SECTION 281524

IP video intercom and exterior gate control SYSTEM

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**NOTE TO SPECIFIER**

*Use this Specification Section for Mail Processing Facilities.*

***This is a Type 2 Specification with primarily editable text; therefore, most of the text can be edited, but there is some required text which is noted within the Section with a “Note to Specifier.” Do not revise these 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.*

**Refer to standard detail P5-7-4q4 for the design of a typical video intercom system riser.**

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1. GENERAL
	1. SCOPE
		1. Provide an IP video intercom system complete with door and gate controls for the exterior motorized gates and employee entrances. Provide multiple master control units and video door stations as shown on the drawings.
	2. SUMMARY
		1. Section Includes:
			1. Video master control station.
			2. High power PoE+ switch.
			3. Video door stations.
			4. Category-6 and fiber cabling.
			5. Fiber distribution patch panels.
			6. Fiber media converters.
			7. UPS unit.
			8. Spare parts.
		2. Related Sections:
			1. Section 260500 - Common Work Results for Electrical.
			2. Section 264128 - Surge Protective Devices (SPD).
			3. Section 281304 - Enterprise Physical Access Control System.
	3. REFERENCES
		1. Electronic Industries Association (EIA):
			1. ANSI/TIA/EIA-568 - Commercial Building Telecommunications Cabling Standard.
			2. ISO 9001:2015 – Quality Management Systems – Requirements.
		2. National Fire Protection Association (NFPA):
			1. NFPA 70 - National Electrical Code.
	4. SUBMITTALS
		1. Procedures for submittals.
			1. Product Data: Manufacturer's data sheets on each product to be used, including:.
				1. Preparation instructions and recommendations.
				2. Storage and handling requirements and recommendations.
				3. Installation methods.
			2. Shop Drawings: Submit the following:
				1. Wiring Diagrams: Indicate wiring for each item of equipment and interconnections between items of equipment.
				2. Include manufacturer's names, model numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts.
			3. Installation and Operation Manuals:
				1. Submit manufacturer's installation and operation manual, including operation instructions and component wiring diagrams.
				2. Provide detailed information required for the Postal Service to properly operate equipment
		2. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.
		3. Maintenance Data: For equipment to include in maintenance manuals specified in Division 1.
		4. Assurance/Control Submittals:
			1. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
			2. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.
		5. Procedures for closeout submittals.
			1. Operating and Maintenance Data: Operating and maintenance instructions, parts lists and wiring diagrams.
			2. Submit written special warranty with forms completed in United States Postal Service name and registered with manufacturer as specified in this Section.
		6. Warranty: Submit manufacturer’s and installer’s 2-year warranty for full parts and labor.
	5. QUALITY ASSURANCE
		1. Qualifications:
			1. Manufacturer: ISO 9001.2015 Certified Company specializing in manufacturing products specified with minimum 5 years documented experience.
			2. Installer: Factory trained and experienced Company specializing in performing the work of this section with minimum 5 years documented experience and an authorized representative of equipment manufacturer for both installation and maintenance of equipment.
		2. Regulatory Requirements:
			1. Conform to requirements of NFPA 70 and UL 50.
			2. Products: Listed and classified by Underwriter's Laboratories Incorporated as suitable for the purpose specified and indicated.
	6. DELIVERY, STORAGE, AND HANDLING
		1. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
		2. Storage: Store materials in clean, dry area indoors in accordance with manufacturer's instructions.
		3. Handling: Protect materials during handling and installation to prevent damage.
	7. PROJECT CONDITIONS
		1. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
2. PRODUCTS

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**NOTE TO SPECIFIER**

REQUIRED: Do not modify the Acceptable Manufacturer.

Verify manufacturer information, product numbers, and availability at time of Project Manual preparation for Project. Report any discrepancies to the USPS Project Manager; an approved deviation may be necessary if the product has changed.

