SECTION 260533.13 – CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SCOPE

A. This Section applies to electrical conduit systems composed of circular section conduits and the boxes, fittings, and accessories necessary for a complete system.

1.2 REFERENCE STANDARDS

A. Materials and galvanizing shall conform to ANSI C-80-1 (latest issue).

B. All conduit system components shall be UL listed.

PART 2 - PRODUCTS

2.1 METALLIC CONDUIT, ELBOWS, AND COUPLINGS

A. Rigid metal (RGS) or intermediate metal galvanized steel unless otherwise indicated.

B. Electrical Metallic Tubing (EMT): may be used in protected locations above grade, but not in poured concrete. Protected locations are above dropped ceilings, in concrete block voids, stud walls, in mechanical and maintenance spaces, and in other dry spaces reasonably safe from physical damage. Process spaces are not protected locations unless indicated.

2.2 METALLIC CONDUIT FITTINGS AND MATERIALS

A. Rigid Metal or Intermediate Metal Conduit

1. Threaded type.
2. Galvanized iron alloy, copper free aluminum, or galvanized malleable iron.
3. Covers of same material as body.
4. Covers shall be gasketed in outdoor, wet, or dusty locations.

B. Electric Metallic Tubing

1. Set-screw type connectors permitted unless noted otherwise.
2. Galvanized steel or approved cast aluminum boxes and bodies.
3. Standard UL and NEC permitted.
4. Galvanized steel or aluminum covers.

C. Expansion Fitting: Linear, continuous ground type.

D. Bushings: Provide bushings or plastic inserts for conductor protection on all conduits entering boxes and enclosures, except where the box itself has built-in threaded bushings.

E. Insulated Bushings: Provide on conducts 1” and larger, where the box does not have built-in threaded bushings.

2.3 NON-METALLIC CONDUIT AND FITTINGS

A. General: For special conditions provide conduits and fittings as detailed on the Drawings.

B. Polyvinyl chloride (PVC), Schedule 80: shall be used outdoors and in wet locations, except where Fiberglass is indicated. Below grade up to 1-1/2”; larger sizes may be used above grade.

C. Polyvinyl chloride (PVC), Schedule 40: may be used indoors below grade unless otherwise noted, and above grade in protected wet locations.

D. Fiberglass Reinforced Epoxy: Shall be used outdoors below grade for pipe sizes 2” and larger. Champion SW, General Electric FRE, or United Fiberglass. Minimum wall thickness 0.066”; heavier wall thickness where indicated on the Drawings. Tensile strength 11,000psi. Temperature (-)40 degrees F to 230 degrees F.

2.4 FLEXIBLE CONDUIT

A. Interior Lighting and Dry Areas: Convoluted galvanized steel. Smooth interior finish. Flexible metallic tubing acceptable for lighting and other equipment in ceiling plenums.

B. General Outdoor and Process Areas: Convoluted galvanized steel core. Smooth interior finish. Bonded PVC or polyurethane jacket, with high water and oil resistance. Jacket shall not wrinkle when conduit is bent to its minimum rated radius.

C. Grounding: Conduit and fittings shall provide electrical conductance continuity.

D. Fittings: Insulated throat type.

2.5 BOXES

A. General: “Boxes” applies to all boxes, fittings, and conduit bodies as defined in the NEC. It does not include boxes containing fixed terminal boards, control panels, or equipment enclosures.

B. Size: satisfy the requirements of the NEC, unless larger size is indicated on the Drawings. Minimum depth of receptacle boxes, 2-1/8”.

C. Surface Mounted Boxes in Unfinished Areas: Cast type with appropriate covers.

D. Large Boxes In Poured Concrete: Boxes larger than 5 inches in both length and width shall be external flanged Feraloy with neoprene gasket.

E. Small Boxes In Concrete: Cast or pressed steel designed for concrete installation.

F. Outdoor: NEMA 4, with gasketed cover.

G. Identification: Each outdoor grade pullbox or slab junction box larger than 5 inches square shall have the word “ELECTRIC” embossed or engraved on the cover with minimum 1/4 inch high letters.

