University at Buffalo®

CONSULTANT SPECIFICATION GUIDELINES

2026

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1. GENERAL

1.1. SUMMARY

1.1.1. The Contractor is responsible for thoroughly reviewing and understanding all provisions contained herein, as well as any additional specification sections required for the proper completion of the installation.

1.1.2. The Contractor shall furnish all necessary materials, qualified labor, and associated services to deliver a fully functional and operational system, installed full accordance with the contract documents.

1.2. INTENT OF THE DRAWINGS AND SPECIFICATIONS

1.2.1. These specifications, together with the accompanying drawings, define the installation requirements necessary for successful execution of the project.

1.2.2. The Contractor shall furnish and install all incidental items not explicitly shown or specified, but required by industry best practices to provide a fully functional system.

1.3. COMMUNICATION

1.3.1. The University at Buffalo expects the Architect/Engineer of record to collaborate closely with the UBIT Representative to address technical issues and meet all owner requirements.

1.3.2. All inquiries, requests for deviations, and comments regarding the interpretation, or application of these guidelines shall be submitted in writing to the UBIT Representative for review and approval.

1.3.3. No deviations from these guidelines shall be implemented without prior written approval from the UBIT Representative.

1.4. DEFINITIONS

1.4.1. Contractor – The entity awarded the contract as the successful bidder.

1.4.2. Telecommunications Space – Any area containing telecommunications equipment, including entrance facilities (EFs), equipment rooms (ERs), telecommunication rooms (TRs), cable vaults, and data-center areas that contain telecommunications equipment or isolated racks/cabinets in rooms not dedicated to telecommunications.

1.4.3. Owner-Approved Products – A requirement indicating that one of three specified products must be selected and submitted for approval.

- Where less than three products are specified, the Contractor is allowed to submit documentation to approve the use of a specified product or an equivalent product of equal or superior quality.

1.5. ACRONYMS

1.5.1. UBIT Representative – University at Buffalo Information Technology Representative

1.5.2. RCDD – Registered Communications Distribution Designer

1.6. ADMINISTRATIVE REQUIREMENTS

1.6.1. Pre-Installation Meetings

1.6.1.1. The Contractor and Contractor's RCDD shall meet with the UBIT Representative prior to installing any components to clarify requirements, coordination, and schedule.

1.6.1.2. Pre-installation meetings are defined within the applicable specification sections.

1.6.2. Sequencing
1.6.2.1. All painting and dust-producing work within telecommunication spaces shall be completed prior to installing any telecommunications components.
1.6.2.2. Telecommunication Spaces shall be secure, clean, and free of trash and dust before equipment racks, cables, or components are installed.
1.6.3. Scheduling
1.6.3.1. Any work with the potential to impact service shall be performed outside of normal business hours (prior to 7:30 a.m.), as coordinated with the UBIT Representative.
1.6.4. Submittals
1.6.4.1. The Contractors RCDD shall review, approve and stamp all documents prior to submitting.
1.6.5. Warranty Documentation
1.6.5.1. Provide a numbered certificate from the manufacturer registering the installation for the Advanced System Warranty.
1.6.5.2. Provide contact information for any warranty claims.

1.7. SUBSTITUTIONS
1.7.1. If, through no fault of the Contractor, a specified product becomes unavailable or an unlisted product is required, the Contractor's RCDD shall obtain and submit manufacturer approval for the proposed substitution. All substitutions must receive written approval from the UBIT Representative prior to implementation.

1.8. QUALITY ASSURANCE
1.8.1. Qualifications
1.8.1.1. The Contractor shall demonstrate design and installation training and possess certifications of competence. At least one BICSI RCDD shall be on staff or engaged as a consultant for the duration of the project.
1.8.2. Installers
1.8.2.1. Copper and fiber cable installation shall be supervised by a certified BICSI Level 2 Installer, who shall be present whenever work under this section is performed.
1.8.2.2. All installation personnel shall maintain current certification required by the structured cabling manufacturer's Advanced System Warranty program and shall be qualified to perform installations in full compliance with the manufacturer's guidelines.

1.8.3. Delivery Storage and Handling
1.8.3.1. Visually inspect all products for damage, do not accept any visibly damaged items.
1.8.3.2. Store products in a clean, dry conditions and in a manner that prevents damage.
1.8.3.3. Recycle or dispose of all waste produced.

1.9. PROTECTION OF EXISTING TELECOMMUNICATION FACILITIES
1.9.1. The Contractor shall be fully responsible for any damage caused to existing-to-remain telecommunications systems and shall immediately restore all affected systems to their original condition at the Contactor's expense.

2. PRODUCTS

2.1. CONTRACTOR FURNISHED PRODUCTS

2.1.1. All products shall conform to applicable industry standards including but not limited to:

- NEMA (National Electrical Manufacturers' Association)
- ANSI (American National Standards Institute)
- ASTM (American Society for Testing and Materials)
- IEEE (Institute of Electrical and Electronic Engineers)
- NEC (National Electric Code)
- NESC (National Electrical Safety Code)

2.1.2. All products shall be UL-listed unless otherwise indicated.

2.1.3. All products must be new.

2.1.4. All components within a specific system shall be from the same manufacturer unless otherwise approved by the warranty provider or UBIT Representative.

2.2. OWNER FURNISHED PRODUCTS

2.2.1. Ethernet Switches will be furnished and installed by the owner (OFOI).

2.2.2. Wireless Access Points and mounting hardware will be furnished by the owner and installed by the Contractor (OFCI).

3. EXECUTION

3.1. EXAMINATIONS

3.1.1. Verify existing conditions and report discrepancies to the Architect and UBIT Representative.

3.1.2. Inspect cables, reels, and shipping cartons for damage; replace any visibly damaged materials at no additional cost to the owner.

3.2. PREPARATIONS

3.2.1. Protect all existing components and systems within the work area from dust, moisture, and excessive heat.

3.2.2. Provide all necessary services (power, temporary cooling, air quality control) required to maintain active components that remain in service.

3.2.3. Remove existing components and systems indicated for demolition.

3.3. TELECOMMUNICATIONS INSTALLATION

3.3.1. The Contractor shall coordinate with all other trades and integrate work as required.

3.3.2. The Contractor shall furnish all materials on the drawings or specified herein to provide a complete telecommunication system.

3.3.3. All telecommunication infrastructure shall be installed neatly, aesthetically, and for optimal performance.

3.3.4. All telecommunication infrastructure shall be clearly labeled.

3.3.5. Any user outages shall be submitted to the UBIT Representative for approval at least one week before work begins.

3.3.6. Construction in new telecommunication rooms shall be substantially complete prior to cable installation, including installation of plywood, cable tray, ladder tray, electrical outlets, lighting, sprinklers, ductwork, and grounding. All walls must be painted before cabling begins.
3.3.7. New telecommunication rooms shall be free of dust and debris before terminating copper or fiber cabling. Doors shall remain closed during termination.

3.4. TELECOMMUNICATIONS DEMOLITION
3.4.1. Where telecommunication rooms are being relocated and existing-to-remain cables can reach the new location, cables may be removed back to the hallway and reinstalled to the new room. If cables cannot reach, new cables shall be installed. All relocated cables shall be retested.
3.4.2. For removal of an existing telecommunication room, the UBIT Representative will remove all active telecommunication equipment prior to demolition.
3.4.3. All cabling identified for demolition shall be removed from the outlet back to source.

3.5. CLEANING
3.5.1. Maintain a broom-clean work area throughout the project.
3.5.2. Remove all unused materials, tools, debris, and packing materials from completed work areas.
3.5.3. Damp clean all surfaces before final acceptance by owner.

END OF SECTION 27 05 00

1. GENERAL

1.1. SUMMARY

1.1.1. The Contractor shall furnish and install a telecommunications bonding and grounding system in all telecommunication spaces, in full compliance with ANSI/TIA J-STD-607-D and the Bonding and Grounding (Earthing) guidelines outlined in the BICSI TDMM, 15th Edition.

1.1.2. The Contractor shall furnish and install a telecommunications bonding backbone, a telecommunications main ground busbar, and all associated field testing and system interconnections.

1.1.3. This section includes labor, equipment, materials, supplies, and testing required for the installation, termination, and labeling of the grounding and bonding infrastructure as indicated on the drawings and/or required by these specifications.

1.1.4. The Contractor shall furnish all incidental equipment and materials necessary to complete the systems included in this section, whether or not specifically indicated on the drawings.

1.2. SECTION INCLUDES

- Wall-Mount Busbars
- Rack-Mount Busbars
- Bonding Conductors
- Bonding Accessories

1.3. INFORMATIONAL SUBMITTALS

- Shop Drawings
- Product Data
- As-built Plans Showing Locations of Infrastructure
- Qualifications for Installers

1.4. CLOSEOUT SUBMITTALS

1.4.1. Operation and Maintenance Data

1.4.1.1. Ground-resistance test results measured at the BCT connection.

1.4.1.2. Bonding-resistance test results at each TGB and its nearest grounding electrode.

1.4.1.3. Final as-built documentation showing infrastructure locations and connectivity.

1.5. MAINTENANCE SUBMITTALS

1.5.1. Extra Stock Material

1.5.1.1. Provide five Equipment Ground Kits for each equipment rack to be installed.

2. PRODUCTS

2.1. WALL-MOUNT BUSBARS

2.1.1. Telecommunications Main Grounding Busbar (TMGB)

2.1.1.1. TMGB shall be constructed of .25” thick copper bar.

2.1.1.2. The busbar shall be 4” H x 20” L with 30 attachment points for two-hole grounding lugs or 4” H x 12” L with 9 attachment points.

