SECTION 270500

COMMON WORK RESULTS FOR COMMUNICATIONS

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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

1.1 SUMMARY

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**NOTES TO SPECIFIER**

Edit Paragraphs A, B, and C below as needed to coordinate with project scope of work.

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* + 1. Section includes the following structured cabling system provisions:
			1. Pre-Construction Design Review/Monthly Status Meetings.
			2. Pre-Work Submittals.
			3. Contractor RCDD/Installer requirements.
			4. Labeling.
			5. Post-Work Close-Out Submittals.
		2. Related Documents:
			1. The Contract Documents, as defined in Section 011000 – Summary of Work, apply to the Work of this Section.
			2. USPS Structured Cabling System Best Practices, 01 October, 2022.
			3. Cable Termination Schedule – Template.
			4. “Sample” Fiber Backbone Schematic.
			5. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
		3. Related Sections:
			1. Section 078400 – Fire stopping.
			2. Section 260500 – Common Work Results for Electrical.
			3. Section 260533 – Raceway and Boxes for Electrical Systems.
			4. Section 271100 – Communications Equipment Room Fittings.
			5. Section 271300 – Communications Backbone Cabling.
			6. Section 271500 – Communications Horizontal Cabling.
			7. Section 272133 – Data Communications - Wireless Access Points.
			8. Section 275319 – Distributed Antenna System (DAS).
	1. REFERENCES
		1. Conform to the current Edition of the following documents:
			1. TIA-568.0-*X* - Generic Telecommunications Cabling for Customer Premises.
			2. TIA-568.1-*X* - Commercial Building Telecommunications Infrastructure Standard.
			3. TIA-568-C.*X* – Twisted-Pair Copper Cabling and Components Standard.
			4. TIA-568.3-*X* – Optical Fiber Cabling and Components.
			5. TIA-568-C.*X* – Broadband Coaxial Cabling and Components.
			6. TIA-569 - Telecommunications Pathway and Spaces.
			7. TIA-570 - Residential Telecommunications Infrastructure Standard.
			8. TIA-598 - Fiber Optic Color Codes.
			9. TIA-607-*X* - Generic Telecommunications; Bonding and Grounding (Earthing) for Customer Premises.
			10. TIA-758 - Customer-Owned Outside Plant Telecommunications Infrastructure Standard.
			11. TIA-526-7 - Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant.
			12. TIA-526-14 - Optical Power Loss Measurement of Installed Multimode Fiber Cable Plant.
			13. BICSI Telecommunications Distribution Methods Manual (Latest Edition including all addendums).
			14. IEEE 1100 – Recommended Practice for Powering and Grounding Electronic Equipment (The Emerald Book).
		2. National Electrical Manufacturer's Association (NEMA):
			1. NEMA WC 26 - Wire and Cable Packaging (Current Version adopted by the State, per NFPA website).
		3. National Fire Protection Association (NFPA):
			1. NFPA 70 - National Electrical Code (Current Version).
		4. Regulatory Requirements:
			1. Conform to requirements of Current NFPA 70.
			2. Products: Listed and classified by Underwriter's Laboratories Incorporated as suitable for the purpose specified and indicated.
			3. Perform Work that interfaces with Telephone Utility Company in accordance with Telephone Utility Company rules and regulations.
			4. Conform to current TIA standards and current BICSI TDMM for telecommunications installation.
		5. Fire Stopping
			1. Fire stop penetrations of fire-resistive rated assemblies as specified in Section 078400 – Fire Stopping.
	2. PRE-CONSTRUCTION DESIGN REVIEW/MONTHLY STATUS MEETINGS
		1. Pre-Construction Review Meetings:
			1. Convene Issued for Construction (IFC) Review meeting with USPS IT Service Center representative.
			2. Require attendance of parties directly affecting Work of this Section. The USPS telecommunications system representative for Mail Processing Facilities projects will be the Raleigh Information Technology Support Center (RITSC) Subject Matter Expert, Area Maintenance Representative, Local Maintenance Manager, and the District IS Manager or his representative.
			3. Review conditions of operations, procedures, and coordination with related Work.
			4. Agenda:
				1. Tour, inspect, and discuss building conditions relating to communications cabling and equipment.
				2. Coordination with Telephone Utility Company (LEC) and the USPS telecommunications system representative will be by the Raleigh Service Center IT SME through the USPS Project Manager.
				3. Review exact location of each network related item within building construction, casework, and fixtures and their requirements.
				4. Review/Approve required Pre-Work Submittals.
				5. Review Drawings and Specifications.
				6. Review and finalize construction schedule related to voice and data installation, verify availability of materials, personnel, equipment, and facilities needed to complete project and avoid delays.
				7. Review required labeling process, inspections, and testing.
				8. Review cable routing and support.
		2. Convene re-occurring Monthly Status Meetings at the construction site with Local Maintenance Manager, Raleigh IT Service Center SME representative and District IS Manager.
	3. SUBMITTALS

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**NOTES TO SPECIFIER**

A/E will need to share submittals with the Raleigh IT SME for their review.

