cabling may also be referred to as "backbone cabling." Backbone cabling consists of Single Mode (SM) Fiber optic cable for data connections, and cat5e OSP rated cable – minimum of 100 pr and SM Fiber optic for telephone trunk connections.

Lightning protection boxes and grounding must be provided for 230-volt analog voice applications (See Appendix “C”, Item 6 for lightning box specifications).

8.1 Campus Backbone Cable

Campus/Backbone Cable supports data and voice connectivity between building MDF rooms and the campus Point of Presence (POP).

- The College standard backbone data cable is single-mode fiber optic cable terminated with “SC” type connector.
- All fiber optic cables shall be labeled within 4 inches of both ends with a self-laminating adhesive wire marker.
- The marker shall contain the entire cable identification information. Source Building, Closet, Rack, Fiber Shelf Destination Building, Closet, Rack, Fiber Shelf
- The College standard for fiber installations is to utilize Sumitomo Future Flex Air Blown Fiber Systems.
- The College standard telephone trunk cable is CAT5e OSP-rated in multiple pair bundles.
- Lightning protection boxes and grounding must be provided for telephone trunk cabling. (See Appendix “C”, Item 6 for lightning box specifications).

8.2 outside Emergency Phones

Emergency Phones will have an OSP rated Cat 6 Cable run from a Molex jack terminated inside the Emergency Phone Pedestal through an outside conduit provided by the electricians to a 230-volt Lightning Protection Box inside the building. (See Appendix “C” for Material List)

9. Main Distribution Frame & Intermediate Distribution Frame

The main communications room in a building is known as the Main Distribution Frame or MDF. The MDFs are located where conduits from the campus Point of Presence (POP) are terminated. MDF facilities provide the initial connectivity point between the building and the campus Point of Presents. MDFs house infrastructure equipment and electronics required to terminate and distribute Data, Video and Voice services.

MDFs distribute services to the local communications closets also known as Intermediate Distribution Frames (IDFs).

All MDFs require extensive analysis of design and size. The below items are provided as information to aid in design. The College has MDFs varying in sizes from 300 square feet to 800 square feet.

- All MDFs must be sized according to the specific requirements of the building, buildings or campus it serves.
- The minimal size for the MDF is 300 square feet (15-foot minimum width x 15-foot minimum length) depending upon building requirements.
- All industry-standard clearance requirements must be observed.
- Electrical sub-panels require 36 inches of access clearance.
- Wall-mounted equipment requires 36 inches of access clearance.
- Two poster racks are utilized for Infrastructure equipment (See Equipment Racks section).
- Use Velcro to support all IT cabling in MDF's.
- Possible rack requirements include the following functions:
    - Fiber LIU
    - Telephone trunk termination
    - Vertical riser starts point (fiber/copper)
    - Horizontal copper distribution
    - Cable television Termination Access Point (TAP)
    - UPS
- Possible systems requirements include the following:
    - Building network core infrastructure
    - Telephone PBX switch/DCS location, may also require workstation/control station space
    - Facilities Applications endpoint (Access Control, HVAC, Video Surveillance, etc.)
- Four poster racks, also known as cabinets, are utilized for servers. (See Section 2.4.3)
- A minimum of 24-inch-deep for equipment in two poster racks.
- A minimum of 48 inches of clearance in front of equipment rows.
- A minimum of 36 inches of clearance in the back of the racks.
- A 2-poster equipment rack would cover 27 Square Feet**.**
- Lighting shall be fluorescent hung parallel to the layout of equipment racks and offset to illuminate the front and rear of equipment racks. Care to be given to coordinate lighting locations with a cable tray and ladder rack.
- Routing of any water lines through or above MDF's and IDF's is highly discouraged.

9.1 Intermediate Distribution Frame IDF

The communications rooms in a building that serve a specific floor or section of a building are known as Intermediate Distribution Frames or IDF's. Each work area outlet shall be connected via the horizontal cable to the horizontal cross-connect (patch panel) in the IDF room. At a minimum, depending on the building size and architecture constraints, each floor should have its own IDF room.

- IDFs must be **'stacked'** in a multi-floor building.
- All IDFs must be sized according to specific requirements of the specific space or floor it serves.
- The Riser core requires a core drill between the IDF and between MDF and IDF (see core drills section).
- The minimal size for an IDF is 150 square feet (10-foot minimum width x 15-foot minimum length) depending upon building requirements.
- IDF's accommodate local IT service infrastructure (data, voice, and video).
- Distributes services out to user endpoints.
- Lighting shall be fluorescent hung parallel to the layout of equipment racks and offset to illuminate the front and rear of equipment racks. Care to be given to coordinate lighting locations with the cable tray and ladder rack.
- All wall and floor penetrations shall be sleeved or piped.
- Install fire-stopping material around all cables passing through all wall and floor penetrations.
- Assume a minimum of 24-inch-deep for equipment in two poster racks.
- A minimum of 48 inches of clearance in front of equipment rows.
- A minimum of 36 inches of clearance in the back of racks.
- A 2-poster equipment rack would cover 27 Square Feet.
- Routing of any water lines through or above MDF's and IDF's is highly discouraged.
- Use Velcro to support all IT cabling in IDF's.

10. MDF and IDF Power for Stand Alone and UPS Rack Equipment System and HVAC requirements

Specific design for every MDF/IDF based upon building requirements is required. The following environmental and power concerns are minimum requirements to be incorporated into MDF/IDF designs. There will need to be a discussion with the architects during the design drawings on what type of UP system will be required for the building. There are two types of UPS systems that can be used. Please read the following power requirements below. Depending on the power needs of the building, the UPS system can be one of two UPS configurations:

- Power requirements: Stand-alone UPS
    - If possible a connection to a building-wide or dedicated emergency backup generator is preferred.
    - MDF/IDF power requirements shall be individually based on equipment & facility requirements.
    - The College has standardized on utilizing the APC Matrix series UPS systems which require a dedicated 30 amps 220-volt circuit per UPS device terminated in an L6-30R receptacle. The L6-30R receptacle should be fed from the ceiling down to a location attached to the ladder rack.
    - The L6-30R receptacle should be placed on the back of the telecom rack and wouldn't block the vertical wire manager from swinging open. The rack that is considered to be the back should be communicated by Facilities, architects, General Contractors, electric sub and College IT during site walkthroughs before to the MDF/IDF L6-30R receptacle location.

- The minimum for the MDF is three L6-30R circuits. Refer to figure 3 next page for L6-30R.
- The minimum for the IDFs is two L6-30R circuits. This design is for a standalone UPS system in the IDF.
- A minimum of four 110volts 'household' receptacles for the user equipment is required.
- The PDUs locations in the telecom rack will be determined by each project. This will be a conversation with General Contractor, Electrical Contractor, and the Cabling Contractor.
- Facilities network infrastructure should be provided a dedicated 110V outlet connected to the

Figure 2 L6-30R location Allowing Vertical Wire Manager Door open freely

life safety systems, near to the data racks identified by a red outlet. See Figure 2.