2.1.1.3. Hole pattern shall comply with of ANSI-J-STD-607-D.
2.1.1.4. Busbar shall include wall-mounted standoff brackets, assembly screws and insulators to provide a 2.5” standoff from the wall.
2.1.1.5. Busbars shall be UL listed as grounding and bonding equipment.
2.1.1.6. Owner-Approved Product:

Chatsworth Products, Inc.
Part Number: 40153-020
Part Number: 40153-012

2.1.2. Telecommunications Grounding Busbar (TGB)
2.1.2.1. TGB shall be constructed of .25” thick solid copper.
2.1.2.2. The busbar shall be 2” H x 12” L with 9 attachment points or 2” H x 10 ”L with 7 attachment points.
2.1.2.3. Hole pattern shall comply with ANSI-J-STD-607-D.
2.1.2.4. Busbar shall include wall-mounted stand-off brackets, assembly screws, and insulators to provide a 2.5" standoff from the wall.
2.1.2.5. Busbar shall be UL listed as grounding and bonding equipment.
2.1.2.6. Owner-Approved Product:

Chatsworth Products, Inc.
Part Number: 13622-012
Part Number: 13622-010

2.2. RACK-MOUNT BUSBAR
2.2.1. Vertical Ground Bar
2.2.1.1. Vertical rack-mount ground bar shall be constructed of .05” thick by .68” W tinned copper strip.
2.2.1.2. Bar shall be 78” H for mounting vertically on equipment racks and shall include holes punched on 5/8” -5/8” -1/2” spacing to match the EIA-310 universal hole pattern for a 45 RMU rack.
2.2.1.3. Each bar shall include three #12-24 zinc-plated thread forming screws, an abrasive pad, and antioxidant compound.
2.2.1.4. Bar shall be UL listed as grounding and bonding equipment.
2.2.1.5. Owner-Approved Product:

Chatsworth Products, Inc.
Part Number: 40172-001

2.3. BONDING CONDUCTORS
2.3.1. Conductors shall be green-insulated copper, minimum #6 AWG.
2.3.2. TBB sizing shall be 2 kcmil per linear foot of conductor length to a maximum of 3/0 AWG.

TBB Length (ft)	TBB Size (AWG)
<13	6
14-20	4
21-26	3
27-33	2
34-41	1
42-52	1/0
53-66	2/0
>66	3/0

2.3.3. Insulation shall meet the fire ratings of its pathway or shall be installed in separate conduit.
2.3.4. Provide “L” brackets sized appropriately for routing bonding conductors.
2.3.5. Comply with UL 486A-486B

2.4. BONDING ACCESSORIES
2.4.1. Two-Hole Ground Terminal Block
2.4.1.1. Terminal block shall be made of electroplated tin-coated aluminum.
2.4.1.2. Shall accept conductors from #14 AWG through 2/0 AWG.
2.4.1.3. Set screws shall be stainless steel.
2.4.1.4. Shall include two 1/4” mounting holes spaced on 5/8” centers.
2.4.1.5. Shall be UL listed as a wire connector.
2.4.1.6. Owner-Approved Product:

Chatsworth Products, Inc.
Part Number: 40167-001

2.4.2. Compression Lugs
2.4.2.1. Manufactured from electroplated tinned copper.
2.4.2.2. Shall have two holes spaced 5/8” or 1” centers.
2.4.2.3. Sized for conductors #6 AWG to 3/0 AWG.
2.4.2.4. UL-listed as wire connectors.
2.4.2.5. Owner-Approved Product:

Chatsworth Products, Inc.
Part Number: 40162-***xxx***
Where ***xxx*** is aligns for wire size and spacing

2.4.3. Antioxidant Joint Compound
2.4.3.1. Oxide inhibiting joint compound for copper-to-copper, aluminum-to-aluminum, or aluminum-to-copper connections.
2.4.3.2. Owner-Approved Product:

Chatsworth Products, Inc.
Part Number: 40168-801
Part Number: 40166-801

2.4.4. C-Type Compression Taps
2.4.4.1. Manufactured from copper alloy.
2.4.4.2. Provide irreversible splices requiring hydraulic crimping tool.
2.4.4.3. Sized for conductors #2 AWG to 4/0 AWG.
2.4.4.4. Owner-Approved Product:

Chatsworth Products, Inc.
Part Number: 40163-***xxx***
Where ***xxx*** aligns for wire size

2.4.5. Pipe Clamp with Grounding Conductor
2.4.5.1. Shall be electroplated tinned bronze with stainless steel hardware.
2.4.5.2. Sized for two conductors (#6 AWG to 250MCM), both equal in size.
2.4.5.3. UL listed as grounding and bonding equipment.
2.4.5.4. Owner-Approved Product:

Chatsworth Products, Inc.
Part Number: 40170-***xxx***
Where ***xxx*** aligns for wire size

2.4.6. Equipment Grounding Kit
2.4.6.1. Kit includes one 24” insulated grounding jumper, one straight two-hole lug, one L-shaped two-hole lug, two mounting screws, abrasive pad, and a .5-ounce tube of antioxidant compound.
2.4.6.2. Jumper shall be insulated #6 AWG green/yellow stripe wire.
2.4.6.3. Components shall be UL-listed.
2.4.6.4. Owner-Approved Product:

Chatsworth Products, Inc.
Part Number: 40159-010

3. EXECUTION

3.1. INSTALLATION
3.1.1. Provide a complete telecommunications bonding and grounding system.
3.1.2. Route bonding conductors to minimize bends and overall length.
3.1.3. Install a TBB if the building does not not already have an adequate one.
3.1.4. Install a TBC to the building’s electrical entrance facility if none exists, with conductor size not less than 3/0 AWG.
3.1.5. Install a TMGB if one does not already exist.
3.1.6. Wall-Mount Busbars
3.1.6.1. Mount busbars according to manufacturer instructions.
3.1.6.2. Use two-hole bolt-on compression lugs at all busbar connections.
3.1.6.3. Prepare bonding surfaces and apply antioxidant prior to installation.
3.1.6.4. Bond the wall-mount busbar to:

- The electrical service panel in the same room.
- Building steel.
- The TBB.

3.1.7. Rack-Mount Busbars and Ground Bars
3.1.7.1. Install vertical ground bars on racks supporting active equipment or shielded cabling.
3.1.7.2. Bond rack-mount bars to the TMGB or TGB using properly sized conductors.
3.1.8. Ground Terminal Block
3.1.8.1. Bond each rack individually to the TMGB or TGB.
3.1.8.2. Remove paint at bonding points and apply antioxidant.
3.1.9. Pipe Clamp
3.1.9.1. Bond metal pipes inside telecommunication rooms with minimum #6 AWG.
3.1.9.2. Remove paint and apply antioxidant at the bonding point.
3.1.10. Cable and Ladder Tray
3.1.10.1. Sand bonding points to bare metal and apply antioxidant.
3.1.10.2. Install two-hole-lug #6 AWG bonding jumpers at each tray joint (12” max).
3.1.10.3. Install additional grounding conductors where tray continuity is interrupted.
3.1.10.4. Install L-brackets every 12” for routing bonding conductors, secure with Velcro.

3.2. IDENTIFICATION AND LABELING
3.2.1. Refer to 27 05 53 Identification for Communication Systems.

3.3. FIELD OR SITE QUALITY CONTROL
3.3.1. Engage a qualified testing agency.
3.3.2. Testing Requirements
3.3.2.1. Inspect mechanical condition and verify torque on all bolted connections.
3.3.2.2. Test bonding connections using an AC earth ground-resistance tester following ANSI/TIA-607-D.
3.3.2.3. Maximum acceptable bonding resistance: 100 milliohms.
3.3.2.4. Measure ground loop currents with a digital clamp-on ammeter (full scale ≤ 10 A, resolution 0.01 A).
3.3.2.5. Maximum acceptable AC current on any conductor: 1 A.

END OF SECTION 27 05 26

1. GENERAL

1.1. SUMMARY

1.1.1. Work under this section includes providing and installing conduits, boxes, runways, and related components required to support telecommunications cabling, including twisted-pair and fiber-optic media.

1.1.2. Provide horizontal distribution systems and branch conduits as shown on the Drawings, as specified herein, and in coordination with Electrical specifications.

1.1.3. Provide penetrations and conduits through walls and floors for designated cable pathways.

1.1.4. Provide cable tray above corridor ceilings to serve as horizontal distribution pathways.

1.2. SECTION INCLUDES

- Service Entrance Conduits
- Riser Conduits / Sleeves
- Horizontal Distribution System
- Data Outlet Conduits/Boxes

1.3. INFORMATIONAL SUBMITTALS

- Outlet Boxes
- Cable Tray Fittings and Accessories
- J-Hooks

2. PRODUCTS

2.1. TELECOMMUNICATIONS OUTLET BOX

2.1.1. Data outlet locations require an outlet box size of 5” x 5” x 2 7/8” with a single gang mud ring.

2.1.2. Owner-Approved Product:

RANDL Industries, Inc.
Part Number: T-55017

2.2. Cable Tray

2.2.1. Owner-Approved Product:

Cablofil
12” x 2”
Part Number: CF54/300EZ

12” x 4”
Part Number: CF105/300EZ

3. EXECUTION

3.1. GENERAL REQUIREMENTS

3.1.1. Telecommunication pathways shall provide structured routes between the MDF and IDF rooms, from IDFs to floor corridors, and into individual rooms for data outlets.

3.1.2. New pathways shall not interfere with existing pathways such that cable installation is hindered.
3.1.3. Provide plastic bushings on all conduit termination points.

