UF | Information Technology
UNIVERSITY of FLORIDA

TELECOMMUNICATIONS STANDARDS

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University of Florida Telecommunication Standards

2025 Edition

This document is designed to assist certified Information Transport System (ITS) Designers such as Professional Engineers and Registered Communications Distribution Designers (RCDD®) in the preparation of telecommunications documents in the appropriate Construction Specifications Institute (CSI) format that will accompany a full set of Telecommunications drawings for new construction projects, major renovation projects and minor renovation projects on the University of Florida (UF)campus. This document is also intended as a standard by which all low voltage telecommunications infrastructure shall be installed university wide.

Within UF Information Technology (UFIT), Infrastructure and Communication Technology's (ICT) Construction Management team is responsible for the maintenance of this document. Changes to this document shall be made using the change process specified in the UF Design and Construction Standards, of which this document is an appendix. Suggested changes to this document or variances from this standard must be coordinated through the Vice President for Information Technology & CIO or their designee at 352-273-1788 or ufit-telecom@ufl.edu.

TABLE OF CONTENTS

1.0 Introduction

1.1 Overview: Communication technologies are a critical element in the design of all new and renovation building projects. Whether it be voice, data and video transmission, security and fire alarm systems, building automation systems, audio/visual systems or other communication technologies, it is important that a team of experienced professionals be involved in the design of these complex systems.

A Structured Cabling Plant is a key concept in enabling Information Technology for UF's community. In order to maximize network functionality, and to minimize labor and materials costs, a common set of network codes and standards shall be complied with. To accomplish this, UF has adopted a policy in which these codes and standards are managed and administered centrally. UFIT is charged with this responsibility. Specific UF entities have additional requirements and should be consulted to ensure standards are maintained (refer to Appendix #6).

1.1.1 Definitions

UF: University of Florida

UFIT: University of Florida Information Technology

UFIT ICT: University of Florida Information Technology Infrastructure and Communication Technology

UFIT AT: University of Florida Information Technology Academic Technology

UFIT CM: University of Florida Information Technology Construction Management

- Falls under UFIT ICT
- Includes the Project Manager(s) who interact with UF Planning, Design and Construction (PD&C), architects and engineers as the owner representative in regard to UFIT infrastructure design and construction for renovation and new construction projects
- Include a UF outside plant manager (OSP)

UFIT ICT CS: University of Florida Information Technology ICT Communications Support

- Manages the VoIP and analog phone services for university employees on East, Main and UF Health campuses

UF PD&C: University of Florida's Planning, Design and Construction

- Oversees all of the university's major and minor construction and renovations

UFDEM: University of Florida Department of Emergency Management

1.2 General: Designers shall verify that all applicable portions of these standards are incorporated into the project's design, drawings, specifications and final construction. Requests for variances from these standards shall be submitted in writing to UFIT Construction Management. Use the Standards Variance Request Form found in Appendix #4.

1.3 Telecommunications Projects Eligibility Requirements: All projects designed by an architect/consulting engineer shall have the telecommunications infrastructure designed by the consultant team (Designer) and installed by the Contractor. This infrastructure shall include all pathways, cabling, terminations, testing and telecommunications room construction related to the telecommunications systems. The Designer shall provide these services in accordance with these standards and as directed by UFIT Construction Management

1.4 UF's Final Provisioning Work for all Projects: For all construction projects for UF, construction budgets are required to fund all internal and external telecommunications assets. This includes all wiring, telecom rooms, connectivity products, electronics, handsets, etc. Furthermore, the construction budget is required to pay for any additions to outside plant infrastructure that is needed to support the operation of the building. Designers and Contractors shall be required to develop construction schedules that allow adequate time for UFIT or other responsible organizations to complete this final provisioning work, prior to Substantial Completion and the Owner's occupancy of each part of a project.

1.4.1 Contractors shall be required to cooperate with UFIT personnel and allow them equal access to the jobsite to inspect and complete any work necessary in the completion of the project, concurrent with other work underway by the Contractor.

1.5 Codes and Standards: UF's communications systems shall follow the codes and standards set forth in the following: NEC, NESC, NFPA, ANSI/TIA Telecommunications Building Wiring Standards, FCC, IEEE and BICSI'S Telecommunications Distribution Methods Manual. These codes and standards are to be used as references when designing telecommunications systems.

1.5.1 UF promotes the use of widely accepted industry standards in deploying the university's telecommunications infrastructure. Employees of the university, Consultants and Contractors working on behalf of the university should have a working knowledge of these standards prior to performing work for the university and should follow the university preferred standards and practices while deploying telecommunications infrastructure. University employees, Consultants and Contractors should contact UFIT Construction Management for clarification and interpretation of these standards. The following standards are practiced at UF:

- ANSI/TIA-568-C.0. Generic Telecommunications Cabling for Customer Premises
- ANSI/TIA-568-C.1 Commercial Building Telecommunications Cabling Standard
- ANSI/TIA-568-C.2 Balanced Twisted-Pair Telecommunications Cabling and Components Standard
- ANSI/TIA-568-C.3 Optical Fiber Cabling Components
- ANSI/TIA-569-D- Commercial Building Standard for Telecommunications Pathways and Spaces
- ANSI/TIA-606-B Administration Standard for the Telecommunications Infrastructure. See Appendix #1 for the current UF Labeling standard based on ANSI/TIA/EIA-606-B
- ANSI/TIA-607-B Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises
- ANSI/TIA/-758-B Customer-Owned Outside Plant Telecommunications Infrastructure Standard
- ANSI/TIA/-862-A Building Automation Systems Cabling Standard for Commercial Buildings
- ANSI/TIA-942-A Telecommunications Infrastructure Standard for Data Centers
- NECA 1-Standard Practices for Good Workmanship in Electrical Contracting

1.5.2 These standards can be obtained through BISCI at www.bicsi.com as well as www.tiaonline.org. This manual is based on the version of the standards indicated. In practice, the most recent version should be used.

1.5.3 These standards are not intended to be used as the final specification or bid document for any specific new construction. The standards are to be used as a starting point in a process of collaboration between the Architect/Designer, the occupant and UFIT.

1.5.4 The Design Team shall include the resources needed to fully develop a complete scope of work for all telecommunications, information technology and audio/visual systems and components. The Design Team must consist of BICSI / RCDD qualified staff.

1.5.4.1 All outside plant telecommunications connecting into the UF network conduit system managed and maintained by UF ICT shall be coordinated with UFIT Construction Management. Telecommunications outside plant work (exterior of facility) must be purchased by the project and coordinated with OSP lead within the UFIT Construction Management team. Any outside plant work associated with

communications shall be provided by UFIT approved and designated underground services Contractor. The architect/engineer shall coordinate with the UF PD&C Project Manager to eliminate conflicts with other utilities, landscaping, etc., shall include all such work "by others" in the construction documents, and shall ensure that no gaps exist between the Contractors' scope of work and the scope(s) of work "by others."

1.5.5 Building interior telecommunication installation must be performed by a Contractor who is qualified by UFIT and UF Purchasing under UF Purchasing bid # ITB21KO-103. UF Purchasing maintains a list of pre-qualified Low-Voltage Contractors.

Follow UF Health guidelines for low-voltage Contractor procurement as noted in Appendix #6.

1.5.6 The expected outcome of this collaboration with the Design Team is a detailed bid-quality document that contains commonly accepted and standard language of the industry. These documents are to include a set of appropriate division specifications per Divisions 25, 27 and 28 of the CSI MasterFormat as well as Telecommunications Drawings or Sheets (a.k.a. T-Drawings or T-Sheets).

1.6 VoIP and Jabber Communications Support: UFIT manages telecommunications and collaborative communications services and support for university employees on East, Main and UF Health campuses. Services provided include new Cisco phone sets, line services, toll services, installation and repair, as well as support for collaboration tools such as Jabber softphone.

1.6.1 Line Retention Policy: If a line is not used within 18 months, it is subject to removal to be redistributed on campus.

Primary lines: All Cisco phones (desktop or Jabber app) must have a unique phone number (DID) assigned to the user as their primary line appearance. Additional lines (shared or not) can be added to those devices that support multiple lines. These include current model desktop phones as well as Jabber for desktop.
Note: Jabber mobile platforms do not support multiple line appearance.
Voicemail: Voicemail messages stored on the university's Unity voicemail system are retained as follows:

- Unheard messages are deleted from the system after six months.
- Listened Messages are deleted from the system after 30 days from the date they were first played.

END OF SECTION

2.0 Service Entrance Facility Rooms

2.1 Since UF no longer installs analog telephone services, we are omitting the requirement to allocate space for and the design of a Service Entrance Facility. The Main Telecommunications Room shall serve as the entrance for wide area networking services.

END OF SECTION

3.0 Main Telecommunications Room (MTR)

3.1 Overview: This space provides for the demarcation between inter-building and intra-building telecommunications service. This area contains the electronic equipment that transitions between the core campus data, voice and video backbones and the building backbone. This securable room is to be dedicated to this purpose with no other building services sharing the space. This space may be co-located with the same floor's Telecommunication Room (TR) or Intermediate Distribution Frame ,IDF, provided the room is sized for both functions. Main Telecommunications Rooms are generally considered to be building serving rooms.

3.2 Size: Each Main Telecommunications Room shall have the minimum size restrictions based on the overall square footages of the ***total building area*** being served. The following are minimum guidelines – consult UFIT Construction Management for approval on final design:

In larger buildings, the size of the TR size should be increased in increments of 10 ft^2 for every increase of 100,000 ft^2 in gross building area.

Total Building Size in Gross Sq. Ft.	Minimum MTR Size
up to 500,000	10' x 12'

Coordinate all final telecom room and space sizing with UFIT Construction Management during the design process for the project.

3.2.1 Where a Main Telecommunications Room will also provide service as a Telecommunication Room, the minimum size of the room shall be determined by summing the square footage requirements of all services that will be supplied by that room.

3.2.2 Where a Main Telecommunications Room may house security access control panels, the minimum size of the room shall be provided. Larger rooms may be needed depending on the amount of equipment proposed. Coordinate wall mounting of access control panels with UFIT Construction Management prior to installation. No servers or other ancillary security equipment shall be installed in Telecommunication Rooms. Security panels shall have their own power source, and additional power should be designed into Telecommunications Rooms that house access control panels. Submit variance request (Appendix #4) to mount security access control panels into Telecommunication Rooms as a means to confirm adequate space is available.

3.2.3 Minimum ceiling height is 9' 6", with the bottom of the exposed structure considered the ceiling. The wall shall extend to the bottom of the exposed structure. There shall be no suspended ceiling.

3.2.4 All rooms shall be square or rectangular with walls at right angles to each other. No triangular rooms or walls with curves shall be allowed. No columns shall be allowed inside the room.

3.3 Location: The Main Telecommunications Room shall be located to ensure the room has access to the intra- and inter-building backbone pathway, is accessible for delivery of equipment, away from potential sources of electromagnetic interference (EMI), away from machinery that causes vibration and away from steam pipes, drains and clean-outs. If the Main Telecommunications Room is on a different floor than the Entrance Facility, it should be vertically aligned above the Entrance Facility Room.

3.4 Casework in the Main Telecommunications Room: Install 7' racks or cabinets, without panels, to support video, voice and data network termination devices and electronics. All data equipment shall be rack-mounted and the infrastructure design should reflect this. The amount of service required to support the building might require more than one rack or cabinet to be installed. Fasten the rack(s) or cabinet(s) to the floor and bond the rack or cabinet to the ground bus.

3.4.1 Number and location of the racks or cabinets shall be supplied during the design phase of the project (see Telecommunications Room Examples – Appendix #3). Two post racks shall be secured to the wall behind them with a ladder rack. A good working environment for a Telecommunications Room includes at least three feet of clear space extending out from the front of the equipment mounted on a wall and at least three feet out from the front and back of equipment mounted in a rack with two feet of clearance on each side.

3.4.2 All racks and cabinets shall be provided with cable management for horizontal and backbone cabling. (See Telecommunications Room Examples Appendix #3).

3.5 Disconnect Modules: The UFIT Construction Management team will have their OSP lead coordinate with the public utility on the installation of the building entrance terminal protectors when the feeder cables are installed.

3.6 Door: Rooms shall have a fully opening, lockable door opening into an indoor publicly accessible area. The door shall be at least 36" wide and 80" in height. The door shall be keyed to match UF's 5150 key.

3.7 Electrical: Depending on the several factors including the number of cables and switches that will terminate in the Main Telecommunications Room, there are two

different configurations for power attached to each rack. Please consult the UFIT Construction Management Project Manager for which configuration to consider for each space.

3.7.1 For typically larger density installations with multiple racks and patch panels, every rack in the design shall have one 120Vac/20A quadplex outlet and one 208Y/30A electrical outlet NEMA L630R mounted on the ladder tray between the rack to the wall. Each of these outlets shall be on a dedicated circuit and connected to emergency power if available.

3.7.2 For typically lower density installations with few racks and patch panels, every rack included in the design shall have one 120Vac/20A quadplex outlet and one 120Vac/30A electrical outlet NEMA L530R mounted on the ladder tray between the rack to the wall. Each of these outlets shall be on a dedicated circuit and connected to emergency power if available.

3.7.3 Along all walls there should be one 120Vac/20A electrical duplex outlet every 6 ft at 6" AFF. This should be below the listed and fire rated backboard.

3.7.4 A dedicated circuit shall serve every outlet that provides electrical service to networking equipment, such as switches or power supplies. This is not necessary for the general service outlets 6" AFF. Every electrical outlet shall be labeled with printed labels to indicate the serving power panel and breaker.

3.7.5 If standby power is or will be available, the electrical circuits for the racks shall be included in the emergency standby power design.

3.8 Grounding: Provide a building ground cable, with bus bar, to the room. Locate the bus bar at the lower left corner of the listed and fire rated backboard. Refer to the Grounding section of these standards. (See Grounding and Bonding – Appendix #2)

3.9 HVAC: Equipment Rooms that house electronics shall have a HVAC source to maintain continuous control of temperature and humidity (24 hours per day, 365 days per year). The HVAC designer must consider the heat produced by each piece of equipment (the BTU rating) that will be placed in each Equipment Room. The final Equipment Room design must accommodate any special or specific requirements for heating and cooling. Temperature and humidity shall be controlled at 64 to 77 degrees (F) and 40% to 55% RH respectively. Additionally, design as needed heat dissipation of 5000 BTU/hr per cabinet to accommodate installed electronics. Consider a dedicated HVAC source for the Telecommunications Room if more energy efficient to operate than using the building's general HVAC system.

- Temperature: 18 – 27°C (64 – 81°F)

- Maximum relative humidity (RH): 60%
- Minimum dew point: 5.5°C (42°F)
- Maximum dew point: 15°C (59°F)

3.9.1 HVAC Location: The installed location of the HVAC unit and pipes feeding the unit shall be designed to minimize risk of dripping fluids on the network electronics and shall not be above the network electronics rack.

3.10 Identification: The Main Telecommunications Room shall be identified and labeled per UF PD&C standard procedures. These room numbers typically start with the letters "TR" followed by a two-digit floor number and letter to distinguish rooms on the same floor. For example, the second telecom room on the first floor would be known as "TR01B." Actual room numbers should only be used where required by applicable security regulations.

3.11 Interior Finishes: To minimize dust, floors shall be of vinyl composition tile or sealed concrete. All exposed concrete, brick and gypsum board walls shall be painted or sealed.

3.12 Lighting: Provide a minimum equivalent of 500 lux (50-foot candles) measured at 1 m (3 ft) above finished floor.

3.13 Building Entrance Conduits: Building entrance conduits shall enter the Main Telecommunications Room, typically below grade, with four 4" conduits that run to an exterior maintenance hole or hand hole. One of these three4" conduits shall contain four 1" innerducts or Maxcell brand innerduct.

3.13.1 A minimum of three 4" conduits shall be installed between each Telecommunications Room or IDF and the Main Telecommunications Room.
For Telecommunications bonding backbone, a 1" sleeve or conduit is required for proper grounding pathway. All conduits are required to be fire stopped per NEC.

3.14 Pathways in the Main Telecommunications Room: A 12-inch, or greater, cable ladder-style tray shall be installed that will encircle the room at 8.5' AFF. Additionally, trays shall be installed to service equipment rows, cross-connect areas and conduits entering the room. Waterfalls must be installed where cables drop from the cable ladder tray.

3.15 Plumbing: The Main Telecommunications Room shall <u>not</u> have any water pipes within the room's interior space, routing horizontally on the floor directly above the room or within the floor slab below the room. Additionally, plumbing in the walls surrounding the Main Telecommunications Room should be avoided as

the backboards are fastened with long screws or anchors that could pierce the conduits.

3.16 Backboard Panels: Each wall shall have listed and fire rated backboard consisting of 3/4" X 4' X 8' sheets of A-C Grade plywood installed on them for anchoring termination strips and other devices. The listed and fire rated backboard panels shall be gray in color with 100% acrylic latex primer/sealer applied to front and sides of plywood substrate. Labels must clearly indicate the listing and fire resistivity and be affixed to the backboard.

3.16.1 The backboard shall reach from corner to corner. Install the backboard vertically at 12" AFF and anchor securely to wall substrate with a minimum of five equally spaced fasteners along each vertical edge and down the centerline of each panel. Backboard kits shall include fasteners for masonry, hollow block, steel frame and wood frame walls. Fasteners must be flush with surface of backboard. Fasteners shall be of the appropriate type for each substrate. Provide blocking or additional studs in framed walls to receive backboard panel fasteners. Caution should be exercised to make sure any adjacent electrical panels or in-wall plumbing is not damaged.

3.17 Card Key Access and Security: UF policy calls for the protection of all IT infrastructure, equipment and hardware located within a building. If a new or renovated building includes integration of an access control system, telecommunications rooms shall also be integrated into the access control system for secure entry and monitoring. Systems employed must match those currently being deployed throughout campus. UFIT's physical security of IT assets policy can be found at https://policy.ufl.edu/policy/physical-security-of-information-technology/

END OF SECTION

4.0 Telecommunications Rooms or IDF

4.1 Overview: These rooms provide for demarcation between the per-floor horizontal service distribution cabling and the building video, data and voice backbone cabling. A Telecommunications Room provides the connection point between the building backbone and horizontal distribution pathways. These securable rooms are to be dedicated to this purpose with no other building services sharing the spaces (except as noted below in paragraph 4.2.1 for the security panels). A Telecommunications Room may be co-located with the Main Telecommunications Room provided the room is sized for both functions.

4.2 Size: For new construction the preferred size is a 10' x 12' room with one door opening into a major publicly accessible hallway. For renovations where the preferred design is not possible, a 5' x 14' room with two sets of double doors with each set providing a 6' opening on the 14' wall of a major publicly accessible hallway (the doors must swing into the hallway) may be used. The second design uses the hallway as temporary space during times of maintenance and is most practical in low traffic hallways such as office areas.

4.2.1 Security access control panels: As per Main Telecommunications Room.

4.3 Location: A Telecommunications Room shall be centrally located in reference to the area it serves. This is to minimize the horizontal cable lengths and duplication of electronic equipment.

4.3.1 At a minimum, a Telecommunications Room shall be provided for each floor of the building. The Telecommunications Rooms should be located above each other on the different floors. If the Telecommunications Rooms are not stacked, the Telecommunications Room shall have a means to access the Telecommunications Rooms on the floor above and below via metal conduits or sleeves.

4.3.2 Maximum distance between the Telecommunications Room on each floor and a telecommunications work area data outlet is 295 feet, as measured per the cable pathway.

4.4 Casework: As per Main Telecommunications Room.

4.5 Disconnect Modules: As per Main Telecommunications Room.

4.6 Door: As per Main Telecommunications Room unless a special room size is approved.

4.7 Electrical: As per Main Telecommunications Room.

4.8 Grounding: As per Main Telecommunications Room.

4. HVAC: As per Main Telecommunications Room.

4.10 Identification: As per Main Telecommunications Room.

4.11 Interior Finishes: As per Main Telecommunications Room.

4.12 Lighting: As per Main Telecommunications Room.

4.13 Pathways Entering the Telecommunication Room: If the Telecommunications Rooms are stacked one above another, three 4" sleeves shall be installed between each Telecommunications Room. Should Telecommunications Rooms not be stacked, a minimum of three 4" conduits shall be installed between each Telecommunications Room and the Main Telecommunications Room. For Telecommunications bonding backbone, a 1" sleeve or conduit is required for proper grounding pathway. All conduits are required to be fire stopped per NEC.

4.14 Pathways in the Telecommunication Room: As per Main Telecommunications Room.

4.15 Plumbing: As per Main Telecommunications Room.

4.16 Listed and Fire Rated Backboard Panels: As per Main Telecommunications Room.

END OF SECTION

5.0 Backbone Pathways

5.1 Overview: Communications conduit requirements depart from that for "normal" electrical power distribution. Communications conduit sizing does not follow NEC in terms of the maximum number of conductors allowed per unit volume. Due to the need for facilitating frequent additions, moves and changes to the telecommunications systems, communications conduits are generously sized larger.

5.1.2 Conduits serving as a backbone pathway for telecommunications cables are a minimum of 4". Conduits serving as a pathway for grounding conductors are a minimum of 1".

5.1.3 Conduits shall be used to feed the Main Telecommunications Room from the Outside Plant (OSP). Conduits or sleeves shall be used to connect the Main Telecommunications Room to Telecommunications Rooms or IDFs.

5.2 Entrance Conduits: Reference the OSP section of this standard for complete design guidelines. The following shall only act as a general guide for initial backbone pathway considerations.

5.2.1 A minimum of four 4" conduits shall be used to provide connections from the OSP into the Main Telecommunications Room. One of these conduits shall be supplied with four 1" innerducts or Maxcell brand innerduct.

5.2.2 Conduits entering the building are a minimum of 4" in size with some type of sub-space partitioning.

5.2.3 Conduits shall terminate 1" to 3" inside the Main Telecommunications Room per TIA-569-B and be reamed and bushed.

5.2.4 All entrance conduits shall be sealed so as to be water and gas tight after installation.

5.2.5 Conduits shall not contain more than two 90-degree bends and be placed with a minimum of ¼ inch per foot slope, away from the Main Telecommunications Room, to allow proper water drainage from the ducts.

5.2.6 An additional 1" conduit or sleeve shall also be provided from the Main Telecommunications Room to each Telecommunications Room or IDF to provide a pathway for the Telecommunications Bonding Backbone cable.

5.3 Main Telecommunications Room Conduits: A minimum of three 4” conduits or sleeves shall be installed between the Main Telecommunications Room and each individual Telecommunications Room.

5.4 Conduits between building telecom rooms shall be a minimum of 4" in size.

END OF SECTION

6.0 Horizontal Pathways

6.1 Overview: The standards adopted by UF provide that a clear and accessible pathway for horizontal telecommunications cabling be provided. These pathways are located between the Telecommunications Rooms and the rooms containing the telecommunications outlets. The Design Team shall prepare Telecommunications drawings and specifications that ensure a clear and accessible pathway for telecommunications cabling. Any pathway that is not accessible or does not provide a clear and workable pathway will be rejected.

6.1.2 There are several methods available for providing a pathway for supporting telecommunications cables. The architectural design of each building is unique and requires an analysis of which method(s) are best suited for that building.

6.1.3 Only conduits run directly from the Telecommunications Room to the Work Area Outlet or Cable Trays with Work Area feeding conduits are accepted for horizontal pathways. "J hooks" or other similar types of cable pathway devices shall not be used in any new construction or major renovation project design. MUTOA's, CP's and TP's must be approved through UFIT Construction Management before installation.

6.2 Cable Trays: Cable Trays are the preferred pathways for supporting horizontal telecommunications cables. Cable trays shall be provided from the Telecommunications Rooms to support the horizontal cabling.

6.2.1 The minimum cable tray width is 12" and minimum cable tray depth is 4". The actual cable tray size(s) shall be determined during the design phase of the project. The cable tray shall be installed in accordance with the applicable electrical code. The cable tray is to be dedicated for use only by low-voltage cabling systems. Cable tray should be trapeze supported or wall mounted. If wall mounted, additional threaded rod supports should be provided from the ceiling to the outer edge of the wall mounted tray. Center support cable trays shall not be accepted.

6.2.2 Cable Trays should have devices installed at all inside corners to prevent minimum cable bending radius from being exceeded.

6.2.3 The specification for this cable tray shall be provided along with the design layout.

6.2.4 Cable tray clearances shall follow ANSI/TIA 569-D Standards.

6.3 Horizontal Conduit: Conduit may feed Work Area Outlets (WAO) boxes directly from the Telecommunications Room (home-run). Conduits shall not run continuously for more than 100' before installing a pull box.

6.3.1 Conduits shall not contain more than two 90-degree bends without a pull box. Directional changes shall be made outside pull boxes. At no time shall a pull box be accepted in favor of a bend in the conduit.

6.3.2 Label all conduits as per UF Labeling Standard. Label all pull and junction boxes with the letters IT (See UF Labeling Standard in Appendix #1).

6.3.3 A minimum of one 1" conduit shall connect from the work area outlet box to the nearest cable tray. Conduits connecting a Work Area Outlet and the Cable Tray shall terminate within 4" and above the cable tray. Conduit fill shall not exceed 40 percent of the conduit capacity.

6.3.4 Conduits shall be reamed and bushed.

6.3.5 Each conduit shall contain a nylon pull cord with a 200 LB pulling tension.

6.4 Prohibited Components: Only LB type fittings designed specifically for telecommunication and having an appropriate bend radius may be used for communication conduit. No PVC conduit or PVC sleeves are to be used for communications conduit within the confines of a building.

6.5 Conduit Grounding: Horizontal pathway conduits shall be grounded to the cable tray to ensure a proper grounding path. This may be accomplished by bonding the conduit to the cable tray, using a grounding strap and/or a grounding bushing.

END OF SECTION

7.0 Work Areas

7.1 Overview: The design of work area outlets (WAO) change more often than any other piece of the design process. Different needs demand different solutions. As such, this section details only the most basic requirements and innovative designs that keep these minimal standards in mind.

7.2 WAO Cable Count: A WAO must be able to support at least two unshielded twisted pair (UTP) cables to support telecommunications needs. Customer and department needs will dictate the number of connections needed; however, the minimum is two cables per WAO. WAO dedicated to serving a wireless access point (WAP) need two cables as well. IP cameras and emergency notification speakers may have a single cable.

7.3. WAO Rough-in: Telecommunications outlet boxes installed in drywall, plaster or concrete block wall must be at least 4 X 4 inches and 2.5 in. deep. All WAO boxes should have a single-gang ring.

7.3.1 Floor boxes pose several future issues. The Design Team should plan a pathway to the floor box that allows future accessibility while following horizontal pathway bend radius and pull box requirements. Floor boxes have proprietary inserts for data communications parts that need to be purchased by the project and furnished to the UFIT qualified low-voltage Contractor.

7.3.2 Modular furniture also poses an issue if the data cables are to be integrated into the furniture. A permanent pathway between the wall or floor and the furniture needs to be designed and installed in accordance with horizontal pathway bend radius and pull box requirements. The use of "whips" is fine but must be coordinated up front to ensure that no scope gaps occur. See Modular Furniture Whips – The Permanent Link APPENDIX #10.

7.4 WAO Room Count: All office areas should have at least two Work Area Outlets. These outlet boxes shall be installed on opposing walls. Customer and department needs may require additional locations to meet the users' needs.

7.5 WAO for Wireless: In conjunction with UFIT, the Design Team should conduct a wireless survey and design the wireless system. One work area outlet *(with a minimum of two cables) shall be dedicated to each WAP location*. See Section 19.0 Wireless Networks for additional design requirements.

7.6 WAO Conduit: See Horizontal Pathway section of this standard for conduit requirements.

7.7 WAO Labeling: Label all WAO and WAO terminations. (See UF Labeling Standard in Appendix #1).

7.8 WAO Video Needs: See Video section of the standard for details on video cabling and pathways requirements.

END OF SECTION

8.0 Backbone Cable

8.1 Overview: The building backbone system connects Telecommunications Rooms to each other, to the Main Telecommunications Room and the Main Telecommunications Room to the Entrance Facility. UF specifies several separate cable systems to provide for the data, video and voice needs of the building occupants. Riser-rated twisted-pair copper multi-pair cables, coax, and both single-mode and multi-mode fiber along with their termination systems are specified.

8.2 Entrance Facility to Main Telecommunications Room Backbone Cable: Where an Entrance Facility is not collocated with the Main Telecommunications Room the backbone cables connecting these two rooms shall be equal in content to the cables provided to the Entrance Facility from the OSP. These cables may differ in composition (i.e., rated for interior use) than the entrance backbone cable shall have a pair count, strand count and so on, sized for the needs of the building.

8.3 Copper Cable Backbone: UF is migrating away from analog telephone signal distribution. Installation of a copper cable backbone will be decided on a case-by-case basis. Please consult the UFIT Construction Management Project Manager to determine if installation is necessary. If necessary, a minimum of one 25-pair category-5e or better riser cable shall be installed from the Main Telecommunications Room to each Telecommunications Room. Building design, use and/or services may dictate additional pairs for riser cable needs.

8.4 Copper Cable Testing & Records: The Contractor shall provide the following electrical test records per the Deliverables section of this document for all backbone copper cables:

a. Continuity tests on all pairs (test for opens).
b. Test for crosses and shorts, on all pairs.
c. Test for loss at 100.4 MHz, on all pairs.
d. Test for noise metallic and noise to ground; sampling can be used.
e. Test for insulation resistance; sampling can be used.

8.5 Fiber Optic Cable Backbone: A minimum fiber optic intra-building backbone cable consisting of 12-strand 50-micron OM-4 laser optimized and a 12-strand single-mode shall be installed from the Main Telecommunications Room to each individual Telecommunications Room.

