

DIVISION 27 – COMMUNICATIONS

27 00 00 Communications

27 01 00 Operation and Maintenance of Communications Systems

27 01 10 Operation and Maintenance of Structured Cabling and Enclosures

27 01 20 Operation and Maintenance of Data Communications

27 01 30 Operation and Maintenance of Voice Communications

27 01 40 Operation and Maintenance of Audio-Video Communications

27 01 50 Operation and Maintenance of Distributed Communications and Monitoring

27 05 00 Common Work Results for Communications

27 05 13 Communications Services

27 05 13.13 Dial tone Services

27 05 13.23 T1 Services

27 05 13.33 DSL Services

27 05 13.43 Cable Services

27 05 13.53 Satellite Services

27 05 26 Grounding and Bonding for Communications Systems

27 05 28 Pathways for Communications Systems

27 05 28.29 Hangers and Supports for Communications Systems

27 05 28.33 Conduits and Back boxes for Communications Systems

27 05 28.36 Cable Trays for Communications Systems

27 05 28.39 Surface Raceways for Communications Systems

27 05 43 Underground Ducts and Raceways for Communications Systems

27 05 46 Utility Poles for Communications Systems

27 05 48 Vibration and Seismic Controls for Communications Systems

Seismic Restraint

1.01 General: Mechanical systems including ductwork, piping, and equipment shall be equipped with seismic restraints in accordance with the Arkansas Fire Prevention Code and the Arkansas Mechanical Code.

1.02 Calculations: All design calculations shall be prepared by a registered professional engineer experienced in seismic design.

1.03 Materials

1.03.01 Duct Construction: Duct construction shall conform to SMACNA publications.

1.03.02 Piping Fabrication: Piping shall conform to ANSI / ASME B31.9 Building Services Piping Code.

1.03.03 Angles: Cold-formed angles shall conform to the material and identification requirements of the latest "Specifications for the Design of

Cod-Formed Steel Structural Members” of the American Iron and Steel Institute with a minimum $F_y = 33$ ksi and a minimum F_u of 38 ksi.

- 1.03.04 Shapes and Plates: Hot-rolled shapes and plates shall conform to ASTM A36. Pipes used as braces shall be standard steel pipes ASTM A120 or A53.
- 1.03.05 Cables: Cables shall be wire-core with minimum breaking strength of 4,940 lbs for ¼” cable, 10,980 lbs for 3/8” cable, and 19,280 lbs for ½” cable.
- 1.03.06 Bolts: Bolts shall conform to ASTM A307. Bolt holes shall be 1/16” larger than the bolt diameter.
- 1.03.07 Expansion Anchors: Expansion anchors and cast-in place concrete inserts shall have sufficient shear and tension capacities for the application.
- 1.04 Duct Supports: Brace ducts with cross sectional areas of 6 SF and larger. Bracing shall occur at the intervals specified in the SMACNA tables. All runs (any length of ductwork without a change in direction) shall have a minimum of 2 transverse braces and 1 longitudinal brace. Bracing is not required if the duct is suspended by hangers 12” or less in length as measured from the top of the duct to the bottom of the support where the hanger is attached.
- 1.05 Pipe Supports: Brace all fuel oil and natural gas piping, 1” diameter and larger. : Brace all piping in mechanical rooms that is 1-1/4” diameter and larger. Brace all piping 2-1/2” diameter and larger. Bracing shall occur at the intervals specified in SMACNA tables. Bracing is not required if piping is suspended by hangers 12” or less in length as measured from the top of the pipe to the bottom of the support.
- 1.06 Equipment Supports: Bracing shall be provided for pumps, heating water converters, control panels, variable frequency drives, water heaters, and expansion tanks. Equipment shall be braced independently of the attached piping and ductwork.
- 1.07 Sample Seismic Support Specifications: Refer to Appendix J for sample seismic restraint specifications.
- 1.08 Sample Seismic Support Details: Refer to Appendix I for sample seismic support details including pipe supports, duct supports, and equipment supports.

INCLUDE IN CONSTRUCTION DOCUMENTS

Please check with Facilities Management for the most current color convention for cabling.