10.1 UNINTERRUPTIBLE POWER SUPPLY (UPS) EQUIPMENT RACKS

In any building that has more than 7 powered racks in IT network closets, a central UPS system should be installed to support the building's network infrastructure. This central system will consist of a single, modular, scalable UPS module, located either in a dedicated room or in the main building MDF, with UPS feeder circuits extended to the individual floor IDFs.

10.2 20kW (for lower power requirements)

- UPS device: ISX20K20F InfraStruXure 20kW N+1, 208V, with appropriate 10kW power modules to support N+1 redundancy.
- UPS batteries: Sufficient appropriate battery modules for the InfraStruXure UPS to support a load of 20kW for 30 minutes.
- Circuit panels: One circuit panel for each closet, with independent connections to the UPS.
- Outlets and PDUs: Sufficient outlets and PDUs to provide dual- power feeds to each powered rack.
- The PDUs locations in the telecom rack will be determined by each project. This will be a conversation with General Contractor, Electrical Contractor, and the Cabling Contractor.
- This configuration will utilize two racks.

10.3 30kW/40kW (for higher power requirements)

- UPS device: SY30K40F Symmetry 30kW Scalable to 40kW N+1, 208V, with appropriate 10kW power modules to support N+1 redundancy.
- UPS batteries: Sufficient appropriate battery modules for the lnfraStruXure UPS to support a load of 30kW or 40kW (as appropriate) for 30 minutes.
- Circuit panels: One circuit panel for each closet, with independent connections to the UPS.
- Outlets and PDUs: Sufficient outlets and PDUs to provide dual- power feeds to each powered rack.
- The PDUs locations in the telecom rack will be determined by each project. This will be a conversation with General Contractor, Electrical Contractor, and the Cabling Contractor.
- This configuration will utilize three racks.

Utility input to the UPS will be dependent on the selected unit and available power sources. The power source will be determined during planning to appropriately support the UPS. Each new or renovated building will differ in the amount of kW required, depending on the amount of infrastructure implemented. The AER and IT personnel will need more in-depth discussion during the programming of the project. The space allocated for the uninterruptible power supply system should be 100 (for 20kW unit) or 120 (for 30kW+ unit) square feet. The UPS system should be in a separate room and not in the MDF.

11. MDF and IDF HVAC Requirements:

- Split System HVAC units to accommodate heating and cooling 7x24x365 even when general building or central plant HVAC is not available.
- The MDF/IDF HVAC system must be capable of making three (3) complete changes of air per hour in the MDF/IDF is required.
- A temperature range of 62 to 72 degrees should be maintained.
- For the protection of equipment, the relative humidity should be maintained at 35% + or - 10%.
- Provide the ability to remotely monitor temperature and humidity.

12. Telecom Equipment Racks

Equipment racks are to be EIA/TIA standard 96-inch-tall and 19-inch-wide as specified with 8-inch cable management systems between racks and at the end of all rows.

- Racks in MDF and IDFs shall be EIA/TIA 19-inch-wide 8 feet tall, with 8-or 10-inch vertical cable management systems between each rack. Add 8-or 10-inch vertical cable management system to both ends of each row. The vertical cable manager size is dependent on telecom size, the number of estimated racks required and data drop count per floor.

- In designing the MDF or IDF maintain Rack clearances as follows:
  - Chatsworth
    - Blue 1U markings
  - A minimum of 48 inches in front of each rack row.
  - A minimum of 36 inches between the backs of rows.
  - At a minimum, allow for 24-inch depth for equipment in the racks, in addition to the clearance requirements.

All equipment racks must be bonded to master ground buss bar. All telecom rack grounding should be done at the top of the rack and the ground cable not to interfere or obstruct IT equipment.

- Two 2U wire managers (**provided by cabling contractor/general contractor**) are required per single patch panel.
- Two 2U wire managers (**provided by cabling contractor/general contractor**) are required per piece of infrastructure. This depends on the size of the building and the number of cable drops. To be discussed by facilities project managers and architects.
- Bolt all equipment and cable racks to the floor.
- Bolt all equipment and cable racks to the ladder racks.
- Provide one 20-amp power distribution strip in every rack. These power strips will be connected to UPS systems. (See Appendix "C")

12.1 Ladder Rack, Cable Trays, 'J' Hook, and Beam Clamps

Horizontal pathways are the routes taken for the installation of cable from the telecommunications room to the work area. The pathways can be composed of cable trays, ladder racks, conduit, under floor duct, and ceiling spaces.

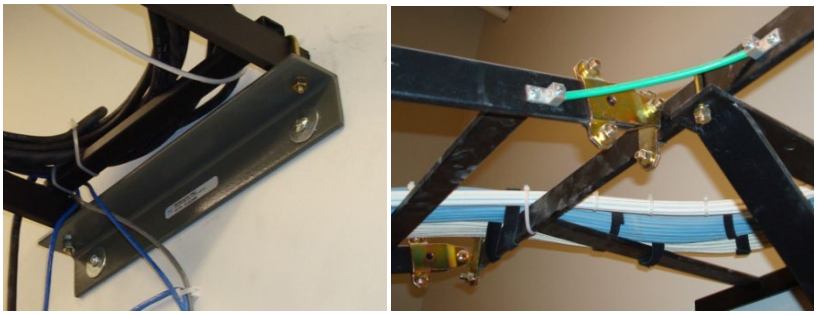
Cable trays are utilized for all horizontal cabling within the building and are extended into the MDFs and IDFs. Ladder racks are used to support the two poster racks and to carry cables to/from the racks within the MDFs and IDFs. J hooks are utilized where conditions do not allow for cable trays or Ladder Racks.

Ladder racks

The layout of the Ladder rack system shall match the configuration of the equipment rows, with consideration for cross-aisle cabling.

- Provide 12-inch minimum single-tier overhead ladder racks for each row of racks. Ladder racks shall be bonded to master ground buss.
- All ladder racks must be extended to and bolted along the entire wall. (minimum of two walls required for stability in the telecom closet) (see illustration below).
- Weight capacity of the ladder rack system to support 40 lbs per linear feet.
- Bolt ladder racks to all equipment racks.
- Ladder racks must be installed for support of all vertical cabling (for example core drills between IDFs).
- Maintain a minimum of 4-inch separation between voice/data cabling and any type of power cable (AC, DC or Grounding systems).
- The College standard for ladder racks is a 12-inch single-tier attached to the top of the equipment racks. Ladder racks must be sized to support requirements.
- See figure 3 illustrates ladder rack wall mounting and grounding.

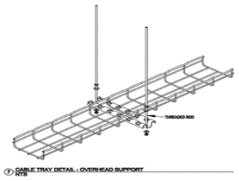
Figure 3 illustrate ladder rack wall mounting and grounding.



Cable Trays:

- The College standard for cable trays is a single-tier overhead Basket Style cable trays. Cable trays must be sized to support requirements. Basket Trays must be a minimum of 18 inches wide.
- Closed bottom tray systems are not permitted.
- Weight capacity of the cable tray system must support 60 lbs per linear foot.

