SECTION 260500

COMMON WORK RESULTS FOR ELECTRICAL

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NOTE TO SPECIFIER

*Use this Specification Section for Mail Processing Facilities.*

***This is a Type 1 Specification with completely editable text; therefore, any portion of the text can be modified by the A/E preparing the Solicitation Package to suit the project.***

*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:
         1. Basic electrical methods.
         2. Grounding and bonding.
         3. Hangers and supports.
         4. Electrical identification.
         5. Motor starters, controls, and connections to mechanical equipment.
         6. Electrical system testing and inspection.
      2. Related Documents: The contract documents, as defined in Section 011000 – Summary of Work, apply to the work of this section. Additional requirements and information necessary to complete the work of this section may be found in other documents.
      3. Related Sections:
         1. Section 019113 - General Commissioning Requirements
         2. Section 024113 - Selective Site Demolition
         3. Section 078400 - Firestopping
         4. Section 220500 - Common Work Results for Plumbing
         5. Section 230500 - Common Work Results for HVAC
         6. Section 251104 - Metering Devices
         7. Section 251304 - Facility System Integration into EEMS
         8. Section 260513 - Medium Voltage Cables
         9. Section 260519 - Low-Voltage Electrical Power Conductors and Cables
         10. Section 260533 - Raceway and Boxes for Electrical Systems
         11. Section 260623 - Lighting Control Devices
         12. Section 260800 - Commissioning of Electrical Systems
         13. Section 261116 - Secondary Unit Substations
         14. Section 261216 - Dry-Type, Medium-Voltage Transformers
         15. Section 261313 - Metal Clad Medium-Voltage Circuit Breaker Switchgear
         16. Section 261317 - Medium-Voltage Interrupter Switchgear
         17. Section 261414 - Infrared Viewing Panes (IR Windows)
         18. Section 262200 - Low Voltage Transformers
         19. Section 262413 - Switchboards
         20. Section 262416 - Panelboards
         21. Section 262726 - Wiring Devices
         22. Section 262773 - Call Bell Systems
         23. Section 262816 - Enclosed Switches and Circuit Breakers
         24. Section 262923 - Variable Speed Drives
         25. Section 264100 - Facility Lightning Protection
         26. Section 264101 - Underground Counterpoise
         27. Section 264128 - Surge Protective Devices (SPD’s)
         28. Section 265100 - Interior Lighting (LED - Solid State)
         29. Section 265600 - Exterior Lighting
         30. Section 270500 - Common Work Results for Communications
         31. Section 271100 - Communications Equipment Room Fittings
         32. Section 271300 - Communications Backbone Cabling
         33. Section 271500 - Communications Horizontal Cabling
         34. Section 272133 - Data Communications – Wireless Access Points
         35. Section 272134 - Video Communications - Outdoor Wireless Access Points
         36. Section 275116 - IP Integrated, Public Address Zone Paging System
         37. Section 275313 - Wireless, Synchronized, GPS Clock System
         38. Section 275319 - Distributed Antenna System (DAS)
         39. Section 281304 - Enterprise Physical Access Control System (ePACS)
         40. Section 281524 - IP Video Intercom and Exterior Gate Control System
         41. Section 281600 - Intrusion Detection System
         42. [Section 282305 - Integrated Security and Investigative Platform (ISIP) CCTV System]
         43. Section 283100 - Fire Emergency Voice/Alarm Communication System (EVACS)
         44. Section 312000 - Earth Moving
         45. Section 312300 - Excavation and Fill
         46. Section 337173 - Electrical Utility Services
   2. REFERENCES
      1. National Electrical Contractors Association (NECA):
         1. NECA SI - Standard of Installation.
      2. National Electrical Manufacturers Association (NEMA):
         1. NEMA KS 1 - Enclosed Switches.
      3. National Electrical Testing Association (NETA):
         1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
      4. National Fire Protection Association (NFPA):
         1. NFPA 70 - National Electrical Code.
   3. SUBMITTALS
      1. Section 013300 - Submittal Procedures: Procedures for submittals.
         1. Product Data:
            1. Grounding electrodes and connections.
            2. Starter electrical characteristics and connection requirements.
         2. Assurance/Control Submittals:
            1. Electrical System Test Reports: Submit report including the following directly to the USPS Project Manager from Testing Laboratory, with copy to Contractor. Prepare reports in conformance with Section 014000 - Quality Requirements.
            2. Summary of project.
            3. Description of equipment tested.
            4. Description of test.
            5. Test results.
