

SECTION 260500

COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Basic electrical methods.
 - 2. Grounding and bonding.
 - 3. Hangers and supports.
 - 4. Electrical identification.
 - 5. Electrical system testing and inspection.
- B. 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.
- C. Related Sections:
 - 1. Section 260519 - Low-Voltage Electrical Power Conductors and Cables
 - 2. Section 260533 - Raceway and Boxes for Electrical Systems
 - 3. Section 260800 - Commissioning of Electrical Systems
 - 4. Section 262416 - Panelboards
 - 5. Section 262726 - Wiring Devices
 - 6. Section 262816 - Enclosed Switches

1.2 REFERENCES

- A. National Electrical Contractors Association (NECA):
 - 1. NECA SI - Standard of Installation.
- B. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA KS 1 - Enclosed Switches.
- C. National Electrical Testing Association (NETA):
 - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- D. National Fire Protection Association (NFPA):
 - 1. NFPA 70 - National Electrical Code.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing Work of this Section with minimum 5 years documented experience.
- B. 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:
 - a. National Electrical Manufacturer's Associates.
 - b. Underwriter's Laboratories.
 - c. Occupational Safety and Health Agency Standards.
 - d. The International Existing Building Code.
 - e. The International Electrical Code.

1.4 BASIC ELECTRICAL METHODS

- A. 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.
- B. Exact location of outlets are 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.
- C. Route conduits and wiring associated with new equipment and systems above ceilings, in existing chases, and concealed within building structure.
- D. Surface mounted raceways or conduit permitted only at locations indicated on Drawings.
- E. 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.
- F. 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.
- G. The sharing of neutral conductors for multiwire branch circuits is prohibited. All branch circuits shall contain individual neutrals.
- H. 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.
- I. 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.

- J. 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.
- K. 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.
- L. Remove existing equipment as required to facilitate proposed installation. 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.

PART 2 - PRODUCTS

2.1 GROUNDING AND BONDING

- A. Mechanical Connectors: Bronze.
- B. Grounding Conductor:
 - 1. Material: Bare stranded copper.

2.2 HANGERS AND SUPPORTS

- A. 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.
- B. Materials and Finishes: Corrosion resistive.
- C. 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.

2.3 ELECTRICAL IDENTIFICATION

- A. Nameplates:
 - 1. Engraved three-layer laminated phenolic plastic, white letters on black background.
 - 2. Locations:
 - a. Each electrical distribution and control equipment enclosure.
 - b. Terminal Cabinets.
 - c. Transformers.
 - d. Pull boxes.
 - e. Panelboards.

- f. Switches and disconnects.
 - 3. Letter Size:
 - a. Use 1/8 inch letters for identifying individual equipment and loads.
 - b. Use 1/4 inch letters for identifying grouped equipment and loads.
- B. 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:
 - a. Power and Lighting Circuits: Branch circuit or feeder number indicated on Drawings.
 - b. Control Circuits: Control wire number indicated on schematic and interconnection diagrams on Drawings.
- C. 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.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to Contracting Officer through 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.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 INSTALLATION - GROUNDING AND BONDING

- A. Provide bonding and grounding in conformance with NFPA 70, utilizing existing facility ground electrode system.
- B. Equipment Grounding Conductor: Provide separate, insulated conductor within all power raceways. Terminate each end on suitable lug, bus, or bushing.
- C. 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.

3.3 INSTALLATION - HANGERS AND SUPPORTS

- A. Install products in accordance with manufacturer's published instructions.

- B. Furnish and install anchors, fasteners, and supports in accordance with NECA SI.
- C. Do not fasten supports to pipes, ducts, mechanical equipment, and conduit.
- D. Do not use spring steel clips and clamps.
- E. Do not use powder-actuated anchors.
- F. Obtain permission from structural engineer before drilling or cutting structural members.
- G. 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.
- H. Install surface-mounted cabinets and panelboards with minimum of four anchors.

3.4 INSTALLATION - ELECTRICAL IDENTIFICATION

- A. Install nameplate parallel to equipment lines.
- B. Secure nameplate to equipment front using stainless steel screws. Use minimum two screws at each end of nameplate.
- C. Secure nameplate to outside surface of door on panelboards and switchboards.
- D. Install Arc Flash Warning Signs on switchboards, panelboards, control panels, and meter socket enclosures 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.

3.5 FIELD QUALITY CONTROL - ELECTRICAL TESTING AND INSPECTION

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. Section 260800 - Commissioning of Electrical Systems: Requirements related to Division 26 Commissioning.
- C. 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.
- D. Provide a complete written record of operational values to be used as a baseline for future operational testing.
- E. Instrumentation:
 - 1. Provide calibration program that assures applicable test instrumentation is maintained within rated accuracy and directly traceable to National Bureau of Standards.
 - 2. Provide recommended instrument calibration frequency for all new instrumentation.
 - 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.
- F. Regulatory Requirements:
1. Safety Practices: Include, but not limited to, the following requirements:
 - a. Occupational Safety and Health Act of 1970 - OSHA.
 - b. Accident Prevention Manual for Industrial Operations, Seventh Edition, National Safety Council, Chapter 4.
 - c. Applicable State and Local Safety Operating Procedures.
 - d. NETA Safety/Accident Prevention Program.
 - e. United States Postal Service Safety Practices.
 - f. NFPA 70E - Electrical Safety Requirements for Employee Workplace.
 - g. 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.
- G. 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. Sub-system tests indicated in other Sections.
- H. Perform electrical system testing and inspection as specified in each related Section and as specified in this Section.