8.6 Installation: The fiber-optic backbone cables shall be terminated at all locations in a rack-mounted fiber panel. There shall be 10 ft. of jacketed cable slack managed outside of the fiber panel to facilitate future re-terminations. This is typically placed

in the cable tray. There shall be 3 ft. of slack (with the outer jacket removed) managed inside the fiber panel.

8.6.1 Terminate all fiber strands via fusion splicing and pig-tail style connectors.

8.7 Fiber Optic Cable Testing: The Contractor on all backbone fiber cables shall provide the following documentation and tests records for each fiber-optic cable installed:

a. Identifier as specified by UF Labeling standard (See Appendix #1).
b. Termination fiber panel identifiers for both sides of the cable.
c. Total fiber-strand type and count in the cable.
d. Distance in meters for actual cable length.
e. Test for end-to-end dB loss, both directions, at 850 nm and 1300 nm for multimode and 1310 nm and 1550 nm for single mode for each individual fiber strand.

8.7.1 End-to-end loss measurements shall be made with a power source and light meter. Multi-mode fiber measurements shall be tested in accordance with ANSI/TIA/-526-14-A method B. Single mode fiber measurements shall be tested in accordance with ANSI/TIA/-526-7 method A.1. Maximum allowable loss:

Maximum allowable loss for splices is .15 dB
Maximum allowable loss for connectors is .5 dB per pair

8.8 CATV Backbone: See Video Specification Guidelines, Section 12.0.

END OF SECTION

9.0 Horizontal Cable

9.1 Overview: To satisfy today's telecommunications requirements, the horizontal cabling shall be planned to reduce on-going maintenance and relocation. It shall also accommodate future needs since horizontal cabling is often much less accessible than the backbone cabling. In keeping with this effort, Category6A UTP cabling or better shall be installed in all new construction and major renovations universitywide. The cable must also be certified by UL with the limited power (LP) rating. The time, effort and skills required for changes can be extremely high. In addition, access to the horizontal cabling frequently causes disruption to occupants and their work. These factors make the choice and layout of horizontal cable types very important to the design of the building cabling. Consideration should be given to accommodating a diversity of user applications in order to reduce or eliminate the probability of requiring changes to the horizontal cabling as user needs evolve.

9.2 Cabling Distance: The cable run from the Telecommunications Room to the WAO, consisting of a minimum of two cables, shall not exceed 295 feet and contain no splices. These cables are to provide service for both voice and data communications as an integrated telecommunications system.

9.3 Cable Installation: Installation and physical protection of Category 6A cable is a critical element for the cable to deliver its rated bandwidth. A "kink," "pinch," a bend radius less than 1.25 inches in diameter, or the manufacturers specified bend radius, or stretching of the cable by exceeding the 25 pound maximum pulling tension during installation will damage the cable to the point that it will not meet rated specifications and shall be replaced.

9.3.1 No open or exposed wiring or conduits shall be permitted below finished ceilings.

9.4 Cable Termination: All UTP horizontal cable should be terminated to T568A pinout. Requirements for terminating Category 6A cable requires that no more than the minimum amount of the common sheath be removed than is required for termination and no more than 1/2 inch of untwisting of conductors.

9.4.1 Horizontal cables shall terminate in a rack-mounted patch panel in the Telecommunications Room. Horizontal cables reserved specifically for non-IP based telephone systems shall terminate into a 110-field termination block. An example would be elevator phone, fire alarm phone and blue light phone wires.

9.4.2 When designing the layout of the Telecommunications Rooms rack-mounted patch panels, racks, uninterruptable power supplies, etc., reference the example provided in this standard. (See Telecommunications Room Example in Appendix #3).

9.5 Cable Slack: At the WAO, there shall be 12" of slack after termination to facilitate future re-terminations.

9.5.1 In the Telecommunications Room, the cable shall reach the punch-down patch panel and have 10' of slack. Coordinate with UFIT Construction Management on the placement of the managed slack.

9.6 Cable Type: All data and voice horizontal cables shall be unshielded twisted-pair cable, each consisting of four twisted pairs of solid conductors type CMR or CMP (as specified by code, the plans or engineer of record), Category 6A or better for all new construction and major renovation projects (as specified by UFIT). The preferred type of communication cable shall be approved by the UFIT Representative during the design phase of each project.

9.7 Clearances: The installation of these data and voice cables shall conform to the following clearances:

a. At least 127 millimeters (5 inches) from power lines carrying 2KVA or less.
b. At least 305 millimeters (12 inches) from power lines carrying from 2 to 5KVA.
c. At least 915 millimeters (36 inches) from power lines carrying more than 5KVA.
d. At least 127 millimeters (5 inches) from all fluorescent lights and other sources of electromagnetic interference.

9.8 Conference Rooms: (See Video Specification Guidelines, Section 12)

9.9 Horizontal cable testing and records: Each cable shall have a permanent link test performed. For Category-6A-rated links a level IIIe tester must be used to certify the cable to 500 MHz. All testers shall be manufacturer certified annually to ensure accuracy.

9.10 Identification: Each cable shall be labeled on each end with an appropriate cable identifier (i.e., 1A-1A01) (See UF Labeling Standard in Appendix # 1).

9.11 Elevator Communications: A pair of horizontal UTP cables shall be installed to support elevator communications. There shall be a means of disconnecting and testing the dial-tone or network communications at or adjacent to the elevator control panel.

9.12 Energy Management Systems: Those energy management systems employing the campus data network for communication shall install their physical infrastructure in accordance with these UFIT Telecommunications standards.

9.13 Other low voltage cabling systems: Other low voltage cabling systems must adhere to the telecommunications standards as well. These cables may share the use of common cable trays as needed. These types of cables include, but are not limited to AV, HVAC control cables, fire control cables and access control systems cables.

9.13.1 If other low voltage systems are to use the campus data network for communicating, these systems must also conform to the campus telecommunications standards. All low voltage systems using the UF network shall be inspected by UFIT Construction Management for compliance with these standards.

END OF SECTION

10.0 Grounding and Bonding

10.1 Overview: All cabling systems and electronics-distribution equipment shall be grounded for both safety and minimization of electromagnetic interference. Specifications for this are found in this section. Telecommunications grounding systems are composed of Telecommunications Bonding Backbones (TBB) and Telecommunications Grounding Bars (TGB). Bonding requirements for Telecommunications at UF follow the ANSI/TIA607-B standard.

10.2 TBB Grounding Wire: The TBB shall be a green insulated grounding wire with a minimum size of 6 AWG.

END OF SECTION

11.0 Deliverables

11.1 Overview: Architects and Contractors have come to accept the rigid industry standards that data communications / information transport systems impose. To a large degree, specialized skill sets are required for the design and installation of these systems and the technology of telecommunications cabling continues to advance dramatically. For this reason, UF requires a Registered Communications Distribution Designer (RCDD) on the installation team. Additionally, the installed systems must be documented in a way that allows for minimal ongoing labor in the maintenance and management of the installed system.

11.2 Telecommunication Contractor's Obligations: If not owner procured, the Contractor shall furnish all material required for a complete structured cabling system, including installation of communication cables, installation of communication outlets, and termination of all cables in the Entrance Facility, the Main Telecommunications Room and Telecommunications Rooms. The Contractor shall install all of this material per these standards.

11.2.1 The Contractor shall test and certify all cable and provide documented results of the testing. If any cable run tests defective, the Contractor shall replace defective cable.

11.2.2 A one-year materials and labor warranty shall be provided on all cable and hardware installed by the telecommunications Contractor. This shall be in addition to any and all factory warranties that can be provided.

11.3 As-Built Drawings and Information: The Contractor shall prepare and submit record drawings at an appropriate scale (1/16" or 1/8" preferred in PDF -- follow UF Design and Commissioning Services Guide using an acceptable electronic media format. The record drawings shall convey the following information:

a. Locations and Identifiers of all work area outlets.
b. All horizontal pathway elements including but not limited to cable tray and conduit.
c. Location and identifiers of all Entrance Facilities, Main Telecommunications Rooms and Telecommunications Rooms.
d. All backbone pathway elements.
e. Emergency speakers, emergency phones and WAPs.

11.4. Test Results and Documentation Required: As a condition of Substantial Completion, the Contractor shall be responsible for providing the following information:

11.4.1 Concerning the horizontal cable installation:

a. Complete test results for each horizontal cable. This test information shall be delivered in electronic, Fluke® Linkware™ compatible format.
b. A cable record for each horizontal cable including the following information:
    i. Cable identifier as per UF labeling standard (see Appendix #1).
    ii. Termination point on the host end identified as per UF labeling standard (see Appendix #1).
    iii. Termination point on the user end identified as per UF labeling standard (see Appendix #1).
    iv. Termination hardware used at the host end (patch panel type)
    v. Termination hardware used at the user end (outlet jack type)
    vi. Cable type and manufacturer's specification sheet for the cable
    vii. Presence of a consolidation point (CP), transition point (TP), or multi-user telecommunications outlet assembly (MUTOA).

11.4.2 Concerning the backbone and entrance fiber cable installation:

a. Complete test results for each backbone fiber cable strand. This test information shall be delivered in electronic, Fluke® Linkware™ compatible format.
b. Provide complete path record for newly installed backbone OSP cable (see Appendix #1).
c. An electronic copy of every insert supplied with every fiber panel
d. A cable record for each fiber cable including the following information:
    i. Cable identifier as per UF labeling standard (see Appendix #1).
    ii. Termination point on the first end identified as per UF labeling standard (see Appendix #1).
    iii. Termination point on the second end identified as per UF labeling standard (see Appendix #1).
    iv. Length of the fiber cable.
    v. Fiber strand count in the individual cable.
e. Cable manufacturer's specification sheet for the cable.

11.4.3 Concerning the terminals of UF-owned entrance copper cable:

a. Each terminal identifier.
b. Quantity and type of protectors.
c. Quantity and type of termination blocks.
d. Cable identifier and pairs entering or leaving.

(section continued next page)

11.4.4 Concerning the UTP riser cable:

a. Cable identifier.
b. Cable type.
c. Size.
d. Pair counts.
e. Length of the cable.

11.5 Inspections: Coordinate site inspections with UFIT for the various phases listed below:

a. OSP – in ground inspection.
b. Above-ceiling inspection.
c. Behind-wall inspection.
d. Telecommunications Room inspection.
e. Telecommunications substantial completion.

See UFIT Telecommunications Inspection Form posted on UF Planning, Design, and Construction's Form & Standards site: https://pdc.ufl.edu/resources/forms-standards/#forms.

11.5.1 Note: No network electronics will be activated until the Telecommunications substantial completion inspection and the remediation of any punch list items. In order to activate ports for building commissioning, at a minimum, the following must be completed as part of the Telecommunications substantial completion:

a. Racks properly secured to the floor.
b. The Telecommunications Room needs to be secure and lockable.
c. Cooling and ventilation must be provided. (Portable AC units are an acceptable temporary solution). Maintain positive pressure in space to reduce dust contamination.
d. All power requirements need to be met.
e. The room must have adequate lighting.
f. The Telecommunications Room must have all walls and ceilings in place as to prevent dust and debris from falling onto and into our equipment.
g. Cable trays must be installed and ready to use as to prevent dust/debris from falling onto/into our equipment.
h. All fiber needed for the project must be installed, tested and ready.
i. Once everything is installed (i.e. cable trays, racks, lighting, power, walls, etc.) the room must be cleaned of dust/debris.
j. Test results for the horizontal cabling serving the ports requesting activation must be received and approved. Horizontal cabling and WAO must be properly labeled.

END OF SECTION

12.0 Video Specifications Guidelines

12.1 As of January 2016, UF no longer provides intra-campus cable television service.

12.2 Projects requiring a wired or satellite television signal should be initiated via UF PD&C project request. UFIT will no longer be involved in television signal distribution unless access is needed to Telecommunications Rooms.

END OF SECTION

13.0 Outside Plant

13.1 Overview: OSP backbone cable shall fulfill all requirements of backbone cable specified in the Backbone Cable section of this standard.

13.2 OSP backbone fiber cable: OSP backbone fiber cable shall be loose-buffered cable. Indoor-outdoor loose-tube cable construction is acceptable.

13.2.1 Each new structure shall be connected to the nearest core location or Communications Cabinet with a minimum 12SM fiber cable. This cable shall pass through the Entrance Facility and terminate in the Main Telecommunications Room. If the Entrance Facility and the TR are not collocated, 20 feet of managed slack shall be placed in the Entrance Facility. NOTE: per NEC code, non-rated OSP cables must be terminated or transitioned to rated cables within 50 feet of being exposed within the building. OSP cables in conduit are not considered to be exposed.

13.2.2 Fiber optics are continuously being deployed on UF's campus for voice and data communications. Because of fiber optic cable sizes, the sharing of full-sized conduits is facilitated by the installation of inner-ducts.

13.3 OSP backbone copper cable: As of 2019, AT&T will no longer install new copper/ analog telephone service to UF buildings.

13.4 Splicing Materials: UF does not allow splicing of the Outside Plant. If an emergency arises and a splice becomes necessary, contact UFIT Construction Management.

13.5 Permit: A dig permit from UF Facilities Services must be obtained prior to any excavation. Dig permit procedures may be obtained from the Facilities Services Website at www.facilitiesservices.ufl.edu or go directly to the instructions at https://www.facilitiesservices.ufl.edu/departments/utilities/dig-permits/

13.6 Trenching: Trenching must be performed by hand wherever obstacles or existing utility lines are known to be in the area. The Contractor is totally responsible for ensuring that no utility or service interruptions occur and that existing utilities or obstructions shall not prohibit installation of service to be provided under this contract at proper grade and location. Where clear and unobstructed areas are to be excavated, appropriate machine excavation is allowed but only when machine weights and operation shall not damage sub-surface structural components or piping.

13.7 Tree Protection: All outside work shall be in compliance with UF PD&C standards on tree protection.

13.8 Concrete Cap: Occasionally, it shall be necessary to provide extra mechanical protection to mainline or subsidiary conduit in certain areas of campus (normally any conduit placement in the main part* of campus would be provided with extra mechanical protection – Contact UFIT Construction Management for direction). The Contractor shall provide a concrete cap with a minimum thickness of 2" consisting of non-reinforced 2500-psi concrete. There must be a minimum of 6" compacted fill between the top of the conduit and the bottom of the concrete cap. Backfill specifications must be followed. Even with the concrete-cap protection, the metallic warning tape must be placed above the cap. Depending on the depth of the cap, the warning tape should be placed at least 6" above the cap.

Note: *The Main part of campus is defined as the campus bounded by University Avenue, SW 13th Street, Archer Road and SW 34th Street.

13.9 Barricades: All pits or trenches left open overnight or unattended must be barricaded with caution lights and a plate placed over the opening. A ¼" steel plate or a plywood sheet of sufficient size and thickness may be used for this purpose. In road openings, only a steel plate with sufficient traffic-bearing strength shall be allowed, and in this case barricades are still required. Shoring must be employed in the event of unstable soil conditions.

END OF SECTION

14.0 Aerial Pathways

14.1 Not Allowed: UF forbids the use of aerial facilities to be placed on any building.

END OF SECTION

15.0 Underground Pathways

15.1 Encasement: Steel-casing pipe provides an effective housing for underground conduit. The preferred method of installing steel casing pipes is simultaneous boring and jacking. Pipe used as casing pipe must be new welded steel pipe. The pipe must conform to ASTM specifications A139, GradeB and have minimum yield strength of 35,000 pounds per square inch. The Contractor must leave sufficient clearance between the top of the conduit formation and the upper arch of the casing pipe (5% of casing diameter). Excavating the earth face in front of the casing by means of a water jet, or the use of water to lubricate the exterior of the casing pipe is not permitted. The diameter of the bored hole must not exceed the outside diameter of the casing pipe by more than 1 inch. If for any reason a bore cannot be completed, the casing must be abandoned in place and filled with concrete. Duct capacity of casings using PVC schedule 40 conduits are 18" casing w/ 1/4" walls, 7-4" "C" plastic ducts, 24' casing w/ 3/8 walls and 14-4" "C" plastic ducts.

15.2 Soil Materials: All soil augured from the casing pipe should be removed from the jacking pit, leaving only undisturbed earth. 5' x 5' concrete footings, which rest on undisturbed earth at each end of the casing pipe, must be constructed. Both the jacking pit and the target pit must be backfilled with well-compacted granular material (processed stone or gravel) to the elevation of the conduit. The backfill material must be placed in lifts of no more than 6 inches and each lift must be mechanically compacted. Processed stone or gravel of the following classes is acceptable for this purpose:

a. CLASS I - Angular 3/4 inch to 1/4 inch graded stone

b. CLASS II - Coarse sands and gravel with maximum particle size of 3/4 inch.

15.3 Trenching, Backfilling and Compaction:

15.3.1 Sand: Clean, hard, uncoated grains free from organic matter or other deleterious substances. Sand for backfill shall be mortar sand grade with 95% passing a No. 8 sieve and not more than 8% passing No. 10 sieve.

15.3.2 Gravel: Clean, well-graded hard stone or lime rock gravel, free from organic material. Size ranges acceptable from No. 4 screen retention to 1".

15.3.3 Earth: Free of stones, wood, roots or rubbish.

15.3.4 Backfilling: Deposit earth or sand, depending on the type of trench requirements, carefully in 4" layers, maintaining adequate side support. Compact fill

in 4" layers to meet 95% Modified Proctor Test, using mechanical means up to the top elevation of the conduit and 12" layers to finish grade. Replace surface to the original condition, i.e., sodding in main campus areas and seeding in the outer areas of campus. UF Facilities Services Grounds shall assist in determining sod or seed.

15.4 Identification: Provide identifying metalized plastic warning tape above conduit. Warning tape shall be placed 6" minimum and 18" maximum above the conduit.

15.4.1 Identification Tape: Polyethylene 0.004" thickness minimum, with metalized locator, 6" wide, yellow or green in color, black letters indicating "Telephone" or "Communications."

15.4.2 All conduits shall be labeled inside maintenance holes, hand holes and Telecommunications Rooms per Appendix #1 of this standard.

15.5 Excavation: Excavation shall be maintained in satisfactory condition during the progress of the work. Sub-surface structures must be constructed in adequately sized excavations with de-watering equipment installed and properly maintained where necessary. In all cases, to protect materials and personnel from injury, shoring must be employed in the event of unstable soil conditions. The standard depth of all trenching is 30 inches as measured from the top of the topmost conduit to the ground line.

15.5.1 The Contractor, shall at all times, keep the construction area, including storage areas used, free from accumulation of waste material or rubbish. The Contractor must exercise reasonable care to prevent construction debris and excavated material from washing into university storm drains. Upon completion of the construction, the Contractor shall leave the work and premises in a clean, neat and workmanlike condition, satisfactory to UF.

15.6 Non-Paved Restoration: All non-paved surfaces (grass, sod, gravel, etc.) must be restored within 7 days of backfilling and compaction.

15.6.1 Sidewalks: Follow guidelines set in the UF Design and Construction Standards. Sidewalks thickness is 6" with 6x6 number 10 reinforcement wire, 1/2" reinforcement bar and 3000-psi concrete. Removal of sidewalks must be from expansion joint to expansion joint. Sidewalk width should be a minimum of five (5) feet and should match surrounding sidewalk patterns and widths. A float trowel and light broom finish is standard.

15.6.2 Sod: The standard for sod shall follow guidelines set in the UF Design & Construction Standards.

15.6.3 Service Drives: Follow guidelines set in the UF PD&C Design and Construction Standards. Service drives shall have an 8-inch base of Florida lime rock compacted to 95% of maximum density. Paving should be 2-inch (min.) type S-1 asphalt. Cuts made through any paved surface must be repaired in a non-discernible fashion. Cuts through concrete must be repaired by replacing the section between the nearest two joints - either construction or expansion. Cuts through asphalt must be repaired so that depressions or humps do not develop during the warranty period. If depressions or humps develop, they shall have to be re-worked until corrected. When cuts extend through pavement markings, the replaced pavement shall be marked to match the existing pavement.

15.7 Paving and Surfacing: Follow guidelines set in the UF PD&C Design and Construction Standards.

15.7.1 Technical Specifications for Construction and Materials: Construction procedures must follow the usual practices of the Florida Department of Transportation (DOT) for work of similar character and extent. The provisions and specifications of Division II and Division III of the "Standard Specifications for Road and Bridge Construction," Florida Department of Transportation edition of 1986 shall apply, where applicable, except where modified herein or specifically designated otherwise. References to compensation do not apply. Where reference is made to the "engineer," substitute the appropriate representative of UF Facilities Services or UFIT.

15.7.2 The Contractor must adequately and fully protect all parts of his work against damage until completed and accepted by UF for maintenance. The Contractor at no additional expense to must properly repair damages there to UF.

15.7.3 The Contractor must protect exposed surfaces adjacent to the work from physical damage resulting from construction activities and from becoming stained during application of paving materials. The Contractor shall clean, repair or replace, as required, surfaces damaged during the course of the work at no additional expense to UF.

15.7.4 The Contractor must provide temporary barricades, properly lighted, to keep traffic off the work throughout the duration of the contract.

15.7.5 Site Work: Preparation of a new paved road over a new base course:

15.7.5.1 Prepare lime rock base as detailed in the Florida DOT Specifications: Allow additional lime rock for compaction of minimum 6" lime rock base prior to paving. This is to be in addition to compaction as required in the Florida DOT Specifications. Asphalt Concrete Surface Course: Surfacing must consist of Type S-3 asphalt concrete in a ½" finishing course following the tack course.

15.8 Paved Restoration: Follow guidelines set in the UF PD&C Standards. All roads, streets, sidewalks of concrete or asphalt construction must be restored or repaved within three days from the time of backfilling and compaction.

15.8.1 Newly poured concrete roads, streets, curbs or sidewalks must be protected and guarded from graffiti from passersby until the concrete has sufficiently cured to resist such molestation. Failure to prevent molestations (graffiti) shall result in the new concrete having to be removed and replaced. This requirement shall warrant the Contractor in taking the necessary steps in preventing such incidents, which shall include guarding the project after hours.

15.9 PVC Conduit and Fittings: Conduit must be made of poly-vinyl-chloride, PVC schedule 40 pipe. Solvent weld fittings are to be used, and joints must be watertight. All conduits must be provided with a sequentially marked pulling tape in English or metric markings with a minimum of 1200 lbs. pulling tension. Conduit must be thoroughly cleaned after lying. During construction and after the conduit is completed, the ends of the conduits must be plugged. After the conduit line has been completed, a mandrel not less than 10" long, having a cross-section approximately ¼" less than the inside cross-section of the conduit shall be pulled through each conduit, after which a stiff bristle brush shall be pulled through.

15.10 Conduit Formation: Where practical, conduit formations using single-bore conduit should be arranged so that orderly cable racking can be accomplished within the maintenance hole or handhold and that minimum changes are made in the formation as it enters the maintenance hole. Ducts must terminate in maintenance holes or hand holes in a manner that is conducive to orderly cable racking. Main conduit formations shall enter the end walls of a maintenance hole as nearly equidistant between the floor, roof and sidewalls as is practical. Subsidiary conduit (the additional ducts required for housing cables that would extend from the main conduit system) to a building location shall be located on top of the main conduit formation. Conduit formations that are to terminate in 4' x 4' x 4' HR hand holes must splay before reaching the handhold and enter the end walls near the sides.

15.11 Bends: The Contractor must use the longest radius bends possible. The minimum bend radius to be used on main conduit formation is 15 feet and 6 feet on the subsidiary conduit. These minimum radius bends must also be encased in concrete along the full length of the bend. Use of factory manufactured bends (heated bends are discouraged). On 4-inch PVC conduits, anything less than an 80-foot bend radius requires concrete encasement. In other words, if you cannot bend a 4-inch diameter straight section of PVC pipe in the ditch without heating or deforming the pipe and need to use sweeps, then the bend will need concrete encasement.

15.12 Terminating Conduit: The practice of terminating conduit (most often subsidiary duct) in the sidewalls of maintenance holes or hand holes is not acceptable

but, in certain situations, a variance may be given. In this case, the holes for the ducts must be positioned near the upper end-corner of the sidewall and then core-bored. All handhold and maintenance hole designs in this document can accommodate such locations due to the absence of rebar in this area.

15.13 Mainline Conduit Sizing: Mainline conduit is defined to be the conduit supporting feeder cables that serve buildings and other structures. Lateral or subsidiary conduits are routed from the mainline conduit system to each building, structure, and fiber interface cabinet or communications cabinet. Sizing is defined as the determination of the number of conduits to be placed between maintenance holes, hand holes or to the buildings along the route. A full-sized 4" conduit shall be used for all installations.

15.13.1 Consider the following for sizing:

a. Initial copper cable placement.
b. Initial optical fiber placement.
c. Initial energy, fire and security cable placement.
d. Future growth in all cable systems (voice, data, video and energy management).
e. Maintenance conduit needs.

15.13.2 A mainline conduit system is allocated to have one 4" conduit for each of the following categories, some of which shall be equipped with four 1" innerducts or MaxCell® innerduct. Depending on the immediate use of the conduit system under design, only one 4-inch conduit shall be required to be equipped initially with innerducts and/or tube cable during construction. Future innerduct and/or tube cable installation shall be necessary as the need develops. The following are mainline conduit allocations:

a. Initial fiber placement for voice with four 1” innerducts or MaxCell® innerduct of two 3-cell packs (www.maxcellinnerduct.com).
b. Initial UFIT and Cox Cable placement for coaxial cables with three 1¼” innerducts or equivalent of MaxCell® innerduct.
c. Initial UFIT and Energy Management Control System (EMCS) Network placement with four 1" innerducts.
d. Copper telephone cable, no innerducts.
e. Maintenance duct, no innerducts.
f. Growth, no innerducts.

15.13.3 Total of six 4" conduits, of which two full-sized conduits are equipped with innerducts. This would be the ultimate configuration of mainline conduit.

15.13.4 Lateral conduit to an AT&T fiber optic interface or fiber hub location shall consist of four full-sized conduits. One conduit shall be for fiber cable equipped with

four 1" innerducts or equivalent of MaxCell® innerducts, unless the fiber hub is within 30 feet of the handhold or maintenance hole and having no more than one 90-degree bend.

15.13.5 Lateral conduit to a communications cabinet shall consist of five full-sized conduits. One conduit is equipped with four 1" innerducts or equivalent of MaxCell® innerducts, unless the fiber hub is within 30 feet of the handhold or maintenance hole, and having no more than one 90-degree bend.

15.13.6 Future innerduct and/or tube cable installation will be necessary as the need develops and shall be the responsibility of the department or project needing the additional facilities.

15.14 Innerducts: Innerducts used on campus must conform to standard C.I.S. 4-86, which is a standard specification for corrugated innerducts produced to I.P.S. dimensions. This specification establishes the parameters common to polyvinyl chloride (PVC) and polyethylene (PE) innerducts. Caution must be taken to use only polyvinyl chloride (PVC) innerduct in building entrance conduit.

END OF SECTION

16.0 Handholes and Maintenance Holes

16.1 Maintenance hole / Handhole: Maintenance holes are recommended for roads, streets, parking lots and where a less obtrusive surface structure is desired. A 30" diameter cast iron lid is less noticeable and safer than a 4' x 4' or 4' x 6' steel plate.

16.1.1 All maintenance holes, handholes and pedestals shall be labeled in accordance with Appendix #1 of this standard.

16.2 Pre-cast: Contractors are encouraged to use pre-cast handholes/maintenance holes wherever possible. Pre-cast maintenance holes or hand holes shall be in compliance with NEC Article 314-30. Handholes must have concrete floors equipped with French drains, cable racks, pulling eyes, supports and miscellaneous fittings. All metal hardware must be hot-dipped galvanized. All handholes and their associated covers must be rated as traffic bearing, i.e., maintenance holes and handholes designed to withstand a subsurface water table depth of 3½ feet and H20 traffic loading. Pre-cast maintenance hole/handhold designs must be in accordance with the requirements set forth by the American Association of State Highway and Transportation Officials. This requires reinforcing bars in all floors and walls (grade 60 reinforcing steel) and 4000 psi concrete.

16.3 Sizes: Typical maintenance hole/handhold sizes used at UF are as follows:

Item	Size	Chimney	Collar/ Cover Type
Handhold	4'x4'x4'	Ground Line	Traffic bearing metal plate
Handhold	4'x6'x4'	Ground Line	Traffic bearing metal plate
Maintenance hole	6'x12'x7'	24" Minimum Headroom	30" Traffic bearing ring and cover
Maintenance hole	6'x9'x7'	24" Minimum Headroom	30" Traffic bearing ring and cover

16.4 Cast-In-Place: All cast-in-place maintenance holes and handholes must be equipped with cable racks, pulling eyes, supports and miscellaneous fittings. All metal hardware must be hot-dipped and galvanized. All maintenance holes and handholes and their associated covers must be rated as traffic-bearing, i.e., maintenance holes and handholes designed to withstand subsurface water table at a depth of 3½ feet and H20 traffic loading requirements set forth by the American Association of State

Highway and Transportation Officials (AASHTO) HB-11th Edition, 1973. This requirement requires deformed reinforcing bars in all floors and walls (grade 60 reinforcing steel) and 4000 psi concrete.

16.4.1 All maintenance holes must be equipped with a 24" high collar, 10" high frame, and a 30" frame and cover. The collar shall be constructed of brick and mortar to allow for easier future level modifications and adjustments. All handhole/maintenance hole covers must be stenciled with "Communications" and be equipped with a hole or other device for cover extraction. Handhole cover plates shall be constructed of steel with an anti-skid design and be traffic-bearing. The handhole shall be equipped with a recessed metal ring to accept and cradle the cover.

