

SECTION 16740

TELEPHONE AND DATA WIRING SYSTEM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Division 0, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 06100, Rough Carpentry.
- C. Section 09900, Painting.
- D. Section 16010, Basic Electrical Requirements.

1.02 WORK INCLUDED

- A. The work includes, but is not limited to, the following:
 - 1. Coordinate backer board provided under Sections 06100 and 09900.
 - 2. Furnish underground duct from riser pole to backer board.
 - 3. Furnish a system of conduits and pull boxes for trunk cables.
 - 4. Furnish outlets and wiring for telephone and data distribution outlets.
 - 5. Test outlet wiring for circuit integrity.
 - 6. Fiber optic cable, telephone/data cables, and cable TV cables.
 - 7. 110 blocks, patch panels, relay racks, fiber optic termination rack, and terminations.
 - 8. Coordinate with Verizon to obtain telephone service to the building.
 - 9. Coordinate with RoadRunner to obtain cable TV service to the building.
 - 10. Cooperate with Owner's telephone equipment supplier.

1.03 WORK NOT INCLUDED

- A. The following work is not included:
 - 1. Telephone equipment and its installation.
 - 2. Telephone service cables.

1.04 REGULATORY AND STANDARDS REQUIREMENTS

- A. ANSI/NFPA 70, National Electrical Code.
- B. ANSI/TIA/EIA-568-B, Commercial Building Telecommunications Standard.
- C. TIA/EIA-607, Commercial Building Grounding and Bonding Requirements for Telecommunications.
- D. BICSI Telecommunications Design Manual.

1.05 SUBMITTALS

- A. Submit catalog cuts in accordance with Section 16010 for the following:
 - 1. Telephone and Data Cable
 - 2. Fiber Optic Cable
 - 3. Telephone/Data Outlet and Cover Plate
 - 4. Patch Panels
 - 5. Relay Rack

- B. Submit factory certification that cable has been tested and meets the specified standards.
- C. Submit test report for installed cables and terminations.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Telephone backer boards shall be 3/4 inch AB grade fir plywood with two coats black enamel paint. Backer board shall be minimum 48" x 96", or as indicated, install 6'-6" AFF to top of board.

2.02 TELEPHONE/DATA OUTLETS

- A. Acceptable Manufacturers:
 - 1. AT&T
 - 2. Hubbell
 - 3. Leviton
 - 4. Panduit
 - 5. Seimon
- B. Data Jacks: RJ-45, eight pin modular, proposed Category 6, UL 1863 file #E129878, meeting FCC Part 68.5, gold plated (50 micro-inch) beryllium copper jack contacts, tin/lead plated IDC "110" contacts, TIA/EIA-568-A configuration, Seimon # MX 6-F20, blue color, or approved equal.
- C. Telephone Jacks: RJ-45, eight pin modular, Category 6, UL 1863 file #E129878, meeting FCC Part 68.5, gold plated (50 micro-inch) beryllium copper jack contacts, tin/lead plated IDC "110" contacts, TIA/EIA-568-A configuration, # MX6-F20, Ivory color, or approved equal.
- D. Mounting Plate: High impact 94 V-O rated gray thermoplastic (Noryl) flush cover plate with labels stenciled by thermal ink transfer, Hubbell FPL series, or approved equal. Provide blank cover for unused openings. Note: System is sized for future expansion, do not use single or dual position plates with no blanks.
- E. Fiber Optic Terminations: Twelve port SC panel, rack mounted with swing out fiber management tray like Hubbell #FPR012SCM.

2.03 CABLE

- A. Acceptable Manufacturers:
 - 1. Lucent/Avaya
 - 2. Belden
 - 3. Berk-Tek
 - 4. CommScope
 - 5. Mohawk/CDT
 - 6. Clifford
 - 7. West Penn
- B. Data and Telephone Station Cables: Inside cable, non plenum applications, NEC Type CM, CMG; riser applications Type CMR; Category 6, unshielded 4-twisted pair solid 24 AWG copper conductors with polyvinyl chloride or polyolefin insulation and polyvinyl chloride sheath, factory certified to conform with EIA/TIA-568-A and Addenda TSB-36 and TSB-40-A, 100 ohms characteristic impedance, designed to support Gigabit Ethernet Standard of 250 MHz with maximum attenuation of 21db and NEXT minimum of 37db. For plenum applications provide cable with CMP (plenum) rating and FEP Teflon insulation for both jacket and individual conductors.
- C. Horizontal/Trunk Cable: Inside cable, 50 pair, NEC Type CM, CMG; riser applications Type CMR; Category 5e, unshielded 4-twisted pair solid 24 AWG copper conductors with polyvinyl chloride or polyolefin insulation and polyvinyl chloride sheath, 100 ohms characteristic impedance, attenuation 8db

@ 1 Mhz, 27.4db @ 100Mhz, per 1000 feet; Ethernet and IBM compatible. For plenum applications provide cable with CMP (plenum) rating and FEP Teflon insulation for both jacket and individual conductors.