- In MDFs and IDFs, install the cable tray at least 1 foot above the ladder rack system ending 6 inches to 12 inches inside the room.
- In MDFs and IDFs a waterfall system will be utilized to transition cable from the cable tray to the ladder rack.
- Support cable tray system from the above deck, horizontally brace from both sides of the cable
- All cable trays shall have 12 inches of clearance above the tray and 24 inches 'of clearance to at least one side of the tray for access.
- Utilize 90-degree sweeps when change in direction is required.
- Cable trays shall be bonded to master ground buss.
- A cable tray system must be continuous with no breaks or sharp cuts.
- In the MDF & IDFs maintain the elevation of the cable tray the same as in the hallway
- All rack and overhead framing shall be grounded and bonded.
- Maintain a minimum of 4 inches' separation between voice/data cabling and any type of power cable (AC, DC or Grounding systems).
- The max allowable load per threaded rod supporting the cable racks is 800 lbs.
- Cable trays may be supported by:
    - Cantilever or trapeze brackets
    - All basket style cables trays must have 2 individual suspension supports (on both sides of the tray – No center supports!). see drawing below



    - Supports shall meet load and span requirements of applicable electrical code.
    - Supports shall be placed on 5-foot centers.

J hooks and Ceiling Straps

J-hooks and ceiling straps are to be used to support telecommunications cabling within ceiling spaces. They should be spaced (to a maximum) of approximately 5 feet apart. Cable pathways should follow a prescribed route going over the top of heating ducts and the use of other conduits if possible.

13. Conduits and Core Drills

Conduits provide pathways between buildings for infrastructure cabling and service entrances to College facilities. Conduits are also utilized in some buildings to provide connectivity paths between MDFs and IDF's for cabling.

13.1 Underground Conduit

Provide pathways for inter-building cabling as follows:

- External new conduit to be installed water-tight and free of obstructions.
- Conduit end locations and pathways shall be mapped end to end.
- The minimum number of conduits between buildings shall be (2) 5 inches' conduits.
- Main duct bank conduit systems shall be either 6 or 8 way (or higher) depending on the locations and number of buildings to be served.
- Conduits protruding through the floor in the MDF or IDF room shall be stubbed 4 inches above the floor surface.
- Conduits shall be terminated with insulated bushings or "No Nik" guards.
- All floor penetrations shall be sleeved or piped and the fire stopped according to code.
- Whenever a conduit penetrates a fire-rated wall, it must be fire stopped according to code.
- Standard IT infrastructure manholes/handholds are 4'x4'x4' at a minimum. (See Appendix "E").
- IT vaults with GPS coordinates that can be a part of the As-Builts.'

13.2 Building Entrances

- Minimum primary IT building entrance conduit for **small** buildings shall be two 5 inches' conduits.
- Minimum primary IT building entrance conduit for **large** buildings serving as intermediate points shall be four 5 inches' conduits.
- Minimum primary IT building entrance conduit for **buildings** serving as campus "Points of Presence" (POP) shall be eight 5 inches' conduits.
- All buildings must incorporate a secondary (redundant) IT building entrance conduit path. The redundant path must utilize a separate entrance location. A minimum of two 5 inches' conduits is required.
- All building entrance conduits shall originate at the closest IT manhole and proceed continuously to the IT MDF within the building
- Building entrance conduits entering the building below floor level shall utilize ladder rack to provide vertical cable support as the cable enters the MDF location
- Building entrance conduits enter the building above floor level shall be continuously swept up to the horizontal cable tray or ladder rack level.
- Conduits protruding through the floor in the MDF or IDF room shall be stubbed 4 inches above the floor surface.
- All conduits shall be terminated with insulated bushings or "No Nik" guards.

13.3 Intra-Building Conduit and Sleeves

- The standard interior conduit size is 4 inches' new conduit to be installed watertight and free of obstructions.
- Whenever a conduit penetrates a fire-rated wall, it must be fire stopped according to code.
- All conduits shall be terminated with insulated bushings or "No Nik" guards.
- Sleeve/Conduit that penetrate the wall from hallway cable tray or J Hooks into a classroom, computer room, suites, should be a 3-inch sleeve/conduit. This information needs to be placed in the telecommunication specifications and the TA drawings.

14. Cables (Fiber/Copper/Coax)

The College's cable selection provides support for both current and emerging network technologies. The College currently uses three types of cable which support Data, Voice and Video applications throughout the College. The three types of cable utilized at the College are Fiber Optic cable, Copper cable and Coax cable.

- Fiber – Sumitomo FutureFLEX ABF System.
- Copper – Molex Premise Networks Systems.
- Coax – Belden Cable Systems.

14.1 Fiber Optic Cabling

The College uses two types of fiber optic cable Single Mode for building to building (SM) Fiber (50/125) and Multi-Mode for risers (MM) Fiber (50 microns 10GB) as defined by standards (ANSI/TIA/EIA-568-B.3) ratified by the TIA/EIA in April 2002, muli.

Fiber Optic Cabling System

The College standard fiber optic cabling is the Sumitomo FutureFLEX Air Blown Fiber (ABF) cabling System, Sumitomo Electric Lightwave Corp. PO Box 13445, 78 Alexander Drive, Research Triangle Park, NC 27709 (see figure 5 below) This system acts as the Conduit and the Inner Duct for fiber cable.

Figure 4 Examples of fiber inner duct (Two Tube, Seven Tube, and Nineteen Tube)

Two Tube, Seven Tube, and Nineteen Tube examples of Outdoor ABF

For more detailed information on the implementation and labeling of the ABF system, refer to Section 2.7 of this document.

14.2 Copper Cabling

Copper cable is to provide support for current and emerging network technologies both data (Blue) and voice (White). The College standard currently uses category 6 UTP Plenum rated cabling which supports the following Ethernet standards; 10base-T, 100base-T and 1000base-T, based upon the Molex Premise Network System, Molex Premise Networks, 2222 Wellington Court, Lisle, IL 60532.

Patch cords shall maintain the same standards as referenced above.

14.3 Coax Cabling

Coax Cable is the College standard for Cable TV distribution and In-House Television Production. Coax standards are based upon the Belden Cable System specifications., Belden Cable, 2200 U.S. 27 South, Richmond, IN 47374.

15. Cable TV:

The standard for Cable TV distribution is to distribute all signals provided by the Cable Company by means of Coax cable, amplifiers and splitters as appropriate.

- Horizontal Coax Cable should be the RG-6.
- Vertical Coax Cable should be RG-11.
- OSP Coax Cable from Building to Building should be Commscope AZ2604221.

