

Appendix B

Telecommunication Systems Guidelines

Table of Contents

- 1. Guidelines For Voice and Data Communications Systems**
 - 1.1. General
 - 1.2. Standards And References
 - 1.3. Procedures

- 2. Guidelines For Cabling, Blocks, Patch Panels and Jack Types**
 - 2.1. County Standard Systems
 - 2.2. Standard Numbering Plan for Cabling Systems – EIA/TIA 606

- 3. Guidelines For Telecommunications Equipment Rooms**
 - 3.1. Telecommunications Room Requirements
 - 3.2. Conduit and Jack Requirements
 - 3.3. Telecommunications Equipment layout
 - 3.4. Ground buss bar details

1. Guidelines for Communications Voice and Data Systems

1.1 General

- a. The following guidelines have been established for contractors to be able to cable Fairfax County Government buildings. The standardization of station cabling will enable the County to have a flexible voice and data cable plant and provide vendors the ability to wire both voice and data for the future. Voice and data backbone/feeder cabling will continue to be specified on a case-by-case basis.
- b. With the evolution of the EIA/TIA-568B Commercial Building Telecommunications Wiring Standard came changes in the way the industry refers to different elements of a cabling system. Fairfax County will follow these standards in all of our existing and future facilities.

1.2 Standards and References

All building wiring, pathways and space grounding and bonding shall meet or exceed the following codes, standards, and references current as of the time of the project design.

- TIA/EIA-568-B.1 Commercial Building Telecommunications Cabling Standard Part 1: General Requirements – (May 2001)
- TIA/EIA-568-B.1-1 Commercial Building Telecommunications Cabling Standard Part 1: General Requirements - Addendum 1 – Minimum 4-Pair UTP and ScTP Patch Cable Bend Radius - (May 2001)
- TIA/EIA-568-B.1-2 Commercial Building Telecommunications Cabling Standard Part 1: General Requirements Addendum 2 – Grounding and Bonding Requirements for Screened Balanced Twisted-Pair Horizontal Cabling - (February 2003)
- TIA/EIA-568-B.1-3 Commercial Building Telecommunications Cabling Standard Part 1: General Requirements Addendum 3 – Supportable Distances and Channel Attenuation for Optical Fiber Applications by Fiber Type - (February 2003)
- TIA/EIA-568-B.1-4 Commercial Building Telecommunications Cabling Standard Part 1: General Requirements > Addendum 4 – Recognition of Category 6 and 850 nm Laser Optimized 50/125 μm Multimode Optical Fiber Cabling - (February 2003)
- TIA/EIA-568-B.1-5 Commercial Building Telecommunications Cabling Standard Part 1: General Requirements Addendum 5 – Telecommunications Cabling for Telecommunications Enclosures – (March 2004)
- TIA/EIA-568-B.1-7 Commercial Building Telecommunications Cabling Standard Part 1: General Requirements Addendum 7 - Guidelines for Maintaining Polarity Using Array Connectors – (January 2006)

- TIA/EIA-568-B.2 Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted-Pair Cabling Components - (December 2003)
- TIA/EIA-568-B.2-1 Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted-Pair Cabling Components – Addendum 1 – Transmission Performance Specifications for 4-Pair 100 ohm Category 6 Cabling - (June 2002)
- TIA/EIA-568-B.2-2 Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted-Pair Cabling Components – Addendum 2 – Revision of Sub-clauses - (December 2001)
- TIA/EIA-568-B.2-3 Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted-Pair Cabling Components – Addendum 3 – Additional Considerations for Insertion Loss & Return Loss Pass/Fail Determination - (March 2002)
- TIA/EIA-568-B.2-4 Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted-Pair Cabling Components – Addendum 4 – Solderless Connection Reliability Requirements for Copper Connecting Hardware - (June 2002)
- TIA/EIA-568-B.2-5 Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted-Pair Cabling Components – Addendum 5 – Corrections to TIA/EIA-568-B.2 – (January 2003)
- TIA/EIA-568-B.2-6 Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted-Pair Cabling Components – Addendum 6 – Category 6 Related Component Test Procedures – (December 2003)
- TIA/EIA-568-B.2-11 Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted-Pair Cabling Components – Addendum 11 - Specification of 4-Pair UTP and SFTP Cabling – (December 2005)
- TIA/EIA-568-3 Optical Fiber Cabling Components Standard - (April 2002)
- TIA/EIA-568-3.1 Optical Fiber Cabling Components Standard – Addendum 1 – Additional Transmission Performance Specifications for 50/125 μm Optical Fiber Cables – (April 2002)
- TIA-569-B Commercial Building Standard for Telecommunications Pathways and Spaces - (October 2004)
- TIA-570-B Residential Telecommunications Infrastructure Standard - (April 2004)
- TIA-598-C Optical Fiber Cable Color Coding - (January 2005)
- TIA/EIA-606-A Administration Standard for Commercial Telecommunications Infrastructure - (May 2002)