3.2. SERVICE ENTRANCE CONDUITS
3.2.1. Install a minimum of four 4" conduits from nearest utility tunnel or duct bank as shown on the drawings.
3.2.2. Terminate conduits entering MDF rooms:
- From below grade: 4" above finished floor and within 12" of room corners.
- From above ceiling: Extend 4" below ceiling or 12" above ladder tray.

3.2.3. Install Owner-approved vertical ladder tray to support cables within 12" of conduit terminations.
3.2.4. Provide continuous conduits runs from building entry to the MDF.
3.2.5. No more than two 90° bend between pulling points.
3.2.6. Seal exterior wall penetrations on both sides with hydraulic cement; seal inside of conduits with plugs or duct sealer.
3.2.7. Provide grounding bushings on metallic conduits and bond to the telecommunications grounding system using minimum #6 AWG conductor.

3.3. PATH REQUIREMENTS FOR ENTRANCE CONDUITS
3.3.1. If conduit exceeds 180° total bends, install an accessible junction box or manhole.
3.3.2. Provide as-built drawings to the UBIT Representative before backfilling.
3.3.3. Install cable waterfalls where vertical cable transitions exceed 6".

3.4. RISER CONDUITS
3.4.1. Provide a minimum of four 4" conduits between the MDF and each IDF.
3.4.2. Terminate within 4" of entrance walls and within 12" of corners.
3.4.3. Terminate conduits from below floor 4" above finished floor.
3.4.4. Riser conduits shall be continuous and separate from horizontal systems.
3.4.5. Limit bends to two 90° bends or 180° total per continuous run.
3.4.6. Install junction boxes only in accessible areas.
3.4.7. Equip conduits with nylon pull cords (minimum 200-lb rating).
3.4.8. Provide restorable firestopping where conduits penetrate fire-rated construction.
3.4.9. Provide insulating press-fit bushings unless cable waterfalls are used.
3.4.10. Install cable waterfalls on all 4" conduits with vertical transitions greater than 6".
3.4.11. Riser conduits shall not be used for horizontal cabling, access control, or any non-telecommunication low-voltage systems.

3.5. RISER SLEEVES
3.5.1. Provide fire-rated floor assemblies where telecommunication rooms are vertically stacked.

3.6. HORIZONTAL DISTRIBUTION SYSTEMS
3.6.1. Conduit System (Renovations Only)

3.6.1.1. Where conduits are exposed, consult A/E regarding painting.
3.6.1.2. Provide 3” or 4” EMT, 10-ft lengths where possible, reamed, with support every 6’.
3.6.1.3. Size conduits to maintain a 40% fill rate to the IDF/MDF.
3.6.1.4. Install conduits stacked against walls when possible, otherwise install side-by-side on Unistrut trapeze hangers.
3.6.1.5. Provide nylon pull cords in all conduits.
3.6.1.6. Install cable waterfalls where vertical transitions exceed 6”.

3.6.2. Corridor Cable System
3.6.2.1. Provide wall-mounted or suspended cable basket tray and accessories as shown, installed per manufacturer instructions.
3.6.2.2. Maintain minimum clearances: 12” above, 6” side, 3” below.
3.6.2.3. Do not exceed 60% of manufacturers load rating.
3.6.2.4. Provide 4” EMT or restorable fire-rated sleeves at walls to maintain ≤20% fill.
3.6.2.5. Where tray is exposed, consult A/E regarding solid-bottom inserts.
3.6.2.6. Provide dropouts where more than 10 cables exit the system.
3.6.2.7. Provide factory tee and 90° fittings and splice connectors.

3.6.3. Sleeves
3.6.3.1. Install waterfalls on all 4” sleeves with vertical transitions >6”.
3.6.3.2. Provide 4” EMT or restorable fire-rated sleeves at fire-rated walls to maintain ≤20% fill.

3.7. DATA OUTLET CONDUITS
3.7.1. Provide 1” conduit stub from outlet location to accessible ceiling.
3.7.2. Provide insulating press fit busing conduits.
3.7.3. Support cabling from stub to nearest runway using j-hooks.
3.7.4. Provide nylon pull cord in each conduit.

END OF SECTION 27 05 28

1. GENERAL

1.1. SUMMARY

1.1.1. The Contractor shall review and understand all requirements in this and all related specification sections necessary for a complete and proper installation.

1.1.2. Work under this section includes providing all labor, equipment, materials, and supplies required to label the telecommunications infrastructure as indicated on the drawings and specified herein.

1.2. SECTION INCLUDES

- Grounding and Bonding
- Copper and Fiber Riser Cable
- Copper Horizontal Cable
- Telephone 110-Block
- Faceplates
- Patch Panels

1.3. INFORMATION SUBMITTALS

- Labeling Scheme

2. PRODUCTS

2.1. COPPER AND FIBER RISER CABLE LABELS IN TELECOMMUNICATION ROOMS

2.1.1. Black lettering on white vinyl tape 0.5” height.

2.1.2. Owner-Approved Product:

Panduit
Part Number: T050X000VPC-BK

2.2. COPPER HORIZONTAL CABLE LABELS IN TELECOMMUNICATION ROOMS AND BEHIND FACEPLATES

2.2.1. Black lettering on white vinyl label 1.” wide x 1.5” length.

2.2.2. Owner-Approved Product:

Panduit
Part Number: S100X150VAC

2.3. TELEPHONE 110-BLOCK LABELS IN TELECOMMUNICATION ROOMS

2.3.1. Black lettering on white vinyl tape, 0.38” height.

2.3.2. Owner-Approved Product:

Panduit
Part Number: T038X000VPC-BK

2.4. FACEPLATE LABELS

2.4.1. Black lettering on white vinyl tape, 0.38” height.

2.4.2. Owner-Approved Product:

Panduit
Part Number: T038X000VPC-BK

2.5. PATCH PANEL LABELS IN TELECOMMUNICATION ROOMS

2.5.1. One-port identifier, black lettering on white, adhesive, polyolefin label, 0.61” wide x 0.30” height.

2.5.2. Owner-Approved Product:

Panduit
Part Number: C061X030FJC

3. EXECUTION

3.1. LABELING SYSTEM

3.1.1. All components – including racks, cables, panels, and outlets – shall be clearly identified.

3.1.2. Labels must indicate cable origin, destination (backbone cabling only), and unique cable identifier.

3.1.3. Racks and patch panels shall be labeled to identify their location in the cabling system.

3.1.4. All labeling information shall be documented on as-built drawings and test reports.

3.2. LABELS

3.2.1. Labels shall be machine-printed using indelible ink.

3.2.2. Self-laminating labels sized to cable OD shall be placed at termination points on each end.

3.2.3. Outlet, patch panel, and block labels shall be installed in the provided label space.

3.3. GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS LABELING

3.3.1. Comply with ANSI/TIA-607-D

3.3.2. Coordinate labeling scheme with the UBIT Representative prior to labeling.

3.3.3. Use pre-printed or computer-generated labels only.

3.3.4. Label TMGBs and TGBs as “fs-TMGB” or “fs-TGB” where fs is the telecommunications space identifier.

3.3.5. Label the TBC and backbone conductors:
“WARNING! TELECOMMUNICATIONS BONDING CONDUCTOR. DO NOT REMOVE OR DISCONNECT!”

3.4. COMMUNICATIONS COPPER BACKBONE CABLE LABELING

3.4.1. At the MDF and IDFs, label only the first and last pairs on each 110-block row.

3.4.2. Place the riser cable number on the center wiring-block label.

3.5. COMMUNICATIONS OPTICAL FIBER BACKBONE CABLE LABELING

3.5.1. Each fiber riser cable shall be labeled at both ends with:

- Building
- Cable Number
- “FO” indicating fiber, plus “S” for single-mode or “M” for multi-mode.

3.5.2. Fiber enclosures shall be labeled on the exterior and inside the front panel.
3.5.3. Label placement in Tunnels:
- Every 200 ft
- At each service coil
- 12” from entrance/exit conduits
- At all innerduct openings when applicable.

3.5.4. Label placement in Utility Holes:
- 12” from conduits
- At each service coil

3.5.5. Label placement in Telecommunication Rooms:
- 12” form conduits and termination points
- At all service coils
- Labels to be placed on all service coils

3.6. COMMUNICATIONS HORIZONTAL CABLE LABELING
3.6.1. Label Format
3.6.1.1. The University at Buffalo has chosen ANSI/TIA/EIA-606(A), Class 1 Administration, for horizontal links. This includes the *fs-a-n* format as indicated in section 5.1 Infrastructure Identifiers where:

f = numeric character(s) identifying the floor of the telecommunication room in which the cable is terminated.

s = alpha character(s) uniquely identifying the telecommunication room on the floor in which the cable is terminated.

a = one or two alpha characters uniquely identifying a single patch panel in the telecommunication room in which the cable is terminated.

n = two or four numeric characters designating the port on the patch panel.

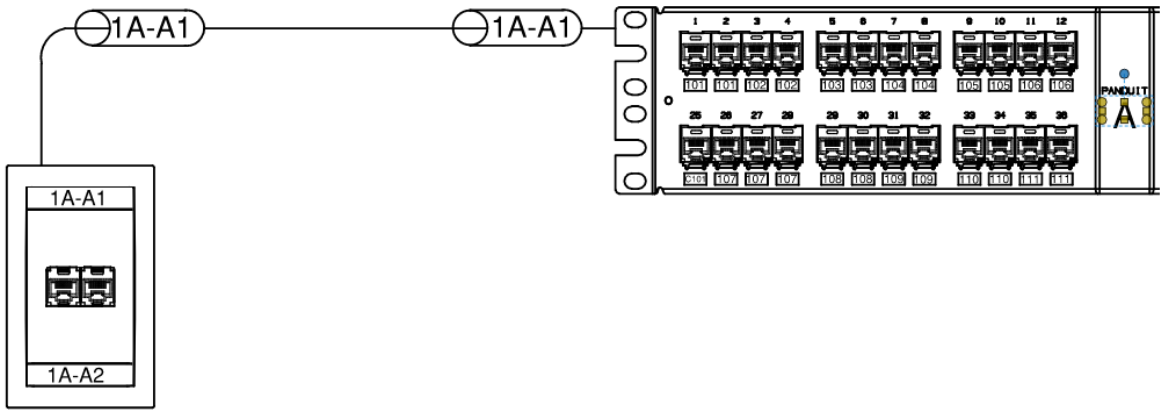
3.6.1.2. The University does not include the room number on the cable label (rrr option).

