

Part 1: General

1.01 Section Includes

- A. Outside Plant Telephone Cable
- B. Horizontal Telephone Cable
- C. Fiber Optic Distribution Cabinets
- D. Telephone Service Equipment
- E. Telephone Modular Jacks

1.02 Publications and Standards

- A. Electronics Industry Associations/Telecommunications Industry Association (EIA/TIA) publications:
 - 1. EIA/TIA 568B: Commercial Building Telecommunications Wiring Standards
 - 2. EIA/TIA 569: Commercial Building Standard for Telecommunications Pathways and Spaces
 - 3. EIA/TIA TSB 72: Centralized Optical Fiber Cabling Guidelines
 - 4. EIA/TIA 606: Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
 - 5. EIA/TIA 607: Commercial Building Grounding and Bonding Requirements for Telecommunications
 - 6. EIA 310-D: Cabinets, Racks, Panels, and Associated Equipment
 - 7. EIA/TIA 455-57A: Optical Fiber End Preparation and Examination
 - 8. EIA/TIA 455-59: Measurement of Fiber Point Defects Using an OTDR
 - 9. EIA/TIA 455-60: Measurement of Fiber Cable Length Using an OTDR
 - 10. EIA/TIA 455-61: Measurement of Fiber Cable Attenuation Using an OTDR
 - 11. EIA/TIA 455-95: Absolute Optical Power Test for Optical Fibers and Cables
 - 12. EIA/TIA 526-14: Optical Power Loss Measurements of Installed Multimode Fiber Cable
- B. ANSI/ICEA S-83-596-1994: Fiber Optic Premise Distribution Cable Technical Requirements.

- C. Installation shall be performed in accordance with the following applicable standards:
1. Applicable codes and regulations of the Government of the State of California and of the City of San Jose.
 2. Building Officials and Code Administration National Code (BOCA)
 3. Electronic Industries Association (EIA)
 4. Institute of Electrical and Electronic Engineers (IEEE)
 5. National Electrical Code (NEC)
 6. National Fire Protection Association (NFPA)
 7. National Electrical Manufacturers Associations (NEMA)
 8. Occupational Safety and Health Administration (OSHA)
 9. Telecommunications Industries Association (TIA)
 10. Underwriters Laboratories (UL)
 11. Building Industry Construction Standards Institute (BICSI)
 12. SJSU ITS Guidelines and Specifications
- D. No work shall be concealed until after inspection and approval by proper authorities. If work is concealed without inspection and approval, the party that concealed said work shall be responsible for all work required for opening and restoring the concealed areas, in addition to all required modifications.

1.03 Submittals

- A. Installer Certification: San José State University is an Avaya Systimax Structured Cabling Systems site. Provide proof of satisfactory completion of Avaya installation training for the staff approved to undertake the following tasks:
1. Fiber optic installation and test procedures
 2. UTP copper cable installation and test procedures
- B. Within thirty (30) days following the date of issuance of the Notice to Proceed, the Contractor shall provide the following to the ITS Project Manager for review:
1. Manufacturer's cutsheets for all of the itemized products in Part 2: Products of this Specification. Samples of each product may be requested at the discretion of the P.M. at any time.
 2. Mounting and attachment details illustrating the connection of equipment racks to the structure, and the connection of the specified equipment to the equipment racks.
 3. Equipment rack elevations illustrating the vertical locations of the terminal equipment (i.e. fiber boxes, patch panels, etc.).
 4. Wall elevations illustrating the vertical routing of all cabling into the destination terminal points and the manner in which the cabling shall be dressed and terminated.
 5. No work will begin until all submittals accepted.

1.04 Quality Assurance

- A. Installer Qualifications: Company specializing in installing telephone premises wiring with minimum three years documented experience. Provide written proof of Avaya training.
- B. The Contractor shall ensure that all design, workmanship, materials employed, required equipment, and the manner and method of installation conforms to accepted practices. The Contractor shall also ensure that each piece of equipment is in satisfactory working condition.
- C. In completing the Work, the Contractor shall adhere to all applicable professional practices, including but not limited to the standards set forth herein, governing the installation of Fiber Optic Systems Network wiring and associated components.
- D. ITS has final acceptance of all work performed.

1.05 Clean Up and Repair

- A. Upon completion of an installation task, the relevant areas and equipment shall be left clean and in an operational state.
- B. The Contractor shall be responsible for debris removal and repairing any damage caused to the premises by the Contractor's installation activities, at no cost to the Owner or any other contractor working on the project.