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* + 1. Installer qualifications:
			1. Name and cell phone number of full-time BICSI RCDD on staff and copy of RCDD certification. Provide RCDD monthly site visit schedule during the construction period and copies of the reports.
			2. Name of full time BICSI TECH on staff and copy of TECH certification for the Lead Installer to be onsite, 5 days a week minimum.
			3. Name of full time BICSI Installers (INST1 minimum certified).
		2. Product Data: Provide detailed data sheet clearly showing manufacturer Unit Price, Total Price, Model Number, Part Number, color, length, quantity for each material or equipment item specified. Including, but not limited to, backbone fiber, horizontal copper, patch panels, bonding busbars, wire baskets, ladder trays, wire managers (horizontal and vertical), equipment racks, patch cords, fiber interconnect panels, UPS’s, rack mounted power strips.

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**NOTES TO SPECIFIER**

A “Cable Termination Schedule Template” and a “Sample Fiber Backbone Schematic” are included in the Building Design Standards, Folder F.5, Structured Cabling Installation. The SCS subcontractor shall utilize the template and schematic to identify each cable terminated at the copper and fiber patch panel ports.

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* + 1. Project Documents: The following documentation shall be provided before installation of cabling.
			1. Proposed copper cable termination schedules identifying each cable terminated at the copper patch panel ports. Termination schedule shall be provided to USPS IT in printed form on CD-ROM.
			2. Proposed fiber backbone schematic showing a visual representation of the fiber port connections for each distribution center within the CCR, TR’s and TE’s. Schematic shall be provided to USPS IT in a USPS compatible version of AutoCAD.
			3. Proposed cable routings shall be provided with cable plant depicted on floor plans. The drawings must identify location of all T/Os (Telecommunications Outlets), TR/TE’s (Telecommunication Rooms / Enclosures), Consolidated Computer Room (CCR) and any other installed component of the cabling solution. Show actual routing of the cable bundles (pathways) and backbone cables on the floor plans. Drawings shall be provided to USPS IT in a USPS compatible version of AutoCAD.
				1. Labeling shall conform to the USPS labeling guidelines. All 48 port Copper Patch Panels in the CCR, TR’s or TE’s shall be labeled 1 thru the end port number. For any questions, contact RITSC SME for clarification.
				2. A detailed cable termination record will be provided in sufficient detail, so that:

Telephone Utility Company or telephone interconnect company can install cross connects.

Postal Service users can install and maintain patch cords at patch panel fields.

The location and size of the service entrance conduits are known.