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* 1. MANUFACTURERS
		1. Acceptable Manufacturer: Aiphone Corp., which is located at: 6670 185th Ave. NE; Redmond, WA 98052; Toll Free Tel: 800-692-0200; Tel: 425-455-0510; Fax: 425-455-0071; Web: www.aiphone.com.
			1. Regional Sales Manager: Robert Hilt; Tel: 813-365-4403; e-mail: robert.hilt@aiphone.com.
			2. Director of Sales – South: Spencer Britenstine; Tel: 614-286-8925; e-mail: spencer.britenstine@aiphone.com.
		2. IP Video Intercom System: IX Series Intercom System as manufactured by Aiphone Corporation.
		3. Substitutions: Not permitted.
		4. On-Site Assistance: Engage a factory-authorized service representative to provide on-site assistance in adjusting sound levels, video images and controls to meet occupancy conditions. Provide up to three on-site assistance visits within one year of Substantial Completion.
	2. SYSTEM DESCRIPTION
		1. IP Network Compatible Video Intercom System: A network-based communication and security system featuring video entry security and internal communication. All master units in the systems shall be able to unlock doors remotely, assist onsite visitors and communicate using a PoE network.
			1. Power Source: Power over Ethernet (802.3af).
			2. Network Interface: 10 BASE-T / 100 BASE-TX Ethernet (RJ-45).
			3. Network Protocols: IPv4, IPv6, TCP, UDP, SIP, HTTP, HTTPS, MJPEG, RTSP, RTP, RTCP, IGMP, MLD, SMTP, DHCP, NTP, DNS.
			4. Bandwidth Usage:
				1. G.711: 64Kbps x 2 per video call.
				2. 64Kbps per monitor.
				3. H.264: 24Kbps ~ 2,048Kbps.
			5. Communication: Hands-free (VOX/PTT) or handset (full-duplex).
			6. Video Display: 7-inch color LCD.
			7. Camera: Type:
				1. 1/3-inch color CMOS. 1.23 Megapixels.
				2. View Area at 0-degree camera angle mounted at 4 feet 11 inches (1500 mm) AFF: 2 feet 3 inches (700 mm) vertical x 3 feet 9 inch (1150 mm) horizontal at 19 inches (500 mm).
			8. Video Stream: ONVIF Profile S.
			9. Door Release: Programmable Form C dry contact, 24V AC/ DC, 1.0A.
			10. Wiring: The audio/video master units and door stations shall be connected to the network node via homerun category-6 wiring and RJ45 jacks.
				1. Maximum distance:

Master station to network node: 330 feet.

Door station to network node: 330 feet.

Utilize fiber optic cable for master and door stations located more than 330 feet from the network node.

* 1. EQUIPMENT
		1. Coordinate features to form an integrated system. Match components and interconnections for optimum performance of specified functions.
		2. Equipment: Modular type, using solid-state components, fully rated for continuous duty, unless otherwise indicated. Select equipment for normal operation on input power usually supplied at 110 to 130 V, 60 Hz.
		3. Waterproof Equipment: Listed and labeled for duty outdoors or in damp locations.

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**NOTE TO SPECIFIER**

REQUIRED: Do not modify the basis of design.

The basis of design for this video intercom system is the Aiphone “IX” series. Typically, Category-6 wiring is utilized for interfacing of the door call-in and master stations to the network node cabinet. Category-6 interface wiring is limited to a maximum length of 330 feet. The network node cabinet shall therefore be centrally located between the master and door stations to avoid excessively long cable runs. Master and call stations located more than 330 feet from the network node cabinet shall utilize fiber cabling, fiber patch panels and fiber transmitters/receivers. Edit the paragraphs below to only remove items not needed for the Project.

