SECTION 271500

COMMUNICATIONS HORIZONTAL CABLING

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**NOTE TO SPECIFIER**

*Use this Specification Section for Mail Processing Facilities.*

***This is a Type 3 Specification with primarily required text; therefore, most of the text cannot be edited, but there is editable text which is noted within the Section with a “Note to Specifier.” Do not revise the required paragraphs without an approved Deviation from USPS Headquarters, Facilities Program Management, through the USPS Project Manager.***

*For Design/Build projects, do not delete the Notes to Specifier in this Section so that they may be available to Design/Build entity when preparing the Construction Documents.*

*For the Design/Build entity, this specification is intended as a guide for the Architect/Engineer preparing the Construction Documents.*

*The MPF specifications may also be used for Design/Bid/Build projects. In either case, it is the responsibility of the design professional to edit the Specifications Sections as appropriate for the project.*

*Text shown in brackets must be modified as needed for project specific requirements.* *See the “Using the USPS Guide Specifications” document in Folder C for more information.*

*The last date that USPS revised this standard specification section occurs in two places, at the end of this section and in the Table of Contents. If the date in this section matches the date in the Table of Contents, then you are using the latest version. Do not delete or revise the “last revised” date at the end of the section during the development of the Project Manual.*

*The footer in this section should be edited to replace the text, “USPS MPF SPECIFICATION” with the project name, and the blank date in the center should be replaced with the submission date, for interim design reviews, or the issue date of the completed Project Manual.*

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1. GENERAL
   1. SUMMARY
      1. Section includes the following structured cabling system components:
         1. Category 6/6A copper communication cable.
         2. Termination equipment.
         3. Patching equipment.
         4. Category 6/6A copper testing.
      2. Related Documents:
         1. Specified in Section 270500 – Common Work Results for Communications.
      3. Related Sections:
         1. Specified in Section 270500 – Common Work Results for Communications.
   2. REFERENCES
      1. Specified in Section 270500 – Common Work Results for Communications.
   3. SYSTEM DESCRIPTION
      1. Specified in Section 270500 – Common Work Results for Communications.
   4. SUBMITTALS
      1. Specified in Section 270500 – Common Work Results for Communications.
   5. QUALITY ASSURANCE
      1. Specified in Section 270500 – Common Work Results for Communications.
   6. DELIVERY, STORAGE, AND HANDLING
      1. Section 016000 – Product Requirements: Transport, handle, store, and protect Products.
      2. Deliver in accordance with NEMA WC 26.
2. PRODUCTS
   1. CATEGORY 6/6A (CATEGORY 6A IS FOR WIRELESS USE ONLY) HORIZONTAL CABLING
      1. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
         1. Belden.
         2. Berk-Tek.
         3. CommScope Uniprise.
         4. General Cable.
         5. Leviton.
         6. Ortronics (Legrand).
         7. Panduit.
         8. Hitachi (Drybit).
         9. Product options and substitutions. Substitutions: Not permitted.
      2. Conductors: 4 twisted pair, minimum #23 AWG, solid copper.
         1. Individually insulated plenum rated conductors under common plenum rated sheath unless entire cable is installed within conduit/EMT or if area where cable is installed is not considered a return air plenum according to any applicable codes.
         2. Complies with individual characteristics established in TIA-568-C, and all addendums for Category 6/6A cable performance specification.
         3. Nominal Impedance: 100 ohms plus or minus 15 percent.
         4. Category 6 cabling shall be “blue” in color and certified as capable of performing to a minimum of 250 MHz.
         5. Category 6A cabling shall be “white” in color and certified as capable of performing to a minimum of 500 MHz.
   2. CATEGORY 6/6A / (CATEGORY 6A WIRELESS USE ONLY), COPPER PATCH CORDS
      1. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
         1. Belden.
         2. Berk-Tek.
         3. CommScope Uniprise.
         4. General Cable.
         5. Hitachi (Drybit).
         6. Leviton.
         7. Ortronics (Legrand).
         8. Panduit.
         9. Product options and substitutions. Substitutions: Not permitted.
      2. Conductors: Straight through type 4 twisted pair minimum #23 AWG, stranded copper.
         1. Terminated with male 8-pin modular plugs.
         2. Complies with individual characteristics established in TIA-568-C, and all addendums for Category 6/6A cable performance specification.
         3. Nominal Impedance: 100 ohms plus or minus 15 per cent.
         4. Match performance and impedance characteristics of the installed horizontal unshielded twisted pair cable.
         5. Contractor shall provide Category 6/6A copper patch cord for 75 percent of the total copper ports installed. Example: 1000 copper ports installed, provide 750 Category 6/6A copper patch cords. Contractor shall provide manufacturer terminated patch cables. Category 6 patch cord lengths shall be determined by Raleigh IT Service Center SME.
         6. Each patch cord shall have a plastic arch for ease of removal of the connector. Preferred copper patch cord type: Ortronics (Legrand) non-booted.
         7. Patch cords shall be factory made, tested and certified.
         8. All Category 6A patch cords shall be “white” in color and certified as capable of performing to a minimum of 500 MHz. All WAP Category 6A patch cords will be 3 feet on the WAP end.
         9. All category 6 patch cords shall be “blue” in color and certified as capable of performing to a minimum of 250 MHz.
      3. Connector:
         1. 8-pin modular, Category 6/6A, non-keyed.
         2. Complies with TIA-568-C “T568A” pinning configuration.
         3. Color: Clear.

