PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Agreement, including Facilities Management Design and Construction Guide, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Supporting devices for electrical components.
2. Equipment connection.
3. Concrete equipment bases.
4. Electrical demolition.
5. Cutting and patching for electrical construction.
6. Touchup painting.
7. Work in existing buildings.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

1.4 COORDINATION

A. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.

1. Set inserts and sleeves in poured-in-place concrete, masonry work, and other structural components as they are constructed.

B. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.

C. Coordinate location of access panels and doors for electrical items that are concealed by finished surfaces.
PART 2 - PRODUCTS

2.1 SUPPORTING DEVICES

A. Material: Cold-formed steel, with corrosion-resistant coating acceptable to authorities having jurisdiction.

B. Metal Items for Use Outdoors or in Damp Locations: Hot-dip galvanized steel.

C. Slotted-Steel Channel Supports: Flange edges turned toward web, and 9/16-inch-diameter slotted holes at a maximum of 2 inches o.c., in webs.
   1. Channel Thickness: Selected to suit structural loading.
   2. Fittings and Accessories: Products of the same manufacturer as channel supports.

D. Raceway and Cable Supports: Manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring-steel clamps or click-type hangers.

E. Pipe Sleeves: ASTM A 53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.

F. Cable Supports for Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for nonarmored electrical cables in riser conduits. Plugs have number and size of conductor gripping holes as required to suit individual risers. Body constructed of malleable-iron casting with hot-dip galvanized finish.

G. Expansion Anchors: Carbon-steel wedge or sleeve type.

H. Toggle Bolts: All-steel springhead type.

2.2 ACCESS DOORS

A. Prime coated, 14 gauge steel, flush, with screwdriver operated cam lock; frame to accommodate construction type. Milcor style M or DW or equivalent.

2.3 TOUCHUP PAINT

A. For Equipment: Equipment manufacturer’s paint selected to match installed equipment finish.

B. Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

PART 3 - EXECUTION

3.1 ELECTRICAL EQUIPMENT INSTALLATION

A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide the maximum possible headroom.

B. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.
C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.

D. Right of Way: Give to raceways and piping systems installed at a required slope.

E. Laying Out work:

1. Carefully lay out all work in advance of installation using data and measurements from the site, the appropriate architectural and structural drawings, and shop drawings. Confirm code-required clearances. Do not infringe upon space required for operation, maintenance, or clearance for items installed by other contractors.

2. Prior to installation of any work, make certain the location does not conflict with other items in or near the same location. If the layouts so prepared indicate that the required conditions cannot be met in the space provided, inform the Architect/Engineer prior to installation and request clarification.

3. Failure to properly coordinate and lay out work will require correction by the Contractor at the Contractor’s expense.

F. Data and Measurements: Data given herein and on the drawings is as accurate as could be secured; absolute accuracy is not guaranteed. Obtain exact locations, measurements, levels, etc., at the site and adapt work to actual conditions. Examine the general construction, mechanical, electrical, and other applicable drawings and the specifications. Plans and specifications are available for examination at the office of the Architect/Engineer. Utilize only architectural drawings, structural drawings, and site measurements in calculations. Mechanical and electrical drawings are diagrammatic or schematic.

G. Position of Outlets:

1. Locate all outlets and devices mounted on finished surfaces with regard to paneling, furring, trim, etc. Install outlets and devices with vertical edges of plates plumb. Install boxes or plaster rings such that the front edge extends to the finished surface of the wall, ceiling or floor without projecting beyond the surface.

2. Install receptacles, switches, etc., on wood trim, cases, or other fixtures symmetrically and, where necessary, install with the long dimension of the plate horizontal.

3. Coordinate locations of outlets and devices with other contractors so as not to destroy the aesthetic effect of the surface in which the outlets and devices are mounted. Coordinate the locations of electrical items with work furnished by other trades to avoid interference.

