SECTION 27 0500 –Communications General Provisions

Revise this Section by deleting and inserting text to meet Project-specific requirements.

This Section uses the term "Architect" or “Engineer.” Change this term to match that used to identify the design professional as defined in the General and Supplementary Conditions.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

Delete hidden text after this Section has been edited for the Project.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The Contractor's attention is specifically directed, but not limited, to the following documents for additional requirements:

1. The current version of the *Uniform General Conditions for Construction Contracts*, State of Texas available on the web site of the Texas Facilities Commission.
2. The University of Houston’s Supplemental General Conditions and Special Conditions for Construction.
3. The University of Houston’s *Network Infrastructure Design Guidelines* (available at https://uh.edu/infotech/services/computing/networks/network-infra-standards/).
4. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This document identifies the design and specification requirements for a complete and functional communications cable plant to be performed for University of Houston. The purpose of the communications cable plant as specified herein is to support the voice, data, AV connectivity and various other low voltage signaling and control devices.

B. Comply with the requirements of the Contract Documents and coordinate the Work of Division 27 sections with the Work of all other sections.

C. All work associated with Network Facilities (NFs) shall comply with the National Electrical Code (NEC), state and local building codes. The guidelines developed by ANSI/TIA/EIA and BICSI shall be followed in both design and construction.

D. The Architect may at any time, by written order, make changes within the general scope of any contract resulting from this proposal document. If such changes expand, reduce, change or modify the scope of work, the price for the change shall be increased or decreased at the unit prices set forth in the Unit Pricing Section, and the amount shall be deducted from, or added to, the sale price of the system to the Owner. Do not add costs to the project without prior written approval from the Architect. If the change will increase the price by an amount that cannot be

determined solely from the prices set forth in the Unit Pricing Section, the change also requires prior written approval from the Owner.

Revise subparagraph(s) below to suit Project.

1.3 PREINSTALLATION MEETINGS

A. Preconstruction Conference: Conduct conference at [**Project site**] <**Insert location**>. The Contractor and the Facilities Project Manager lead the meeting. The UIT Project Manager must be invited to the Preinstallation meetings.

Copy subparagraph below and edit for each activity required for preconstruction conference.

1. <**Insert activity**>.

1.4 AGENCIES, REFERENCE STANDARDS AND CODES

A. Agencies

1. ANSI American National Standards Institute
2. BICSI Building Industry Consulting Service International
3. EIA Electronic Industries Association
4. FCC Federal Communications Commission
5. FOTP Fiber Optic Testing Procedures
6. IEEE Institute of Electrical and Electronic Engineers, Inc.
7. NBC National Building Code
8. NFPA National Fire Protection Agency
9. NEC National Electrical Code
10. TIA Telecommunications Industry Association
11. UL Underwriters Laboratories
12. TAC State of Texas Department of Information Resources:
http://info.sos.state.tx.us/pls/pub/readtac$ext.ViewTAC?tac_view=4&ti=1&pt=10&ch=208
13. UH Manual of Administrative Policies and Procedures (MAPP)

B. Codes and Standards (Latest issue and addenda, if more recent than edition shown)

1. ADA Standards for Accessible Design 28 CFR Part 36
2. American Society for Testing Materials (ASTM)*
3. ANSI/TIA-568.1-D - Commercial Building Telecommunications Infrastructure Standard (through Addendum 1, March 6, 2018)
4. ANSI/TIA-568.2-D - Balanced Twisted-Pair Telecommunications Cabling and Components Standard (through Addendum 1, April 9, 2019)
5. ANSI/TIA-568.3-D - Optical Fiber Cabling And Components Standard (through Addendum 1, January 17, 2019)
6. ANSI/TIA-568.4-D - Broadband Coaxial Cabling and Components Standard (June 27, 2017)
7. ANSI/TIA-569-E - Telecommunications Pathways and Spaces (May 23, 2019)
8. ANSI/TIA-606-C - Administration Standard for Telecommunications Infrastructure (June 19, 2017)

9. ANSI/TIA-607-D - Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises (July 29, 2019)
10. ANSI/TIA-526-7-A - Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant, Adoption of IEC 61280-4-2 edition 2: Fiber-Optic Communications Subsystem Test Procedures - Part 4-2: Installed Cable Plant - Single-Mode Attenuation and Optical Return Loss Measurement (July 29, 2015)
11. ANSI/TIA-526-14-C - Optical Power Loss Measurement of Installed Multimode Fiber Cable Plant; Modification of IEC 61280-4-1 edition 2, Fiber-Optic Communications Subsystem Test Procedures- Part 4-1: Installed Cable Plant-Multimode Attenuation Measurement (April 2015)
12. ANSI/TIA -758-B - Customer-Owned Outside Plant Telecommunications Infrastructure Standard (March 27, 2012)
13. BICSI TDM, Cabling Installation, LAN Design, and Customer-Owned Outside Plant Manuals-Latest Editions
14. Chapter 208- State of Texas Communications Wiring Standard
15. International Standards Organization/International Electrotechnical Commission (ISO/IEC) IS 11801, 2000*
16. National Electric Code (NEC), Latest Issue
17. National Electrical Manufacturers Association (NEMA)*
18. OSHA - U.S. Department of Labor Occupational Safety & Health Administration
19. UL - Underwriters Laboratories (UL) Cable Certification and Follow Up Program*
20. UH Information Technology *Network Infrastructure Design Standards*
21. UH MAPP - Manual of Administrative Policies and Procedures