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**NOTE TO SPECIFIER**

Delete Sections 2.3, 2.4 and 2.5 if CP-1 is not used.

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* 1. CATEGORY-6 12 PORT MODULAR SURFACE-MOUNTED "110"-STYLE PATCH PANELS CONSOLIDATION POINTS (CP-1). TYPE 1
     1. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
        1. CommScope Uniprise.
        2. Ortronics (Legrand).
        3. Panduit.
        4. Product options and substitutions. Substitutions: Not permitted.
     2. Boxes/Panels:
        1. Capable of terminating 12 Category 6 cables.
        2. Equipped with an 89D surface mounting bracket.
        3. Complies with TIA-568-C “T568A” pinning configuration.
     3. Connector:
        1. 8-pin modular, Category 6, non-keyed.
        2. Complies with TIA-568-C “T568A” pinning configuration.
        3. Color: Selected by the USPS IT Project Manager.
        4. Attached to backboard of CP-1 with 89-D type bracket.
     4. Housing
        1. Wall or raceway mounted outlet enclosure, CP-1.
        2. Able to contain 12 modular 8-pin connectors
        3. Installation over single gang junction box, double gang junction box, or raceway knockout as indicated on Drawings.
        4. Color: Selected by the USPS IT Project Manager.
  2. TYPE 1 CONSOLIDATION POINT (CP-1) FOR WORKROOM FLOOR ENCLOSURES
     1. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
        1. Hoffman Enclosures, Inc.
        2. Rittal Corporation: (AE, or EB Series enclosures).
        3. Product options and substitutions. Substitutions: Not permitted.
     2. Enclosures:
        1. Must be metal, no plastic allowed. Minimum 12 inches high x 12 inches wide x 8 inches deep sheet steel NEMA-12 enclosure with hinged, lockable door with rubber gasket, mounted at 14 feet AFF. Alternate size: 14 inches high x 16 inches wide x 6 inches deep.
        2. Door must be oriented so that it opens in a horizontal manner. Enclosure may not be mounted in a manner so that the door opens downward.
        3. The total cable length to the TE, TR or CCR shall be permanently labeled on the inside cover.
  3. OUTLET FACEPLATES/MOUNTING FRAMES
     1. Wall mounted, or raceway mounted outlet faceplates or mounting frames, suitable for the following:
        1. Mounting required number of 8-pin modular connectors.
        2. Use with approved 8-pin modular connectors.
        3. Installation over single gang junction box, double gang junction box, or raceway knockout as indicated on Drawings.
     2. Color: White with Machine manufactured permanent labeling with Black lettering.
  4. CONDUITS, BOXES AND CABLE TRAYS
     1. Specified in Section 260533 – Raceway and Boxes for Electrical Systems.