Data Cables shall be blue in color

Data jacks shall be lime green in color

Phone cables shall be white in color

Phone jacks shall be ivory in color

27 06 00 Schedules for Communications

27 06 10 Schedules for Structured Cabling and Enclosures

27 06 20 Schedules for Data Communications

27 06 30 Schedules for Voice Communications

27 06 40 Schedules for Audio-Video Communications

27 06 50 Schedules for Distributed Communications and Monitoring

27 08 00 Commissioning of Communications

27 10 00 Structured Cabling

PART 1 GENERAL

INCLUDE IN CONSTRUCTION DOCUMENTS

1.1 SUMMARY

- A. This Section includes general requirements specifically applicable to Division 27.
- B. The Contractor shall be responsible for:
 - 1. Providing all additional materials, and the necessary labor and services required to ensure all components of the system are completely installed in accordance with the intent of the Contract Documents.
 - 2. Furnishing and installing all incidental items not actually shown or specified, but which are required by good practice to provide complete functional systems.
 - 3. Coordinating the details of facility equipment and construction for all specification divisions that affect the work covered under this Division.
 - 4. Coordinating all activities with the overall construction schedule.

5. Developing bill of materials, perform material management and efficient use of the materials whether they are issued by the Contractor, the owner or purchased by the Contractor.
6. Ensure materials in excess of those required to complete the project are kept in their original condition and packaging for restocking.
7. Ensure project is properly registered for a warranty.

1.2 WARRANTY

- A. The contractor shall provide a manufacturer's warranty on the horizontal and backbone systems as specified in Section 271300 and 271500.
- B. In addition to the standard warranty requirements, the Certified Contractor shall provide the following during the warranty period:
 1. Within 24 hours after notification of a defect, the Certified Contractor shall start to make the necessary corrections and inform the appropriate Project Manager of the planned corrective actions. The Certified Contractor shall follow this initial contact with continuous effort and complete any required corrective work within 15 days after notification.

END OF SECTION

27 11 00 Communications Equipment Room Fittings

PART 2 GENERAL

2.1 SUMMARY

- A. The communications equipment room will be referred as Telecommunications Room (TR) in this document is intended to house racks, cabinets and equipment necessary for the support of the communications cabling infrastructure.

2.2 REFERENCES

1. All work shall be performed in accordance with the following codes and industry standards, unless noted otherwise:
2. NFPA 70 – National Electrical Code, current version adopted by local or State AHJ.
3. TIA/EIA-568-B – Commercial Building Telecommunications Cabling Standard, current version.
4. TIA/EIA-569-B – Commercial Building Standard for Telecommunications Pathways and Spaces, current version.
5. TIA/EIA-606-A – Administration Standard for Commercial Telecommunications Infrastructure, current version.

6. J-STD-607-A – Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications, current version.
7. TIA-310- D Cabinets, Rack, and Associated Equipment

2.3 IEEE 241 - IEEE Recommended Practice for Electric Power Systems in Commercial Buildings” pertaining to communication systems. (SYSTEM DESCRIPTION)

PART 3 PRODUCTS

3.1 APPROVALS AND SUBSTITUTIONS

- A. All products shall be provided as specified, without exception, unless approved in writing prior to the bid as per Section 012500 – Substitution Procedures. All products shall be “NEW”.
- B. Non-compliant products installed as a part of this Contract shall be removed and replaced and all costs for removal and replacement shall be borne solely by the Contractor.

3.2 TELECOMMUNICATIONS BACKBOARDS

- A. AC-rated plywood, fire-retardant treated, 3/4 inches by 48 inches by 96 inches (19 by 1220 by 2440 mm).

3.3 FREE STANDING EQUIPMENT RACKS

3.4 WALL MOUNTED EQUIPMENT RACKS

3.5 EQUIPMENT ENCLOSURES

CONSULTANT DESIGN GUIDELINE

Provide enough space for networking and networking related equipment. Telecommunication closet may house the main distribution frame, PBXs, secondary voltage protection, etc.

3.6 VERTICAL WIRE MANAGERS

3.7 HORIZONTAL WIRE MANAGERS

3.8 TELECOMMUNICATIONS GROUNDING BUSBAR

3.9 CABLE RUNWAY

3.10 WIRE CABLE TRAY

END OF SECTION

27 11 16 Communications Cabinets, Racks, Frames and Enclosures

27 11 19 Communications Termination Blocks and Patch Panels

27 11 23 Communications Cable Management and Ladder Rack

27 11 26 Communications Rack Mounted Power Protection and Power Strips

27 13 00 Communications Backbone Cabling

PART 4 GENERAL

4.1 REFERENCES

- A. All work shall be performed in accordance with the following Codes and industry Standards, unless noted otherwise:
 - 1. NFPA 70 – National Electrical Code, current version adopted by local or State AHJ.
 - 2. TIA/EIA-568-B – Commercial Building Telecommunications Cabling Standard, current version.
 - 3. TIA/EIA-569-B – Commercial Building Standard for Telecommunications Pathways and Spaces,
 - 4. TIA/EIA-606-A – Administration Standard for Commercial Telecommunications Infrastructure.
 - 5. J-STD-607-A – Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications, current version.
 - 6. IEEE 241 - IEEE Recommended Practice for Electric Power Systems in Commercial Buildings” pertaining to communication systems.