3.7. COMMUNICATIONS PATCH PANEL LABELING
3.7.1. Horizontal data cables are terminated in ascending room-number order.
3.7.2. Each patch panel port shall be labeled with the room number of its corresponding outlet.
3.7.3. Patch panels are assigned letters starting with “A” and descending alphabetically.

3.8. DATA OUTLET RE-LABELING
3.8.1. Contractor shall re-label all existing data outlets that are moved or modified, including changes due to room renumbering.
3.8.2. All associated hardware (110-blocks, patch panels, cables, faceplates) must also be updated.
3.8.3. Existing identification shall be recorded and included in as-built documentation.
3.8.4. Old labels must be completely removed and replaced neatly.

4. SKETCHES

Typical Labeling Scheme for Horizontal Cabling



END OF SECTION 27 05 53

1. GENERAL

1.1. SUMMARY

1.1.1. The Contractor shall review this specification and all related documents necessary for a complete and compliant installation.

1.1.2. Provide all materials, qualified labor, and services to deliver a fully functional system in accordance with project requirements.

1.2. SECTION INCLUDES

- Wall Linings
- Ladder Rack
- Adjustable Cable Runway
- Equipment Racks
- Cable Management
- Rack Mounted Power Distribution Units

1.3. PRE-INSTALLATION MEETINGS

1.3.1. Conduct a pre-installation meeting with the UBIT Representative to confirm mounting locations. Prior to the meeting, assemble a mock-up of racks and vertical cable management components.

1.4. INFORMATION SUBMITTALS

- Product Data

2. PRODUCTS

2.1. WALL LININGS

2.1.1. 4’ x 8’ x ¾” A-C grade fire-retardant plywood.

2.2. TELECOMMUNICATION ROOM LADDER RACK

2.2.1. Manufactured from 3/8” W x 1 ½” H tubular steel, .065” wall thickness.

2.2.2. Stringers are 9’-11 ½” long with welded cross-members every 12” (10 total).

2.2.3. 10 ½” spacing between cross-members.

2.2.4. Delivered individually boxed in specific widths.

2.2.5. UL-Classified for grounding (remove paint and use grounding straps).

2.2.6. Epoxy-polyester hybrid power-coat finish, color as specified.

2.2.7. Basis of Design:

Chatsworth Products, Inc.
Universal Cable Runway, Glacier White
Part Number: 10250-E12
Part Number: 10250-E18

2.3. HORIZONTAL 90 ° TURNS (CABLE RUNWAY E-BEND)

2.3.1. 3/8” W x 1 ½” H tubular steel, .065” wall thickness.
2.3.2. Stringers formed into 90° arc.
2.3.3. Five welded cross-members spaces approximately every 23°.
2.3.4. 15” inside radius for smooth cable transition.
2.3.5. Epoxy-polyester hybrid power-coat finish.
2.3.6. Owner-Approved Product:

Chatsworth Products, Inc.
Cable Runway E-bend, Glacier White
Part Number: 10822-E12
Part Number: 10822-E18

2.4. CORNER BRACKETS (CABLE RUNWAY CORNER BRACKET)
2.4.1. 3/8” W x 1 ½” H tubular steel, .065” wall thickness.
2.4.2. Insider stringers formed at 90° with chamfer.
2.4.3. Outside stringer radius: 15” or 24”.
2.4.4. Single welded cross-member for smooth insider corner transition.
2.4.5. Epoxy-polyester hybrid powder-coat finish.
2.4.6. Owner-Approved Product:

Chatsworth Products, Inc.
Cable Runway Corner Bracket, Glacier White
Part Number: 11959-E15
Part Number: 11959-E24

2.5. LADDER RACK SPLICES
2.5.1. Provide mechanical connections for end-to-end or side-to-end ladder rack sections.
2.5.2. Grounding kits shall bond all ladder rack sections independently of splices.
2.5.3. Grounding kit: #6 AWG green insulated stranded copper conductor with two-hole lugs and stainless hardware.
2.5.4. Splice plates: steel with zinc-plated finish.
2.5.5. All kits include installation hardware.
2.5.6. Owner-Approved Products:

Chatsworth Products, Inc.

Compression Splice – End-to-End
Part Number: 11301-701

Compression Splice – T or L
Part Number: 11302-701

Bolted Splice- End-to-End
Part Number: 11299-701

Bolted Splice – T or L
Part Number: 11298-701

Compression Splice – Angled
Part Number: 10616-701

Compression Splice – Horizontal to Vertical
Part Number: 11314-701

Compression Splice – Swivel
Part Number: 10487-701

Compression Splice – T or L Angled
Part Number: 10488-701

Grounding Kit
Part Number: 12061-001

Compression Splice – Electrically Isolates
Part Number: 10842-001

2.6. LADDER RACK SUPPORTS

2.6.1. Sizes shall match ladder rack width.

2.6.2. Each support must secure the rack per manufacturer instructions.

2.6.3. Epoxy-polyester hybrid powder-coat finish.

2.6.4. Owner-Approved Products:

Chatsworth Products:

Triangular Support Bracket – 12”
Part Number: 11746-E12

Triangular Support Bracket – 24”
Part Number: 11746-E18

Wall Angle Support Kit 12”
Part Number: 11421-E12

Wall Angle Support Kit 18”
Part Number: 11421-E18

Threaded Ceiling Kit – 3/8” Rod
Part Number: 11310-001

Threaded Ceiling Kit – 5/8” Rod
Part Number: 11310-003

Threaded Ceiling Kit – M10 Rod
Part Number: 11310-093

Threaded Ceiling Kit – M16 Rod
Part Number: 11310-094

Rack-to-Runway Mounting Plate 18”
Part Number: 10595-E18

Rack to Runway Mounting Plate 24”
Part Number: 12408-E24

Cable Runway Elevations Kits 2” to 3”
Part Number 10506-E02

Cable Runway Elevation Kits 4” to 6”
Part Number: 10506-E06

2.7. LADDER RACK ACCESSORIES

2.7.1. Cable straps: reusable hook-and-loop type.
2.7.2. Cable retaining posts: 1” x ½” tubular steel, .065” wall, 8” height, rubber end caps.
2.7.3. End caps: black fire-retardant rubber.
2.7.4. Radius drops: aluminum, 90° arc, min. 3” bend radius, includes 1 ½” cable spools.
2.7.5. Auxiliary L-brackets: 1/8” x 1” steel bar, 4” drop, 4” support surface, zinc-plated with gold chem finish.
2.7.6. Touch-up paint to match component finish.
2.7.7. Owner-Approved Products:

Chatsworth Products, Inc.

Saf-T-Grip Cable Management Straps 2”
Part Number: 02006-203

Saf-T-Grip Cable Management Straps 3”
Part Number: 02009-203

Saf-T-Grip Cable Management Straps 4”
Part Number: 02012-203

Cable Retaining Post
Part Number: 10596-708

Cable Runway Protective End Caps
Part Number: 10642-001

Cross Member Radius Drop 12”
Part Number: 12100-E12

Cross Member Radius Drop 18”

Part Number: 12100-E18

Side Stringer Radius Drop
Part Number: 12101-E01

L-Bracket 4”
Part Number: 11268-001

Touch-Up Paint Bottle
Part Number: 25401-E00

2.8. ADJUSTABLE CABLE RUNWAY

2.8.1. Stringers: 1.5” H x 0.4” W roll-formed steel, 0.75” wall.

2.8.2. Cross-members: 1.5” W x .80” D extruded aluminum, .09” wall.

2.8.3. Owner-Approved Products:

Chatsworth Products, Inc.

Adjustable Cable Runway 18”
Part Number: 14300-E18

Adjustable Cable Runway 24”
Part Number: 14300-E24

2.9. ADJUSTABLE CABLE RUNWAY CROSS MEMBER KIT

2.9.1. Packs of 10 or 50 tool-less aluminum cross-members, 18” or 24” width.

2.9.2. Owner-Approved Products:

Chatsworth Products, Inc.

Cross Member Kit 18”
Part Number: 14302-E18

Cross Member Kit 24”
Part Number: 14302-E24

2.10. TELECOMMUNICATION ROOM D-RINGS

2.10.1. Plastic vertical d-rings for 110-block cable management.

2.10.2. Owner-Approved Product:

Panduit

Open-Access Vertical D-Ring
Part Number: CMVDR1

2.11. EQUIPMENT RACKS

2.11.1. Aluminum construction with L-shaped top and base angles and C-shaped mounting channels.

2.11.2. Universal EIA-310-D hole pattern, 45U, numbered.

2.11.3. 7’ H x 20.3” W assembled.