16.4.2 Typical maintenance hole/handhold sizes and racking requirements to be used at UF are the same sizes listed for pre-cast listed above.

16.4.3 There will be times when access to an existing conduit formation is necessary. An intercept maintenance hole/handhole would then be placed over the existing conduit formation. The new hole must be located so as to allow the existing conduit to parallel the length of the hole along one side. This allows the cables to be formed and racked along the wall once the conduit casing has been carefully removed within the boundary of the hole.

16.5 Construction Points: Concrete with 28-day compressive strength of 4000 psi. Reinforcing steel with yield strength of 60,000 psi grade 60. Reinforcing bars with kinks or bends are not be used except where bends are specified. Reinforcing bars should be clean and free of loose rust, oil or other matter that might weaken the concrete-metal bonding. Forms for cast-in-place maintenance holes should be designed to permit easy removal, constructed to conform to the required maintenance hole dimensions, substantially leak-proof, and capable of being placed and secured to prevent displacement while concrete is being poured.

16.5.1 The concrete for the handhole/maintenance hole floor should be poured in a continuous operation with a plastic water stop placed in the construction joint between the floor and walls. The concrete for the walls should be poured in a continuous operation. If it is not possible to complete the walls in one pour, a construction joint with a continuous plastic water stop must be formed. Both handholes and maintenance holes shall have concrete reinforced floors as detailed in attachment drawings. However, maintenance holes shall have a solid leak-proof floor with a sump depression while a handhold shall have a "sump like" hole used as a French drain complete with coarse gravel.

16.5.2 When pouring, do not place concrete in contact with the earth walls of the excavation. Close sheeting placed to support the earth wall may be used as forms for the outside surfaces of the maintenance hole walls. Specially constructed outside forms may also be used.

16.5.3 To raise the cast-iron frame and maintenance hole cover to the proper height above the maintenance hole, some combination of pre-cast concrete collars of various heights, i.e., 3, 9 and 15 inches, may be used. The frame and each collar must be set in mortar at the top of the maintenance hole or on another collar. The frame shall be set on a collar constructed of bricks or concrete segments and mortar.

16.5.4 Temperature reinforcement has been designated as No. 5 rebars with nominal 12-inch spacing. No. 5 rebars must be run parallel to the floor-wall and wall-wall junctions to provide a means for fully tying the end of the rebars together to form an electrical grid. No. 14 annealed steel wire should be used to make wire ties for the rebar. Welding of the bars is not permitted. The rebars must extend to a point 1 to 2 inches from the outside edge of the concrete slabs. All concrete slabs shall have reinforcement in two directions. Rebars for the floor slabs are designated as "W" and "L" reinforcement, and those for the wall slabs are designated as "H" and "L" or "H" and "W." The "H" reinforcement is placed parallel to the height (H) dimension, the "W" reinforcement parallel to the width (W) dimension and the "L" reinforcement parallel to the length (L) dimension. The reinforcement in one direction also has an "I" designation. The "I" indicates reinforcement which must be located nearest the inside surface of the slab, 1" minimum from the inside surface of roofs and walls and 3" for floors. The other reinforcement must be located next to the "I" reinforcement and toward the outside surface of the slab.

16.5.5 A diagonal pattern of rebars must be placed around all openings in slabs except where single duct subsidiaries can be located between the reinforcement. The diagonal reinforcement should consist of #5 rebars placed at 45 degrees to the slab sides and, where practical, extend to within 1 to 2 inches of the exterior slab edges. The first diagonal is placed 2" from the edge of the opening and each succeeding parallel bar is located 3 to 4 inches on center away from the opening. Diagonals located between the openings should extend uninterrupted to the slab edges to provide additional structural integrity to the slab.

16.6 Cable Bonding: A cable bonding ribbon must be provided in the center of each splicing bay of the maintenance hole/handhole. The bonding ribbons should be included in the roof slab in the case of a maintenance hole clamped to one of the reinforcement bars or to a reinforcement bar in the wall in the case of a handhold. One continuous length of bonding ribbon can serve two splicing bays on opposite walls. The bonding ribbon should be run within the wall slab and brought into the maintenance hole at a point approximately 3" below ceiling level.

16.7 Pull-in-Irons: Pulling-in irons are required as a point of attachment for blocks, sheaves, etc., to place and remove cables. The pulling-in iron must be installed to extend into the handhold with a clear opening of 3". One pulling-in iron is placed

opposite and in line with the centerline of each duct entrance formation and a minimum of 3" above the floor.

16.8 Conduit Lengths: Conduit section lengths (the measured distance between two holes) must never exceed 700 feet with any more than two 90-degree sweeps allowed in a conduit section. A full 180-degree sweep (full reversal in direction) is not permitted without a maintenance hole or handhole inserted within the sweep.

16.9 Maintenance Hole and Handhole Sizing: Several factors determine when a maintenance hole or handhole is to be installed.

16.9.1 Maintenance holes are recommended over handholes when the total number of 4" conduits to be terminated in the walls exceeds twelve. The total number of conduits terminated in a handhold or maintenance hole is determined by counting all conduits terminated in the "end" and "side" walls.

16.9.2 A 4' x 4' x 4' size handhold can be used to support up to eight 4" conduit terminations, only if copper telephone cables of 200 pair or less are to be spliced in the hole.

16.9.3 A 4' x 6' x 4' handhold can be used to support up to twelve 4" conduit terminations and can support copper telephone cables exceeding 200 pairs.

16.9.4 When a situation calls for a special size and shape maintenance hole and one of the four sizes cannot be used, UFIT shall design the maintenance hole and provide drawings.

END OF SECTION

17.0 Blue Light Emergency Telephones

17.1 Overview: UFIT Construction Management is responsible for the installation, maintenance and operation of the blue light emergency telephones located throughout campus. The location of blue light phones is to be coordinated with and approved by the UF Police Department (UFPD), UFDEM and UF Physical Security. Installation shall be coordinated with UFIT Construction Management. Designate the blue light telephones on project plans as "by others" and provide dedicated electrical power connections, pathway for communications cabling and concrete pad for mounting. Coordinate work with all trades including landscaping. The installation of any blue light phone will include the addition of an integrated security camera. UF Physical Security must be contacted to coordinate the selection and installation of a security camera on all new blue light phones.

17.2 Models: The models of blue light emergency phones are subject to change; please consult UFIT before ordering any equipment. Currently only the Talk-A-Phone® models match UF criteria of being listed (UL or ETL), Singlewire® Informacast® compatible, or other UFDEM designated system. Talk-A-Phone has created SKUs unique to UF specifications. CCTV is now video surveillance. The call box must also have a pin hole camera for monitoring users activating device. When a free-standing Talk-A-Phone® model is selected, it must include a CCTV arm to allow for a security camera to be mounted on the top of the stanchion. If a wall-mounted phone is chosen, it must have a wire path from the phone to an adjacent camera which must be installed in view of the phone. When a free-standing Talk-A-Phone model is selected, it must include outdoor speakers that can be registered in InformaCast®.

17.3 Power Connections: These units require a constant, dedicated 120VAC power source. The building, room, panel number and position of the circuit breaker must be labeled at the receptacle.

17.4 Blue Light Strobe: To conform with NEC codes, the lights may need to be connected to and powered via a listed, outdoor direct current transformer.

17.5 Installation: Blue light phones are typically located exterior to buildings, either wall-mounted at building entrances or away from the building in the parking areas in a free-standing configuration. UF's Police Department, Emergency Management and Physical Security should be consulted for locations.

17.5.1 A special concrete base is needed. Talk-A-Phone's manufacturer drawings are shown in Appendix #5.

17.5.2 Place separate 1" minimum PVC conduit for power and a separate 1.25" minimum PVC conduit for data service.

17.5.3 Tower units shall have five CAT6 UTP burial grade cables run to a designated telecommunications space. Lightning surge protection shall be installed and properly grounded within the tower and telecommunications space. The surge protectors must be CAT6 and power over Ethernet (POE) compatible. The surge protectors should be mounted to minimize space and be oriented to ensure they stay dry. A dab of dielectric grease should be placed within each female style RJ45 opening.

17.5.4 Wall-mounted units shall have two CAT6 UTP cables run to a designated telecommunications space. Consult with the UFIT Project Manager to determine if surge protection or burial grade cables are needed.

17.6 Test and Inspection: Coordinate test and inspection with UFIT , UF Physical Security, UFDEM and UFPD. Blue light phones with outdoor speaker capability must be registered with InformaCast once installation is complete and then tested for functionality. All outdoor blue light phones with outdoor notification capability will be tested, at a minimum, annually during the emergency notification drill during the fall. UFIT will test phones and put them into production mode with UFPD's approval. Emergency phones not in production mode must have electrical power turned off and be wrapped with black plastic to prevent accidental use. Non-functional phones will have a wrap and labels placed on them to indicate that the unit is out of service and to call 911 for an emergency; UFPD 352-392-1111 for non-emergencies.

END OF SECTION

18.0 Mass Notification System (MNS)

18.1 Overview: UFIT is responsible for the installation and maintenance of the Mass Notification System (MNS) or other system determined by UFDEM and UFIT, located throughout campus and coordinated through UFDEM as part of the university's emergency notification systems. This system provides the capability to send live or prerecorded messages delivered simultaneously to all campus devices or to specific zones (typically by building). The location of the alert devices (IP speakers, IP phones, outdoor PA speakers, signage, desktop notification, etc.) is to be coordinated with and approved by UFDEM. Installation shall be coordinated with UFIT Construction Management.

18.2 IP Paging System: The notification system uses the InformaCast broadcasting solution from Singlewire Software in conjunction with the campus Voice over IP system (Cisco Systems). All campus IP phones provided as part of a new construction project shall have an InformaCast license.

18.3.1 Indoor IP Speaker: The indoor IP speakers shall be Atlas Sound brand of Informacast compatible speakers. Power shall be provided by 802.3af compliant POE network switch or via local 12VDC to 18VDC power injector. Provide indoor IP speaker (or IP Phone as noted below) in general assembly areas and as directed by UFDEM. Target locations are primarily academic classrooms, classroom laboratories and other assembly areas. Use the following table as a guideline only (building environment and surrounding noise levels will affect final design):

Indoor IP Speaker Count	Coverage Area
Zero -- use IP phone	Less than 1,000 sq. ft.
1	1,000 sq. ft. to 3,000 sq. ft.
2	3,000 sq. ft. to 5,000 sq. ft.
3 or more	Over 5,000 sq. ft. -- design per manufacturer's recommendations

18.3.2 Fire Alarm Integration - An alternative to Indoor IP Speakers for new buildings: When a new building is designed with a voice annunciator fire alarm system, a single Atlas VoIP to Analog gateway may be integrated with the fire alarm panel to create a mass notification system. The fire alarm panel must have a line level audio input that is cabled to the line level audio output of the Atlas gateway. The Atlas gateway will receive power via a data network connection and

POE. The construction project's fire alarm Designer is responsible to design the mass notification integration. The construction project's fire alarm Installer is responsible to install a blue box, 1" blue conduit to data cable tray, 1" blue conduit to fire alarm panel, 18/2 cable from fire alarm audio line-in to blue box and 18/2 cable from fire alarm's audio/strobe activation trigger to blue box. UFIT will be responsible for supporting the Atlas gateway only. See Appendix #8 – Mass Notification Integration with Fire Alarm System.

18.4 Outdoor IP Speaker: The outdoor IP speakers shall be Atlas Sound brand of Informacast compatible speakers. Power shall be provided by 802.3af compliant POE network switch or via local 12VDC to 18VDC power injector. Design and place outdoor IP speakers as directed by UFDEM.

18.5 WAO for MNS: The Design Team should conduct a mass notification survey and design the IP speaker(s) / phone placement. One work area outlet shall be dedicated to each IP speaker. WAO for MNS needs one cable only.

18.6 Test and Inspection: Coordinate test and inspection with UFIT and UFDEM. UFIT will test IP phones and IP speakers and put them into production mode with UFDEM approval.

END OF SECTION

19.0 Wireless Networks

19.1 Wireless Network Design: The wireless network design and wireless access point selection shall be coordinated with the UFIT Wireless Network Engineer to seamlessly integrate with the existing campus wireless system. The wireless network shall be designed to provide high quality wireless network coverage for the entire building, including all publicly accessible exterior spaces as defined by the project site plan. Incorporate specific needs of the user group into the wireless design for the project.

19.1.2 Academic Health Center Wireless Network Design: UF Academic Health Center's wireless network design and specifications shall be coordinated with UF Health/HealthNet. Paragraphs 19.2 through 19.10 shall not apply to HealthNet managed facilities unless specified.

19.2 WAP Locations for Interior Spaces: Wireless Access Point placement will be determined by the UF ICT Wireless Network Engineer utilizing wireless predictive design software, Ekahau AI Pro, to determine all locations, equipment types and models.

19.2.1 Approximate Spacing Between WAPs: Access Point locations typical approximate separation distance of 30 feet. A UFIT Network Engineer utilizing Ekahau AI Pro simulation software will determine actual locations.

19.2.2 Minimum Signal Strength Specification for Interior Spaces: Wireless Access Point placement design must provide a wireless footprint utilizing IEEE 802.11ax or better, shall provide minimum signal strength of at least -67dBm in all locations (this assumes an Access Point running in the 5GHz spectrum transmitting at a maximum 50mW). A UF ICT Network Engineer utilizing Ekahau AI Pro simulation software will determine actual locations.

19.2.3 Access Point Equipment Specifications: Actual deployment equipment specifications, if desired, can be obtained by contacting UFIT Construction Management Project Manager.

19.3 WAOs for Interior Access Point Locations: Cabling drops for access point locations shall be located in above-ceiling spaces and in easily accessible locations no more than twelve feet above a walkway with adequate space to safely deploy a conventional stepladder. If ceiling construction prohibits use of above-ceiling space, then surface mount locations on the ceiling should be considered. If architectural or aesthetic concerns prohibit ceiling mounting locations, wall mount locations may be considered. Two network connections should be available at each access point location.

19.4 Wireless Coverage for Exterior Spaces: The minimum signal strength for exterior spaces as defined by the site plan shall be -67dBm utilizing Wi-Fi 6 (IEEE 802.11ax). A UFIT Network Engineer utilizing Ekahau AI Pro simulation software will determine actual locations.

19.4.1 Exterior Locations: UF has made exterior access to wireless networking a priority. New construction and major renovations must factor in exterior locations. The UFIT Wireless Network Engineer will provide exterior location suggestions. It is up to the architect or engineering firm to coordinate aesthetically pleasing, yet functional locations. See Appendix #9 Exterior Wireless Access Point Mounting for suggestions on pathways to exterior locations.

19.4.2 RJ45 style interfaces located in high-humidity or exterior locations, especially those transmitting POE shall have a dab of dielectric grease placed on the conductors to inhibit moisture from crossing the conductors.

19.5 Testing Wireless Network Deployment: Field tests shall be performed following building substantial completion to ensure that operable signal strength levels are available throughout the entire building with additional Access Points deployed or repositioned as required.

END OF SECTION

20.0 Pedestals and Communications Cabinets

20.1 Pedestals provide above ground facilities that typically house passive connection points for fiber and copper cables.

20.2 Communications Cabinets: Communications cabinets provide an above ground cabinet facility for cable terminations and electronic equipment placement. The communications cabinet is mounted on a concrete slab for stability and weed control. The cabinet has hinged doors on both sides for easy access to the internal mounting surfaces. The hinges consist of a continuous hinge using galvanized steel with a stainless-steel pin. The doors are equipped with two 3-point latching mechanisms operated by padlocking handles. The cabinet is made of 12-gauge galvanized steel with a drip-shield top and smooth, seam-free sides which slope front to back to prevent rain from entering the cabinet. The cabinet is painted "BellSouth" light green.

20.2.1 Cabinet Requirements:

- Insulated Enclosure: Cabinet must be insulated to protect internal components from temperature fluctuations.
- DIN Rail Mounting: Standard DIN rail installation support for switches, power systems, control components and fiber.
- Elevated GFCI Power: Ground Fault Circuit Interrupter (GFCI) protected electrical outlet(s), mounted 6–12 inches above the surface. Electrical outlets must be labeled with the source panel location.
- If the cabinet is fed with low-voltage power (12/24/48 volt) from a remotely installed transformer, the copper cable shall be labeled on both ends with a tag indicating "DANGER: Live Wire" and be labeled with the disconnect location.
- Active Airflow: Fans must be installed with intentional placement to ensure adequate airflow through the cabinet.
- Lightning Protection: Surge suppression and protection for all low-voltage circuits. Surge suppression should be properly mounted to minimize the cabinet space used.
- Ground Bus Bar: A properly bonded grounding bus with wire sized per NEC and BICSI standards.

20.2.2 Cabinet Environmental Conditions:

- Debris Control Perimeter: A minimum of 18 inches of stone or an extended concrete pad must surround the cabinet to prevent grass and vegetation growth, which can interfere with airflow and clog fans.
- Contaminant-Resistant Air Intake: Air inlets must be positioned to minimize the intake of plant debris and moisture.
- UPS Battery Specification: Only high-temperature tolerant batteries and UPS systems should be used in unconditioned outdoor enclosures.

- RJ45 style interfaces, especially those transmitting POE shall have a dab of dielectric grease placed on the conductors to inhibit moisture from crossing the conductors.

20.2.3 Cabinet Standards and References:

- Power and Safety Compliance: All electrical work must adhere to the National Electrical Code (NEC).
- Grounding and Bonding: All grounding and bonding must comply with BICSI best practices and UF Facilities Services guidance for proper grounding planes.
- Supported Hardware:
    - Cisco industrial grade switching platforms.
    - APC UPS systems rated for outdoor use.
    - Other UF-approved industrial enclosures and components.

20.2.3 Cabinet Service Delivery and Connectivity:

- Optical vs Electrical Handoff:
    - Optical handoffs are preferred where practical to mitigate ground plane differentials and related damage.
    - Electrical (copper) handoffs require additional scrutiny around surge protection and grounding.
- Cooling Strategy:
    - Actively cooled solutions are preferred in enclosed spaces; passive systems must be validated for thermal performance.
- Path Redundancy:
    - Consider redundant fiber paths or diverse routing where continuous service is critical.
- Ground Plane Mitigation:
    - Special attention is required when using copper in distributed environments. Considerations for SFP-based optical handoff solutions should include consultation regarding performance in high-temperature conditions.

END OF SECTION

21.0 Bollards for Outdoor Wi-Fi or Remote Networking

21.1 Purpose: Bollards are plastic dome shaped structures designed to be mounted on the ground and provide a weatherproof housing for internal electronics such as WAPs and industrial network switches. The purpose of the bollard is to facilitate placement of networked devices outside and farther than 290 feet from a Telecommunications Room.

21.2 Installation: Since the low-voltage power and data may share the same pathway, the minimum of a 1" conduit must be stubbed up into the bollard's concrete base. This conduit should then extend to a hand hole or maintenance hole that has underground pathway access to a nearby building.

21.3 Power: Bollards are typically fed with low-voltage power (12/24/48 volt) from a remotely installed transformer that is located in a building Telecommunications Room. This is achieved via a 12 AWG, 2 conductor copper cable that may be run in conjunction with the fiber optic cable. The transformer shall be plugged into an uninterruptable power supply (UPS). The copper cable shall be labeled on both ends with a tag indicating "DANGER: Live Wire" and be labeled with the disconnect location.

21.4 Fiber Optics: To exceed the distance limitation of copper cabling, a single mode fiber optic cable with low strand count must be run from the same Telecommunications Room as the power cable. A weatherproof termination point shall be provided and mounted inside the bollard as part of the fiber installation.

21.5 RJ45 style interfaces, especially those transmitting POE shall have a dab of dielectric grease placed on the conductors to inhibit moisture from crossing the conductors.

21.6 Aesthetic considerations: Depending on the location and type of project, the university Architect or project architect should be consulted to ensure the bollard does not interfere with the project's aesthetics. For example, shorter, color camouflaged bollards may be considered for landscape enhancement projects.

See Examples in Appendix #7 – Bollards for Outdoor Wi-Fi or Remote Networking

END OF SECTION

Appendix #1 – UF Labeling and Naming Conventions in Accordance with ANSI/TIA-606-B

Introduction: The administration standard as presented in the ANSI/TIA-606-B addresses the need for an independent and scalable labeling standard in the administration of telecommunications cabling infrastructure. In order to standardize and administer the entirety of the infrastructure at UF, it is necessary to have a complete standard for labeling so that technicians do not need to learn new standards as they move from one building to the next. Contractors need a concrete labeling scheme furnished to them so that they can make their products as useful as possible.

According to the ANSI/TIA-606-B standard, what we are presently concerned with would be considered a class 3 labeling standard. We have multiple buildings and outside pathways that must be documented. All identifiers are independent and scalable. All labels read from the general to the specific from left to right.

There are three significantly different pieces to consider in developing a system for the administration of any complex system: naming, labeling and supporting documentation.

Naming is the process of assigning every piece of identifiable equipment a unique identifier to differentiate it from others. Unique names enable the use of databases in administration of the supporting documentation. In this system, the style of a name differs based upon the type of equipment named. This allows a quick and easy identification of the hardware.

Labeling is the process of affixing tags to the hardware so that their names can be determined. The tag affixed to the hardware is not always the full name of the piece of infrastructure. As will become apparent later, a number of pieces of a name can be determined based upon the location of the hardware. Because of this, it is not necessary to affix the entire name to every piece of hardware. This distinction becomes critical when the piece of equipment is too small to accept a label that contains its full name.

Supporting documentation is the key to any successful administration. Naming and labeling assure that everyone on campus can use the same basic keys for accessing information about the infrastructure but the supporting documentation holds all the information that individuals will need to know: fiber-optic strand count, termination points, last test date, copper pair counts, manufacturer of the cable, etc. This document deals primarily with the naming and labeling process in order to support Contractors installing the network infrastructure here at UF. Aside from the

deliverables required by UFIT Telecommunications Standards, the Contractor is not responsible for maintaining any documentation of campus infrastructure.

Naming: There are four distinct styles of naming telecommunications infrastructure here at UF. They all use the same identifiers in the construction of a name but differ in their order and presentation.

Every component of the telecommunications infrastructure has a unique and independent identifier.

Label Target	Example	Explanation
Building	0115	UF official building number
Telecommunications Room	1A	1-first floor, A- Telco Room A on that floor
Communications Cabinet	PCB001	Designates Pathway communication cabinet #1
Maintenance Hole	PMH001	Maintenance Hole #1
UTP communications panel	A	Designates communication panel A
Other communications panel	1	Designates communication panel 1, most commonly a fiber panel
Panel module	1	Module #1 in a communication panel
Port	1	Port #1 in a module or communication panel

Individual identifiers can be combined to create an overall and accurate picture of a cabling plant. Names will use a combination of these identifiers in an established format to completely identify any piece of the cabling plant. This, in turn, requires that every piece of equipment be labeled so that a technician can determine the name of any piece of infrastructure while in the field.

Constructing a name (location): There are four fundamental identifier types that shall be used at the beginning of any name: building numbers, telecommunications room identifiers, room numbers and communications cabinet identifiers. These are used to designate locations and include all location types here at **UF**. Assignment of any location identifiers should be coordinated with Facilities Planning & Construction in the case of building and room numbers, or the UFIT in the case of Telecommunication Room identifiers or Communications Cabinet identifiers.

Building numbers: UF has determined official building-number designations for each building on and off campus. These numbers shall be used to reference the buildings

in all names. These numbers can be obtained from UF PD&C. For example, 0042 is the official building number of the Computer Sciences and Engineering Building.

Telecommunication Room Identifiers: Each Telecommunication Room (including Entrance Facilities and Main Telecommunications Rooms) shall be identified with two alphanumeric characters that represent the floor level and a letter that differentiates it from other TRs on the same floor. The identification, assignment of these identifiers and labeling of these rooms will be covered later in this standard. The full name of a Telecommunications Room is this two-character identifier preceded by the four-digit building number. For example, 0038-1A is the name of a Telecommunications Room on the first floor of building 0038 (Bryant Hall). All letters in Telecommunications Room identifiers are capitalized.

Room Numbers: Room numbers are assigned by the university and reflect individual rooms that are not serving as Telecommunications Rooms.

OSP Locations: UF maintains a system of OSP locations that are individually named to allow for their documentation. The locations currently administered by UF consist of the following: communications cabinets, handholds and maintenance holes. Each location's name is created by assigning the correct three letter prefix and following that with a three-digit numeric identifier.

PMH001 is a maintenance hole identified and labeled as Maintenance Hole #1.
PHH009 is a handhole identified and labeled as Handhole #9.
PCB048 is a communications cabinet identified and labeled as cabinet #48.
PBE001 is a pathway bollard enclosure and labeled as bollard #1.

Constructing a name (equipment): All infrastructure elements that are not addressed in the other naming standards are named as pieces of infrastructure equipment. The beginning of the name specifies the location of the piece of equipment. The end of the name includes a three-letter description of the equipment and ends with an index number. The index number exists solely to differentiate the piece of equipment from other similar equipment in the same location. The three-letter acronym used in describing the equipment is based on the abbreviations presented in the ANSI/TIA-606-B. The most common abbreviations used at **UF** can be found in the following examples.

0047-1A-PRK1

- This equipment is located in Building 0047, Telecommunications Room 1A.
- This equipment is a pathway element (P), specifically, a rack (RK).
- The index number will differentiate it from other racks in the same location, a second rack in building 0047, room 1A would have an index number of two.

0047-1A-TGB1

- This equipment is located in Building 0047, Telecommunications Room 1A
- This equipment is a telecommunications (T) grounding bar (GB)
- The index number will differentiate it from other grounding bars in the same location; a second grounding bar would have an index number of two

0047-235A-WAO01

- This equipment is located Building 0047, room 235A
- This equipment is a Work Area Outlet (WAO)
- The index number will differentiate it from other work area outlets in the same location; a second work area outlet in the same room would have an index number of two

An exception to this is the Telecommunications Main Grounding Busbar. It does not have an index number at the end of its name since there should never be a situation where there will be more than one per building. Instead, an additional alphabetic identifier is used:

0047-1A-TMGB

- This equipment is located Building 047, Telecommunications Room 1A
- This equipment is a telecommunications (T) main grounding bar (MGB)

Pieces of equipment that are located in racks or mounted on walls follow a similar naming convention with an additional character to denote where the equipment can be found. This additional character follows the second dash and precedes the three-letter descriptive acronym. All acronyms are based on ANSI/TIA-606-B standard abbreviations. The additional character shall be a number if the equipment is located in a rack or other identified termination area (rack, cabinet, mounting table etc.) This number shall be the index number of the termination location. If the equipment is wall-mounted, the character shall be an upper-case W.

0047-1A-1FPL1

- This equipment is located in Building 0047, Telecommunications Room 1A.
- This equipment is located or mounted inside a termination area (rack, cabinet or other) within the room identified as #1.
- This piece of equipment is a fiber (F) panel (PL) and its index number is 1.

0047-1A-WXPL1

- This equipment is located in Building 0047, Telecommunications Room 1A.
- This equipment is mounted on the wall.
- This piece of equipment is a coaxial (X) panel (PL) and its index number is 1.

An exception to these rules has been made in the case of Unshielded Twisted Pair (UTP) termination panels. Instead of using index numbers, UTP panels are identified by an indexing letter. This is in accordance with the standards set out by the ANSI/TIA-606-B.

0047-1A-WCPLA

- This equipment is located in Building 0047, Telecommunications Room 1A.
- This equipment is mounted on the wall.
- This piece of equipment is a copper twisted pair (C) panel (PL) and its index letter is A. A second panel on the wall would be identified as B.

Subdivisions of pieces of equipment, such as the modules of a fiber panel or the ports of a UTP panel, will have the same name as their parent piece of equipment followed by an additional index number that is assigned to the subdivision. In the interest of brevity, subdivisions are not preceded by a three-letter descriptor. The index number of the parent piece of equipment and the subdivision will be separated by a period. A period always represents a subdivision of a larger piece of equipment. This nomenclature applies to all aspects of this naming standard except when referring to the ports on an individual module. In that case, the two numbers will be separated by a slash, instead of a period, following current switch naming conventions.

Port numbers are assigned beginning with 1 independently for each subdivision

0047-1A-WCPLA .01

- This equipment is located in Building 0047, Telecommunications Room 1A.
- This equipment is mounted on the wall.
- This is the first port of a UTP copper(C) panel (PL) designated as A.
- In general, UTP panels do not have subdivisions aside from ports.

0047-1A-1FPL1.2

- This equipment is located in Building 0047, Telecommunications Room 1A.
- This equipment is located or mounted inside a termination area (rack, cabinet or other) within the room identified as #1.
- This piece of equipment is part of a fiber (F) panel (PL) whose index number is 1.
- This equipment is a module designated as module #2.

- In general, fiber optic panels are assumed to have subdivisions (modules or drawers) that will be identified. Fiber Panels that do not have modular subdivisions are treated as if all ports are located in module #1.

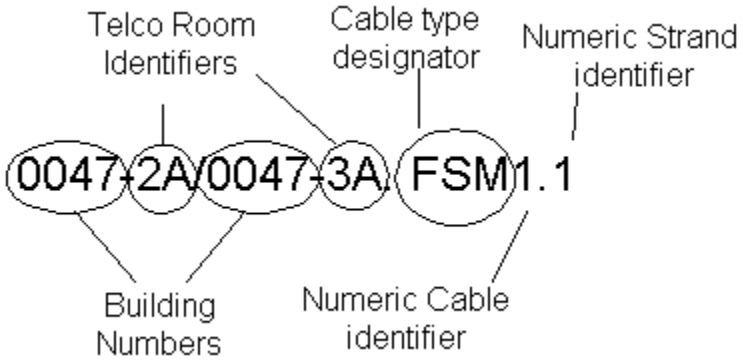
  0047-1A-1FPL1.2/03

- This equipment is located in Building 0047, Telecommunications Room 1A.
- This equipment is located or mounted inside a termination area (rack, cabinet or other) within the room identified as #1.
- This piece of equipment is part of a fiber (F) panel (PL) whose index number is 1.
- This designates port #3 on module #2 in fiber panel #1.