C. Acronyms and Abbreviations

1.	ADA	Americans with Disabilities Act
2.	AKA	also known as
3.	ANSI	American National Standards Institute
4.	ASTM	American Society for Testing and Materials
5.	AWG	American Wire Gauge
6.	BDF	Building Distribution Frame (also known as BICSI Entrance Facility)
7.	BICSI	Building Industry Consulting Services International
8.	CFCI	Contractor Furnished Contractor Installed
9.	CO-OSP	customer owned outside plant
10.	EIA	Electronic Industries Alliance
11.	EMI	electromagnetic interference
12.	FCC	Federal Communications Commission
13.	Gb/s	gigabits per second
14.	HC	horizontal cross-connect
15.	HVAC	heating, ventilation, and air conditioning
16.	IEEE	Institute of Electrical and Electronics Engineers
17.	IDF	Intermediate Distribution Frame
18.	ISO	International Organization for Standardization
19.	LAN	local area network
20.	LF	lateral fiber
21.	Mb/s	megabits per second

22.	MC	main cross-connect
23.	MDF	Main Distribution Frame (also known as BICSI Entrance Room)
24.	MF	metro fiber
25.	NEMA	National Electrical Manufacturers Association
26.	NESCO	National Electrical Safety Code
27.	NF	Network Facility (broad term for MDF, BDF or IDF; also known as Telecommunications Room, TR, Equipment Room, or ER)
28.	NFPA	National Fire Protection Association
29.	NVR	network video recorder
30.	OFCI	Owner Furnished Contractor Installed
31.	OFOI	Owner Furnished Owner Installed
32.	PM	Project Manager
33.	RCDD	Registered Communications Distribution Designer
34.	RFP	Request for Proposal
35.	RFO	Request for Offer
36.	TBB	telecommunications bonding backbone
37.	TGB	telecommunications grounding busbar
38.	TIA	Telecommunications Industry Association
39.	TMGB	telecommunications main grounding busbar
40.	TE	telecommunications enclosure
41.	UIT	University Information Technology
42.	UITNS	University Information Technology Network Services
43.	UL	Underwriters Laboratories
44.	UTP	unshielded twisted-pair
45.	WAN	wide area network
46.	WAP	wireless access point
47.	Wi-Fi	wireless telecommunications defined by IEEE 802.11

1.5 GENERAL ADMINISTRATIVE REQUIREMENTS

A. The Network Cabling Contractor, here after referred to as “Cabling Contractor,” shall provide all materials, components, tools and labor necessary for the complete installation of all communications work required in the contract documents and specified herein.

B. The Electrical Contractor, here after referred to as “Electrical Contractor,” shall provide materials, components, tools and labor to complete a communications cabling pathway, electrical power distribution and communications building grounding system as set forth in the Structured Cabling System specifications and electrical specifications and Technical and Electrical drawings.

C. Work furnished and installed by the Cabling Contractor as specified in Division 27 and as shown in Electrical and Technical Drawings includes:

1. The overhead cable runway system (basket trays) within the new ER;
2. Identification for Communications Systems;
3. Communications Equipment Room Fittings;
4. Communications Backbone Cabling;

5. Communications Horizontal Cabling;
6. Patch Cords, Station Cords, and Cross-Connect Wire;
7. Bonding conductors from all cable tray, sleeves and conduits;
8. Coordination with OFOI Communications Services;
9. Coordination with OFOI Data Communications Equipment;
10. Coordination with OFOI Voice Communications Equipment;
11. Coordination with OFCI Communications Services;
12. Coordination with OFCI Data Communications Equipment;
13. Coordination with OFCI Voice Communications Equipment;

D. Work under this Division not in contract (NIC) that will be Owner Furnished/Owner Installed (OFOI) includes:

1. Communications services (e.g., ISP connectivity);
2. Voice communications equipment (end user devices);
3. Phone cords at the work area;

E. Work furnished and installed by the Electrical Contractor as specified in Division 27 and as shown in Electrical and Technical Drawings includes:

1. The conduits and back boxes for the work area telecommunications outlets.
2. Installation of the TMGB in the new MDF/BDF;
3. Installation of the TBB from the new MDF/BDF to the new IDFs;
4. Installation of the Bonding Conductor for Telecommunications (BCT) that bonds the TMGB to the electrical power ground compliant with ANSI J STD-607 A Standards;
5. Electrical circuits in the telecom rooms.

F. Work furnished and installed by others as described in other Divisions of the *Master Specification*.

1. Network Facility walls shall be covered, floor to ceiling, with rigidly fixed ¾-inch fire rated plywood, void free, and capable of supporting attached connecting hardware. Cover plywood with two coats of fire retardant paint per *27 1100 Network Facility Fittings*.
2. Fire walls shall be marked for easy identification.
3. Security systems and access control.
4. Fire sprinkler systems.
5. HVAC.

