

University of Houston Master Specification

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SECTION 27 0528 - PATHWAYS FOR COMMUNICATIONS SYSTEMS

Revise this Section by deleting and inserting text to meet Project-specific requirements.

This Section uses the term "Architect" or "Engineer." Change this term to match that used to identify the design professional as defined in the General and Supplementary Conditions.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

Delete hidden text after this Section has been edited for the Project.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor's attention is specifically directed, but not limited, to the following documents for additional requirements:
 - 1. The current version of the *Uniform General Conditions for Construction Contracts*, State of Texas available on the web site of the Texas Facilities Commission.
 - 2. The University of Houston's Supplemental General Conditions and Special Conditions for Construction.
 - 3. The University of Houston's *Network Infrastructure Design Standards* (available at <https://uh.edu/infotech/services/computing/networks/network-infra-standards/>).

1.2 SUMMARY

- A. Section Includes:
 - 1. Interior communications pathways and supports.
 - 2. Outlets and conduit runs.
 - 3. Risers in Network Facilities (NFs).
 - 4. Grounding and bonding of pathways.
 - 5. Pathway firestopping requirements.

Revise subparagraph(s) below to suit Project.

1.3 PREINSTALLATION MEETINGS

- A. Preconstruction Conference: Conduct conference at [Project site] <Insert location>. The Contractor and the Facilities Project Manager lead the meeting. The UIT Project Manager must be invited to the Preinstallation meetings.

Copy subparagraph below and edit for each activity required for preconstruction conference.

- 1. <Insert activity>.

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Follow the *Submittal Administrative Requirements* as stated in *Section 01 3300 Submittal Procedures*. For submittals to UIT, use electronic format only.

1.5 ACTION SUBMITTALS

- A. Provide Shop Drawings showing tray routing. Obtain University Information Technology Network Services (UITNS) approval before installation proceeds.
- B. Present solutions and Shop Drawings/submittals for firestop materials and systems to the Contractor for written approval of materials prior to purchase and installation.

1.6 INFORMATIONAL SUBMITTALS

- A. Provide As-built plans showing locations of network infrastructure.

PART 2 - PRODUCTS

2.1 PARTS AND MANUFACTURERS

- A. Refer to *Section 01 2500 Substitution Procedures* for variations from approved manufacturers or parts. **Obtain written approval from UITNS before requesting a substitution for work covered by *Division 27 Communications*.**
- B. Pathways
 - 1. Panduit
 - a. J-Hooks: J-Pro
- C. Comfort Cradles
 - 1. Tomarco/Stiffy
 - a. 2-inch FIG205-122UH
 - b. 3.5-inch FIG205-8UH
 - c. 2-inch FIG201-2UH
 - d. 3.5-inch FIG201-3UG
- D. Cable Tray
 - 1. Cablofil
 - a. 12-inch x 2-inch CF54 /300 EZ
 - b. 12-inch X 4-inch CF105 / 300 EZ
- E. Fiber Optic Innerduct

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1. White or orange, plenum rated, UL Listed, flexible optical fiber/communications raceway, recognized per NEC Articles 770 and 800 for plenum areas for optical fiber and telecommunications cables.

F. Trapeze Support Kits

1. Cooper B-Line
 - a. 9G-55XX-22SH

G. Wall-mounted Brackets

1. Cooper B-Line
 - a. B409

H. Powered Fiber Cable Systems

1. CommScope
 - a. Powered Fiber Cable Indoor/Outdoor : PFC-S04L12
 - b. Powered Fiber Cable Outdoor : PFC-S04O12
 - c. Power Express Distribution Shelf w/Alarm Module: PFP-PX-S1
 - d. Power Express Distribution Module, Supports up to 8 Devices: PFP-PX-8M
 - e. Power Express Blank Slot Panel: PFP-PX-SF
 - f. SPS Rectifier Power Distribution Shelf: PFP-SPS-S1
 - g. 1600W SPS Power Rectifier Module: PFP-SPS-1600M
 - h. SPS Rectifier Controller Display: PFP-SPS-C1
 - i. SPS Rectifier Blank Slot Panel: PFP-SPS-SF
 - j. 60W, 2 Port, PoE Extender: PFU-P-C-O-060-02

2.2 CONDUITS AND FITTINGS

- A. For each communications outlet, provide a complete assembly of conduit, tubing or duct with fittings including, but not necessarily limited to, connectors, nipples, couplings, locknuts, bushings, expansion fittings and other components and accessories as needed to form a complete system of the type indicated.
- B. The minimum conduit size for telecommunications outlets shall be 1 inch.
- C. All sleeves shall be reamed and grommets placed prior to cable installation to prevent cable damage.