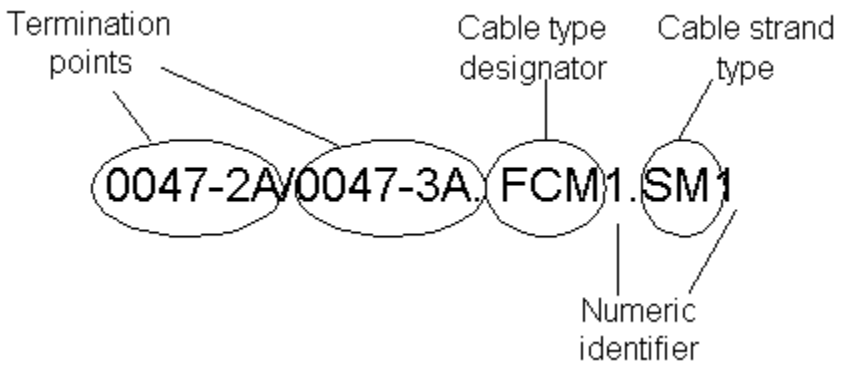
Note that the standard for identification of a Communications Cabinet follows the same standard as any other piece of equipment. It has a three-letter descriptor followed by an indexing number. Since they are not located inside any traditional space, they have no location numbers to precede them and their location is tracked in the supporting documentation held by UFIT.

Constructing a name (backbone cables and pathways): Backbone cable and pathway names are constructed by combining the names of the two Telecommunications Rooms that are being joined by this equipment, following them with a description of the equipment itself and ending with a numeric designator to distinguish the equipment from any other object with the same qualities. Order of the Telecommunications Rooms in the name is decided alphanumerically, not based on physical location itself. The Telecommunications Room identifiers will be separated by a slash and followed by a comma to separate them from the equipment description. There is no space between the comma and the building description.

The following is a breakdown of a single-mode fiber cable name.



Below is a breakdown of a composite fiber (containing both multi-mode and single-mode) cable name



Consistent with this standard, index-number identifiers for cables and cable strands are used solely to differentiate themselves from other cables sharing their same characteristics. A cable should only be identified with a 0047-1A/0193-1A,-FMM2 if there is already a 0047-1A/0193-1A,-FMM1 in existence.

0047-1A/0193-1A,FMM1

- Cable terminates in Building 0047, Telecommunications Room 1A.
- Cable terminates in Building 0193, Telecommunications Room 1A.
- This is a fiber (F) multimode (MM) cable connecting these rooms and its index number is 1.

0047-1A/0193-1A,FSM1

- Cable terminates in Building 0047, Telecommunications Room 1A.
- Cable terminates in Building 0193, Telecommunications Room 1A.
- This is a fiber (F) single-mode (SM) cable connecting these rooms and its index number is 1.

0047-1A/0193-1A,FCM1

- Cable terminates in Building 0047, Telecommunications Room 1A.
- Cable terminates in Building 0193, Telecommunications Room 1A.
- This is a fiber (F) composite (CM) cable connecting these rooms and its index number is 1.

0047-1A/0193-1A,CUT1

- Cable terminates in Building 0047, Telecommunications Room 1A.
- Cable terminates in Building 0193, Telecommunications Room 1A.
- This is a copper (C) unshielded twisted-pair (UT) backbone cable connecting these rooms and its index number is 1.

0047-1A/0047-1A,CUT1

- Both ends of cable terminate in Building 0047, Telecommunications Room 1A.
- This is a copper (C) unshielded twisted-pair (UT) backbone cable
- This is representative of a backbone cable connecting a wall mounted 110 block to a rack mounted RJ45 patch panel

0047-1A/0193-1A,PCO01

- Conduit terminates in Building 0047, Telecommunications Room 1A.
- Conduit terminates in Building 0193, Telecommunications Room 1A.
- This is a pathway (P) conduit (CO) connecting these rooms and it's index number is 1.

0047-1A/PMH074,PCO01

- Conduit terminates in Building 0047, Telecommunications Room 1A.
- Conduit terminates in Maintenance Hole 74
- This is a pathway (P) conduit (CO) connecting these rooms and it's index number is 1.

0047-1A/0193-1A,TBB1

- Conductor terminates in Building 0047, Telecommunications Room 1A.
- Conductor terminates in Building 0193, Telecommunications Room 1A.
- This is a telecommunications (T) bonding backbone (BB) cable connecting these rooms and its index number is 1.

Subdivisions of backbone cables or pathways shall be labeled following the manner of labeling subdivisions in equipment. Subdivisions will have the same name as their parent piece of equipment followed by an additional index number that is assigned to the subdivision. (Note: different binder groups in UTP or fiber cable will not be tracked as subdivisions in this standard.) In the interest of brevity, subdivisions are not preceded by a three-letter descriptor except as needed to differentiate themselves from other subdivision types. Currently, only composite-fiber-cable subdivisions require an additional descriptor for each fiber strand. The index number of the parent piece of equipment and the subdivision will be separated by a period. Fiber strand numbers in a fiber cable will be assigned in order with standard color code as outlined in TIA-598-C.

0047-1A/0193-1A,FMM1.01

- Cable terminates in Building 0047, Telecommunications Room 1A.

- Cable terminates in Building 0193, Telecommunications Room 1A.
- This is strand #1 in fiber (F) multi-mode (MM) cable #1 connecting these rooms

  0047-1A/0193-1A,FSM1.01

- Cable terminates in Building 0047, Telecommunications Room 1A.
- Cable terminates in Building 0193, Telecommunications Room 1A.
- This is strand #1 in fiber (F) single-mode (SM) cable #1 connecting these rooms

  0047-1A/0193-1A,FCM1.MM01

- Cable terminates in Building 0047, Telecommunications Room 1A.
- Cable terminates in Building 0193, Telecommunications Room 1A.
- This is multi-mode strand #1 in fiber (F) composite (CM) cable #1 connecting these rooms.
- Single-mode strand #1 of the same cable would be named 0047-1A/0193-1A, FCM1.SM1.

  0047-1A/0193-1A,CUT1.01

- Cable terminates in Building 0047, Telecommunications Room 1A.
- Cable terminates in Building 0193, Telecommunications Room 1A.
- This is a pair #1 in copper (C) unshielded twisted-pair (UT) cable #1 connecting these rooms.

  0047-1A/0193-1A,PCO1.01

- Conduit terminates in Building 047, Telecommunications Room 1A
- Conduit terminates in Building 193, Telecommunications Room 1A
- This is innerduct #1 in pathway (P) conduit (CO) #1 connecting these rooms

  PHH005/PMH05,PCO1.04

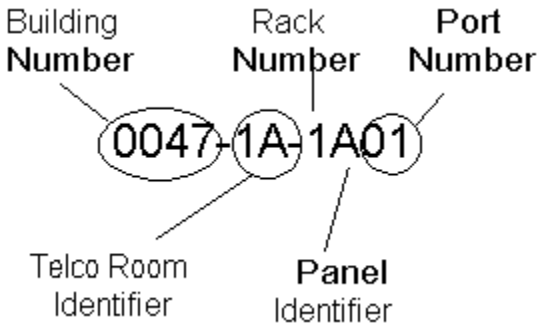
- Conduit terminates in Handhold #5
- Conduit terminates in Maintenance Hole #5
- This is innerduct #1 in pathway (P) conduit (CO) #1 connecting these rooms

Constructing a name (horizontal cables and pathways): Horizontal refers to any piece of the cable plant that feeds directly from a Telecommunications Room out to a user outlet or work area. This includes equipment that feeds out to a consolidation point in the work area or MUTOA. Horizontal cable labeling is based on the point of

origination of the cable or pathway element in the Telecommunications Room. Each horizontal plant element is labeled on both ends with an identifier that locates its termination point in the appropriate Telecommunications Room.

For UTP horizontal cables, the point of origination for the cable run will usually be located in a patch panel or termination block. A port in a patch panel is named according to the standards for equipment given above. For identification of horizontal cabling, a shorthand version of the full port name is used in order to differentiate the cable name from the termination point name and to facilitate labeling by providing a shorter name. A termination point for a horizontal run might terminate in 0047-1A-1CPLA.1. This would be port #1, in copper panel A, in termination area #1, in Telecommunications Room 1A, in building #0047.

The horizontal cable attached to that port would be identified as follows:



0047-1A-1A45

- UTP cable originates in Building 047, Telecommunications Room 1A.
- UTP cable originates in Rack #1, Patch Panel A, Port 45.

0047-3B-WA37

- UTP cable originates in Building 047, Telecommunications Room 3B.
- UTP cable originates in wall mounted Patch Panel A, Port 37.

For non-UTP horizontal cable installations, the panel identifier shall not be used for cable names due to the variety of termination methods that exist for non-UTP cable. Fiber cables truly terminate in more than one port and could conceivably terminate in multiple panels. Coaxial installations often do not use termination panels at all and plug directly into electrical devices.

The name of non-UTP horizontal cables is still based upon the point of origination, but that information is limited to the Telecommunication Room where the cable originates. This information is followed by the standard three-letter descriptor and an index number.

0047-1A-FMM01

- Horizontal fiber (F) multimode (MM) cable that originates in Building 047, Telecommunications Room 1A.

0047-3B-XDR01

- Horizontal coaxial (X) drop (DR) that originates in Building 047, Telecommunications Room 3B.

Finally, horizontal conduit installations will be named following the equipment standard set forth above. This implies that a horizontal conduit will be named for the Telecommunications Room in which the conduit originates.

0155-4A-PCO01

- This is a horizontal conduit.
- This horizontal pathway (P) conduit (CO) element originates in Telecommunications Room 4A, in building #0155.

Labeling: Labeling is the process of affixing tags to the infrastructure components in order to effectively communicate the name of that piece of equipment to the technician in the field. In many cases this can be as simple as tagging a piece of equipment with the official name but under some circumstances this may not be feasible due to the size of the piece of equipment or other factors. Additionally, the labeling may communicate other pieces of information such as what fiber cable is located in what FPL in a particular Telecommunications Room. And finally, this standard addresses the need for each piece of equipment to be labeled in exactly the same fashion so that technicians can expect the same standards of repair to be used at each UF location.

All labels are to be mechanically generated. Handwritten labels are not acceptable. All label adhesives shall have a functional lifespan equal to the infrastructure being labeled.

Following is a comprehensive list of how each piece of network infrastructure will be labeled at UF. If there are any questions concerning these requirements, please contact UFIT.

Backbone Conduit

An installed conduit shall be labeled with its full name as discussed in the naming portion of this standard above. The backbone conduit will be labeled at both ends within 4 inches of termination of the conduit. The backbone conduit will also be

labeled where it enters and where it exits any pull boxes that have been installed along its path.

Communications Cabinet

Communications Cabinets are to be labeled with their full name. Cabinets should be labeled outside on the most visible side. Cabinets should be labeled inside as well. The inside label will be applied to the interior of the fiber-side door with the locking assembly. Purchasing of labels for use on external Communication Cabinets must be coordinated through UFIT.

Entrance Facilities, Main Telecommunications Rooms and Telecommunications Rooms

Room labeling will consist of a plastic sign on the outside door of the Telecommunications Room consistent with the style of other room signs in the building. This sign should designate the use of the room as a Telecommunications Room and display the appropriate identifier for that specific room such as 'Telecommunications Room 1A.'

Fiber- Optic cable

The fiber optic cable should be labeled at both termination points on the outside jacket of the cable within 8 inches of the breakout point for the individual strands. This label will contain the full name of the cable. A typical backbone label will be of the following format, 0147-1A/0147-3A, FSM1. A typical horizontal label will be of the following format, 0147-1A-FSM01. This label will be applied outside of the fiber panel.

Individual fiber strands should be inserted into any fiber panel following the standard color code for fiber with Blue being first, as per TIA-598-C. This color code should be followed so it can be read from left to right and from up to down for each module as viewed from the front of the fiber panel. In the documentation, strand numbers will begin at 1 and ascend in keeping with the color code, i.e., blue=1, orange=2, green=3 etc.

Each fiber termination should be labeled on the boot by a number that corresponds to its placement in the color code of the cable. Numbers should begin at 1 and ascend from there with duplicate numbers used for different types of fiber strands in one cable. For example, a composite fiber cable will have multiple strands designated with a 1 to correspond to the first MM fiber cable and the first SM fiber cable. Numbers will not refresh for different binder groups, only for different classifications of fiber.

The color sequence to be used is:

Blue-Orange-Green-Brown-Slate-White-Red-Black-Yellow-Violet-Rose-Aqua

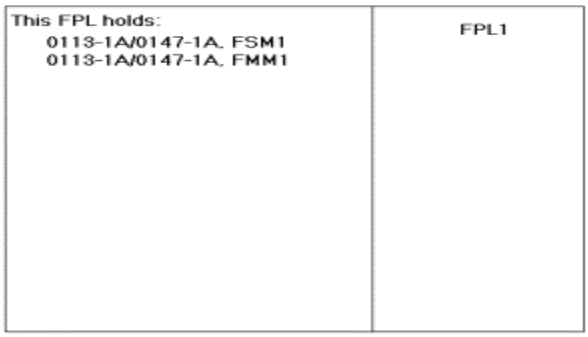
Fiber Panel

Outside

A fiber panel should be assigned an independent identifier and be labeled with it in the upper right corner of the front of the LIU. Appropriate identifiers include FPL1, FPL2 etc.

A fiber panel should have a list of all fiber cables that are held in the box itself. Often times, this will just be one fiber cable but could be much more. This list should be preceded with an introduction of 'This FPL holds:' or the like to prevent confusion between the fiber name and the recorded name of the fiber panel. This list should be in the upper left corner of the fiber panel.

In the event that both ends of a particular fiber cable terminate in the same room, the name of that cable on the front of the fiber panel should be followed by an additional label in parentheses that specifies the rack and fiber panel numbers on both ends of that cable. For example, 0019-2A/0019-2A,FMM1 followed by (WFPL6/1FPL1) would communicate that one end of the cable terminates in a wall mounted fiber panel labeled FPL6 and a rack mounted fiber panel labeled FPL1 in rack 1. This additional label does not add to the cable name for record purposes but exists solely to assist technicians in the field:



Inside

Fibers should be installed in each module of a fiber panel from left to right and up to down accordingly as you look at the face of the bulkheads with the standard color code for fiber installation.

Each bulkhead will have an independent identifier. In a fiber panel that has been subdivided into modules, label the modules with numbers beginning with 1 and ascending. The individual bulkheads need not be labeled as they will be identified with numbers that begin with 1 and will be read from left to right or up to down in accordance with the orientation of the module. In fiber panels that have not been subdivided, the individual bulkheads will need to be identified with a number. If the

fiber panel does not come preprinted, the Installer will be responsible for labeling the bulkheads.

A documentation page will be supplied inside the panel that should be marked with which fiber strand matches up to which bulkhead. The Installer may create a simple spreadsheet similar to that pictured below. In this case, labeling should make clear the identity of each bulkhead and the fiber strand that is connected to it. In the case of horizontal fiber, the strand identifier will be followed by the room number of the cables remote end. This sheet should be stored in a clear plastic pouch inside the FPL. If the FPL does not provide such a pouch, the Installer is responsible for providing one. Copies of this spreadsheet will be supplied to UFIT with all other deliverables at the end of a project.

Fiber Panel # 0006-2B-WFPL2

Module/Port	Fiber Identifier
1/1	0006-2B/0406-2A, FMM1.01
1/2	0006-2B/0406-2A, FMM1.02
1/3	0006-2B/0406-2A, FMM1.03
1/4	0006-2B/0406-2A, FMM1.04
1/5	0006-2B/0406-2A, FMM1.05
1/6	0006-2B/0406-2A, FMM1.06
2/1	0006-2B-FMM01.01(Rm 0234)
2/2	0006-2B-FMM01.02(Rm 0234)
2/3	0006-2B-FMM02.01(Rm 0236)
2/4	0006-2B-FMM02.02(Rm 0236)
2/5	0006-2B-FMM02.03(Rm 0236)
2/6	0006-2B-FMM02.04(Rm 0236)

This insert can be found in fiber panel #2, mounted on the wall In Telecommunications Room 2B, in building #0006. Bulkhead #1 of module #1 holds the strand #1 of multi-mode fiber-optic cable #1 that connects Telecommunications Rooms 0006-2B and 0406-2A. Bulkhead #1 of module #2 holds the first strand of a horizontal fiber cable that feeds from Telecommunication Room 0006-2B.

At no time should the labeling inside a fiber panel require a technician or engineer to open the Installer's side of the fiber panel to retrieve labeling information.

Grounding Busbars

Each grounding busbar in each Telecommunication Room will be labeled in the upper-left corner with the full name of the busbar.

Hand holes

Hand holes are to be labeled with their full name. Hand holes should be labeled underneath the cover and on an interior wall if possible. Purchasing of labels for use on external Communication Cabinets must be coordinated through UFIT.

Horizontal Cable

Each end of the horizontal cable should be labeled on the outside jacket of the cable within 12 inches of the termination points with the name of the cable. Horizontal cables do not need building identifiers printed in the name on these labels. This label will follow the conventions outlined above with a typical label being 1A-1A03 in the case of UTP cable or 1A-FMM01 in the case of non-UTP cable. This label shall be applied before the horizontal cable enters any bundle.

Horizontal Conduit

An installed horizontal conduit that directly connects the WAO with the TR without passing through the cable tray shall be labeled with the conduit's full name and the name of the WAO it serves within 4 inches of the termination in the Telecommunications Room.

An installed horizontal conduit that directly connects the WAO with the TR without passing through the cable tray shall be labeled at the user end, inside the work area outlet box with the full name of the conduit

WAO feeding horizontal conduit that stubs out at the ceiling or extends only from the Work Area Outlet to the nearest cable tray shall be marked inside the WAO with blue paint. Where it terminates in the ceiling or near the cable tray, this conduit shall be wrapped with blue electrical tape.

Maintenance Hole

Maintenance Holes are to be labeled with their full name. Maintenance hole identifiers should be placed underneath the cover and on an interior wall if possible. Purchasing of labels for use on external Communication Cabinets must be coordinated through UFIT.

Twisted Pair Patch Panels and Termination Blocks

Labeling of panels or punch blocks with letters will begin with A. Labeling of panels should begin again with the letter A for each new termination area and the labeling of panels on the wall should begin with A.

Where possible, individual ports on the panel should be numbered in ascending order. If not printed on the panel by the manufacturer, the Installer is responsible for making sure that each port is labeled with its own number. Since identification of individual panels for wall mounted 110 panels can be difficult, that the Installer will

be held responsible for labeling all ports on wall mounted 110 blocks with the Panel identifier and the port identifier before adding additional labeling information.

Horizontal terminations

Each port on a UTP termination panel will be labeled with the room number of the room where the opposite end of the cable terminates.

For rack or wall mounted RJ45 patch panels that do not have a defined label space place the label above or below the Port. E.g., *rm 424*.

For rack or wall mounted 110 punch blocks, labeling in the approved labeling section above or below the termination pins will fulfill this requirement. E.g., *A01 / rm 424*.

Backbone terminations

Where 4 pair UTP cable terminating in patch panels is being used as a backbone connection between TR's, the patch panel port where they terminate will be labeled with the termination position of the other end of the cable. For example, where 0132-1A/0132-1B,CUT1 connects two TR's each patch panel would be labeled with the termination position of the other room. In 0132-1A, the port where this line terminates may be labeled 1B-1A05. This points to Rack #1, Panel A and port 5 in TR 1B.

For higher count UTP backbone cables terminating in wall mounted 110 blocks on both sides, the termination area should be labeled with the name of the backbone cable. This should be followed by the pair count in parentheses. Pair count should also be accessible through the supporting documentation. An appropriate label on a fourth floor termination block would read 0024-3B/0024-4A,CUT1 (100 pair), where the other end of the cable terminates in room 324 and the cable has 100 pairs.

For higher count UTP cables that terminate in a 110 block on one side and an RJ45 patch panel on the other, we default to the standard listed above for 4 pair UTP cables. This requires that the 110 blocks be split into logical ports for purposes of labeling. Each pair, or set of pairs, that connect to a port on the RJ45 patch panel will be considered a port and should be labeled as such on the wall mounted panel. Each panel on each side then will be labeled according to the port identifier for the other side. For example, where 0132-1A/0132-1A,CUT1 connects two termination areas within the same TR, the 110 block and the RJ45 patch panel would be labeled with the termination position of the other side. On the patch panel, each port would be labeled with a port identifier for the 110 block, *1A-WA14*. On the 110 block, the 'port', or series of pairs, would be labeled with the panel and port identifier for the 110 block followed by the port identifier for the patch panel, *A14 / 1A-1A14*.

Rack or other Termination Area

Termination areas within a room should be labeled numerically beginning with 1 and ascending as more racks or cabinets are added to the room. The equipment defining the termination area should be clearly labeled along the top crossbar.

For purposes of this labeling standard, a termination area is considered to be any structure capable of holding telecommunications terminations and electronic hardware. This includes, but is not limited to, 7-ft free-standing racks, free-standing enclosures, 3-4 ft wall mounted fixed racks, wall-mounted enclosures, server desks and so on.

Telecommunications Bonding Backbone

Telecommunications bonding backbones will be labeled with the full name of the bonding backbone at each termination point.

In addition, the bonding backbone will be labeled with the full name of the bonding backbone at every point to which it is bonded in any other Telecommunications Rooms through which it passes.

Telecommunications Pull Boxes

All pull boxes installed to support telecommunications infrastructure will be identified as such. The letters UFIT will be painted on the front cover plate of the outlet box.

All conduits entering the pull box shall be labeled as addressed in the horizontal and backbone conduit sections in this standard.

Twisted Pair Backbone cable

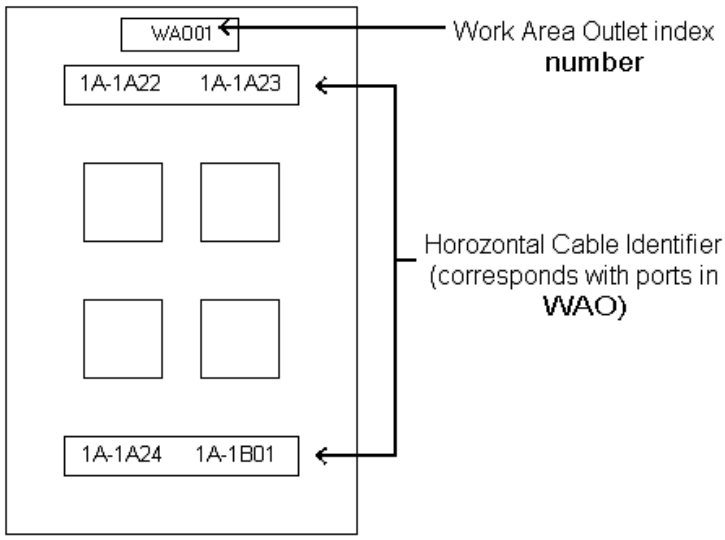
The twisted pair cable should be labeled at both termination points on the outside jacket of the cable within 8 inches of the breakout point for the individual strands. This label will contain the full name of the cable. A typical label will be of the following format, 0147-1A/0147-3A, CUT1.

WAOs

Outlet box ports shall be labeled on the appropriate area with the name of the cable connected to them without the building designator. For example, the Work Area Outlet port connection for 0047-1A-1B05, should be labeled 1A-1B05. See the illustration below.

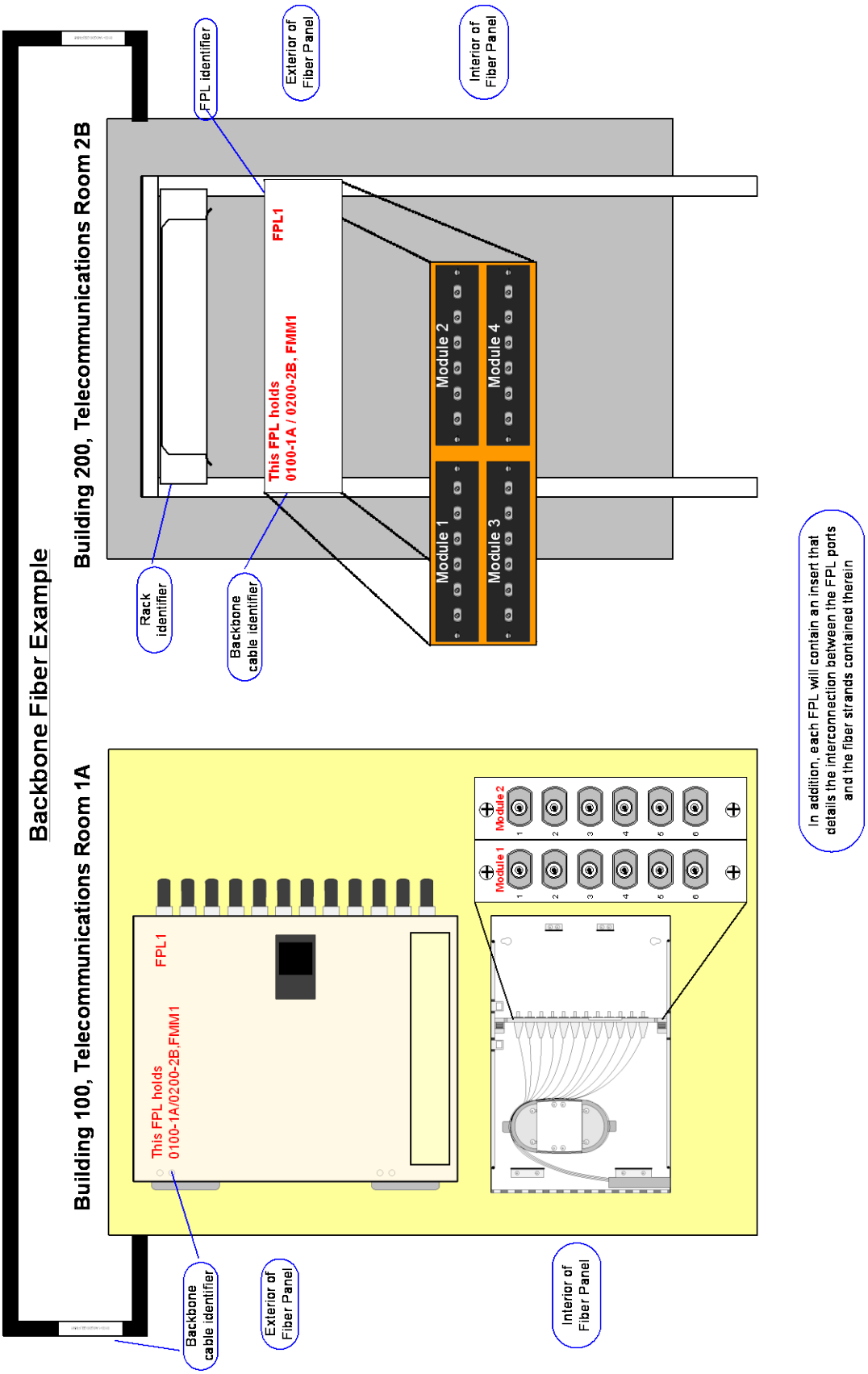
Outlet boxes will be labeled numerically with the WAO number at the top of the faceplate preceded by WAO. For each room, this number will begin at 1 and ascend numerically as new outlet boxes are added.

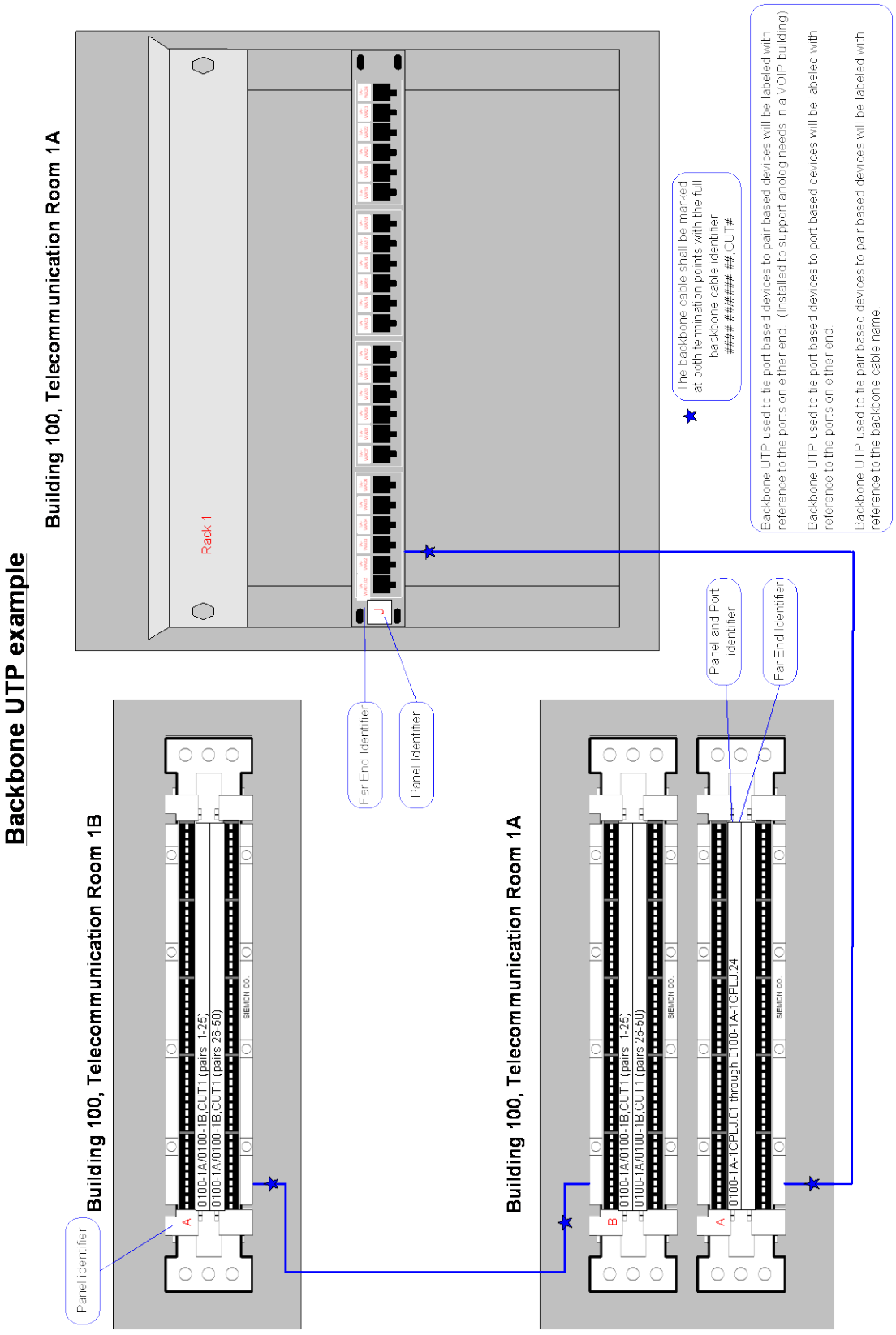
The interior of an outlet box should be labeled with the name of the horizontal conduit that feeds it (see horizontal conduit section).

