PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Drawings and general provisions of the Contract, including Facilities Management Design and Construction Guide, apply to this Section.

1.2 SUMMARY
A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring and telecommunications cabling pathways.
B. Related Sections include the following:
   1. Division 16 Section "Basic Electrical Materials and Methods".

1.3 DEFINITIONS
A. EMT: Electrical metallic tubing.
B. FMC: Flexible metal conduit.
C. IMC: Intermediate metal conduit.
D. LFMC: Liquidtight flexible metal conduit.
E. RNC: Rigid nonmetallic conduit.
F. Telecommunications Pathway: Any item, raceway, box or enclosure in which telecommunications cabling is placed.

1.4 SUBMITTALS
A. Product Data: For surface raceways, wireways and fittings, hinged-cover enclosures, and cabinets.

1.5 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.
C. Telecommunications Pathways: Comply with TIA/EIA and BICSI standards.
1.6 COORDINATION

A. Coordinate layout and installation of raceways, boxes, enclosures, cabinets, and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

B. Coordinate layout and installation of raceways and boxes with other construction elements to ensure adequate headroom, working clearance, and access. Do not install exposed raceways on floor surfaces. Do not support from floor surfaces in a manner which impedes access to spaces or equipment or which creates a tripping hazard.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements provide surface raceways manufactured by Wiremold.

2.2 METAL CONDUIT AND TUBING

A. Rigid Steel Conduit: ANSI C80.1.

B. IMC: ANSI C80.6.

C. EMT and Fittings: ANSI C80.3.
   1. Fittings: Steel compression type.

D. Fittings: NEMA FB 1; compatible with conduit and tubing materials.

E. Insulated Bushings: Thermosetting phenolic.

F. Grounding Bushings: Grounding bushings shall be malleable iron, threaded, with insulated liner and solderless wg.

2.3 NONMETALLIC CONDUIT AND TUBING

A. RNC: NEMA TC 2, Schedule 40 and Schedule 80 PVC.

B. RNC Fittings: NEMA TC 3; match to conduit or tubing type and material.

2.4 METAL WIREWAYS

A. Material and Construction: Sheet metal, NEMA 1 unless otherwise indicated.

B. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
C. Select features, unless otherwise indicated, as required to complete wiring system and to comply with NFPA 70.

D. Wireway Covers: Screw-cover type unless otherwise indicated.

2.5 SURFACE RACEWAYS

A. Surface Metal Raceways: Steel with snap-on covers.

B. Types, sizes, and channels as indicated and required for each application, with fittings that match and mate with raceways.

2.6 BOXES, ENCLOSURES, AND CABINETS

A. Boxes shall be manufactured by Raco, Steel City, or equivalent.

B. Interior boxes shall be hot-dipped galvanized steel.

C. Exterior boxes shall be cast boxes with threaded hubs and gasketed cover.

D. Boxes for Communications Outlets:


E. Boxes for Electrical Wiring Devices:

   1. Recess: Hot dip galvanized sheet steel, 4-inch square, minimum, 2-1/8-inch deep. Provide with appropriate trim ring.

F. Sheet Metal Pull and Junction Boxes: Galvanized or painted sheet metal with a removable cover on the largest side of the box. Include cable supports if any dimension of the box is greater than 48 inches.

G. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous hinge cover and flush latch.

   1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.

H. Cabinets: NEMA 250, Type 1, galvanized steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel. Hinged door in front cover with flush latch and concealed hinge. Key latch to match panelboards. Include metal barriers to separate wiring of different systems and voltage and include accessory feet where required for freestanding equipment.

2.7 CONDUIT FINISHES

A. All exposed conduit shall be prepared and painted to match surrounding surfaces, and as selected by Owner.
2.8 FACTORY FINISHES

A. Finish: For raceway, wireway, enclosure, or cabinet components, provide manufacturer’s standard paint applied to factory-assembled surface raceways, enclosures, and cabinets before shipping.

B. Finish: For surface raceway components, provide ivory, unless otherwise indicated.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors:

1. Exposed: Rigid steel or IMC.
2. Concealed: Rigid steel or IMC.
3. Underground: RNC.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
5. Boxes and Enclosures: NEMA 250, Type 3R unless otherwise indicated.