1.6 WORK RESULTS — DESCRIPTION OF PROJECT

Designer to list the elements that constitute the completed work results in Part 1 of each relevant Section.

A. Work results are listed in Part 1 of each Section in Division 27.

B. Network Connectivity for Other Trades:

1. Audio/Visual – Provide network connectivity as required for A/V elements. Refer to AV drawings and specifications for details.
2. Electronic Safety and Security – Provide copper and fiber cabling and termination hardware as required facilitating voice and data network connectivity for IP cameras,

Emergency Call Towers, Access Control Panels, etc. Refer to Security drawings and specifications for details.

3. Fire Alarm – Provide copper/ fiber connectivity as required for Fire Alarm Panels.
4. Building Management System – Provide network connectivity as required facilitating operation of BMS/DDC.
5. Elevator Equipment Room – Provide copper connectivity to elevator equipment room(s). Coordinate with elevator equipment provider.

C. Project Meetings

1. If necessary, invite UITNS to meetings in the FP&C Project Programming/Feasibility Study phase.
2. In the FP&C Schematic Design (SD) phase, the FP&C Project Manager (PM) shall open a work order for UITNS, and invite the UIT PM to design meetings in this phase.
3. In the FP&C Design Development (DD) phase, the FP&C PM shall invite the UIT PM to design meetings in this phase. Adhere to the requirements of *Network Infrastructure Design Standards* in drawings produced in this phase. The version of that document in effect at the beginning of this phase is locked in for the project, with the exception of approved manufacturers and products purchased directly by UITNS.
4. In the FP&C Construction Document (CD) phase, the FP&C PM shall invite the UIT PM to design meetings in this phase. Adhere to the requirements of *Network Infrastructure Design Standards* in drawings produced in this phase.
5. Cabling Contractor shall attend preconstruction meetings with Project Team.
6. Cabling Contractor shall provide representation on Project Team Meeting as specified in *Division 01* and by the Contractor as required.
7. Cabling Contractor shall provide representation on the Commissioning Team as required for implementation of the Commissioning Plan.

D. Preconstruction Evaluation

1. Examination of buildings and site shall be the responsibility of the Cabling Contractor. Examine conditions for compliance with Communications design specifications. Validate Communications section is in accordance with related Contract Documents and the specified Owner's operational needs.

E. Construction Documentation

1. Cabling Contractor shall coordinate requirements with general provisions specified in *Division 1 - Construction Progress Documentation*.
2. Cabling Contractor shall provide weekly progress report including synopsis of previous week’s completed tasks, list of ongoing work, and updated schedule addressing milestones. Also include items for Owner coordination.
3. Cabling Contractor shall provide weekly report of inspection by project RCDD to confirm Cabling Contractor's work is compliant with industry and manufacturer standards.

1.7 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Follow the *Submittal Administrative Requirements* as stated in *Section 01 3300 Submittal Procedures*. For submittals to UIT, use electronic format only.

B. Submit shop drawings, product data, and samples promptly enough and in appropriate sequence to cause no delay in the work or in the activities of separate contractors.

C. Append information for new installations to existing documentation so that a complete, consolidated inventory of all installations and work completed by the contractor is maintained.

1.8 PROPOSAL SUBMITTALS

A. Cabling Contractor Certification:

1. Cabling Contractor shall be a licensed Panduit Certified Integrator (PCI) Design and Installation Company, or a CommScope ACT (Authorized Connectivity Training) capable of issuing a numbered registration certificate for the entire cable system, or both depending on the products used for the project. Include a copy of the PCI Company and ACT certificate or verification by Panduit and/or CommScope records with the Cabling Contractor bid; expired certificates and/or certificates issued under Panduit or CommScope past certification programs are unacceptable. Include proof of certification in the proposal.
2. Submit written proof that the Cabling Contractor is certified by the manufacturer of the products and adheres to the engineering, installation and testing procedures and utilizes the authorized manufacturer components and distribution channels in provisioning this Project.
3. Cabling Contractor shall be a member of Building Industry Consulting Services International (BICSI).
4. 100 percent of on-site personnel shall have either a CommScope or Panduit Certification in effect through, the bidding process, installation, testing, documentation, and acceptance. Documentation of all on-site personnel shall be provided post recommendation of selected Cabling Contractor in order to receive final UITNS approval.
5. 100 percent of on-site installation personnel shall have BISCI certification in effect through the bidding process, installation, testing, documentation and acceptance. Documentation of all on-site personnel shall be provided post recommendation of selected Cabling Contractor in order to receive final UITNS approval.
6. Cabling Contractor shall have a minimum of one (1) Registered Communications Distribution Designer (RCDD) on staff, with Panduit approved Certification plus RCDD equivalent, submitted and approved by Panduit or CommScope prior to project award. Submit a resume and copy of certifications for Cabling Contractor's RCDD.
7. The RCDD shall provide approval on the design, installation, and documentation of communications system along with ensuring all Panduit Integrity System or CommScope Warranty documentation and requirements are met and submitted to Panduit or CommScope upon completion of the project. Documentation of all on-site personnel shall be provided before final UITNS approval is granted.
8. Cabling Contractor shall not subcontract installation of voice/data/video cabling, termination or testing without the written consent of UITNS and with Panduit's or CommScope's review and confirmation to UITNS of proposed subcontractor's current and valid Panduit PCI and CommScope ACT certified status.
9. Cabling Contractor shall have worked satisfactorily for a minimum of five (5) years on systems of this type and size.