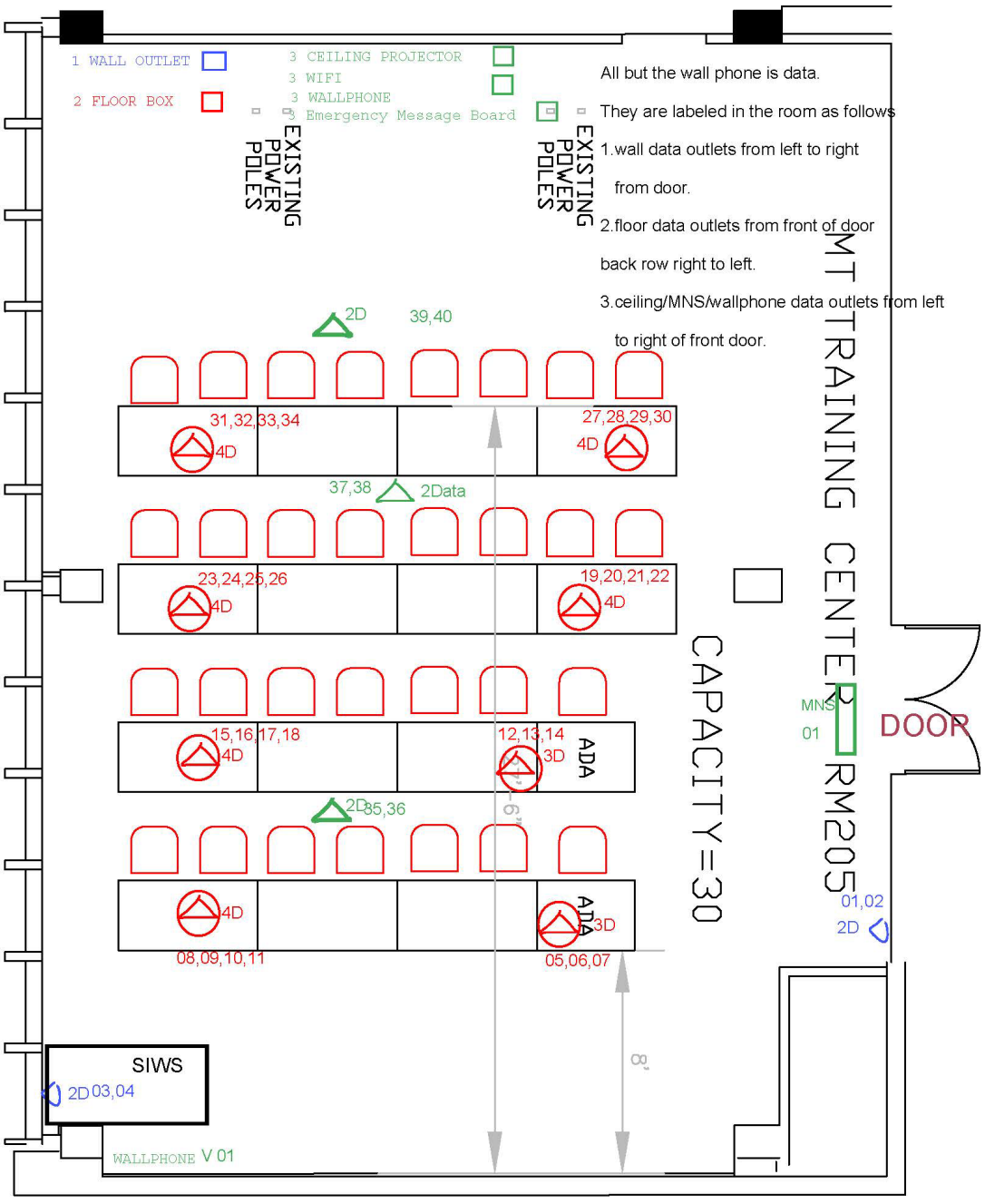
16. Installation of cables for classroom

This section describes specific installation methodologies as they are implemented at the College. Installation practices such as Labeling and Cable are outlined.

Room termination

- All data and voice will be terminated in sequential order from left to right (clockwise) starting with wall termination first then floor termination then ceiling termination using the following diagram on the next page. See figure 5 next page.

Figure 5 Basic classroom room termination design



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- Figure 6 below depicts cable labeling in a building where ‘GB’ is the building code, the room number is 112. It shows both data and voice examples. For the Data line, the closet # is ‘1’, the

Figure 6 Data and Voice Cabling Faceplate Sample for Labeling

rack # is ‘6’, the Panel # is ‘2’ and the cables are sequentially numbered starting at ‘Port 18’ through ‘Port19.’ For the Voice line, the closet # is ‘1’, the rack # is ‘3’, the Panel # is ‘2’ and the cables are sequentially numbered starting at ‘Port 14’ through ‘Port15.’

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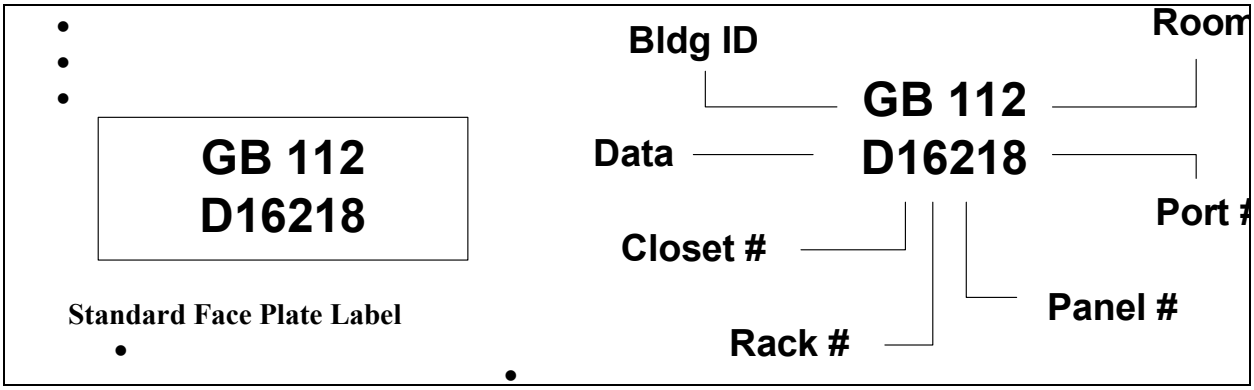

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17. Labeling

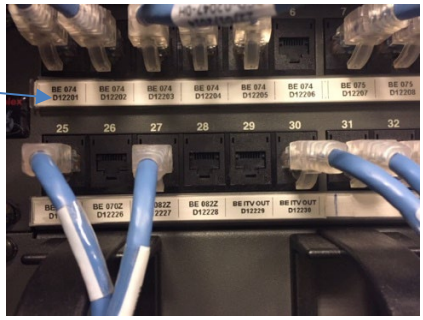
Labeling of cables is required for all cable types within the College. As stated in Section 1.3.3 of this document, a sample of a faceplate (shown as Figure 2 below) using the College IT labeling standards as documented in this section is required for review by the IT Project Manager before faceplate to the start of the labeling effort.