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* 1. AUDIO VIDEO MASTER CONTROL STATION(S)
		1. Master station(s) shall initiate and answer calls from up to 500 additional master or door substations. Master station(s) shall be wall or desk mounted and shall have the following features:
			1. 7-inch color LCD touchscreen
			2. PoE power source
			3. Camera for 2-way video calls
			4. 8 speed dial buttons
			5. Hands-free VOX/PTT communication and privacy handset (duplex)
			6. All call to other master stations
			7. Selective calling to any station in the system
			8. Privacy prevents other masters from listening in
			9. Door release button activates door strike or magnetic lock (selectable N/O or N/C contacts from door station)
			10. Tone and volume adjustments for audio communication
			11. Brightness and contrast adjustments for video.
		2. Basis of Design:
			1. Aiphone #IX-MV7-HW (Master Station) – white finish.
	2. HIGH POWER PoE+ SWITCH
		1. The PoE+ switch shall be 24 port gigabit, ethernet, unmanaged, high power PoE+ with 380 Watt PoE budget. Unit shall be expandable and shall have the following features:
			1. Wiring hub for system using category-6 cable
			2. Controls all functionality of “IX” system
			3. Speed: Gigabit
			4. 24 ethernet ports (RJ45)
			5. PoE ports/max. power per port: 30 Watts
			6. Programmable functionality via supplied software
			7. USB to serial adaptor and gender changer, software program and Installation and Operation Manual on CD, and QuikStart Guide.
		2. Operation: The PoE+ switch handles the calling and communication signals for the “IX” system, as well as providing selective door release outputs, video outputs, DVR trigger outputs and CO line transfer output. System set-up and a variety of functions are programmed in the PoE+ switch with the use of the supplied software. The serial connection is for uploading the system programming, for raw RS232 data output, or for system monitoring via supplied program.
		3. Mounting: The unit shall be mounted in a standard 19 inch EIA rack within the intercom network node cabinet.
		4. Basis of Design: Netgear #GS324PP.
	3. AUDIO/VIDEO DOOR STATIONS
		1. The remote audio/video door stations shall include a color camera, microphone, speaker and call button with the following features:
			1. PoE with pass-through port.
			2. Color video camera with audio intercom
			3. 2-way hands-free voice communication with master station
			4. Call button to initiate call to master(s)
			5. White LED illuminator for low light conditions
			6. RJ45 jack for category-6 connection
			7. 2 Form C, dry contacts for door/gate release
		2. Operation: When the call button on the door station is pushed, the master station(s) ring and the video screen comes on with the image from the door station’s camera. The master station user then initiates communication and the person at the door station speaks hands-free.
		3. Basis of Design: Aiphone #IX-DV (surface mounted); Aiphone #IX-DVF (surface or flush wall mounted).
			1. Exterior audio/video door stations to be pedestal or surface wall mounted and containing surge protection devices shall be Aiphone #IX-DVF equipped with stainless steel, surface mount backbox (10 7/16 inch H x 5 15/16 inch W), Aiphone #SBX-IDVF.
	4. FIBER OPTIC MEDIA CONVERTER MODULES
		1. Fiber optic transmission equipment shall be used when category-6 cable lengths (including horizontal and vertical distances) exceed 330 linear feet.
		2. Fiber transmitter modules located at field devices shall be low profile totally enclosed type and shall be mounted within individual enclosures or nearby ePACS terminal cabinets containing the long range, card reader power supplies and reader interface modules.
			1. Transmitter requires 60 Watt, 48VDC power supply and 120Volt power feed.
			2. Basis of design: AFI #50SL-PoE+ with #PS-4860 power supply.
			3. Alternate U.S. manufacturers permitted.
		3. Fiber receiver modules located at the node location shall be rack mounted.
			1. Basis of design: AFI #RX-50 Series.
			2. Alternate U.S. manufacturers permitted.
		4. Fiber optic modules shall conform to the following minimum specifications:
			1. 10/100 MBps RJ45 Ethernet port, SC Fiber Ports.
			2. 62.5/125, OM1, tight-buffered, multimode fiber.
			3. PoE+ device.
			4. Protocol independent.
			5. -31 to 158 deg operating Temperature.
			6. IEEE 802.3, IEEE 803.2u and IEEE 803.2af Complaint.
	5. CABLING
		1. Cabling requirements:
			1. Cable runs from master or call-in stations to the network node that do not exceed 330 feet shall be category-6; utilize plenum or outdoor rated where required.
			2. Cable runs exceeding 330 feet from master or call-in stations to the network node shall be 2 count 62.5/125, OM1, multimode, indoor fiber cable; utilize plenum or outdoor rated where required.
			3. All exterior category-6 and fiber cable runs shall be contained in conduit.
			4. Category-6 cable shall be terminated utilizing 8 pin, male RJ45 jacks at the device and to 8 pin, modular connectors at the patch panels within the network node cabinet to facilitate cable testing prior to installation of the network node. All testing shall be performed only after the cables have been terminated with the male RJ45 jacks.
			5. When fiber optic modules are required, provide fiber optic cable appropriate for the application. Cable shall conform to the following specifications:
				1. “SC” type connectors shall be used on all cable terminations.
				2. Performance characteristics (including optical attenuation) shall be such that the fiber optic modules deliver signals end-to-end with sufficient bandwidth and quality to meet the specified application.
				3. At no time shall fiber optic cable have loose ends terminated and left loose. All fiber optic cable shall be looped, stored, connected and permanently mounted in appropriate LIU cabinets/devices prior to testing. Fiber distribution, patch boxes (interconnect centers) shall be provided for termination of the fiber cabling.

Fiber patch box shall be (6) port complete with adapter plate, appropriate number of “SC” connectors, splice tray, protection sleeves and enclosure.

Basis of Design: RLH Industries #PWSN-A-1 (Slimline patch panel: 4 inch W x 5 1/2 inch H x 2 inch D.

