

SECTION 27 11 00**COMMON WORK RESULTS FOR COMMUNICATIONS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions, apply to work of this section.
- B. Division 26 Basic Electrical Materials and Methods sections apply to work specified in this section.

1.2 SUMMARY

- A. Cable trays, raceways, electrical services, etc. provided by others, which are required in connection with the installation of telephone/data systems, are specified in other Division 26 sections.
- B. Extent of telephone/data hardware systems work is indicated by drawings and schedules and is hereby defined to include, but not by way of limitation, the provisions of:
 - 1. All station cabling between the telecommunications closets and the outlets.
 - 2. All termination blocks, outlets/jacks, patch panels, patch cords, cabinets, etc., required to support, terminate and/or cross connect cabling at the main cross-connect, telecommunications rooms and/or other designated equipment.
 - 3. Bond each cabinet or frame installed under this work to the nearest Telecommunications Grounding Bus Bar.
 - 4. All physical cable management hardware including, but not limited to: "J-hooks" in accessible ceiling areas, ladder-type cable racks within telecommunication rooms and "D-rings" on backboards and equipment racks.
 - 5. Seismic bracing of all cabinets, equipment racks and ladder-type cable racks provided under this work as required by code and by local governing jurisdiction.
 - 6. Termination, cross connect and patching of all fibers and cable pairs as indicated on schedules or on drawings.
 - 7. Testing, labeling and documentation of all cables and hardware installed under this contract.
 - 8. Preparation and submission of product data, shop drawings, testing reports, as-built drawings, and cabling documentation as required in this specification.
 - 9. Fire stopping as required.
- C. Rough carpentry is specified in a Division 6 section.

1.3 SUBMITTALS

- A. Product Data: Submit complete bound set of manufacturer's product data including tele-data communications equipment, special systems equipment and all other components provide as part of this scope of work. All equipment and accessories proposed shall be clearly highlighted including model numbers, colors, accessories, mounting components, add-ons, etc within the bound set.

B. Warranty:

1. All documentation pertaining to and indicating warranty information shall be included for all products and installation applications covered by the system 20 year warranty

1.4 QUALITY ASSURANCE

- A. Coordinate with local telephone company for main and alternate service to main telephone room in the facility.
- B. Coordinate with electrical work and other trades to properly interface installation of telephone system with other work.
- C. Sequence installation of telephone/data system with other work to minimize possibility of damage and soiling during remainder of construction.

PART 2 - PRODUCTS

- 2.1 Conduit, boxes, connectors and supports are specified in other sections of specification.
- 2.2 Plywood: Where indicated, provide flame retardant, exterior grade 3/4" plywood. Plywood shall be bolted to all interior walls of telephone rooms and closets, as shown in the drawings and painted to match architectural finish.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions under which telephone/data systems are to be installed. Notify Engineer in writing of conditions detrimental to proper completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to installer.

3.2 INSTALLATION OF TELEPHONE/DATA HARDWARE SYSTEM

- A. Install telephone/data raceway and accessories as indicated herein and specified in other sections of the specifications and drawings.
 1. Provide seismic support and bracing, as required by code, for all cabinets, and distribution frames installed under this work. "J-hooks" must be structurally designed to accommodate cable loads. In general, provide support only from floor slabs, beams, columns, or structural walls (such as shear walls). Coordinate seismic design with architectural, structural, mechanical, electrical, and other trades.
- B. Provide 4'x 8'x 3/4" flame retardant, exterior grade plywood backboard mounted on communications walls at 6" to 102" AFF as noted on drawings. Plywood shall be painted with fire resistant paint on all sides to match architectural finish (white minimum).
- C. Distribution Rings/Troughs/Backboards
 1. For use in the telecommunication rooms, at the termination block fields and cross-connects:
 - a. 110-18A distribution ring shall be mounted vertically between terminal blocks for routing of patch cords and jumper wire.

- b. 110A2 wiring trough shall be mounted horizontally and vertically for routing of patch cords and jumper wire.
 - c. 188B2 backboard shall be mounted horizontally for routing of patch cords and jumper wire.
 - d. Types 188C3, 188D3 and 188E3 shall be mounted adjacent to 110 Patch Panel System terminal blocks for routing of patch cords and jumper wire.
- D. Floor to floor distribution shall be provided with concrete floor sleeves, or conduits as noted on the drawings, and as required by Architectural Design.
- E. Provide protective cable bushings on all conduits immediately after installation.
- F. Use only electrical 45° or 90° conduit elbows with long bend radii as follows:
 - 6:1 bend radius of the inside conduit diameter for sizes 2" or less.
 - 10:1 bend radius of the inside conduit diameter for sizes greater than 2".
- G. Do not place more than two 90° sweeps or exceed 100 ft. between pull boxes without providing a pull box.
- H. Unless otherwise noted the following conduit schedule shall be followed:
 - 1. One Workstation or Communication Interface - 1" C. with pullwire.
- I. Fire seal all openings to maintain fire rating after telephone cables are installed.
- J. Place telephone and/or data label on pull and junction boxes.

