

(NOTE TO DESIGNER: These Specifications are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

SECTION 27 05 28
PATHWAYS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Interior communications pathways and supports.
- B. Outlets and conduit runs.
- C. Risers in ER/TR(s).
- D. Grounding and bonding of pathways.
- E. Pathway fire stopping requirements.

1.2 RELATED SECTIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Related Division 27 Sections include:
 - 1. 27 05 00 Common Work Results for Communications
 - 2. 27 05 53 Identification for Communications Systems
 - 3. 27 13 00 Communications Backbone Cabling
 - 4. 27 15 00 Communications Horizontal Cabling

1.3 SUMMARY

- A. This Section specifies the requirements for the Pathways for Communications Systems for the University of Houston [Project Name]. [Insert Project description.].
- B. Communication Pathways are defined to include, but are not limited to innerduct, conduit, pull boxes, sleeves, cable trays, supports, accessories, associated hardware and fire stopping materials.
- C. Final design and specifications for conduits shall be made by the Electrical Engineer of Record.
- D. Work furnished and installed by Electrical Contractor as specified in this Section and as shown in E and T drawings includes:
 - 1. The conduits and back boxes for the work area telecommunications outlets.
 - 2. The floor poke through hardware.
 - 3. Fire stopping of cable tray and conduit cable pathway
- E. Work furnished and installed by the Cable Contractor as specified in this section and as shown in E and T drawings includes:
 - 1. The overhead cable runway system (ladder rack) within the new ER.
 - 2. Bonding and grounding of overhead cable runway system (ladder rack), racks and cabinets within the ER/TR.
- F. The primary horizontal cable support system will be cable tray, installed as shown in T drawings. Cable tray will be properly grounded. Wall penetrations shall transition to properly firestopped 1" - 4" sleeves, then back to cable tray.
- G. Outlets having one single cable require a single gang box that stubs up into the ceiling void via one (1) 1" conduit with pull string. Use of flexible conduit is expressly discouraged.

- H. Outlets having two or more cables require a double gang box with a single gang reducer that stubs up into the ceiling void via one (1) 1" conduit with pull string.
- I. Conduit runs may not be longer than 100ft or have more than two 90 degree bends without the use of a properly sized junction box. Insulated throat compression fittings must be used for communications conduit runs, with termination points having plastic or grounding bushings installed.
- J. Minimum radii for conduit bends shall be as follows:
 - 1. Internal diameter of less than two (2) inches is 6 times the internal diameter.
 - 2. Internal diameter of more than two (2) inches is 10 times the internal diameter.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Pathways:
 - 1. J-Hooks: Panduit
 - a. J-Pro
- B. Cable Tray: Cablofil
 - 1. 12" x 2" – CF54 /300 EZ
 - 2. 12" X 4" – CF105 / 300 EZ

2.3 CABLE HOOK SYSTEMS

- A. J-hooks shall be installed 4ft to 5ft apart. Uniform spacing should be avoided to minimize problems with signal degradation.
- B. J-hooks shall be supported from decking or building structure using methods approved by the manufacturer.
- C. Cable count shall not exceed manufacturer's recommended maximum. Add separate parallel J-hook pathway when cable count requires it.

2.4 CONDUITS AND FITTINGS

- A. For each communication outlet indicated, provide a complete assembly of conduit, tubing or duct with fittings including, but not necessarily limited to, connectors, nipples, couplings, locknuts, bushings, expansion fittings, other components and accessories as needed to form a complete system of the same type indicated.
- B. See SECTION 26 05 33 - RACEWAYS, CONDUITS AND BOXES
- C. Minimum conduit size for Telecommunications Outlets shall be 1 (one) inch.

2.5 WALL AND CEILING OUTLET BOXES

- A. All wall outlets shall be mounted in a minimum four (4)-inch by four (4)-inch by two and one-half (2 1/2)-inch deep double gang outlet box with a single gang mud-ring.
- B. 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 outlet boxes being used and meeting requirements of individual situations.

2.6 PULL / JUNCTION BOXES

- A. Pull boxes used with telecommunications conduits in interior locations shall be rated NEMA- 1. Pull boxes used in damp or wet locations such as plumbing chases or out of doors shall be rated NEMA-3R. Pull boxes shall be installed in conduits run at an interval no greater than every 100 feet. A pull box shall be installed 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 UH Information Technology.

2.7 PLENUM RATED FIBER OPTIC INNERDUCT

- A. All fiber shall be installed in 1 ¼" corrugated, non-metallic plenum rated innerduct when not installed in conduit or in utility tunnel tray.
 - 1. Innerduct shall be UL Listed with Flame Propagation compliant with UL 2024.
 - 2. Only manufacturer's fittings, transition adapters, terminators and fixed bends shall be used.
- B. Products
 - 1. White or orange, plenum rated, UL Listed, flexible optical fiber/communication raceway.
 - 2. Recognized per NEC Articles, 770 and 800 for plenum areas for optical fiber and telecommunications cables.
 - 3. Provide all fittings to form a complete integrated raceway system.
- C. Fabrication
 - 1. Footage shall be sequentially marked.