Alternate U.S. manufacturers permitted.

Fiber patch boxes shall be equipped with covers, so the fiber strands are not exposed.

* + - 1. Fiber cabling not routed within conduit shall be encased within appropriately sized inner ducts; utilize plenum rated where required.
			2. The Contractor shall terminate and test the fiber optic cable and connectors.
	1. CATEGORY-6, 12 or 24 PORT MODULAR SURFACE-MOUNTED "110"-STYLE PATCH PANELS
		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. Alternate U.S. manufacturers permitted.
		2. Boxes/Panels:
			1. Capable of terminating 12 or 2) category-6 cables.
			2. Equipped with an 89D surface mounting bracket.
			3. Complies with TIA-568-C “T568A” pinning configuration.
		3. Connector:
			1. Rack mounted, 8-pin modular, category-6, non-keyed.
			2. Complies with TIA-568-C “T568A” pinning configuration.
	2. CATEGORY 6 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. Product options and substitutions. Alternate U.S. manufacturers permitted.
		2. Conductors: 4 twisted pair, minimum 23 AWG, solid copper.
			1. Individually insulated plenum rated conductors under common plenum rated sheath unless entire area where cable is installed is not considered a return air plenum according to any applicable codes. Provide outdoor, “OSP” rated cable and patch cords for exterior applications.
			2. Complies with individual characteristics established in TIA-568-C, and all addendums for category-6 cable performance specification.
			3. Nominal Impedance: 100 ohms plus or minus 15 percent.
			4. Certified and capable of performing to a minimum of 250 MHz.
			5. 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 ½ inch of the stripped cable.
			6. Provide footage markings and “yellow” colored insulation.
		3. Basis of Design:
			1. Indoor riser rated (yellow): General Cable #7133802 or approved equal.
			2. Indoor plenum rated (yellow): General Cable #7131802 or approved equal.
			3. Outdoor “OSP” rated (black): General Cable #7136100 or approved equal.
	3. CATEGORY 6, 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. Alternate U.S. manufacturers 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 cable performance specification.
			3. Nominal Impedance: 100 ohms plus or minus 15 per cent. Certified and capable of performing to a minimum of 250 MHz.
			4. Match performance and impedance characteristics of the installed horizontal unshielded twisted pair cable. Utilize plenum or outdoor, “OSP” rated where required.
			5. Each patch cord shall have a plastic arch for ease of removal of the connector (rubber boots are not acceptable). Preferred Copper Patch type: Ortronics (Legrand) #OR-MC615-*XX*.
			6. Patch cords shall be factory made, tested and individually factory wrapped within non-clear plastic bags.
			7. All category-6 patch cords shall be yellow in color.
		3. Connector:
			1. 8-pin modular, category-6, non-keyed.
			2. Complies with TIA-568-C “T568A” pinning configuration.
			3. Color: Clear.
	4. OM1 FIBER 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. Corning Cable Systems.
			5. General Cable.
			6. Leviton.
			7. Optical Cable Corp.
			8. Ortronics (Legrand).
			9. Superior Essex.
			10. Product options and substitutions: Alternate U.S. manufacturers permitted.
		2. Conductors: 2 / 6 strand.
			1. Provide multi-strand, 62.5/125 micron, tight-buffered, multimode, OM1 fiber cabling rated as follows:
				1. 1 Gb/s < 150m @ 850 nm.
				2. 1 Gb/s < 1000m @ 1300 nm.
			2. The fiber cabling shall meet the following specifications:
				1. EIA/TIA-492AAAA-A-1997, “Detail Specification for 62.5 micron Core Diameter/125 micron Cladding Diameter Class 1a Graded-Index Multimode Optical Fibers.”
				2. IEC 60793-2-10, “Product specifications – Sectional specification for category A1 multimode fibers”, Type A1b 62.5/125 micron graded index fiber.
			3. Provide individually insulated plenum rated strands under common plenum rated sheath unless entire area where cable is installed is not considered a return air plenum according to any applicable codes.
			4. Fiber cabling shall comply with individual characteristics established in TIA-568-C including all addendums for fiber optic cable performance specification.
			5. All exterior or underground fiber cable shall be indoor/outdoor rated.
			6. Provide footage markings to easily identify the cable lengths.
		3. Basis of Design:
			1. Indoor riser rated: General Cable #CG0021PNR or approved equal.
			2. Indoor plenum rated: General Cable #CG0021PNU or approved equal.
			3. Indoor/Outdoor, plenum rated: General Cable #CG0021ANU.BK or approved equal.
	5. OM1 FIBER OPTIC PATCH CORDS: 2 STRAND, TIGHT BUFFERED
		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. Corning Cable Systems.
			5. General Cable.
			6. Leviton.
			7. Optical Cable Corp.
			8. Ortronics (Legrand).
			9. Superior Essex.
			10. Product options and substitutions. Alternate U.S. manufacturers permitted.
