



Berea College
Information Systems and Services
Network Infrastructure Design Specification & Guidelines

Berea College
Learning, labor, & service

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Notice

This document is a **living document** and is subject to change. It is intended for use for architects, engineers, contractors, BERA COLLEGE personnel and others dealing with the design and installation of telecommunications infrastructure for voice, data and video for the Berea College, Berea Kentucky (BEREA COLLEGE).

SCOPE

General

Berea College, Berea Kentucky (BEREA COLLEGE) Information Technology's Infrastructure Design Guidelines are intended to be used in conjunction with the BEREA COLLEGE Division 250000 and Division 270000 Specification Guidelines and BEREA COLLEGE Telecommunications Reference Drawings. These documents are integral set to each other and are to be incorporated into BEREA COLLEGE construction project specifications.

The purpose of the Design Guidelines is to describe and specify the minimum building infrastructure required to support the communications and networking requirements at BEREA COLLEGE. Architects, engineers and designers should use these Design Guidelines to incorporate the information provided into Construction Documents. This document is based on industry standards and codes. This document does not replace any national or local standards, regulations or codes, but enhances them. If the standards and practices of BEREA COLLEGE exceed national or local standards, regulations or codes, BEREA COLLEGE's practices shall take precedent.

The scope of this document includes the design and installation methods of Multifunction Communication Rooms (MCR's), Intermediate Communication Rooms (ICR's), cabling distributions systems, work area outlet locations, cable specifications, testing, documentation and administration. For details on products and installation practices for communications cabling and components refer to the Division 250000 and Division 270000 Specification Guidelines as referenced. This document is subject to change in form and technical content as warranted by advancements in building construction techniques and telecommunications technology. As such, BEREA COLLEGE specifically reserves the right to add to and revise, the information contained herein.

Normative references

The following codes and standards contain provisions that, through reference in this text, constitute provisions of Document. At the time of publication, the editions indicated were valid. All codes and standards are subject to revision; parties to agreements based on this Document shall apply the most recent editions of the codes standards indicated. All equipment, construction practices, design principles and installations must conform to the latest version of any or all of the following standards and codes, published by the following organizations, where applicable;

Federal Communications Commission (FCC)
Institute of Electrical and Electronics Engineers, Inc (IEEE)
National Fire Protection Association (NFPA)
National Electrical Safety Code (NESC)
American National Standards Institute (ANSI)
Telecommunications Industry Association (TIA)
Electronic Industries Alliance (EIA)
Building Industry Consulting Service International (BICSI)
National Electrical Contractors Association (NECA)

Reference Documentation

All BEREA COLLEGE staff, architects, engineers, consultants, contractors and vendors involved in the design, installation, specifications and details of the BEREA COLLEGE Telecommunications Distribution Infrastructure and Wiring must have access to most recent copies of the following referenced documentation and will be held accountable to the standards set forth in this document. These documents are to be used in the design, layout and installation of the BEREA COLLEGE Telecommunications Distribution Infrastructure for voice, data, and video. The standards, codes, and

regulations referenced may have corrections, additions, technical service bulletins, and addendums that are not specifically called out in this section.

In all cases it will be the responsibility of the BEREA COLLEGE staff, architects, engineers, consultants, contractors and vendors involved in the design, installation, specifications and details of the BEREA COLLEGE Telecommunications Distribution Infrastructure and Wiring to be sure that the latest codes, standards, regulations, and specifications are referenced regardless of codes, standards, regulations, and specifications stated in this document.

Questions, problems or comments concerning this document or the referenced documents should be directed to BEREA COLLEGE Information Systems & Services or BEREA COLLEGE Facilities Management.

FCC Regulations

FCC Part 68 Regulations for connecting premise cabling and customer provided equipment to regulated networks

FCC Documentation Available from:

http://www.fcc.gov/Bureaus/Engineering_Technology/Documents/cfr/1999/47cfr68.pdf

NFPA Codes (2002 Edition)

These NFPA documents are related to telecommunications:

NFPA-70	National Electrical Code Chapter 8- Communications Systems
NFPA-71	Central Signaling Systems
NFPA-72	National Fire Alarm Code
NFPA-75	Protection of Electronic and Computer Data Processing Equipment
NFPA-780	Lightning Protection Code
NFPA-101	Life Safety Code

NFPA Documentation Available from:

National Fire Protection Association

1 Battery march Park

Quincy, MA 02269-9101

Telephone: (617) 770-3000

Fax: (617) 770-0700

ANSI/TIA/EIA Telecommunications Building Wiring Standards (latest version)

There are several documents that make up the ANSI/TIA/EIA Commercial Building Telecommunications Cabling Standards. These include:

ANSI/TIA/EIA - 568-B Commercial Building Telecommunications Cabling Standard

ANSI/TIA/EIA -569-A Commercial Building Standard for Telecommunications Pathway and Spaces

EIA/TIA-606-A Administration Standard for the Telecommunications Infrastructure of Commercial Buildings

EIA/TIA-607 Commercial Building Grounding and Bonding requirements for Telecommunications

ANSI/NESC 1997 National Electrical Safety Code

ANSI Documentation Available from:

Global Engineering Documents

15 Inverness Way East

Englewood, CO 80112-5776

(800) 854-7179 ext7931

BICSI Methodologies (latest version)

BICSI Telecommunications Distribution Methods Manual
BICSI Telecommunications Cabling Installation Manual
BICSI Customer Owned Outside Plant Design Manual
ANSI/NECA/BICSI 568-2001 Installing Commercial Building Telecommunications Cabling

BICSI Documentation Available from:

BICSI
8610 Hidden River Parkway
Tampa, FL 33637-1000
(800) 242-7405
<http://www.bicsi.org>

DEFINITION OF TERMS, ACRONYMS AND ABBREVIATIONS

General

This section contains definitions of terms, acronyms, and abbreviations that have a special meaning or that are unique to the technical content of this document. The terms that are used in only one clause may be defined within, and at the beginning of, that clause.

Definition of terms

Multifunctional Communications Room (MCR): The MCR is a special purpose room that will provide common dedicated space for services such as voice, video and data. Campus and Building serving MCR's may contain equipment to support all of the following: entrance protection, access provider terminations, cable infrastructure pathway, voice MDF, BDF and IDF, wireless (satellite), data communications, paging, fire /smoke detection, security alarm systems, radio, building automation control (including energy monitoring, lighting control, environmental controls), area of rescue assistance equipment, CATV and video conferencing and all associated system backbone and horizontal cable terminations. Floor serving MCRs are called Intermediate Communications Rooms (ICR) and may contain all of the above except entrance protection, access provider terminations, voice MDF or BDF, the floor serving MCR will serve as the cabling termination point for the horizontal cabling serving that floor or area of a floor.

Acronyms:

AFF	Above the Finished Floor
BDF	Building Distribution Frame
BICSI	Building Industry Consultants Service International
CAT	Category
CATV	Community Antenna Television (cable television)
HH	Handhole
ICR	Floor Serving Intermediate Communications Room
IS&S	Information Systems & Services
BC	Berea College
MCR	Multifunctional Communications Room
MDF	Main Distribution Frame
MH	Maintenance Hole
TGB	Telecommunications Grounding Busbar

TMGB	Main Telecommunications Grounding Busbar
TDMM	Telecommunications Distribution Methods Manual (BICSI Publication)
UTP	Unshielded Twisted Pair
WAO	Work Area Outlet
WAP	Wireless Access Points

Also see "Normative references" for additional codes and standards Acronyms.