2.8 CABLE TRAY SECTIONS AND COMPONENTS

- A. General: Except as otherwise indicated, 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. Tray Sizes shall have 4 inch minimum usable load depth, or as noted on the drawing.
- C. Straight tray sections shall have side rails fabricated as I-Beams. All straight sections shall be supplied 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 twelve (12) inches or as shown on drawings.
- E. All fittings must have a minimum radius of 24 inches.
- F. Splice plates shall be the bolted type made as indicated below for each tray type. The resistance of fixed splice connections between adjacent sections of tray shall not exceed .00033 ohms. Splice plate construction shall be such that a splice may be located anywhere within the support span without diminishing rated loading capacity of the cable tray.
- G. Cable Tray Supports: Shall be placed so that the support spans do not exceed maximum span indicated on drawings. Supports shall be constructed from 12 gauge steel formed shape channel members 1-5/8 inch by 1-5/8 inch with necessary hardware such as Trapeze Support Kits (9G-55XX-22SH) as manufactured by Cooper B-Line, Inc. [or engineer approved equal]. Cable trays installed adjacent to walls shall be supported on wall mounted brackets such as B409 as manufactured by Cooper B-Line, Inc. [or engineer approved equal].
- H. Trapeze hangers shall be supported by 1/2 inch (minimum) diameter rods.
- I. Barrier Strips: Shall be placed as specified on drawings and be fastened into the tray with self-drilling screws.
- J. Accessories - special accessories shall be furnished as required to protect, support, and install a cable tray system. Accessories shall 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 SUMMARY

- A. Final design and specifications for the Communications Systems conduits shall be made by the Electrical Engineer and Architect of record.
- B. All communication pathways shall be sized 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 contract drawings. No conduit shall be less than 1".
- C. Conduits entering the Telecommunications Room shall be located allowing for the most flexibility in the routing and racking of cables.
- D. Conduits between Building Telecommunication Rooms shall be four (4) inches.
- E. Conduits or conduit sleeves entering through the floor of the Telecommunications Room shall terminate two (2) inches above the finished floor. The outer diameter of the conduit shall be located within four (4) inches of room walls.
- F. All metallic telecommunications conduits entering the Telecommunications Room, Equipment Room, or Entrance Facility shall be bonded together, and bonded to the Telecommunications Main Grounding Busbar with a #6 AWG ground cable.
- G. Conduits shall be installed in the most direct route possible from the Telecommunications Room to the work area.
- H. Conduits shall not be run next to hot water lines, steam pipes, or other utilities that may present a safety hazard or cause a degradation of system performance.
- I. All in-use and spare conduits entering the Telecommunications Room, Equipment Room, or Entrance Facility shall be sealed to prevent the intrusion of water, gasses, and rodents throughout the construction project. Within five days of releasing the conduit for the installation of cable, the conduit installation contractor shall prove all conduits to be clean and dry.
- J. All conduits and cables that penetrate fire rated walls or floors must be fire stopped.
- K. Cables shall be neatly dressed along common paths with Velcro tie wraps with voice cables separated from data cables. Maximum number of cables per bundle shall not exceed manufacturer specifications.
- L. Layout cable pathway runs in advance to determine space requirement along pathways, and to ensure non-interference from other trade installations.
- M. Do not support communication pathway from, or lay on, ceiling suspension system or use electrical, plumbing, or other pipes for support. Communication pathway supports shall be permanently anchored to building structure or joist.
- N. 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 with architect and/or construction manager on installation procedures for cable support system prior to implementation.
- O. Conduits shall be reamed to eliminate sharp edges. Metallic conduit shall be terminated 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 05 53 for administration of the pathway system.
- P. The inside of the cable tray or wireway shall be free of burrs, sharp edges or projections that can damage cable insulation. Abrasive supports (e.g., threaded rod) shall have the portion within the tray protected with a smooth, non-scratching covering so that cable can be pulled without physical damage. When a wireway passes through a partition or wall, it shall be an unbroken length. Installation of telecommunications cables shall not exceed the fill requirements. Openings in fire-rated walls, floors and ceilings shall be properly firestopped. Barriers between power and telecommunications cables shall be installed per electrical code. Cable trays and wireways shall not be used as walkways or ladders unless

specifically designed and installed for that purpose.

- Q. Supports should be located where practicable so that connections between sections of the tray fall between the support point and the quarter section of the span. The support centers shall be in accordance with the load and span for the applicable class as specified in the electrical code. A support should be placed within 600 mm (2 ft) on each side of any connection to a fitting. Wireways shall be supported on 1500 mm (5 ft) centers unless designed for greater lengths.
- R. A minimum of (12 in) access headroom shall be provided and maintained above a cable tray. Care shall be taken to ensure that other building components e.g., air conditioning ducts) do not restrict access to trays or wireways.

3.2 MINIMUM CLEARANCES

- A. Communication Pathway minimum clearances from:
 - 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 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 fluorescent fixtures.
 - 6. Minimum of 6 feet separation from electrical motors and transformers.
 - 7. Minimum of 2-inches from exposed all-thread rods.

3.3 FIRE STOPPING

- 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. Coordinate fire stopping procedures and materials with General Contractor and Electrical Contractor.
- B. Solutions and shop drawings/submittals for fire stop materials and systems shall be presented to the General Contractor for written approval of materials prior to purchase and installation.
- C. Materials shall be installed per manufacturer instructions, be UL listed for intended use, and meet NEC codes for fire stopping measures.
- D. The material chosen shall be distinctively colored to be clearly distinguishable from other materials, adhere to itself, and remain resilient and pliable to allow for the removal and/or addition of communication cables without the necessity of drilling holes in the material.
- E. The fire stopping material shall maintain/establish the fire rated integrity of the wall/barrier that has been penetrated.
- F. Cable Contractor shall laminate and permanently affix to the MDF wall, adjacent to chases, the following information:
 - 1. Name of manufacturer of fire stop system.
 - 2. Part & model numbers of system and all components.
 - 3. Phone numbers of manufacturer's corporate headquarters in U.S. and local distributor's name and phone number.

END OF SECTION