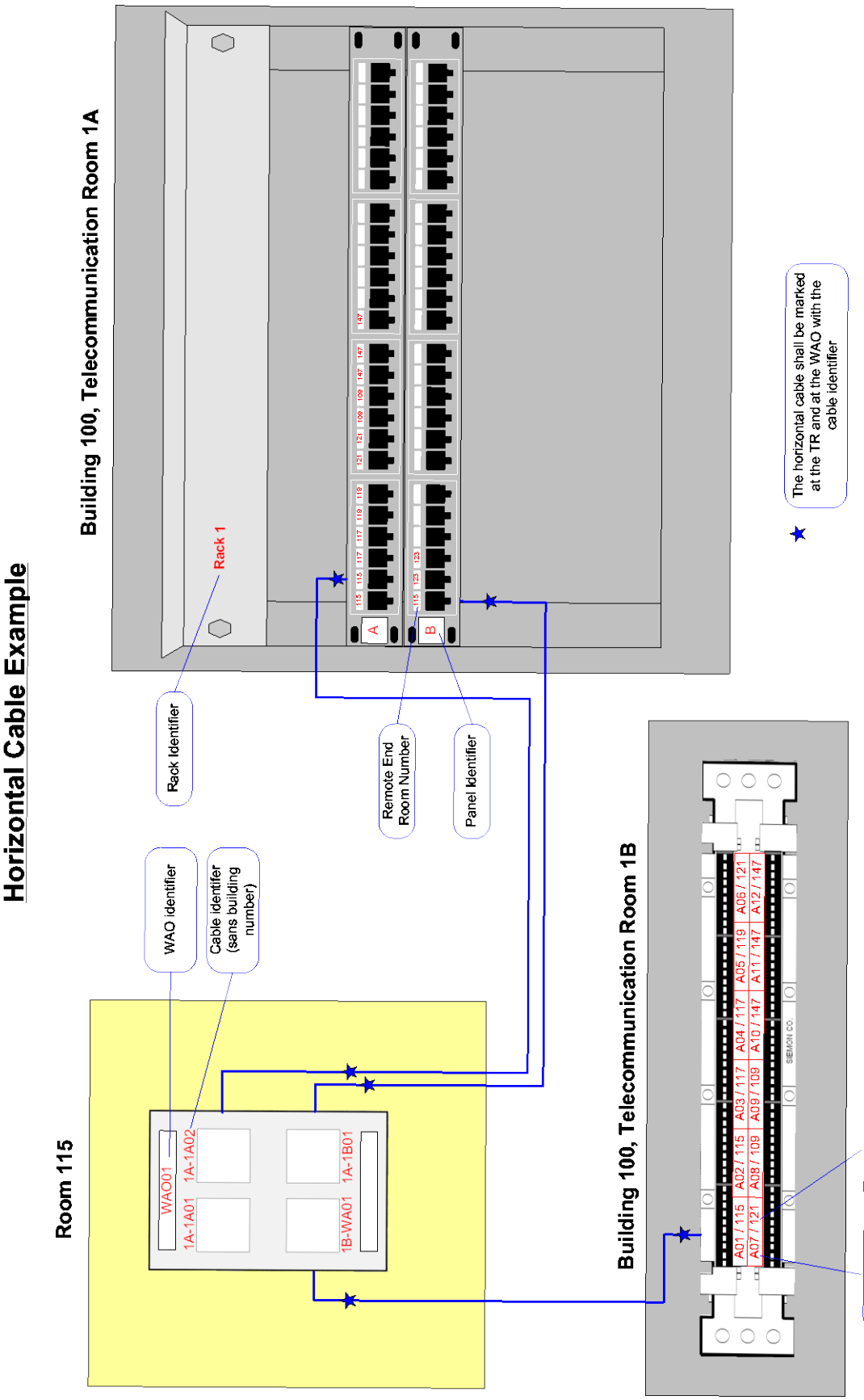


Supporting Documentation: All deliverables that are turned over to UF will reference network-infrastructure equipment using this standard. At that point it is the responsibility of UFIT to maintain all records and documentation of network infrastructure. As such, those procedures are open to more regular review, procedural change and will not be addressed here.

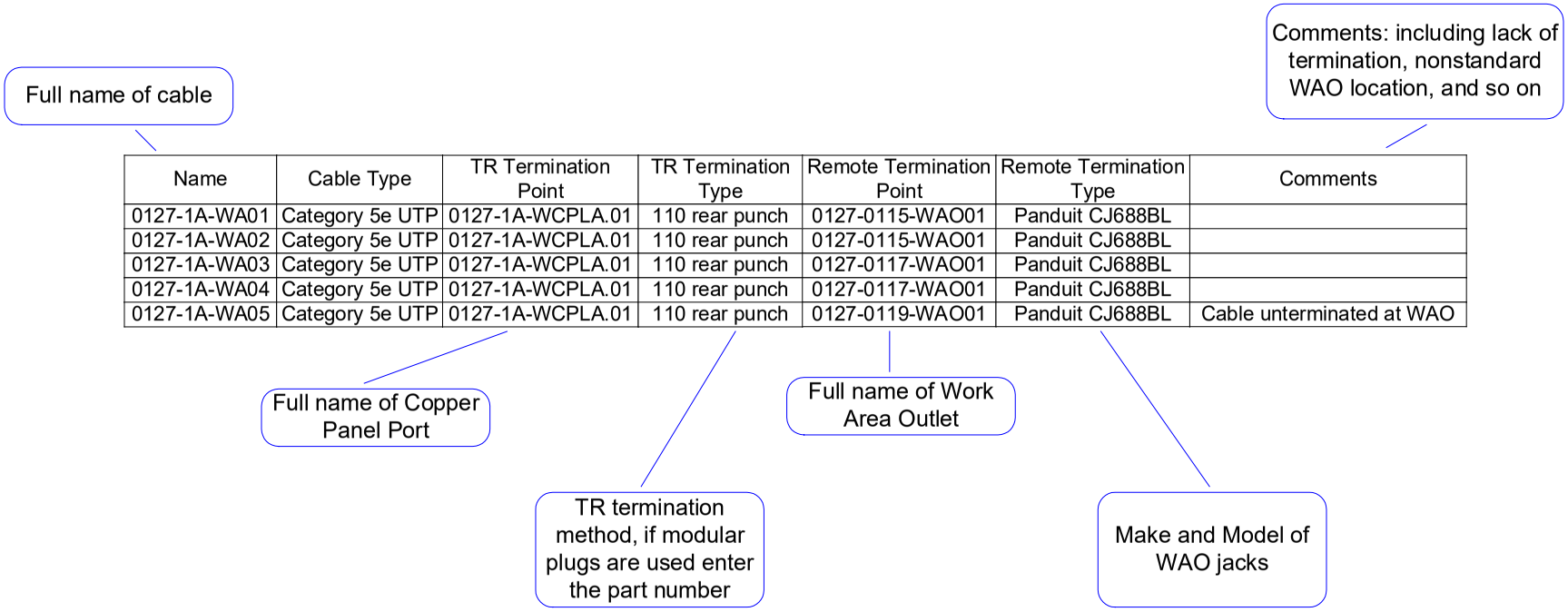
Conclusion: This document covers the most common labeling needs for the installation of network infrastructure across UF. There are a number of more specific situations covered in the ANSI/TIA/-606-B administration standard including a standard fare of abbreviations for descriptors. If you have any questions concerning these standards and their interpretation in reference to UF, contact UFIT.


Backbone Fiber Example
Building 200, Telecommunications Room 2B
FPL identifier
Exterior of Fiber Panel
Interior of Fiber Panel
FPL1
This FPL holds
0100-1A / 0200-2B, FMM1
Module 1
Module 2
Module 3
Module 4
Rack identifier
Backbone cable identifier
Building 100, Telecommunications Room 1A
FPL1
This FPL holds
0100-1A/0200-2B,FMM1
Module 1
Module 2
Backbone cable identifier
Exterior of Fiber Panel
Interior of Fiber Panel
In addition, each FPL will contain an insert that details the interconnection between the FPL ports and the fiber strands contained therein


Backbone UTP example
Building 100, Telecommunication Room 1A
Rack 1
J
The backbone cable shall be marked at both termination points with the full backbone cable identifier ####.#####-##.CUT#
Backbone UTP used to tie port based devices to pair based devices will be labeled with reference to the ports on either end. (Installed to support analog needs in a VOIP building)
Backbone UTP used to tie port based devices to port based devices will be labeled with reference to the ports on either end.
Backbone UTP used to tie pair based devices to pair based devices will be labeled with reference to the backbone cable name.
Far End Identifier
Panel Identifier
Panel and Port Identifier
Far End Identifier
Building 100, Telecommunication Room 1B
Panel identifier
A
0100-1A/0100-1B,CUT1 (pairs 1-25)
0100-1A/0100-1B,CUT1 (pairs 26-50)
SIEMON CO.
Building 100, Telecommunication Room 1A
B
0100-1A/0100-1B,CUT1 (pairs 1-25)
0100-1A/0100-1B,CUT1 (pairs 26-50)
SIEMON CO.
A
0100-1A-1CPLJ_01 through 0100-1A-1CPLJ_24
SIEMON CO.

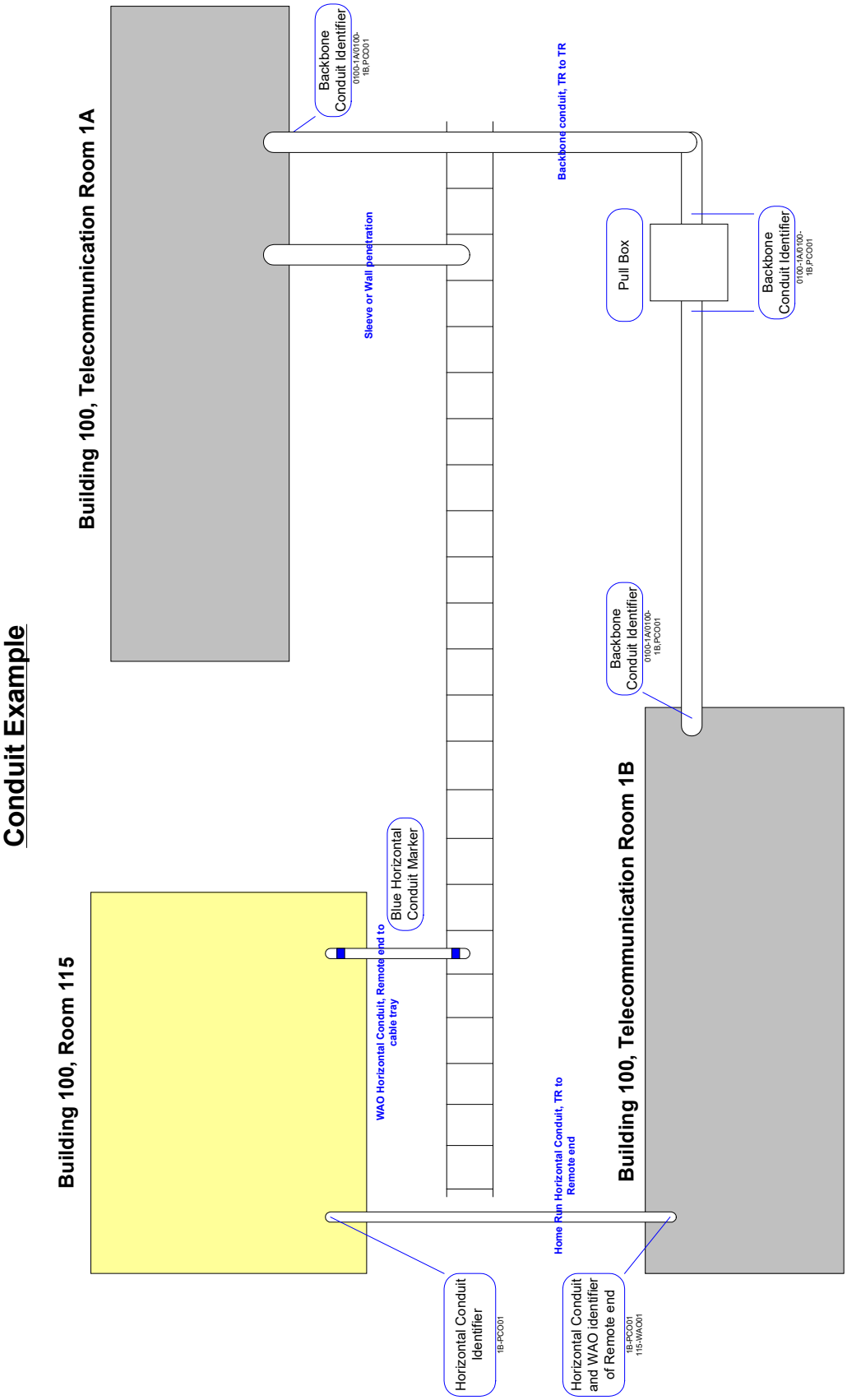

Horizontal Cable Example
Building 100, Telecommunication Room 1A
Rack 1
A
B
The horizontal cable shall be marked at the TR and at the WAO with the cable identifier
Rack Identifier
Remote End Room Number
Panel Identifier
WAO identifier
Cable identifier (sans building number)
Room 115
WAO01
1A-1A02
1A-1A01
1A-1B01
1B-WA01
Building 100, Telecommunication Room 1B
A01 / 115
A02 / 115
A03 / 117
A04 / 117
A05 / 119
A06 / 121
A07 / 121
A08 / 109
A09 / 109
A10 / 147
A11 / 147
A12 / 147
Remote End Room Number
Panel and Port identifier

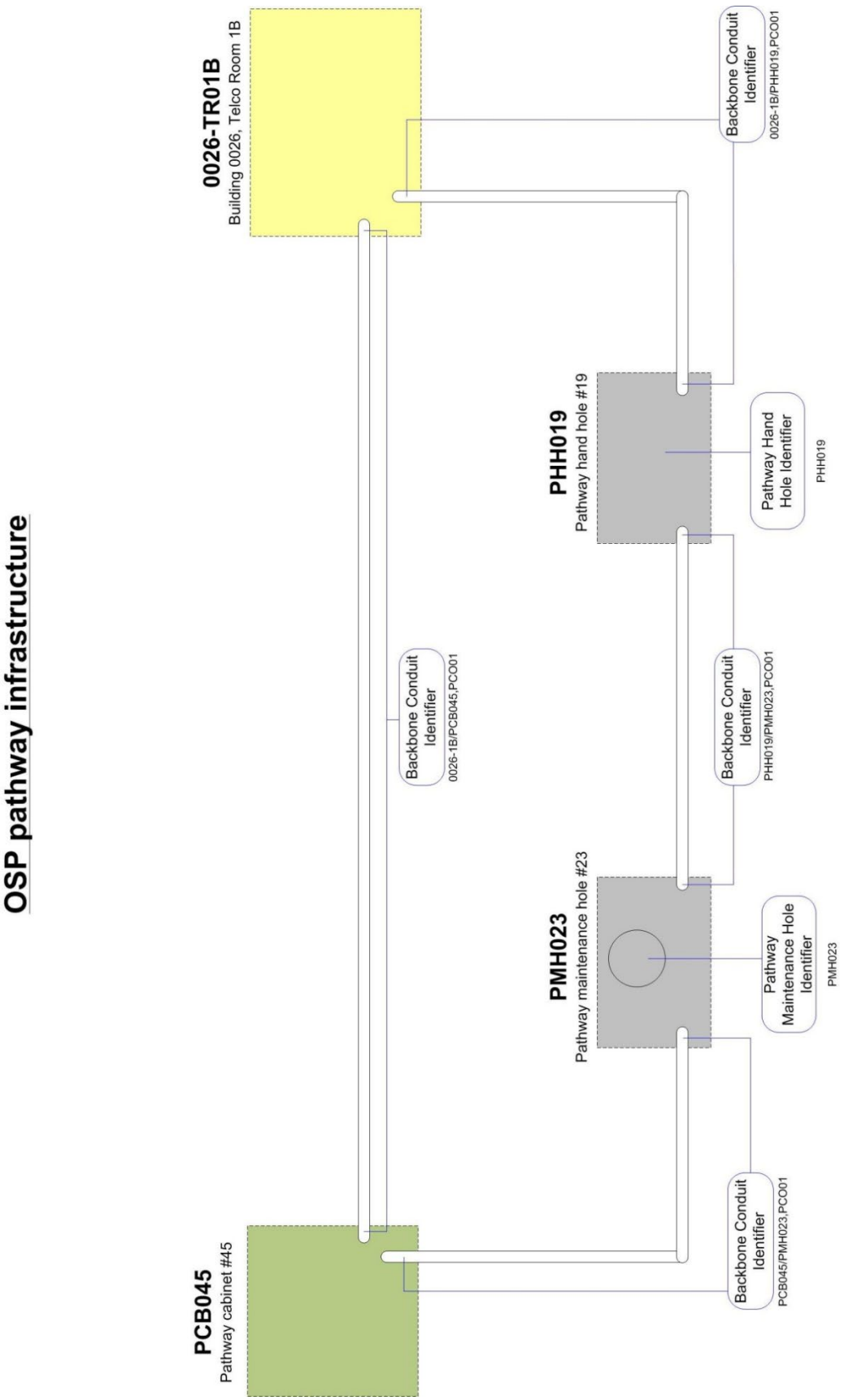
Horizontal Record Example



Name	Cable Type	TR Termination Point	TR Termination Type	Remote Termination Point	Remote Termination Type	Comments
0127-1A-WA01	Category 5e UTP	0127-1A-WCPLA.01	110 rear punch	0127-0115-WAO01	Panduit CJ688BL	
0127-1A-WA02	Category 5e UTP	0127-1A-WCPLA.01	110 rear punch	0127-0115-WAO01	Panduit CJ688BL	
0127-1A-WA03	Category 5e UTP	0127-1A-WCPLA.01	110 rear punch	0127-0117-WAO01	Panduit CJ688BL	
0127-1A-WA04	Category 5e UTP	0127-1A-WCPLA.01	110 rear punch	0127-0117-WAO01	Panduit CJ688BL	
0127-1A-WA05	Category 5e UTP	0127-1A-WCPLA.01	110 rear punch	0127-0119-WAO01	Panduit CJ688BL	Cable unterminated at WAO

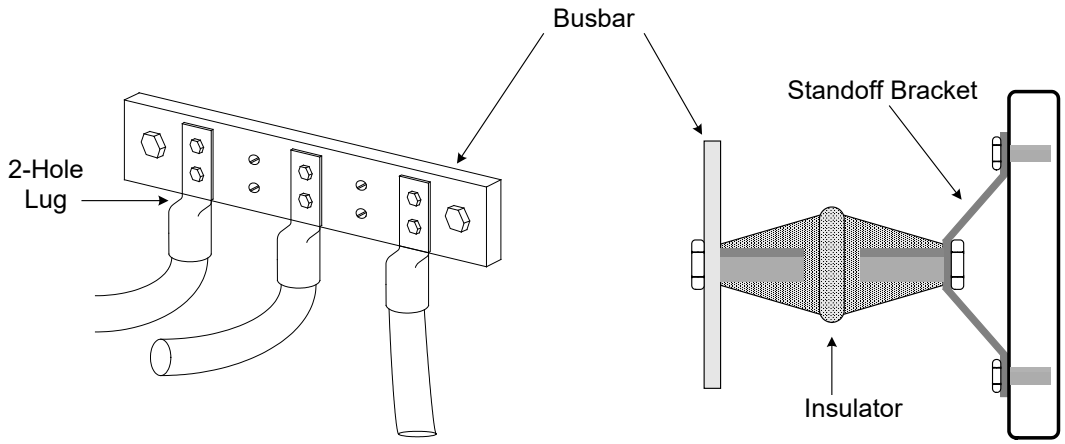
Conduit Example




OSP pathway infrastructure
0026-TR01B
Building 0026, Telco Room 1B
PCB045
Pathway cabinet #45
PHH019
Pathway hand hole #19
PMH023
Pathway maintenance hole #23
Backbone Conduit Identifier
0026-1B/PCB045,PCO01
Backbone Conduit Identifier
0026-1B/PHH019,PCO01
Backbone Conduit Identifier
PHH019/PMH023,PCO01
Backbone Conduit Identifier
PCB045/PMH023,PCO01
Pathway Hand Hole Identifier
PHH019
Pathway Maintenance Hole Identifier
PMH023

Appendix #2 - Grounding and Bonding

Appendix 2 - Typical Grounding Busbars

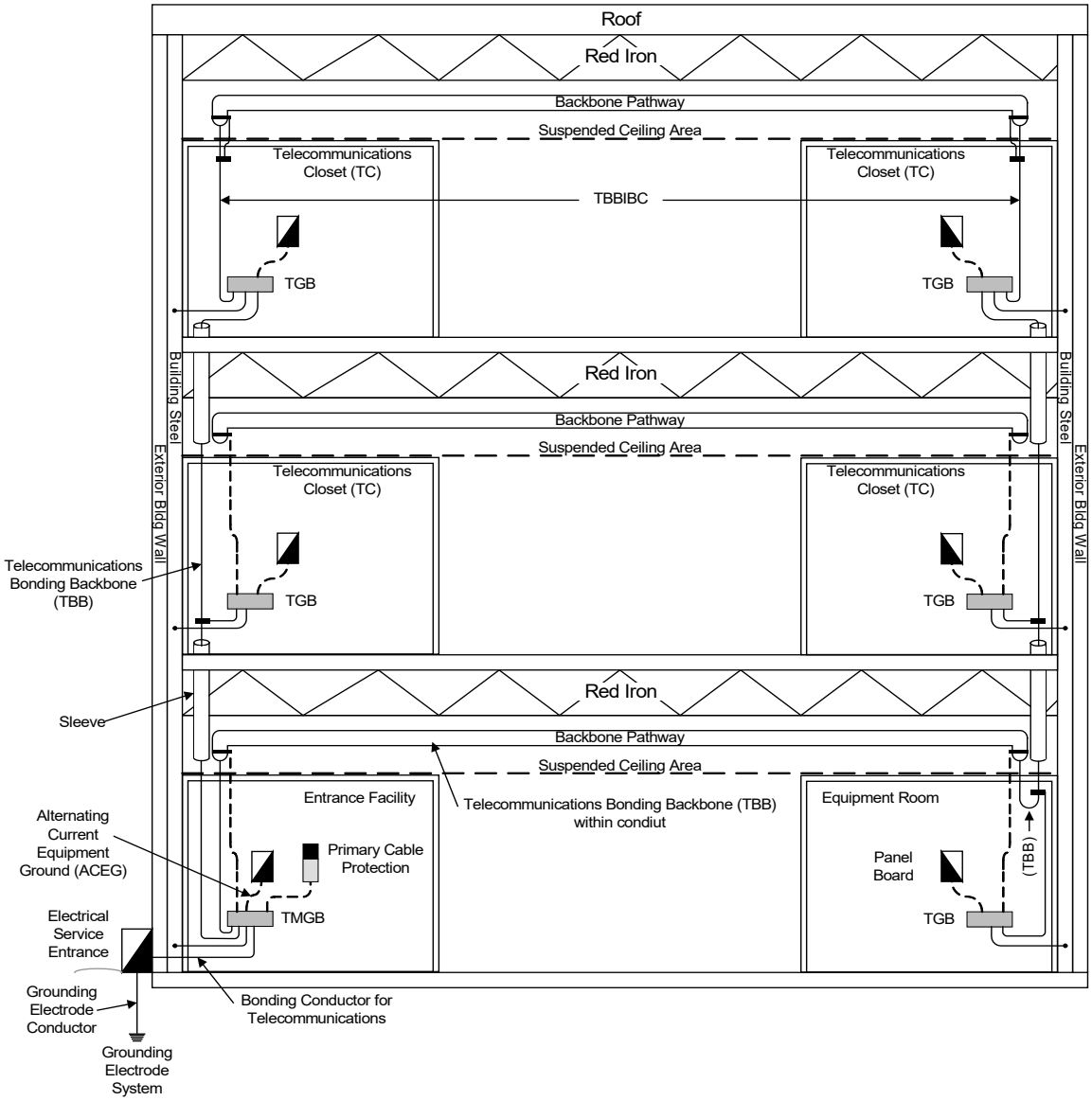


A Telecommunications Bonding Backbone (TBB) conductor is connected from the TMGB to the Telecommunications Grounding Busbar (TGB) in Telecommunications Closets within the building. The minimum dimensions of the TGB are 6 mm (0.25 in) thick, 50 mm (2 in) wide and variable in length.

A TBB is a conductor that interconnects all the TGBs with the TMGB. The TBB is designed to interconnect busbars and is not intended to have equipment bonding conductors spliced on to it. The minimum TBB size shall be a 6 AWG and could be as large as a 3/0 AWG.

The busbar designated for protectors, the Telecommunications Main Grounding Busbar (TMGB), must safely carry lightning and power fault currents. The TMGB is directly bonded to the electrical service ground. It should be positioned adjacent to the protectors and directly between the protectors and the approved building ground for protector operation. The minimum dimensions of the TMGB are 6 mm (0.25 in.) thick, 100 mm (4 in.) wide and variable in length.