- B. This Section specifies the requirements necessary to furnish and install an inter-building and intra-building twisted-pair and fiber optic cable distribution subsystem including:
 - 1. Cabling, splice closures, and related components.
 - 2. Placement, splicing, termination, and other required services.

4.2 SYSTEM DESCRIPTION

- A. Interbuilding Backbone: The interbuilding subsystem refers to all twisted-pair and fiber optic backbone communications cabling connecting the Main Building Equipment Room (BER) to each building equipment room (BER) in all buildings on the campus.

- B. Intra-building Backbone: The intra-building subsystem refers to all twisted-pair and fiber optic backbone communications cabling connecting the Main Telecommunications Room (TR) to each Telecommunication Room (TR) in the building.

- C. Backbone cabling consists of copper and optical fiber cables and associated connecting hardware.

- D. Contractor shall furnish and install all materials necessary for a complete and working system.
- E. Field terminated optical fiber jumpers shall not be allowed.

4.3 WARRANTY

- A. Telecommunications contractor shall administer the warranty process with the responsible manufacturer's representative.
- B. All necessary documentation that must be provided to the manufacturer will be furnished by the Telecommunications contractor immediately following 100% testing of all cables.

PART 5 PRODUCTS

5.1 APPROVALS AND SUBSTITUTIONS

- A. All products shall be provided as specified, without exception, unless approved in writing prior to the bid. All products shall be "NEW".
- B. Non-compliant products installed as a part of this Contract shall be removed and replaced and all costs for removal and replacement shall be borne solely by the Contractor(s).

5.2 INTERBUILDING FIBER OPTIC CABLE

- A. Loose Tube dielectric multimode/single-mode Fiber optic cable
 - 1. All-Dry Flame Rated Optical Cable constructed of buffer tubes stranded around a dielectric strength member. Buffer tubes shall use a dry water blocking technology that does not rely upon yarns, binders, or tapes. Must be suitable for underground conduit, direct burial or Aerial applications. Optical fibers shall be laser optimized 50/125- μ m optical fiber having a minimum Effective Modal Bandwidth (EMB) of 2000 MHz•km at 850 nm (ANSI/EIA/TIA-492AAAC-A) or Low Water Peak Dispersion Unshifted Single-mode fiber (ANSI/EIA/TIA-492CAAB).
- B. Outside Plant Loose Tube dielectric multimode Fiber optic cable
 - 1. Outside plant Optical Cable constructed of gel filled buffer tubes stranded around a dielectric strength member. Must be suitable for underground conduit, direct burial or Aerial applications. Optical fibers shall be laser optimized 50/125- μ m optical fiber having a minimum Effective Modal Bandwidth (EMB) of 2000 MHz•km at 850 nm (ANSI/EIA/TIA-492AAAC-A) or Low Water Peak Dispersion Unshifted Single-mode fiber (ANSI/EIA/TIA-492CAAB).

5.3 INTRABUILDING MULTIPAIR UNSHEILDED TWISTED PAIR

- A. General purpose 4 pair category 3 unshielded twisted pair
 - 1. Twisted-pair cable with 24-AWG solid conductor, 4-pair, 100-ohm unshielded twisted-pair core covered by a PVC outer jacket. CMP Rated.
- B. General purpose 25 pair category 3 unshielded twisted pair
 - 1. Twisted-pair cable with 24-AWG solid conductor, 100-ohm unshielded twisted-pair core covered by a PVC outer jacket. CMP Rated.
- C. General purpose 50 pair category 3 unshielded twisted pair
 - 1. Twisted-pair cable with 24-AWG solid conductor, 100-ohm unshielded twisted-pair core covered by a PVC outer jacket. CMP Rated.
- D. General purpose 100 pair category 3 unshielded twisted pair
 - 1. Twisted-pair cable with 24-AWG solid conductor, 100-ohm unshielded twisted-pair core covered by a PVC outer jacket. CMP Rated.
- E. General purpose 200 pair category 3 unshielded twisted pair
 - 1. Twisted-pair cable with 24-AWG solid conductor, 100-ohm unshielded twisted-pair core covered by a PVC outer jacket. CMP Rated
- F. General purpose 300 pair category 3 unshielded twisted pair
 - 1. Twisted-pair cable with 24-AWG solid conductor, 100-ohm unshielded twisted-pair core covered by a PVC outer jacket. CMP Rated.
- G. General purpose 400 pair Type III unshielded twisted pair
 - 1. Twisted-pair cable with 24-AWG solid conductor, 100-ohm unshielded twisted-pair core covered by a PVC outer jacket. CMP Rated.
- H. Augmented category 6 unshielded twisted pair (NetClear GTX or Leviton)
 - 1. 100 ohm, Category 6a, 23 AWG, 4-pair unshielded twisted pair,
 - a. Maximum insertion loss of 2.0 dB/100M at 1 MHz, 19.0 dB/100M at 100 MHz, 31.0 dB/100M at 250 MHz and 45.3 dB/100m at 500 MHz
 - b. Minimum PSNEXT of 72.3 dB at 1 MHz, 42.3 dB at 100 MHz, 36.3 dB at 250 MHz and 31.2 dB at 500 MHz
 - c. Cable balance: LCL/TCL greater than 50 dB @ 100 m at 1 MHz, 30.0 dB @ 100m at 100 MHz and 26.0 dB @ 250 MHz. EL TCTL greater than 30 dB @ 100m at 1 MHz, and 5.5 dB @ 100m at 31.25 MHz
 - d. Minimum PS-ANEXT of 80.0 dB at 1 MHz, 60.0 dB at 100 MHz, 54.0 dB at 250 MHz and 49.5 dB at 500 MHz.
 - e. Minimum PS-AELFEXT of 77.0 dB at 1 MHz, 37.0 dB at 100 MHz, 29.0 dB at 250 MHz and 23.0 dB at 500 MHz.
 - f. Electrical characteristics must be characterized to 750 MHz.
 - g. Cable must be third party verified by ETL.
 - h. 0.300 inch max cable diameter
 - 2. 100 ohm, Category 6a, 23AWG, 4-pair unshielded twisted pair,