PROJECT REQUIREMENTS

An appendix to this document will provide a list of specified, approved and/or recommended products with manufacturer names, item descriptions, product numbers, and the location for individual product specifications or details. This list shall be used as general reference information for the convenience to the designer, engineer, consultant or contractor – specific project requirements will need to be verified on a case by case basis and will be stated in the Division 250000 and 270000 Specification Guidelines.

Telecommunications Distribution Infrastructure whether new construction, rebuilds or remodels must meet the following requirements:

- BERA COLLEGE Facilities Management and BERA COLLEGE Information Systems & Services must accept all projects prior to their beginning regardless of funding source
- Awarded firm, vendor or installation staff is responsible for the proper location, design, and layout of all requirements stated in this document.
- All national, state, and local codes and standards must be followed.
- All BERA COLLEGE requirements, Specification Guidelines and work details must be met unless written acceptance given for waiver.
- Component materials, specifications, locations, designs, and layouts must be approved by a BICSI registered RCDD or equivalent Telecommunications Infrastructure Specialist
- All BERA COLLEGE requirements, Specification Guidelines, work details, and drawings must be included in architectural, construction, or project documentation.
- Project design is subject to the final acceptance of BERA COLLEGE Facilities Management and BERA COLLEGE Information Systems & Services.
- BERA COLLEGE associates who chose to do their own voice, data or video projects will be treated as any other firm or vendor in a BERA COLLEGE project and must meet all stated requirements.

Division 250000

BERA COLLEGE Specification Guidelines and associated T-Reference Drawings as listed below are to be included as separate sections of the Division 250000 contractor requirements.

BERA COLLEGE SPECIFICATION GUIDELINES:

251200 INTERIOR COMMUNICATIONS PATHWAYS
251300 EXTERIOR COMMUNICATIONS PATHWAYS

BERA COLLEGE T-REFERENCE DRAWINGS:

251200 BERA COLLEGE TYPICAL CLASSROOM AND OUTLET DETAILS
251200-1 OUTLET AND CABLETRAY DETAILS
251200-2 TYPICAL CLASSROOM LAYOUT
251300 BERA COLLEGE OUTSIDE PLANT
251300-1 OUTSIDE PLANT DUCTBANK

Also in BERA COLLEGE Specification Guideline 271100 MULTIFUNCTIONAL COMMUNICATIONS ROOM there are special Division 250000 power requirements for the MCR and HVAC Requirements that need to be added to a special section.

All referenced documentation is an integral set to each other and are to be incorporated into BEREА COLLEGE construction project specifications.

In all cases it will be the responsibility of the BEREА COLLEGE staff, architects, engineers, consultants, contractors and vendors involved in the design, installation, specifications and details of the BEREА COLLEGE Telecommunications Distribution Infrastructure and Wiring to be sure that the latest codes, standards, regulations, and specifications are referenced regardless of codes, standards, regulations, and specifications stated in this document.

Questions, problems or comments concerning this document or the referenced documents should be directed to BEREА COLLEGE Information Systems & Services or BEREА COLLEGE Facilities Management.

251200 INTERIOR COMMUNICATIONS PATHWAYS

REFERENCE:

BEREA COLLEGE SPECIFICATION	251200 INTERIOR COMMUNICATIONS PATHWAYS
BEREA COLLEGE T-DRAWING	251200 BEREА COLLEGE TYPICAL CLASSROOM AND
OUTLET DETAILS	251200-1 OUTLET AND CABLETRAY DETAILS
	251200-2 TYPICAL CLASSROOM LAYOUT

General

The Interior Communications Pathways will provide a distribution system for all system cabling that will be served by the building MCRs. The pathways for a building may include all or some of the following, cable tray, conduit systems, conduit stubs, sleeves, and cable hangers. All pathways must be accepted in writing by BEREА COLLEGE prior to design completion. Interior pathway design shall follow all BICSI TDMM design recommendations and TIA568-B and TIA569-A standards. A detailed T1 and Pathway Logical drawing will be required for all Pathway Plans. For additional design information see the BICSI TDMM and all referenced BEREА COLLEGE Specification Guidelines and BEREА COLLEGE T-Reference Drawings.

Cable Tray

A continuous cable tray system shall be installed on each floor. Minimum tray size shall be 12 inch x 4 inch deep. When making turns and elevation changes use the appropriate tray accessories to achieve the proper cable bend radius. For access to, and installation of, cables in the cable tray, the following clearances are required around the cable tray. The cable tray system shall have 1 foot clearance measured from the top most surface of the tray. Access from the sides shall be 6 inches to 1 foot. Access to the cable tray from below shall be unobstructed its entire length at an elevation of 3 inch to 12 inch above the finished ceiling. There shall be no other equipment, lights, conduits, fixtures, HVAC ducts etc. attached to, mounted on, running through or on the cable trays. Cable tray may be run through walls or above any inaccessible ceilings if proper access is provided. If access is not possible the tray shall stop at all walls or inaccessible ceiling space and sleeves or conduits will be installed of equal or greater cable capacity as the tray, the tray shall continue on the other side of the wall or ceiling space.

Conduit:

Conduit pathways built for telecommunication cabling have more stringent bending and pull box requirements than electrical cabling and must be adhered to (i.e. a telecommunications conduit can have no more than 180 degrees of cumulative bends between pull points where as a conduit installed for electrical wiring may have 360 degrees of bends between pull points).

- Sizes indicated for conduits are trade sizes in all cases.
- Conduit stubs shall have an insulated bushing installed prior to the installation of telecommunications cabling.
- Conduits must have the ends plugged upon installation to keep debris from entering them.
- Conduit needs to run in the most direct route possible, usually parallel with building lines.
- Conduit runs shall contain no continuous sections longer than 98 feet. If runs total more than 98 feet, pull points or pull boxes need to be inserted.
- Conduit shall have no more than 180 degrees of cumulative bends between pull points or more than 90 degrees of bends at any one point.
- Electrical Metallic Tubing shall be electro-galvanized steel.
- Reference Specification Guidelines for conduit detail and capacity charts

Sleeves/Conduits

UTP sleeves for Horizontal cabling exiting MCR

The quantity of horizontal sleeves installed in each MCR for horizontal cabling shall be four (4) 4 inch sleeves. The sleeves shall be a minimum 8 feet AFF to the bottom of the sleeves. Sleeves that are installed above 9 feet-0" AFF must have vertical cable tray installed from the bottom of the sleeve to the top of the cable tray for lashing of cables in the vertical run.

Backbone Intra-building Backbone conduit (MCR to MCR)

In a multi-story building where MCRs are stacked to form a riser, a minimum of three (3) - 4 inch sleeves shall be installed between the stacked MCRs.

In Instances where backbone riser cable is required to run horizontally between MCRs three (3) - 4 inch conduits shall be installed between the MCRs. One of these 4 inch conduits shall be innerducted per BERA COLLEGE Specification Guidelines.

Work Area Outlet (WAO) Box and Conduit location

New construction WAO

Conduit from the cable tray to a typical wall WAO should be a minimum of 1 inch. Each 1 inch conduit will service only **one** wall outlet location. The conduit will be terminated in a minimum 4 inch x 4 inch x 2.5 inch deep box with a pull string. The box shall be fitted with a single gang mud ring and installed flush to finished wall. (See BERA COLLEGE Specification Guideline 271500 Horizontal Cabling for outlet types)

Unless otherwise noted, mount devices and equipment at heights measured from finished floor to device/equipment centerline as follows:

- Desktop telephone outlets 18 inch
- Data outlets 18 inch
- Data outlets (special need) 30 inch
 - Above hot water or steam baseboard heaters.
 - Do not install receptacle outlets above electric baseboard heaters.
- Television outlet 18 inch
- Multimedia Box 6 gang 18 inch
- Multimedia Box 3 gang 44 inch
- Wall Mounted Phone 48 inch
- Bracket Mounted Television 96 inch

Conduits should "home run" to the cable tray and should end no further than 4 feet and no closer than approximately 4 inch- 6 inch inches away from edge of the cable tray to maintain a proper bend radius. Do not "turn down" conduit into cable tray.