- J-STD-607-A Commercial Building Grounding (Earthling) and Bonding Requirements for Telecommunications - (October 2002)
- TIA-758-A Customer-owned Outside Plant Telecommunications Infrastructure Standard – August 2004
- TIA-526-7 Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant – OFSTP-7 - (February 2002)
- TIA-526-14-A Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant – OFSTP-14 - (August 1998)
- ANSI/EIA/TIA Telecommunications Infrastructure Standards is available from:
 - Electronic Industries Association Engineering Department 2000 Pennsylvania Avenue, N.W. Washington, DC 20006 (202) 457-4966

1.3 Procedures

1. In most new County buildings, CAT-6 or better UTP cabling system is required, as specified in the attached guidelines. Where there are minimal or no potential future data requirements (e.g., courtesy/emergency phones, recreation centers, etc.), all Category 3 or a combination of Category 3 and 5E or better cabling will be used. The Voice Communications Services Branch will specifically identify those situations when a vendor order is placed. Existing County facilities shall be cabled per the attached guidelines, unless there is a specific, pre-approved reason for deviation from guidelines.
2. The Infrastructure Project Manager will send notification to County cabling vendors, specifying that they must adhere to the attached guidelines, unless given specific instructions otherwise.
3. The assigned Infrastructure Project Manager is responsible for ensuring vendor compliance with these guidelines.

2. Guidelines for Cabling, Blocks, Patch Panels and Jack Types

2.1 County Standard Systems

1. Station Jacks Standard
 - a. CAT 6 Siemon 1-CT-6-A4-A4-02 Dual Jacks with a white icon for voice and a red icon for data, 568B 8-pin, RJ45's.
 - b. CAT 6 Siemon 1-CT-6-A4-A4-02 Dual Jacks with white icon for voice and a red icon for data, 568B 8-pin, RJ45's to be used upon request only.
2. Station Cabling Standard
 - a. Data – Mohawk MegaLAN 400 CAT 6 24 AWG 4PR (blue in color). All cables should be plenum rated.
 - b. Voice – Mohawk CAT 6, 24 AWG 4PR, Yellow in color and plenum rated.
3. Connecting Blocks Standard
 - a. 110 Type CAT 6 Siemon # 100PR Voice Termination 110 Type CAT 6 Siemon # 300PR
 - b. 110 Type CAT 6 Siemon # 100PR Data Termination
 - c. 110 Type CAT 6 Siemon # 300PR
 - d. 66 Type CAT 6 Siemon # S66M1-50 Data Termination
 - e. 66 Type CAT 6 Siemon # S66M1-50 Voice Termination
4. Patch Panels Standard
 - a. Siemon CAT 6 24-port-Blank #CT-PNL-24 48-port-Blank #CT-PNL-48 Inserts – Dual RJ45 #CTS-A4-A4-02 (red icons for data).
5. Patch Cords Standard
 - a. RJ45 to RJ45 8-pin-to-8-pin 568B CAT 6 (voice patch cables to be yellow in color)
 - b. RJ45 to RJ45 8-pin to 8-pin 568B CAT 6 (data patch cables to be grey in color).
6. Racks Standard
 - a. All new/future facilities
 - b. Cable Talk rack 84” by 19” rack with minimum 5” cable management on both sides, electrical power strip and top panels
7. Under Floor Duct Systems
 - a. Under Floor Duct Systems BICSI Telecommunications Distribution Methods Manual Volume I.
8. Raised Floors
 - a. Twenty four inch raised floor BICSI Telecommunications Distribution Methods Manual Volume I

2.2 Standard Numbering Plan For Cabling Systems – EIA/TIA 606

1. All vendors working on County IT projects shall maintain Fairfax County's Numbering Plan for wiring. Station cables shall be labeled by the communications room that they pull to, then by sequential numbering. For example, TC01-001 is station cable 001 connected to telephone room 01. The station end shall terminate in a dual jack with a white icon insert for voice and a red icon insert for data. The telephone room end shall terminate in wall-mounted blocks (AT&T 110 or Siemon 66 type) for voice cable, and directly to the CAT 6 patch panel for data cable.
2. Workstation cable runs cannot exceed 290 feet from the Telecommunications Equipment room. County buildings that exceed 290 feet from station set to the Telecommunications Room will require more than one Telecommunications Equipment Room.
3. All cables, circuits and facilities shall be clearly identified and labeled at all County sites. Cable shall be labeled at terminating points by use of durable self-laminating wire and cable markers. Patch panels, station jacks, terminal plates, etc., shall have typed labels. The AT&T 110/66 Siemon blocks shall be equipped with designation strips, which will be used to mark county cable and identify use. At the station jack, a label shall be placed at each cable, inside the outlet box, and on the jack faceplate.