- a. Maximum insertion loss of 2.0 dB/100M at 1 MHz, 19.0 dB/100M at 100 MHz, 31.0 dB/100M at 250 MHz and 45.3 dB/100m at 500 MHz.
- b. Minimum PSNEXT of 72.3 dB at 1 MHz, 42.3 dB at 100 MHz, 36.3 dB at 250 MHz and 31.2 dB at 500 MHz.
- c. Cable balance: LCL/TCL greater than 50 dB @ 100 m at 1 MHz, 30.0 dB @ 100m at 100 MHz and 26.0 dB @ 250 MHz. EL TCTL greater than 30 dB @ 100m at 1 MHz, and 5.5 dB @ 100m at 31.25 MHz
- d. Minimum PS-ANEXT of 80.0 dB at 1 MHz, 60.0 dB at 100 MHz, 54.0 dB at 250 MHz and 49.5 dB at 500 MHz.
- e. Minimum PS-AELFEXT of 77.0 dB at 1 MHz, 37.0 dB at 100 MHz, 29.0 dB at 250 MHz and 23.0 dB at 500 MHz.
- f. Electrical characteristics must be characterized to 750 MHz.
- g. Cable must be third party verified by ETL.
- h. 0.310 inch cable diameter

5.4 INTRABUILDING AND INTERBUILDING FIBER OPTIC CABLE

- A. Loose Tube dielectric indoor/outdoor multimode/singlemode Fiber optic cable
 - 1. All-Dry Flame Rated Optical Cable constructed of buffer tubes stranded around a dielectric strength member. Buffer tubes shall use a dry water blocking technology that does not rely upon yarns, binders, or tapes. Must be suitable for underground conduit, direct burial or Aerial applications. Optical fibers shall be laser optimized 50/125- μ m optical fiber having a minimum Effective Modal Bandwidth (EMB) of 2000 MHz•km at 850 nm (ANSI/EIA/TIA-492AAAC-A) or Low Water Peak Dispersion Unshifted Single-mode fiber (ANSI/EIA/TIA-492CAAB).
- B. Tight Buffer indoor multimode/singlemode Fiber optic cable
 - 1. Tight Buffer Flame Rated Optical Cable. Optical fibers shall be laser optimized 50/125- μ m optical fiber having a minimum Effective Modal Bandwidth (EMB) of 2000 MHz•km at 850 nm (ANSI/EIA/TIA-492AAAC-A) or Low Water Peak Dispersion Unshifted Single-mode fiber (ANSI/EIA/TIA-492CAAB).
- C. Interconnect Tight Buffer dielectric indoor multimode/single-mode Fiber optic cable
 - 1. Flame Rated Optical Cable Optical fibers shall be laser optimized 50/125- μ m optical fiber having a minimum Effective Modal Bandwidth (EMB) of 2000 MHz•km at 850 nm (ANSI/EIA/TIA-492AAAC-A) or Low Water Peak Dispersion Unshifted Single-mode fiber (ANSI/EIA/TIA-492CAAB).