4. Install outlets at the heights indicated below unless otherwise noted. All heights of outlets are measured from finished floor to centerline of device. Adjust heights as necessary to clear wall-mounted cabinets, fin tube convectors, unit heaters, etc. Mounting heights shall be in compliance with ADA requirements. When devices are installed in masonry walls, adjust mounting heights to correspond to block coursing. Do not mount outlets below 15 inches or switches above 46 inches.
   a. Wall switches: 46 inches.
   b. Receptacle outlets (general): 16 inches.
   c. Wall phones: 48 inches.
   d. Communication outlets: 16 inches.

5. The mounting heights of disconnect switches, circuit breakers, motor controllers, pushbutton stations and other similar devices and equipment may vary
depending upon location and whether individually or group mounted. For convenience and safety, mount equipment with the center of operating levers, handles or buttons no more than 72 inches above the finished floor. Locate individual devices or pieces of equipment, unless otherwise specified, so the operating handle, lever or button is located approximately 5 feet above finished floor. Coordinate heights of all electrical items with work furnished by other trades to avoid interferences.

6. Improperly located devices or outlets shall be relocated by the Contractor at the Contractor’s expense including necessary patching.

3.2 ELECTRICAL SUPPORTING DEVICE APPLICATION

A. Damp Locations and Outdoors: Hot-dip galvanized materials.

B. Dry Locations: Steel materials.

C. Selection of Supports: Comply with manufacturer’s written instructions.

D. Strength of Supports: Adequate to carry present and future loads, times a safety factor of at least four.

3.3 SUPPORT INSTALLATION

A. Install support devices to securely and permanently fasten and support electrical components.

B. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.

C. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.

D. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps.

E. Install 1/4-inch- diameter or larger threaded steel hanger rods, unless otherwise indicated.

F. Spring-steel fasteners specifically designed for supporting single conduits or tubing may be used instead of malleable-iron hangers for 1-1/2-inch and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings and for fastening raceways to slotted channel and angle supports.

G. Arrange supports in vertical runs so the weight of raceways and enclosed conductors is carried entirely by raceway supports, with no weight load on raceway terminals.

H. Separately support cast boxes that are threaded to raceways and used for fixture support. Support sheet-metal boxes directly from the building structure or by bar
hangers. If bar hangers are used, attach bar to raceways on opposite sides of the box and support the raceway with an approved fastener not more than 24 inches from the box.

1. Mount electrical equipment mounted on exterior walls or other damp locations on U-channel system components.

I. Install metal channel racks for mounting cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices unless components are mounted directly to structural elements of adequate strength.

J. Install sleeves for cable and raceway penetrations of concrete slabs and walls unless core-drilled holes are used. Install sleeves during erection of concrete and masonry walls. Extend sleeves 4 inches above floor in mechanical spaces and unfinished spaces. Seal sleeves through exterior walls with watertight caulking after installation of conduit. Space sleeves a minimum of three sleeve diameters on center.

K. Securely fasten electrical items and their supports to the building structure, unless otherwise indicated. Perform fastening according to the following unless other fastening methods are indicated:

   1. Wood: Fasten with wood screws or screw-type nails.
   2. Masonry: Toggle bolts on hollow masonry units and expansion bolts on solid masonry units.
   3. New Concrete: Concrete inserts with machine screws and bolts.
   4. Existing Concrete: Expansion bolts.
   5. Steel: Welded threaded studs or spring-tension clamps on steel.
      a. Field Welding: Comply with AWS D1.1.
   6. Welding to steel structure may be used only for threaded studs, not for conduits, pipe straps, or other items.
   7. Light Steel: Sheet-metal screws.
   8. Fasteners: Select so the load applied to each fastener does not exceed 25 percent of its proof-test load.

3.4 EQUIPMENT CONNECTION

A. General:

1. Provide final power and control connections for all equipment furnished under other Divisions of this specification and for all Owner-furnished equipment. Where not specified in mechanical sections of this specification, connect all motor controls and associated mechanical equipment as required for a complete and functional control system.

2. Provide interlocks and wiring to and between controls for condensing units, heat pumps, and fan coil units.

3. Verify all control wiring requirements with manufacturer certified shop drawings for each piece of equipment or control system and install accordingly, where indicated. Install control wiring in conduit.