END OF SECTION

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SECTION 27 15 01**HORIZONTAL CABLING****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions apply to work of this section.
- B. Division 26 Basic Electrical Materials and Methods sections apply to work specified in this section.

1.2 SUMMARY

- A. Extent of tele-data special systems work is indicated by drawings and schedules, and is hereby defined to include, but not by way of limitation, the provisions of:
 - 1. All station cabling between the telecommunications closets and the outlets.
 - 2. All termination blocks, outlets/jacks, patch panels, patch cords, cabinets, etc., required to support, terminate and/or cross connect cabling at the main cross-connect, telecommunication rooms and/or other designated equipment locations.
 - 3. Bond each cabinet or frame installed under this work to the nearest Telecommunications Grounding Bus Bar.
 - 4. All physical cable management hardware including, but not limited to: "J-hooks" in accessible ceiling areas, ladder-type cable racks within telecommunication rooms and "D-rings" on backboards and equipment racks.
 - 5. Seismic bracing of all cabinets, equipment racks and ladder-type cable racks provided under this work as required by code and by local governing jurisdiction.
 - 6. Termination, cross connect and patching of all fibers and cable pairs as indicated on schedules or on drawings.
 - 7. Testing, labeling and documentation of all cables and hardware installed under this contract.
 - 8. Preparation and submission of product data, shop drawings, testing reports, as-built drawings, and cabling documentation as required in this specification.
 - 9. Fire stopping as required.

1.3 SUBMITTALS

- A. Product Data: Submit complete bound set of manufacturer's product data including tele-data communications equipment, special systems equipment and all other components provide as part of this scope of work. All equipment and accessories proposed shall be clearly highlighted including model numbers, colors, accessories, mounting components, add-ons, etc within the bound set.

1.4 QUALITY ASSURANCE

- A. Installer's Qualifications: Firms with at least three (3) years of successful installation experience with projects utilizing tele-data/special media systems and equipment similar to that required for this project.

B. Codes and Standards:

1. Electrical Code Compliance: Comply with applicable local code requirements of the authority having jurisdiction and NEC, including 725(B) and 800-Series articles as applicable to installation, and construction of communications systems.
2. IEEE Compliance: Comply with Std 241, "IEEE Recommended Practice for Electric Power Systems in Commercial Buildings", pertaining to communication systems.
3. NEMA Compliances: Comply with NEMA's Pub. No. 250, "Enclosures for Electrical Equipment (1000 Volts Maximum)".
4. EIA Compliance: Comply with EIA Standards RS-453, 464, and EIA/TIA 568, 569 standards pertaining to installation of communications systems.
5. ANSI/EIA/TIA-607; ANSI NFPA 70 pertaining to grounding of communications systems.
6. BICSI TDM manual (current edition).

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver equipment and components in factory-fabricated containers or wrappings, which properly protect equipment from damage.
- B. Store equipment and components in original packaging. Store inside in a well-ventilated space protected from weather, moisture, soiling, humidity, and extreme temperatures.
- C. Handle equipment and components carefully to prevent damage. Do not install damaged units or components; replace with new.

1.6 SEQUENCING AND SCHEDULING

- A. Coordinate installation with Electrical, HVAC, Plumbing, Fire Protection, and other trades to eliminate disruption and/or conflict with other systems.

PART 2 - TELE-DATA/SPECIAL SYSTEMS TOPOLOGY AND SPECIFICATIONS**2.1 FACILITY ADMINISTRATION LOCAL AREA NETWORKS (LAN) HORIZONTAL COPPER BASED CABLE DISTRIBUTION:**

- A. Topology:
 1. The Horizontal Copper Based system will be a logical star configuration originating from the local computer room.
 2. Splices are not acceptable in the LAN cabling systems.
- B. Cabling Specifications:
 1. All LAN Systems cabling from the computer room to the workstation(s) will be plenum rated; Category 6A (Augmented); 4 pair, 24 awg; unshielded twisted pair cables (blue).
 2. All LAN Systems cabling routed below grade and/or any area where cable may be submerged in water or other liquid (permanently or temporarily) will be Category 6A (Augmented), 4-pair, 24AWG, unshielded twisted pair gel-filled/water block cable.
 3. Cable length between the computer room interconnect and the workstation/terminal termination point will not exceed 295' (90 meters).
 4. All cabling will be installed in accordance with local, state, national codes and EIA/TIA 568 standards.
 5. All cabling shall be procured from one manufacturer.