END OF SECTION

- 27 13 13.13 Communications Copper Cable Splicing and Terminations
- 27 13 23 Communications Optical Fiber Backbone Cabling
 - 27 13 23.13 Communications Optical Fiber Splicing and Terminations
- 27 13 33 Communications Coaxial Backbone Cabling
 - 27 13 33.13 Communications Coaxial Splicing and Terminations
- 27 13 43 Communications Servicing Cabling
 - 27 13 43.13 Dial-Tone Services Cabling
 - 27 13 43.23 T1 Services Cabling
 - 27 13 43.33 DSL Services Cabling
 - 27 13 43.43 Cable Services Cabling
 - 27 13 43.53 Satellite Services Cabling

27 15 00 Communications Horizontal Cabling

PART 6 GENERAL

6.1 SUMMARY

- A. Horizontal (distribution) communications wiring and connecting hardware from the Telecommunications Room (TR) to Telecommunication Outlets (TO) throughout the site.

6.2 SYSTEM DESCRIPTION

- A. The horizontal distribution subsystem refers to all intra-building twisted-pair and fiber optic communications cabling connecting Telecommunication Rooms (TR's) to telecommunication outlets (TO's) located at individual work areas.
- B. Horizontal cabling may consist of a combination of the following types of cable from the TR to the TO:
 - 1. Augmented Category 6, Enhanced Category 6, Category 6, Enhanced Category 5e, (100 Ohm, 4-pair, unshielded twisted pair) cables from the TR's to the TO's.) Port 1 or Port 2
 - 2. 62.5/125 μm , 50/125 μm , or 850 nm Laser Optimized 50/125 μm optical fiber cable. Port 2
- C. The Horizontal System includes cables, jacks, patch panels, connecting blocks, patch cords, fiber connectors and jumpers as well as the necessary support systems, such as cable managers and faceplates.
- D. Cables may be routed through conduit, cable trays, spaces below raised floors, open ceiling areas, non-ventilated spaces above ceiling tile, and through plenum air-handling spaces above ceiling tile. Coordinate with General Contractor (GC).

- E. Telecommunications contractor shall furnish and install all materials necessary for a complete and working system.

6.3 WARRANTY

- A. Telecommunications Contractor shall administer the warranty process with the responsible manufacturer's representative. The warranty shall be provided directly to the owner from the manufacturer. Telecommunications contractor shall insure that the manufacturer provides the Owner with the appropriate warranty certification within 30 calendar days of the final project completion.

PART 7 PRODUCTS

7.1 APPROVALS AND SUBSTITUTIONS

- A. All products shall be provided as specified, without exception, unless approved in writing prior to the bid.
- B. Non-compliant products installed as a part of this Contract shall be removed and replaced and all costs for removal and replacement shall be borne solely by the Contractor(s).
- C. All products shall be "NEW".

END OF SECTION

- 27 15 00.16 Voice Communications Horizontal Cabling
- 27 15 00.19 Data Communications Horizontal Cabling
- 27 15 00.23 Audio-Video Communications Horizontal Cabling
- 27 15 00.39 Patient Monitoring and Telemetry Communications Horizontal Cabling
- 27 15 00.43 Nurse Call and Intercom Communications Horizontal Cabling
- 27 15 00.46 Paging Communications Horizontal Cabling
- 27 15 00.49 Intermediate Frequency/Radio Frequency Communications Horizontal Cabling
- 27 15 00.53 Antennas Communications Horizontal Cabling
- 27 15 13 Communications Copper Horizontal Cabling
- 27 15 23 Communications Optical Fiber Horizontal Cabling
- 27 15 33 Communications Coaxial Horizontal Cabling
- 27 15 43 Communications Faceplates and Connections

27 16 00 Communications Connecting Cords, Devices and Adaptors

PART 8 GENERAL

8.1 SUMMARY

- A. This section applies to any device that is a portion of the cabling channel that is connected to a work area outlet/ telecommunication outlet (TO) and at the equipment racks/cabinets.

8.2 REFERENCES

- A. All work shall be performed in accordance with the following codes and industry standards, unless noted otherwise:
 1. NFPA 70 – National Electrical Code, current version adopted by local or State AHJ.
 2. TIA/EIA-568-B – Commercial Building Telecommunications Cabling Standard, current version.
 3. TIA/EIA-569-B – Commercial Building Standard for Telecommunications Pathways and Spaces, current version.
 4. TIA/EIA-606-A – Administration Standard for Commercial Telecommunications Infrastructure, current version.
 5. J-STD-607-A – Commercial Building Grounding (Earthing) and Bonding requirements for Telecommunications, current version.
 6. IEEE 241 - IEEE Recommended Practice for Electric Power Systems in Commercial Buildings” pertaining to communication systems.