There are different standards for copper, coax, and fiber. Each label shall indicate, at a minimum, the physical address of the component, any physical extensions, and/or terminations:

- Vertical and backbone cables shall be labeled at each end.
- Horizontal cabling is labeled on the patch panel and the jacks.
- Label cables and conduits at strategic locations such as conduit ends, backbone splice points, manholes and pull boxes.
- Each cable shall have a unique identifier.
- The identifier shall be marked directly on the cable or the labels affixed to the cable.
- Labels shall be made from a durable material, such as vinyl.
- Labels shall be suitable for wrapping and bending.
- Labels shall be consistent across an installation.
- All labels shall be easy to see.
- Horizontal data, voice and video cable labeling. Label cables with the following information:
- Building code
- Room number
- Cable identifier D =data, V=voice, W=wireless, P=projector, E=mass notification systems, B= Building automation System
- Telecom closet number (MDF always Telecom room # 1 could be ground floor or 1st floor) Each of the other telecom rooms should be labeled with a separate number as 2 then 3 etc. Each telecom room in the building will get a separate number. This will be discussed during the design phase of the project and reviewing of the construction drawings.
- Rack number
- Panel number
- Port number (sequential incremented per room).
- The patch panel labeling should match the wall plate labeling

Figure 8 below that illustrates cable labeling in a building where ‘BE’ is the building code and the room numbers are 074 and 075. The figure depicts data lines where the Telecom closet # is ‘1’, the rack # is ‘2 the Panel # is ‘2’ and the cables are sequentially numbered starting at “Port 01’ through Port 08 and Port 25 through Port 32. See sample picture next page.

Figure 8,9, 10 Typical RJ 45 48-Port Cat 6 Patch Panel



FutureFLEX Air Blown Fiber

The FutureFLEX Air Blown Fiber (ABF) cabling system consists of two components, Tubes, and Cores.

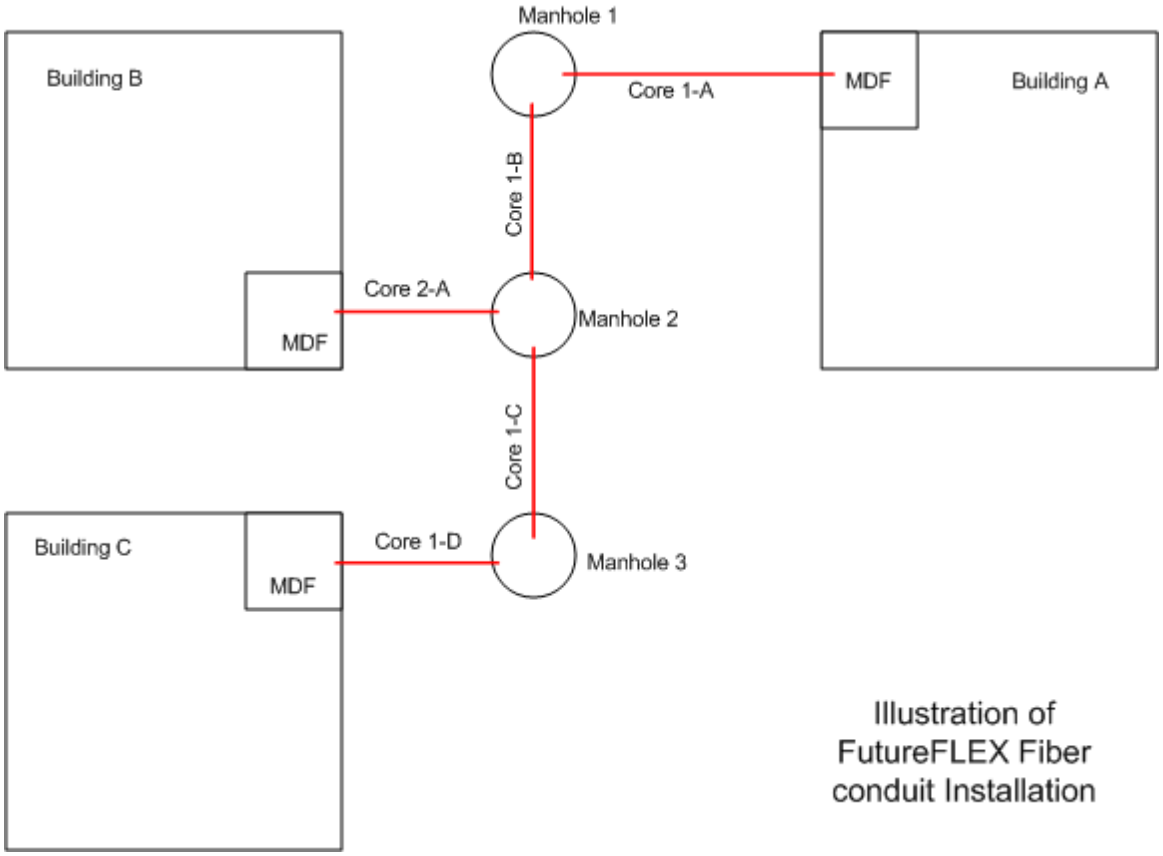
Air Blown Fiber (ABF) Core Labeling:

Each Core is labeled with a unique number. Core one (1) on a campus would be labeled 'C1'.

Any given Core run may be cut within a manhole to provide a path between tubes in other cores with different destinations.

Each section of the Core will have the sections identified as sections A, B, etc. For example, A Core has three splice points between its end-points yielding four sections of core one. In this illustration, the four sections would be labeled 'C1A', C1B', 'C1C' and 'C1D' respectively.

Figure 9 example Core One or 'C1'



ABF Tube Labeling:
All within each ABF Core are to be labeled with a number starting with one and incrementing by one to the total count of that particular core. Both ends of the tubes at all splice points must be labeled identically.

For example, a seven-tube core will have the tubes labeled: '1', '2', '3', '4', '5', '6' and '7'.

Riser fiber optic cable labeling:

Label cables with the following information:

- Building code
- Closet room number
- Rack number
- Fiber shelf number

Backbone fiber optic cable labeling:

All backbone fiber optic cable is labeled at both ends with the termination information of the other end of the cable:

- Label cables with the following information:
    - Building code
    - Closet room number
    - Rack number
    - Fiber Shelf number

18. Cable Testing

All new cable installations shall be tested after installation according to current Industry Standards.
A written copy of all tests shall be provided to the IT Project Manager at completion of the tests.
The College requires 'End-to-End' testing of all cabling plants after infrastructure equipment is installed. In the case of telephone jacks, a 'dial tone' test is performed. In the case of data drops, network connectivity is tested. In case the of Fiber cabling drops a sweep, a test is performed.

Testing category 6 cable

All Category 6 cables shall be tested to and pass ANSI/TIA/EIA 568 B.2. Tests shall utilize a Category 6 compliant cable tester. Electronic results for each cable will be submitted as part of the "As-Built" project performance acceptance records. In addition to the above information, the documentation will also include a pass/fail indication for the specified cable, the test date, the serial number, and software version of the scanner, and a copy of the calibration certificate for the scanner. Necessary applications for reading the results will be provided by the requirements-refer to ANSI/TIA/EIA 568-B.2. This document can be found in the "TIA/EIA Telecommunications Building Wiring Standards. A written copy of all tests shall be provided to the IT Project Manager after completion.When testing the Cat6 data cable with the fluke testers, you should use the same adapters, on transmit and receive ends. A Permanent link adapter should be used on both ends and a Channel Adapters should be used on both ends when testing. DO NOT use a Permanent link adapter on one end with a Channel Adapter on the other end during the cable testing process.