New construction floor WAO

Conduit from the cable tray to a typical floor outlet should be a minimum of 1 inch. Each 1 inch conduit will service only **one** floor outlet location. The conduit will start at the cable tray located on the same floor as the work area. Confirm all floor outlets meet Fire Code and will accommodate manufacturer's jacks and outlets.

Renovations WAO

For areas being renovated, the minimum requirement is for horizontal wiring to be properly supported and secured in the work area in either surface raceway, communications pole, enclosed within the wall or furniture and not exposed to possible damage. From the cable tray to the outlet location, in the area above the drop ceiling, the cable shall be supported by CAT 5e or higher approved cable hangers mounted a minimum of 6 inch above the ceiling at a maximum distance of 3 foot on center.

Fire Alarm/Elevator/Security (Life Safety) WAO

Conduit from these life safety WAO must be continuous home runs from the WAO directly back to the MCR for the served area that Each 1 inch conduit will service only **one** life safety WAO. Confirm all life safety WAO meet Fire Code and will accommodate manufacturer's jacks and outlets.

Pull Boxes

Must meet the following requirements:

- Must be in easily accessible locations
- Be immediately above suspended ceilings where feasible and should be easily identified and labeled
- The box should have a hinged panel (or equivalent), which can also serve as it's cover
- Are not to be used as splice locations
- Do not use a PB in lieu of a bend
- Align conduits that enter the PB from opposite ends with each other
- PB are to be used in conduit sections that are 100 feet or more in length, or contain more than two 90 degree bends, or contain a reverse bend
- They are to provide adequate depth and width for fishing, pulling, and looping the cable

The length must be 12 times the diameter of the largest conduit and in some cases (e g, when large cables are planned to serve multiple work areas), a box length of 16 times the diameter of the largest conduit may be appropriate.

Sleeves

- Sizes indicated for sleeves are trade sizes in all cases.
- Sleeves shall have an insulated bushing installed prior to the installation of telecommunications cabling.
- Sleeves must have the ends plugged upon installation to keep debris from entering them.
- Sleeves used at wall transition points for cable tray systems shall be 4 inch. Quantity of sleeves shall be equal to the capacity of the cable tray.
- Sleeves for distribution of horizontal cable in renovated areas not having conduits to the cable tray shall be sized so that when all cables have been installed at the completion of the project, the sleeve will be at 50% capacity of the sleeves maximum fill (maximum fill is based on using a UL listed fire rated assembly [40%]).
- All sleeves shall have a minimum 2-hour UL listed fire rated assembly installed regardless if the wall or floor is not fire rated or has a rating of lesser value. If the wall or floor has a fire rating greater than 2 hours the sleeve shall have an equal rating in all cases
- The minimum sleeve size installed for any penetration shall be 1 inch.

Bonding and grounding

All metallic conduits, cable trays, sleeves, etc. shall be bonded back to building steel and the TMGB or TGB in the MCR that serves cabling in that serving zone. All grounding and bonding shall be designed and installed in accordance to **EIA/TIA-607** (Note: **EIA/TIA-607** requirements are more stringent than the NEC grounding and bonding requirements). (See BERA COLLEGE Grounding and Bonding Detail)

Miscellaneous Interior Pathway requirements

No bridal ring distribution systems are to be used for horizontal wiring or for Inter-building Campus Backbone voice, data or video distribution. Cable tray and wireways can be used for Inter-building Campus Backbone voice, data, or video distribution but separation for the backbone cables must be provided by using properly sized innerduct for protecting cables or conductors.

Fire alarm, HVAC, security and any other wiring that is not part of the voice, data or video horizontal or backbone wiring must installed in a separate support system and must not be a part of the telecommunications infrastructure system.

251300 EXTERIOR COMMUNICATIONS PATHWAYS

REFERENCE:

BEREA COLLEGE SPECIFICATION	251300 EXTERIOR COMMUNICATIONS PATHWAYS
BEREA COLLEGE T-DRAWING	251300 BERA COLLEGE OUTSIDE PLANT
	251300-1 OUTSIDE PLANT DUCTBANK

General

The Exterior Communications Pathways will provide a campus distribution system for all system cabling that will be served by the building serving MCRs. The pathways for a campus distribution system may include all or some of the following, maintenance holes, hand holes, innerduct for both in conduits and direct buried, conduit, multi-cell conduits, All pathways must be accepted in writing by BERA COLLEGE prior to design completion. Exterior pathway design shall follow all BICSI TDMM and BICSI Customer Owned Outside Plant Design Manual design recommendations and TIA568B and 569A standards. BERA COLLEGE must accept all final design in writing. Sizes indicated for conduits and innerduct are trade sizes in all cases. A detailed T-Drawing and Exterior Pathway logical drawing will be required for all Exterior Pathway Plans. For additional design information see the BICSI TDMM, BICSI Customer Owned Outside Plant Design Manual and all referenced BERA COLLEGE Specification Guidelines and BERA COLLEGE T-Reference Drawings.

Note: Exterior Conduit pathways built for telecommunication cabling have more stringent bending and pull box requirements than electrical cabling and must be adhered to (i.e. a telecommunications conduit can have no more than 180 degrees of cumulative bends between pull points where as a conduit installed for electrical wiring may have 360 degrees of bends between pull points).

CONDUIT REQUIREMENTS

Option One

- Install four (4) 4" diameter type 40 PVC conduits (or equal) encased in a concrete ductbank
- PVC conduit is not to be direct buried (see option two)
- One 4" conduit is to be innerducted with Maxcell 3" 3 cell product (or equal).
- Conduit structure to be encased by 3500 psi concrete with minimum depth of 3" on top and each side and 6" on bottom

- Number 6 rebar must be connected to support structure and also run parallel to conduit to reinforce concrete ductbank.

Option Two

- Install four (4) Carlon Multi-Gard 4" type 40 PVC conduit with 3-way innerduct (or equal)
- Can be used for direct bury or concrete encased applications.
- Boreable Multi-Gard 4" type 40 PVC conduit with 3-way innerduct (or equal) can be used in a boreable application
- Must be compatible with other Multi-Gard type 40 PVC.

For All Options

- Conduit shall have no more than 180 degrees of cumulative bends between pull points or more than 90 degrees of bends at any one point.
- Conduit runs shall contain no continuous sections longer than 500 feet. if runs total more than 500 feet, pull points need to be inserted. (4x4x3 handholes or 4x6x8 maintenance holes)
- All bends must be long, sweeping bends with a radius not less than six times the internal diameter of conduits 50 mm (2 in) or smaller, or ten times the internal diameter of conduits larger than 50 mm (2 in). All bends must use the same coupling design as the straight sections.
- All conduits entering a building must be pitched to drain away from the building to avert water intrusion.
- If possible all conduits should drain back to MH or HH.
- Conduits entering through walls shall be either encased in a reinforced concrete ductbank that extends 10 feet from entrance to wall or Carlon Multi-Gard EMT 4" with 3 innerducts (or equal)
- The ductbank or conduits should extend to undisturbed earth, particularly where such backfill is susceptible to load bearing tension.
- Termination kits must be used for sealing all inner and outerducts and must have all conduits ends plugged with the watertight plugs upon installation.