8.3 WARRANTY

- A. Telecommunications contractor shall administer the warranty process with the responsible manufacturer’s representative. The warranty shall be provided directly to the owner from the manufacturer. Telecommunications contractor shall insure that the manufacturer provides the Owner with the appropriate warranty certification within 90 calendar days of the final project completion.

PART 9 PRODUCTS

9.1 APPROVALS AND SUBSTITUTIONS

- A. All products shall be provided as specified, without exception, unless approved in writing prior to the bid. All products shall be “NEW”.
- B. Non-compliant products installed as a part of this Contract shall be removed and replaced and all costs for removal and replacement shall be borne solely by the Contractor(s).

END OF SECTION

27 16 13 Communications Custom Cable Assemblies

27 16 16 Communications Media Converters, Adapters, and Transceivers

27 16 19 Communications Patch Cords, Station Cords, and Cross Connect Wire

SECTION 27 20 00

DATA COMMUNICATIONS

CONSULTANT DESIGN GUIDELINE

Provide data drops for each vending machine in a vending area, compatible with the University card system.

Design and installation shall comply with the following:

ANSI/TIA/EIA - 568 B: Commercial Building Telecommunications Cabling Standard.

ANSI/TIA/EIA - 569: Commercial Building Standard for Telecommunication Pathways and Spaces.

ANSI/TIA/EIA - 606: The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.

ANSI/TIA/EIA - 607: Commercial Building Grounding and Bonding Requirements for Telecommunications.

TIA/EIA - TSB67: Transmission Performance Specifications for Field Testing of Unshielded Twisted Pair Cabling Systems.

ISO/IEC IS 11801: Generic Cabling for Customer Premises>

INCLUDE IN CONSTRUCTION DOCUMENTS

Submit manufacturer's technical data sheets including complete installation information, performance specifications and wiring diagrams for each system.

The Contractor shall provide shop drawing submittal information for review. Do not order materials until the Engineer has approved the shop drawings and submittals. Provide each of the following for review:

Material and equipment submittals for each item.

A cable routing and grouping plan.

Proposed wall termination block/wire management elevations, to scale, for each backboard in

each communications closet.

A list of proposed test equipment for use in verifying the installation of the cabling system. Manufacturer documentation showing date and outcome of last recalibration. Testing device shall have been re-calibrated within the last six months.

Manufacturer documentation showing software revision. Software revision shall be most current version available for device and based upon the most current TIA/EIA testing guidelines. Proposed Category 6 UTP cable and fiber optic cable test forms.

Operating and maintenance instructions for each device in the system. These instructions shall detail how to install and service the equipment and shall include all information necessary for rough-in preparation for the building facilities to receive the materials. At the completion of the project, update the operating and maintenance information to reflect any changes during the course of construction, and shall be provided to the owner in a binder labeled with the project name and description. Provide three copies of the operating and maintenance information.

Prior to bidding the project, the Contractor shall be trained and certified by the manufacturer to install, test, and maintain the systems and shall be certified by the manufacturer to provide the manufacturer's products, performance, and application warranty.

The Contractor shall employ a minimum of one Register Communications Distribution Designer (RCDD) certified by the Building Industry Consulting Service International (BICSI). The RCDD shall be a direct employee of the Contractor. The RCDD shall inspect the work in progress and shall certify the work at the completion of the project.

The Contractor shall have employees directly involved with the supervision, installation, and testing of the data systems trained and certified by the supplier for Communication for installation and testing.

The Contractor shall have a minimum of three years' experience installing data cabling systems.

During construction, the Contractor shall periodically review installation progress for conformation to TIA/EIA and BICSI installation standards. The Contractor shall provide an official, written report to the Engineer that details the work reviewed and verifies that the work conforms to all applicable TIA/EIA and BICSI installation standards.

After substantial completion and prior to Owner's acceptance, the Contractor shall certify in writing on company letterhead that the completed installation meets or exceeds TIA/EIA and BICSI installation standards. The written certification shall be complete with the RCDD's stamp/certification number and shall bear the RCDD's signature across the face of the stamp.

The Contractor shall provide a manufacturer 15-year product, performance, application, and labor warranty. This warranty shall guarantee against defects in materials and workmanship (extended product warranty) for a period of 15 years. All cabling components of the installed systems will meet or exceed the specification of TIA/EIA 568 B and ISO/IEC 11801 (performance warranty) for a period of 15 years.

All shielded and unshielded twisted pair cabling links/channels will meet or exceed the attenuation and NEXT requirements of TIA/EIA TSB 67 and ISO.IEC 11801 (performance warranty) for a period of 15 years.