* 1. INSTALLER QUALIFICATIONS
		1. Installer: Minimum of one BICSI certified Technician on the job site at all times with documented formal training in the installation of Category 6, Category 6A and fiber optic cabling systems. 50% of onsite installers shall possess a certification for a total systems solution being installed from the manufacturer of the cabling and terminating hardware. The contractor must present these certifications to the Raleigh IT SME before beginning work.
		2. Installer Company: Full time BICSI RCDD with current credentialing on staff. Company specializing in the installation of Category 6, Category 6A, and single-mode fiber optic Structured Cabling Systems with a minimum of 5 years documented experience. Installation certification – 50% of Low voltage installers must be trained by the manufacturer and currently certified to install manufactures product line of copper/fiber wiring. Provide current installer certifications before doing any copper or fiber installations. This certification is part of the 15 year warranty.
		3. Lead Installer: Minimum of BICSI Technician Certification.
	2. LABELING
		1. Furnish and install machine generated labels.
		2. Patch Panels, CP1 Enclosures, and Outlet Faceplates: Display outlet or cable identification number in uppercase lettering on permanent machine generated adhesive label stock. Each individual port requires a port number label. The faceplate cannot be labeled as a range.
		3. Label the Consolidated Computer Room as CCR and TR/TE’s as 1-01, 1-02, 1-03, etc. Example: 3rd TE for mail processing on the first floor: TE 1-03.
		4. Label all copper patch panel ports in a horizontal fashion left to right in numerical sequence. Example: If there are seven 48 port copper patch panels in a rack, the ports are numbered consecutively from port 1 all the way through 336.
		5. Label all (TE) Workroom Floor locations with a minimum of 18 inch high letters, contrasting color, block letters mounted on all three sides of the TE. Black letters for the metal sides and orange for the glass door is acceptable. Example: TE 1-02 on the three visible sides in contrasting colors.
		6. Label all (WRF) Workroom Floor CP-1 NEMA-12 housing units with a minimum of six inch, black, block letters affixed to the outside of the enclosure. Label shall include the port numbers at the TE/TR/CCR.
			1. The total cable length to the TE, TR or CCR shall be permanently labeled on the inside cover of the enclosure.
		7. All CP-1 type terminations will be labeled alphabetically. Example: First CP-1 would be labeled CP-1A, the second CP-1 would be labeled CP-1B, the third CP-1C, etc.
		8. CP-1s will have the following Patch Panel Port assignments. Example: (CP-1A Ports 1-12), (CP‑1B Ports 13-24) (CP-1C Ports 25-36), (CP-1D Ports 37-48), (CP-1E Ports 49-60) \* Note CP‑1E begins on the second patch panel numerically numbered ports 49 – 96.
		9. Label Copper Patch Panel ports in the order the cables were terminated beginning with all CP-1 type terminations, followed then by T/O terminations in the order of six-plexes, quads and triplexes.
		10. Label telecommunications outlet faceplate and CP-1 location in the same manner as the patch panel.
		11. Display cable identification number in black uppercase lettering on machine generated permanent adhesive self-laminating label of contrasting color from cable sheath.
		12. Place labels on each end of cable, maximum 6 inches from cable termination.
	3. CLOSEOUT SUBMITTALS
		1. Test Reports: Submit to the Raleigh Service Center IT SME through the USPS Project Manager from Testing Laboratory.
		2. Prepare reports in conformance with Section 014000 – Quality Requirements.
		3. Provide end-to-end tests.
		4. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
		5. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals. Deliver prior to Final Acceptance.
		6. Comprehensive test results for Category 6, Category 6A and fiber optic certification of cable plant per specifications of TIA/EIA-568-C, and all addendums. Immediately following new Category 6/6A copper and single-mode fiber installation, submit raw test results via e-mail to the Raleigh IT Service Center representative who will be performing copper and fiber site acceptance. All testing must be performed using an industry standard compliant test device. Test results must be furnished in format used by testing device. Vender generated spreadsheets or PDF’s are not acceptable. Paper test results are not acceptable. There is a USPS 10MB attachment limit. USPS cannot access file sharing sites.
		7. Project Record Documents: Accurately record the following as-built documentation:
			1. Final copper cable termination schedules, in printed form on CD-ROM.
			2. Final fiber backbone schematic showing a visual representation of the fiber port connections for each distribution center within the CCR, TR’s and TE’s. Schematic shall be provided to USPS IT in a USPS compatible version of AutoCAD.
			3. Cable routings (as-built drawings) shall be provided with cable plant depicted on floor plans prior to acceptance. The drawings must identify location of all T/Os (Telecommunications Outlets), TR/TE’s (Telecommunication Rooms / Enclosures), Consolidated Computer Room (CCR) and any other installed component of the cabling solution. Show actual routing of the cable bundles (pathways) and backbone cables on the floor plans. Provide master overall set plus one set for each TR/TE which will detail T/O’s and CP’s served by that TR/TE. As-built drawings shall be provided to USPS IT electronically in a USPS compatible version of AutoCAD on a CD-ROM.
		8. Operations and Maintenance Data: Data including wiring diagrams, parts lists, shop drawings, product data, manufacturer's instructions for cables and equipment and certifications identified above shall be provided.
		9. Total Systems Solution Warranty: Minimum 15 year warranty from both manufacturer of cabling as well as connecting hardware when installed together according to predetermined manufacturers’ specifications. Installer shall possess certifications from manufacturers of the components installed as a total systems solution and must present said certifications to the contracting officer through the USPS Project Manager in advance of beginning the Work.
1. PRODUCTS
	1. CONDUITS, BOXES AND CABLE TRAYS
		1. Specified in Section 260533 – Raceway and Boxes for Electrical Systems.
2. EXECUTION
	1. EXAMINATION
		1. Verification of Conditions: Verify that field measurements, surfaces, substrates, and conditions are as required, and ready to receive Work.