- D. Trunk Cable: Twisted pairs (100), solid AWG 24 copper conductors with polyvinyl chloride or polyolefin insulation and polyvinyl chloride sheath, Clifford Stock No. 100P24B1 CMR, or approved equal.
- E. Fiber Optic Cable: FDDI rated 62.5/125 micron graded index 12 strand multimode, Halar outer covering, maximum 3.75 db/km attenuation, AT&T LGBC-006A PX Comcode 104-272-502, or approved equal.

2.04 CATV CABLE

- A. Acceptable Manufacturers:
 - 1. Belden
 - 2. CommScope
- B. Trunk/Riser Cable: Polymer foam dielectric, 0.500" semi-rigid, 75-ohm, coaxial cable, CommScope #P3 75-500JCAR, or approved equal. Terminate cables with Type F, female connectors, Gilbert #GRS-500-BAFF-DU-03, or approved equal.
- C. Horizontal Cable, Closet to Outlet (Drop): Type RG-6U coaxial cable, Belden #1530A, or approved equal. Terminate cables with Type F, male connector, Gilbert #GF-6-AHS/USA, or approved equal.
- D. Signal Splitters: Indoor type, 1 Ghz bandwidth, 100dB or better EMI rejection, 1 in/3 out , 1 in/4 out, 1 in/6 out or 1 in/8 out as indicated.

2.05 EQUIPMENT

- A. Relay Racks: Hubbell HPW84RR19 open relay rack with dual cable channels; provide with #MCCPSS19 10 outlet surge protected power strip, wire management panels, cable guides and accessories as necessary to properly organize cabling.
- B. Data Patch Panels: Category 6, "110" termination, Hubbell #P670XX series, provide ports as required for installed cables, plus 10 percent spares, or approved equal. Use for terminating all Category 6 cables.
- C. Telephone Patch Panel: Category 6, "110" termination, Hubbell # P670XX series, provide ports as required for installed cables, plus 10 percent spares, or approved equal. Use for terminating telephone trunk cables and telephone PBX circuits.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install wiring in conduit as specified for branch circuits, Section 16010, except use cable tray and underfloor raceway where indicated.
- B. All conduit installed for telephone wiring shall have no more than two 90° bends in any run unless one or more accessible, appropriately sized pull boxes are provided.
- C. Leave telephone service and feeder ducts with a pull string for use by others.
- D. Installers shall be well trained, experienced, and familiar with TIA/EIA-568-A and its application in the installation of communication wiring. Run Category 6 cables in strict compliance with TIA/EIA-568-A. Observe bending radius rules, do not staple cable, and do not exert excessive tension when installing in raceway.

- E. Fiber Optic Cable: Do not exceed cables minimum manufacturers specified bending radius and/or maximum tensile rating during installation. Install all fiber cable in inner duct, minimum 1 1/4" trade size, install duct to minimize bends and twists. Secure all exposed sections with cable ties; do not allow the cable ties to bear the cable's weight.
- F. Make up telephone jacks to cables in accordance with TIA/EIA -568-verify 568-A or B with Owner prior to installing standards and test for opens, shorts and grounds at each pin. Cooperate with Owner's telephone equipment installer, who will install trunk cables and telephone equipment, and aid in troubleshooting cable problems. Correct defects in circuits supplied under this section.

3.02 TERMINATIONS

- A. Voice Riser (trunks): Terminate on AT&T or equivalent 110 type insulation displacement connection (IDC) termination blocks, with the shield grounded. Maintain pair twists to within 1/2" of the termination points.
- B. Data Riser: Terminate fiber strands using the appropriate ST/SC connectors.
- C. Station Outlets: Flush mounted four position faceplate with unused positions covered with blank off insert. Terminate cables on jack inserts, install voice jack in top position, data jack(s) in bottom position(s).
- D. Station Terminal Fields:
 1. Terminate voice station cables on AT&T, or equivalent, 110 type insulation displacement connection (IDC) termination blocks. Maintain pair twists to within 1/2" of the termination points.
 2. Terminate data station cables on Category 6 modular patch panels having 110 type insulation displacement connection termination for the station cable, and RJ-45 style eight (8) position jacks wired in TIA-T-568-A pin configuration. Maintain pair twists to within 1/2", or less, of the termination points.
- E. Ground patch panels via a bond connection to the appropriate telecommunications grounding busbar.