END OF DOCUMENT

SECTION 260519

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Building wire and cable.
 - 2. Branch-circuit cable.
 - 3. Wiring connectors and connections.
- B. Related Documents: Requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections
 - 1. As specified in Section 260500 - Common Work Results for Electrical.

1.2 REFERENCES

- A. As specified in Section 260500 - Common Work Results for Electrical.

1.3 SUBMITTALS

- A. As specified in Section 260500 - Common Work Results for Electrical.

1.4 QUALITY ASSURANCE

- A. As specified in Section 260500 - Common Work Results for Electrical.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver in accordance with NEMA WC 26.

PART 2 - PRODUCTS

2.1 BUILDING WIRE AND CABLE

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Alcan Cable, Atlanta, GA (770) 392-2376.
 - 2. Anixter, Inc., Skokie, IL (800) ANIXTER.
 - 3. General Cable, Highland Heights, KY (800) 526-4391.
 - 4. General Electric, Plainville, CT (860) 747-7111.

5. Okonite, Ramsey, NJ (201) 825-0300.
6. Southwire Company, Carrollton, GA (800) 444-1700.
7. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

- B. Description: Single conductor insulated wire.
- C. Conductor: Copper, except conductors #1/0 AWG and larger may be compact stranded aluminum if equipped with compression lugs and installed per manufacturer's recommendations and the National Electrical Code.
- D. Insulation Voltage Rating: 600 Volts.
- E. Insulation: NFPA 70, Type THHN/THWN or Type XHHW-2

2.2 WIRING CONNECTORS

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
1. Buchanan Construction Products, Hackettstown, NJ (800) 610-5201.
 2. Thomas and Betts, Memphis, TN (800) 695-1901.
 3. 3M, St. Paul, MN (800) 364-3577.
- B. Compression Connectors; Conductor sizes #12 through #6 AWG:
1. Buchanan: 2006S or 2011S.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. As specified in Section 260500 - Common Work Results for Electrical.

3.2 PREPARATION

- A. Completely and thoroughly swab raceway before installing wire.

3.3 INSTALLATION

- A. Wiring methods
1. Concealed Dry Interior Locations: Use building wire, Type THHN/THWN or Type XHHW-2 insulation in metallic raceway or MC multiconductor cable.
 2. Exposed Dry Interior Locations: Use building wire, Type THHN/THWN or Type XHHW-2 insulation in metallic raceway or MC multiconductor cable.
 3. Above Accessible Ceilings: Use building wire, Type THHN/THWN or Type XHHW-2 insulation in metallic raceway or MC multiconductor cable.
 4. Wet or Damp Interior/Exterior Locations: Use only building wire, Type THHN/THWN or Type XHHW-2 insulation in raceway.
- B. Install products in accordance with manufacturers published instructions and NECA SI.

- C. Use solid conductor for feeders and branch circuits 10 AWG and smaller.
- D. Use stranded conductors for control circuits and final connections to all vibration equipment.
- E. Use conductor not smaller than 12 AWG for power and lighting circuits.
- F. Use conductor not smaller than 14 AWG for control circuits.
- G. Use 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet.
- H. Use 10 AWG conductors for 20 ampere, 277 volt branch circuits longer than 200 feet.
- I. Pull all conductors into raceway at same time.
- J. Use approved wire pulling lubricant for all building wire.
- K. Protect exposed cable from damage.
- L. Neatly train and lace wiring inside boxes, equipment, and panelboards in accordance with NECA Standards.
- M. Clean conductor surfaces before installing lugs and connectors.
- N. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
- O. For splices and taps, use only compression connectors for copper conductors, 6 AWG and larger or aluminum conductors 1/0 and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.
- P. Use solderless pressure compression connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
- Q. Use conductors rated 90 degrees C, inside a ballast compartment or within 6 inches of any ballast.
- R. Conductor Sizes #8 and Larger: Class B stranding.
- S. The sharing of neutral conductors for multiwire branch circuits is prohibited. All branch circuits shall contain individual neutral conductors.

3.4 CONSTRUCTION

- A. Interface with Other Work:
 - 1. Identify wire and cable using Thomas and Betts type WM vinyl markers.
 - 2. Identify each conductor with its circuit number or other designation indicated on Drawings in all junction, pull, terminal boxes and cabinets. Identify neutrals with common circuit numbers in all junction, pull and terminal boxes, panels and cabinets.

3.5 WIRING COLOR CODE

- A. Comply with the following color code for each voltage system.

- B. 208Y/120 Volt System:
 - 1. Phase A - Black
 - 2. Phase A Switch Leg - Black with "S" tag.
 - 3. Phase B - Red
 - 4. Phase B Switch Leg - Red with "S" tag.
 - 5. Phase C - Blue.
 - 6. Phase C - Switch Leg - Blue with "S" tag.
 - 7. Travelers - Yellow.
 - 8. Neutral - White.
 - 9. Equipment Ground - Green.
- C. 240/120 Volt System:
 - 1. Phase A - Black.
 - 2. Phase A Switch Leg - Black with "S" tag.
 - 3. Phase B - Orange (High-Leg)
 - 4. Phase C - Blue
 - 5. Phase C Switch Leg - Blue with "S" tag.
 - 6. Travelers - Yellow.
 - 7. Neutral - White.
 - 8. Equipment Ground - Green.
- D. 480Y/277 Volt System:
 - 1. Phase A - Brown
 - 2. Phase A Switch Leg - Brown with "S" Tag.
 - 3. Phase B - Orange.
 - 4. Phase B Switch Leg - Orange with "S" Tag.
 - 5. Phase C - Yellow
 - 6. Phase C Switch -Leg- Yellow with "S" Tag.
 - 7. Travelers - Yellow with "T" Tag.
 - 8. Neutral - Grey.
 - 9. Equipment Ground - Green with Yellow stripe.
- E. Use same color for same phase throughout. Use same colors for switch legs. Travelers shall be yellow. Phase rotation shall be same in all panels. Identify large cables with colored tape.
- F. Provide identification tags on each conductor entering panel, switch, junction box and pull box to identify conductor.