            6. Conclusions and recommendations.
            7. Appendix, including appropriate test forms.
            8. List of test equipment used and calibration date.
            9. Signature of responsible Testing Laboratory Officer.
            10. Certificates: Manufacturer's certificate that each Product specified meet or exceed specified requirements.
            11. Qualification Documentation: Submit documentation of experience indication compliance with specified qualification requirements.
      2. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
         1. Project Record Documents: Accurately record the following.
            1. Locations of components and grounding electrodes.
   4. QUALITY ASSURANCE
      1. Installer Qualifications: Company specializing in performing Work of this Section with minimum 5 years documented experience.
      2. Regulatory Requirements:
         1. Products: Listed and classified by Underwriters Laboratories, Incorporated as suitable for the purpose specified and indicated.
         2. Work herein shall conform to all applicable laws, ordinances and regulations in accordance with the latest applicable requirements of:
            1. The National Electrical Code (NFPA 70).
            2. National Electrical Manufacturer’s Associates.
            3. Standards of National Fire Protection Association (NFPA 72, 90A and 101).
            4. Underwriter’s Laboratories.
            5. Occupational Safety and Health Agency Standards.
            6. Illuminating Engineering Society Handbook.
            7. The International Existing Building Code.
            8. The International Electrical Code.
            9. ASHRAE Standard 90.1.
            10. The International Energy Conservation Code.
   5. BASIC ELECTRICAL METHODS
      1. Drawings are schematic and diagrammatic. Use judgment and care to install electrical Work to function properly and fit within building construction and finishes. Electrical conductors, conduit, components, not shown or specified, which are required for any device or system to produce a complete and operative system are required to be furnished and installed.
      2. Exact location of outlets is determined from dimension on Drawings, manufacturer's shop drawings, or as may be determined at Project Site. Do not scale Drawings for exact location of any item. Verify item mounting heights as required by project conditions prior to rough-in.
      3. Route conduits and wiring associated with new equipment and systems above ceilings, in existing chases, and concealed within building structure.
      4. Surface mounted raceways or conduit permitted only at locations indicated on Drawings.
      5. Circuit grouping, conduit or cable runs and home runs are indicated with number of conductors shown in each raceway to clarify operation and function of various systems. Provide proper number of conductors and conduits or cables to provide operative system as indicated on Contract Documents. Do not regroup any feeder circuits, branch circuits, home runs, and zone alarms at any point, from that shown on Contract Documents. Each conduit run shall contain no more than (6) current carrying conductors.
      6. Branch and home run circuits are indicated as 2, 3, or 4 wire circuits unless otherwise noted. Do not connect two ungrounded conductors to same circuit breaker/fused switch in any panel. Circuit runs consist of a maximum of five conductors; 3 phase conductors, 1 neutral conductor, and 1 equipment ground conductor, unless otherwise noted. Do not splice branch circuit conductors in any panels, safety switches, or circuit breakers in separate enclosures.
      7. The sharing of neutral conductors for multiwire branch circuits is prohibited. All branch circuits shall contain individual neutrals.
      8. Proposed equipment, switches or devices, shown mounted on and/or adjacent to equipment, which if installed, would impair proper operation of existing or new equipment, shall be removed and relocated by Contractor as required so equipment will function properly. Notify Contracting Officer immediately if any such condition exists.
      9. Seal and make permanently watertight penetrations by electrical raceways or equipment through ceilings, walls or floors.
         1. Seal penetrations in non-fire rated ceilings, walls or floors material specified in Section 079200 – Joint Sealants.
         2. Seal penetrations in fire rated walls with material specified in Section 078400 - Firestopping.
      10. Tighten electrical connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torqueing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL 486A, and NFPA 70.
      11. Install equipment and materials to provide required maintenance and code working clearance for servicing and maintenance. Coordinate final location of concealed equipment and devices requiring access with final location of required access panels and doors. Allow required space for removal of parts that require replacement or servicing.