Conduit Encasement

- Surface must be cut, patched, and repaired to match existing surface.
- Top of ductbank must be buried at least 30 inches below the ground surface.
- 12" wide orange marking tape must be buried 18" below and/or concrete top dyed yellow.
- Conduit supports (Carlon Snap-N-Stack or equal) must be used every 8-10 feet to provide adequate support and to maintain proper spacing.
- Reinforcing bars shall be installed parallel to conduit in corners of concrete ductbank.
- Rebar reinforcement to be used at support sections to tie conduits down to prevent floating.

Maintain Separation from Other Utilities

- Power up to 1kva:
 - 12 inch of well- packed earth
 - 4 inch of masonry
 - 3 inch of concrete
- Gas, Oil, Water, etc...:
 - 12 inch when parallel
 - 6 inch when crossing
 - steam:
 - 6 feet when parallel

Trench Width

- Should be no greater than is needed to provide adequate working space
- When backfill is used the trench must be 5 inches wider than the width of the conduit structure.

- When conduits are encased in concrete (3500 psi) the trench must be 3 inches wider than the width of the conduit structure.
- The trench bed must be level and if necessary sand and/or other granular backfill is to be used as bedding material so the conduit will be evenly supported over the length of each section

Maintenance Holes

General Notes

- Maintenance Hole (MH) is to be within 100 feet of building and Handholes (HH) are not be used as first pull points outside a building but can be used in ductbank structure.
- MH and/or HH are to be no more than 500-700 feet apart.
- Joint use MH and/or HH and are not permitted.
- Covers should be centrally located on single- cover Maintenance Holes.
- Frames and covers used in roads or driveways shall be rated to withstand vehicular traffic.
- All covers shall have telecommunications pre-marked on the cover for easy identification.
- All hardware in MH must be galvanized.
- MH shall be equipped with the following:
 - Bonding inserts and struts for racking.
 - Pulling eyes at least 22 mm (7/ 8 in) in diameter.
 - A sump of at least 200 mm (8 in) in diameter.
 - An entry ladder (where feasible).
- All exterior surfaces of below grade portions of sides and tops of all MH shall be weatherproofed.
- Conduits entering the MH are to be placed at opposite ends of a MH.
- MH and conduits must be sealed during construction to prevent debris from entering and must be cleaned prior to installation.

Handholes

General Notes:

- Handhole (HH) box cover to be marked telecommunications.
- HH is not be used as a substitute for maintenance hole (MH) without approval.
- MH must be used for first pullpoint outside building.
- HH to be no more tha 500 feet apart from other HH or MH.
- HH enclosures, boxes and covers are required to conform to all provisions of NEC 314.30 and ANSI/SCTE 77 "Specification for Underground Enclosure Integrity" for tier 15 applications.
- Independent third party verification or test reports stamped by a registered professional engineer certifying that all test provisions of this specification have been met are required with each submittal.
- HH must be excavated to be at least 6" – 8" deeper than the depth of the grade level of the enclosure to allow for the placement of a minimum 6" of gravel in the bottom of the hole.
- The gravel base should always extend no less than 3 inches past the sidewalls of the enclosure, the gravel acts as a french drain and also provides a support base to help prevent the enclosure from sinking.
- Once the enclosure is positioned on top of the gravel and the elevation is checked, the enclosure is ready for back-filling.

Aerial or Direct Buried Cable

Aerial or direct buried cable campus backbone distribution systems are discouraged and must have special acceptance by BEREA COLLEGE Information Systems & Services prior to installation. They are not covered in these Specification Guidelines and will be accepted on a case-by-case basis.

Division 270000

BEREA COLLEGE Specification Guidelines and associated T-Reference Drawings as listed below are to be included as separate sections of the Division 250000 contractor requirements.

BEREA COLLEGE SPECIFICATION GUIDELINES:

270100 BASIC COMMUNICATIONS REQUIREMENTS
271100 MULTIFUNCTIONAL COMMUNICATIONS ROOM
271400 BACKBONE CABLING

271500 HORIZONTAL CABLING
271600 TESTING, IDENTIFICATION AND ADMINISTRATION
271700 SUPPORT AND WARRANTY

BEREA COLLEGE T-REFERENCE DRAWINGS:

T-SYM01 TELECOMMUNICATIONS SYMBOLS FOR LEGENDS
271100-1 BERA COLLEGE MCR-GROUNDING-BONDING-WTRAY
271400-0 BERA COLLEGE TELECOMMUNICATIONS AND BACKBONE LAYOUT
271400-1 FIBER BACKBONE
271400-2 COPPER BACKBONE
271400-3 COAX BACKBONE
271500-1 VOICE DATA COAX RACK LAYOUT

BEREA COLLEGE APPENDIX:

271700-A PANDUIT WARRANTY GUIDE

Also in BERA COLLEGE Specification Guideline 271100 MULTIFUNCTIONAL COMMUNICATIONS ROOM there are special Division 250000 power requirements for the MCR and Division 15 for HVAC requirements for the MCR.

All referenced documentation is an integral set to each other and are to be incorporated into BERA COLLEGE construction project specifications.

In all cases it will be the responsibility of the BERA COLLEGE staff, architects, engineers, consultants, contractors and vendors involved in the design, installation, specifications and details of the BERA COLLEGE Telecommunications Distribution Infrastructure and Wiring to be sure that the latest codes, standards, regulations, and specifications are referenced regardless of codes, standards, regulations, and specifications stated in this document.

Questions, problems or comments concerning this document or the referenced documents should be directed to BERA COLLEGE Information Systems & Services or BERA COLLEGE Facilities Management.

270100 BASIC COMMUNICATIONS REQUIREMENTS

REFERENCE:

BEREA COLLEGE SPECIFICATION GUIDELINE 27010 BASIC COMMUNICATIONS
REQUIREMENTS

General

This section is not design orientated in nature. The referenced BERA COLLEGE Specification Guideline 270100 deals with Contractor qualifications and responsibilities for the installation of the BERA COLLEGE Telecommunication Infrastructure. This section is an integral set to the other Division 270000 sections and is to be incorporated into BERA COLLEGE construction project specifications.

271100 MULTIFUNCTIONAL COMMUNICATIONS ROOM DESIGN GUIDELINES

REFERENCE:

BEREA COLLEGE SPECIFICATION 271100 MULTIFUNCTIONAL COMMUNICATIONS ROOM
BEREA COLLEGE T-DRAWING 271100-1 BEREA COLLEGE MCR-GROUNDING-
BONDING-WTRAY
271500-1 VOICE DATA COAX RACK LAYOUT

General

The following section will outline the location, design and pathway requirements for Multifunctional Communications Rooms (MCR) and Intermediate Communications Rooms (ICR). The term MCR will be used for both and MCR and ICR in this section unless notes. MCR design shall follow all BICSI TDMM design recommendations for Equipment Rooms and Telecommunications Rooms. BEREA COLLEGE must accept all final design in writing. A detailed T3 drawing will be required for Telecommunication Plans, see the BEREA COLLEGE T3 series typical drawings for suggested standard layout and requirements. For additional MCR design information see the BICSI TDMM and all referenced BEREA COLLEGE Specification Guidelines and BEREA COLLEGE T-Reference Drawings.

