SECTION 27 1500 – COMMUNICATIONS HORIZONTAL CABLING

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

Maintain Section format, including the UH Master spec designation and version date in bold in the center columns in the header and footer. Complete the header and footer with Project Information.

Designer is required to adhere to the University's "Network Infrastructure Design Standards" and "Electronic Access Control Design Guide" available in Owner's Design Guidelines on the University's Facilities Planning and Construction web site.

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.   Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this Section.

   B.   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.

1.2   SUMMARY

   A.   Section Includes:

      1.   Manufacturers and products.
      2.   Required submittals.
      3.   Installation.
      4.   Testing, performance and acceptance.
      5.   Project documentation.

B.   This Section describes horizontal communications cabling materials and installation methods, copper connectivity equipment and horizontal cable testing methods.

1.3   SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A.   Follow the Submittal Administrative Requirements as stated in Section 01 3300 "Submittal Procedures." Use electronic format only.

1.4   ACTION SUBMITTALS

A.   Product Data: For each type of product.

B.   Shop Drawings:

1.   System Labeling Schedules that are part of the cabling and asset identification system of the software.
2.   Cabling administration drawings and printouts.

C.   IP Addresses:

1.   To request IP addresses for Wi-Fi, security devices, code blue cameras, HVAC, etc., submit the IP Planning Workbook to the UIT Project Manager at least 30 days before the addresses are needed.
2.   The IP Planning Workbook is available on the UIT Network Infrastructure and Audiovisual Design Standards web page. Contact the UIT Project Manager for help completing the form.

D.   Test Result Documentation:

1.   Use native-format data from testers for all test results.
2.   Record test results information for each link in the memory of the field tester upon completion of the test.
3.   Ensure that measurement results are transferred to the PC unaltered, i.e., "as saved in the tester" at the end of each test and that these results cannot be modified at a later time.
4.   Provide the following general information with the test results information for each link:
        a.   Identification of Project Site as specified by Owner.
        b.   Identification of the link in accordance with the naming convention defined in the overall system documentation.
        c.   Overall Pass/Fail evaluation of the link-under-test.
        d.   Name of the standard selected to execute the stored test results.
        e.   Cable type and value of NVP used for length calculations.
        f.   Date and time the test results were saved in the memory of the tester.
        g.   Brand name, model and serial number of the tester.
        h.   Identification of the tester interface.
        i.   Revision of the tester software and revision of the test standards database in the tester.

          j.   Information on each of the required test parameters included in the test results.

    5.   Provide detailed test results data in the electronic database for each tested link containing the following information:

        a.   Frequency-dependent test including:

            1)   Length: Identify the wire-pair with the shortest electrical length, the value of the length rounded to the nearest 0.1 m (1ft) and the test limit value.

            2)   Propagation delay: Identify the pair with the shortest propagation delay, the value measured in nanoseconds (ns) and the test limit value.

            3)   Delay Skew: Identify the pair with the largest value for delay skew, the value calculated in nanoseconds (ns) and the test limit value.

            4)   Attenuation: Minimum test results for the worst pair.

            5)   Return Loss: Minimum test results for the worst pair as measured from each end of the link.

            6)   NEXT, ELFEXT, ACR: Minimum test results documentation as explained in Section I.B for the worst pair combination as measured from each end of the link.

            7)   PSNEXT, PSELFEXT, and PSACR: Minimum test results documentation for the worst pair as measured from each end of the link.

1.5   INFORMATIONAL SUBMITTALS – Not Used

PART 2 - PRODUCTS

2.1   PARTS AND MANUFACTURERS

    A.   GENERAL GUIDELINES

        1.   Do not mix manufacturers for closely related parts. For example, do not use different manufacturers for faceplates and blank inserts since the parts may not be compatible.

        2.   Refer to Section 01 2500 "Substitution Procedures" for variations from approved manufacturers or parts. Obtain written approval for substitutions from both the Owner's Project Manager and the UIT Project Manager.

    B.   Cable – Twisted Pair

        1.   CommScope

           a.   CS34P BLU Category 6 U/UTP Cable, plenum rated, 4 pair count.