Part 2: Products

2.01 Outside Plant Cable

- A. Outside plant cable shall be run to the appropriate Equipment Room as shown on the Drawings.
 - 1. For Voice and Data connections:
 - a. Outside plant fiber cabling for both voice and data use shall be composite design fiber optic cabling with 48 multimode and 24 single mode strands. Use exact number of fibers as defined in the Contract Drawings.
 - b. OSP fiber optic cable shall conform to the following characteristics:
 - 1) Loose buffer tube construction with gel injected in the tubes.
 - 2) Dry pack water absorption media around the buffer tubes.
 - 3) Dielectric strength member.
 - 4) Polyolefin or flame retardant PVC sheath, black in color.
 - 5) UL rating of OFNR (riser-rated), for indoor extension, zero halogen, low smoke.
 - c. Shall be Avaya Technologies/Fitel, Option 1.
 - 2. For Voice Service:
 - a. EIA/TIA Category 3, 24 AWG solid copper conductor with number of pairs as noted in the Contract Drawings. ASP-Filled, ANMW.
 - b. EIA/TIA Category 3, 24 AWG solid copper conductors with number of pairs as noted in the Contract Drawings. Aircore, ARMM.

2.02 Horizontal Telephone Cable

- A. Horizontal voice cabling shall be plenum rated, white jacket. Cat 3 cable as specified in Section 16740: Data and Broadband Systems.

2.03 Fiber Optic Distribution Cabinets

- A. LST distribution shelf shall be used for terminating and/or splicing fiber optic cables for fiber interconnects up to 144 ports. The shelf shall be rack mountable (on standard 19" rack frames), for acceptance of fiber LC connections.
- B. Distribution shelf shall be Systimax, G2 4U Fiber Optic Modular Cassette Shelf, Sliding, Product 1000G2-4U-MOD-SD
- C. IDC closets (risers) shall use Systimax 600 shelves.

2.04 Telephone Service Equipment

A. Splice Closures:

1. Bolted stainless steel splice case, air tight and liquid tight. Building splice closures shall be fire retardant. Closures shall allow re-entry for modifications without cutting or otherwise damaging the closure.
2. Shall be Preformed, or approved equal.

B. Protection Panels:

1. Unit shall consist of a metal housing containing mountings for Avaya 4C protector units. Unit shall include 25 foot, 26 AWG stub cable to serve as a fusible link, a 24 AWG terminating cable, and two connectors for external ground connections. Provide protector units to fill 100% capacity. Panels shall be 50 or 100 pair as required for service.
2. Shall be Systimax, 190-type.

C. Protector Units:

1. Solid state, plug-in module, compatible with 190 type protection panel. Units shall provide overvoltage protection and shall include heat coils to provide sneak current protection.
2. Shall be Systimax, 4C-S.

D. Cross Connection Blocks:

1. 100 or 300 pair units as required for service. Provide Avaya C-4, 4-pair punch down clips for inside wiring and Avaya C-5, 5-pair punch down clips for outside plant wiring.
2. Shall be Systimax, 110A wiring blocks with standoff legs.

E. Cross Connection Back Plane:

1. Provide BCT channel backboards with all applicable attachments (i.e. distribution rings) and mounting brackets for a complete job.

F. Hook Up Wire:

1. Wire shall be 24 AWG, copper, PVC insulation, for use in cross connecting all 110 termination blocks. Avaya Technologies CCW-F.

2.05 Telephone Modular Jacks

- A. Voice, RJ-45 type, Category 3 compliant and Ivory color, unless specified white. Shall be Systimax, Model #M1BH-246, cc# 107321721

Part 3: Execution

3.01 General

- A. Install wire and cable in accordance with manufacturer's instructions and in accordance with TIA/EIA-568-A.
- B. Support raceways, backboards, and cabinets. See Installation Specifications.
- C. Install termination backboards plumb, and attach securely to building wall at each corner.
- D. Only industry approved pulling compounds are to be used in accordance with accepted industry standards.
- E. All cables and conduits in buildings, manholes and pullboxes shall be securely supported with the appropriate cable racking or Unistrut to meet NEC 1996 codes and all applicable regulations and standards. All conduit shall be equipped with bushings to protect the cable from abrasion at all end locations.
- F. A usable, new poly pull rope, without splices, shall be installed in all riser and entrance conduits AFTER cable placement.
- G. All equipment shall be mounted level and true. Information outlets shall be mounted in vertical position only. No equipment is to be held in place with double backed tape as the only fastener.
- H. All building entrance conduits, sleeves and penetrations of all walls shall be sealed with an industry approved fire stop compound.
- I. Any spare conduit placed shall be cleaned of debris, swabbed dry, have a spare usable poly one-piece pull rope installed and be capped for future use.