3.5 CONCRETE BASES

A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger, in both directions, than supported unit. Follow supported equipment manufacturer's
anchorage recommendations and setting templates for anchor-bolt and tie locations, unless otherwise indicated. Dowel to structural slab.

3.6 WORK IN EXISTING BUILDINGS

A. General: Execute work in the existing building, indicated on the drawings or specified herein, with a minimum amount of interference with the normal activities of the occupants of the building. Schedule work in advance with the Owner and proceed only with the Owner’s written approval.

B. Utilities: Do not interrupt utilities without the Owner’s prior written approval regarding the time and duration of such interruptions. Do not disconnect utilities to existing facilities until new or temporary facilities are installed except for short periods of interruption which are necessary for the performance of the new work and which are approved by the Owner. Storm water may be temporarily diverted to surface drainage provided such drainage is arranged to prevent flooding of structures, basements and excavations for construction.

C. Fire Alarm System: As a minimum, maintain the existing degree of protection for all areas throughout construction. Coordinate required outages with the Owner and the Fire Marshal. After any additions or modifications to the fire alarm system, a re-acceptance test shall be performed by a licensed party in accordance with NFPA 72.

D. Welding: Notify the Owner before starting welding or cutting. Fire extinguishers shall be immediately accessible when welding or cutting with an open flame or arc. Stop operations involving welding or cutting with an open flame or arc not less than one hour before leaving the premises.

E. Noisy Operations: Schedule noisy operations, such as those involving use of air hammers, etc., in demolition or cutting of openings, with the Owner.

F. Occupancy: The Owner will continue to occupy the building and carry on normal activity. Protect the occupied areas from dust, smoke, etc., by a method reviewed by the Architect/Engineer.

G. Owner’s Right to Direct Work: The Owner shall have the right to direct the places of beginning work, its prosecution, and the manner in which all work under this contract is to be conducted, insofar as may be necessary to secure the safe and proper progress and quality of the work.

H. Existing Conduits or Electrical Equipment: Remove or relocate, as required, or as directed by the Architect/Engineer, existing conduit or electrical equipment which would interfere with the proper installation of new work. Modify existing work in conformance with these specifications. Use the same materials as for new work unless otherwise specified.

3.7 DEMOLITION AND REMODEL

A. Protect existing electrical equipment and installations indicated to remain. If damaged or disturbed in the course of the Work, remove damaged portions and install new products of equal capacity, quality, and functionality.

B. Accessible Work: Remove exposed electrical equipment and installations, indicated to be demolished, in their entirety.
C. Abandoned Work: Cut and remove buried raceway and wiring, indicated to be abandoned in place, 2 inches below the surface of adjacent construction. Cap raceways and patch surface to match existing finish.

D. Remove demolished material from Project site.

E. Remove, store, clean, reinstall, reconnect, and make operational components indicated for relocation.

F. Remove all existing lights, receptacles, switches, etc., indicated on plans or which are not indicated but must be removed to accommodate demolition or new remodeling.

G. Where existing walls are indicated to be removed, disconnect power to electrical devices and associated appurtenances relating to the walls. Maintain circuit continuity up and down stream from removed outlets. Extend circuiting to up and downstream devices and reconnect as required. Where existing site lighting fixtures are removed, verify the routing of existing circuits. Maintain circuit continuity between existing fixtures which remain.

H. In areas which are remodeled, replace existing wire with new wire. No existing wire is permitted to remain unless noted. Existing concealed conduit and boxes may be reused.

I. Verify existing conditions infield prior to bid date.

3.8 CUTTING AND PATCHING

A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit electrical installations. Perform cutting by skilled mechanics of trades involved.

B. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new fireproofing where existing firestopping has been disturbed. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.

3.9 FIELD QUALITY CONTROL

A. Inspect installed components for damage and faulty work, including the following:

1. Raceways.
2. Building wire and connectors.
4. Concrete bases.
5. Electrical demolition.
6. Cutting and patching for electrical construction.
7. Touchup painting.

3.10 CLEANING AND PROTECTION

A. On completion of installation, including outlets, fittings, and devices, inspect exposed finish. Remove burrs, dirt, paint spots, and construction debris.

B. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.
## SUBMITTAL SCHEDULE

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