C. Termination Specifications:

1. All LAN Systems network cabling will be terminated in the computer room on system specific Category 6A (Augmented) jack panels; blue with T568B pin configuration. Each system to be a separate grouping - color coded.
2. All LAN Systems workstations and terminals will be terminated on Category 6A (Augmented), blue with T568B pin configuration, mounted in stainless steel multi-port face plates.
3. All termination hardware shall be procured from one manufacturer.
4. All Category 6A (Augmented) Terminations shall utilize cross-over lead technology to address data circuit applications exceeding 500 MHz and meet or exceed the following electrical, mechanical and NEXT specifications listed below:

a. Electrical Specifications:

- 1) Proposed TIA/EIA Category 6A (Augmented)/Class E Standard or higher.
- 2) Data Rate: All Category 6A (Augmented) cables shall conform to or exceed the EIA/TIA 568 Commercial Building Wiring Standard, Horizontal Cable Section and the EIA/TIA Technical Systems Bulletin 36 for Unshielded Twisted Pair Cables. Other standards supported include IEEE 802.3, 1Base5, 10BASE-T, IEEE 802.5, 4 Mbps, 16 Mbps (328 ft [100m], 104 Workstations) and ANSI X3T9.5 TP-PMD requirements for UTP at 100 Mbps. In addition, cables shall be capable of supporting high-end applications such as 155 Mbps ATM, 1.0 Gbps Ethernet (1000 Base-T), 1.2 Gbps Technologies and 10 Gbps Ethernet (10 G Base-T) for 100 meter channel.
- 3) Insulation resistance: 500 MΩ maximum.
- 4) Dielectric withstand voltage 1,000 VAC RMS, 60 Hz minimum, contact-to-contact and 1,500 VAC RMS, 60 Hz minimum to exposed conductive surface.
- 5) Contact resistance: 20MΩ maximum.
- 6) Current rating: 1.5 A at 68°F (20°C) per IEC Publication 512-3, Test 5b.
- 7) UL Listed.
- 8) CSA Certified.
- 9) Comply with FCC Part 68.

b. Mechanical Performance:

- 1) Plug Insertion Life: 750 insertions
- 2) Contact Force: 3.5-oz (99.2g) minimum using FCC approved modular plug.
- 3) Plug Retention Force: 30-lb (133N) minimum between modular plug and jack.
- 4) Temperature Range: -40 to 150°F (-40 to 66°C).

c. Worst Pair to Pair Near-End Crosstalk (NEXT) Values.

-@ 1.0 MHz:	72.7
-@ 4.0 MHz:	63.0
-@ 10.0 MHz:	56.6
-@ 16.0 MHz:	53.2
-@ 20.0 MHz:	51.6
-@ 25.0 MHz:	50.0
-@ 31.25 MHz:	48.4
-@ 62.50 MHz:	43.4
-@ 70.0 MHz:	42.5

-@ 100.0 MHz:	39.9
-@ 120.0 MHz:	38.6
-@ 140.0 MHz:	37.4
-@ 149.1 MHz:	36.9
-@ 155.5 MHz:	36.7
-@ 160.0 MHz:	36.4
-@ 180.0 MHz:	35.6
-@ 200.0 MHz:	34.8
-@ 250.0 MHz:	33.1

*Note: All performance data shown is for Category 6 due to finalization of Category 6A (Augmented) standard to be completed in year 2006. Solution shall meet new standard once completed.

- d. Minimum channel performance requirement @ 100 MHz (performance at 250 MHz shown in parenthesis):

Specified Frequency Range	1-250 MHz
Attenuation	21.2dB (36.0dB)
NEXT	39.9dB (33.1dB)
Power Sum NEXT	37.1dB (30.2dB)
ACR	18.2dB (-2.9dB)
Power Sum ACR	15.4dB (-5.8dB)
ELFEXT	23.2dB (15.3dB)
Power Sum ELFEXT	20.2dB (12.3dB)
Return Loss	12.0dB (8.0dB)
Propagation Delay	548ns (546ns)
Delay Skew	50ns

*Note: All performance data shown is for Category 6 due to finalization of Category 6A (Augmented) standard to be completed in year 2006. Solution shall meet new standard once completed.

5. Terminations shall be wired per T568B configuration.

D. Labeling

1. Each cable will be identified at the workstation and in the computer room. The label will include:
 - a. Cable number.
 - b. Work station I.D.
 - c. Computer room number.
 - d. Jack panel and port number.

E. LAN Systems Cable Testing:

1. All cabling will be test/certified for conformance to the proposed EIA/TIA 568 Category 6/Class E specifications using TSB-67 Level 4 test equipment to include documentation of: NEXT attenuation, characteristic impedance, mutual capacitance, resistance, noise, wire map; with print outs for each cable.

F. As-Built Drawings and Cable Records:

1. The as-built drawings shall be of the complete telecommunications cabling system including, but not limited to, floor plans showing the locations of telecommunications outlets and cable routing, and telecommunications equipment room details (including elevations of all walls, racks, cabinets and frames) showing the exact placement of all termination blocks, racks, patch panels, equipment, etc. Include details showing the exact type, quantities, and routes of all inter-room cabling. Submit the As-Built drawings as Autocad Release 2007 files plus two (2) sets of reproducible plots and five (5) sets of prints.
2. Cable Records: Cable records shall be submitted in hard copy and on disk in Excel (latest release).

END OF SECTION

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