2.11.4. Electrical bonding provided through assembly hardware; dedicated ground stud provided.
2.11.5. Owner-Approved Products:

Chatsworth Products, Inc.
Part Number: 55053-E03

Panduit
Part Number: R2PWH

Eaton
B-Line Series
Part Number: SB556084XUFB

2.12. CABLE MANAGEMENT – VERTICAL
2.12.1. Double-sided H-shaped trough with independent front and rear channels.
2.12.2. Removal/hinged doors with two-point latch.
2.12.3. T-shaped cable guides; rounded edges; individually boxed.
2.12.4. Owner-Approved Products:

Chatsworth Products Inc,
Evolution® Cable Management 10”
Part Number: 35523-E03

Evolution® Cable Management 12”
Part Number: 35524-E03

Panduit
PatchRunner™ 2 Enhanced 10”
Part Number: PE2VD10WHY

PatchRunner™ 2 Enhanced 12”
Part Number: PE2VD12WH

Eaton
RCM+ 10”
Part Number: SB860810D084EW

RCM+ 12”
Part Number: SB860812D084EW

2.13. CABLE MANAGEMENT – HORIZONTAL
2.13.1. Single-sided C-shaped trough with cover.
2.13.2. T-shaped cable guides along top and bottom.
2.13.3. Delivered individually boxed.
2.13.4. Owner-Approved Products:

Chatsworth Products, Inc.

Evolution® Cable Management
Part Number: 35441-E04

Panduit
PatchRunner™ 2 Enhanced
Part Number: PR2HF4WH

Eaton
RCM+
Part Number: SB87019SX4EW

2.14. RACK MOUNT POWER DISTRIBUTION UNITS (PDU'S)

2.14.1. 3.3/3.8kW Single-Phase 208/240V Basic PDU, 14 Outlets (12 C13 & 2 C19), NEMA L6-20P Input, 15' cord, 1U Rack-Mount.

2.14.2. Owner-Approved Products:

Tripp Lite
Basic Series PDU
Part Number: PDUH20HVL6

Panduit
Basic PDU
Part Number: P12B46M

APC
NetShelter Basic Rack PDU
Part Number: AP9566

2.14.3. Basic PDU, 20AMP, 120Volt, 12 Outlets (5-20R), L5-20P Input

2.14.4. Owner-Approved Products:

Tripp Lite
Basic PDU
Part Number: PDU1220T

Panduit
Basic PDU
Part Number: P12B30M

nVent
Rack Mount PDU
Part Number: DP1N191020ST

3. EXECUTION

3.1. GENERAL

3.1.1. Telecommunication rooms shall be clean and free of dust before installation.

3.1.2. Coordinate with other trades to avoid conflicts.

3.1.3. Install all infrastructure per BICSI best practices and maintain organization suitable for future moves, adds, and changes.
3.1.4. Maintain TIA-569 access and clearance requirements.
3.1.5. Maintain continuous operation of existing network services; submit outage-related work to the UBIT Representative at least one week in advance.

3.2. Wall Linings
3.2.1. Mount plywood from 6" AFF to 8'6" AFF with A-side facing outward.
3.2.2. Paint with grey fire-retardant paint, leaving the UL fire-rating stamp visible.
3.2.3. Do not obstruct cable routing with mechanical/electrical equipment.

3.3. Ladder Rack and Adjustable Cable Runway
3.3.1. Install ladder rack around the room perimeter, install adjustable cable runway above racks.
3.3.2. Minimum width 18".
3.3.3. Mount horizontal runs at 8' AFF to rack bottom; consult with UBIT Representative for conflicts.
3.3.4. Add ladder rack sections where OSP, riser, or large cable bundles enter the room.
3.3.5. Use radius drops where cables exit ladder rack/runway.
3.3.6. Use components from a single manufacturer.
3.3.7. Install with side rails facing downward (inverted U-shape).
3.3.8. Support per TIA-569-E:
- Every 5' or less
- Within 2' of splices, intersections, and elevation changes
- Every 2' for vertical wall-mounted runs

3.3.9. Provide heavy-duty splices for 18"+ racks.
3.3.10. Maintain clearances:
- 12" above ladder rack
- 3" above equipment racks

3.3.11. Bond ladder rack/runway to form an electrically continuous system and connect to the TGB.
3.3.12. Cable fill shall not exceed 50% of interior area or manufacturer load limits.
3.3.13. Secure cable bundles with reusable straps unless retaining posts are used.
3.3.14. Install 8" cable retaining posts when fill exceeds 2" or straps cannot be used.
3.3.15. Separate cable media types using cable spools.

3.4. Electrical Outlets
3.4.1. Label outlet covers with circuit number and panel.
3.4.2. Label panel schedules to identify circuits serving the telecom room.

3.5. D-Rings
3.5.1. Install D-rings on plywood a shown in drawings to route cabling between tray/riser and 110-blocls.

3.6. Equipment Racks
3.6.1. Assemble racks per manufacturer instructions, anchor to floor at four points.

3.6.2. Ground racks to the TGB.
3.6.3. Ladder rack may be attached to top using manufacturer-approved hardware—do not drill racks.
3.6.4. Turn over unused hardware to UBIT.

3.7. Cable Management – Vertical
3.7.1. Install vertical cable managers on rack ends and between racks:
- 10” wide at ends with no future expansion
- 12” wide at ends with future expansion and between racks

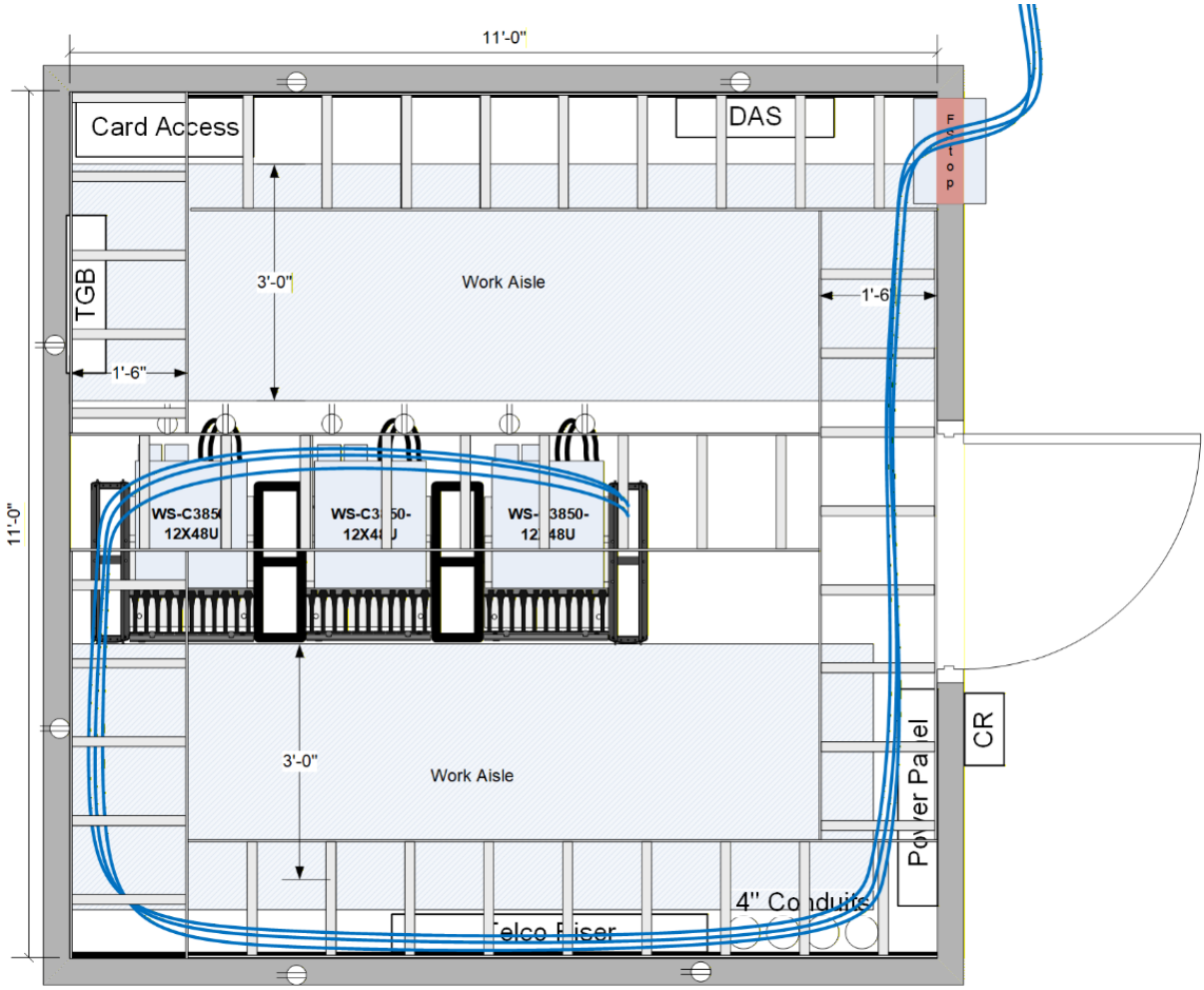
3.7.2. Secure managers to racks using provided hardware.
3.7.3. When shared between two racks, attach to both.
3.7.4. Use consistent make/model across grouped racks.
3.7.5. Install doors and leave closed after cabling.

3.8. Cable Management – Horizontal
3.8.1. Provide two 4U horizontal managers per rack.
3.8.2. Coordinate mounting height with UBIT Representative.
3.8.3. Install with four screws per manufacturer instructions; close covers after cabling.