Each Campus must have one Campus serving MCR that serves as:

- Demark or hub for all voice, data, and video services for the campus
- Connection point for all other Building MCR by the Campus Backbone Distribution System

Each Building on campus must have one Building MCR that serves as:

- Building demark or hub for all voice, data, and video services
- Connection point back to Main MCR by the Campus Backbone Distribution System
- Connection point to other Intra-Building MCR

Each Campus Building Floor must have at least one Intra-Building ICR that serves as:

- Floor demark or hub for all voice, data, and video services
- Connection point back to Building MCR

Each Campus Building Floor must have more than one Intra-Building ICR:

- For floors that are over 10,000 square feet
- Have work area outlets more than 275 feet from an Intra-Building MCR

MCR Location

MCR locations must meet the following requirements:

- Location should be selected so that the room may be expanded.
- Shall be located as close as practicable to the center core of the building to minimize horizontal cable distances (Maximum cable length is 295 feet (90m) from MCR to drop location), pay close attention to cable route paths when selecting location.
- Shall be accessible through common-use corridors that will allow the delivery of large cable reels and equipment and access for repairs 24x7.
- In multiple floor applications, MCRs shall have all 4 walls vertically stacked.
- Rooms shall be located away from sources of electromagnetic interference (EMI). Special attention shall be given to electrical power supply transformers, motors and generators, x-ray equipment, elevator equipment, and induction devices.

- Access to the Rooms shall be 24 hours-per-day, 365 days-per-year basis (24x7). Access shall be through common use corridors and not accessed by way of any other room.
- In areas of highly concentrated work area outlets it is recommended not to exceed 150 feet from WAO to MCR.
- MCRs may not be inside of or be part of a Mechanical space, Equipment room, Washroom, storage area, janitor closet.

An MCR shall not be located in any place that may be subject to:

- Water infiltration
- Steam infiltration
- Humidity from nearby water or steam
- Heat (ex direct sunlight)
- Any other corrosive atmospheric or adverse environmental conditions
- Locations that are below water level are to be avoided unless preventive measures against water infiltration are employed
- The room must be free of plumbing and electrical utilities that are not directly required to support the telecommunications function
- Rooms with:
 - Electrical power supply transformers, motors, generators
 - X- ray equipment, radio transmitters, radar transmitters
 - Induction heating devices
 - Photocopying equipment that is closer than 10 feet

NOTE: All MCR room locations and sizes must be accepted in writing by BEREA COLLEGE prior to Phase B.

MCR Architectural Requirements

MCR Size must meet the following requirements:

Campus serving Campus MCR minimum size is to be:

- 400 square feet minimum
- 20 x 20 dimension minimum

Building serving MCR minimum size is to be:

- 150 square feet minimum
- 10 feet x 15 feet or 12 feet 6 inches x 12 feet 6 inches dimension minimum

Floor Serving ICR minimum size is to be:

- 100 square feet minimum
- 10 feet x10 feet or 8 feet 6 inches x 11 feet 9 inches dimension minimum

Walls

All four (4) walls shall be floor to deck and have a 2-hour fire rating.

Plywood backboards

All four (4) walls shall be covered with ¾ inch AC grade plywood, void free. It can be either ¾ inch BCX, fire rated plywood – not painted OR 4 x 8 x ¾ inch AC, non-fire rated, and (painted two coats on all sides – with light color, acrylic, interior, fire resistant paint). To reduce warping, fire-rated plywood shall be kiln-dried to maximum moisture content of 15%.

All linear wall space used for anchoring equipment shall be lined for the full closet width with approved materials. The plywood use for mounting termination equipment shall be installed vertically side by side a minimum of 6 inch above finished floor. The mounting of is to be sufficient enough to support the

equipment. If fire retardant plywood is used, all anchoring hardware (screws, bolts, etc.) that comes in contact with wood shall be galvanized or treated to prevent corrosion.

Ceilings height

Room shall not have a false ceiling this will permit maximum use of cable pathways both vertically and horizontally. In such cases where fire-proofing may be sprayed onto the exposed ceiling, the fire-proofing shall be treated to mitigate airborne dust. The height between the finished floor and the lowest point of the ceiling should be a minimum of 8 feet6 inch.

Treatment

Paint walls and ceiling to eliminate dust prior to cable installation. Finishes shall be light in color to enhance room lighting. Floor covering shall be a vinyl anti-static material. Color shall be determined on a case-by-case basis.

Doors

Doors shall be a minimum of 0.9 m (36 inch) wide and 2 m (80 inch) high, without doorsill, hinged to open outward (code permitting) or slide side-to-side, or be removable. Consideration should be given to using double doors with a removable center-post. The door(s) shall be fitted with a lock that is keyed for telecommunication locations. The door frame shall be prepped for an electric strike for a Card Access system.

Floor loading

The MCRs shall be located on floor areas designed with a minimum floor loading of 4.8 kPa (100 lbf/ft²). The MCRs shall be located on floor areas designed with a minimum floor loading of 2.4 kPa (50 lbf/ft²). The project structural engineer shall verify that concentrations of proposed equipment do not exceed the floor-loading limit.

Signage

Signage, if used, should be developed within the security plan of the building.

MCR Environmental/HVAC Requirements

(These requirements MUST be placed in HVAC Specifications for all MCR)

Contaminants

The rooms shall be protected from contaminants and pollutants that could affect operation and material integrity of the installed equipment.

Heating, Ventilation and Air Conditioning (HVAC)

Continuous operation

HVAC shall be available on a 24 hours-per-day, 365 days-per-year basis. A stand-alone unit should be considered for Telecommunication Rooms. One unit can control all MCR within a building if stacked or in close proximity.

Standby operation

If a standby power source is available in the building, consideration should be given to also connecting the HVAC system serving the Communications Rooms to the standby supply.

Operational parameters

The temperature shall be controlled to provide continuous operating ranges of 18C (64F) to 24C (75F) Humidity should be considered and kept between 30% to 55% relative humidity. The ambient temperature and humidity shall be measured at a distance of 1.5 m (5 ft) above the floor level, after the equipment is in operation, at any point along an equipment aisle centerline. Heat

dissipation should be 750-5000 Btu per cabinet with minimum capacity for two cabinets. Btu requirements shall be based on not less than 10-15 Watts per square foot. Other Btu requirements reviewed on a per case basis.

The MCR shall have independent HVAC sensors and controls. These controls and sensors are to be located in the MCR.

Positive pressure

A positive pressure differential with respect to surrounding areas should be provided with a minimum of one air change per hour.

Vibration

Mechanical vibration coupled to equipment or the cabling infrastructure can lead to service failures over time. A common example of this type of failure would be loosened connections. If there is a potential for vibration within the building that will be conveyed to the MCR via the building structure, the project structural engineer should design in safeguards against excessive TR vibration.

Other mechanical fixtures

Mechanical fixtures (e.g., piping, ductwork, pneumatic tubing electrical conduits) not related to the support of the MCR shall not be installed in, pass through, under or enter the MCR. In addition, the area adjacent to the exterior of the MCR walls shall remain clear for cable pathways entering the MCR.

MCR Electrical Requirements

(These requirements MUST be placed in Division 25 Specifications for all MCR)

Lighting

Lighting shall be a minimum of 500 lx (50 foot candles) measured 1 m (3 ft) above the finished floor, mounted 8.5 ft minimum above the finished floor. Light fixtures must be independently supported from the building structure. Light fixtures shall not be mounted to, or supported by the cable tray. Light fixtures are to be coordinated with rack and cable tray placement to maintain a minimum separation of 12 inch clearance due to EMI concerns and permit maximum illumination (lights shall not be placed directly above equipment racks or cable tray but to the front and back).