        2.   Panduit

           a.   PUP6504BU-UY (blue jacket)

    C.   Cable – Coaxial (NOT USED FOR NEW CONSTRUCTION PROJECTS)

        1.   CommScope

           a.   2275 V

D.   Cable Fiber (Distribution)

   1.   Corning
        a.   Single-mode: 012ED8-31331-20
        b.   Multi-mode: 012KD8-31330-20

   2.   CommScope
        a.   Single-mode: P-012-DS-8W-FSUYL
        b.   Multi-mode: P-012-DS-6F-FSUOR

E.   Cable Fiber (OSP)

   1.   Corning
        a.   24F, single-mode- 024EUC-T4101D20
        b.   48F, single-mode- 048EUC-T4101D20
        c.   96F, single-mode- 096EUC-T4101D20
        d.   144F, single-mode- 144EUC-T4101D20

   2.   CommScope
        a.   24F, single-mode- 024EUC-T4101D20 D 024-LA-8W-F12ns
        b.   48F, single-mode- 048EUC-T4101D20 D 048-LA-8W-F12NS
        c.   96F, single-mode- 096EUC-T4101D20 D 096-LA-8W-F12-NS
        d.   144F, single-mode- 144EUC-T4101D20 D 144-LA-8W-F12ns

F.   Angled Patch Panels

   1.   Panduit
        a.   UICMPPA48BL

   2.   CommScope
        a.   M2000A-48

G.   Faceplates

   1.   Panduit
        a.   CFPE4IW

   2.   CommScope
        a.   UNF-MFM-4P-WH

H.   Telecommunications Outlets: 8-pin modular Category 6, un-keyed, pinned T568B standards to be fully terminated. Single-gang mounting plate with four (4) openings which shall include one or more of the following devices:

   1.   Panduit
        a.   Telecommunications Outlet, Red: CJ688TPRD
        b.   Wireless Outlet, Yellow: CJ688TPYL
        c.   Security Camera/Intrusion Alarm Outlet/Door Locks, Violet: CJ688TPVL?
        d.   EMECS Systems, Green: CJ688TPGR
        e.   Blank: CMBIW-X

   2.   CommScope

        a.   Telecommunications Outlet, Red: UNJ600-RD

        b.   Wireless Outlet, Yellow: – UNJ600-YL

        c.   Security Camera/Intrusion Alarm Outlet/Door Locks, Violet: UNJ600-VL?

        d.   EMECS Systems, Green: UNJ600-GR

        e.   Blank – 1-1116412-3

I.   Wireless Access Points (WAPs)

    1.   Aruba

        a.   Consult the assigned UIT Project Manager for the approved WAP model at the time of product selection.

J.   Telephone Equipment

    1.   For a list of Skype-compatible phones and accessories, please visit the University's website at Infotech/Services/Skype.

K.   Firestopping

    1.   Basis of Design Product: Specified Technologies EZ-Path firestop pathways.

    2.   Comply with requirements of Section 07 8413 "Penetration Firestopping."

L.   Powered Fiber Cable Systems

    1.   CommScope

        a.   Powered Fiber Cable Indoor/Outdoor : PFC-S04L12

        b.   Powered Fiber Cable Outdoor : PFC-S04O12

        c.   Power Express Distribution Shelf w/Alarm Module: PFP-PX-S1

        d.   Power Express Distribution Module, Supports up to 8 Devices: PFP-PX-8M

        e.   Power Express Blank Slot Panel: PFP-PX-SF

        f.   SPS Rectifier Power Distribution Shelf: PFP-SPS-S1

        g.   1600W SPS Power Rectifier Module: PFP-SPS-1600M

        h.   SPS Rectifier Controller Display: PFP-SPS-C1

        i.   SPS Rectifier Blank Slot Panel: PFP-SPS-SF

        j.   60W, 2 Port, PoE Extender: PFU-P-C-O-060-02

PART 3 - EXECUTION

3.1   GENERAL

A.   Do not attach cable to the ceiling grid support system.

B.   Terminate horizontal cabling in the TRs on 48-port, 8-pin modular insulation displacement connector (IDC) meeting Category 6 performance standards and pinned to T 568B standards. Mount Category 6 patch panels in an approved 19-inch relay rack. Terminate all horizontal cabling on patch panels in the Network Facility.