3.6 FIELD QUALITY CONTROL

- A. As specified in Section 260500 – Common Work Results for Electrical.
- B. Cables, 600 Volt or less and size no. 3 or larger, shall be meggered using an industry-approved "megger with a minimum of 500 Volt internal generating voltage. All inspection, cleaning and testing procedures shall be in compliance with the recommendations and standards outlined in the "maintenance testing specifications for electrical power distribution equipment and systems", latest edition, published by International Electrical Testing Association (NETA). Insulation resistance test values shall be no less than 250 megaohms. A typewritten report of all readings shall be prepared and submitted.

END OF SECTION

260519 - 4

Seattle NDC - Elevator Upgrades & New Install
Federal Way, WA
USPS Project Number EFMS E82393

SECTION 260533

RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Metal conduit.
 - 2. Electrical metallic tubing.
 - 3. Fittings and conduit bodies.
 - 4. Pull and junction boxes.
- B. 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.
- C. Related Sections:
 - 1. Section 260500 - Common Work Results for Electrical.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM A 123 - Specification for Zinc (Hot-Galvanized) Coatings on Iron and Steel Products.
- B. American National Standards Institute (ANSI):
 - 1. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
 - 2. ANSI C80.3 - Electrical Metallic Tubing, Zinc Coated.
- C. National Electrical Contractors Association (NECA):
 - 1. NECA "Standard of Installation."
- D. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
- E. National Fire Protection Association (NFPA):
 - 1. NFPA 70 - National Electrical Code.

1.3 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. Conduit Size: NFPA 70, unless indicated otherwise on Drawings.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Conform to requirements of NFPA 70.

2. Provide products listed and classified by Underwriters Laboratories, Incorporated.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect products.
- B. Accept conduit on site. Contractor inspect for damage prior to acceptance.
- C. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

PART 2 - PRODUCTS

2.1 CONDUIT REQUIREMENTS

- A. Where conduit is required by standards, codes, or required elsewhere, minimum size shall be as follows:
 1. 1/2 inch for power and branch circuit wiring, unless indicated otherwise. All homerun conduits shall be 3/4 inch, minimum.

2.2 METAL CONDUIT

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 1. Allied Tube & Conduit, Harvey, IL (800) 882-5543.
 2. Wheatland Tube Co., Collinswood, NJ (800) 257-8182.
 3. Republic Wire & Cable, Rocky Mount, NC (800) 533-8198.
 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Rigid Galvanized Steel Conduit (GRC): ANSI C80.1, UL6.
- C. Intermediate Metal Conduit (IMC): UL1242.
- D. Fittings and Conduit Bodies: NEMA FB1 Material to match conduit.

2.3 ELECTRICAL METALLIC TUBING (EMT)

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 1. Allied Tube & Conduit, Harvey, IL (800) 882-5543.
 2. Wheatland Tube Co., Collinswood, NJ (800) 257-8182.
 3. Republic Wire & Cable, Rocky Mount, NC (800) 533-8198.
 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Description: ANSI C80.3; galvanized tubing.

- C. Fittings and Conduit Bodies: NEMA FB 1; steel set-screw type. Die-cut Zinc not permitted.

2.4 FLEXIBLE METAL CONDUIT (FMC)

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - 1. Hubbell, Millford, CT (203) 882-4800.
 - 2. Electriflex, Roselle, IL (800) 323-6174.
 - 3. O-Z/Gedney, Farmington, CT (860) 677-5541.
 - 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Description: Interlocked steel and aluminum construction.
- C. Fittings: NEMA FB 1.

2.5 FITTINGS

- A. Manufacturer: Raco, Inc., South Bend, IN (219) 234-7151.
 - 1. Subject to compliance with project requirements, one of the following manufacturers may also be provided:
 - a. Steel City.
 - b. O-Z/Gedney.
 - 2. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Conduits 1/2 inch thru 1 inch enter junction boxes, pull boxes, panels, cabinets, and gutters, provide the following:
 - 1. Rigid Conduit: Raco 1222, 1223, 1224.
- C. Conduits 1-1/4 inch and larger entering junction boxes, pull boxes, panels, cabinets, and gutters, provide Insulated throat type bushings; Raco 1225, 1226, 1228, 1230, 1232, 1234, 1236.
- D. Provide threaded joint connectors and malleable iron no thread compression box connectors on rigid conduit. Do not provide fittings requiring set screws or indenter type applications including BM connectors.
- E. Provide only steel set-screw couplings and connectors on EMT conduit.