2.6 UNDERGROUND MARKER TAPE

A. 6 inch wide bright colored polyethylene plastic tape. Continuous imprinting, CAUTION BURIED ELECTRIC LINE BELOW. Or equivalent.

PART 3 - EXECUTION

3.1 CONDUIT SIZE

A. General Use: 1/2 inch minimum unless otherwise noted on Drawings.

B. Fixture Stems: 1/2 inch.

C. Thermostats: 1/2 inch.

3.2 ORIENTATION

A. Parallel or perpendicular to building surfaces, unless impractical or concealed.

B. Group whenever possible.

C. Utilize structural members where possible to protect from physical damage.

D. Conceal conduits in new construction finished areas such as offices, and laboratories. Do not run conduits in concrete, except for distances not more than 10 ft. for equipment connections as necessary.

E. Locations shown on Plans are only approximate; alternate locations may be used to avoid interferences.

3.3 CLEARANCES

A. Walls: 1/4 inch minimum to prevent dirt and moisture accumulation.

B. Hot Fluid Lines: 6 inch minimum.

3.4 VERTICAL DROPS

A. In open space rigidly support from the equipment or floor structure so that the unsecured drop length does not exceed 12 ft.

3.5 SUPPORTS

A. Intervals not to exceed NEC recommendations.

B. Suspend conduits with rigid conduit hangers or hanger rods.

3.6 FITTINGS

A. Insulated Metallic Bushings: Install on conduits entering boxes or cabinets, except those with threaded hubs. Provide locknuts to insure good contact to ground.

B. Location: Install conduit access fittings (Pulling, Tee's, Ell's, and junction boxes) only where accessible. Do not exceed 270 degrees of bends in any pulling length.

C. Expansion Fittings: Provide where conduits cross structure expansion joints.

3.7 FLEXIBLE CONDUIT CONNECTIONS

A. Lighting: 1/2 inch minimum size: 5 ft. maximum length, above dropped ceilings.

B. Equipment: 1/2 inch minimum size: 1'-6" to 3'-0" length.

3.8 UNDERGROUND INSTALLATIONS

A. Encasement: Encase conduits under roadway in 3" min. concrete to 3 ft. beyond edge of roadway measured perpendicular to centerline, and in other locations indicated on Drawings.

B. Cover

1. Non-encased: minimum 24 inches below finished grade, or as otherwise noted.
2. Encased: Top of concrete minimum 9 inches below finished grade.

C. Underground Bends

1. Conduits less than 3" diameter: radius 18 inches.
2. Conduits 3" and larger diameter: radius 36 inches.
3. Larger radius where shown on Drawings.

D. Underground Marker Tape: Install above all conduit 9 inches below grade.

3.9 SPARE

A. Install removable caps and markers on each end of all spare conduits. Indicate the destination of the conduit, such as column line, panel, motor control center, etc. Markers shall be adhesive-backed plastic-faced tape as manufactured by the W.H. Brady Co., or approved equal.

3.10 PREPARATION

A. End Cuts: Cut square, ream and file to remove burrs.

B. Field Bends: No indentations. Long axis of elliptical sections shall not exceed short axis by more than 15%.

C. Threads: Apply conductive joint compound to metallic conduit threads.

3.11 CONCEALED CONDUIT CHECK

A. After the conduit has been installed and before pulling in wire and cable, a standard flexible mandrel not less than 12 inches long, having a diameter of approximately 1/4 inch less than the inside diameter of the conduit shall be pulled through each conduit.

B. Replace any conduit containing indentations or elliptical sections which the mandrel and brush cannot be pulled through, or remove any obstructions.

3.12 IDENTIFICATION

A. Label each interior junction or pull-box with both dimensions larger than five inches.

B. Indicate the highest voltage within the box.

C. Make label of durable materials.

D. Secure label with stainless steel bolts or permanent adhesive.

3.13 OUTLET BOX LOCATIONS

A. Elevation for boxes from finished floor/grade to center of box shall be as follows, except where otherwise noted:

1.	Light Switches	4’-0”
2.	Receptacles	4’-0”

END OF SECTION 260533.13