2.3 WALL AND CEILING OUTLET BOXES

- A. Provide outlet box accessories as required for each installation, including mounting brackets, wallboard hangers, extension rings, fixture studs, cable clamps and metal straps for supporting outlet boxes, compatible with the outlet boxes being used and meeting the requirements of each individual situation.

2.4 PULL / JUNCTION BOXES

- A. Provide pull boxes rated NEMA- 1 for telecommunications conduits in interior locations. For damp or wet locations such as plumbing chases or outdoors, provide pull boxes rated NEMA-3R.

2.5 PLENUM RATED FIBER OPTIC INNERDUCT

- A. Provide all fittings to form a complete, integrated raceway system.
- B. Install all fiber in 1 ¼-inch corrugated, non-metallic plenum-rated innerduct when not installed in conduit or in utility tunnel tray.
 - 1. Provide UL Listed innerduct with flame propagation compliant with UL 2024.
 - 2. Only manufacturer's fittings, transition adapters, terminators and fixed bends are to be used.
- C. Fabrication
 - 1. Sequentially mark footage as specified in *Section 27 0553 Identification for Communications Systems*.

2.6 CABLE TRAY SECTIONS AND COMPONENTS

- A. General: Provide metal cable trays of types, classes and sizes indicated, with splice plates, bolts, nuts and washers for connecting units. Construct units with rounded edges and smooth surfaces, in compliance with applicable standards and with the following additional construction features.
- B. Provide cable trays with a minimum 4-inch usable load depth, or as noted on the Drawings.
- C. Straight tray sections shall have side rails fabricated as I-Beams. Supply straight sections in standard 12-foot lengths, except where shorter lengths are permitted to facilitate tray assembly lengths as shown on Drawings.
- D. Tray widths shall be 12 inches or as shown on Drawings.
- E. All fittings shall have a minimum radius of 24 inches.
- F. Provide bolted type splice plates for each tray type. The resistance of fixed splice connections between adjacent sections of tray shall not exceed .00033 ohms. Make splice plate construction in such a way that a splice may be located anywhere within the support span without diminishing rated loading capacity of the cable tray.
- G. Cable Tray Supports: Construct supports from 12 gauge steel formed shape channel members 1 5/8 inch by 1 5/8 inch with Trapeze Support Kits (9G-55XX-22SH) as manufactured by Cooper B-Line, Inc. Support cable trays installed adjacent to walls on wall-mounted brackets B409 as manufactured by Cooper B-Line, Inc.
- H. Support trapeze hangers supported by ½-inch (minimum) diameter rods.

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- I. Barrier Strips: Place as indicated on Drawings and fasten into the tray with self-drilling screws.
- J. Accessories: Furnish special accessories as required to protect, support, and install a cable tray system. Accessories consist of but are not limited to section splice plates, expansion plates, blind-end plates, specially designed ladder dropouts, barriers, etc.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install pull boxes in conduits at intervals no greater than 100 feet. Install a pull box in conduit runs whenever there are two 90° sweeps, or a total of 180° of sweeps in a conduit run. A pull box may not be used to change the direction of a conduit run. Any deviations from these criteria must have prior approval from UITNS.
- B. Mount wall outlets in a minimum 4-inch x 4-inch x 2 ½-inch double gang outlet box with a single gang mud-ring. Stub gang boxes for outlets into the ceiling void via one 1-inch conduit with pull string.
- C. Size communications pathways in accordance with the requirements of BICSI and the NEC where conduit, pull boxes, cable tray and other raceway sizes are not specifically shown on Drawings. The minimum conduit size shall be 1 inch.
- D. Bond all metallic telecommunications conduits entering the NF or the Building Distribution Frame (BDF) together and to the TMGB with a #6 AWG ground cable.
- E. Locate conduits entering the NF so as to allow for the greatest flexibility in the routing and racking of cables.
- F. Provide 4-inch conduits between NFs.
- G. Terminate conduits or conduit sleeves entering through the floor of the NF, 2 inches above the finished floor. Position the outer diameter of the conduit within 4 inches of room walls.
- H. Conduit runs shall not exceed 100 feet or have more than two 90-degree bends without the use of a properly sized junction box. Insulated throat compression fittings shall be used for communications conduit runs, with termination points having plastic or grounding bushings installed.
- I. Minimum radius for conduit bends:
 - 1. Internal diameter of less than 2 inches – 6 times the internal diameter.
 - 2. Internal diameter of more than 2 inches – 10 times the internal diameter.
- J. Install conduits in the most direct route possible from the NF to the work area.
- K. Do not run conduits next to hot water lines, steam pipes, or other utilities that may present a safety hazard or cause degradation of system performance.