Testing Single Mode Fiber Optic Cables

All single-mode fiber cables shall be tested at both 1310 nm and 1550 nm after installation. Printed test results for each fiber strand are required. All tests are to be performed in accordance with ANSI/TIA/EIA-526-7, Method A.1, and One Reference Jumper. Fibers will be considered acceptable if the OTDR trace for that fiber shows an end to end loss of less than xxdB + yy (0.2) dB + zz (0.5) dB (where yy is the number of splices, zz is the number of connector pairs and xx is calculated using the following formula: xx = distance X fiber attenuation/unit distance @ lambda). Also, no splice may show a loss of greater than 0.2 dB and no connector pairs may show a loss of greater than 0.5 dB. Any additional tests required by the ANSI/TIA/EIA standard shall also be performed and also included in the written test report.

Each fiber strand must be tested utilizing an Optical Time Domain Reflectometer bi-directional tester at the wavelengths specified above. Overall, the OTDR test results shall be made up of the wavelength of the conducted test, the link length, attenuation, cable identification, and the locations of the near end, the far end and each splice point or points of discontinuity. Hard-copy results for each fiber strand shall be

submitted as part of "As-Built" documentation. A written copy of all tests shall be provided to the IT Project Manager after completion.

Testing Multi Mode Fiber Optic Cables

All multi-mode fiber cables shall be tested at both 850 nm and 1300 nm after installation. Printed test results for each fiber strand are required. All tests are to be performed per the ANSI/TIA/EIA-526-14A. Fibers will be considered acceptable if the OTDR trace for that fiber shows an end to end loss of less than xxdB + yy (0.2) dB + zz (0.5) dB (where yy is the number of splices, zz is the number of connector pairs and xx is calculated using the following formula: xx = distance X fiber attenuation/unit distance @ lambda). Also, no splice may show a loss of greater than 0.2 dB and no connector pairs may show a loss of greater than 0.5 dB. Any additional tests required by the ANSI/TIA/EIA standard shall also be performed and also included in the written test report. The vendor shall test each fiber strand utilizing an OTDR bi-directional tester at the wavelengths specified above. Overall, the OTDR test results shall be made up of the wavelength of the conducted test, the link length, attenuation, cable identification, and the locations of the near end, the far end and each splice point or points of discontinuity. Hard-copy results for each fiber strand shall be submitted as part of "As-Built" documentation. If the cable fails to meet the above requirements, the contractor at the contractor's expense shall replace it. A written copy of all tests shall be provided to the IT Project Manager after completion.

Testing Copper Voice Feeder Cables:

For all voice copper cable installations, the cables shall be tested for the following:

- Continuity of each conductor from the end-to-end - open test.
- Shorted conductors with other conductors - short test.
- The proper polarity of paired conductors from the end-to-end - reverse test (for the correct tip & ring and data terminations).
- Proper termination of wire pairs from the end-to-end – cross-test (for splits and other incorrect terminations).
- Proper ground and shield bonding (for shielded cables only) - effective ground test (for zero potential difference bonding).
- Grounded conductors (for all cables) - ground fault test.
- Detection of AC or DC power on any conductor - power fault test.
- All data cables shall be tested per EIA/TIA TSB-67 Level II requirements.
- A maximum of 1% defective pairs will be allowed in the Outside Plant Copper Cable. For any number higher than this, the cable shall be replaced or repaired at the splice point.
- A written copy of all tests shall be provided to the IT Project Manager after completion.

Testing Fiber Cable:

All testing of point to point fiber cabling will be conducted with in-house specialized communication engineers present. Testing of communication, video, audio, and tally information will be tested with appropriate cable testers and in-house equipment to ensure operability. A sweep test is required.

Appendix A: Telecommunication Trade Contractor Qualification Statement

PART 1 - SUBMITTAL REQUIREMENTS

1.0 Telecommunications Trade Contractor must submit the Qualification Statement with their bid.

PART 2 - TECHNICAL EVALUATION CRITERIA

1.0 The qualification statement must provide, at a minimum, the following information.

State the number of years in the cable installation business. The trade contractors are required to have engaged in cable installation at commercial, governmental or education institutional agencies within the Metropolitan Washington area (including Baltimore) for not less than 3 years. Trade Contractors should currently have in their employ sufficient staff to provide the required work per specification in this Request for Proposal. State number of qualified support staff available to complete the project as required.

A. Trade Contractor(s) MUST have sufficient qualified staff to accommodate a project that requires a minimum crew of two (2) people at the job site. A crew consists of a minimum of 1 qualified technician and one helper. Include a brief description on a separate sheet, of personnel that will be assigned to work on the project. Copies of resumes, certifications, manufacturer training, technical schooling and background showing qualifications and length of current employment of field staff to be assigned to this contract MUST be included with this statement.

B. Trade Contractor(s) MUST be a Certified Organization or have a minimum of one certified installer, or employ a Certified Sub-Contractor for each type of communication cable being installed. Certification programs as established by the manufacturers below are typical College standards;
    1. **CAT 6 Copper**
        a. Molex Premise Networks, 2222 Wellington Court, Lisle, IL. 60532
    2. **Fiber Optic**
        a. Sumitomo Electric Lightwave Corp. PO Box 13445, 78 Alexander Drive, Research Triangle Park, NC. 27709
    3. **Coaxial**
        a. Belden Cable, 2200 U.S. 27 South, Richmond, IN. 47374

    Evidence of current Certifications MUST be included with your statement and MUST be maintained through the life of the contract.

C. The Trade Contractor(s) MUST provide a statement, on a separate sheet, demonstrating that they understand the scope of the work as outlined in this Bid. The Trade Contractor MUST describe the approach that they propose to use in fulfilling the College's requirements.

D. The Trade Contractor(s) MUST provide evidence of their ability to perform building-wide wiring installations of copper cabling and Category 6 unshielded twisted pair (UTP) cabling, 62.5 multi-mode, 50 microns 10GB multimode and single-mode optical fiber cabling in accordance with referenced standards contained within. The Trade Contractor(s) may provide this evidence by listing three (3) prior references that had requirements similar to those required in this contract, along with the location, contact person, current telephone number, and a short narrative description detailing the scope of the project. Descriptions shall include wiring closet installation, wiring types, cable routes and supporting electrical installation (if any).

E. The prime Trade Contractor MUST employ on staff a minimum of one (1) BICSI certified RCDD designer and (1) BICSI LAN Specialist throughout the life of the contract. Copies of resumes, professional licenses, certifications, manufacturer training, technical schooling and background showing qualifications and length of current employment of field staff to be assigned to this contract MUST be included with your proposal.

F. The Trade Contractor MUST possess and demonstrate the ability to use both an Optical Time Domain Reflectometer (OTDR) and a Microtest Pentascanner or equivalent to meet the testing requirements specified elsewhere in this document. The Trade Contractor MUST provide evidence of its ability to use these testing devices by submitting samples of reports in the manner required in the cable testing section of this document.