2.6 CONDUIT STRAPS AND HANGERS

- A. Strap Manufacturer: Raco, Inc., South Bend, IN (219) 234-7151.
 - 1. Subject to compliance with project requirements, one of the following manufacturers may also be provided:
 - a. Steel City.
 - b. Unistrut.
 - 2. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

- B. Hanger Manufacturer: Steel City/Thomas & Betts, Memphis, TN (800) 888-0211.
 - 1. Subject to compliance with project requirements, one of the following manufacturers may also be provided:
 - a. Unistrut.
 - b. Raco.
 - 2. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- C. Straps: Two hole push on stamped steel straps on surface areas such as concrete, masonry, wide flange beams, columns, and wood.
 - 1. Rigid Conduit: Raco 2232, 2233, 2234, 2235, 2336, 2238.
 - 2. Electrical Metallic Tubing: Raco 2092, 2093, 2094.
- D. Hangers: Lay-in pipe hanger.
 - 1. Conduits 1-1/4 Inch and Larger: Steel-City C-149.
- E. Trapeze Hangers for Conduits Grouped Together: Hangers consisting of all thread rods sized as required and Kingdorff channel.
 - 1. Steel City B-909, 1/2 inch x 1-7/8 inch (12 gauge) with single bolt channel pipe straps.
 - 2. Steel City C-105, C-105-AL, or C-106, (no wire permitted for anchoring conduit).

2.7 OUTLET BOXES

- A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
 - 1. Equipment Supporting Boxes: Rated for weight of equipment supported; include 1/2 inch male fixture studs where required.
 - 2. Receptacle and Device Boxes - 4 inch square x 2-1/8 inch deep with raised, single gang, plaster ring unless indicated otherwise.

2.8 PULL AND JUNCTION BOXES

- A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Verify routing and termination locations of conduit prior to rough-in.
- C. Report in writing to Contracting Officer through 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.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 INSTALLATION - RACEWAYS

- A. Install Galvanized thick wall rigid steel (GRC), or intermediate grade rigid steel (IMC), or electrical metallic tubing (EMT), unless indicated otherwise on Drawings. Flexible metal conduit (FMC) may be used for box or equipment terminations located on or along catwalks, not to exceed 36 inches. Plastic PVC conduit shall not be permitted.
- B. Install conduit in accordance with NECA "Standard of Installation."
- C. Conduit routing indicated on Drawings are approximate locations unless dimensioned. Route parallel and perpendicular to building construction for complete wiring system regardless whether exposed or concealed.
- D. Arrange supports to prevent misalignment during wiring installation.
- E. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- F. Group related conduits; support using conduit rack. Construct rack using approved steel channel and provide space on each rack for 25 percent additional conduits.
- G. Fasten conduit supports to building structure and surfaces under provisions of this section.
- H. Do not support conduit with wire or perforated pipe straps in any type structure. Remove wire used for temporary supports. Steel tie wire may be used to anchor conduit down to reinforcing rods in concrete encasement only.
- I. Do not attach conduit or boxes to ceiling support wires. Boxes shall be independently supported.
- J. Arrange conduit to maintain headroom and present neat appearance. Maintain required clearance between conduit and piping.
- K. Route all conduit, whether exposed or concealed, parallel and perpendicular to walls, ceilings, building structures, etc.
- L. Maintain 12 inch clearance between conduit and surfaces with temperatures exceeding 104 degrees F.
- M. Cut EMT conduit square using saw or pipecutter; de-burr cut ends and ream. Bring conduit to shoulder of fittings; fasten securely.
- N. Use conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes. Use Myers hub connectors on all conduit entering top or sides of all junction boxes, pull boxes, wiring gutters, exposed to weather.
- O. The number of conduit bends per box shall comply with NFPA 70, Article 360. Conduit bends for "SCS" installation shall not exceed two 90 degree bends or exceed a total of 180 degrees of bend between pull boxes or conduit ends. Pull boxes shall be sized per NEC codes per conduit installed. Use conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one-shot bender to fabricate or use factory elbows for bends in metal conduit larger than 2 inch size.
- P. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.

- Q. Provide suitable fittings to accommodate expansion and deflection where conduit crosses control and expansion joints.
- R. Provide suitable nylon pull string or #14 AWG steel wire in each conduit excluding sleeves and nipples.
- S. Ground and bond conduit per NFPA 70.
- T. Conduits shall be sized as indicated on Drawings. Where sizes are not indicated, conduit shall be sized per NFPA 70.
- U. Cap all upturned conduits during construction rough-in to prevent moisture or debris from entering. Pull through each and every conduit a dry swab of sufficient size to remove any and all moisture.
- V. Assure ground continuity on all branch circuitry conduits with two locknuts, one inside and one outside of all boxes, cabinets and gutters for rigid conduit. One locknut inside of all boxes, cabinets, and gutters for EMT.
- W. Provide conduit supports as follows:
 - 1. Galvanized rigid thick wall conduit (GRC), intermediate grade rigid conduit (IMC) and electrical metallic conduit (EMT) within three feet of all outlet boxes, junction boxes, cabinets, gutters, or fittings. Horizontally anchored at 10 foot maximum intervals. Other spacings indicated on Drawings.
 - 2. Flexible metal conduit within 12 inches of all outlet boxes, junction boxes, cabinets, gutters, or fittings and bends or turns. Horizontally anchored at 4-1/2 foot intervals. 1/2 inch minimum size permitted.