		2. Fiber optic duplex patch cords.
			1. Fiber connectors shall be SC/SC type.
			2. Complies with individual characteristics established in TIA-568-C including all addendums for fiber optic patch cable performance specification. Utilize plenum or outdoor, “OSP” rated where required.
			3. Patch cords shall be factory made and factory tested individually, and factory wrapped within non-clear plastic bags.
	6. WIRE MANAGEMENT PANELS
		1. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
			1. Panduit.
			2. Chatsworth Products.
			3. CommScope Uniprise.
			4. Leviton.
			5. Ortronics (Legrand).
			6. Product options and substitutions: Alternate U.S. manufacturers permitted.
		2. Cable management panels shall be “2RU” high, horizontally rack mounted and equipped with opaque covers to conceal the patch cords.
	7. ACCESSORIES
		1. Lightning/Surge Protection: Products shall utilize internal or external (power and low voltage) surge protection such that a normally occurring power surge shall not void any manufacturer’s warranty.
			1. Provide individual surge protective devices (power and low voltage) at both ends of all exterior copper intercom wiring exiting the building. Surge suppression shall be provided for the power and control wiring associated with the barrier arm and sliding gates, exterior call stations and power supplies. Refer to specification section 264128.
				1. Rack mounted surge protectors shall be provided within the network node cabinet to protect the category-6 cabling serving the exterior, call-in stations. Modular surge protectors shall also be provided at the call-in stations end of the category-6 cable.
				2. The Contractor shall provide high-definition photographs showing the installation of the required surge protection devices at both ends of all exterior power and low voltage conductors. Photographs shall be transmitted to the A/E and USPS Project Manager.
		2. Intercom network node equipment rack shall utilize a standalone, UPS sized for a minimum of 18 minutes of battery run-time. The UPS shall be provided with a dedicated 20 Amp, 120VAC power and NEMA L5-20R receptacle.
			1. The UPS shall be line-interactive, rack mounted and rated 1000VA/900Watt with an 18 minute battery reserve at 450 Watts; Tripp-Lite #SMART1000RMXL2U.
		3. Wall mounted rack(s): Provide and install wall mounted, open equipment rack(s) to provide sufficient mounting space for the required video intercom equipment.
			1. Racks shall be all metal construction conforming to EIA standards with 19 inch equipment mounting opening and 1-3/4 inch vertical spacing of equipment. Rack rails shall be punched with captive nuts, 10-32 screws and nylon washers.
1. EXECUTION
	1. EXAMINATION
		1. Section 017300 - Execution: Verification of existing conditions before starting work.
		2. Verification of Conditions: Verify that field measurements, surfaces, substrates, and conditions are as required, and ready to receive Work.
		3. Report in writing to the USPS Project Manager prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
		4. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the USPS.
		5. Provide required power outlets, low voltage power supplies, interconnecting cables, hardware, and equipment for a complete and operable system.
		6. Master and call-in station locations are to be reviewed and approved by the Facility and Postal Inspector, through the USPS Project Manager, prior to installation of conduit and cabling.
	2. INSTALLATION
		1. Install in accordance with manufacturer’s instructions.
		2. Verify that electrical connections are made correctly.
		3. When not installed in cable trays, cable (category-6, fiber optic, and low voltage power) shall be supported with wide base cable hangers rated for proper support of category-6, fiber optic, and innerduct cables (compliant with UL and NEC requirements for structured cabling).
			1. Cable hangers shall be installed every 3 to 6 feet and shall be rated to support the weight of the cable multiplied by a factor of three.
		4. Install exposed conduits and cables parallel and perpendicular to surfaces or exposed structural members, and follow surface contours.
		5. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess. Use lacing bars in cabinets.
		6. Cables are to be secured to the rack frames at sufficient intervals to ensure that the weight of the cable will not contribute to fatigue or early failure of that cable or the device and connector to which it is attached.
		7. Sufficient excess cable shall be provided in “service loop locations” to ensure that the cable may be re-connected without requiring the addition of extension pieces.
		8. All permanent cabling shall be mechanically numbered to provide system documentation. Apply wire and cable marking tape to designate wires and cables to identify media in coordination with system wiring diagrams.