The College shall be the sole judge in determining whether a Trade Contractor is qualified. In evaluating each telecommunication Trade Contractor, consideration shall be given to items including, but not limited to, the reputation and experience of the Trade Contractor, the quality of performance of previous contracts or services, either with the college or with other customers.

Appendix B: Sample of a Cut Sheet

CABLE CUT SHEET															
	1ST FLOOR	SCIENCE	EAST												
ROOM	CONFIGURATION	JACK PORT	TYPE	CLOSET	RACK	PANEL	PORT	LABEL	JACK PORT	TYPE	CLOSET	RACK	PANEL	PORT	LABEL
SC-150	2D/2V	A-DATA	D	5	2	1	01	SC150-5-2-1-01	A-VOICE	V	5	1	1	01	SC-150-5-1-1-01
		B-DATA	D	5	2	1	02	SC150-5-2-1-02	B-VOICE	V	5	1	1	02	SC-150-5-1-1-02
SC-150	2D/2V	A-DATA	D	5	2	1	03	SC150-5-2-1-03	A-VOICE	V	5	1	1	03	SC-150-5-1-1-03
		B-DATA	D	5	2	1	04	SC150-5-2-1-04	B-VOICE	V	5	1	1	04	SC-150-5-1-1-04
SC-150	1D/C	A-DATA	D	5	2	1	05	SC150-5-2-1-05							
SC-150	WAP	A-DATA	D	5	2	1	06	SC150-5-2-1-06							
SC-150	SPARE WAP	A-DATA	D	5	2	1	07	SC150-5-2-1-07							
SC-150	SPARE WP								A-VOICE	V	5	1	1	05	SC-150-5-1-1-05
SC-151	1D/C	A-DATA	D	5	2	1	08	SC-151-5-2-1-08							
SC-151	2D/2V	A-DATA	D	5	2	1	09	SC-151-5-2-1-09	A-VOICE	V	5	1	1	06	SC-151-5-1-1-06
		B-DATA	D	5	2	1	10	SC-151-5-2-1-10	B-VOICE	V	5	1	1	07	SC-151-5-1-1-07
SC-151	4D	A-DATA	D	5	2	1	11	SC-151-5-2-1-11							
		B-DATA	D	5	2	1	12	SC-151-5-2-1-12							
		C-DATA	D	5	2	1	13	SC-151-5-2-1-13							
		D-DATA	D	5	2	1	14	SC-151-5-2-1-14							
SC-151	6D	A-DATA	D	5	2	1	15	SC-151-5-2-1-15							
		B-DATA	D	5	2	1	16	SC-151-5-2-1-16							
		C-DATA	D	5	2	1	17	SC-151-5-2-1-17							
		D-DATA	D	5	2	1	18	SC-151-5-2-1-18							
		E-DATA	D	5	2	1	19	SC-151-5-2-1-19							
		F-DATA	D	5	2	1	20	SC-151-5-2-1-20							
SC-151	6D	A-DATA	D	5	2	1	21	SC-151-5-2-1-21							
		B-DATA	D	5	2	1	22	SC-151-5-2-1-22							
		C-DATA	D	5	2	1	23	SC-151-5-2-1-23							
		D-DATA	D	5	2	1	24	SC-151-5-2-1-24							
		E-DATA	D	5	2	1	25	SC-151-5-2-1-25							
		F-DATA	D	5	2	1	26	SC-151-5-2-1-26							
SC-151	WAP	A-DATA	D	5	2	1	27	SC-151-5-2-1-27							
SC-151	WP								A-VOICE	V	5	1	1	08	SC-151-5-1-1-08
SC-152	4D	A-DATA	D	5	2	1	28	SC-152-5-2-1-28							
		B-DATA	D	5	2	1	29	SC-152-5-2-1-29							
		C-DATA	D	5	2	1	30	SC-152-5-2-1-30							
		D-DATA	D	5	2	1	31	SC-152-5-2-1-31							
SC-152	3D	A-DATA	D	5	2	1	32	SC-152-5-2-1-32							
		B-DATA	D	5	2	1	33	SC-152-5-2-1-33							
		C-DATA	D	5	2	1	34	SC-152-5-2-1-34							
SC-152	WAP								A-VOICE	V	5	1	1	09	SC-152-5-1-1-09
SC-152	3D/1V	A-DATA	D	5	2	1	35	SC-152-5-2-1-35	A-VOICE	V	5	1	1	10	SC-152-5-1-1-10
		B-DATA	D	5	2	1	36	SC-152-5-2-1-36							
		C-DATA	D	5	2	1	37	SC-152-5-2-1-37							
SC-152	4D	A-DATA	D	5	2	1	38	SC-152-5-2-1-38							
		B-DATA	D	5	2	1	39	SC-152-5-2-1-39							
		C-DATA	D	5	2	1	40	SC-152-5-2-1-40							
		D-DATA	D	5	2	1	41	SC-152-5-2-1-41							
SC-152	3D/1V	A-DATA	D	5	2	1	42	SC-152-5-2-1-42	A-VOICE	V	5	1	1	11	SC-152-5-1-1-11

Appendix C: Material List
Manufacturer Contact and Part Numbers

- Chatsworth- WWW.chatsworth.com
  a. Two Poster Rack-
     - Chatsworth 19" equipment racks
     - 55053 – 715 8-foot black
  b. Vertical Cable Manager-
     - Chatsworth Master Cabling Sections (MCS)
     - 30096 – 715 8 foot black (10" wide vertical cable manager)
     - 35522 – 715 8 foot black (8" wide vertical cable manager)
  c. Rack Mount Power Strips-
     - Chatsworth 12816-707
  d. Grounding
     1. Busbar- 40153-012
     2. Grounding Cable- 6 AWG
  e. Ladder Rack- 10250-712 (12" minimum, sized according to requirements)
     1. Butt-Splice kit- 11301-701
     2. Junction-Splice kit- 11302-701
     3. 3" Channel Rack to Ladder Mounting Plate- 12730-712
     4. Wall Angle Support kit- 11421-712
  f. UPS Shelves- TS1008848
- B-Line- WWW.b-line.com
  a. Wire basket tray FT2X18X10 (18" minimum, sized according to requirements)
  b. Washer splice kit- Washer SPL KIT_
  c. 90 Degree Kit- 90 DEGREE KIT_
- Caddy- WWW.erico.com
  a. Mounting plate bracket- MPLS
  b. J-Hooks- (Depends on Ceiling) View website or ask College for preference.
  c. Rings- (Depends on Ceiling) View website or ask College for preference.
- Molex- WWW.molexpn.com
  a. Faceplate
     i. 2-port- WSY-00018-02
     ii. 4-port- WSY-00002-02
     iii. 6-port- WSY-00001-02
     iv. Biscuit- SSY-00002-02
     v. Wall Phone Plate- WSS-00007
  b. Blanks- KSJ-00005-02
  c. Jacks
     i. Data- KSJ-00018-BL (Blue)
     ii. Voice- KSJ-00018-02 (White)
     iii. MCFNET- KSJ-00018-08 (Grey)
     iv. Coax- MSY-00002-02