3.02 Labeling

- A. All information outlet faceplates containing voice cable shall be identified as indicated (Run number and Equipment Room designation) with 1/2" black on translucent labels made by an electric printer specifically designed for the purpose of making labels.
 - 1. Example: R#106 (upper left) 2.2 (upper right)
- B. All equipment room termination blocks shall be labeled using typed or printed color-coded designation strips made for Avaya 110 hardware.
- C. All cables shall be identified on both ends, at splice and manhole areas, in pullboxes and in all visible locations with an industry approved cable tag. Information shall include cable size, cable count, date installed, installing company name and cable address (to and from information).
- D. Provide labeling for voice outlets as per SJSU Campus Standards. Obtain approval of labeling scheme prior to installation from ITS P.M.

3.03 Splicing

- A. Filled cable shall be transitioned to Avaya Cat 3 white sheathed 24 AWG unfilled cable, using Avaya filled 710 connectors, before termination on 110 hardware.
- B. All copper pairs installed and/or joined shall be 100% correct and usable.
- C. All cable at splice openings shall be bonded with an approved braid or bonding bar.
- D. Install wire and cable in accordance with manufacturer's instructions and in accordance with TIA/EIA-568-B.

3.04 Terminations

- A. All UTP shall terminate on Avaya 110 blocks. Color-coding for designation strips are as follows:
 - 1. Green: All switched cable pairs
 - 2. Red: All unswitched cable pairs
 - 3. Yellow: All house cable.
 - 4. Blue: All station runs
 - 5. White: All tie cables
- B. All backbone, service entry, riser and workstation cable shall be 100% terminated, spliced, or labeled as theoretical, as appropriate.

3.05 Testing

- A. After final installation, and in the presence of the designated ITS Project Manager, every copper cable pair shall be tested from end to end through all connectors for opens, shorts, reversals, continuity, pin configuration, and correct location. Anomalies are to be located, reported to the Project Manager and repaired where defective, and pairs retested until accepted.
- B. After final installation, and in the presence of the designated ITS Project Manager, cable and connectors shall be tested at the highest applicable level and original printed results (showing all tests pass) from an approved testing device shall be provided.
- C. Refer to Specification Section 16740: Data and Broadband Distribution Systems, for testing requirements of fiber optic cable.

3.06 Installation

- A. Install in accordance with manufacturer's instructions.
- B. Wiring shall conform to EIA/TIA-568B wiring standards.
- C. Maintain Category 5E and fiber optic bend radius, pulling tension, and cable support requirements in the cabling runs. The cable manufacturer's specifications for each particular cable type shall be following exactly. All cable shall be installed in continuous runs, end to end, between patch bays. No splices or taps will be permitted.
- D. All cable shall be visually inspected for insufficient bend radius during and after pulling. Appropriate forms shall be used to maintain proper radii at cable entrances and exits. All cable shall be pulled using an appropriate measuring device to ensure that the specified maximum pulling force is not exceeded. Install bending forms in all junction boxes to ensure minimum bend radius.

- E. Maximum data cable length from the telecommunications closet to the workstation area is to be 290 feet, excluding patch cords and equipment cords.
- F. Provide and install cable supports for any horizontal spans greater than three (3) feet. Provide and install cable supports for any vertical spans, between the cable trays and poke throughs/sleeves greater than three (3) feet. Plenum Tie wraps shall be used for spans of less than six (6) feet.
- G. Provide a minimum of 20 feet of coiled cable near the rack location at each location to facilitate final termination and proper cable dress.
- H. All deviations from straight runs shall be made at right angles, wherever possible. Cables shall be mounted as high as practicable, and kept clear of line voltage electrical conduits.
- I. All cables shall be protected from sharp metal edges.
- J. Framework and racking must be free from burrs and sharp edges or points. The protuberance of bolts and/or threaded rods shall not exceed a length equal to 1/4 of the bolt or rod diameter. Frame end sections must be closed with rubber caps, as appropriate.
- K. Empty or future conduits shall be correctly plugged with plastic caps or inserts with a 3/8" polyethylene pull rope. Plugging conduits with plastic tape or "duct" tape is not acceptable.
- L. Innerduct shall be used whenever fiber optic cabling is routed without metallic conduit. (i.e. around beams, existing ductwork, piping, etc.)
- M. All patch panels, 110 patch blocks and adjoining cables are to be properly labeled. There shall be no unlabeled cables.
- N. Cable trays shall be level to within 1/8" per every eight (8) feet of horizontal run.
- O. Ensure that all connectors, for fiber optics and copper cables, are properly attached as per manufacturer's specifications.
- P. Terminate all unused outputs.
- Q. All labels, boxes, racks, equipment, etc. shall be secured plumb and square.

3.07 Grounding

- A. The Contractor shall provide ground bus bars within each equipment cabinet and equipment rack. Said bus bar shall be bonded to the frame of the cabinet or rack.
- B. The Contractor shall provide an individual ground wire from each distribution closet equipment rack ground bar to a building master ground bar. Verify location of master ground bar in field.
- C. All telecommunications grounding shall comply with EIA/TIA 607.