

University of Houston Master Specification

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<Insert Issue Name>

<Insert Issue Date>

SECTION 27 0528 - PATHWAYS FOR COMMUNICATIONS SYSTEMS

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

Maintain Section format, including the UH Master spec designation and version date in bold in the center columns in the header and footer. Complete the header and footer with Project Information.

Designer is required to adhere to the University's "Network Infrastructure Design Standards" and "Electronic Access Control Design Guide" available in Owner's Design Guidelines on the University's Facilities Planning and Construction web site.

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. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this Section.
- B. 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.

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 fire stopping requirements.

1.3 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Follow requirements as stated in Section 01 3300 "Submittal Procedures." Use electronic format only.

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1.4 ACTION SUBMITTALS

- A. Provide Shop Drawings showing Communications Pathway routing to include:
 - 1. Cable/Basket Tray Routing.
 - 2. Interior Conduit routing and Junction Box locations for conduit 2 inch OD and larger.
 - 3. Wall and Floor Sleeves or EZ-path.
 - 4. Mounting height at base of pathway for all elements shown.
 - 5. All outdoor pathway routing, including depth.
- B. Firestop material solutions:
 - 1. Product data
 - 2. Shop drawings.

1.5 INFORMATIONAL SUBMITTALS - Not Used

PART 2 - PRODUCTS

2.1 GENERAL GUIDELINES

- A. Refer to Section 01 2500 "Substitution Procedures" for variations from approved manufacturers or parts. Obtain prior written approval for substitutions from both the Owner's Project Manager and the UIT Project Manager.

2.2 PARTS AND MANUFACTURERS - PATHWAY

- A. J-Hooks:
 - 1. Panduit: J-Pro
- B. Comfort Cradles:
 - 1. Tomarco/Stiffy: 2-inch "Shorty" Fig 205-XX02UH
 - 2. Tomarco/Stiffy: 3.5-inch "Shorty" Fig 205-XX03UH
 - 3. Tomarco/Stiffy: 2-inch Clip-on Fig 201-02UH
 - 4. Tomarco/Stiffy: 3.5-inch Clip-on Fig 201-03UH
- C. Cable Tray:
 - 1. Cablofil: 12-inch X 4-inch CF105 / 300 EZ
 - 2. Cablofil: 18-inch X 4-inch CF105 / 450 EZ
- D. Fiber Optic Innerduct
 - 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.

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E. Trapeze Support Kits

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

F. Wall-mounted Brackets

1. Cooper B-Line: B409

2.3 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 pathway shall be 1 inch.
- C. Reamed and install grommets on all sleeves prior to cable installation to prevent cable damage.

2.4 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.
 1. Do not locate wall outlet boxes back-to-back in the same stud wall cavity. Ensure that communications and electrical outlet boxes are placed at least one stud or 16 inches apart when located on opposite sides of a partition wall

2.5 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.

2.6 PLENUM RATED FIBER OPTIC INNERDUCT

- A. Install all fiber optic cables in 1-1/4 inch corrugated, non-metallic, plenum-rated innerduct when not installed in conduit or in utility tunnel tray.
- B. Provide all fittings to form a complete, integrated raceway system.
 1. Use manufacturer-specific fittings, transition adapters, terminators and fixed bends.
 2. For point to point runs, use innerduct with sequentially marked footages as specified in Section 27 0553 "Identification for Communications Systems."

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2.7 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 Drawings.
- C. Supply straight sections in standard 10-foot lengths, except where shorter lengths are permitted to facilitate tray assembly lengths as shown on Drawings.
- D. Tray Widths: 18 inches or as shown on Drawings.
- E. Tray Fittings: Minimum radius of 24 inches.
- F. Provide bolted type splice plates for each tray section. The resistance of fixed splice connections shall not exceed 0.00033 ohms.
- 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 1/2-inch (minimum) diameter rods.
- I. Barrier Strips: Place as indicated on Drawings and fasten into the tray with manufacturer approved hardware.
- 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 degree sweeps, or a total of 180 degree of sweeps in a conduit run. A pull box may not be used to change the direction of a conduit run.
- B. Do not locate wall outlet boxes back-to-back in the same stud wall cavity. Ensure that outlet boxes are placed at least one stud or 16 inches apart when located on opposite sides of a partition wall.

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- 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 Network Facility (NF) or the Building Distribution Frame (BDF) together and to the TMGB with a #6 AWG ground cable.
- E. 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.
- F. 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.
- G. Minimum radius for conduit bends:
 - 1. Internal diameter of less than 2 inches – 6 times the internal diameter.
 - 2. Internal diameter of 2 inches or more – 10 times the internal diameter.
- H. Install conduits in the most direct route possible from the NF to the work area.
- I. Seal all in-use and spare conduits entering the NF or BDF to prevent the intrusion of water, gases and rodents during construction. Within five days of releasing the conduit for the installation of cable, Contractor shall ensure that all conduits are clean and dry.
- J. All conduits and cables that penetrate fire-rated walls or floors shall be fire-stopped in accordance with the requirements of Section 07 8413 "Firestopping."
- K. The primary horizontal cable support system shall be conduit to cable tray, installed as shown in 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 fire-stopped 1-inch – 4-inch sleeves or Ez-Pass, then back to cable tray.
- L. 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.
- M. Outlets having two to four cables shall have a double gang box with a single gang reducer that stubs up into the ceiling void via minimum of one-inch conduit with pull string.
- N. Outlets having more than 4 cables shall have a double gang box with a single gang reducer that stubs up into the ceiling void via minimum of two (2) 1-inch conduits with pull strings.
- O. 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.

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- P. Install J-hooks 4 to 5 feet apart. Avoid uniform spacing to minimize problems with signal degradation.
- Q. Lay out cable pathway runs in advance to determine space requirement along pathways and to ensure non-interference from other trade installations.
- R. 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.
- S. 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.
- T. 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-606 and Section 27 0553 "Identification for Communications Systems" for administration of the pathway system.
- U. 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.
- V. When a wireway passes through a partition or wall, it must be an unbroken length.
- W. Do not exceed the fill requirements when installing telecommunications cables.
- X. Install barriers between power and telecommunications cables per electrical code.
- Y. 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.
- Z. 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. 1 foot parallel, 3 inches crossover from power cables and conduits.
 - 2. 6 inches above ceiling tiles.
 - 3. 24 inches from hot flues, steam pipes, hot water pipes and other hot surfaces.
 - 4. 3 feet separation from electrical panel boards.
 - 5. 5 inches from lighting fixtures.

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6. 6 feet separation from electrical motors and transformers.
7. 2 inches from exposed all-thread rods.

3.3 FIRESTOPPING

- A. Comply with requirements of Section 07 8413 "Penetration Firestopping."

3.4 CLOSE-OUT DOCUMENTS

- A. Provide As-Built Drawings in .dwg, .rvt and .pdf formats, showing locations of network pathways including:
 1. Basket tray
 2. Conduit and J-boxes for runs that contain conduit 2 inches or larger

END OF SECTION 27 0528

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