Raceway Applications

v. Keystone Data- KSJ-00033-BL (Blue)
vi. Keystone Voice- KSJ-00033-02 (White)

d. Cable
   i. Data- CAA-0181P-BL (Blue)
   ii. Voice- CAA-0181P-02 (White)
   iii. Mass Notification Camera's/Message Boards- CAA-0181P-PK (Pink)
   iv. Building Automation System (BAS) CAA-0181P-GR (Green)
e. Patch Panel- PID-00142 (Data)
f. Rack Mount 110 Blocks
   i. Cat 6 Station Voice- KPD-00080
   ii. Cat 6 C4 Connectors- KPD-00088
   iii. Cat 5e Tie Cable- KPD-00061
g. Horizontal Wire Manager
   i. 1U- 25. B016G
   ii. 2U- 25. B013G
   iii.
h. Patch Cords
   i. Cat6 1.5m- PCD-02047-OH (Blue) (Closet End)
   ii. Cat6 3m- PCD-02043-OH (Blue) (Closet/Station End)
   iii. Cat6 5m- PCD-02044-OH (Blue) (Closet/Station End)

Mass Notification Patch Cords

iv. Cat6 1.5m- PCD-02047-PK (Pink) (Closet End)
v. Cat6 3m- PCD-02043-PK (Pink) (Closet/Station End)
vi. Cat6 5m- PCD-02044-PK (Pink) (Closet/Station End)

Building Automation Systems (BAS) (MCFNET) Patch cords

vii. Cat6 1.5m- PCD-02047-GR (Green) (Closet End)
viii. Cat6 3m- PCD-02043-GR (Green) (Closet/Station End)

- Sumitomo- WWW.sumitomoelectric.com
  a. Tubes
     i. 2 tube- TC02TOX Underground, TC02MSOS Aerial, TC02TRC Riser, TC02TP2 Plenum
     ii. 4 tube- TC04TOX Underground, TC04MSOS Aerial, TC04TRC Riser, TC04TP2 Plenum
     iii. 7 tube- TC07TOX Underground, TC07MSOS Aerial, TC07TRC Riser, TC07TP2 Plenum
     iv. 19 tube- TC19TOX Underground, TC19MSOS Aerial, TC19TRC Riser, TC19TP2 Plenum
     v. Clear tube from Distribution Unit to Fiber Box TC01TCX

b. Fiber

i. Single-mode

- 6 Strand FB06SX
- 12 Strand FB12SX
- 18 Strand FB18SX
- 24 Strand FB24SX

ii. Multimode- (50/125)

- 6 Strand FB06G53
- 12 Strand FB12G53
- 18 Strand FB18G53
- 24 Strand FB24G53

iii. Connectors- SC

c. Fiber Box

i. 2U (24-48 Ports)- FT02RU4P
ii. 3U (48-96 Ports)- FT03RU8P
iii. 4U (72-144 Ports)- FT04RU12P
iv. 12 Port Cassette FTSC-FBK12TBFOM4MP12/ FTSC-FBK12TBFOS2MP12

b. Tube Distribution Unit- DE06MDU Small, DE20IDU Medium, DE36IDU Large
c. Outdoor Nema6 Armadillo Case
   i. DE09SPC- Medium
   ii. DE12SPC- Large

iv. Lighting Protection Systems – 230-volt applications
a. Tii Porta Systems www.tiinettech.com
   i. Lightning Protection Box- 25100-110-M110PC
   ii. Lightning Protection Box- 25025-110-M110PC
b. Circa Systems
   i. Circa 1880ENA1/NSC-50

v. Superior Essex- WWW.superioressex.com
a. Tie Cable
   i. OSP Cat5 MEGAPIC-NF – 04-104-31 (100 Pair)
   ii. UTP Cat5e 25 Pair- 51-478-48

vi. Commscope- WWW.commscope.com
a. OSP Trunk Cable- P3500JCASS

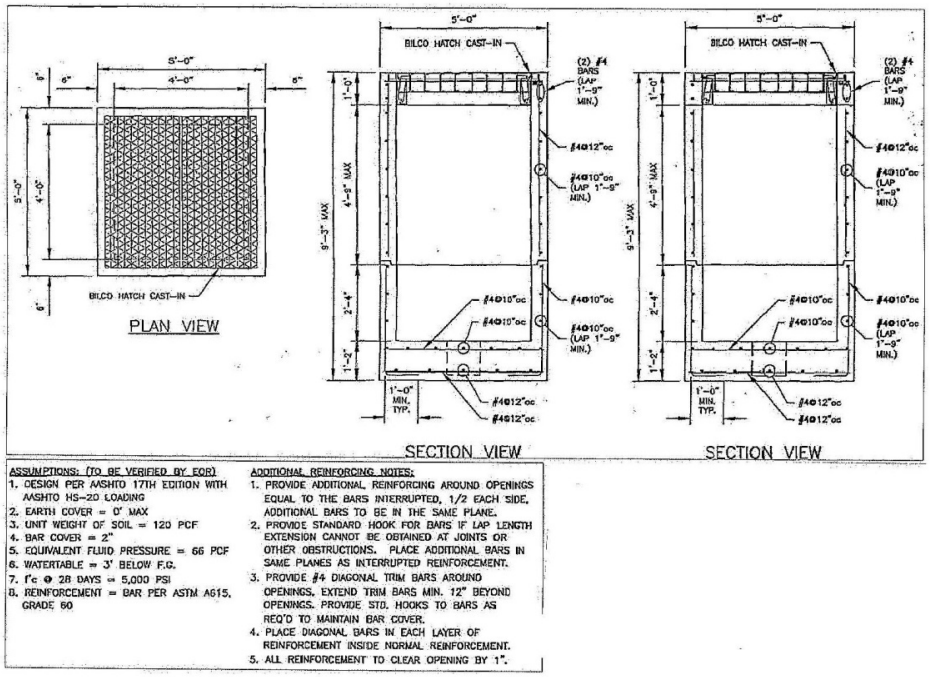
Belden- WWW.Belden.com

b. Horizontal Coax- (1695A)
c. RG 11 Vertical Coax- 7731A

vii. Mohawk- WWW.Mohawk.com
a. Cat6 Outside Plant 4 pair Copper Cable- M57562

viii. Blonder Tongue- WWW.Blondertongue.com
a. 8 port splitter- (LPD-8p)
b. 8 port amplifier- specific details to be provided

Appendix D: IT Telecom Manhole Diagram



TELECOMMUNICATIONS MANHOLE DETAIL 8

NOT TO SCALE

Note: Add ladder rungs to manholes exceeding 4 feet in depth.

Note: Add manhole cable racking devices on a minimum of 2 walls to support cables within the manhole.

Note: The MDF and IDF rack elevations will be designed by Montgomery College when all data, voice, and fiber amounts have been determined throughout the building design.