

**SECTION 17010- GENERAL DESIGN REQUIREMENTS FOR
TELECOMMUNICATIONS
CONSTRUCTION STANDARD**

PART 1: GENERAL

1.01 Telecommunications Engineer

Minimum qualifications for the Telecommunications Engineer are:

- A. Texas Licensed Profession Engineer (PE)
- B. Registered Communications Distribution Designer (RCDD) or equivalent.
- C. Ten (10) years working experience within the telecommunications industry.
- D. Three (3) years working experience in the planning, design, engineering, installation, and testing of both outside plant and building cabling systems, to include copper twisted pair, fiber and 75 ohm coax, for use as a CATV system, in the campus environment.
- E. Ability to author detailed specifications.
- F. Ability to prepare detailed construction and as-built drawings.
- G. Ability to inspect and supervise the project.
- H. Provide references on three (3) projects of similar scope worked within the last five (5) years.

1.02 Telecommunications Contractor

Minimum qualifications for Telecommunications Contractor are:

- A. Five (5) years experience in the telecommunications industry.
- B. Three (3) years working experience in installation and testing of both outside plant and building cabling systems, in the campus environment to include:
 - 1. Placing, splicing, terminating and testing of inter-building backbone cables, to include up to 2400 pair copper twisted pair, 144 strand fiber and .5 inch and .75 inch 75 ohm coax.
 - 2. Placing, terminating and testing of intra-building backbone cables, to include up to 1200 pair copper twisted pair, 96 strand fiber and .5 inch

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and .75 inch 75 ohm coax and horizontal distribution cables, to include Category 5e unshielded twisted-pair, 2 strand fiber and 75 ohm coax.

- C. Ability to read and interpret construction specifications and drawings.
 - D. Ability to inspect and supervise the project.
 - E. Ability to prepare cable records and record-drawings.
 - F. Ability to prepare cable test records
 - G. Familiarity with 110 Cross-Connect System, Ortronics Series II Outlets, and associated hardware.
 - H. Provide references on three (3) projects of similar scope worked within the last five (5) years
- 1.03 The University shall review and approve the qualifications of all Telecommunications Engineers, Contractors and Sub-Contractors.
- 1.04 Minimum Required Telecommunications Drawings and Details
- Telecommunications drawings and details shall be provided; separate from other disciplines; placed within the Electrical section; and identified as “Telecommunications System” drawings.
- 1.05 Telecommunications Plan Drawings
- Telecommunications plan drawings shall be submitted in AutoCAD compatible drawing files scaled to the true dimensions of the building (AutoCAD latest release drawings are preferred, however a minimum of Release 13 will be accepted).
- Telecommunications plan drawings shall include separately developed layers identifying Telecommunications pathways and spaces and Telecommunications outlet/connector locations
- 1.06 Telecommunications plan drawings shall indicate:
- A. Location of all telecommunications rooms, closets and spaces.
 - B. All conduits, raceways, cable trays, floor ducts, and pull boxes, and their means of support.
 - C. Source and destination locations for all telecommunications outlets.

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1.07 Telecommunications Backbone Schematic (Riser) Diagrams

Telecommunications backbone schematic diagrams shall be provided and shall indicate:

- A. Inter-Building Backbone pathway.
- B. Telecommunications service entrance.
- C. Splice locations with cable identifier and count.
- D. Protector locations with cable identifier and count.
- E. Telecommunications Bonding and Grounding System
- F. Intra-Building Backbone pathways.
- G. Intra-Building Backbone cable support systems.
- H. Cross-connect locations.
- I. Type, size, sheath, gauge and length of all Backbone cables.
- J. Schedule of major hardware components.

1.08 Telecommunications Room, Closet and Space Detail Drawings

Telecommunications room, closet and space detail drawings, in both plan and elevation views, shall be provided and shall indicate location, with dimensions, of:

- A. Conduits, slots and sleeves.
- B. Cable ladder and hardware.
- C. Grounding Busbar.
- D. Backboards.
- E. Cross-connect hardware for backbone and horizontal cables of each media type.
- F. Splices with cable identifier and count.

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- G. Protector frames with cable identifier and count.
- H. Equipment Racks.
- I. Enclosures.

1.09 Minimum Required Telecommunications Specifications

Telecommunications specifications shall be provided; separate from other disciplines; placed within the Electrical section; and identified as “Telecommunications System” specifications. **Editor Note: The intention was to have a Division 17 for all low voltage cabling systems. Is this still the case? If so make changes to text.**

Telecommunications product specifications shall be submitted. These include, but are not limited to the following:

- A. Cable
- B. Cable support hardware to include:
 - Cable ladder
 - Cable tray
 - J-hooks
 - Conduit
 - Pull-boxes

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C. Connecting hardware to include:

Outlet/connectors
Cross-connects
Protector frames and protectors
Splice cases and modules

D. Enclosures

Telecommunications execution specifications shall include guidelines for placement; termination; grounding; splicing; labeling; testing; documentation and commissioning of all telecommunications systems.