		9. All wiring to include category-6 and Fiber Optic cables shall utilize hook and loop fasteners to eliminate the risk of over-tightening cable bundles and affecting the strength or rated performance of the cable. The use of tie wraps is not acceptable.
		10. Double-sided foam tape shall not be used to secure any equipment, terminal blocks, or accessory devices. All device mounting shall be of a permanent nature.
		11. All excess length AC cords are to be tie-wrapped out of the way. Where possible, they shall be routed in a separate bundle a minimum of 6 inches away from any signal or control cable.
		12. Care shall be exercised at all times to protect Postal Service property. For example, ladders shall not be placed against wallpapered or finished surfaces, equipment or furnishings; desks or countertops shall not be used in lieu of ladders.
		13. Arrange all components to be mounted in the network node rack(s)to provide a neat appearance and accessibility for servicing equipment.
		14. Provide required power outlets, interconnecting cables, hardware and equipment for a complete and operable system.
			1. Power, 120VAC: As required by codes and standards for the facility.
			2. Where conduit is used, a minimum of 40% excess capacity shall be provided for future use.
		15. Control-Circuit Wiring: Install number and size of conductors as recommended by system manufacturer for control functions indicated.
		16. Weatherproof Equipment: Install units that are mounted outdoors, in damp locations, or where exposed to weather consistent with requirements of weatherproof rating. Provide surge protection where required.
	3. FIELD TESTING CATEGORY-6 COPPER AND FIBER OPTIC CABLE
		1. Section 014000 – Quality Requirements: Field testing and inspection.
		2. Field Testing Procedures:
			1. Provide all equipment and services necessary to test the cabling.
			2. Test and calibrate instruments before testing.
			3. Re-terminate and retest any cable found to be defective.
			4. Perform cable testing and submit report prior to installation of any cameras or node cabinets.
		3. Category-6 Copper Cable Testing:
			1. Use Level III Compliant test equipment.
			2. Test parameters shall include:
				1. Wire map.
				2. Insertion loss (attenuation).
				3. DC loop resistance.
				4. Return loss at camera.
				5. NEXT, NEXT at camera.
			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, per TIA-568-C, including all addendums.
				6. Measured effective cable run length.
		4. Fiber Optic Testing:
			1. Use 62.5/125 micron, OM1, multimode fiber optic cable testing.
			2. Perform testing of fiber in accordance with the fiber type being tested, TIA-526-14-A, Method B for Multimode Fiber (One Jumper/Two Adapters).
			3. Multimode fiber optic cable shall be tested bi-directionally at wavelengths of 850nm and 1300nm.
			4. The fiber testers and test heads shall have passed calibration within one year of actual test date.
			5. Tests include:
				1. Tier 1 Testing with Optical Loss Test Set (OLTS) that includes testing for length.
				2. Tier 2 Testing with OTDR to show all splices.
	4. FIELD QUALITY CONTROL
		1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installations, including connections. Report results in writing.
		2. Testing:
			1. The Contractor shall perform tests and provide test equipment, tools, and personnel required to conduct system tests and inspections.
			2. The Contractor shall conduct system acceptance test upon completion of installation using pre-approved procedures. Test shall consist of system, subsystem, and device level acceptance tests, including software.
			3. The Contractor shall ensure that test procedures confirm each specification statement and manufacturer requirement has been met or exceeded. An actual demonstration of each system function and a simulation of each system failure shall be provided.
			4. An acceptance test period of thirty days shall begin at the start of the acceptance test. Any system failure during the acceptance test period will suspend the acceptance test. The thirty-day test period will restart when the required repairs have been made and certified.
			5. Perform all tests in the presence of the USPS Project Manager. The USPS reserves the right to accept any portion or activate any phase prior to acceptance of entire system.
			6. Schedule tests with at least seven days advance notice of test performance.
	5. ADJUST AND CLEAN
		1. Adjust equipment for proper operation.
	6. PROTECTION
		1. Protect finishes until substantial completion.
	7. DEMONSTRATION
		1. Engage a factory-authorized service representative to train maintenance personnel to adjust, operate, and maintain equipment as specified below:
			1. Train maintenance personnel on programming equipment for starting up and shutting down, troubleshooting, servicing, and maintaining equipment.
			2. Review data in maintenance manuals.
			3. Schedule training with Postal Service at least seven days in advance.

END OF SECTION

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