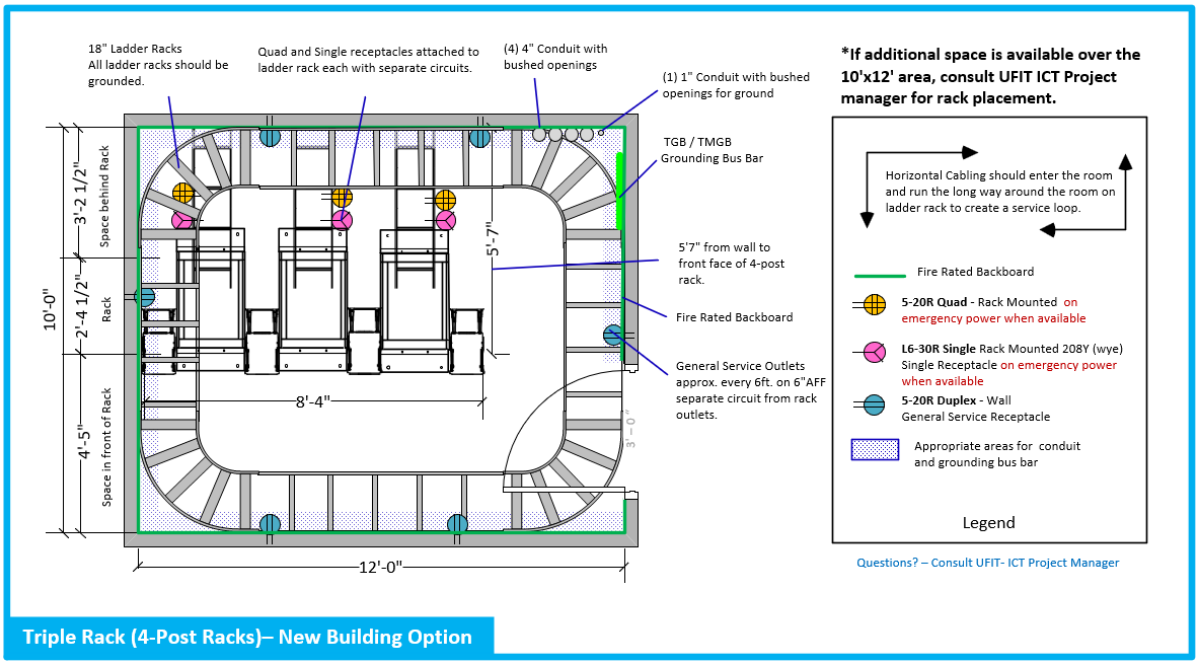
Typical Telecommunications Grounding System:



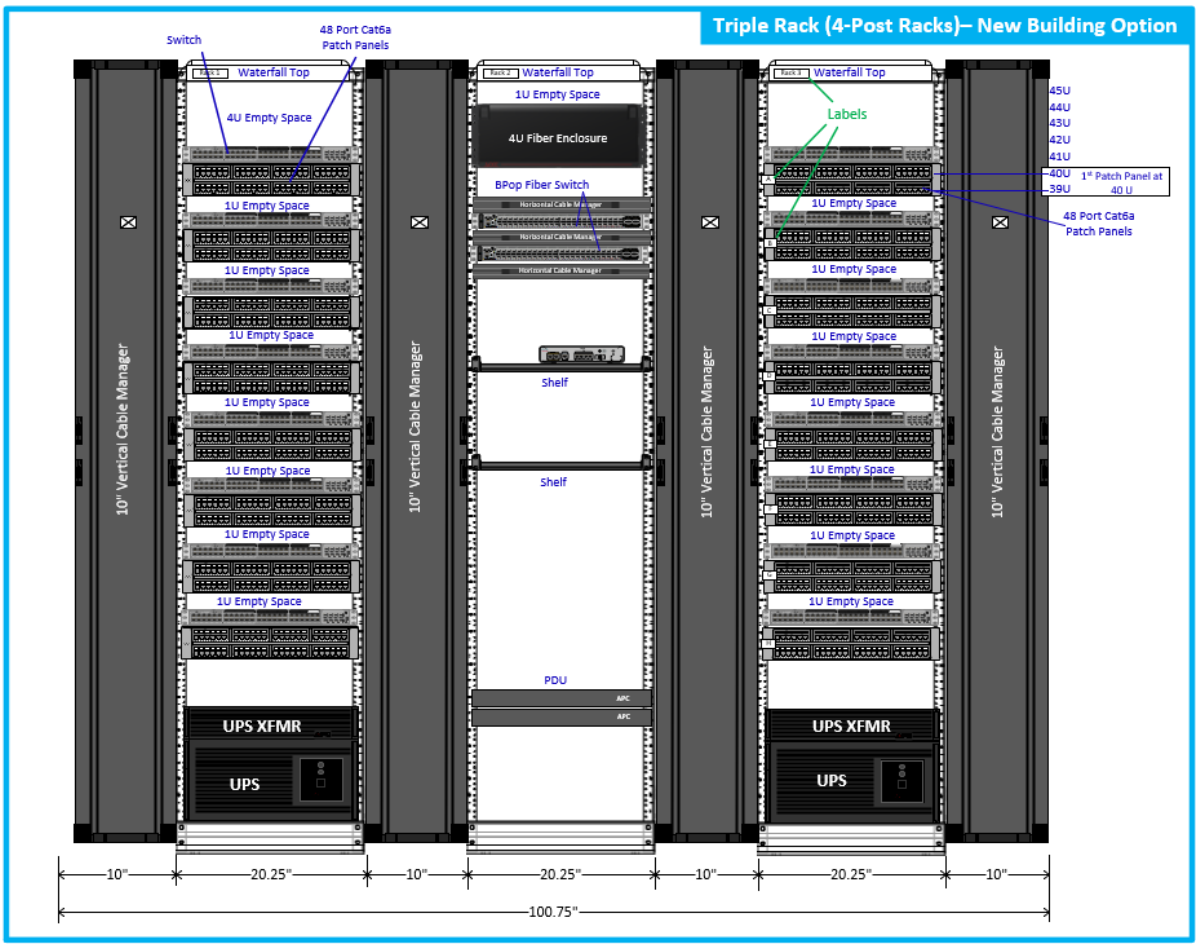
Glossary:

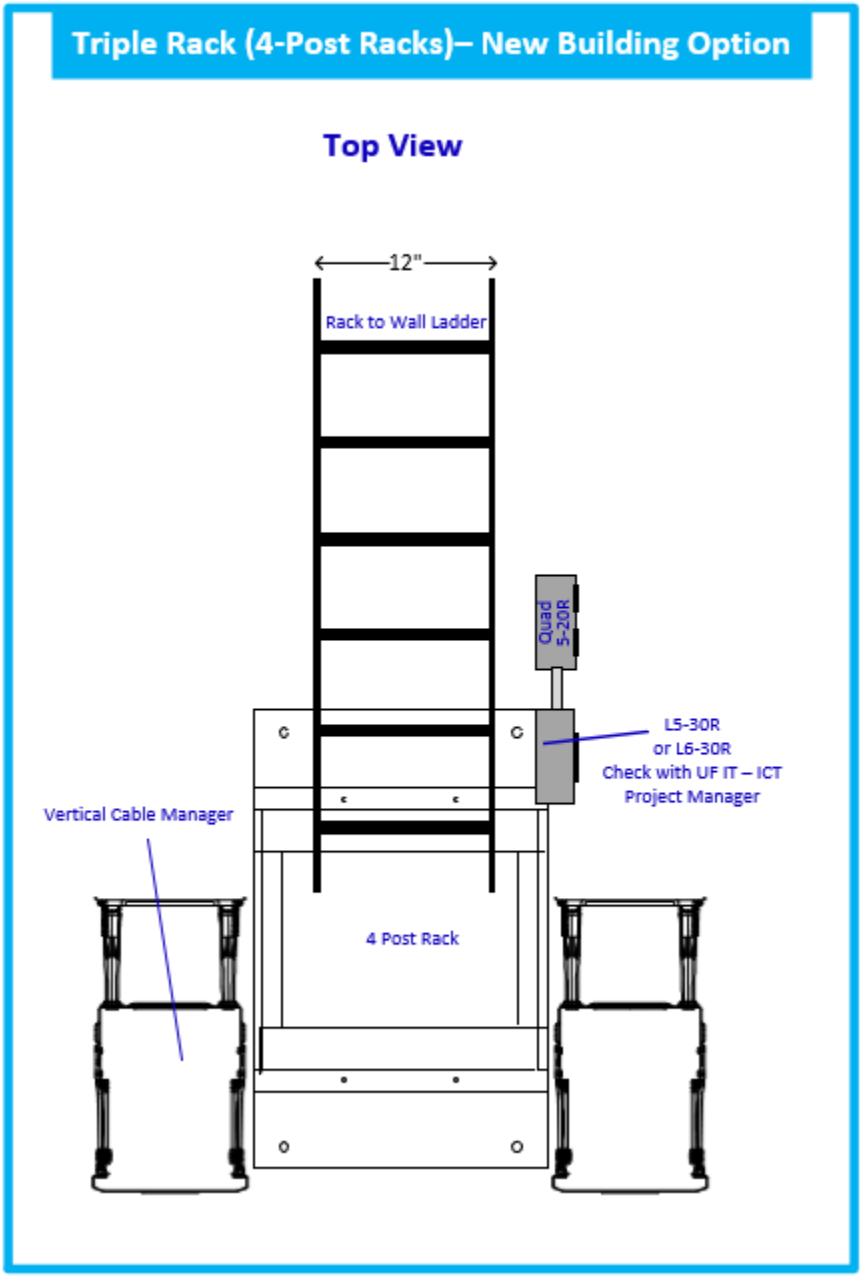
TBB - Telecommunications bonding backbone
TMGB - Telecommunications main grounding busbar
TGB - Telecommunications grounding busbar
TBBIBC - Telecommunications bonding backbone interconnecting bonding conductor

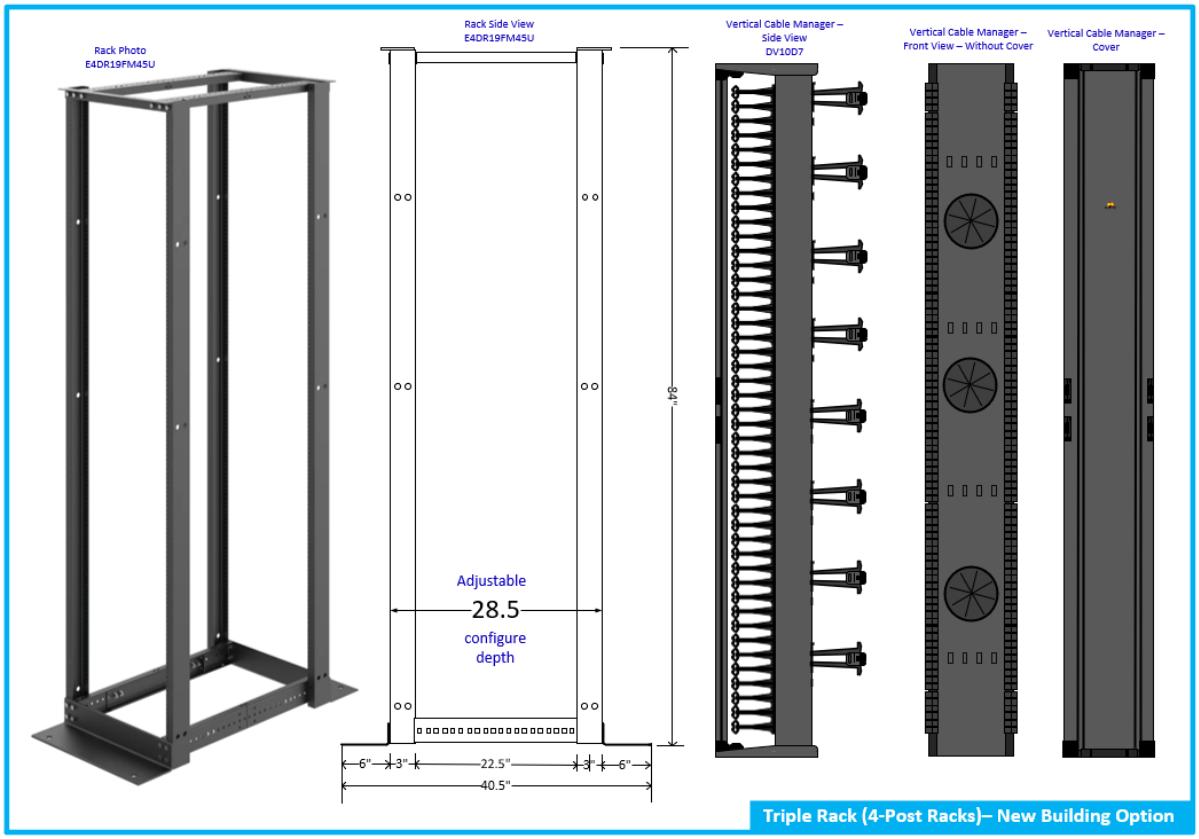
Appendix #3 -Telecommunications Room Design Examples



Triple Rack (4-Post Racks)– New Building Option




Triple Rack (4-Post Racks)– New Building Option
Top View
12"
Rack to Wall Ladder
Quad 5-20R
L5-30R
or L6-30R
Check with UF IT – ICT
Project Manager
Vertical Cable Manager
4 Post Rack

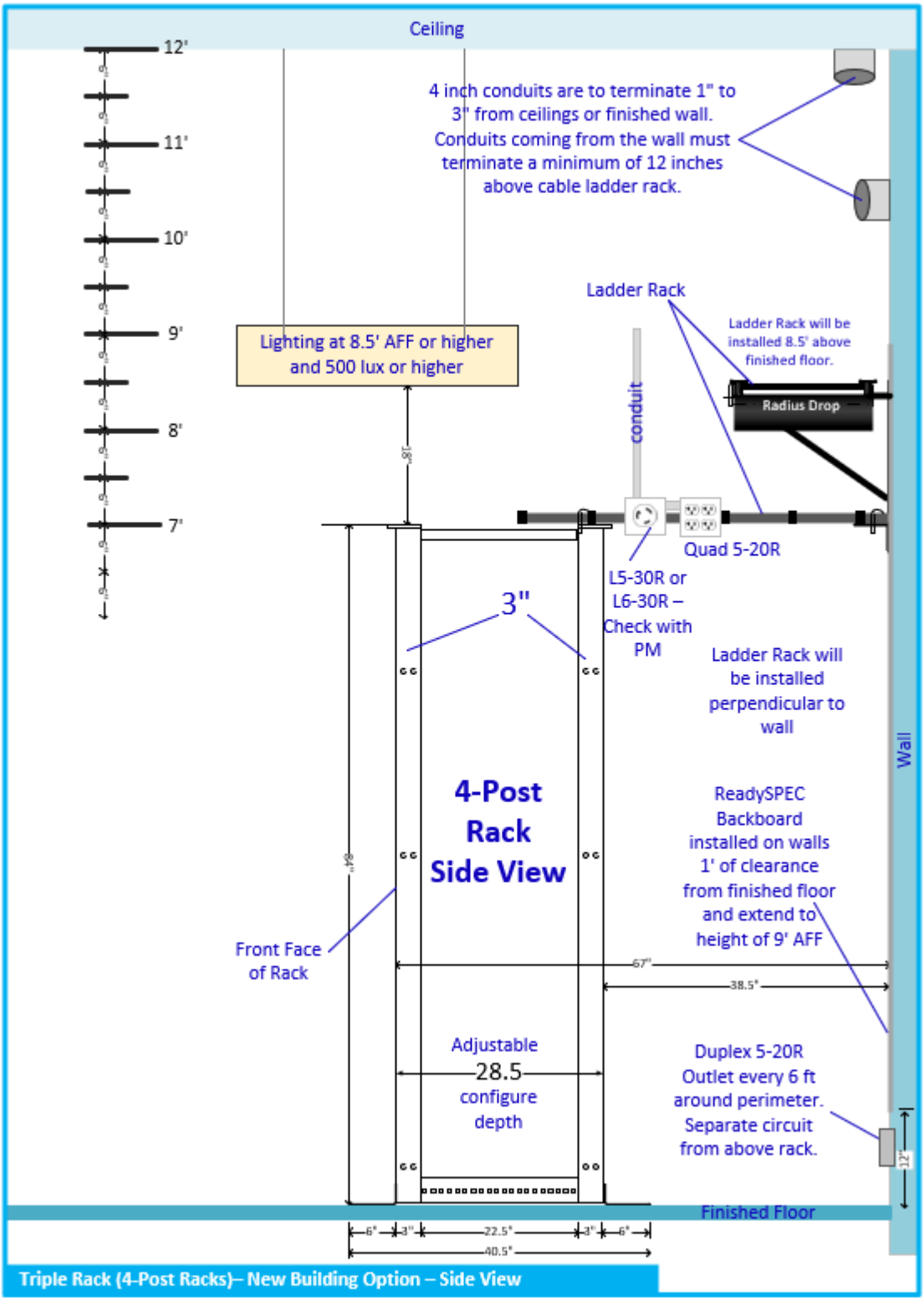


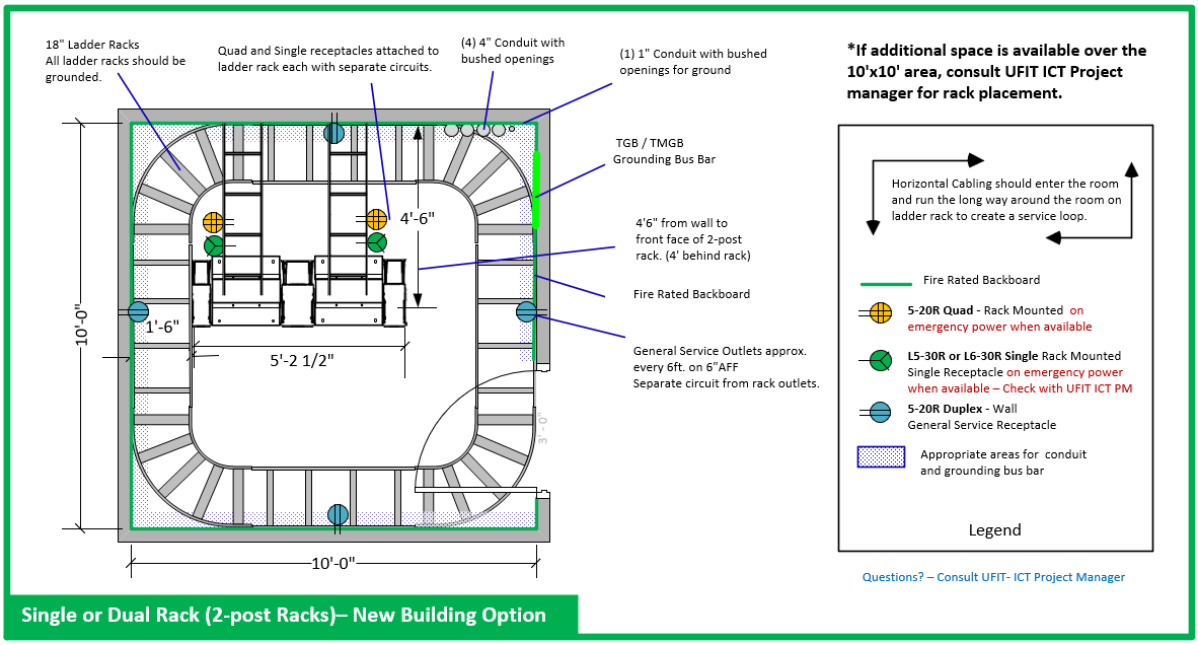
Triple Rack – New Building Option

Unless otherwise noted, the manufacturer is nVent/Hoffman.

Parts List *	(QTY)Manufacturer Part #
Rack	(3)E4DR19FM45U
Electrical Isolation Kit, Red Fiberglass	(3)A19ESO4K
Concrete Expansion Bolt Anchor Kit	(3)ESBDK
Open Frame Rack Hardware Kit	(1)E4PKIT
Rack-to-Wall Kit	(3)E45RUBKIT
Vertical Cable Managers	(4)DV10D7
Waterfall Top	(3)EWFT
Single-Sided Solid Shelf - Black - 3U	(2)ESH19S
Horizontal Cable Managers	(3)DCHS1
ReadySPEC® Backboard for all Walls - 3/4 Gray	Model # check with ReadySPEC®

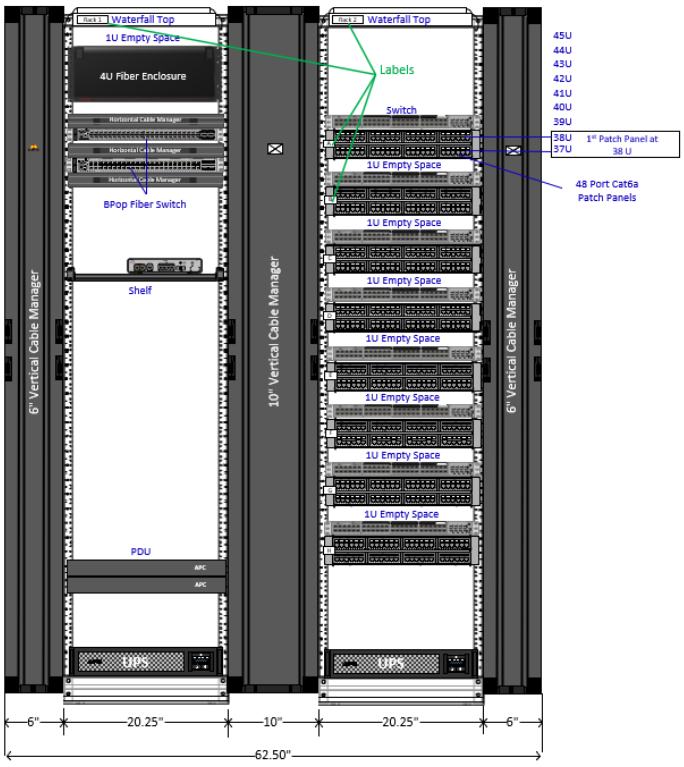
*This list is a starting point. The list does not include all ladder rack parts to surround the room. (j-bolts, clamps, ladder rack, curved sections, support brackets, elevation kits, runway, runway-butt splice, etc.) It is the responsibility of the Contractor to verify comprehensiveness and changes to the list and any additional equipment.

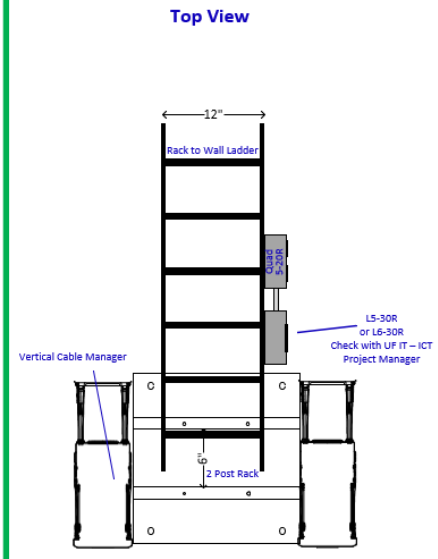

Ceiling
12'
11'
10'
9'
8'
7'
4 inch conduits are to terminate 1" to 3" from ceilings or finished wall. Conduits coming from the wall must terminate a minimum of 12 inches above cable ladder rack.
Ladder Rack
Ladder Rack will be installed 8.5' above finished floor.
Lighting at 8.5' AFF or higher and 500 lux or higher
conduit
Radius Drop
Quad 5-20R
L5-30R or L6-30R – Check with PM
3"
Ladder Rack will be installed perpendicular to wall
4-Post Rack Side View
Wall
ReadySPEC Backboard installed on walls 1' of clearance from finished floor and extend to height of 9' AFF
Front Face of Rack
Adjustable
28.5
configure depth
Duplex 5-20R Outlet every 6 ft around perimeter. Separate circuit from above rack.
Finished Floor
Triple Rack (4-Post Racks)– New Building Option – Side View

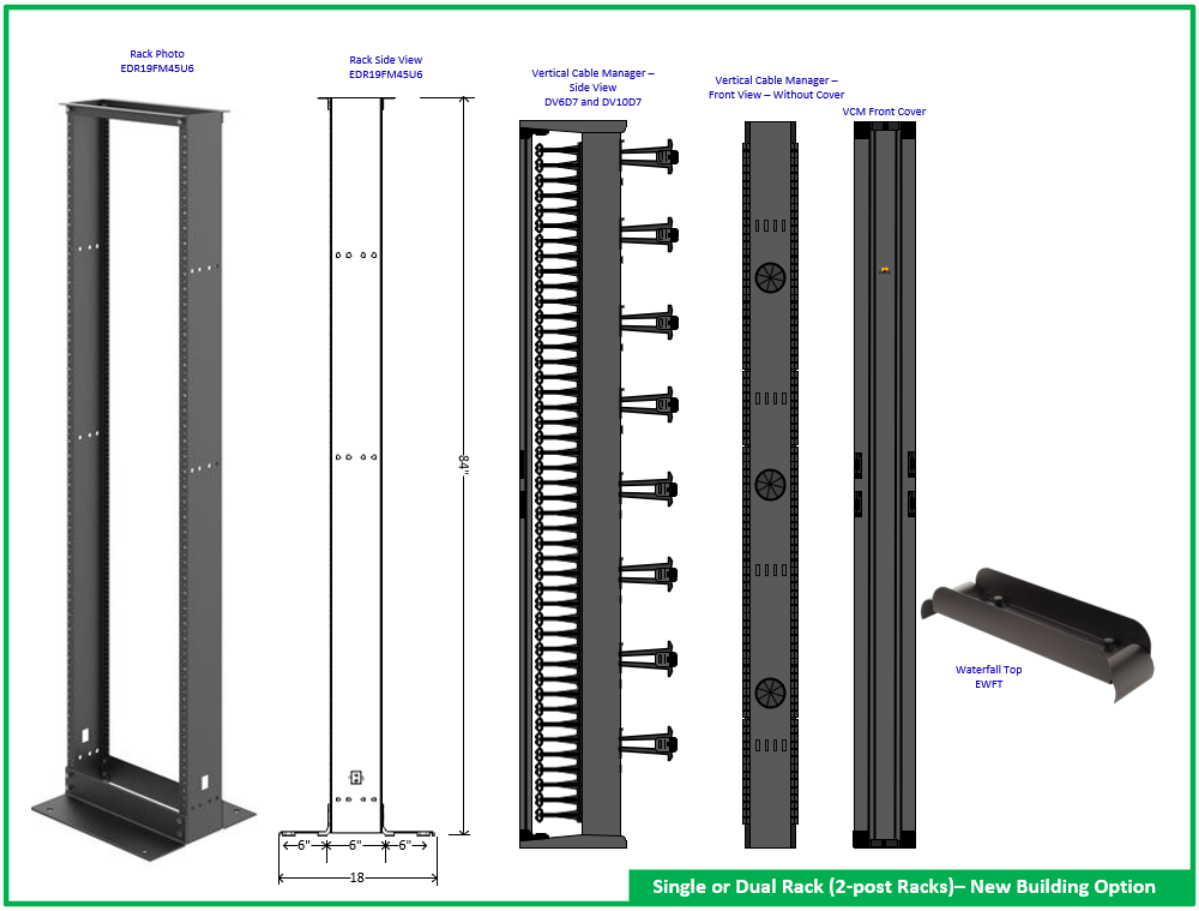


Single or Dual Rack (2-post Racks)– New Building Option

Single or Dual Rack (2-post Racks)– New Building Option





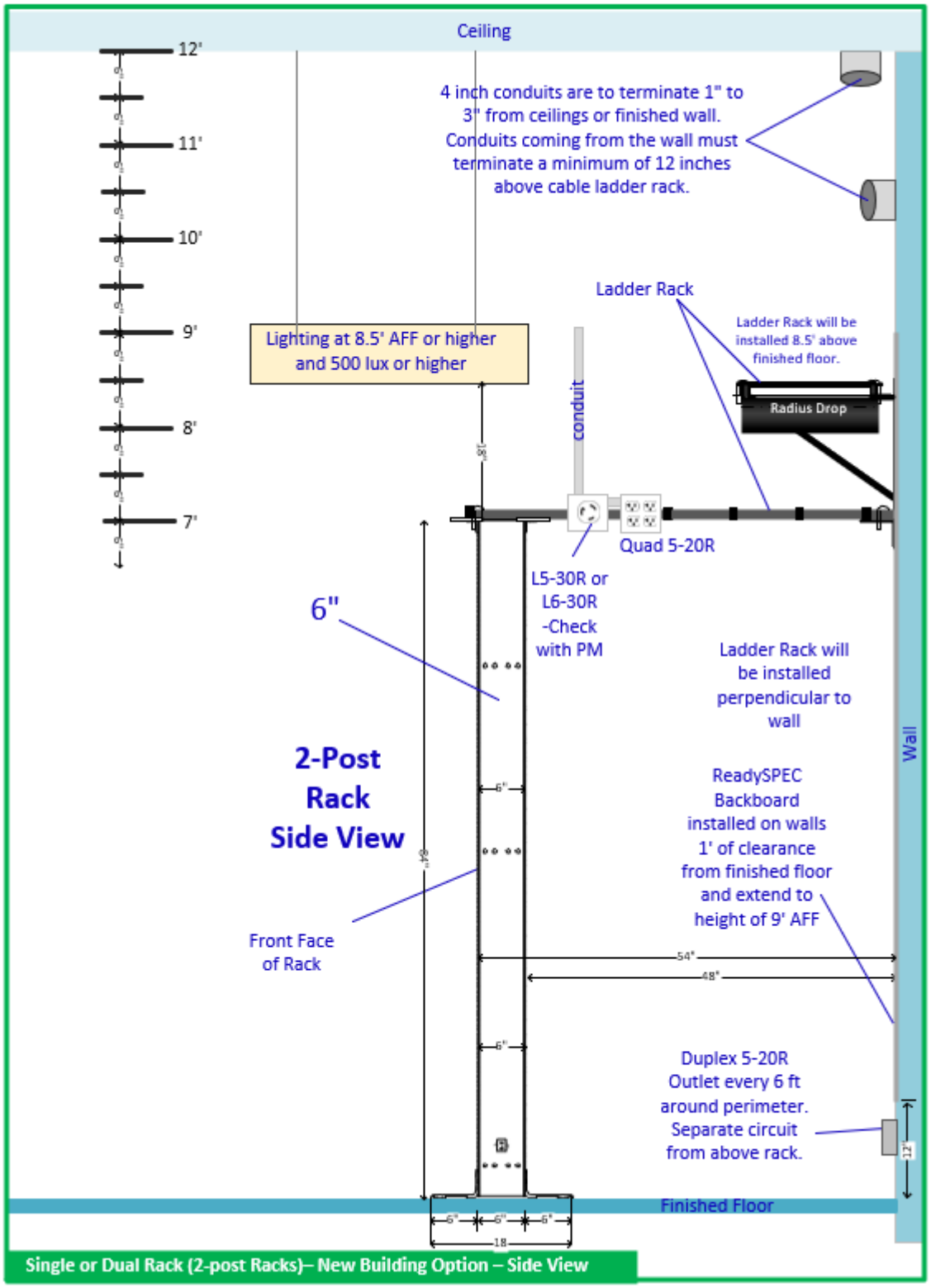


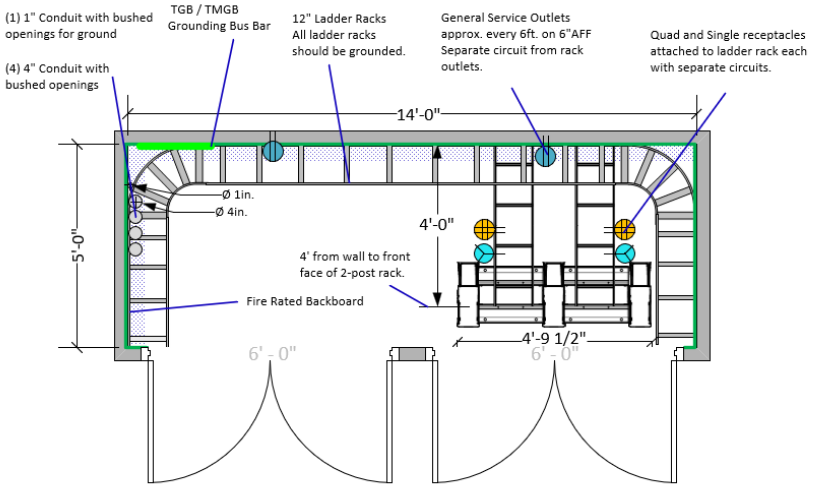
Dual Rack – New Building Option

Unless otherwise noted, the manufacturer is nVent/Hoffman.