10. Design and Installation Certificates: Signed by local cable manufacturer's representative certifying that design is acceptable with cable manufacturer's Design Engineer(s) and Cabling Contractor is authorized by manufacturer to install registered (warranty) cabling system.
11. Submit a minimum of three (3) representative educational facilities cabling projects (higher education facilities are preferred) as references, including the school's name, location, Architect or Engineer, cost of the cabling project and the contact person at the school district, including phone number.
12. Upon request by UITNS, furnish a list of references with specific information regarding type of project and involvement in providing of equipment and systems.

B. A list of technical product education (training) completed by the Cabling Contractor's project personnel.

1. All members of the installation team shall be certified by the Manufacturer as having completed the necessary training to complete their part of the installation. Submit resumes of the entire team and completed training courses and copies of BICSI Installer as well as CommScope or Panduit training course certificates.
2. Submit cable tester manufacturer or a third-party certification for copper and fiber cable test technicians.

C. Warranty

1. Unless otherwise specified, unconditionally guarantee in writing the materials, equipment, and workmanship for a period of not less than fifteen (15) years from date of acceptance by UITNS, or 20 years in the case of CommScope.

D. Price Quotation Information -

Include price quote that includes labor and material (and pre-cutover add/deduct unit pricing and post-cutover add/deduct unit pricing, as appropriate) for each item to be used in the installation. See example item description below.

1. Itemized Unit Pricing for Labor and Material;
2. Itemized Add/Deduct Unit Pricing for Labor and Material for Pre-Cutover (200' average length) FOUR (4) CAT 6 Drops;
3. Itemized Add/Deduct Unit Pricing for Labor and Material for Post-Cutover (200' average length) FOUR (4) CAT 6 Drops.

1.9 ACTION SUBMITTALS

A. Additional action Submittals are listed separately in each Section of Division 27.

B. In the FP&C Schematic Design (SD) phase, the FP&C PM shall submit a complete set of drawings (including civil, landscape, structural, architectural, mechanical, electrical, plumbing, fire protection, telecommunications, audio visual and security) to the UIT PM for comment and written approval by UIT before proceeding to the Design Development (DD) phase.

C. In the FP&C Design Development (DD) phase, the FP&C PM shall submit a revised, complete set of drawings (including civil, landscape, structural, architectural, mechanical, electrical, plumbing, fire protection, telecommunications, audio visual and security) to the UIT PM for comment and written approval by UIT before proceeding to the Construction Document (CD) phase.

D. In the FP&C Construction Document (CD) phase, the FP&C PM shall submit a revised, complete set of drawings (including civil, landscape, structural, architectural, mechanical, electrical, plumbing, fire protection, telecommunications, audio visual and security) to the UIT PM for final comment and written approval by UIT before proceeding to the Bidding phase.

E. Test Reports with related Test Result Documentation.

1. Submitted test results and other submittals that are non-compliant shall be reviewed and returned to the Cabling Contractor with comments.
2. Re-submitted test results and other submittals that are non-compliant shall be reviewed and returned to the Cabling Contractor with comments.
3. Subsequent reviews of test results and other submittals shall be performed jointly by the Cabling Contractor and the Communications Consultant and Cabling Contractor shall pay Communications Consultant's published hourly rate during third review and thereafter.

1.10 INFORMATIONAL SUBMITTALS

A. Follow Division 1 and this Article.

B. Within thirty days of award of the contract

1. General

a. Bill of materials, noting items with long lead time
b. Optical loss budget calculations for each optical fiber run
c. Project schedule, including all major work components that materially affect any other work on the project

2. Shop Drawings

a. Backbone (riser) diagrams
b. System block diagram, indicating interconnection between system components and subsystems
c. Interface requirements, including connector types and pin-outs, to external systems and systems or components not supplied by the contractor
d. Fabrication drawings for custom-built equipment

3. Product Data — catalog cut sheets and information for

a. Wire, cable, and optical fiber
b. Outlets, jacks, faceplates, and connectors
c. All metallic and nonmetallic raceways, including surface raceways, outlet boxes, and fittings
d. Terminal blocks and patch panels
e. Enclosures, racks, and equipment housings

f. Over-voltage protectors
g. Splice housings

4. Samples

a. Material samples of all items proposed as a substitution for or variation from authorized manufacturers and products set forth in each Section of Division 27.