NOTE - Lighting fixtures should not be powered from the same electrical distribution panel as the MCR. Dimmer switches shall not be used and emergency lighting and signs should be properly placed such that an absence of primary lighting will not hamper emergency exit.

Power

General

Each MCR shall be fed from a dedicated communications electrical distribution panel servicing the MCR equipment outlets with individual branch circuits. One panel can control all MCR if they are stacked or in close proximity. Other equipment in the room (e.g., fluorescent lighting, motors, air conditioning equipment) should be supplied by a separate feeder, conduit, and distribution panel) The MCR electrical distribution system may need to be backed up by the emergency electrical power. "Mission-critical" equipment such as Voice Over IP (VOIP) and critical servers to be power conditioned and on back-up power that allows a controlled shutdown of the equipment in the event of a power failure. Each panel shall have a printed directory to indicate rooms and circuit served by all breakers.

Equipment 110vOutlets

MCR's shall be equipped with dedicated 110-120V- 20A quad receptacle provided to each rack and/or cabinet. Outlets may be wall mounted, installed in divided surface raceway or installed on Kindorf channel above equipment racks depending on room configuration. Rack One shall be equipped with a dedicated 110-120V- 30A circuit with a single receptacle that is a NEMA L5-30R. All outlets shall have a printed circuit identifiers affixed to it indicating the panel room number, panel ID and circuit number. BEREA COLLEGE may specify additional outlets on a case-by-case basis.

110v Convenience Outlets

MCRs shall be equipped with convenience quad outlets (Dedicated 110-120V- 20A capacity) with power conditioning, placed at 6 feet intervals around perimeter walls at least 6 inches above the floor for uses other than network equipment (i.e. power tools, testing equipment). This outlet shall be run from a separate electrical panel. All outlets shall have a laser printed circuit identifiers affixed to it indicating the panel room number, panel ID and circuit number. BEREА COLLEGE may specify additional outlets on a case-by-case basis.

Location of power conditioning systems

Where applicable, equipment, such as power conditioning systems, and UPS up to 100 kVA shall be installed in the MCR. "Mission critical" equipment is to be power conditioned and on back-up power that allows for a controlled shutdown of the equipment in the event of a power failure. UPS larger than 100 kVA should be located in a separate room. This must be accepted in writing by BEREА COLLEGE prior to design.

MCR Bonding and grounding

Follow NFPA-70 and ANSI/TIA/EIA-607

Building serving MCRs shall have a Telecommunications Main Grounding Busbar (TMGB) installed to which all Telecommunications Grounding Busbars (TGB) in each floor serving MCRs is bonded back to with the Telecommunications Bonding Backbone (TBB) and the TMGB must be grounded to the approved earth ground. All equipment, conduits, cable shields, cable trays, sleeves, etc. shall be bonded to the TGB servicing that area. The TMGB shall be connected to the main electrical service ground of the building with a minimum conductor size 2 AWG. A larger conductor size may be required based on the distance between the TMGB and the main electrical service ground. The TMGB shall also be bonded to building structural steel.

The TBB shall have a minimum conductor size 6 AWG. A larger conductor size may be required based on the distance between the TMGB and the TGB. The TBB shall be continuous from the TMGB to the furthest TGB in a riser system. The TGBs shall also be bonded to building structural steel if close and accessible. A separately derived ground or isolated ground system is not permitted.

MCR Miscellaneous Requirements

Fire protection

Fire protection of the Telecommunications Rooms, if required, shall be provided as per applicable code. If sprinklers are required within the spaces, the heads shall be provided with wire cages to prevent accidental operation. Drainage troughs shall be placed under the sprinkler pipes to prevent leakage onto the equipment within the room. For some applications, consideration should be given to the installation of alternate fire-suppression systems, confirm applications with BEREА COLLEGE.

Water infiltration

The MCR shall not be located below water level unless preventive measures against water infiltration are employed. The room shall be free of water or drain pipes not directly required in support of the equipment within the room. A floor drain shall be provided within the room if risk of water ingress exists.

Room Layout

- Cable tray pathway to encircle the room on all main walls
- Cable tray is to transition from the height of the cable tray in the hallway maintaining proper transitions and bend radius to a height of not more than 8 feet above finished floor
- Proper bend radius and transitions to be used for all corners for cable tray
- Cable tray to "tie in" to the equipment racks and provide proper support and bend radius
- Each closet will need a minimum of two 19 inches x 7 feet equipment racks
- Equipment racks to include horizontal and vertical wire management and power outlets
- If phone/voice equipment needs to be walled mounted it is to be installed on the left wall as entering the room going clockwise to the right

- If video equipment needs to be either rack mounted and or if wall mounted it is to be installed on the far right side of the room going clockwise to the right
- Wall-mounted equipment must not be behind the equipment racks or cabinets, or over or under conduit entrances
- A 36 inches minimum clearance in front and back of each rack with a minimum side clearance of not less than 24 inches must be maintained
- All rack mounted or wall mounted equipment must be properly grounded, clearly labeled and all cables must maintain horizontal and vertical wire management procedures

MCR Cable Pathways

To be coordinated with BERE A COLLEGE Specification Guideline 251200 Interior Communication Pathways

General

Conduits and sleeves should extend 3- 6 inch into the MCR. If the conduits or sleeves are subject to water intrusion they must drain away from the room and be watertight. All conduits and sleeves must have the ends plugged upon installation to keep debris from entering the conduits and sleeves. Cable tray may be run through walls if proper fire stopping is applied where required. . Conduits and sleeves must have bushings installed at all ends and at all pull boxes. BERE A COLLEGE must accept all pathway designs in writing.

Conduit pathways built for telecommunication cabling have more stringent bending and pull box requirements than electrical cabling and must be adhered to (i.e. a telecommunications conduit can have no more than 180 degrees of cumulative bends between pull points where as a conduit installed for electrical wiring may have 360 degrees of bends between pull points).

Cable Tray

Minimum size 12inches wide by 4 inches deep cable tray shall be run around the inside perimeter of the room for the distribution of cabling within the room. The cable tray shall also be run down the center of the free standing racks that will be installed. The cable tray shall be mounted no less than 7 feet from finished floor to the bottom of the tray but should be at same height as rack. There shall be no other equipment, lights, conduits, fixtures etc. attached to, mounted on, running through or on the cable tray except those needed to support the cable tray systems.

In a multi-story building where MCRs are stacked to form a riser, a minimum of three (3)-4 inch conduits shall be installed between the Building MCR and the first MCR in the riser. Cable tray can be used for Inter-building Backbone distribution only with the use of properly sized innerduct or by the installation of a physical separation for the protection of the Backbone cables from general cable installation. BERE A COLLEGE must accept use of cable tray as a backbone distribution system in writing.

271400 BACKBONE CABLING

REFERENCE:

BEREA COLLEGE SPECIFICATION	271400 BACKBONE CABLING
BEREA COLLEGE T-DRAWING	271400-0 BERE A COLLEGE TELECOMMUNICATIONS AND
BACKBONE	271400-1 FIBER BACKBONE
	271400-2 COPPER BACKBONE
	271400-3 COAX BACKBONE

General

Backbone cabling is the media over which Voice, Video, Data, Audio, Community antenna television (CATV) signals will be transmitted to the MCR's. The media used for the transmission of the signals will be copper, fiber and coax. Backbone cables are broken into two types, inter-building and intra-building. Inter-building cabling has very strict requirements when entering a building. Cable insulation type, lightning protection and termination methods are important considerations when designing outside plant (OSP) cabling.