B. Indoors:

1. Exposed: EMT.
2. Concealed: EMT.
3. Connection Within Existing Walls: FMC.
5. Wet Locations: Rigid steel conduit.
7. Boxes and Enclosures: NEMA 250, Type 1, except as follows:
   a. Wet Locations: NEMA 250, Type 4, stainless steel.

C. Minimum Raceway Size: 3/4-inch trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Provide insulated bushings on box connectors 1-inch and larger and on conduits stubbed above an accessible ceiling.
2. Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.

3.2 INSTALLATION

A. Install raceways, boxes, enclosures, and cabinets as indicated, according to manufacturer’s written instructions. Securely fasten each component to the surface on which it is mounted.

B. Where a box is attached on one side to a metal stud, provide a support bracket on the side of the box opposite the stud to prevent the box from twisting. Orient each box located above an accessible ceiling so the box opening faces down or to one side.
C. Keep electrical raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Keep telecommunications raceways at least 5 inches away from light fixtures, transformers, panelboards, and feeders. Keep non-metallic telecommunications raceways at least 24 inches away from electrical equipment, feeders, and services. Install horizontal raceway runs above water and steam piping.

D. Complete raceway installation before starting conductor installation.

E. Support raceways as specified in Division 16 Section "Basic Electrical Materials and Methods."

F. Install temporary closures to prevent foreign matter from entering raceways.

G. Make bends and offsets so inside diameter is not reduced. Keep legs of bends in the same plane and keep straight legs of offsets parallel, unless otherwise indicated.

H. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.
   1. Run concealed raceways parallel and perpendicular to structural members of the building.

I. Install exposed raceways parallel or at right angles to nearby surfaces or structural members and follow surface contours as much as possible.
   1. Run parallel or banked raceways together on common supports.

J. Join raceways with fittings designed and approved for that purpose and make joints tight.
   1. Provide expansion joints for conduits crossing building expansion joints and for conduits connected to two separate structures.

K. Terminations:
   1. Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against box. Use two locknuts, one inside and one outside box.
   2. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into hub so end bears against wire protection shoulder. Where chase nipples are used, align raceways so coupling is square to box; tighten chase nipple so no threads are exposed.

L. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 18 inches of slack at each end of pull wire.

M. Communications System Raceways: In addition to above requirements, install raceways in maximum lengths of 100 feet and with a maximum of two 90-degree bends or equivalent. Separate lengths with pull or junction boxes where necessary to comply with these requirements.
N. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with UL-listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces and building exterior walls.
2. Where otherwise required by NFPA 70.

O. Exterior Branch Circuits: Route conduits adjacent to curbs. Push or directional bore conduits beneath paved areas; otherwise, sawcut and remove pavement. Replace removed pavement to match existing.

P. Flexible Connections: Use maximum of 72 inches of flexible conduit for recessed and semi-recessed lighting fixtures. Install separate ground conductor across flexible connections.

Q. Surface Raceways: Install a separate, green, ground conductor in raceways from junction box supplying raceways to receptacle or fixture ground terminals.

R. Install hinged-cover enclosures and cabinets plumb. Support at each corner.

S. Provide “locator wire” buried with all non-metallic conduit. Use solid copper AWG-12 with 30 mil polyethylene insulation as manufactured by Kris-Tech Wire Co. Model PE-30.

3.3 TELECOMMUNICATIONS PATHWAY AND OUTLET INSTALLATION

A. Pull or junction boxes installed for telecommunications cable shall not function as a corner.

B. Use EMT conduit, size as noted on drawings for interior penetration sleeves. Provide bushing at each end of penetration sleeve.

C. Penetration sleeve conduits shall be mechanically secured; see detail drawings.

D. Penetrations shall be firestopped after installation of cables with a UL listed sealant. Seal penetrations with intumescent caulk or putty. Firestopping shall be adequate to maintain the fire rating of the wall penetrated.

E. Surfaces affected by installation of penetrations shall be refinished to match adjacent surfaces.

3.4 PROTECTION

A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.
3.5 CLEANING

A. After completing installation of exposed, factory-finished raceways and boxes, inspect exposed finishes and repair damaged finishes.

END OF SECTION 16130