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NOTE TO SPECIFIER

Include paragraph 1.5.L below for projects within existing buildings.

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* + 1. Remove existing equipment, lighting fixtures, switches, and receptacles as required to facilitate proposed installation and as specified in [Section 024119 - Selective Structure Demolition]. Remove existing wiring and conduit serving items to be removed. Conduit in inaccessible areas shall be cut off below finished surfaces and existing surface patched to match existing. Provide blank plates on existing flush mounted outlet boxes that will be abandoned. Remove all abandoned conductors from raceways.

1. products
   1. GROUNDING AND BONDING
      1. Grounding System Resistance: Five ohm.
      2. Rod Electrodes:
         1. Material: Copper.
         2. Diameter: 3/4 inch.
         3. Length: 10 feet.
      3. [Active Electrodes]:
         1. [Description: Metallic-salt-filled copper-tube electrode].
         2. [Shape: As required to pass test].
         3. [Length: As required to pass test].
         4. [Connector: U-bolt pressure plate].
      4. Mechanical Connectors: Bronze.
      5. Electrode Conductor:
         1. Material: Bare stranded copper.
         2. [Foundation Electrodes: [2/0] [2] [ \_\_\_\_\_\_ ] AWG].
         3. [Grounding Electrode Conductor: Size to meet NFPA 70 requirements].
      6. [Electrode Access Well Components]:
         1. [Pipe: 12 inch diameter by 12 inch long PVC access well].
         2. [Cover: Cast iron with legend "GROUND" embossed on cover.]
         3. [Harger #362PS12CILS80,]
   2. HANGERS AND SUPPORTS
      1. Product Requirements: Furnish and install approved materials, sizes, and types of anchors, fasteners, and supports to carry loads of equipment and conduit, including weight of wire in conduit plus 300 pounds.
      2. Materials and Finishes: Corrosion resistive.
      3. Anchors and Fasteners:
         1. Steel Structural Elements: Beam clamps and welded fasteners.
         2. Concrete Surfaces: Self-drilling anchors and expansion anchors.
         3. Hollow Masonry, Plaster, and Gypsum Board Partitions: Toggle bolts and hollow wall fasteners.
         4. Solid Masonry Walls: Expansion anchors.
         5. Sheet Metal: Sheet metal screws.
         6. Wood: Wood screws.
   3. ELECTRICAL IDENTIFICATION
      1. Nameplates:
         1. Engraved three-layer laminated phenolic plastic, white letters on black background.
         2. Locations:
            1. Each electrical distribution and control equipment enclosure.
            2. Communication cabinets.
            3. Terminal Cabinets.
            4. Individual motor starter.
            5. Separately enclosed circuit breakers.
            6. Panelboards
            7. Transformers.
            8. Pull boxes.
            9. Lighting contactor/control panel enclosure.
            10. Relays.
            11. Switches and disconnects.
         3. Letter Size:
            1. Use 1/8 inch letters for identifying individual equipment and loads.
            2. Use 1/4 inch letters for identifying grouped equipment and loads.
         4. Nameplates shall indicate voltage of the equipment and the source of power from the upstream device or equipment.
      2. Wire and Cable Markers:
         1. Description: Cloth tape or tubing type wire markers.
         2. Locations: Each conductor at panelboard gutters, pull boxes, outlet and junction boxes, and each load connection.
         3. Identification:
            1. Power and Lighting Circuits: Branch circuit or feeder number indicated on Drawings.
            2. Control Circuits: Control wire number indicated on schematic and interconnection diagrams on Drawings.
            3. Communications Cable: Per section 270500.
      3. Conduit Markers:
         1. Underground conduit routings shall be marked utilizing magnetic marker tape set atop of the entire conduit run.
            1. Underground-Type Plastic Line Marker: Manufacturer’s standard detectable permanent, bright colored, continuous-printed plastic tape, intended for direct-burial service; not less than 6 inches wide by 4 mils thick. Provide tape with printing which most accurately indicates type of service of buried cable. Locate tape 12 inches above top of conduit.
         2. Detectable marker tape cannot be installed atop of directionally bored underground conduits. Directionally bored conduits containing only fiber cabling shall therefore be equipped with a #12/AWG copper conductor to enhance detection.
      4. Arc Flash Warning Signs: Furnish signs in accordance with NEC Article 110.16, warning of potential arc flash hazard and requiring suitable Personal protective equipment. Locate and install signs per INSTALLATION Section of this specification.
      5. Confined space markings: Work within electrical manholes and underground vaults must comply with “confined space” OSHA requirements. Manhole covers and the entrance to underground vaults shall be stamped or marked as “CONFINED SPACE – PERMIT REQUIRED”.
      6. Receptacles and Switches: All coverplates for receptacles and switches shall be labeled with the branch circuit number. Label shall be machine generated and permanently affixed to the outside of the coverplate.
   4. MOTOR STARTERS, CONTROLS, AND CONNECTIONS TO MECHANICAL EQUIPMENT
      1. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
         1. ABB/G.E. Industrial Solutions (ABB/GEIS), Mebane, NC (800) 431-7867.