C. At least ten business days prior to obtaining approval for cutover to any portion of the new cable plant system

1. Drawings: As-built documentation, AutoCAD 2000 or newer (DWG).

D. At the conclusion of the project

1. Final approved shop drawings. **Laminate one set of shop drawings and place them in the related NFs.**
2. Plan drawings indicating location and identification of work area outlets, nodes, NFs, plan and elevation of Network Facilities, cable pathway details, and backbone cable type and locations and cable ID numbers
3. Cable inventory data for all copper and fiber and termination hardware (prior to cutover to new cable plant if applicable). Submit data in Microsoft Excel format, listing products furnished, including:

a. Manufacturer's name and part numbers.
b. Cable numbers utilizing the Owner's cable numbering standard.
c. Network Facility termination detail sheets
d. Location and riser assignments.
e. Cross-connect schedules including entrance point, main cross-connects, intermediate cross-connects and horizontal cross-connects.
f. Labeling and administration documentation
g. Warranty documents for equipment
h. Copper certification test result (readable reports and test equipment native format)
i. Optical fiber power meter/light source, OTDR test results.

4. Location table and spreadsheet with location detail for each wall jack:

a. jack numbers
b. room number
c. wall orientation (North, South, East, or West, or Power Pole if applicable)
d. landmark orientation and distance

5. Manufacturer Certificates: Within 10 days of completion of the project, Cabling Contractor shall deliver letter signed by local Structured Cabling Components representatives and Cabling Contractor's RCDD stating that installed cabling system complies with all requirements specified in manufacturer's installation guidelines and that there were no accidents, improper installation, mishandling, misuse, damage while in transit, unauthorized alteration, unauthorized repair, failure to follow instructions, or misuse with the structured cabling system that could adversely impact warranty.

6. Manufacturer's warranty to the Owner. This shall include, but is not limited to: Owner's name and project name and address. (Within three weeks of substantial completion.)
7. Within 10 days of completion of the project, Cabling Contractor shall deliver letter signed by local SCS Manufacturers representative and Cabling Contractor's RCDD stating that installed cabling system complies with all requirements specified in installation guidelines and that there were no accidents, improper installation, mishandling, misuse, damage while in transit, unauthorized alteration, unauthorized repair, failure to follow instructions, or misuse with the structured cabling system that could adversely impact warranty.
8. Within 21 days of completion of a project the Cabling Contractor and/or the manufacturer's local representative shall provide owner The Structured Cabling Performance Warranty signed by the manufacturer. The warranty shall list the owner and name of the Facility including location as the holder of the warranty.

E. EQUIPMENT RELOCATION AND SYSTEM STARTUP

Designer to provide a detailed summary of all work to be performed; examples below.

1. Upon notice of construction completion, UITNS shall be responsible for system startup services for the new Network Facility. The Cabling Contractor shall be responsible for ensuring the new equipment rooms, cabinets, floors and walls are clean and ready for equipment installation. On behalf of the Owner, the Cabling Contractor shall be responsible for coordinating with the GC and other trades to keep the NFs clean and dust free at all times.
2. It shall be the responsibility of the Cabling Contractor to develop and implement a full migration project schedule detailing the responsibilities of assigned personnel, along with contingency plans, and submit it to the Owner, or their designated representative, for approval.
3. During the transition period, Cabling Contractor shall have the necessary supervisory, technical, and other personnel available throughout technology relocations and cutover of the telephone, networking, and video systems. This is to ensure that technicians are on site to observe the operation and maintenance of the equipment, and to resolve any cabling related issues during system start-up.
4. Cabling Contractor shall ensure all amenities are present prior to equipment relocation. Cabling Contractor shall immediately contact the GC and the UITNS PM if a required service such as HVAC, electrical, backup power, etc., is not present.
5. Cabling Contractor shall accomplish a smooth and successful transition of operations and services to the new Network Facility. The transition includes the coordination, migration, testing, and problem resolution with the system vendors and UITNS.

F. SEQUENCING AND SCHEDULING

Designer to provide a detailed summary of all work to be performed; examples below.

1. An initial planning meeting shall be held with the successful bidder to clarify all requirements (systems, services, distribution methods, etc.), identify responsibilities, and schedule the events that will transpire during the implementation of the project. Within two (2) weeks of the initial meeting, the Cabling Contractor shall provide a written report

and project schedule to clearly document the events and responsibilities associated with the project. Include the UITNS Project Manager in this meeting.

2. Cabling Contractor shall be responsible for the development and implementation of a complete project schedule detailing the responsibilities of assigned personnel and submit it to the GC and UITNS for approval.

G. QUALITY ASSURANCE - CABLING CONTRACTOR QUALIFICATIONS (Designer to provide a detailed summary of all work to be performed; examples below.)