3.3 INSTALLATION - BOXES

- A. Install boxes in accordance with NECA "Standard of Installation."
- B. Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with NFPA 70.
- C. Set wall mounted boxes at elevations to accommodate mounting heights indicated or as required for specific project requirements. Orient boxes to accommodate wiring devices as specified in Section 262726.
- D. Electrical boxes are indicated on Drawings in approximate locations unless dimensioned. Adjust box location up to 10 feet if required to accommodate intended purpose with no additional cost to contract. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.
- E. Maintain headroom and present neat mechanical appearance.

3.4 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field inspection.
- B. Inspect conduit installation, types, sizes, fittings and attachment to structure.
- C. Inspect box installation, locations, connection to conduit, and attachment to structure.

3.5 ADJUSTING

- A. Install knockout closures in unused box openings.

3.6 CLEANING

- A. Clean interior of boxes to remove dust, debris, and other material.
- B. Clean exposed surfaces and restore finish like new.

END OF DOCUMENT

SECTION 260800

COMMISSIONING OF ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Systems and equipment testing and start-up.
- B. Validation of proper and thorough installation of Division 26 systems and equipment.
- C. Functional performance testing of electrical systems.
- D. Documentation of tests, procedures, and installations.
- E. Coordination of Training Events.
- F. Generic Start-Up Procedures for electrical systems and equipment.

1.2 SCOPE

- A. The following equipment and/or systems shall be commissioned if in compliance with the guidelines provided in Specification 019113, or with Contracting Officer approval:
 - 1. Electrical Distribution System Wiring

1.3 GENERAL DESCRIPTION

- A. Commissioning (Cx) is the process of ensuring that all building systems are installed and perform interactively according to the design intent; that systems are efficient and cost effective and meet the USPS's operational needs; that the installation is adequately documented; and that the Operators are adequately trained. It serves as a tool to minimize post-occupancy operational problems. It establishes testing and communication protocols in an effort to advance the building systems from installation to full dynamic operation and optimization.
- B. This Section outlines the Cx procedures specific to the Contractor's electrical responsibilities.

1.4 RELATED WORK AND DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section
- B. Section 013300 - Submittal Procedures: Stipulates additional copies of submittals to be submitted and refers to other sections for additional submittal requirements related to Cx.
- C. Section 017704 - Closeout Procedures and Training: Defines the milestones in completion incorporating the Cx process.

- D. Individual Specification Sections: Individual sections stipulate installation, start-up, warranty, O&M documentation, and training requirements for the system or device specified in the Section.

1.5 REFERENCE STANDARDS

- A. National Electric Code (NEC)
- B. American Society for Testing and Materials (ASTM)
- C. Electronics Industry Association/Telecommunications Industry Association (EIA/TIA)
- D. Institute of Electrical and Electronics Engineers (IEEE)
- E. International Electrical Testing Association (NETA)
- F. National Electrical Manufacturers Associates (NEMA)
- G. National Fire Protection Association (NFPA)
- H. Underwriters Laboratory, Inc. (UL)

1.6 RELATED WORK AND DOCUMENTATION

- A. As required in the following as they apply to the commissioning of equipment:
 - 1. Factory Test Reports: Contractor shall provide any factory testing documentation or certified test reports required by the specifications. These shall be provided prior to Acceptance Phase. Factory Test Reports should be provided in pdf electronic format. These include but are not limited to:
 - a. Field Testing Agency Reports: Provide all documentation of work done by independent testing agencies required by the contract documents. These shall be provided prior to Acceptance Phase. Field Testing Agency Reports should be provided in pdf electronic format.

1.7 COORDINATION MANAGEMENT PROTOCOLS

- A. Coordination responsibilities and management protocols relative to Cx are initially defined in this Section, but shall be refined and documented in the Construction Phase Cx Kick-Off meeting. Contractor shall have input in the protocols and all Parties will commit to scheduling obligations. The Contractor will record and distribute.

1.8 CONTRACTOR RESPONSIBILITIES

- A. Refer to Section 019113: Detailed Contractor responsibilities common to all Divisions are specified in Section 019113. The following are additional responsibilities or notable responsibilities specific to the electrical systems.
- B. Construction Phase:
 - 1. Coordinate the work of the Electrical Testing Agency and the Cx requirements, as required.
 - 2. Provide skilled technicians qualified to perform the work required.

3. Provide factory-trained and authorized technicians where required by the Contract Documents.
4. Prepare and submit required draft Start-Up Procedures and submit along with the manufacturer's application, installation and start-up information.
5. Contractors, subcontractors and vendors shall review Functional Performance Test (FPT) procedures and phasing schedule to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during the tests.
6. Thoroughly complete and inspect installation of systems and equipment as detailed throughout Contract Documents, as required by reference or industry standards, and as specifically indicated elsewhere this Section.
7. Record Start-up Procedures on start-up procedure forms and certify that the systems and equipment have been started and or tested in accordance with the requirements specified above. Each task or item shall be indicated with the Party actually performing the task or procedure.

C. Acceptance Phase:

1. Assist in functional performance testing. Assistance will generally include the following:
 - a. Manipulate systems and equipment to facilitate testing.

D. Warranty Phase:

1. Maintain record documentation of any configurations, set ups, parameters etc, that change throughout the period.
 - a. Respond to Warranty issues as required by Division 1 and the General Conditions.

1.9 START-UP PROCEDURES AND DOCUMENTATION

- A. Refer to Part 3 - Execution.

1.10 FUNCTIONAL PERFORMANCE TESTING

- A. For applicable systems and equipment, Contractor shall participate in Functional Performance Testing.