All fiber links/channels shall meet or exceed the loss and bandwidth requirements of TIA/EIA

TSB 67 and ISO/IEC 11801 (performance warranty) for a period of 15 years.
The system shall be application independent and shall support both current and future applications that use the TIA/EIA 568 B or ISO/IEC 11801 component and link/channel specifications for cabling (application warranty) for a period of 15 years.
Supply all labor attributable to and required by the above at no additional cost to the owner for a period of 15 years.

The warranty period shall begin on the date of substantial completion.

Install freestanding EIA standard universal 19" wide equipment racks, sized at 7' at location indicated on Drawings. Install racks with mounting holes on both sides and provide with top angles, self-supporting bases and grounding kit.

Wall mounted racks shall be mounted on a backboard and provided with a ground kit.

Install fiber patch panels to accommodate multimedia fiber optic cable as indicated on the Drawings

Modular equipment manufacturer shall furnish workstation outlets.

All cabling shall bear plenum or riser related markings for the environment in which installed.

Install Category 6 cable for data ports. Install one cable per 8-position communications jacks on a given workstation outlet. Category 6 cables shall meet or exceed TIA/EIA 568 B Category 6 specifications for performance, shall be part of the UL LAN Certification and follow-up program, defined by the manufacturer as an "extended performance Category 6 cable."

Install fiber optic riser cable for data backbones as indicated on the Drawings. Terminate all multimode fiber strands with Duplex SC-style connectors. Fiber optic cables shall meet or exceed standard for 100Mbps transmission. Multimode fiber optic cable shall be 62.5/125 micron graded index, tight buffered.

Label shall be as recommended in TIA/EIA 606. Labels shall be permanent and legible as created by a Brady #LS-2000 label maker or equivalent. Handwritten labels are not acceptable. Labels shall be required for communications closets, riser cables, communication jacks, termination block columns for workstations and riser cables, termination strip pairs, and grounding bus bars.

END SECTION

27 21 00 Data Communications Network Equipment

- 27 21 13 Data Communications Firewalls
- 27 21 16 Data Communications Routers, CSU/DSU, Multiplexers, Codec's, and Modems
- 27 21 26 Data Communications Network Management
- 27 21 29 Data Communications Switches and Hubs
- 27 21 33 Data Communications Wireless Access Points

27 22 00 Data Communications Hardware

- 27 22 13 Data Communications Mainframes
- 27 22 16 Data Communications Storage and Backup
- 27 22 19 Data Communications Servers
- 27 22 23 Data Communications Desktops
- 27 22 26 Data Communications Laptops
- 27 22 29 Data Communications Handhelds

27 24 00 Data Communications Peripheral Data Equipment

- 27 24 13 Printers
- 27 24 16 Scanners
- 27 24 19 External Drives
- 27 24 26 Virtual Reality Equipment
- 27 24 29 Disaster Recovery Equipment

27 25 00 Data Communications Software

- 27 25 13 Virus Protection Software
- 27 25 16 Application Suites
- 27 25 19 Email Software
- 27 25 23 Graphics/Multimedia Software
- 27 25 26 Customer Relationship Management Software
- 27 25 33 Database Software
- 27 25 37 Virtual Private Network Software
- 27 25 39 Internet Conferencing Software

27 26 00 Data Communications Programming and Integration Services

- 27 26 13 Web Development
- 27 26 16 Database Development
- 27 26 19 Application Development
- 27 26 23 Network Integration Requirements
- 27 26 26 Data Communications Integration Requirements

27 30 00 VOICE COMMUNICATIONS

CONSULTANT DESIGN GUIDELINE

Telephone system shall comply with the following:

ANSI/TIA/EIA - 568 B: Commercial Building Telecommunications Cabling Standard.

ANSI/TIA/EIA - 569: Commercial Building Standard for Telecommunication Pathways and Spaces.

ANSI/TIA/EIA - 606: The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.

ANSI/TIA/EIA - 607: Commercial Building Grounding and Bonding Requirements for Telecommunications.

TIA/EIA - tsb67: Transmission Performance Specifications for Field Testing of Unshielded Twisted Pair Cabling Systems.

ISO/IEC IS 11801: Generic Cabling for Customer Premises>

INCLUDE IN CONSTRUCTION DOCUMENTS

The Contractor shall provide shop drawing submittal information for review. Do not order materials until the Engineer has approved the shop drawings and submittals. Provide each of the following for review:

Cable routing and grouping plan.

Proposed wall termination block/wire management elevations, to scale, for each backboard in each communications closet.

Provide operating and maintenance instructions for each device in the system. These instructions shall detail how to install and service the equipment and include all information necessary for rough-in preparation for the building facilities to receive the materials. At the completion of the project, update the operating and maintenance information to reflect any changes during the course of construction, and provide to owner in a binder labeled with the project name and description.