1. Follow Division 1 and this Section.
2. Voice/Data
    a. The installation company shall have a full-time RCDD on staff during all phases of the installation including testing and documentation. RCDD documentation shall be included in all responses to RFP/RFO.
    b. The Installer shall have either CommScope or Panduit Certification in effect throughout installation, testing, documentation and acceptance.
    c. All active on-site personnel shall be manufacturer certified for the system to be installed (e.g., Panduit, CommScope). The Cabling Contractor's project manager or lead technician shall be BICSI certified to facilitate on-site installation practices and to provide inspections of on-going work.
    d. Personnel who are untrained, lacking certification, or otherwise unqualified are not allowed to perform any portion of the communications infrastructure installation.
    e. All personnel shall be permanent employees of the Cabling Contractor or approved sub-contractors.
3. General
    a. Material shall be new, and conform to grade, quality, and standards specified. Materials of the same type shall be a product of the same manufacturer throughout.
    b. Subcontractors shall assume all rights and obligations toward the contractor that the contractor assumes toward the University of Houston and UITNS.
    c. Coordinate Quality Assurance inspections with UITNS Project Managers.

PART 2 - PRODUCTS

2.1 PARTS AND MANUFACTURERS

A. The following Sections of Division 27 provide approved product and schedules for this project.

Designer delete sections that are not applicable to this project.

1. 27 0526 Bonding and Grounding For Communications System
2. 27 0528 Pathways For Communications Systems
3. 27 0543 Underground Duct And Raceways
4. 27 0553 Identification For Communications Systems
5. 27 1100 Network Facility Fittings
6. 27 1300 Communications Backbone Cabling
7. 27 1500 Communications Horizontal Cabling

8. 27 1619 Patch Cords, Station Cords And Cross-Contact Wire
9. 27 2000 Data Communications Equipment
10. 27 3000 Voice Communications Equipment

B. Refer to *Section 01 2500 Substitution Procedures* for variations from approved manufacturers or parts. **Obtain written approval from UITNS before requesting a substitution for work covered by *Division 27 Communications.***

2.2 PRODUCT WARRANTY

A. An extended manufacturer Product Warranty and System Assurance Warranty for the wiring system shall be provided (15 years for Panduit, 20 years for CommScope).

B. The warranty covers all cables installed, tested and registered in a structured cabling system for the covered period. A structured cabling system is defined as a cabling infrastructure, designed and installed to current ANSI/TIA/EIA-568-B series standards.

C. The Extended Product Warranty shall ensure against product defects, that all approved cabling components exceed the specifications of ANSI/TIA/EIA 568B and ISO/IEC IS 11801, exceed the attenuation and NEXT requirements of ANSI/TIA/EIA 568B and ISO/IEC IS 11801 for cabling links/channels, that the installation exceeds the loss and bandwidth requirements of ANSI/TIA/EIA 568B and ISO/IEC IS 11801 for fiber links/channels. The warranty shall apply to all passive SCS components.

D. Unless otherwise specified, unconditionally guarantee in writing the materials, equipment, and workmanship for a period of not less than twenty (20) years from date of acceptance by University IT Network Services (UITNS).

E. Warrant installation against all product defects, and that all approved cabling components meet or exceed the requirements of TIA/EIA-568B and ISO/IEC 11801 for a period of 20 years.

F. The Extended Product Warranty and the System Assurance shall cover the replacement or repair of defective products and labor for the replacement or repair of such defective products.

G. Within 10 days of completion of the project, Cabling Contractor shall deliver letter signed by local SCS Manufacturers representative and Cabling Contractor's RCDD stating that installed cabling system complies with all requirements specified in installation guidelines and that there were no accidents, improper installation, mishandling, misuse, damage while in transit, unauthorized alteration, unauthorized repair, failure to follow instructions, or misuse with the structured cabling system that could adversely impact warranty.

H. Within 21 days of completion of a project the Cabling Contractor and/or the manufacturer's local representative shall provide owner The Structured Cabling Performance Warranty signed by the manufacturer. The warranty shall list the owner, name of the facility including location as the holder of the warranty.

I. The Owner shall not be responsible for any aspect of ensuring the warranty is issued or updated. It shall be the Contractor's responsibility in conjunction with the Manufacturer.

J. During the warranty period, Owner may engage any manufacturer approved cabling contractor to perform future moves, adds and changes to the system. Owner approved contractors shall be responsible for updating any required documentation. Owner shall not be responsible for any aspect of updating and maintaining the warranty.

K. The Labor, Material and Performance Warranty shall cover the testing and replacement of all structured cabling components. The structured cabling system shall be a complete certified system. The system and all components shall be performance matched and guaranteed by the manufacturer.

L. Person / Entity Covered

1. This warranty is for the sole benefit of Owner and any successor in interest to the site in which such Registered SCS was originally installed.
2. All communications work and materials not included in the SCS components shall be warranted by the Cabling Contractor that performed the work for a minimum of three years from the date of substantial completion.

2.3 DELIVERY, STORAGE, AND HANDLING

A. Delivery, Storage and Handling Requirements: Follow Division 1 Requirements.

B. Temporary Storage: Coordinate with UITNS as necessary for temporary secure storage of equipment and materials during project timeframes.

2.4 PRODUCT QUALITY

A. All materials and equipment provided shall be the standard Commercial-Off-The-Shelf (COTS) products of a manufacturer engaged in the manufactures of such products. All materials shall be typical commercial designs that comply with the requirements specified. All materials and equipment shall be readily available through manufacturers and/or distributors. All equipment shall be supplied complete with any optional items required for proper installation.