Sizing of backbone cabling for support of a building is directly related to the building's functions both during initial occupancy and future use. There is no generic backbone installation that will fit all applications. Design of the building's backbone cabling will be on a case-by-case basis. Generally, Optical Fiber (Single Mode and Multimode), High Pair Count Copper and Coaxial cable will be installed for backbone applications.

Backbone cable design shall follow all BICSI TDMM design recommendations and TIA568B standards. BEREA COLLEGE must accept all final design in writing. A detailed T-Reference Drawing and Backbone logical drawings will be required for all Backbone cabling Plans. For additional design information see the BICSI TDMM, all referenced BEREA COLLEGE Specification Guidelines, BEREA COLLEGE Approved Materials List and BEREA COLLEGE T-Reference Drawings.

271500 HORIZONTAL CABLING

REFERENCE:

BEREA COLLEGE SPECIFICATION	271500 HORIZONTAL CABLING
BEREA COLLEGE T-DRAWING	271500-1 VOICE DATA COAX RACK LAYOUT

General (Please Note: Office and Dorm Rooms will be treated as the same)

Horizontal Cabling is the media over which Voice, Video, Data, Audio, Community antenna television (CATV) signals will be transmitted to from MCR's to the WAO. The media used for the transmission of the signals will be primarily copper, and coax.

The following will describe the **minimum** work area outlet requirements for area such as, a standard 8 foot x 10 foot office/dorm room, classroom and conference room, and special locations. The exact placement, quantities of outlets, number of drops per WAO and pathways must be accepted in writing by BEREA COLLEGE prior to design completion. Any deviation from these guidelines shall require written acceptance from the BEREA COLLEGE Project Manager.

The Horizontal Cable design shall follow all BICSI TDMM design recommendations and TIA568B standards. BEREA COLLEGE must accept all final design in writing. A detailed T-Reference Drawing and logical drawings will be required for all Horizontal Cabling Plans showing all WAO with port counts. For additional design information see the BICSI TDMM, all referenced BEREA COLLEGE Specification Guidelines, BEREA COLLEGE Approved Materials List and BEREA COLLEGE T-Reference Drawings.

Typical Work Area Outlet

In general, install one WAO on each wall measuring 12 feet in linear length. Provide additional WAO as required so that no "point" along the liner wall space is more than 12 feet from a network outlet. This rule is intended to keep the network station patch cable from exceeding the length of 10 feet from the WAO outlet to the network device.

A minimum of one duplex electrical outlet shall be installed within 5 feet of every work area outlet. If more than 4 data cables are installed at a single work area outlet location, add duplex electrical outlets in the same proportion.

Typical Work Area Outlet must meet the following requirements:

- Meet minimum Work Area Conduit and Outlet Box requirements
- Be flush mounted where possible
- Outlet to be located no more than 10 feet from networked location
- Have a 110-120V- 20 Amp circuit within five (5) feet of outlet
- Be mounted above the floor approximately eighteen (18) inches above finished floor or to match electrical box height
- Typical work area outlet should have two data ports to be used potentially for voice, data or video
- At least one in every room used by staff, faculty, student or for meetings or instructional purposes
- No work area outlet in BEREA COLLEGE should be more than 275 feet from an MCR (not 298 feet)

Faculty and Staff Outlet Location must meet the following requirements:

- Meet minimum Typical Work Area Outlet location requirements
- Outlet location to be no more than 10 feet from networked location

Private Office Work Area Outlet Location must meet the following requirements:

- Meet minimum Typical Work Area Outlet location requirements
- At least one outlet with minimum of two ports per outlet in a office
- Suggested option is to have two outlets to be on opposite walls
- Outlet location to be no more than 10 feet from networked location

Instructional Classroom Areas Outlet and Conference Room Location must meet the following requirements:

- Meet minimum Typical Work Area Outlet location requirements
- Not less than one outlet on each wall separated by no more than 20 feet
- All outlets shall have a minimum of two ports per outlet
- Recommended that an outlet be located by the doorway for a wall mount single line phone with

Business, CAD and Computer Labs Outlet Location must meet the following requirements:

- Meet minimum Typical Work Area Outlet location requirements
- Minimum of one port for each computing device that is in the lab plus a 20 percent growth or failure factor (e.g., 25 devices would need a minimum of 30 ports on the room)
- Outlets are to be located according to furniture layout.
- There are several options that can be used for flexibility:
 - Perimeter Raceway
 - Low level access flooring
 - Trench flooring
 - In floor grid system with recessed floor boxes
- All outlets to have a minimum of four ports per outlet unless design requirements differ
- In areas of a higher concentration or clusters of Business, CAD and Computer Labs with more than 100 networked devices it is recommended not to exceed 150 feet from the MCR

HVAC/Maintenance Room Outlet Location must meet the following requirements:

- Meet minimum Typical Work Area Outlet location requirements
- Outlet location to be placed where HVAC controller, phone or data connections are required
- Shall have a work area outlet with two ports
- Outlet to be protected from harsh environmental factors if present

Fire Alarm/Elevator/Security/Life Safety Outlet Location must meet the following requirements:

- Meet minimum Typical Work Area Outlet location requirements
- The conduit is to a continuous “home run” from the WAO back to the MCR
- WAO to be placed where as required by manufacturer in location where for Fire Alarm/Elevator/Security/Life Safety connectivity are required
- To have a work area outlet with two ports
- Fire alarm/Elevator to be properly connected to RJ31X terminal block
- Outlet to be protected from harsh environmental factors if present

Pay Phones Outlet Location must meet the following requirements:

- Meet minimum Typical Work Area Outlet location requirements
- Outlet location to be placed where Pay Phone or Courtesy phone locations are required
- To have a work area outlet with two ports with an electrical outlet adjacent
- Outlets are required to be at an approved ADA height and location

Fax Machines and Credit Card Locations Outlet Location must meet the following requirements:

- Meet minimum Typical Work Area Outlet location requirements
- Outlet location to be placed where Fax Machines and Credit Card locations are required
- Shall have a work area outlet with two ports with an electrical outlet adjacent

Copier and Printer Locations Outlet must meet the following requirements:

- Meet minimum Typical Work Area Outlet location requirements
- Outlet location to be placed where Copier and Printer locations are required
- To have a work area outlet with two ports with an electrical outlet adjacent for phone access
- Because of the higher power requirements for copiers and laser printers (especially color lasers) it is to have a dedicated 110-120V-20A capacity circuit at these locations

Special Equipment Areas Outlet Location Requirements

There are instructional areas that require special consideration and may not be able to have telecommunications outlets due to program requirements, distance from MCR, and inaccessibility to the physical location. Also in areas with environmental or life and safety issues no outlets or telecommunications equipment are to be installed. These areas include areas with excessive electrical interference, dirty or dusty areas, and locations with hazardous, explosive, or combustible materials or gases.

Multi-Media and Video Conference Rooms Outlet Location Requirements

Multi-Media and Video Conference Rooms require special consideration for the location of the telecommunications outlets, microphone positions, television and camera outlets, video control station and other remote devices. These are designed on a case-by-case basis and must be accepted by BEREA COLLEGE Information Systems & Services and BEREA COLLEGE Facilities Management.

271600 TESTING, IDENTIFICATION AND ADMINISTRATION

REFERENCE:

BEREA COLLEGE SPECIFICATION 271600 TESTING, IDENTIFICATION AND ADMINISTRATION

General

This section is not design orientated in nature but is critical to reference. The BEREA COLLEGE Specification Guideline 271600 deals with the contractor responsibility and the criteria for the required testing, identification and Administration of the BEREA COLLEGE Telecommunication Infrastructure.