         2. Allen-Bradley Company, Milwaukee, WI (414) 382-2000.
         3. Cutler-Hammer Eaton Corp, Milwaukee, WI (800) 833-3927.
         4. Square D Company, Palatine, IL (847) 397-2600.
         5. Siemens Energy and Automation, Alpharetta, GA (800) 964-4114.
         6. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
      2. Motor Starters
         1. Provide manual, single phase, 120/277V, toggle type, motor rated switches with thermal overload element (sized at 115 percent of full load current) for fractional horsepower motors not requiring automatic control interfaces.
         2. Provide across-the-line, AC magnetic motor starters in applications where controls other than manual on and off are involved. Motor starters shall be UL labeled. Provide starters with the following features:
            1. Rating for the voltage and current imposed.
            2. Enclosure for the application usage: NEMA 1 for dry, indoors, NEMA 3R for outdoors, etc.
            3. Control circuit voltage and amperage to match coil voltage and ratings of control apparatus.
            4. Control transformers with primary and secondary fusing for control circuits, as required.
            5. Overload elements for every conductor leg above ground. Elements are to be “thermal alloy” type, resettable and properly sized to motor nameplate rating. Elements located near boilers, heat strips, duct heaters or other heat sources or where heating by conduction or radiation can occur, shall be ambient temperature compensated types.
            6. Adjustable phase loss/phase reversal protection (0-15 seconds), factory set at 7 seconds and a minimum of two field convertible auxiliary contacts.
            7. Cover-mounted control switch is to be a “start-stop” or “hand-off-auto” type with “running” and “auto” pilot lights, as required by the control sequence. A suitable reset device for manually resetting overcurrent trip shall be provided.
         3. Starters for motors 10 hp or less shall be connected to automatically return the motor to service after a power interruption. Starters for motors over 10 hp shall be equipped with time delay relays so that after a power resumption and after a preset delay of 0-30 seconds, the motor shall automatically be returned to service.
         4. Combination magnetic motor starter/fused disconnect unit shall be utilized wherever possible.
      3. Furnish and Install the Following:
         1. Conduit, wiring and electrical connections to motors, safety switches, starters, relays, electrical interlock circuits, valves, unit heaters, fan coil units, air handling units, and other similar equipment, required for complete and ready for operation. Coordinate with and review other sections of the specifications describing electrical equipment in order to fully understand the wiring requirements.
         2. Starters as indicated on Drawings except factory provided starters such as those physically mounted on the unit or any piece of equipment where starter is furnished as an integral part of the equipment.
         3. Electrical line voltage control components and installation as specified in Division 26 Sections.
         4. Furnish and install low voltage (below 50 volts) control wiring as indicated on Drawings using metallic conduit and No. 12 type THHN wire, minimum.
         5. [Thermostat and special wire other than building wire].
      4. Refer to Drawings for quantity and size of motor starters.
      5. Individual and group mounted motor starters within motor control centers and those starters factory provided integral with the equipment shall be furnished in accordance with paragraph 2.4 B.
2. 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 United States Postal Service.
   2. INSTALLATION - GROUNDING AND BONDING
      1. Install rod electrodes at locations indicated. Install additional rod electrodes as required to achieve specified resistance to ground.
      2. Provide grounding well pipe with cover at [each rod location] [rod locations where indicated]. Install well pipe top flush with finished grade or surface.
      3. Provide grounding electrode conductor and connect to reinforcing steel in foundation footing, building steel above grade and metallic cold water pipe.
      4. Provide bonding and grounding in conformance with NFPA 70.
      5. Equipment Grounding Conductor: Provide separate, insulated conductor within all lighting and power raceways. Terminate each end on suitable lug, bus, or bushing.
      6. Testing and Inspection:
         1. Inspect and test in accordance with NETA ATS, where applicable.
         2. Perform inspections and tests listed in NETA ATS, Section 7.13.
         3. Test ground resistance of system with clamp-on ground resistance tester. The resistance of the grounding system shall not exceed 5 ohms. Where tests show resistance-to-ground is over 5 ohms, take appropriate action to reduce resistance to 5 ohms, or less, by driving additional ground rods, lengthening the rods or installing ground enhancing materials; then retest to demonstrate compliance. Install rods at least 8 feet apart.
   3. INSTALLATION - HANGERS AND SUPPORTS
      1. Install products in accordance with manufacturer's published instructions.
      2. Furnish and install anchors, fasteners, and supports in accordance with NECA SI.
      3. Do not fasten supports to pipes, ducts, mechanical equipment, and conduit.
      4. Do not use spring steel clips and clamps.