B. In the event of a breach of the representations and warranties contained herein, the Cabling Contractor, at their own expense, shall take all measures necessary to correct and make the cabling system work in compliance with the applicable manufacturer written technical recommendations and standards.

PART 3 - EXECUTION

3.1 SITE CONDITIONS

A. Existing Site Conditions

1. Cable pathways and runs to individual outlets are not shown in their entirety but shall be provided as if shown in their entirety. The Cabling Contractor shall coordinate with other trades to determine exact routing.

B. Environmental Limitations

1. Due to the critical nature of the environment, the Cabling Contractor shall use extra effort to provide a clean work environment, free from trash/rubbish accumulated during and after cabling installation. Cabling Contractor shall remove all rubbish from job site daily at his or her own expense.
2. Environmental Requirements are usually covered in the General Requirements (Division 1) sections.

C. Use of Site: Coordinate the requirements in this Section with those in Division 1.

1. Proceed with work without interfering with ordinary use of streets, aisles, passages, exits, and operations of the University of Houston including University IT Network Services (UITNS).
2. Cabling Contractors shall adhere to the University of Houston's Contractor Badge program and shall wear assigned contractor's badge on person in a clearly visible location following the Contractor Badge program standards as administered and provided by Facilities Planning & Construction.
3. Access to buildings where work is to be performed shall be directed by University IT Network Services (UITNS).
4. Cabling Contractors shall provide proper safeguards with personnel or appropriate safety barricades when pulling cables in any University of Houston building or related off-site areas.

D. Continuity of Services

1. Make advance arrangements with the University representative to avoid interference with or interruption of existing building services. Arrange the work to minimize down time.
2. Should services be inadvertently interrupted, immediately furnish labor (including overtime), material, and equipment necessary for prompt restoration of interrupted service.

3.2 EXAMINATION

A. Examination of buildings and site shall be the responsibility of the Cabling Contractor. Examine conditions for compliance with requirements of other sections in which related work is specified and determine if conditions affecting performance of the work of this Section are satisfactory. Do not proceed with work of this Section until unsatisfactory conditions have been corrected in an acceptable manner.

B. Verify liquid-carrying pipes are not installed in or above voice and data system Network Facilities.

C. Verify fire-rated backboards are properly installed and painted following Section 06105. Notify the UITNS Project Manager immediately and prior to installation in the event that the backboards are not installed or painted properly.

D. Verify conduit, raceways, and boxes are properly installed.

E. Prior to starting the installation, the assigned installation supervisor shall participate in a walk-through of the project site with the UITNS Project Manager to review the installation documentation, verify that all construction necessary for the installation has been completed, and verify all installation methods and cable routes.

F. The Cabling Contractor shall provide a complete cabling infrastructure according to the written specifications and drawings. If the scope of work to be performed by the Cabling Contractor changes, it shall be in writing. Cabling Contractor shall respond to these changes with a complete material list, including pricing, labor, and taxes in writing per Division 1 requirements. Cabling Contractor shall not proceed with additional scope of work without signed approval by the Contractor.

3.3 PREPARATION

A. Protection of Surroundings

1. Repair: Patching and repair of facilities, finishes, and equipment. Any damage to building or site caused by Cabling Contractor, including grass, paving, curbs etc., shall be restored at Cabling Contractor's expense to match condition prior to damage. If necessary and requested by the Contractor, Cabling Contractor shall provide professional services to clean or repair scratched/soiled finishes at their own expense.
2. Cabling Contractor shall keep all foods and liquids (water, drinks, etc.) in designated break areas.
3. The Cabling Contractor shall obtain the Architect's and Engineer's written permission via the Contractor before proceeding with any work necessitating cutting into or through any part of building structures such as girders, beams, concrete or tile floors, partition and/or ceilings.
4. If it becomes necessary to cut through any wall, floor, or ceiling to install any work under this Section of the Contract or to repair any defects that may appear up to the expiration of the guarantee period, such cutting shall be done by the Cabling Contractor under the supervision of the Contractor.
5. Patching of all openings cut by the Cabling Contractor, or repairing of any damage to the work of other trades caused by cutting or by the failure of any part of the work installed under this Contract, shall be performed by the appropriate trade but shall be paid for by the Cabling Contractor.
6. Openings cut through concrete and masonry shall be made with masonry saws and/or core drills and at such locations acceptable to the Architect/Engineer. Impact-type equipment shall not be used except where specifically approved by the Architect/Engineer.
7. All openings shall be restored to “as-new” condition under the appropriate Specification Section for the materials involved, and shall match remaining surrounding materials and/or finishes.
8. Refer to Division 1 for additional information.

B. DEMOLITION/REMOVAL

1. Unless indicated otherwise, all items that must be removed due to interference with work of this contract remain the property of the Owner, and are to be salvaged solely at the

Owner's discretion. Obtain written approval from the Contractor before salvaging any material other than Cabling Contractor's waste material.