Parts List *	(QTY)Manufacturer Part #
Rack	(2) EDR19FM45U6
Electrical Isolation Kit , Red Fiberglass	(2) A19ESOK
Concrete Expansion Bolt Anchor Kit	(2) ESBDK
Open Frame Rack Hardware Kit	(1) E2PKIT
Rack-to-Wall Kit	(2) E45RUBKIT
Vertical Cable Managers	(2) DV6D7 and (1) DV10D7 (both are used)
Waterfall Top	(2) EWFT
Single-Sided Solid Shelf - Black - 3U	(1)ESH19S
Horizontal Cable Managers	(3)DCHS1
ReadySPEC® Backboard for all Walls - 3/4 Gray	Model # check with ReadySPEC®

*This list is a starting point. The list does not include all ladder rack parts to surround the room. (j-bolts, clamps, ladder rack, curved sections, support brackets, elevation kits, runway, runway-butt splice, etc.) It is the responsibility of the Contractor to verify comprehensiveness and changes to the list and any additional equipment.


Ceiling
12'
11'
10'
9'
8'
7'
4 inch conduits are to terminate 1" to 3" from ceilings or finished wall. Conduits coming from the wall must terminate a minimum of 12 inches above cable ladder rack.
Ladder Rack
Ladder Rack will be installed 8.5' above finished floor.
Lighting at 8.5' AFF or higher and 500 lux or higher
conduit
Radius Drop
Quad 5-20R
L5-30R or L6-30R -Check with PM
6"
Ladder Rack will be installed perpendicular to wall
2-Post Rack Side View
Wall
ReadySPEC Backboard installed on walls 1' of clearance from finished floor and extend to height of 9' AFF
Front Face of Rack
54"
48"
Duplex 5-20R Outlet every 6 ft around perimeter. Separate circuit from above rack.
12"
Finished Floor
18
Single or Dual Rack (2-post Racks)– New Building Option – Side View



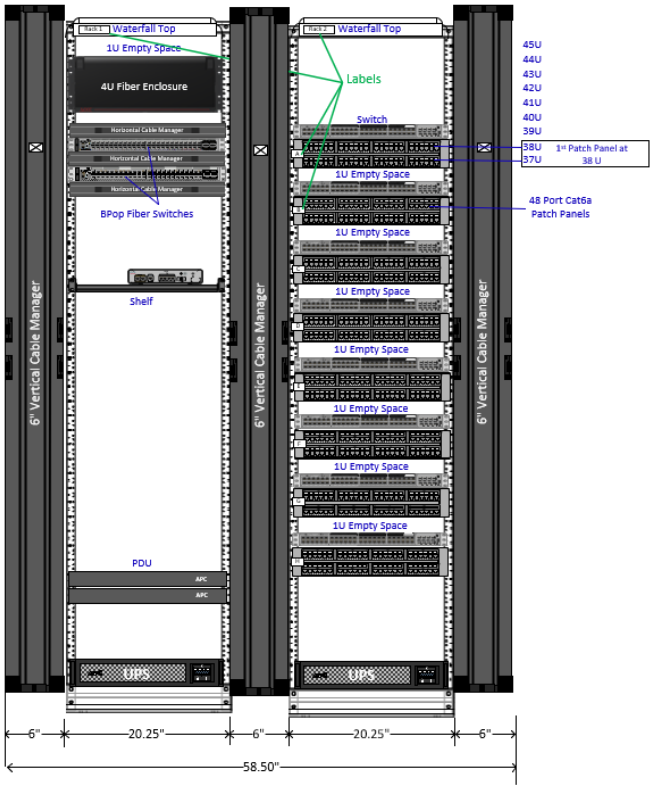
***Renovation Option – use only renovated areas. No new buildings.**

- Fire Rated Backboard
- **5-20R Quad** - Rack Mounted on emergency power when available
- **L5-30R Single** Rack Mounted Single Receptacle on emergency power when available
- **5-20R Duplex** - Wall General Service Receptacle
- Appropriate areas for conduit and grounding bus bar

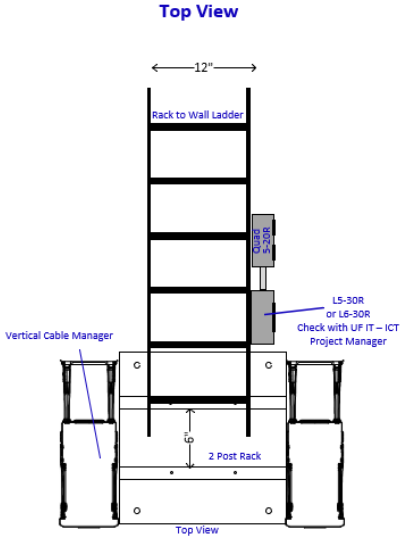
Legend

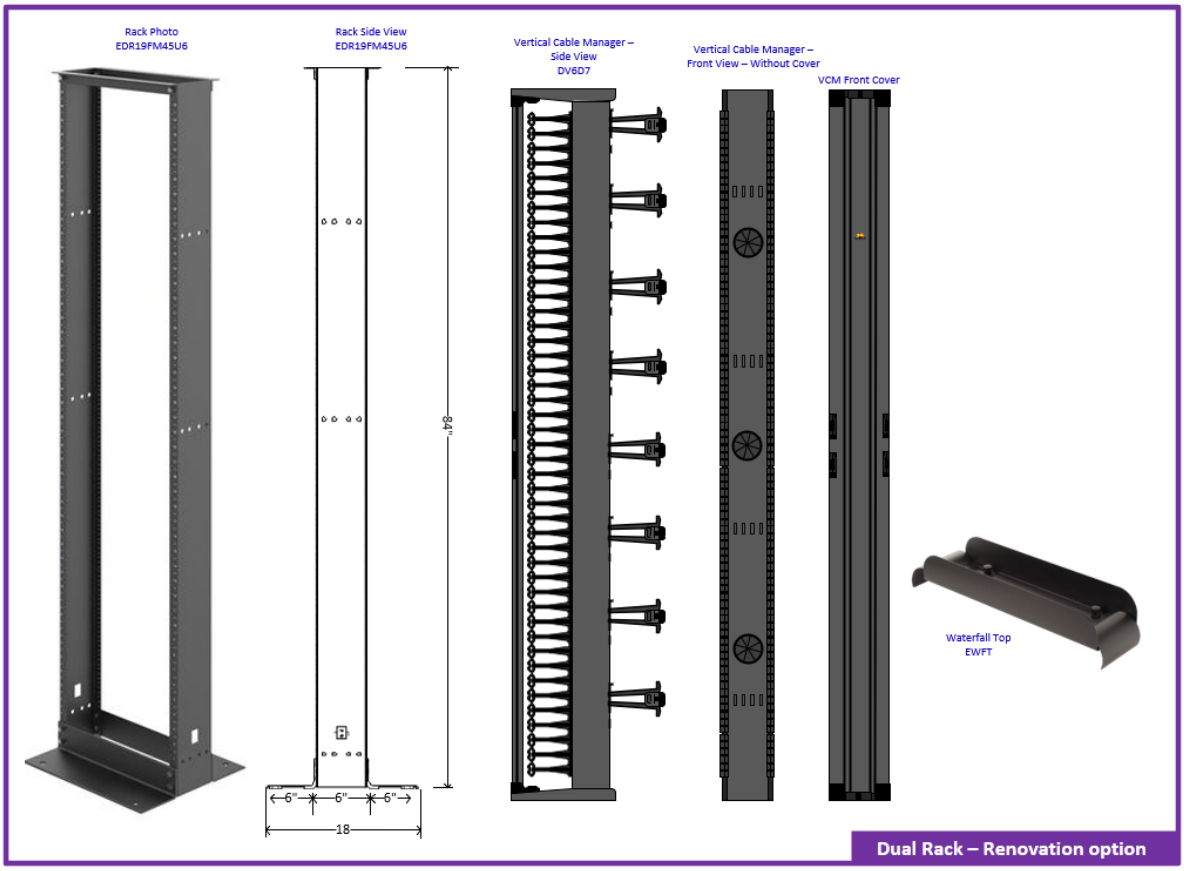
Questions? – Consult UFIT- ICT Project Manager

Dual Rack – Renovation option



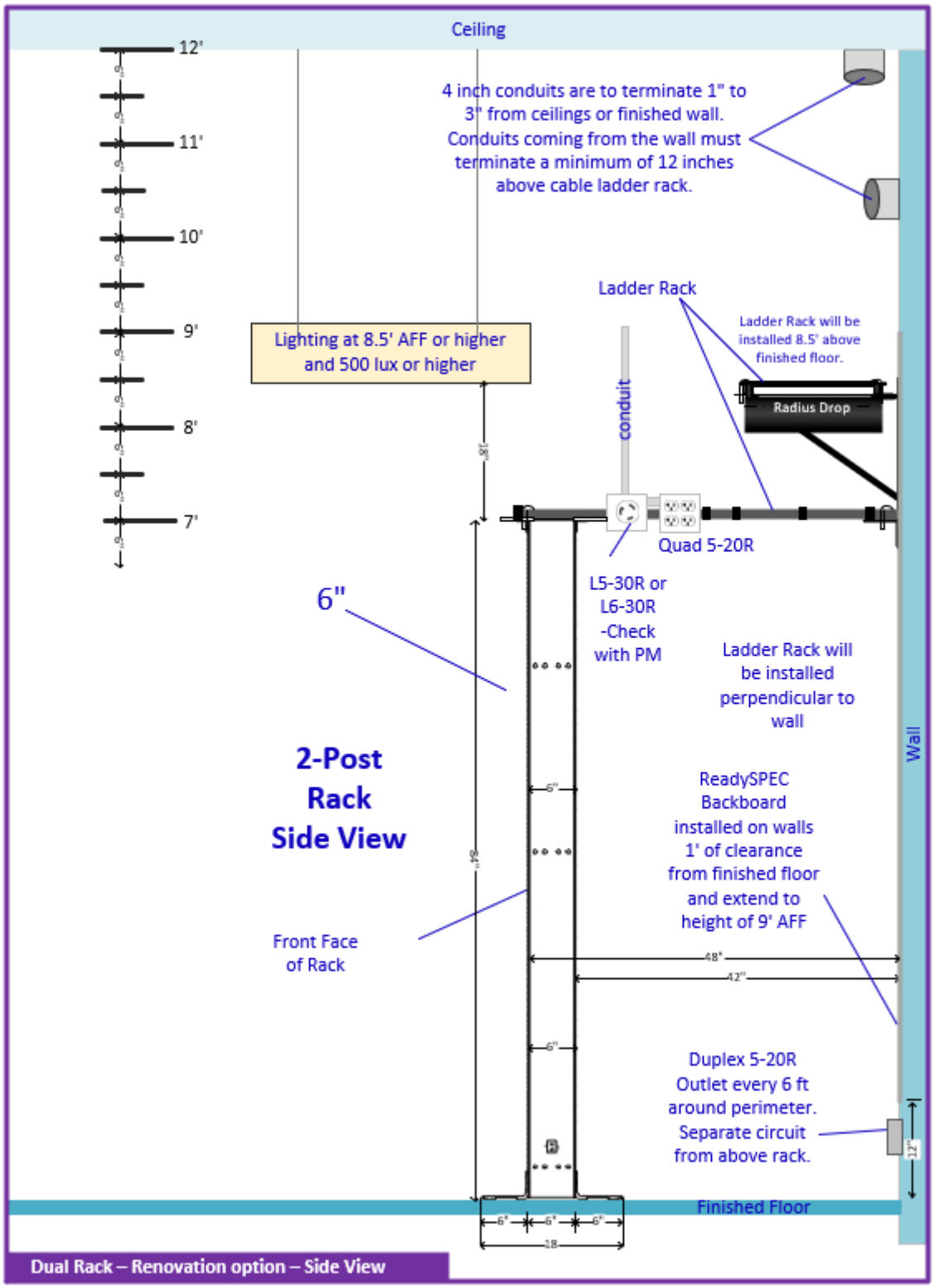
Dual Rack – Renovation option

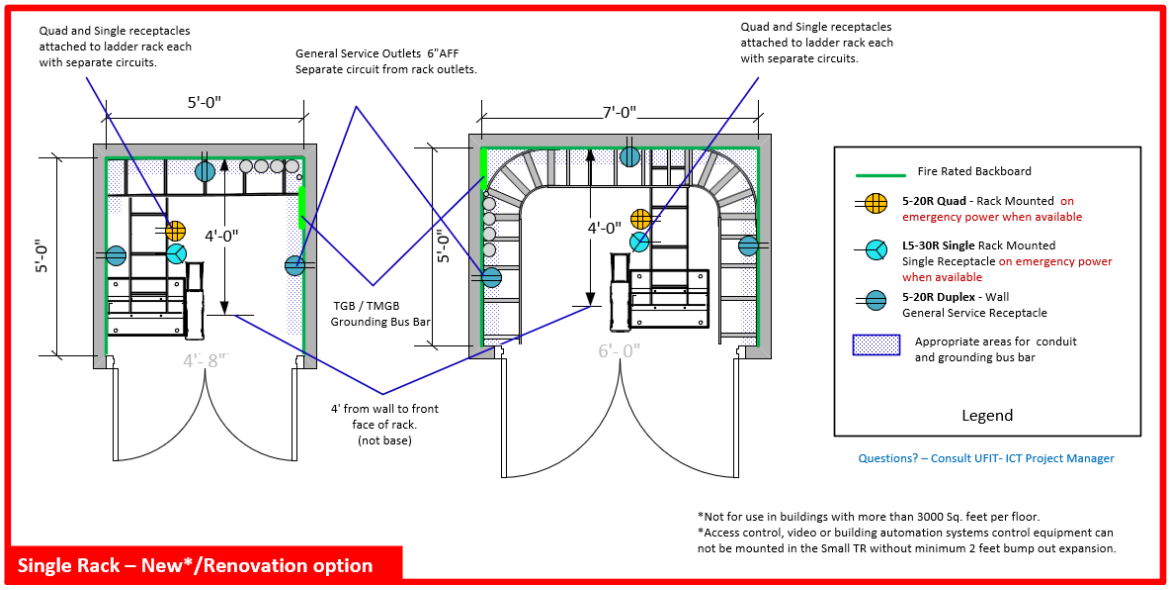


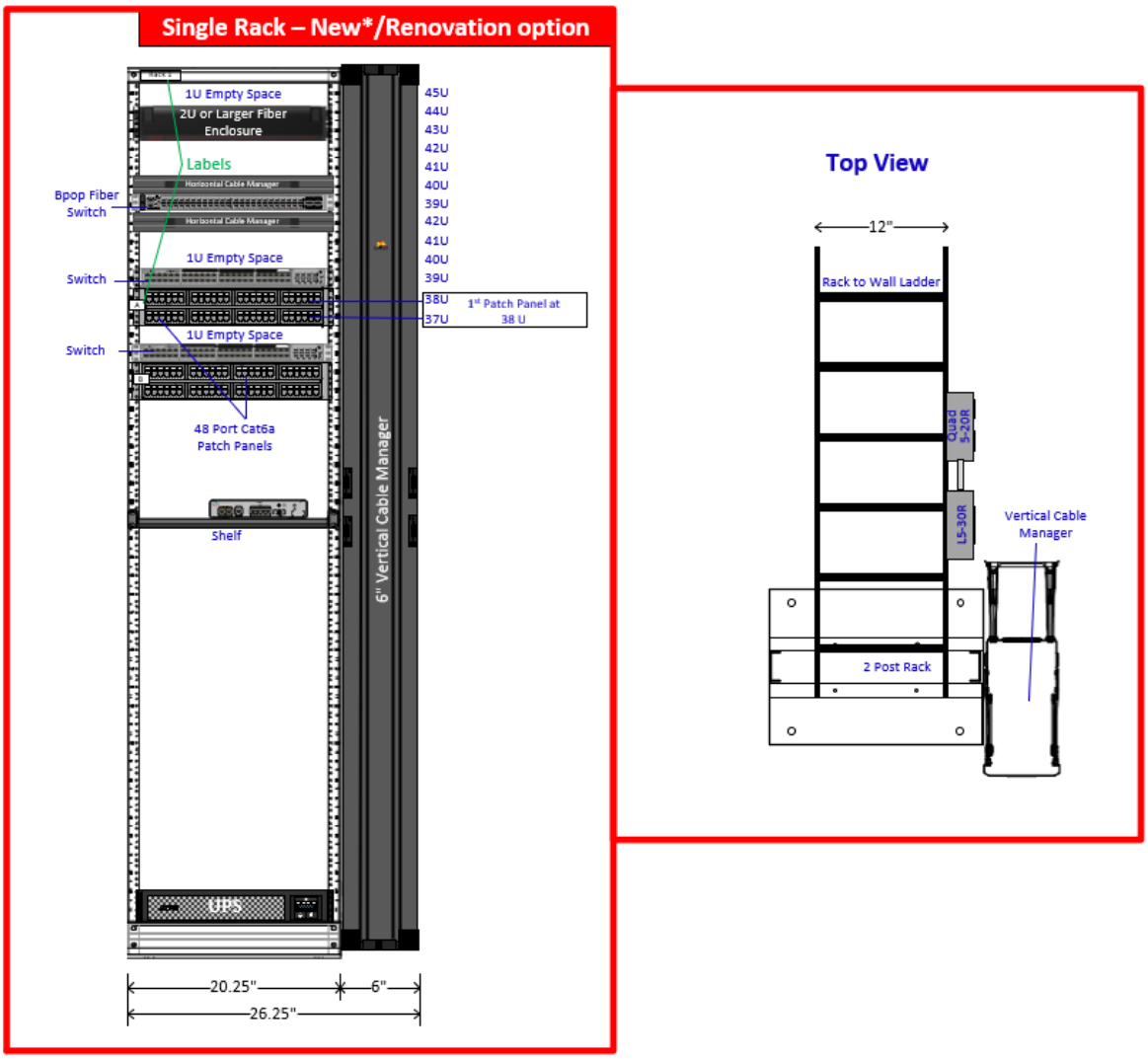


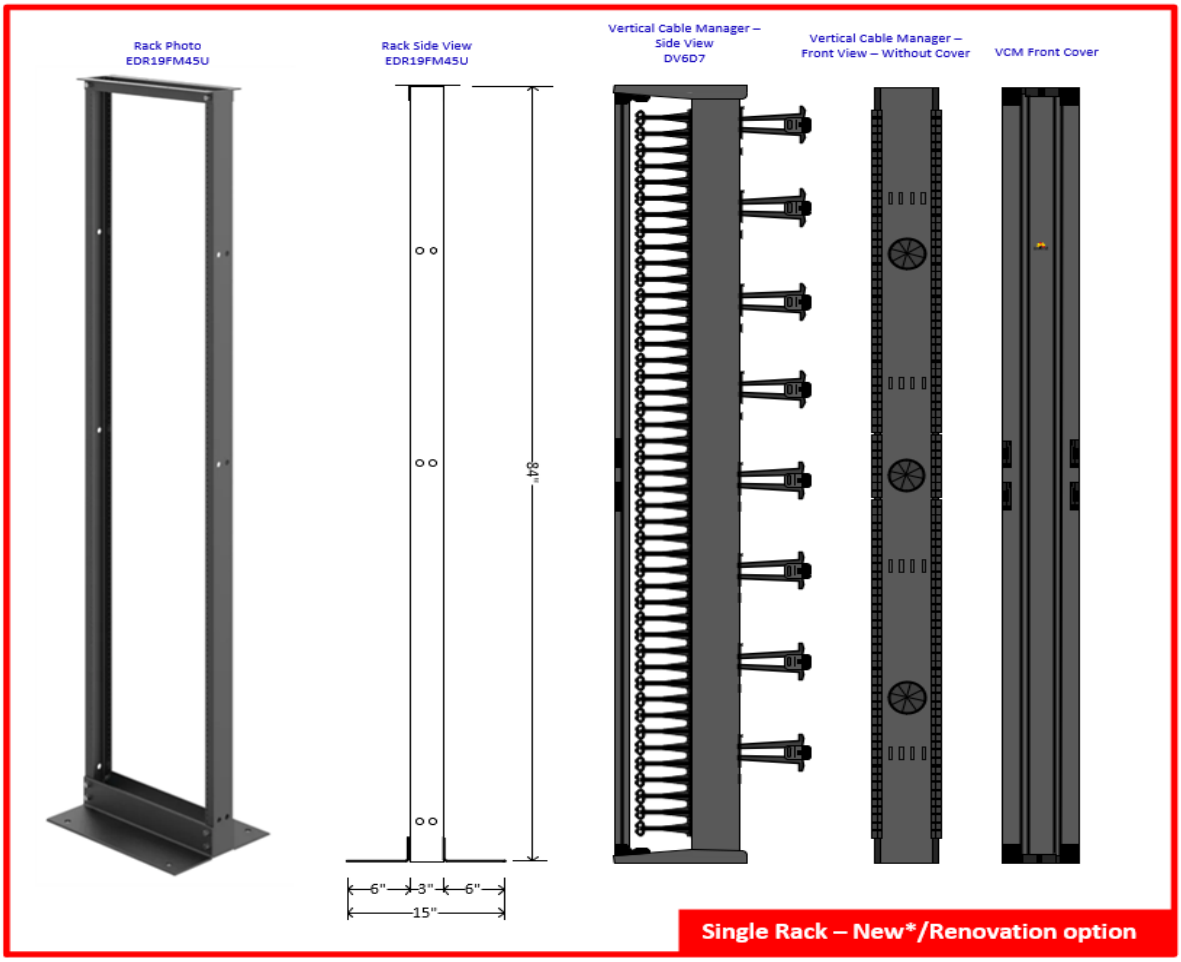
Dual Rack – Renovation Build Unless otherwise noted, the manufacturer is nVent/Hoffman.	
Parts List *	**(QTY)Manufacturer Part #**
Rack	(2) EDR19FM45U6
Electrical Isolation Kit , Red Fiberglass	(2) A19ESOK
Concrete Expansion Bolt Anchor Kit	(2) ESBDK
Open Frame Rack Hardware Kit	(1) E2PKIT
Rack-to-Wall Kit	(2) E45RUBKIT
Vertical Cable Managers	(3) DV6D7
Waterfall Top	(2) EWFT
Single-Sided Solid Shelf - Black - 3U	(1)ESH19S
Horizontal Cable Managers	(3)DCHS1
ReadySPEC® Backboard for all Walls - 3/4 Gray	Model # check with ReadySPEC®

*This list is a starting point. The list does not include all ladder rack parts to surround the room. (j-bolts, clamps, ladder rack, curved sections, support brackets, elevation kits, runway, runway-butt splice, etc.) It is the responsibility of the Contractor to verify comprehensiveness and changes to the list and any additional equipment.


Ceiling
12'
11'
10'
9'
8'
7'
4 inch conduits are to terminate 1" to 3" from ceilings or finished wall. Conduits coming from the wall must terminate a minimum of 12 inches above cable ladder rack.
Ladder Rack
Ladder Rack will be installed 8.5' above finished floor.
Lighting at 8.5' AFF or higher and 500 lux or higher
conduit
Radius Drop
Quad 5-20R
L5-30R or L6-30R -Check with PM
6"
Ladder Rack will be installed perpendicular to wall
2-Post Rack Side View
Wall
ReadySPEC Backboard installed on walls 1' of clearance from finished floor and extend to height of 9' AFF
Front Face of Rack
48"
42"
Duplex 5-20R Outlet every 6 ft around perimeter. Separate circuit from above rack.
12"
Finished Floor
6"
6"
6"
18"
Dual Rack – Renovation option – Side View

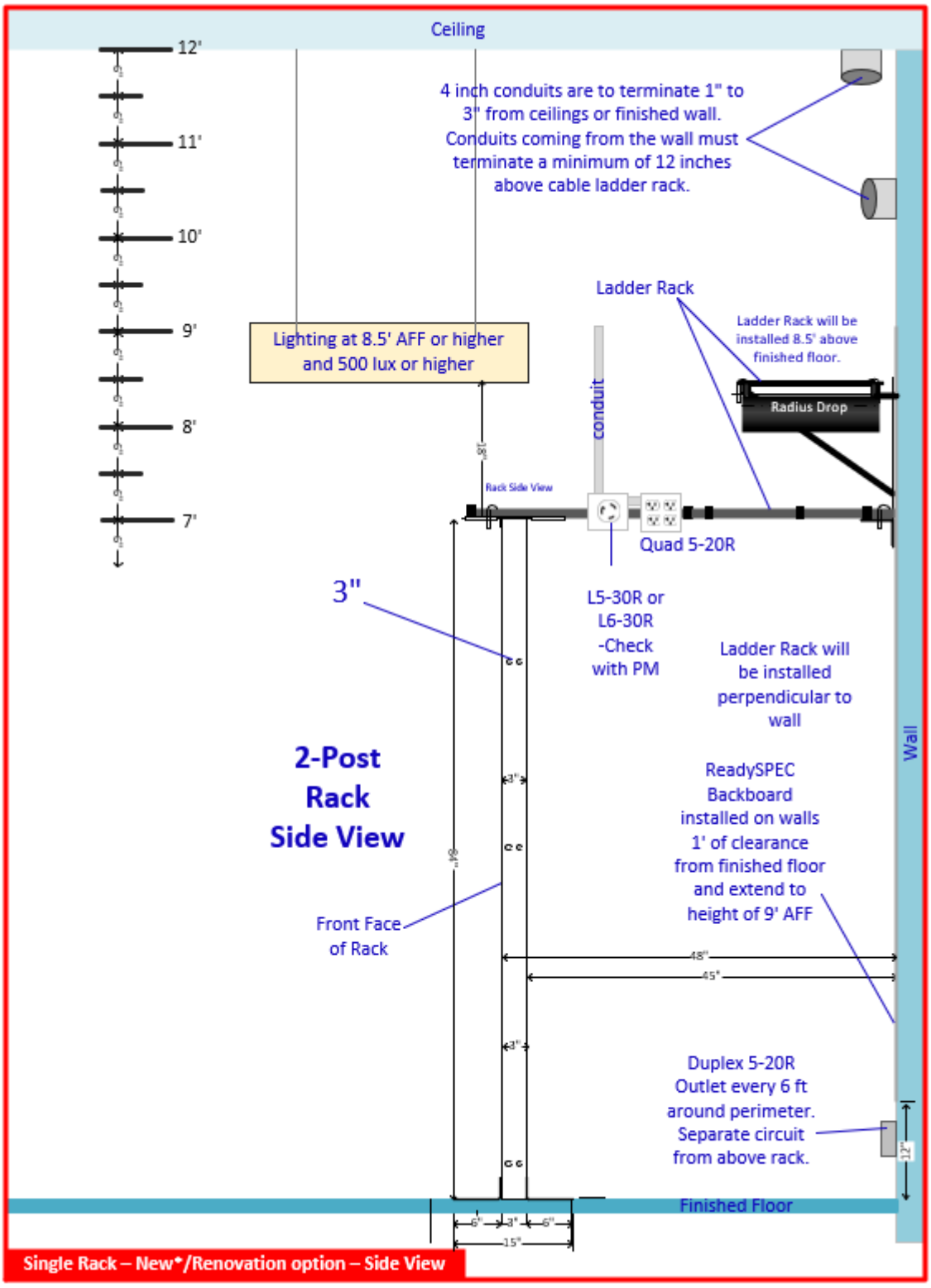

Quad and Single receptacles attached to ladder rack each with separate circuits.
General Service Outlets 6"AFF Separate circuit from rack outlets.
Quad and Single receptacles attached to ladder rack each with separate circuits.
5'-0"
5'-0"
4'-0"
4'- 8"
TGB / TMGB Grounding Bus Bar
4' from wall to front face of rack. (not base)
7'-0"
5'-0"
4'-0"
6'- 0"
Fire Rated Backboard
5-20R Quad - Rack Mounted on emergency power when available
L5-30R Single Rack Mounted Single Receptacle on emergency power when available
5-20R Duplex - Wall General Service Receptacle
Appropriate areas for conduit and grounding bus bar
Legend
Questions? – Consult UFIT- ICT Project Manager
*Not for use in buildings with more than 3000 Sq. feet per floor.
*Access control, video or building automation systems control equipment can not be mounted in the Small TR without minimum 2 feet bump out expansion.
Single Rack – New*/Renovation option

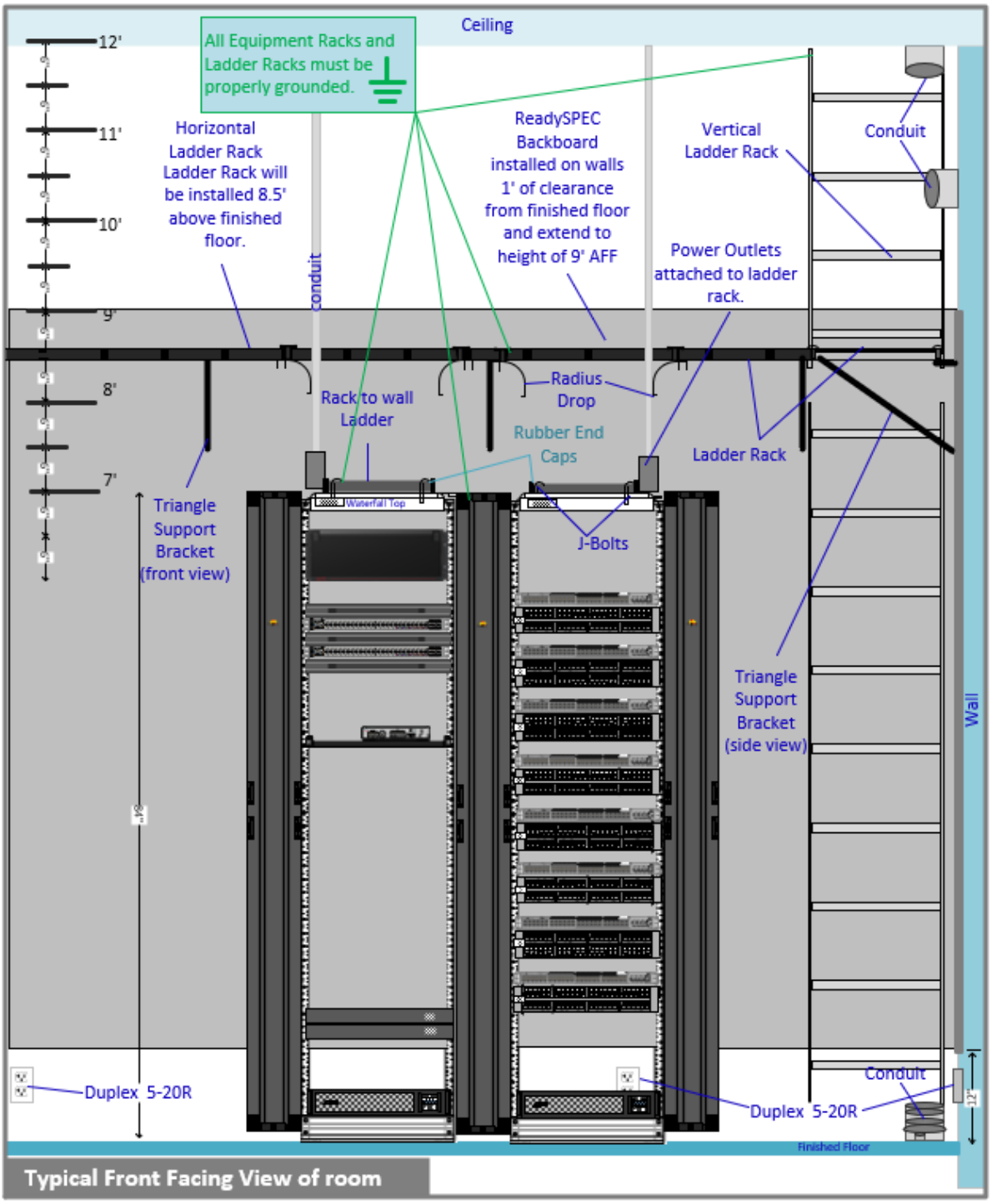

Single Rack – New*/Renovation option
1U Empty Space
2U or Larger Fiber Enclosure
Labels
Bpop Fiber Switch
Horizontal Cable Manager
Horizontal Cable Manager
1U Empty Space
Switch
1U Empty Space
Switch
48 Port Cat6a Patch Panels
Shelf
45U
44U
43U
42U
41U
40U
39U
42U
41U
40U
39U
38U
37U
1st Patch Panel at 38 U
6" Vertical Cable Manager
20.25"
6"
26.25"
Top View
12"
Rack to Wall Ladder
Quad 5-20R
L5-30R
Vertical Cable Manager
2 Post Rack



Single Rack – New or Renovation Build Unless otherwise noted, the manufacturer is nVent/Hoffman.	
Parts List *	**(QTY)Manufacturer Part #**
Rack	(1)EDR19FM45U
Electrical Isolation Kit , Red Fiberglass	(1)A19ESOK
Concrete Expansion Bolt Anchor Kit	(1)ESBDK
Open Frame Rack Hardware Kit	(1)E2PKIT
Rack-to-Wall Kit	(1)E45RUBKIT
Vertical Cable Managers	(quantity depends on project)(*1 or 2) DV6D7
Waterfall Top	(not needed on this build)
Single-Sided Solid Shelf - Black - 3U	(1)ESH19S
Horizontal Cable Managers	(1)DCHS1
ReadySPEC® Backboard for all Walls - 3/4 Gray	Model # check with ReadySPEC®

*This list is a starting point. The list does not include all ladder rack parts to surround the room. (j-bolts, clamps, ladder rack, curved sections, support brackets, elevation kits, runway, runway-butt splice, etc.) It is the responsibility of the Contractor to verify comprehensiveness and changes to the list and any additional equipment.