1. EXECUTION
   1. EXAMINATION
      1. Specified in Section 270500 – Common Work Results for Communications.
   2. INSTALLATION
      1. Cables: Provide communications cables as specified, in accordance with Cable Termination Schedules, manufacturer's published instructions, TIA-568-C including all addendums and as indicated on Drawings.
         1. Dress cable to final location, remove sheath to point allowing splaying of conductors, and terminate. Make each termination uniform and precise. Hook and loop cable straps shall be used for bundling and dressing all cabling. No nylon zip ties shall be used for cable bundling or attachment.
         2. Maintain manufacturer's twisting of wire pairs to termination point. Do not attempt to restore, modify, or add to manufacturer’s twisting of cable. Do not untwist more than 1/2 inch of the stripped cable.
         3. Label each end with a machine generated, self laminating label.
         4. Mechanical couplers or splices not permitted in copper or fiber cabling.
         5. Cable conductors shall be continuous from originating termination equipment to destination termination equipment.
      2. Telecommunications Outlet: Provide appropriate number of female 8-pin modular jack connectors on one face plate at each T/O (telecommunications outlet) as indicated on Drawings.
         1. Install faceplate over duplex outlet box, double duplex outlet box, or raceway knockout, level and in alignment with adjacent faceplates.
         2. Except where entire cable run is in conduit/EMT, provide a minimum 20-foot service loop in the ceiling at the end of the conduit/EMT riser before the cable enters the outlet box.
         3. Coordinate color with Raleigh IT Service Center POC.
   3. CAT-6/6A COPPER TESTING
      1. Section 014000 – Quality Requirements: Field testing and inspection.
      2. Testing and Certification Overview
         1. The Contractor shall provide Fluke Copper equipment and materials for the testing of all installed copper transmission media. For Category 6 copper, the supplier shall employ Level III compliant test equipment that stores the test results in internal memory and produces test result reports. For Category 6A, the supplier shall employ Level IV compliant test equipment that stores the test results in internal memory and produces test result reports. The supplier shall provide the USPS, test results in test equipment format (raw electronic). Supplier prepared spread sheets and PDF files are not acceptable.
            1. The USPS technical representative may conduct random tests of copper cable with USPS test equipment as part of the final inspection. Contractor to re-terminate and retest any cable found to be defective.
            2. Provide all equipment and services necessary to secure and provide the USPS a system warranty. Inspect installation of cables and equipment during and at completion of installation.
            3. Test results indicating “Pass\*(Star)” or “Fail” shall not be accepted and must be repaired/retested with second set of test results submitted to USPS.
            4. Test results must be uploaded to the “Link Ware Live” cloud based repository for USPS RITSC access.
      3. Copper Cable Testing
         1. Test parameters include, but are not limited to:
            1. Wire Map
            2. Length
            3. Propagation Delay
            4. Delay Skew
            5. DC Loop Resistance
            6. Insertion Loss (Attenuation)
            7. Return Loss (RL), RL @ Remote
            8. NEXT, NEXT @ Remote
            9. Attenuation-to-crosstalk Ratio (ACR-N), ACR-N @ Remote
            10. ACR-F (ELFEXT), ACR-F @ Remote
            11. Power Sum ACR-F (ELFEXT), PS ACR-F @ Remote
            12. Power Sum NEXT, PS NEXT @ Remote
            13. Power Sum ACR-N, PS ACR-N @ Remote
            14. Power Sum Alien Near End Xtalk (PS ANEXT)
            15. Power Sum Alien Attenuation Xtalk Ratio Far End (PS AACR-F)
            16. Alien Cross-talk
         2. Cable test parameters shall be set to the manufacturer’s values for NVP and Test Limit (TIA-568-C, Category 6/6A, Permanent Link). If the NVP is not set correctly, test results will be rejected.
         3. Perform end-to-end tests of each 4-pair cable as follows:
            1. Pair/conductor for proper pinouts and continuity.
            2. Ground fault.
            3. Proper termination, shorts, and crossed pairs.
            4. Channel attenuation per TIA-568-C, including all addendums.
            5. Channel bi-directional worst case near end cross talk (NEXT) at frequencies up to 250 MHz (category 6) or 500 MHz (category 6A), per TIA-568-C, including all addendums.
            6. Measured effective cable run length.
   4. INSTALLATION COMPONENTS
      1. Specified in Section 270500 – Common Work Results for Communications.
   5. CONSTRUCTION
      1. Specified in Section 270500 – Common Work Results for Communications.
   6. FIELD QUALITY CONTROL
      1. Specified in Section 270500 – Common Work Results for Communications.

END OF SECTION

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