Design Development Review Documents

Preliminary Telecommunications plan drawings; Preliminary Telecommunications backbone schematic diagrams and Preliminary Telecommunications specifications shall be provided.

Preliminary telecommunications plan drawings shall indicate:

- A. Location of all telecommunications rooms, closets and spaces.
- B. Source and destination locations for telecommunications outlets.

Preliminary telecommunications backbone schematic diagrams shall indicate

- A. Telecommunications service entrance.
- B. Inter-Building Backbone pathways.

50% Construction Development Review Documents

Telecommunications plan drawings; telecommunications backbone schematic diagrams and telecommunications specifications, to include comments submitted by the University at Design Development, shall be provided.

Telecommunications plan drawings shall indicate:

- A. Location of all telecommunications rooms, closets and spaces.
- B. Source and destination locations for telecommunications outlets.

Telecommunications schematic diagrams of:

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- A. Telecommunications pathways and spaces
- B. Telecommunications inter-building backbone cables (distribution)
- C. Telecommunications intra-building backbone cables (riser)

Telecommunications Product Schedules, symbol legend and all telecommunications details shall be provided.

95% Construction Development Review Documents

Telecommunications plan drawings; telecommunications backbone schematic diagrams and telecommunications specifications, to include comments submitted by the University at 50% Construction Development Review, shall be provided.

Included, for each media type, shall be the final tabulations indicating the size and number of horizontal cables and backbone cables to be terminated; a termination hardware component schedule for each telecommunications room, closet or space and a telecommunications outlet/connector schedule.

PART 2: CABLING STANDARDS

2.01 Technical Considerations for CATV Cabling System

General

General network configuration shall be as dictated by accepted engineering practices, with passive devices located as required by network design and active components located in equipment spaces as indicated on the project drawings and dictated by network design. Each CATV outlet shall have a 75 ohm terminator installed.

CATV System Performance Requirements

- CATV network bandwidth shall extend from 50 MHz to at least 860 MHz.
- Any channel at any point in the system shall exhibit the following characteristics

Worst case carrier to noise ratio	49 dB
Worst case cross modulation	-55 dB
Worst case 2nd order distortion	-67 dB
Worst case composite triple beat	-54 dB
Worst case hum modulation	-59 dB

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- Each outlet in the system shall exhibit the following characteristics

Minimum signal level, any channel	+ /- 0.0	dBmV		
Maximum signal level, any channel	+8	dBmV		
Maximum adjacent channel variation in level	2	dB		
Amplitude response variation across any channel	+/- 1	dB	6	MHz
Maximum tilt, lowest level channel			to	highest level channel
	6	dB		

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Component Requirements

- Passive Devices

Trunk	Minimum bandwidth - 1000 MHz Scientific Atlanta or equivalent
Feeder	Minimum bandwidth - 1000 MHz Scientific Atlanta or equivalent

- Active Devices

Trunk Amplifiers C-COR Flexnet 900 series, or equivalent.
Feeder Amplifiers C-COR Flexnet 900 series, or equivalent

Component Requirements-Continued

- Cable

Trunk cable	Comm/Scope .750 P3 Flooded cable or equivalent
Feeder cable	Comm/Scope .500 P3 Flooded cable or equivalent
Drop cable	Comm/Scope RG-6 Quad shield, 90% braid, or equivalent

CATV System Warranty

The installation contractor shall provide written "proof-of performance" demonstrating that the installed system meets all of the above stated requirements as well as applicable FCC requirements for leakage and radiation. (100% testing of all the outlets is not required, but the report must include measurements at those points in the system where normal practice would predict the worst-case performance.) The installation contractor shall guarantee said performance for a period of not less than one year after acceptance by the University. The University will assume all responsibility for maintenance of these parameters after the initial warranty period.

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Telecommunications
General Specification

Cabling

General

The University prefers to have the minimum number of telecommunications rooms possible with accessible pathways throughout the building to facilitate additional cable placements during the life cycle of the building.

It is most desirable that the building have all cabling terminated in the telecommunications service entrance, while maintaining a maximum cable length of 90 meters.

OSP Copper Cable

- The University will provide and install a (tbd) pair OSP cable to the telecommunications service entrance. The University will splice to the 100 pair tails on the CIRCA 1880B1-100 protected termination blocks, or The University approved equivalent. CIRCA 1880B1-100 protected termination blocks to be provided by project.

OSP Fiber Cable

- The University will provide and install a (tbd) strand 62.5/125 multi-mode fiber cable and a (tbd) strand single-mode fiber cable to telecommunications service entrance. OSP fiber cable and termination hardware to be provided and installed by UT.