This section is an integral set to the other Division 270000 sections and is to be incorporated into BERA COLLEGE construction project specifications.

271700 SUPPORT AND WARRANTY

REFERENCE:

BEREA COLLEGE SPECIFICATION 271700 TESTING, IDENTIFICATION AND ADMINISTRATION
BEREA COLLEGE APPENDIX 271700 PANDUIT WARRANTY GUIDE

General

This section is not design orientated in nature but is critical to reference. The BERA COLLEGE Specification Guideline 271700 deals with the contractor responsibility and the criteria for the support and warranty of the BERA COLLEGE Telecommunication Infrastructure. This section is an integral set to the other Division 270000 sections and is to be incorporated into BERA COLLEGE construction project specifications.

272000 BERA COLLEGE APPROVED MATERIALS LIST

REFERENCE:

BEREA COLLEGE SPECIFICATION GUIDELINE 272000 BERA COLLEGE APPROVED
MATERIALS LIST

General

This section is not design orientated in nature but is critical to reference. The BERA COLLEGE Specification Guideline 272000 deals with the BERA COLLEGE approved materials list for the installation and support of the BERA COLLEGE Telecommunication Infrastructure. Due to the nature of updates and changes this document will be updated frequently. Please verify the latest version with BERA COLLEGE Network Operations. This section is an integral set to the other Division 270000 sections and is to be incorporated into BERA COLLEGE construction project specifications.

BEREA COLLEGE – Information Systems & Services Checklist

This checklist is to be used to verify that required Specification Guidelines, Reference Drawings and Details have been checked, edited verified and included in the documentation of BERE A COLLEGE Projects. Each of these items need to be checked, edited and verified per project requirements with BERE A COLLEGE Information Systems & Services and BERE A COLLEGE Facilities Management prior to Phase B documentation. All documentation must be checked, and verified with approved changes by BERE A COLLEGE Information Systems & Services and BERE A COLLEGE Facilities Management prior to Phase C and again prior to final construction bid documentation.

SPECIAL NOTE:

Specifications Guidelines and Details that do not have a N/A option are required for each project but will all items will still need to follow guidelines as listed above.

BEREA COLLEGE SPECIFICATION GUIDELINES:

Complete N/A

- 251200 INTERIOR COMMUNICATIONS PATHWAYS
- 251300 EXTERIOR COMMUNICATIONS PATHWAYS
- 270100 BASIC COMMUNICATIONS REQUIREMENTS
- 271100 MULTIFUNCTIONAL COMMUNICATIONS ROOM
- 271400 BACKBONE CABLING
- 271500 HORIZONTAL CABLING
- 271600 TESTING, IDENTIFICATION AND ADMINISTRATION
- 271700 SUPPORT AND WARRANTY

BEREA COLLEGE T-REFERENCE DRAWINGS:

Complete N/A

- 251200 BERE A COLLEGE TYPICAL CLASSROOM AND OUTLET DETAILS
- 251200-1 OUTLET AND CABLETRAY DETAILS
- 251200-2 TYPICAL CLASSROOM LAYOUT
- 251300 BERE A COLLEGE OUTSIDE PLANT
- 251300-1 OUTSIDE PLANT DUCTBANK
- 271100-1 BERE A COLLEGE MCR-GROUNDING-BONDING-WTRAY
- 271400-0 BERE A COLLEGE TELECOMMUNICATIONS AND BACKBONE LAYOUT
- 271400-1 FIBER BACKBONE
- 271400-2 COPPER BACKBONE
- 271400-3 COAX BACKBONE
- 271500-1 VOICE DATA COAX RACK LAYOUT
- T-SYM01 TELECOMMUNICATIONS SYMBOLS FOR LEGENDS

BEREA COLLEGE APPENDIX:

- 271700-A PANDUIT WARRANTY GUIDE
- BERE A COLLEGE APPROVED MATERIALS LIST

BEREA COLLEGE T-REFERENCE DRAWINGS AND DETAILS:

Complete N/A

- 251200 BERE A COLLEGE TYPICAL CLASSROOM AND OUTLET DETAILS
- 251200-1 OUTLET AND CABLETRAY DETAILS
- CABLETRAY CLEARANCE DETAIL
- WORK AREA AND PHONE OUTLET DETAIL
- WORK AREA OUTLET DETAIL - DRYWALL
- WORK AREA OUTLET DETAIL - MASONRY
- WORK AREA RECESSED FLOOR BOX OUTLET DETAIL
- RECESSED FLOOR BOX OUTLET DETAIL
- SURFACE MOUNTED RACEWAY DETAIL

- SURFACE MOUNTED RACEWAY OUTLET – DRYWALL DETAIL
- SURFACE MOUNTED RACEWAY OUTLET – MASONRY DETAIL

- 251200-2 TYPICAL CLASSROOM LAYOUT
- TYPICAL CLASSROOM INFRASTRUCTURE LAYOUT PERSPECTIVE VIEW
- TYPICAL CLASSROOM INFRASTRUCTURE LAYOUT NOTES
- PROJECTOR SUPPORT DETAIL
- FLAT PANEL SUPPORT DETAIL
- RECESSED FLOOR BOX DETAIL
- WALL MOUNTED RECESSED AND PROJECTOR BOX DETAIL
- MULTIMEDIA OUTLET DETAIL
- WALL MOUNTED RECESSED DETAIL

- 251300 BERA COLLEGE OUTSIDE PLANT
- 251300-1 OUTSIDE PLANT DUCTBANK
- CONDUIT CONCRETE DUCTBANK DETAIL
- CONDUIT DIRECT BURIED DUCTBANK DETAIL
- DUCTBANK NOTE
- HANDHOLE (QUAZITE) DETAIL
- MAINTENANCE HOLE DETAIL
- MAINTENANCE HOLE NOTES

- 271100-1 BERA COLLEGE MCR-GROUNDING-BONDING-WTRAY
- MCR DETAIL (ONE PER REQUIRED MCR)
- MCR NOTES (ONE PER REQUIRED MCR)
- SLEEVE DETAIL
- CONDUIT STUB UP DETAIL
- GROUNDING BONDING DETAIL
- LEGEND

- 271400-0 BERA COLLEGE TELECOMMUNICATIONS AND BACKBONE LAYOUT
- 271400-1 FIBER BACKBONE
- OUTSIDE PLANT DETAIL
- CAMPUS OR BUILDING MCR
- FLOOR SERVING MCR#1
- FLOOR SERVING MCR#2 (USE AS MANY AS REQUIRED)

- 271400-2 COPPER BACKBONE
- RJ31X DETAIL
- OUTSIDE PLANT DETAIL
- CAMPUS OR BUILDING MCR
- FLOOR SERVING MCR#1
- FLOOR SERVING MCR#2 (USE AS MANY AS REQUIRED)

- 271400-3 COAX BACKBONE
- OUTSIDE PLANT DETAIL
- CAMPUS OR BUILDING MCR
- FLOOR SERVING MCR#1
- FLOOR SERVING MCR#2 (USE AS MANY AS REQUIRED)

- 271500-1 VOICE DATA COAX RACK LAYOUT
- RACK LAYOUT DETAIL (DESIGN PER MCR LAYOUT)
- WORK AREA OUTLET DETAIL
- WORK AREA AND PATCH CABLE NOTES
- HORIZONTAL CABLE NOTES



T-SYM01 TELECOMMUNICATIONS SYMBOLS FOR LEGENDS