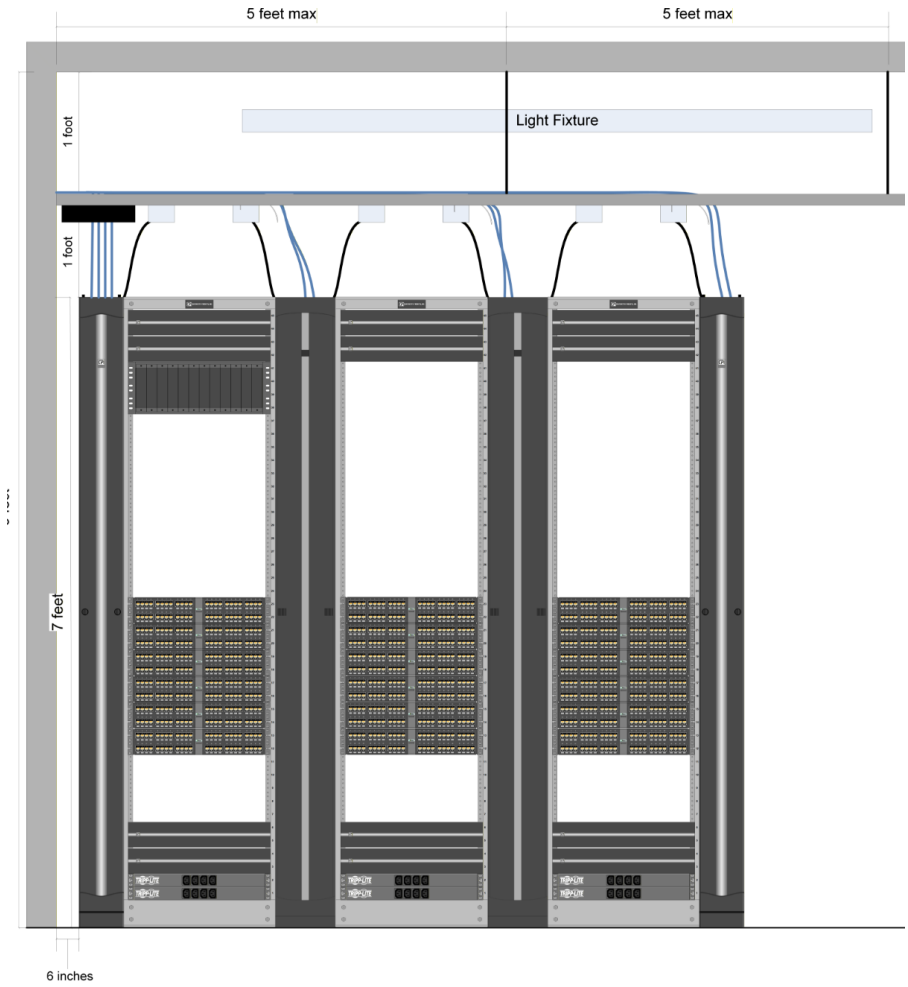
3.9. Power Distributions Units (PDU’s)
3.9.1. Provide two rack-mounted PDUs per equipment rack.
3.9.2. Select PDU models compatible with available power.

4. SKETCHES

Typical Telecommunication Room Layout



Typical Equipment Rack Elevation



END OF SECTION 27 11 00

1. GENERAL

1.1. SCOPE OF WORK

1.1.1. The Contractor shall review this specification and all related documents necessary for a complete, compliant installation.

1.1.2. Provide all required materials, qualified labor, and services to deliver a fully functional operational system in accordance with contract documents.

1.2. SECTION INCLUDES

- Intrabuilding Copper Cable

1.3. INFORMATION SUBMITTALS

- Product Data
- As-built
- Test Results

2. PRODUCTS

2.1. INTRABUILDING COPPER CABLE (VOICE)

2.1.1. Provide riser cables from the MDF to each IDF as shown on the drawings or as specified.

2.1.2. Cable shall consider of 25-pair, unshielded twisted pair (UTP), 24 AWG solid bare annealed copper with semi-rigid PVC insulation.

2.1.3. Category 3, CMP-rated.

2.1.4. Owner-Approved Products:

Prysmian Group
Part Number: 2131505

Superior Essex
Part Number: 18-499-36

3. EXECUTION

3.1. INTRABUILDING COPPER CABLE (VOICE)

3.1.1. Follow manufacturer installation instructions for proper termination and wire management.

3.1.2. Owner will provide future cross-connect terminations.

3.2. WIRING COLOR CODES

3.2.1. Wire to ANSI/TIA/EAI standards.

3.3. GENERAL CABLE INSTALLATION

3.3.1. Do not exceed manufacturer-recommended bend radius or pulling tension.

3.3.2. Provide 8’-10’ of slack per riser cable; secure slack loop on wall near the termination block.

3.3.3. In telecommunication rooms, bundle cables with hook-and-loop reusable ties every 3’; do not use plastic zip ties or deform cable jackets.

3.4. IDENTIFICATION AND LABELING

3.4.1. Refer to 27 05 53 - Identification for Communication Systems.

3.5. CABLE TESTING

3.5.1. Perform basic continuity testing.

3.5.2. Tone each pair using a tone generator and confirm routing with an inductive probe.

3.6. AS-BUILT INFORMATION

3.6.1. Provide complete as-built documentation and all test results.

3.6.2. Submit redlined construction drawings showing conduit routes, cable tray paths, junction boxes, and all telecommunication-related changes.

END OF SECTION 27 13 13

1. GENERAL

1.1. SUMMARY

1.1.1. The Contractor shall review this specification and all related documents, and shall provide all qualified materials, qualified labor, and services to deliver a fully operational system installed in accordance with contract requirements.

1.1.2. All grounding, bonding, duct seals, and fire stopping shall meet applicable code and project specifications.

1.2. SECTION INCLUDES

- Interbuilding Fiber Optic Cabling
- Intrabuilding Fiber Optic Cabling
- Fiber Optic Cable Termination Enclosures
- Fiber Optic Cable Termination Cassettes
- Fiber Optic Grounding Kits

1.3. PRE-INSTALLATION MEETINGS

1.3.1. The Contractor's RCDD and installation supervisor shall meet with the UBIT Representative prior to fiber installation to coordinate all requirements.

1.4. INFORMATIONAL SUBMITTALS

1.4.1. Manufacturer data sheets and installation instructions for all products in this section.

1.4.2. Cable pulling plan prepared and stamped by the Contractor's RCDD including:

- Cable routes and runs
- Date and Duration
- Pulling method and equipment
- Pulling tensions

1.4.3. Warranty documentation, including extended warranty information.

1.4.4. Draft and final test plans (approved and stamped by the Contractor's RCDD).

1.4.5. Contractor qualification statements.

1.4.6. Installer certifications from the cable manufacturer.

1.5. CLOSEOUT SUBMITTALS

1.5.1. As-Built Drawings

1.5.2. Warranty Documentation

1.5.3. Approved test reports (stamped by the Contractor's RCDD)

1.5.4. Letter of project completion from Contractor's RCDD.

1.6. QUALITY ASSURANCE

1.6.1. UBIT Representative must inspect work prior to concealment; uncovering uninspected work is at the Contractor's expense.

1.6.2. Fiber installation must be supervised by a certified BICSI Level 2 installer.

1.6.3. All installation personnel must hold current manufacturer training credentials for the warranty program.

1.7. DELIVERY, STORAGE, & HANDLING

1.7.1. Store all materials in original packaging; protect from weather, humidity, and dust per manufacturer guidelines.

1.8. WARRANTY

1.8.1. Standard Manufacturer Warranty: 1 year from Substantial Completion.

1.8.2. Extended Manufacturer Warranty: 25 years from Substantial Completion.

2. PRODUCTS

2.1. GENERAL

2.1.1. To qualify for the Manufacturer's Warranty and Application Assurance, all backbone components shall be from the same manufacturer as specified.

2.2. INTERBUILDING FIBER OPTIC CABLING

2.2.1. Shall be form only one manufacturer.

2.2.2. Shall be outdoor rated.

2.2.3. Owner-Approved Products:

Corning
ALTOS Loose Tube, Fast Access, Binderless, Gel-Free Cable, Single Mode
Part Number: 024ZU4-T4F22D20

ALTOS Lite Loose Tube, Armored Cable with Fast Access
Part Number: 024ZUC-T4F22D20

Panduit
Opti-Core Gel-Free Outside Plant Cable, Unarmored
Part Number: FSTN924

Opti-Core Gel Free Outside Plant Cable, Armored
Part Number: FSWN924

Leviton
Indoor/Outdoor Plenum Premises Distribution Cable
Part Number: PDP024AB0707-I/O-C4(YEL)

Indoor/Outdoor Plenum Premises Distribution Interlock Armored
Part Number: PDPK024AB0707-I/O-C4C5(YEL)

2.3. INTRABUILDING FIBER OPTIC CABLING

2.3.1. Shall be from only one manufacturer.

2.3.2. Shall be riser rated.

2.3.3. Armored cable shall be grounded.

2.3.4. Owner-Approved Products:

Corning
MIC Tight-Buffered Cable, Riser, Single Mode (OS2)
Part Number: 012E81-33131-24

MIC Tight-Buffered Cable, Riser 50 µm multimode (OM4)
Part Number: 012T81-33190-24

MIC Tight-Buffered, Interlocking Armored Cable, Riser, Single-Mode (OS2)
Part Number: 012E81-33131-A1

MIC Tight-Buffered, Interlocking Armored Cable, Riser, 50 µm multimode (OM4)
Part Number: 012T81-33190-A1

Prysmian
Distribution Indoor Tight Buffered - Riser, Single-Mode OS2
Part Number: F-400-00-HB-012-EB

Distribution Indoor Tight Buffered - Riser, 50 µm multimode (OM4)
Part Number: F-400-00-G4-012-M3

Distribution Indoor Tight Buffered Armored, Single-Mode (OS2)
Part Number: F-400AJ-00-HB-012-EA

Distribution Indoor Tight Buffered Armored, 50 µm multimode (OM4)
Part Number: F-400AJ-00-G4-012-M3