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- L. Seal all in-use and spare conduits entering the NF or BDF to prevent the intrusion of water, gases and rodents during the construction project. Within five days of releasing the conduit for the installation of cable, the Contractor shall ensure all conduits to be clean and dry.
- M. All conduits and cables that penetrate fire-rated walls or floors shall be firestopped.
- N. The primary horizontal cable support system shall be conduit to cable tray, installed as shown in Technical Drawings. Place supports so that the support spans do not exceed maximum span indicated on Drawings. Cable tray shall be properly grounded. Wall penetrations shall transition to properly firestopped 1-inch – 4-inch sleeves, then back to cable tray.
- O. Outlets having one single cable shall have a single gang box that stubs up into the ceiling void via one (1) 1-inch conduit with pull string. Use of flexible conduit is prohibited.
- P. Outlets having two or more cables shall have a double gang box with a single gang reducer that stubs up into the ceiling void via one (1) 1-inch conduit with pull string.
- Q. Neatly dress cables along common paths with Velcro tie wraps, with voice cables separated from data cables. Do not exceed the maximum number of cables per bundle specified by the manufacturer. Add separate parallel J-hook pathway when cable count requires it.
- R. J-hooks shall be installed 4 to 5 feet apart. Avoid uniform spacing to minimize problems with signal degradation.
- S. Use methods approved by the manufacturer to support J-hooks from decking or building structure.
- T. Lay out cable pathway runs in advance to determine space requirement along pathways, and to ensure non-interference from other trade installations.
- U. Do not support communications pathway from, or lay on, ceiling suspension system or use electrical, plumbing or other pipes for support. Communications pathway supports shall be permanently anchored to building structure or joist.
- V. Provide attachment hardware and anchors designed for the structure to which attached, and that are suitably sized to carry the weight of the pathway and cables to be supported. Confirm installation procedures for cable support system with the Architect before implementation.
- W. Ream conduits to eliminate sharp edges. Terminate metallic conduit with an insulated bushing. Initial sealing of the sleeve penetration shall be completed by the sleeve installer. Refer to ANSI/TIA/EIA-606 and *Section 27 0553 Identification for Communications Systems* for administration of the pathway system.
- X. The inside of the cable tray or wireway shall be free of burrs, sharp edges or projections that can damage cable insulation. For abrasive supports (e.g., threaded rod), protect the portion within the tray with a smooth, non-scratching covering so that cable can be pulled without physical damage.

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- Y. When a wireway passes through a partition or wall, it must be an unbroken length.
- Z. Do not exceed the fill requirements when installing telecommunications cables.
- AA. Properly firestop openings in fire-rated walls, floors and ceilings.
- BB. Install barriers between power and telecommunications cables per electrical code.
- CC. Do not use cable trays and wireways as walkways or ladders unless specifically designed and installed for that purpose.
- DD. Locate supports where practicable so that connections between sections of the tray fall between the support point and the quarter section of the span. Support centers shall be in accordance with the load and span for the applicable class as specified in the NEC. A support shall be placed within 600 mm (2 feet) on each side of any connection to a fitting. Support wireways on 1500 mm (5 feet) centers unless designed for greater lengths.
- EE. Provide and maintain a minimum of 12-inch headroom above a cable tray. Ensure that other building components (e.g., air conditioning ducts) do not restrict access to trays or wireways.

3.2 MINIMUM CLEARANCES

- A. Communications pathway minimum clearances:
 - 1. Minimum of 1 foot parallel, 3 inches crossover from power cables and conduits.
 - 2. Minimum of 6 inches above ceiling tiles.
 - 3. Minimum of 24 inches from hot flues, steam pipes, hot water pipes and other hot surfaces.
 - 4. Minimum of 3 feet separation from electrical panel boards.
 - 5. Minimum of 5 inches from lighting fixtures.
 - 6. Minimum of 6 feet separation from electrical motors and transformers.
 - 7. Minimum of 2 inches from exposed all-thread rods.

3.3 FIRESTOPPING

- A. Provide fire-resistant materials to restore fire ratings to all wall, floor or ceiling penetrations used in the distribution and installation for communications cabling system.
- B. Comply with requirements as stated in *Division 07 Penetration Firestopping*.

END OF SECTION 27 0528

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