1.11 FPT ACCEPTANCE CRITERIA

- A. Acceptance criteria for tests are indicated in the specification Sections applicable to the systems being tested. Generally, unless indicated otherwise, the criteria for acceptance will be that specified with the individual system, equipment, component, or device, which in general conform to NFPA 70B and International Electrical Testing Association (NETA) testing specifications NETA ATS-2003.

1.12 TRAINING

- A. Contractors, subcontractor, vendors, and other applicable Parties shall prepare and conduct training sessions on the installed systems and equipment they are responsible for per the requirements of Section 019113 and the individual Specifications.

1.13 O&M MANUAL CONTENT - PREPARATION AND LOGISTICS

- A. Refer to Section 017704 and the individual Specifications.

PART 2 - PRODUCTS

2.1 INSTRUMENTATION

- A. All testing equipment used by any Party shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified. If not otherwise noted, the following minimum requirements apply: All equipment shall be calibrated according to the manufacturer's recommended intervals. Calibration tags shall be affixed or certificates readily available.
- B. Testing Instrumentation: Contractor shall provide all instrumentation necessary for tests for which they are responsible. CxA will provide standard instrumentation for measuring medium and low voltage electrical voltage, current, power factor, power, and THD. CxA will provide receptacle testers for normal and GFI receptacle tests. Contractor shall provide all other instrumentation required to accomplish the specified testing.
- C. Contractor shall provide infrared scanning equipment when required by the contract documents. Infrared scanning equipment shall be an AGA (or approved equal) thermovision set capable of viewing an entire bus or equipment assembly at one time and have a sensitivity of 0.2 degree C with a liquid nitrogen reference.

PART 3 - EXECUTION

3.1 START-UP PROCEDURES

- A. This Section outlines 'generic' or minimally acceptable Start-Up Procedures. These items shall provide a minimum or guideline for required Contractor development of Start-Up Procedures. Contractor shall synthesize these minimum requirements along with their own internal quality control practices, those of the manufacturer, and any applicable codes and standards to develop specific and itemized Start-Up Procedures specific to the equipment and systems installed on this project.
- B. Refer to NETA which is referenced in several Division 26 sections which outline electrical related testing required.
- C. The following start up verifications/procedures are common to all systems:
 - 1. Checkout shall proceed from devices to the components to the systems.
 - 2. Verify labeling is affixed per spec and visible.
 - 3. Verify prerequisite procedures are done.
 - 4. Inspect for damage and ensure none is present.
 - 5. Verify system is applied per the manufacturer's recommendations.
 - 6. Verify system has been started up per the manufacturer's recommendations.
 - 7. Verify that access is provided for inspection, operation and repair.
 - 8. Verify that access is provided for replacement of the equipment.
 - 9. Verify the record drawings, submittal data and O&M documentation accurately reflect the installed systems.
 - 10. Verify all gages and test reports are provided as required by contract documents and manufacturer's recommendations.
 - 11. Verify all recorded nameplate data is accurate.
 - 12. Installation is done to ensure safe operation and maintenance.
 - 13. Verify specified replacement material/attic stock has been provided as required by the Construction Documents.
 - 14. Verify all rotating parts are properly lubricated.

Seattle NDC - Elevator Upgrades & New Install
Federal Way, WA
USPS Project Number EFMS E82393

15. Verify all monitoring and ensure all alarms are active and set per USPS's requirements.
16. Verify that medium voltage circuit breaker relays and low voltage power breaker trip units have been programmed per project documents.

END OF DOCUMENT

USPS Mail Processing Facility Specification issued: 10/1/2016
Last revised: 9/16/2015

SECTION 262416

PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes:
 - 1. Panelboards.
- B. 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.
- C. Related Sections:
 - 1. Section 260500 – Common Work Results for Electrical.

1.2 SUBMITTALS

- A. Product Data: Required
- B. Shop Drawings: Required
- C. Directories: Required

1.3 QUALITY ASSURANCE

- A. Panelboards shall be UL Listed and labeled and shall be designed in accordance with the applicable standards of ANSI and NEMA.

PART 2 - PRODUCTS

2.1 GENERAL CLASSIFICATION

- A. Manufacturers: General Electric Company (G.E.) Catalog numbers are used to identify type of equipment specified. Equivalent products by the following manufacturers are acceptable:
 - 1. Siemens
 - 2. Cutler Hammer
 - 3. Square-D
 - 4. Eaton/Cutler Hammer
 - a. Branch Circuit Panels:
 - 1) 120/208V: G.E. Type AQ
 - b. Distribution Panels:
 - 1) Circuit breaker: G.E. to match existing.