3.4 FIRESTOPPING

A. The Cabling Contractor is required to properly firestop any penetrations through fire barriers utilized for the placement of telecom cabling in keeping with the firestopping provisions in Division 07. Provide fire resistant intumescent materials to restore fire ratings to wall, floor, or ceiling penetrations according to local and national codes.

1. Coordinate with trades constructing floors, walls, or other partitions of building construction to specify the size and shape of each opening to be constructed and device or system approved for use in each instance.
2. Coordinate each firestop selection with adjacent work for dimensional or other interference and for feasibility. In areas accessible to public and other "finished" areas, firestop systems work shall be selected, installed, and finished to the quality of adjacent surfaces of building construction being penetrated.
3. Use materials that have no irritating or objectionable odors when firestopping is required in existing buildings and areas that are occupied.
4. Provide damming materials, plates, wires, restricting collars, and devices necessary for proper installation of firestopping. Remove combustible installation aids after firestopping material has cured.
5. Additional requirements for existing penetrations are:

    a. Existing raceways, cable trays, and cabling whether they are contained in the preceding structures or penetrate any existing building construction shall be firestopped to the extent necessary to fill cavities that exist between existing building construction and existing communications penetrations or conduit sleeve, and between existing conduits and existing conduit sleeve.
    b. Assemblies consisting of individual steel-hat type restricting collars filled with intumescent type materials that completely surround communications penetration shall be used for nonmetallic raceways and cabling.

6. If required by inspecting authorities:

    a. Expose and remove firestopping to the extent directed by the inspecting authority to permit his or her inspection.
    b. Reinstall new firestopping and restore work where removed for inspection.

B. Verify the hourly rating of the barrier.

C. Verify that cabling and other penetrating elements and supporting devices have been completely installed and temporary lines and cables have been removed.

D. Select the UL Listing to match or exceed the barrier.

E. Adhere to cable loads and fill procedure in the Listing.

F. Seek pre-approval from the Authority Having Jurisdiction (Inspector).

G. When installing the System, be sure not to exceed the listed limitations.

H. After installation, place information labels and take digital photographs of both sides of each firestopped penetration in the System for future reference.

I. All openings shall be restored to “as-new” condition under the appropriate Specification Section for the materials involved, and shall match remaining surrounding materials and/or finishes.

J. Provide fire resistant materials to restore fire ratings to all wall, floor, or ceiling penetrations used in the distribution and installation for communications cabling system. Coordinate firestopping procedures and materials with Contractor and Master Specification Division 07.

K. Solutions and shop drawings/submittals for firestop materials and systems shall be presented to the Contractor for written approval of materials prior to purchase and installation.

L. Materials shall be installed per manufacturer instructions, be UL listed for intended use, and meet NEC codes for firestopping measures.

M. The material chosen shall be distinctively colored to be clearly distinguishable from other materials, adhere to itself, and remain resilient and pliable to allow for the removal and/or addition of communications cables without the necessity of drilling holes in the material.

N. The firestopping material shall maintain/establish the fire rated integrity of the wall/barrier that has been penetrated.

O. Cabling Contractor shall coordinate with Electrical Contractor and ensure Communications Pathway firestopping is properly identified and labeled. Cabling Contractor shall laminate and permanently affix to each side of a fire wall/floor penetration, the following information:

1. Installing Cabling Contractor's name, address and phone number.
2. Alpha-numeric unique identifier (floor/penetration - A1)
3. Name of manufacturer of firestop system.
4. Part & model numbers of system and all components.
5. Phone numbers of manufacturer's corporate headquarters in U.S. and local distributor's name and phone number.

3.5 CONSTRUCTION WASTE MANAGEMENT

A. Cabling Contractor shall remove all excess material and debris from the site upon completion of work each day and in a manner approved by the Contractor's Project Manager. See *Section 01 7419 Construction Waste Management and Disposal*.

3.6 LABELING

A. Confirm administrative labeling scheme of cabling and its numerical positions on the termination hardware. Refer to *27 0553 Identification of Communications Systems*.

3.7 CLOSEOUT ACTIVITIES

A. Acceptance shall be subject to substantial completion of all work, successful post-installation testing which yields 100% PASS rating, and receipt of full documentation as described herein. Refer to 01 7700 Closeout Procedures for additional detail.

1. All Proposal Submittals and Project Record Submittals.
2. Training to Owner's representative on methods to add and remove firestop barriers, add and remove isolation conduit seals and, when necessary, add and remove IP 67 rated outlets.
3. Maintenance manuals specified in Division 1 to GC and Owner regarding structured cabling system, firestopping and conduit sealing methods and manufacturer's recommended maintenance instructions.
4. Cabling Contractor shall complete all punch list items within thirty (30) days of notification by GC.
5. Cabling Contractor shall wipe down all equipment, racks, cabinets, and sweep and mop NF floors prior to Substantial Completion. The Project is not considered complete until cleaning has been done.
6. Cabling Contractor shall complete Closeout Checklist listing status of all submittals, maintenance manuals, Owner training, and punch list items and deliver per Division 1.

END OF SECTION 27 0500