Ceiling
12'
11'
10'
9'
8'
7'
4 inch conduits are to terminate 1" to 3" from ceilings or finished wall. Conduits coming from the wall must terminate a minimum of 12 inches above cable ladder rack.
Ladder Rack
Ladder Rack will be installed 8.5' above finished floor.
Lighting at 8.5' AFF or higher and 500 lux or higher
conduit
Radius Drop
Rack Side View
Quad 5-20R
3"
L5-30R or L6-30R -Check with PM
Ladder Rack will be installed perpendicular to wall
2-Post Rack Side View
ReadySPEC Backboard installed on walls 1' of clearance from finished floor and extend to height of 9' AFF
Front Face of Rack
Wall
Duplex 5-20R Outlet every 6 ft around perimeter. Separate circuit from above rack.
Finished Floor
Single Rack – New*/Renovation option – Side View



END OF SECTION

Appendix #4 - Standards Variance Form

Telecommunications Standards Variance Request Form
Instructions: To request an exception to the UF Telecommunications Standards, complete this form and submit to the Facilities Planning & Construction Project Manager. The request will then be submitted to UFIT Construction Management for consideration. Deviations from the standards will not be allowed without approval from UFIT Construction Management.

Project Manager:	
Project Title:	
Date of Request:	
Requested By:	

Description of Variance:

Reason for Variance:

To be completed by UFIT:

Circle One:	APPROVED / DENIED
Date:	
Reviewed By:	
Signature / Associate Director:	

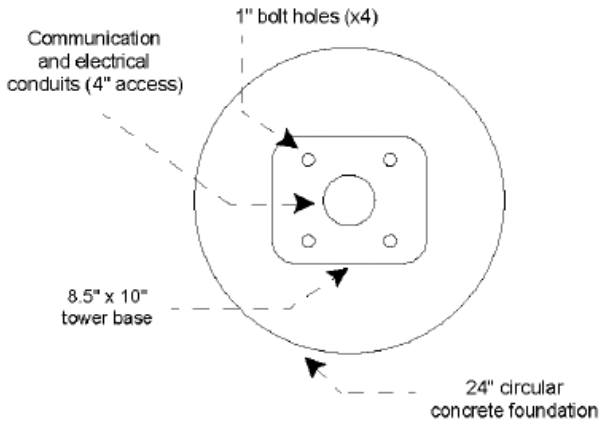
Comments:

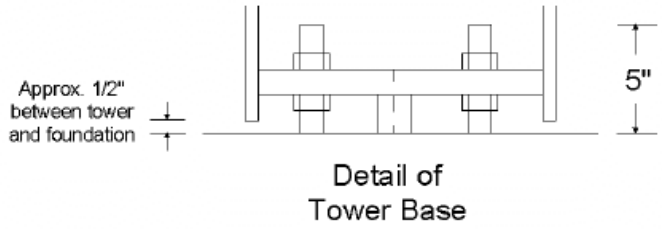
Appendix #5 – Blue Light Emergency Phone Tower Installation

UFIT will coordinate installation of foundation pad for Talk-a-Phone tower units per the manufacturer's directions provided at:
https://5468817.fs1.hubspotusercontent-na1.net/hubfs/5468817/Manuals/MT_MT-R_MTE_WEBS-MT-R_Series_Guidelines_Install_Rev_1_3_2022_10_07.pdf

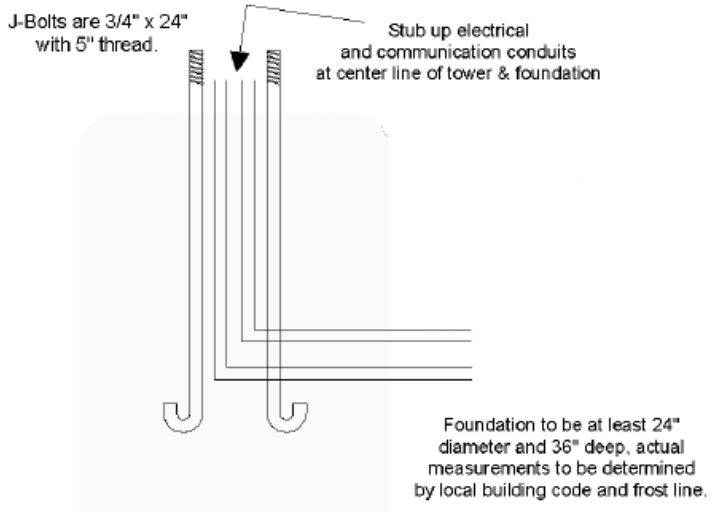
Project shall furnish a 1" conduit with a dedicated power circuit and a separate 1.25" conduit for data communications.

Details of Tower Base:





Detail of Tower Base



Appendix #6 – UF, UF Health and Other UF Department Specific Guidelines

The UF Telecommunication Standards shall be followed when designing an information transport system for any new construction and major renovation project. Procurement of the installation of these systems varies slightly between UFIT and UF Health. Also, other UF networking departments may have additional requirements and projects specific to those entities should be coordinated as noted below.

These guidelines are provided for informational purposes to assist with developing the scope of work for projects. The building design and drawings shall show all information transport systems work and then denote whether project furnished or "by others".

UF Projects:

1. Telecommunications Rooms: The UF PD&C Project Manager shall coordinate the build out of the Telecommunications Rooms directly with UFIT Construction Management. UFIT's designated and approved Contractor shall provide:
    a. Walls lined with Readyspec® backboard
    b. Ladder rack circling room mounted 12 inches below top of backboard
    c. Minimum of two 7ft. two post 19" racks with 6" front and rear vertical wire management.
    d. Ladder rack support for each rack.
    e. Grounding bus bar with minimum #6 green jacketed ground wire to all racks and ladder racking.
    f. Top and bottom horizontal management on each rack.
    g. Fiber LIU sized for building mounted in the equipment rack.
    h. Riser cabling: 12 single mode fibers between Telecommunications Rooms.
    i. Work provided by the project includes, but is not limited to:
        i. Electrical outlets, including those mounted at equipment racks
        ii. Lighting and HVAC.
        iii. Firestopping.
        iv. Audio / Visual specific riser and distribution cabling

2. Horizontal Cabling: Only use approved low-voltage cabling Contractor.

3. Outside Plant Work: Coordinate this work directly with UFIT. UFIT's designated Contractor's outside plant work shall include:
    a. Telecommunications duct bank from maintenance / manhole / hand hole to Main Telecommunications Room.

b. Furnishing and placement of Blue Light Emergency Telephones; project shall provide 1" conduit for power, furnish dedicated power circuit and install a separate 1.25" conduit for communications pathway.
c. Fiber placement to the building from UF's core network connections.
d. Project shall furnish landscaping for any work performed on site drawings.

Locations:

1. These telecommunication standards apply to all UF telecommunication rooms that have horizontal cabling and outside plant needs in all UF locations. This includes UF Health, IFAS, Student Life, UF Scripps Campus, UF Jacksonville campus, and University Athletic Association locations.
2. Any deviation from this standard for any of the locations mentioned above has to have the approval of the VP CIO or their designee.

END OF SECTION

Appendix #7 – Bollards for Outdoor Wi-Fi or Remote Networking

Installation Instructions for Oberon® Netpoint™ Bollards can be found at Chatsworth.com.

Check with the UFIT Project Manager for size, color and accessories needed for each installation.

Labels: Each bollard should be given a unique three-digit ID number assigned by the UFIT Project Manager. The ID starts with "PBExxx" where the x's represent the three-digit ID. The labels shall be reflective with black text on an orange background. Your UFIT Project Manager will assign the PBE#.

Examples of bollard installations on UF Campus:

Figure 1. Bollard with Cisco wireless access point and fiber LIU.

Photo credit: Tom Chesterfield/UFIT

Figure 2. Bollard with cover next to blue light telephone.

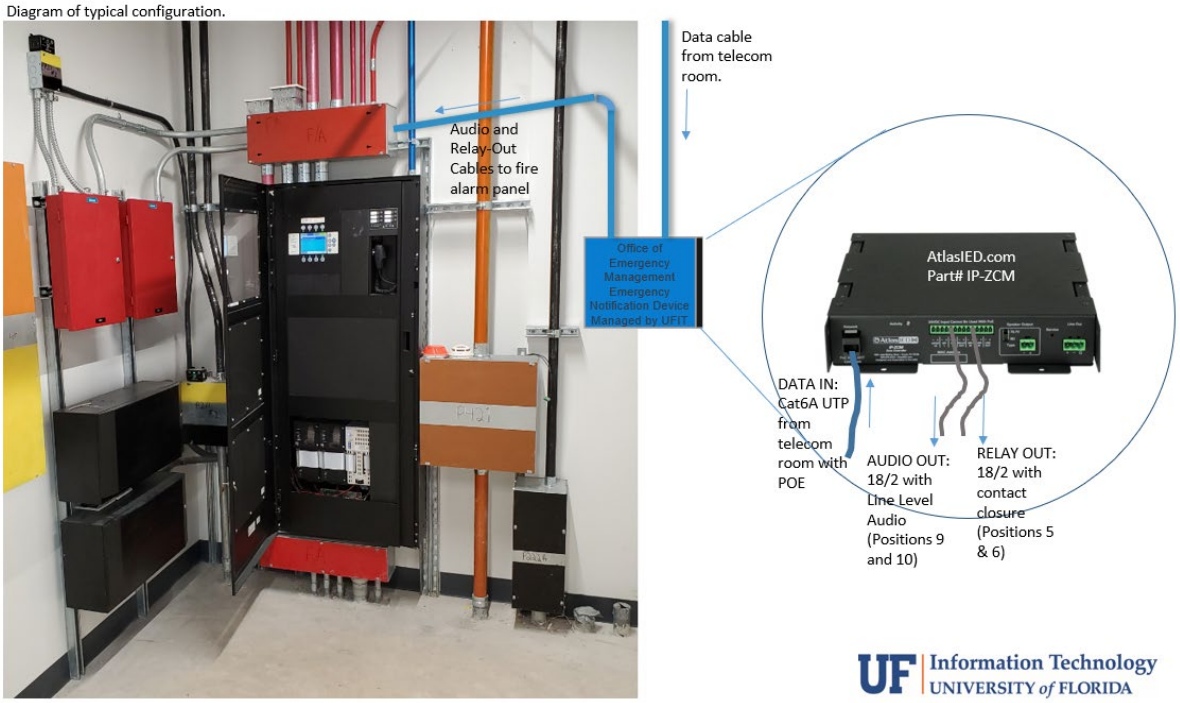
Photo credit: Google Maps

END OF SECTION

Appendix #8 – Mass Notification Integration with Fire Alarm System

UF Mass Notification Integration into Fire Alarm System

Diagram of typical configuration.



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The line level audio and relay out cables should be 18 AWG/ 2 conductor and provided by the fire alarm installer to our enclosure. The fire alarm installer may attach a resister to the line level audio cable.

Do not attempt to enter or alter connections in the fire alarm panel!

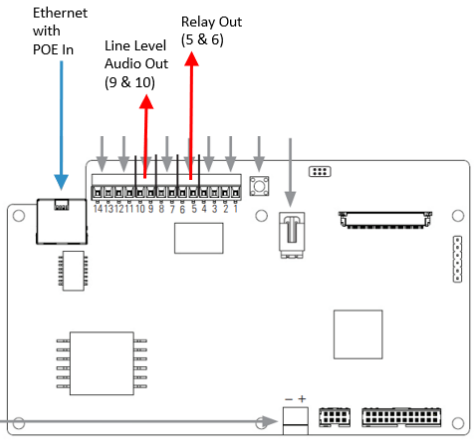


Diagram of typical Atlas IED devices. The pin locations are identical for the Gateway and speakers.

Responsibility Matrix

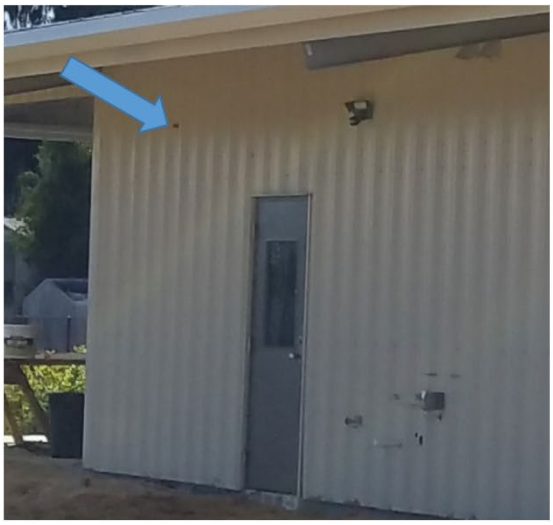
Materials and Installation	Responsibility
All Blue Conduit and pathways (painted blue)	CM/Electrician
Metal Enclosure (painted blue)	CM/Electrician
18/2 cable from Fire Alarm's line level audio input to metal enclosure	CM/Electrician
18/2 cable from Fire Alarm's trigger input to metal enclosure	CM/Electrician
AtlasIED.com Part# IP-ZCM	UF IT
Category 6A UTP from TR to metal enclosure	UF IT
Configure and Test AtlasIED	UF IT
Configure and Test Integrated Systems	CM/Electrician & UF IT

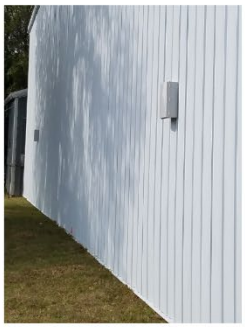
END OF SECTION

Appendix #9 - Exterior Wireless Access Point Mounting

Examples of Exterior WAP Installations:

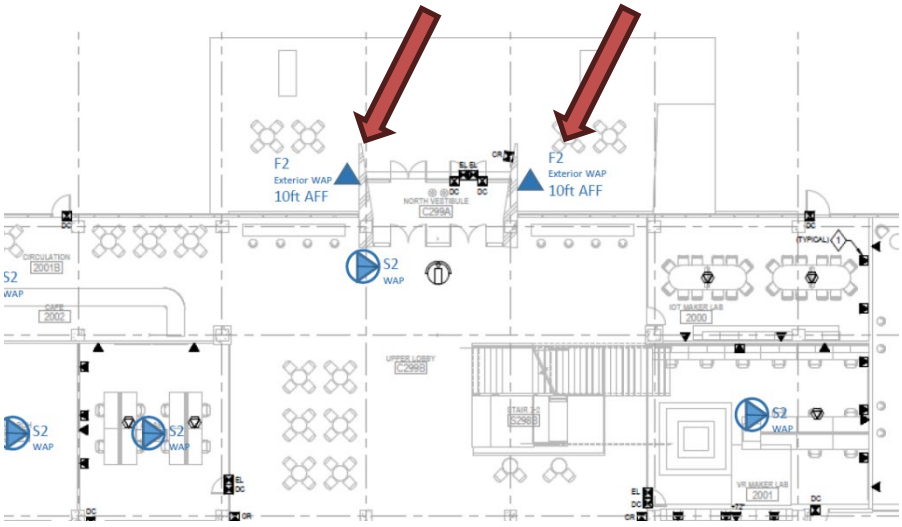
Exterior WAP locations can be roughed as a junction box flush with the exterior wall or just a 1" conduit poke-thru as shown below.





Exterior WAP locations can be roughed as a junction box flush with the exterior wall or just a 1" conduit poke thru. The box or conduit should be installed between 9-12ft AFF depending on exterior wall features but should be mounted below overhangs if possible. Each location should receive two data cables.

On the plans, exterior WAPS may be shown as wall mounted outlets with a height shown and approved by the architect.



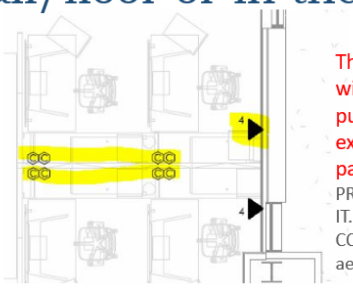
END OF SECTION

Appendix #10 – Modular Furniture Whips – The Permanent Link

Permanent Links in Modular Furniture Via "Whips"

The Design Stage: Shall the cables terminate at the wall/floor or in the furniture?

Data terminated on the wall (NOT in furniture):

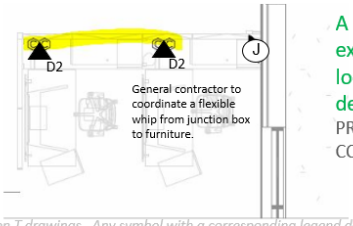


This example indicates that the permanent link connections will end at the wall with four ports. The C's do not have a purpose on a T-drawing. The IT support staff must then extend the wall connections to phones and/or computers via patch cables.

PRO: The occupants can rearrange the furniture without consulting UF IT.

CON: customer must use a very long patch cord that may not be aesthetically pleasing.

Data terminated in the furniture:



A better way let all parties know that the data cables extended into modular furniture is to show a junction box location on the wall or floor and wall plate locations at the desks.

PRO: Short patch cords and easily accessible ports at each work area.

CON: The furniture cannot be moved without a major rewire by UF IT.

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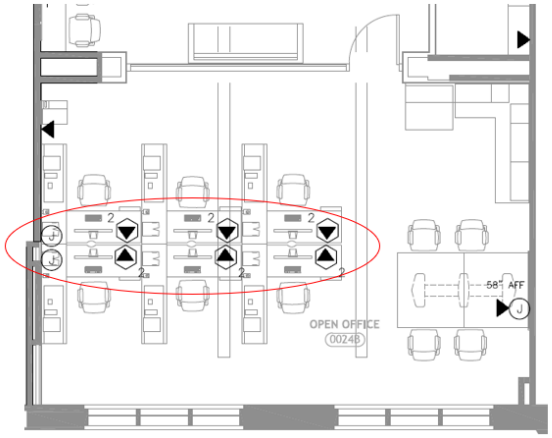
This is just one example of symbols commonly used on T drawings. Any symbol with a corresponding legend definition is acceptable.

The Design Stage: Shall the cables terminate at the wall/floor or in the furniture?

Data terminated in the furniture:



Another example of a design indicating that the cables will be terminated in the furniture with two ports per wall plate. The "J" or junction box indicates where the in-wall conduit and box should be roughed in. This location must be planned to not be blocked or interfere with the furniture installation. For this example, two "J" box locations were needed to accommodate the number of cables while not exceeding a 40% conduit fill ratio of a 1" EMT conduit in the wall.

PRO: Short patch cords and easily accessible ports at each work area.

CON: The furniture cannot be moved without a major rewire by UF IT.

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This is just one example of symbols commonly used on T drawings. Any symbol with a corresponding legend definition is acceptable.

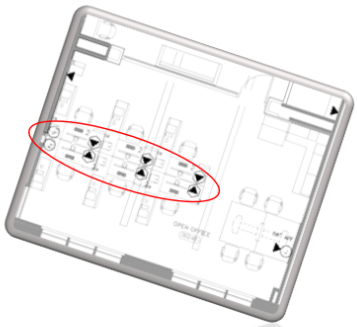
The Installation Stage: Maintaining the Permanent Link

The permanent link is the portion of the network cabling from the patch panel to the wall plate. This is the portion on the network channel that does not move or involve patch cables. This is the portion of the deliverables that our cabling contractors must certify. This is the portion of the network channel that UFIT documents in various databases including STARS.

The "Whip" is a flexible conduit that transitions the permanent link channel from the wall or floor to the furniture.

Wall mounted junction box example:

As Installed.



As Drawn.

This is just one example of symbols commonly used on T drawings. Any symbol with a corresponding legend definition is acceptable.

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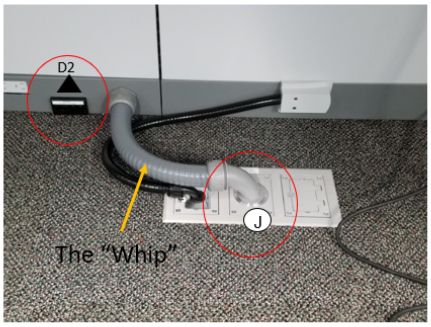
The Installation Stage: Maintaining the Permanent Link

The permanent link is the portion of the network cabling from the patch panel to the wall plate. This is the portion on the network channel that does not move or involve patch cables. This is the portion of the deliverables that our cabling contractors must certify. This is the portion of the network channel that UFIT documents in various databases including STARS.

The "Whip" is a flexible conduit that transitions the permanent link channel from the wall or floor to the furniture.

Floor mounted junction box example:



Note: floor boxes are proprietary and require proprietary parts to complete in-floor data terminations or furniture whips. It is the responsibility of the general contractor and electrician supplying the floor box to also supply the matching inserts or blanks for data connections.

This is just one example of symbols commonly used on T drawings. Any symbol with a corresponding legend definition is acceptable.

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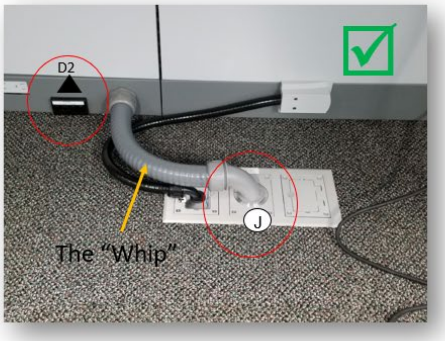
Co-locating Data and Power in the Same Floor Box

When the floor box installed can accommodate both power and data, a new problem is encountered in terms of access to the power connections and acceptance by UF EH&S. When the data cables are pulled through the floor box in Example 2, the shared top plate is difficult to remove to access the electrical connections below. UF EH&S will not allow the power to be inaccessible.

Example 1: Power and Data have separately accessible faceplates.



Example 2: Power and Data share one top plate that cannot be accessed once the data cables are pulled straight through.

Note: floor boxes are proprietary and require proprietary parts to complete in-floor data terminations or furniture whips. It is the responsibility of the general contractor and electrician supplying the floor box to also supply the matching inserts or blanks for data connections.

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The Installation Stage: Conduit Fill Ratio

Like electrical installations, data installations are also subject to not exceeding a conduit fill ratio of 40%. This includes the above ceiling, in-wall, furniture raceway, and Whips. The minimum conduit size allowed by UFIT Telecommunications Standards is 1". The number of conduits and conduit size may have to be increased to maintain a fill ratio of no more than 40%. The examples below show some of the new

Panduit CAT6A riser (PUR6AV04): outside diameter = .26 in

Conduit - Trade Size					
Trade Size		Conduit I.D. (in)	Conduit Area	Fill Area	# Cables
1/2	(16mm)	0.622	0.30	0.12	2
3/4	(21mm)	0.824	0.53	0.21	4
1	(27mm)	1.049	0.86	0.35	6
1-1/4	(35mm)	1.380	1.49	0.60	11
1-1/2	(41mm)	1.610	2.03	0.81	15
2	(53mm)	2.067	3.35	1.34	25
2-1/2	(63mm)	2.731	5.85	2.34	44
3	(78mm)	3.356	8.84	3.54	66
3-1/2	(91mm)	3.834	11.54	4.62	86
4	(103mm)	4.334	14.75	5.90	111

Commscope Uniprise CAT6A riser (CS44R): outside diameter = .285 in.

Conduit - Trade Size					
Trade Size		Conduit I.D. (in)	Conduit Area	Fill Area	# Cables
1/2	(16mm)	0.622	0.30	0.12	1
3/4	(21mm)	0.824	0.53	0.21	3
1	(27mm)	1.049	0.86	0.35	5
1-1/4	(35mm)	1.380	1.49	0.60	9
1-1/2	(41mm)	1.610	2.03	0.81	12
2	(53mm)	2.067	3.35	1.34	21
2-1/2	(63mm)	2.731	5.85	2.34	36
3	(78mm)	3.356	8.84	3.54	55
3-1/2	(91mm)	3.834	11.54	4.62	72
4	(103mm)	4.334	14.75	5.90	92

Commscope Uniprise CAT6 riser (75N4): outside diameter = .23 in.

Conduit - Trade Size					
Trade Size		Conduit I.D. (in)	Conduit Area	Fill Area	# Cables
1/2	(16mm)	0.622	0.30	0.12	2
3/4	(21mm)	0.824	0.53	0.21	5
1	(27mm)	1.049	0.86	0.35	8
1-1/4	(35mm)	1.380	1.49	0.60	14
1-1/2	(41mm)	1.610	2.03	0.81	19
2	(53mm)	2.067	3.35	1.34	32
2-1/2	(63mm)	2.731	5.85	2.34	56
3	(78mm)	3.356	8.84	3.54	85
3-1/2	(91mm)	3.834	11.54	4.62	111
4	(103mm)	4.334	14.75	5.90	142

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The Installation Stage: Tips

Tip 1: UF Environmental Health and Safety inspectors have been making sure that all data and electrical junction boxes remain accessible when the furniture is completely installed.

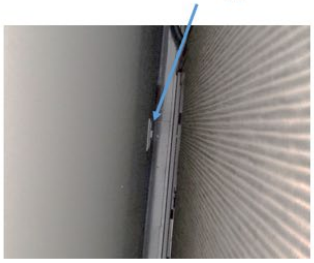
Tip 2: The low voltage installer should order face plates (bezels) and jacks that match the color of the furniture. Bezels should be sized appropriate for the furniture cutouts.

Panduit NetKey Face Plate for modular furniture.

Tip 3: Decide who will be responsible for installing the data "whips" early in the project.

Tip 4: As mentioned earlier, floor boxes are proprietary and require proprietary parts to complete in-floor data terminations or furniture whips. It is the responsibility of the general contractor and electrician supplying the floor box to also supply the matching inserts or blanks for data connections.

Tip 5: Any confusion in the T drawings could result in the data cables being terminated on the wall or behind a furniture modesty panel.



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