Provide three copies of the operating and maintenance information.

The Contractor shall provide a manufacturer endorsed and backed extended 15-year product, performance, application, and labor warranty, which shall warrant the following:

Warrant against defects in materials and workmanship (extended product warranty) for a period of 15 years.

All cabling components of the installed systems will meet or exceed the specification of TIA/EIA 568 B and ISO/IEC 11801 (performance warranty) for a period of 15 years.

All shielded and unshielded twisted pair cabling links/channels will meet or exceed the attenuation and NEXT requirements of TIA/EIA TSB 67 and ISO.IEC 11801 (performance

warranty) for a period of 15 years.

All fiber links/channels shall meet or exceed the loss and bandwidth requirements of TIA/EIA TSB 67 and ISO/IEC 11801 (performance warranty) for a period of 15 years.

The system shall be application independent and shall support both current and future applications that use the TIA/EIA 568 B or ISO/IEC 11801 component and link/channel specifications for cabling (application warranty) for a period of 15 years.

All labor attributable to and required by the above supplied at no additional cost to the owner for a period of 15 years.

END SECTION

SECTION 27 31 00 Voice Communications Switching And Routing Equipment

27 31 13 PBX/Key Systems

27 31 23 Internet Protocol Voice Switches

27 32 00 Voice Communications Telephone Sets, Facsimiles and Modems

27 32 13 Telephone Sets

27 32 16 Wireless Transceivers

27 32 23 Elevator Telephones

27 32 26 Ring-Down Emergency Telephones

Consultant design guideline

Blue light phones should be Gaitronics or equal. Gaitronics is the only unit we know of equipped to handle duplexing – where the officer can talk to the customer at the same time the customer can talk with them – unlike the communications systems used by others that operate like a radio where one has to stop talking before the other can talk.

End of section

27 32 29 Facsimiles and Modems

27 32 36 TTY Equipment

27 33 00 Voice Communications Messaging

27 33 16 Voice Mail and Auto Attendant

27 33 23 Interactive Voice Response

27 33 36 Facsimile Servers

27 34 00 Call Accounting

27 34 13 Toll Fraud Equipment and Software

27 34 16 Telemanagement Software

27 35 00 Call Management

27 35 13 Digital Voice Announcers

27 35 16 Automatic Call Distributors

27 35 19 Call Status and Management Displays
27 35 23 Dedicated 911 Systems

27 40 00 AUDIO-VIDEO COMMUNICATIONS

27 41 00 Audio-Video Systems

27 41 13 Architecturally Integrated Audio-Video Equipment

27 41 16 Integrated Audio-Video

27 42 16.25 Integrated Audio-Video Systems and Equipment for Restaurants and Bars

27 42 16.28 Integrated Audio-Video Systems and Equipment for Conference Rooms

27 42 16.29 Integrated Audio-Video Systems and Equipment for Board Rooms

27 42 16.51 Integrated Audio-Video Systems and Equipment for Classrooms

27 42 16.61 Integrated Audio-Video Systems and Equipment for Theaters

27 42 16.62 Integrated Audio-Video Systems and Equipment for Auditoriums

27 42 16.63 Integrated Audio-Video Systems and Equipment for Stadiums and Arenas

27 41 19 Portable Audio-Video Equipment

27 41 23 Audio-Video Accessories

27 42 00 Electric Digital Systems

27 42 13 Point of Sale Systems

27 42 16 Transportation Information Display Systems

27 42 19 Public Information Systems

27 50 00 DISTRIBUTED COMMUNICATIONS AND MONITORING SYSTEMS

27 51 00 Distributed Audio-Video Communications Systems

27 51 13 Paging Systems

27 51 13.13 Overhead Paging Systems

27 51 16 Public Address and Mass Notification Systems

27 51 19 Sound Masking Systems

27 51 23 Intercommunications and Program Systems

27 51 23.20 Commercial Intercommunications and Program Systems

27 51 23.30 Residential Intercommunications and Program Systems

27 51 23.50 Educational Intercommunications and Program Systems

27 51 23.63 Detention Intercommunications and Program Systems

27 51 23.70 Healthcare Intercommunications and Program Systems

27 52 00 Healthcare Communications and Monitoring Systems

27 52 13 Patient Monitoring and Telemetry Systems

27 52 16 Telemedicine Systems

27 52 19 Healthcare Imaging Systems

27 52 23 Nurse Call/Code Blue Systems

27 53 00 Distributed Systems

SECTION 27 53 13

CLOCK SYSTEMS

27 53 16 Infrared and Radio Frequency Tracking Systems

27 53 19 Internal Cellular, Paging, and Antenna Systems