2.2 BRANCH CIRCUIT PANELS

- A. Cabinet: Construct cabinet with code gauge galvanized steel. Provide minimum 20 inch wide cabinets, and extra wiring space where incoming feed-through or parallel lines are required.
- B. Doors: Provide single door construction, made of cold-rolled steel. Door shall have concealed hinges, flush catch, and lock. (Tee bar handles not acceptable). Secure top and bottom of door to cabinet by slotted steel bolts. Release shall be by one-half turn with a screwdriver. All panels shall be keyed alike.
 - 1. Panelboards shall be equipped with "door within door" type trim.
- C. Panels located adjacent to each other shall have identically sized enclosures and trims.
- D. Finish: Finish exposed parts with one coat of primer and one coat of light gray enamel suitable for overpainting in field if desired.
- E. Phase, neutral and ground bus bars shall be tin plated copper.
- F. Provide all hardware for future breakers, identified on drawings as SPACES, or for the full length of usable bus, whichever is longer.
- G. Provide ground bus with full complement of terminals in addition to insulated neutral bus.
- H. Circuit Breakers:
 - 1. Provide multi-pole units with common trip elements. Handle ties are not acceptable.
 - 2. Provide key-operated circuit breakers in the panelboards used for the Fire Alarm. Security and CCTV Systems. Circuit breakers shall be similar to square D type QO_K.
 - 3. 120/208V branch circuit panelboards: Molded cast bolt-on type designed for 120/208V, three phase, four wire service with minimum 10,000 amperes rms short circuit rating.
 - 4. 277/480V branch circuit panelboards: Molded cast bolt-on type designed for 277/480V, three phase, four wire service with minimum 14,000 amperes rms short circuit rating.
- I. Provide all panelboards with lockout/tagout devices; Circuit-Safe type as manufactured by Stranco, Inc. or approved equal.
- J. Nameplates: Provide screwed-on (no adhesives) engraved bakelite nameplate identification on outside of each panel showing panel designation, voltage and phase in minimum 1/4 inch high letters.
- K. Circuit directories: Provide a metal-framed circuit directory on inside of inner door, with plastic protector.
- L. Provide 2-3/4 inch and 1-1 inch spare empty conduits routed above into accessible ceiling space from all flush mounted panelboards.
- M. Panels serving electronic equipment and/or other harmonic producing loads shall be equipped with double neutral bus bars.

PART 3 - EXECUTION

3.1 CLEARANCES

- A. Minimum code required clearances around panelboards must be maintained.

3.2 MOUNTING HEIGHT

- A. Typically mount panel boards top at 6 ft. - 0 in. above finished floor but no more than 6 ft. - 6 in. above finished floor to top of circuit breaker handle.

3.3 MOUNTING HARDWARE

- A. Provide all necessary blocking, channels and other hardware for securing panelboards to wall, column, or other parts of building structure.

3.4 FIELD CONTROL

- A. Section 014000 – Quality Requirements: Field Testing and Inspection.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.5.

END OF SECTION

SECTION 262726

WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Wall switches.
 - 2. Receptacles.
 - 3. Device plates and box covers.
- B. 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.
- C. Related Sections:
 - 1. Section 260500 - Common Work Results for Electrical: Supporting devices, electrical identification, grounding and bonding.
 - 2. Section 260533 – Raceway and Boxes for Electrical Systems: Pull, junction, outlet and switch boxes.

1.2 REFERENCES

- A. National Electrical Contractors Association (NECA):
 - 1. NECA "Standard of Installation."
- B. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA WD 1 – General Requirements for Wiring Devices.
 - 2. NEMA WD 6 – Wiring Devices – Dimensional Requirements.
- C. National Fire Protection Association (NFPA):
 - 1. NFPA 70 - National Electrical Code.

1.3 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum 5 years documented experience.
- B. Regulatory Requirements:
 - 1. Conform to requirements of NFPA 70.
 - 2. Provide Products listed and classified by Underwriters Laboratories, Incorporated.

1.4 SUBMITTALS

- A. Product data required.

PART 2 - PRODUCTS

2.1 WALL SWITCHES

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - 1. Hubbell, Inc, Milford, CT (203) 882-4800.
 - 2. Leviton Manufacturing, Company, Inc., Little Neck, NY (800) 824-3005.
 - 3. Pass & Seymour, Syracuse, NY (800) 776-4035.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- C. Provide 20Amp, 120/277Volt, specification grade, flush single pole toggle switches with side and back wired screw terminals.
- D. Single Pole Switch:
 - 1. Leviton Cat. No.1221-2.
 - 2. P&S Cat. No. PS20AC1I.
 - 3. Hubbell Cat. No. HBL1221.
- E. Double Pole Switch:
 - 1. Leviton Cat. No. 1222-2.
 - 2. P&S Cat. No. PS20AC2.
 - 3. Hubbell, Cat. No. HBL1222.
 - 4. Hubbell Cat. No. HBL1221L.
- F. Color: Color as directed by USPS.

2.2 RECEPTACLES

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - 1. Leviton Manufacturing, Company, Inc., Little Neck, NY (800) 824-3005.
 - 2. Pass & Seymour, Syracuse, NY (800) 776-4035.
 - 3. Hubbell, Inc, Milford, CT (203) 882-4800.
 - 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Provide duplex specification grade receptacles, 20Amp, 125Volt, 2 pole, 3 wire, grounding with green hexagonal equipment ground screw.
- C. Duplex Convenience Receptacle:
 - 1. Leviton Cat. No. 5362.
 - 2. P&S Cat. No. 5362.
 - 3. Hubbell Cat. No. HBL5352.
- D. Tamper and weather resistant GFCI Receptacle (Side Wired Feed-Thru):
 - 1. Hubbell Cat. No. GFR5362SG.

- E. Color: As directed by USPS.

2.3 WALL PLATES

- A. Provide stainless steel wall plates.
- B. Provide waterproof covers on all exterior receptacles and where indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Verify that outlet boxes are installed at proper height.
 - 2. Verify that wall openings are neatly cut and will be completely covered by wall plates.
 - 3. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
- C. Report in writing to Contracting Officer 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.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean debris from outlet boxes.