3. Guidelines for Telecommunications Equipment Rooms

3.1. Telecommunications Room Requirements

1. Telecommunications Equipment rooms for telephone, data, video (CATV), etc., must be separate from electrical rooms.
2. No transformers or electrical distribution panels are permitted in Telecommunications Equipment rooms.
3. All Telecommunications Equipment rooms shall be provided with HVAC systems capable of maintaining the temperature of the room between 64 and 75 degrees F with the humidity being kept between 35 and 55 percent non-condensing. Separate split system units are acceptable.
4. Design door to open out of Telecommunications Equipment room.
5. Provide anti-static VCT flooring in the room.
6. A 12-inch buss bar with a number 6-ground wire to run from the buss bar to the main building ground in accordance with the NEC. See attachment for buss bar detail.
7. A minimum of one Telecommunications Equipment room must be provided at each floor of a facility with additional rooms as required to accommodate the communications equipment and wiring requirements. Workstation cable runs cannot exceed 290 feet from the patch panel to the jack.
8. All Telecommunications Equipment rooms, switch rooms, equipment, materials, wiring and ancillary provisions shall be designed and constructed in accordance with all requirements and recommendations of the Electronic Industries Association/ Telecommunications Industries Association (EIA/TIA) Standards. Requirement for compliance with this document must be reflected on project plans and specifications.
9. Telecommunications Equipment rooms must be of adequate size to accommodate requirements for County telephone, data and CATV, but in no instance shall they be smaller than 10' X 12'.
10. All four walls shall be covered with 4'x 8'x 3/4" fire retardant plywood for County telephone, data and cable television equipment. Plywood have two coats of white paint and installed from floor to ceiling. (8ft x 4ft.). Additional backboards may be required for VERIZON or CATV equipment.
 - a. A minimum of four (4) separately fused, 3-wire, 110 volt, dedicated quad electrical outlets one on each wall twelve inches above finished floor as shown on the typical floor plan. Four dedicated quad outlets mounted at 90 inches above finish floor. The DIT project manager must be consulted for the exact location of these outlets. The four outlets at 90 inches must be connected to generator power.

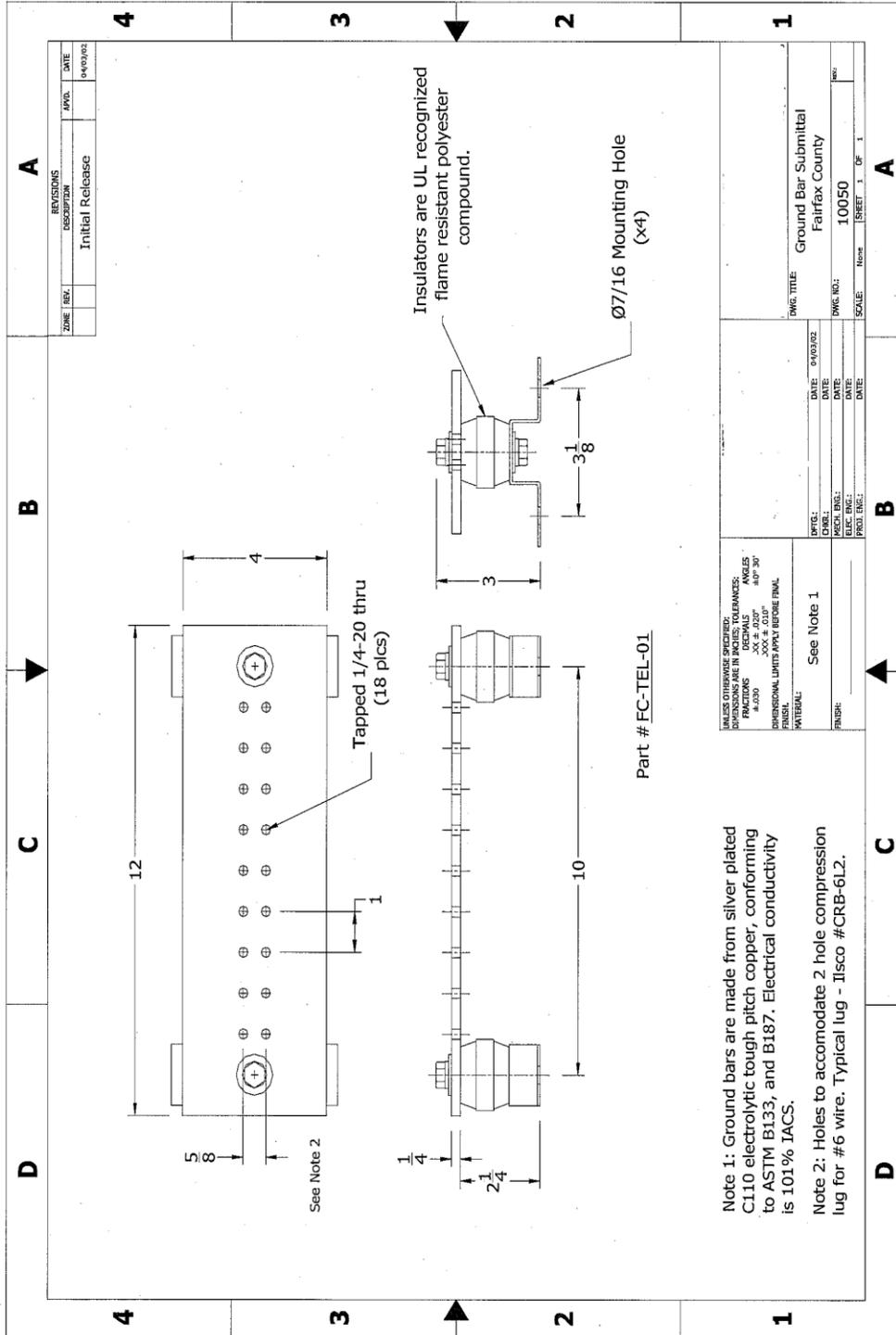
- b. Two ceiling mounted, tube fluorescent light fixtures with cover guard and a separate wall mounted switch to provide a minimum of 50 foot candles at 3' above finish floor and connected to emergency power.
- c. Adequate floor space for two (3) 30" wide by 26" deep by 84" high Cable Talk racks. (NFPA states 3 feet of clearance around active equipment).
- d. A minimum of three feet clear space on all sides of electrical/communications equipment per National Electric Code (NEC).
- e. Additional provisions may be required for other communications systems. See the DIT project manager for details