      5. Do not use powder-actuated anchors.
      6. Obtain permission from structural engineer before drilling or cutting structural members.
      7. Fabricate supports from structural steel angle or structural steel channel. Rigidly weld members or use hexagon head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.
      8. Install surface-mounted cabinets and panelboards with minimum of four anchors.
      9. In wet and damp locations use structural steel channel supports to stand cabinets and panelboards one inch off wall.
      10. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.
   4. INSTALLATION - ELECTRICAL IDENTIFICATION
      1. Install nameplate parallel to equipment lines.
      2. Secure nameplate to equipment front using stainless steel screws. Use minimum two screws at each end of nameplate.
      3. Secure nameplate to outside surface of door on panelboards and switchboards.
      4. Install Arc Flash Warning Signs on switchboards, panelboards, control panels, meter socket enclosures, and motor control centers likely to require examination, adjustment, servicing, or maintenance while energized. Locate sign so as to be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment.
   5. INSTALLATION – MOTOR STARTERS. CONTROLS, AND CONNECTIONS TO MECHANICAL EQUIPMENT
      1. Verify and check equipment manufacturer's nameplate and installation instructions to obtain exact location of outlets for equipment before installation.
      2. Wire and connect line voltage controls in accordance with approved wiring diagrams. Provide line voltage interlock and control wiring as indicated on Drawings using conduit and No. 12 type THHN wire.
   6. FIELD QUALITY CONTROL - ELECTRICAL TESTING AND INSPECTION
      1. Section 014000 - Quality Requirements: Field testing and inspection.
      2. Section 260800 - Commissioning of Electrical Systems: Requirements related to Division 26 Commissioning
      3. Conduct testing to Determine that Electrical Equipment and Systems:
         1. Are in conformance with Contract Documents and applicable reference standards.
         2. Is properly installed without damage due either to installation or shipment.
         3. Operate correctly, meet design intent, and are performing at optimum level, in safe manner.
      4. Provide a complete written record of operational values to be used as a baseline for future operational testing.
      5. Instrumentation:
         1. Provide calibration program that assures applicable test instrumentation is maintained within rated accuracy and directly traceable to National Bureau of Standards.
         2. Calibrate instruments in accordance with following frequency schedule:
            1. Field Instruments:
            2. Analog - 6 months maximum.
            3. Digital - 12 months maximum.
            4. Leased Specialty Equipment: 12 months. (Where accuracy is guaranteed by lessor.)
         3. Dated Calibration Labels: Visible on test equipment.
         4. Keep records current; Show date and result of instruments calibrated or tested.
         5. Maintain current instrument calibration instruction and procedure for each test instrument.
         6. Calibrating Standard: Higher accuracy than that of instrument being calibrated.
      6. Regulatory Requirements:
         1. Safety Practices: Include, but not limited to, the following requirements:
            1. Occupational Safety and Health Act of 1970 - OSHA.
            2. Accident Prevention Manual for Industrial Operations, Seventh Edition, National Safety Council, Chapter 4.
            3. Applicable State and Local Safety Operating Procedures.
            4. NETA Safety/Accident Prevention Program.
            5. United States Postal Service Safety Practices.
            6. NFPA 70E - Electrical Safety Requirements for Employee Workplace.
            7. American National Standards for Personnel Protection, ANSI Z244.1.
         2. Perform tests with apparatus de-energized except where otherwise specifically required herein.
         3. Testing Laboratory: Provide a designated safety representative present at Project Site and supervise safety operations.
         4. Power Circuits: Conductors shorted to ground by a hot line grounded device approved for the purpose.
         5. Do not proceed until safety representative has determined that it is safe to do so.
         6. Testing Laboratory: Provide sufficient protective barriers and warning signs to conduct specified tests safely.
      7. Tests and inspections include, but are not limited to the following:
         1. Proper operation of lights and equipment.
         2. Continuity of raceway system.
         3. Insulation leakage and impedances.
         4. Ground system resistance.
         5. Elimination of reverse rotation and single-phasing of motors.
         6. Sub-system tests indicated in other Sections.
         7. Proper operation of communications systems specified in Section 270500.
         8. Proper operation of intrusion detection systems specified in Section 281600.
         9. Proper operation of video surveillance system specified in Section 282305.
         10. Proper operation of fire alarm system specified in Section 283100.
      8. Load balance all electrical phases, at device, panels, and switchboards.
      9. Perform electrical system testing and inspection as specified in each related Section and as specified in this Section.

END OF SECTION

USPS MPF Specification Last Revised: 10/1/2022