3.03 LABELING REQUIREMENTS

- A. Number both ends of each cable with labels of waterproof materials and indelible ink text information, using either mechanical or waterproof adhesive attachment.
- B. The MDF and IDF's termination blocks, patch panels, cables, and wall plates shall be numbered using the following scheme. The scheme is intended to insure that no two labeled items of the same type will have the same number.
- C. Wall Plate Marking:
 1. Wall Plate ID = FTNN Where F= Floor Designator
T= Terminal Identifier (i.e. "A", "B")
N= Sequential station placement drop number (Keyed to room number)
 2. Example: G-A-1024.3-3 = Ground floor, IDF A, Room 1024.3-Outlet number 3 in this room.
 3. This designation must be permanently and indelibly marked on the wall plate in a clear and legible manner. The designation must also be marked on the terminal block or patch panel of the associated distribution frame location (MDF/IDF).
 4. Record the wall plate number on the building floor plan record diagram.
- D. Riser (Trunk) Pair Marking:
 1. Riser Pair ID = NNN Where NNN= Sequential riser pair number.
 2. Example: (Riser) 245 = Riser pair number 245.
 3. The designation must be marked on the termination blocks at each end of the riser cables. Riser pair counts shall not be repeated. If riser pair 1-48 terminates at the first IDF, the next riser pair count in the following IDF shall start with pair number 49.

3.04 GROUNDING REQUIREMENTS

- A. Extend service equipment ground to service backer board using #6 copper. In exposed locations, install ground wire in EMT. Bond all raceway to form a continuous path to ground.
- B. Provide appropriate grounding for the protection of personnel, materials and equipment conforming to all applicable regulations, codes and standards.

3.05 FIRE STOPPING

- A. Apply UL 1479 listed cementitious fire stop materials conforming to ASTM E814 F and T ratings, in full hours, compatible with the rating of the penetrated fire barrier.

3.06 TESTING

- A. Voice Circuits: Test for opens, shorts, grounds, and pair compliance at each pin. Correct defects and retest as necessary to obtain error free circuits. No defective pairs are permitted in station cables. A pair is defective if:
 - 1. Either or both conductors are open.
 - 2. Either or both conductors are shorted to ground or another conductor.
 - 3. Tip and ring are reversed.
 - 4. Foreign voltages are present.
- B. Riser (trunk) Circuits: Test each pair end to end after termination. In the event of defective conductors, or pairs, replace the cable.
- C. Data Circuits: Test and certify all Category 6 cable runs to conform to TIA/EIA-568-A and UTP Addenda TSB-36, TSB-40A, 569, and 606. Runs shall support the Gigabit Ethernet Standard for 250 Mhz with maximum attenuation of 21db and NEXT minimum of 37db. Perform bi-directional test using a network analyzer, Microtest Penta scanner, or approved equal. Defective pairs are not permitted; runs which do not meet this requirement shall be replaced or suitably repaired and retested. Submit a computer generated test report listing results for each run.
- D. Fiber Optic Riser: Fiber Optic Riser: Test each strand in accordance with ANSI/TIA/EIA-526-7, with a Optical Time Domain Reflectometer (OTDR). Test in one direction at 1310 and 1550 nm wavelengths; attenuation shall not exceed 1.0db/km at both wavelengths. Connector loss shall not exceed 1.5db per connector pair. No defective fiber strands, or splices of any type, are permitted in a riser cable. Replace any cable containing defective strands. Submit test report summarizing test results.
- E. CATV Riser and Station Cables: After termination, test all cables for center conductor and shield continuity, check for open conductors and center conductor-to-shield shorts. Test from each end with metallic time-domain reflectometer (MTDR), to check for opens, shorts, impedance and loss anomalies. Any defective CATV cables shall be replaced. Submit final test report summarizing test results.
- F. Submit a typed test report indicating test results for each circuit, including station circuits and trunk cables.

END OF SECTION