3.2. Conduit and Jack Requirements

1. A one inch conduit with drawstring must be provided to each communication device location and stubbed towards the Telecommunications Room. The 1" conduit must be stubbed to the nearest drop ceiling area. Cable trays may be required based on the overall density of the voice and data cabling. Only metallic conduit or PVC (schedule 40) smooth conduit are allowed. Systems Furniture cable trays, J-Hooks, etc.
2. Co-located voice and data communications cables may utilize the same 1" conduit into a single gang box.
3. Inaccessible or secure areas must have an entire conduit system from communication jack to the Telecommunications Equipment room.
4. Empty conduits and boxes in concrete slabs or an under slab duct /conduit distribution system, are required for systems furniture and/or freestanding furniture requiring communications outlets, as determined by the project scope.
5. A minimum of two four-inch empty conduits with mule tape (with footages) must be provided vertically and horizontally between all communications rooms that are wired in a series. The number, location and routing of these conduits are to be approved by the DIT Project Manager prior to construction.
6. A minimum of two four-inch conduits must be provided from the main Telecommunications Equipment room to the Quazite pull boxes located near the property line where the telephone service is located. Each conduit must have mule tape with footage markings. See typical floor plan for location of these conduits.
7. A minimum two, four-inch o must be provided from main Telecommunications Equipment room to extend to the pull boxes (see appendix for type and size) located near the property line where the source for CATV service is located. See typical floor plan for location of these conduits.

8. Provide sleeves through floors and ceilings as required for cable path ways.
9. Turn up U.F.D. (under floor duct) three inches from the wall and at least three inches above the finished floor.
10. Accessible pull boxes which can be used as a junction point for several one inch conduit runs and which provide an empty three inch conduit with mule tape having footage markings home run to the nearest Telecommunications Equipment room must be identified and detailed.
11. Provisions for dedicated voice and data jacks at mechanical EMCS stations and the direct dialer in the Telecommunications Equipment room for remote emergency monitoring must be made.
12. All voice and data jacks, wiring and cover plates will be furnished and installed by Fairfax County or its authorized vendors and contractors. Empty conduits with pull strings, pull boxes, junction boxes and fit-up of Telecommunications Equipment room with plywood, ground wire and buss bar, and electrical outlets as described in these guidelines, shall be included in the design and provided to the contractor.
13. All building wiring, pathways and spaces, grounding and bonding shall meet or exceed the ANSI/EIA/TIA Telecommunications Infrastructure Standards as well as the NEC Electrical code (NFPA 70) as referenced in Section 1- Standards and References of these guidelines.

3.4 Ground Buss Bar Details



Note 1: Ground bars are made from silver plated C110 electrolytic tough pitch copper, conforming to ASTM B133, and B187. Electrical conductivity is 101% IACS.

Note 2: Holes to accommodate 2 hole compression lug for #6 wire. Typical lug - Jisco #CRB-6L2.