    1.   Use Category 6E and Category 6A jacks.

2.   The exposed front of each jack shall be the correct color to represent the connection's purpose as follows:
       a.   Red   General purpose, office and lab connection - other than Category 6A
       b.   Blue   General purpose, office and lab connection - Category 6A
       c.   Yellow   Wireless Access Point connection
       d.   Violet   Security camera, security device, lighting controller, door lock or Code Blue phone
       e.   Green   EMECS system connection
       f.   White   AV

C.   Follow manufacturer's installation guidelines.

D.   All voice and data cabling shall be continuous from the nearest Network Facility to the telecommunications outlet. Splicing of cable is not allowed.

E.   Pay strict attention to the manufacturer's guidelines on bend radii, maximum pulling tension and vertical rise during installation.

F.   Use lubricants to facilitate pulling of cables. Lubricant shall not be harmful to the cable, the raceway, or personnel. J-Type Polywater is preferred.

G.   UTP Cabling:

1.   Provide a minimum of 3-foot service loop (for re-termination) for horizontal cables. Locate service loop where horizontal cable run transitions to cable tray. Place at least 12 inches of service loop in outlet box.
2.   The maximum horizontal distance shall be 295 feet, independent of media type.
3.   Total length allowed for cords in the work area plus patch cords or jumpers plus equipment cables or cords in the Network Facility shall not exceed 10 m (33 feet).
4.   Cable placement shall not deform the cable sheath.

H.   Wireless Access Points (WAPs)

1.   Run two Category 6 cables and install two jacks at each WAP location to accommodate future needs.
2.   Mount WAP in a visible and accessible location, no higher than 14-feet high, avoiding metallic objects that will interfere with the performance.
3.   If a WAP must be mounted in a non-standard location, coordinate with the UIT Project Manager prior to installation.
4.   Label WAPs and their associated jacks as described in Section 27 0553 "Identification for Communications Systems."

3.2   SITE QUALITY CONTROL

A.   Site Testing Requirements

1. Test every cabling link in accordance with the Permanent Link test specifications defined in ANSI/TIA-568.2-D — "Balanced Twisted-Pair Telecommunications Cabling and Components". This document shall be known as the "TIA Cat 6 Standard."
2. Test using a properly calibrated, Level III field tester as defined in the ANSI/TIA-568.2-D.
3. Diagnose and correct any failing links. Retest to confirm correction.

B. Site Testing, Inspection and Acceptance

1. Remove and replace horizontal cable that contains bad conductors or damaged outer jacketing.
2. Invite the UIT Project Manager to witness field testing. Provide 5 business days' notice.
3. At the conclusion of field testing, coordinate with the UIT Project Manager to schedule a Witnessed Random Sample Testing of (up to 10 percent of) the installed links in each wiring closet.
4. Should the Witnessed Random Sample Testing results differ significantly from the original test results or display a fail result, Contractor shall resolve all conditions causing the failed test and, under supervision of the UIT Project Manager, repeat all testing at no cost to Owner.

3.3   CLOSE-OUT DOCUMENTATION

A. Red Line Drawings: Contractor shall keep one full-size set of Drawings at the Project Site during working hours with installation progress marked and outlet labels noted. Red Line Drawings shall be available for examination during construction meetings and field inspections.

B. Provide files in .dwg, .rvt and .pdf formats showing Drawings with room numbers and actual outlet locations and labeling. Submit within 5 business days of final cable testing.

C. For Wi-Fi network infrastructure, provide the final WAP location map (PDF) and spreadsheet (MS Excel) with WAP location information that includes the MAC address, room number, IDF number and switch port number (see example below).

Sample of Excel File with WAP information

AP Name	AP Model	MAC Address	Room #	IDF #	Switch Port #
563-0100N-HW	AP320i	00:0c:e6:08:18:f4	100N	IDF 105	1/0/11
563-0107B-CT	AP320i	00:0c:e6:07:91:1f	107B	IDF 105	1/0/15
563-00102-HW	AP320i	00:0c:e6:07:8f:65	102	IDF 105	1/0/17

END OF SECTION 27 1500