3.3 INSTALLATION

- A. Install wiring devices as indicated, in accordance with manufacturer's written instruction, applicable requirements of NEC and NECA's "Standard of Installation" and in accordance with recognized industry practices to fulfill project requirements.
- B. Install devices plumb and level.
- C. Install switches with OFF position down.
- D. Install receptacles with grounding pole on bottom.
- E. Connect wiring device grounding terminal to branch circuit equipment grounding conductor.

- F. Connect wiring devices by wrapping conductor 2/3 of screw diameter in clockwise direction around screw terminal. Tighten screw to 12 pound-inches. Do not use spring pressure devices for wire connections.
- G. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.
- H. Provide plates on switch, receptacle, and blank outlets.

3.4 CONSTRUCTION

- A. Interface with other work:
 - 1. Coordinate locations of outlet boxes provided under Section 260533 to obtain mounting heights indicated on Drawings.

3.5 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field inspection.
- B. Prior to energizing circuitry, test wiring for electrical continuity, and for short circuits. Ensure proper polarity of connections is maintained. Subsequent to energization, test wiring devices to demonstrate compliance with requirements.
- C. Operate each wall switch with circuit energized and verify proper operation.

3.6 ADJUSTING

- A. Adjust devices and wall plates to be flush, level and plumb with wall.

3.7 CLEANING

- A. Section 017300 - Execution: Cleaning installed work.
- B. Clean exposed surfaces to remove splatters and restore finish.

END OF SECTION

SECTION 262816
ENCLOSED SWITCHES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fusible switches.
 - 2. Nonfusible switches.
 - 3. Fuses.
- B. 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.
- C. Related Sections:
 - 1. As specified in Section 260500 - Common Work Results for Electrical.

1.2 REFERENCES

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA FU 1 - Low Voltage Cartridge Fuses.
 - 2. NEMA KS 1 - Enclosed Switches.

1.3 SUBMITTALS

- A. As specified in Section 260500 - Common Work Results for Electrical.
 - 1. Product Data:
 - a. Switch ratings and enclosure dimensions.
 - b. Fuse data sheets showing electrical characteristics including time-current curves.
 - 2. Assurance/Control Submittals:
 - a. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
 - b. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Project Record Documents: Record actual locations of enclosed switches and actual fuse sizes.

1.4 QUALITY ASSURANCE

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Perform Work in accordance with NECA SI.

1.5 MAINTENANCE

- A. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
- B. Extra Products: At completion of installation, deliver to Contracting Officer.
 - 1. Three of each size and type fuse installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Switches: Subject to compliance with project requirements, manufacturer's offering Products which may be incorporated in the Work include the following:
 - 1. Eaton/Cutler Hammer Corp., Pittsburg, PA (800) 525-2000.
 - 2. General Electric Company (800) 626-2000.
 - 3. Siemens Energy & Automation, Alpharetta, GA (800) 964-4114.
 - 4. Square D Company, Palatine, IL (800) 392-8781.
- B. Fuses: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Cooper Industries Incorporated, Waukesha, WI (414) 524-3300.
 - 2. General Electric Company (800) 626-2000.
 - 3. Gould Shawmut, Newburyport, MA (508) 462-6662.
- C. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 FUSIBLE ENCLOSED SWITCH ASSEMBLIES

- A. NEMA KS 1, Type HD heavy duty, 100,000 AIC load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Cover shall be equipped with a manual defeat to allow opening by authorized personnel while energized. Handle shall be lockable in ON or OFF position.
- B. Rating: 250 volts AC or 600 volts AC as indicated on Drawings.
- C. Fuse Clips: Designed to accommodate Class R fuses.
- D. Enclosures: NEMA KS 1.
 - 1. Interior Dry Locations: NEMA Type 1 or 12.
 - 2. Exterior Locations: NEMA Type 3R or 12.
- E. Provide factory grounding lug and neutral block if required.
- F. Provide auxiliary interlock electrical contacts for elevator disconnect switches.

2.3 NONFUSIBLE SWITCH ASSEMBLIES

- A. NEMA KS 1, Type GD, general duty load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Cover shall be equipped

with a manual defeat to allow opening by authorized personnel while energized. Handle shall be lockable in ON or OFF position.

- B. Rating: 250 volts AC or 600 volts AC as indicated on Drawings.
- C. Enclosures: NEMA KS 1.
 - 1. Interior Dry Locations: NEMA Type 1 or 12.
 - 2. Exterior Locations: NEMA Type 3R or 12.
- D. Provide factory grounding lug and neutral block if required.

2.4 FUSES

- A. NEMA FU 1, Class RK5, dual element, current limiting, time delay, 250 volt AC or 600 volt AC as indicated on Drawings.
- B. Interrupting Rating: 100,000 rms amperes.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. As specified in Section 260500 – Common Work Results for Electrical.

3.2 INSTALLATION

- A. Switches:
 - 1. Install in accordance with manufacturers published instructions and NECA SI.
 - 2. Install where indicated on Drawings, where required by equipment, and where required by NFPA 70.
 - 3. Apply adhesive tag on inside door of each fused switch indicating NEMA fuse class and size installed.
- B. Fuses:
 - 1. Install fuses in fusible switches in accordance with manufacturer's published instructions, as indicated on Drawings, or as required by loading per NFPA 70.
 - 2. Install fuse with label oriented with manufacturer, type, and size easily read.

3.3 FIELD QUALITY CONTROL

- A. As specified in Section 260500 – Common Work Results for Electrical.

END OF SECTION