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**NOTES TO SPECIFIER**

Only delete paragraphs below not needed for project scope of work.

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* 1. INSTALLATION GUIDELINES
		1. Special requirements for cable routing and installation:
			1. The majority of the structured cabling system wiring in this building will be installed above ceilings without conduit. All cabling used throughout this project shall comply with the requirements as outlined in the National Electric Code (NEC) article 725. All cabling shall bare CMP and/or appropriate markings for the environment in which they are installed. All interior cables shall be CMP rated.
			2. Where cables pass through partitions, walls and floors, provide properly bushed conduit sleeves to allow passage of the cabling.
			3. Sealing of openings for cable pass through between floors and fire rated walls and partitions shall be provided in accordance with section 078400 - Firestopping.
				1. The USPS Project Manager shall be the final authority in approving firestopping materials and methods.
		2. Support cables installed in ceiling spaces with cable tray and/or wide-base J-hooks Category 6/6A compliant suspension devices, anchored to building ceiling structural steel (red iron).
			1. Maximum spacing between supports: Non-continuous supports shall be installed at intervals not exceeding 5 feet.
			2. Maximum Number of 4 Pair Cables per support: 25.
			3. Furnish and install additional supports as required.
			4. Install complete cable support device system before starting installation of cable.
				1. Installation of cable before completion of support system not permitted.
				2. Unsupported cable not permitted.
			5. Organize and group cables. Install cable group as single run through ceiling spaces following column and building lines. Do not install cable group runs diagonally across center of building.
			6. Install armored fiber optic cabling in cable tray or approved support solution.
			7. Cabling will not be suspended from any electrical conduits, HVAC ducts, sprinkler systems, gas, or water pipes, etc.
			8. Cabling will not be attached to suspended ceiling grid system.
			9. Cabling system shall be installed in approved suspension devices for telecommunications cabling.
			10. Vertical runs of backbone and horizontal cabling (e.g.: cabling exiting thru-wall penetrations) shall be equipped with factory manufactured cable drop out fittings and kellums cord grips to properly support the cabling at the vertical bends.
		3. Cable trays shall be required for areas of heavy cable concentration including but not limited to CCRs, TR/TE’s, exposed workroom areas and large administrative hallways.
			1. Maximum spacing between each cable tray support: Specified by manufacturer of cable tray.
			2. Maximum number of cables supported by cable tray: Specified by manufacturer of cable tray not-to-exceed 40% fill ratio. Install additional cable tray or wire basket as needed to maintain 40% Maximum Fill Ratio.
			3. Install complete cable tray system before starting installation of cable.
				1. Installation of cable before completion of tray system not permitted.
				2. Cabling shall not be bundled within cable tray.
				3. Provide factory manufactured cable drop-out fittings for transportation of cabling entering or exiting the cable tray.
			4. Cable/Ladder trays, wire mesh tray or solid bottom cable tray shall be provided as specified in USPS MPF specification section 260533, paragraph 2.12.
				1. Provide equipment “drop off” fittings for cord drops and factory sweep corners for all changes in direction.
		4. Cabling routed underground, or exterior of the building, or through inaccessible ceilings shall be contained in conduit. Provide flush boxes within finished areas and surface mounted, cast aluminum, ”FD” factory boxes in unfinished areas. Provide 3/4 inch conduit risers with 90 degree bend and bushing for all T/O’s.
			1. Conduit/EMT, cable tray or wire basket shall be used in the ceiling of the workroom floor where a suspended ceiling system is not present. Cabling within exposed workroom areas, not routed within cable trays, must be contained within conduit raceways (3/4 inch minimum).
			2. All conduit stubs must have a plastic bushing/collar installed at each end.
			3. All conduit runs require an accessible pull-string in each conduit.
			4. Interior conduits shall be a minimum of 3/4 inch in diameter. Conduits shall adhere to the 40 per cent fill ratio.
			5. No conduit is to be buried directly in the slab.
			6. There shall be no more than 180 degrees of bend in a conduit longer than 30 feet. All conduits that are comprised of more than two (2) ninety degree bends or a reverse bend shall have a properly installed pull box. Pull boxes shall be 12 x 12 x 6 inches for up to 1-inch EMT, 18 x18 x 8 inches for up to 1-1/2 inch EMT. Ninety degree bends in fiber runs shall be installed using dual forty-five degree bends.