Leviton
Indoor/Outdoor Plenum Premises Distribution - Single-mode (OS2)
Part Number: PDP012AB0707-I/O-C4(YEL)

Indoor/Outdoor Plenum Premises Distribution – Multimode 50 µm (OM4)
Part Number: PDP012FB3010/F5-I/O-C4(AQU)

Indoor/Outdoor Plenum Premises Distribution with Armor-Tek, Single-mode
Part Number: PDPK012AB0707-I/O-C4C5(YEL)

Indoor/Outdoor Plenum Premises Distribution with Armor-Tek, Multimode 50
Part Number: PDPK012FB3010/F5-I/O-C4C5(AQU)

2.4. INTERBUILDING FIBER OPTIC INNDERDUCT

2.4.1. Shall be from only one manufacturer.

2.4.2. Shall be sized for 4" conduits.

2.4.3. Owner-Approved Product:

Maxcell
Edge 4.00"
Part Number: MXE86383

2.5. INTRABUILDING FIBER OPTIC INNERDUCT

2.5.1. Shall be designed for the fiber optic riser cable installation.

2.5.2. Owner-Approved Product:

Panduit
Corrugated Loom Solid Wall Tubing
Part Number: CLTS50F-C3

2.6. FIBER OPTIC CABLING TERMINATION HARDWARE - ENCLOSURES

2.6.1. Shall be based on and matched to the manufacturer of the Outside Plant Fiber Optic Cable.

2.6.2. Owner-Approved Products:

Corning
Rack Mounted 1U Housing
Part Number: CCH-01U

Rack Mounted 2U Housing
Part Number: CCH-02U

Rack Mounted 4U Housing
Part Number: CCH-04U

Wall Mounted 24 Fiber Housing
Part Number: WCH-02P

Wall Mounted 48 Fiber Housing
Part Number: WCH-04P

Panduit
Rack Mounted 1U Housing
Part Number: FRE1UBL

Rack Mounted 2U Housing
Part Number: FRE2UBL

Rack Mounted 4U Housing
Part Number: FRE4UBL

Wall Mounted 24 Fiber Housing
Part Number: FWME2

Wall Mounted 48 Fiber Housing
Part Number: FWME4

Leviton
Rack Mounted 1U Housing
Part Number: 5R1UH-W03

Rack Mounted 2U Housing
Part Number: 5R2UH-W06

Rack Mounted 4U Housing
Part Number: 5R2UH-W12

Wall Mounted 24 Fiber Housing
Part Number: 5WSML-02C

Wall Mounted 48 Fiber Housing
Part Number: 5WSML-04C

2.7. FIBER OPTIC CABLING TERMINATION HARDWARE – CASSETTES

2.7.1. Shall be based on and matched to the manufacturer of the Outside Plant Fiber Optic Cabling.

2.7.2. Owner-Approved Products:

Corning
CCH Pigtailed Splice Cassette 12F, LC UPC Duplex, Single-Mode (OS2)
Part Number: CCH-CS12-A9-P00RE

Panduit
Opticom Fiber Optic Splice Cassette 12 F, LC UPC Duplex, Single-Mode (OS2)
Part Number: FCS9N-12-10P

Leviton
SDX Pigtail Fusion Splice Module 12 F, LC UPC Duplex, Single-Mode (OS2)
Part Number: SPLCS-2LL

2.8. FIBER OPTIC GROUNDING KITS

2.8.1. Shall be based on and matched to the manufacturer of the Outside Plant Fiber Optic Cabling.

2.8.2. Owner-Approved Products:

Corning
Armored Cable Grounding Kit
Part Number: FDC-CABLE-GRND

Panduit
Structured Ground Armored Cable Grounding Kit
Part Number: ACGK

Leviton / Berk-Tek
Armor-Tek Ground Straps
Part Number: 1114671

3. EXECUTION

3.1. GENERAL

3.1.1. Install all products in accordance with manufacturer requirements, drawings, and UBIT standards.
3.1.2. Work shall be plumb, square, clean, and professional.
3.1.3. Maintain clean telecom rooms, tunnels, handholes, ducts, and manhole during installation.

3.2. EXAMINATIONS

3.2.1. Verify all ducts, conduit, entrance facilities, trays, and pull boxes are properly installed before proceeding.

3.3. FIBER OPTIC INNERDUCT INSTALLATION

3.3.1. Clean ducts using compressed air or brushed prior to installation.
3.3.2. Leave ~6” of innerduct extending from duct ends.
3.3.3. Provide continuous sections; splice only when necessary using approved methods.
3.3.4. Secure pull ropes using a slit-and-wedge method and tie off excess slack.

3.4. INTERBUILDING FIBER OPTIC CABLE INSTALLATION

3.4.1. Install cable in Owner-designated ducts; coordinate any changes with the UBIT Representative.
3.4.2. If a multicell duct is available, install cable in a sub-duct. If no multi-cell duct is available, the Contractor is to install multi-cell innerduct into a single duct.
3.4.3. New cables may share ducts with existing cables if safe.
3.4.4. Pull each fiber run in one continuous length with no splices unless approved by the UBIT Representative.
3.4.5. Route the fiber optic cable from the entrance facility to the termination point as shown on the drawings.
3.4.6. Provide 25’ slack at locations shown or determined during pre-installation meeting.
3.4.7. Keep telecom rooms clean; doors must remain closed during termination.

3.5. INTRABUILDING FIBER OPTIC CABLE INSTALLATION

3.5.1. Terminate in rack-mounted or wall-mounted enclosure.
3.5.2. Do not exceed manufacturer bend radius or pulling tension.
3.5.3. Provide minimum 10’ service loop at both ends.
3.5.4. Keep telecom rooms clean and closed during terminations.

3.6. GROUNDING
- 3.6.1. Ground fiber optic cabling per manufacturer's instructions.

3.7. FIBER OPTIC CABLE TESTING
- 3.7.1. Test per latest TIA standards.
- 3.7.2. All fibers must be fully certified.
- 3.7.3. Interbuilding Mandatory Testing includes:
  - 3.7.3.1. Tier One (OLTS)
  - 3.7.3.2. Tier Two (OTDR)
  - 3.7.3.3. End Face Inspection IEC 61300-3-35
- 3.7.4. Intrabuilding Mandatory Testing includes:
  - 3.7.4.1. Tier One (OLTS)
  - 3.7.4.2. End Face Inspection IEC 61300-3-35
- 3.7.5. Coordinate a meeting with the UB IT Representative to discuss testing procedures, equipment, documentation, etc. to verify to the Owner a complete understanding of requirements and schedule.
- 3.7.6. Provide qualified test technicians.
- 3.7.7. Testing must be performed on all fibers in the completed end-to-end system.
- 3.7.8. The UBIT Representative shall be notified at least 24 hours prior to testing to allow 100% observation at the UBIT Representatives discretion. If the UBIT Representative confirms their intention to observe, a reasonable starting time will be agreed upon.
- 3.7.9. Maintain electronic copies of all test results.
- 3.7.10. Submit final certified test reports.

3.8. FIBER OPTIC CABLE TESTING EQUIPMENT
- 3.8.1. Submit equipment specifications and calibration records for approval.

3.9. AS-BUILT INFORMATION
- 3.9.1. Provide electronic as-built drawings showing OSP routes, conduit configurations, labeling, cable types, and all changes.
- 3.9.2. If construction drawings are not used, provide an accurate scaled site plan.

3.10. IDENTIFICATION AND LABELING
- 3.10.1. Refer to 27 05 53 Identification for Communication Systems.

3.11. CLEANING
- 3.11.1. Remove all debris; keep areas clean.

3.12. PROTECTION
- 3.12.1. Protect installed products until substantial completion, replace damaged items.

END OF SECTION 27 13 23

1. GENERAL

1.1. SUMMARY

1.1.1. Provide a complete Category 6A F/UTP (shielded) structured cabling system supporting 10 Gb/s up to 100 meters.

1.1.2. Provide a Manufacturer's Warranty and Application Assurance for a minimum of 20 years.

1.1.3. Furnish all horizontal cabling, termination hardware, adapters, and cross-connect components required for a complete system.

1.2. SECTION INCLUDES

- Category 6A F/UTP Cable
- Category 6A Shielded Patch Panels
- Category 6A Shielded Modular Jacks
- Modular Faceplates
- Category 6A Shielded Cable Assemblies
- Consolidation Points
- Entrance Protection Equipment

1.3. COORDINATION

1.3.1. Coordinate faceplate color with the Architect.

1.3.2. Coordinate labeling scheme, consolidation point requirements, and product selections with the UBIT Representative.

1.4. PRE-INSTALLATION MEETINGS

1.4.1. Contractor's RCDD and installation supervisor shall meet with UBIT prior to cable installation to coordinate:

- Labeling Scheme
- Cable Routing
- Wireless Access Point Installation

1.5. SEQUENCING

1.5.1. Provide all Category 6A shielded patch cords after horizontal cable testing.

1.6. SUBSTITUTIONS

1.6.1. For discontinued or unlisted products, Contractor's RCDD must obtain written Manufacturer approval and submit to the UBIT Representative for review.

1.7. SUBMITTALS

1.7.1. Manufacturer's Warranty and Application Assurance documentation.

1.8. CLOSEOUT SUBMITTALS

1.8.1. Warranty Documentation
1.8.2. Test Reports (approved and stamped by Contractor's RCDD)
1.9. MAINTENANCE SUBMITTALS
1.9.1. Extra Stock Material: Provide two patch cords per data outlet, distributed equally across approved lengths (5', 7', 10', 15').