Telecommunications Grounding System

- A Telecommunications main grounding busbar shall be provided and installed at each telecommunications service entrance.
- A telecommunications grounding busbar shall be provided and installed in all telecommunication rooms.
- A bonding conductor for telecommunications shall be provided and installed from the service equipment in the electrical entrance facility to the telecommunication main grounding busbar. Engineer to specify conductor size based on 2000 circular mils per linear foot.
- A telecommunications bonding backbone shall be provided and installed from the telecommunications main grounding busbar to each telecommunications grounding busbar. Engineer to specify conductor size based on 2000 circular mils per linear foot.

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Intra-Building Backbone Copper Distribution Cable

- To be specified by Engineer.

Intra-Building Backbone Fiber Distribution Cable

- To be specified by Engineer.

Horizontal Distribution Cable

- To be specified by Engineer, with a minimum of three ANSI/TIA/EIA-568-B.1 category 5e cables installed to each outlet location (two for data and one for voice) and two outlet locations per work area.
- Work area outlets shall be Ortronics Series II telecommunications outlets.

Network Implementation

- Equipment racks shall be provided and installed in the telecommunications service entrance and in each telecommunication room.
- A #6 AWG grounding conductor shall be provided and installed to bond the telecommunications grounding busbar to the equipment racks.
- (tbd) Category 5e patch cables shall be provided for installation by owner.
- (tbd) 62.5/125 multi-mode fiber patch cables shall be provided for installation by owner.

PART 3: TELECOMMUNICATIONS ROOM STANDARDS

1. General

- 1.1 The telecommunications room shall be designed to contain telecommunications equipment and cable terminations.
- 1.2 The telecommunications room shall not be shared with building or custodial services. The telecommunications room shall not be shared with building power other than a dedicated power panel installed to serve the telecommunications equipment in the room.
- 1.3 Piping, ductwork or distribution of electrical power to the building shall not be located in or pass through the telecommunications space.

2. Size

The telecommunications room shall be sized to provide a minimum of 2 ft. of linear wall space for each usable 1,000 of usable floor space served.

3. Location

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- 3.1 The telecommunications room shall be located as close as practicable to the center of the area that it is intended to serve.
- 3.2 The telecommunications room shall be accessible from a hallway or other common area.
- 3.3 The telecommunications room shall be located in an area of the building with a minimum floor loading of 50 LB/ft.².
- 3.4 The telecommunications room shall be located away from any threat of flooding.
- 4. Provisioning
 - 4.1 General

The telecommunications room floors, walls and ceilings shall be treated to eliminate dust. Finishes shall be light in color to enhance room lighting
 - 4.2 Power

The telecommunications room shall have a minimum of two dedicated 20 A, 120V AC duplex non-switched electrical outlets for equipment power and a separate 120V AC duplex non-switched electrical outlet for tools and instruments.
 - 4.3 Lighting

The telecommunications room shall have a minimum equivalent of 50 footcandles measured 3 ft. above finished floor.

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- 4.4 Environmental control
Heating ventilation and air-conditioning that will maintain 64° F to 75° F and 30% to 55% RH and maintain positive pressure with a minimum of one air change per hour shall be provided.
- 4.5 Fire protection
If sprinkler heads are provided, wire cages shall be installed to prevent accidental operation. If a wet pipe system is present, drainage troughs under the piping shall be installed.
- 4.6 Ceiling
The minimum ceiling height shall be 8 ft. 6 in. False ceilings shall not be provided.
- 4.7 Walls
A minimum of two telecommunications room walls shall be covered with Trade Size 3/4 in. AC-grade plywood installed 8-ft high. The plywood shall be securely fastened to the supporting wall.
- 4.8 Doorways
The telecommunications room shall have fully opening; lockable doors which are at least 36-in. wide and 80-in. tall. The door hardware shall be keyed to the Telecommunications Master and a passkey provided for the client's network manager.
- 4.9 Conduit, raceway and duct penetrations
Sleeves or slots through the telecommunications room floor shall be located adjacent to or behind the door. Conduits, raceways and ducts shall penetrate the telecommunication room wall at a minimum of 8 ft. above finished floor.

**Editors Note: The following needs to be inserted but I am not certain where.
Engineer shall contact The University Assignment Office at 471-7800 for numbering
scheme for voice and data in each telecommunications room.**

Cabling terminations for voice shall be to be separated from cabling terminations for data in each telecommunications room.

Testing deliverables shall include:

Source---building and room number

Outlet Number

Destination---building and room number

Length of the cable

Type of cable---category

Outlet Types Used

Indication if cable is terminated on voice or data field in the telecommunications room

Date of test

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Link to the preinstallation section-send to David Rea