			7. Under no circumstances shall a pull box be used to change direction of a conduit. All conduits shall be installed in a manner so that cabling passes directly through the pull box without changing direction.
			8. Underground service and interbuilding conduits shall be a minimum of four 4-inch diameter, buried minimum of 36 inch BFG, equipped with heavy wall rigid galvanized steel conduit elbows and risers and marked with red magnetic warning tape, refer to Module 1, 5-2.7.2. Conduits shall adhere to the 40 per cent fill ratio and each 4 inch conduit shall be provided with 3-cell mesh, fabric innerduct equipped with individual pull strings.
				1. Basis of Design: MaxCell “Edge”-Flexible, 3-cell, fabric innerduct.
		5. Route cable for T/O (telecommunications outlets) as follows:
			1. Wall Mounted: Through ceiling spaces to conduit stub-ups or junction boxes. Include drag lines.
			2. Furniture System Cable Raceway: Point of entry to outlet.
			3. Floor Outlet Box: Through under floor conduit to box requires prior approval from USPS.
			4. Column Mounted-Workroom Floor: Through surface mount conduit stubs to junction box or cable tray.
			5. Consolidated Computer Room: Along ladder rack from rack to locations to be run in ladder tray / basket tray.
		6. Communications cabling and fixtures shall have minimum separation from the following devices:
			1. Non-Shielded Electrical Cables: 12 inches.
			2. Fluorescent Light Fixtures: 12 inches.
		7. Cross electrical cables with communications cables at 90 degrees only. Data cables shall not run parallel with electrical cables, unless separated by 12 inch minimum.
		8. Comply with cable manufacturers minimum bend radius requirements. For Category 6/6A, minimum bend radius shall be no less than 4 times diameter of outer sheath of cable. For Fiber optic cabling, minimum bend radius shall be no less than 10 times diameter of outer sheath of cable.
			1. Do not stretch, stress, tightly coil, bend or crimp cables.
			2. Replace cables that are severely stressed during installation at no additional cost to USPS.
			3. Any armored cable that has had its armor sheathing broken shall be replaced in its entirety, end to end at no additional cost to USPS.
		9. Cabling installed in plenum or non-plenum air returns.
			1. All interior cabling installed shall be CMP plenum rated.
		10. Cable Run Lengths: Route cables so that cable run length does not exceed recommended maximum distance.
			1. UTP cabling from the back of the patch panel to the Telecommunications Outlet (T/O) is limited to a maximum total run of 295 feet and 230 feet for CP-1 Consolidation Points on the work room floor. Minimum cable run length between back of patch panel and type 1, consolidation points shall be 49 feet per TIA-568-C
			2. Cable conductors shall be continuous (“homerun”) from originating termination equipment to destination termination equipment.
		11. Cables: Furnish and install 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 conductor, and terminate. Make each termination uniform and precise. Hook and loop cable straps shall be used for bundling and dressing all cabling on manufacturer supplied Strain Relief Bars. No nylon zip ties shall be used for cable bundling or attachment. No wire managers will be used/substituted for Strain Relief Bars.
			2. Maintain sheath integrity. Remove minimum amount of sheath required for termination up to a maximum of 1/2-inch.
			3. 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.
			4. Label each end with a machine generated, self-laminating label.
			5. Mechanical couplers or splices not permitted in fiber or copper cabling.
			6. A fiber optic service loop of sheathed fiber no less than 20 feet at each end of a fiber optic cable shall be installed at each termination point in/on the wire basket/ladder tray. All service loops shall be installed so that the minimum bend radius (10 times the outside diameter of the fiber) is maintained. All service loops shall be installed outside of the fiber optic termination housing. Once the fiber reaches the entrance point of the fiber optic enclosure, there shall be no less than 3 feet of unsheathed fiber installed neatly in the fiber optic storage tray prior to terminations being installed. Unsheathed fiber shall be installed in the storage tray per the fiber optic enclosures manufacturer’s instructions.
			7. When installing Armored Fiber Optic cabling, proper telecom bonding techniques to bond the metallic member of the Armored Fiber Optic Cable must be maintained. Armored fiber will be bonded on the CCR/TR/TE end only to the “SBB”.

END OF SECTION

USPS MPF Specification Last Revised: 10/1/2022