1.10. QUALITY ASSURANCE
1.10.1. 20-year Manufacturer Warranty covering replacement/repair of defective passive components.
1.10.2. 20-year Application Assurance covering system performance for all supported and future standards-based applications.
1.10.3. Manufacturer registration certificate required upon system acceptance.

1.11. INSTALLERS
1.11.1.1. Copper installation shall be supervised by a certified BICSI Level 2 Installer.
1.11.1.2. All installers must hold current manufacturer training credentials.

2. PRODUCTS

2.1. GENERAL
2.1.1. All horizontal cabling components must be from the same manufacturer to maintain system warranty eligibility.

2.2. CATEGORY 6A F/UTP CABLE
2.2.1. Owner-Approved Products:

Panduit
General Cable, GenSPEED 10,000 Category 6A F/UTP (ScTP) Cable
Part Number: 7141586

Leviton
FDT Plenum Cat6a F/UTP
Part Number: 11143338

Commscope
Copper Twisted Pair Cable, Category 6A, Shielded, 1000ft, Blue
Part Number: UN874034704/10

2.3. CATEGORY 6A SHIELDED AND ANGLED PATCH PANELS
2.3.1. Must match cable manufacturer.
2.3.2. Include grounding hardware.
2.3.3. Owner-Approved Products:

Panduit

Mini-com, Angled, Shielded, Patch Panel, 48 port, 2 RU, White
Part Number: CPA48WH

StructuredGround Thread Forming Bonding Screw
Part Number: RGTBSG

Leviton
Shielded Angled Quickport Patch Panel, 48-Port, 2RU, White
Part Number: 4S256-WS8

Commscope
Shielded Angled Discrete Distribution Module Panel, SL, 2U, 48 port, White
Part Number: 760257024

2.4. CATEGORY 6A SHIELDED MODULAR JACKS

2.4.1. Must match cable manufacturer.

2.4.2. Owner-Approved Products:

Panduit
Mini-Com TX6A 10Gig Shielded Jack Modules
Part Number: CJS6X88TGY

Leviton
Atlax-X1 Cat6A Component-Rated Shielded QuickPort Jack
Part Number: 6ASJK-RL6

Commscope
Cat6A Uniprise SLX Series Modular Jack
Part Number: 760238121

2.5. MODULAR FACEPLATES

2.5.1. Must match cable manufacturer.

2.5.2. Owner-Approved Products:

Panduit
Mini-Com Executive Series Faceplates
Part Number: CFPE***x***I***yy***Y
Where ***x*** is the number of ports, from 1 to 6
Where ***yy*** is the color code to be coordinated with Architect

Mini-Com Stainless Steel Faceplates
Part Number: CFPL***x***SY
Where ***x*** is the number of ports from 1 to 10

Leviton

QuickPort Single & Dual Gang Faceplates with ID Windows
Part Number: 42080-***xx***-***yy***
Where ***xx*** is the number of ports, from 1 to6
Where ***yy*** is the color code to be coordinated with Architect

Commscope
Universal Opening Flush Style Faceplate, Labeled
Part Number: FP-LBL-***x***P-***yyy***
Where ***x*** is the number of ports from 1 to 10
Where ***yyy*** is the color code to be coordinated with Architect

2.6. CATEGORY 6A SHIELDED CABLE ASSEMBLIES
- 2.6.1. Must match cable manufacturer.
- 2.6.2. Owner-Approved Products:

Panduit
TX6A 10Gig Shielded Patch Cords
Part Number: STP6X5BU
Part Number: STP6X7BU
Part Number: STP6X10BU
Part Number: STP6X15BU

Leviton
Atlas-X1 Slimline Boot Shielded (S/FTP)
Part Number: 6AS10-05
Part Number: 6AS10-07
Part Number: 6AS10-10
Part Number: 6AS10-15

Commscope
Uniprise Ultra 10 Cat6A S/FTP
Part Number: UC111G2-0ZF005
Part Number: UC111G2-0ZF007
Part Number: UC111G2-0ZF010
Part Number: UC111G2-0ZF015

2.7. ENTRANCE PROTECTION EQUIPMENT
- 2.7.1. Support for up to 10GbE data rate
- 2.7.2. Shielded RJ45 In/Out Connectivity
- 2.7.3. Owner-Approved Products:

Ditek
Power over Ethernet Surge Protector
Part Number: DTK-MRJPOES

3. EXECUTION

3.1. EXAMINATIONS

3.1.1. Verify before installation:

- Conduits, trays, and pull boxes are installed.
- Plywood backboards installed.
- Grounding system installed and tested.
- Backbone service loops protected.

3.2. CATEGORY 6A F/UTP CABLE

3.2.1. Install per manufacturer guidelines and industry best practices.
3.2.2. Provide pull cord (1/8" nylon minimum) in all conduits.
3.2.3. Do not exceed TIA/EIA-569-D raceway fill limits.
3.2.4. Install cables in continuous lengths; splices only at approved transition/consolidation points).
3.2.5. Do not exceed cable bend radius or pulling tension.
3.2.6. Support cable every 48-60" when using j-hooks.
3.2.7. Cables shall not rest on ceiling grids or sprinkler systems.
3.2.8. Bundle no more than 25 cables per group.
3.2.9. Do not attach to ceiling grids or fixture wires; use proper supports.
3.2.10. Replace any damaged cable at no cost to Owner.
3.2.11. Horizontal Cables for wireless access points and security cameras shall be terminated with a modular jack, in a box with a faceplate.
3.2.12. Store no more than 12" slack inside boxes or raceways; excess slack shall be neatly store above ceiling without violating bend radius.

3.3. CATEGORY 6A SHIELD AND ANGLED PATCH PANELS

3.3.1. Each telecom room receives patch panels sized to serve all associated cables.
3.3.2. Mount patch panels in 19" racks as determined during the pre-installation meeting.
3.3.3. Cable routing (front of rack):

- Cables 1-12 route right → left → ports 1-12
- Cables 13-24 route left → right → ports 13-24

3.3.4. Use hinged brackets where no full-size rack exists.
3.3.5. Ground all patch panels per manufacturer instructions.

3.4. CATEGORY 6A SHIELDED MODULAR JACKS

3.4.1. Terminate per ANSI/TIA-568-E, manufacturer guidelines, and best practices.
3.4.2. Pair untwist ≤ 0.125".
3.4.3. Bend radius ≥ 4x cable OD.
3.4.4. Maintain jacket to within 1" of termination.
3.4.5. Protect jacks during construction.

3.5. MODULAR FACEPLATES

3.5.1. Install jacks, secure faceplate, ensure level alignment, and apply labeling.

3.6. ENTRANCE PROTECTION EQUIPMENT

3.6.1. Mount near building penetration.

3.6.2. Ground to structural steel using minimum 14 AWG copper.

3.7. TESTING AND ACCEPTANCE

3.7.1. All cables and termination hardware shall be 100% tested for defects in installation and to verify cabling system performance under installed conditions according to the requirements of ANSI/TIA/EIA-568.0-D. All pairs of each installed cable shall be verified prior to system acceptance. Any defect in the cabling installation including but not limited to cable, connectors, feed through couplers, patch panels, and connector blocks shall be repaired or replaced in order to ensure 100% useable conductors in all cables installed.

3.7.2. All cables shall be tested in accordance with this document, the ANSI/TIA/EIA standards, the manufacturer's warranty guidelines and best industry practice. If any of these are in conflict, the Contractor's RCDD shall bring any discrepancies to the attention of the project team for clarification and resolution.

3.7.3. All twisted-pair copper cable links shall be tested for compliance to the requirements in ANSI/TIA/EIA/568.2-D for the appropriate category of cabling installed.

3.7.4. All twisted-pair copper cable links shall be tested for DC Resistance Unbalance in accordance with the IEEE 802.3bt standard.

3.7.5. The UBIT Representative may request a 10% random field re-test to be conducted on the cable system, at no additional cost, to verify documented findings. Tests shall be repeat of those defined above. If findings contradict the documentation submitted by the telecommunications Contractor, additional testing can be requested to the extent determined necessary by the UBIT Representative, including a 100% re-test. This re-test shall be at no additional cost to the Owner.

3.7.6. The field test equipment shall meet the requirements of ANSI/TIA/EIA-568-D. The appropriate level III tester shall be used to verify Category F/UTP cabling systems.

3.8. IDENTIFICATION AND LABELING

3.8.1. Refer to 27 05 53 Identification for Communication Systems for requirements.

3.9. SYSTEM DOCUMENTATION

3.9.1. Upon completion of the installation, the telecommunications Contractor shall provide an electronic pdf format documentation set to the Engineer/End User for approval.

Within 10 Working Days

- All test results

- Draft As-Built Drawings (May include annotations by hand)

Within 30 Working Days

- Machine Generated As-Built Drawings.

3.9.2. The As-Built drawings are to include cable routes and outlet locations. Their sequential number as defined elsewhere in this document shall identify outlet locations. Numbering, icons, and drawing conventions used shall be consistent throughout all documentation provided. The Architect will provide floor plans in electronic format on which as-built construction information can be added. These documents will be modified accordingly by the telecommunications Contractor to denote as-built information as defined above and returned to the Owner.

3.9.3. Test result documentation shall be provided in electronic format. The results shall include a record of test frequencies, cable type, conductor pair, and cable (or outlet) ID, measurement direction, reference setup, and crew member name(s).

3.9.4. Test equipment name, manufacturer, model number, serial number, software version, and last calibration date will also be provided at the end of the test result documentation.

3.9.5. The test result documentation shall detail the test method used and the specific settings of the equipment during the test as well as the software version being used in the field test equipment.

3.9.6. Contractor shall submit cable records to reflect all moves, additions, and changes to existing cabling infrastructure.

END OF SECTION 27 15 00