SECTION 16111
CONDUITS

PART 1 – GENERAL

1.01 SCOPE

A. Provide a mechanically and electrically complete conduit system when required by IBC, National Electrical, NFPA, State, City, Fire or any governing code requirements.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A.	Supplementary Electrical Provisions	Section 16010
B.	Wires and Cables	Section 16120
C.	Supporting Devices	Section 16190

1.03 QUALITY ASSURANCE

A. Source Quality Control Test to meet applicable Underwriters Laboratories, Inc. Standard
B. Reference Standards:
   1. Underwriters Laboratories No. 1 – Flexible Metal Electrical Conduit.
   2. Underwriters Laboratories No. 6 – Rigid Metal Electrical Conduit.
   3. Underwriters Laboratories No. 360 – Liquid-tight Flexible Steel Conduits, Electrical.
   4. Underwriters Laboratories No. 651 – Rigid Nonmetallic Electrical Conduit.
   5. Underwriters Laboratories No. 797 – Electrical Metallic Tubing.
   6. National Electrical Code Latest Edition.

1.04 SUBMITTALS

A. Samples: Provide samples upon specific request.
B. Produce Data: If materials are by manufacturers other than those specified, submit product data giving complete description for sizes employed, material type, and installation methods.
C. Certificates:
   1. Labels of Underwriters' Laboratories, Inc. affixed to each item of material.
   2. If materials are by manufacturers other than those specified, submit Certification that meets applicable Underwriters' Laboratories, Inc., Standards.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Protect conduits from damaged.

1.06 COORDINATION

A. Sequencing:
   1. Install conduits before concrete is placed, and in advance of masonry work.
   2. Install conduits through roof in time to be flashed prior to roofing application.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Metallic Conduits: Triangle, Pittsburgh, Sprang, and NEPCO.
B. Nonmetallic Conduits: Carlon, SEDCO, Lasco and JM Eagle
C. Others: As listed with products

2.02 MATERIALS

A. Rigid Metal Electrical Conduit: Hot-dipped galvanized steel with zinc coated threads and an outer coating of zinc bichromate, complete with one of coupling and one end thread protector.
B. Intermediate Metal Conduit: Hot-dipped galvanized steel, complete with on coupling and one end thread protector.
C. Electrical Metallic Tubing: Welded, electro-galvanized thin wall steel tubing.
D. Flexible Metal Electrical Conduit: Hot-dipped galvanized steel strip core with integral copper ground wire on sizes 1¼" and smaller.
E. Liquid-tight Flexible Metal Electrical Conduit: Hot-dipped galvanized steel strip core with extruded polyvinyl jacket, O-Z/Gedney type UAG.
F. Rigid Nonmetallic Electrical Conduit: Schedule 40 heavy wall polyvinyl chloride, high impact resistant.
G. Elbow and Bends:
   1. Rigid nonmetallic conduit systems, rigid metal electrical conduit.
   2. Other Conduit Systems: Same material as the conduit with which they are installed.
   3. All Types: Size 1¼" inch and larger factory manufactured bushings.
   4. Size 1¼" and smaller: High impact thermo-setting phenolic. 150 degrees C. O-Z/Gedney type "A".
   5. 2" and Larger: Hot-dipped galvanized steel with thermo-setting phenolic insulation, 150 degrees C., O-Z/Gedney type "B". Locknuts: 1½" and smaller: zinc plated heavy stock steel, O-Z/Gedney.
   6. 2" and Larger: Cadmium plated malleable iron, O-Z/Gedney.
H. Hubs: Cadmium plated malleable iron, tapered threads, neoprene "O" ring, insulated throat, O-Z/Gedney.
I. E.M.T. Compression Connectors: Gland compression type, zinc plated steel body, cadmium plated malleable iron nut, insulated throat, O-Z/Gedney.
J. E.M.T. Compression Connectors: Gland compression type, zinc plated steel body, cadmium plated malleable iron nut, O-Z/Gedney.

K. Liquid-tight Conduit Connectors: cadmium plated malleable iron body and nut, cadmium plated steel ferrule, insulated throat, integrally cast external ground lug, O-Z/Gedney Type 4QL.
L. Seals for Walls and Floor Penetrations: Malleable iron body, oversize sleeve, sealing ring, pressure clamp and rings and sealing grommet, hex head cap screws, O-Z/Gedney Type FSK.
M. Fire Seals: Heat activated intumescent material, elastomeric sealing ring, socket head cap screws, steel pressure discs and flange, O-Z/Gedney Type CFSF.
N. End Bells: Hot-dipped galvanized threaded Malleable iron O-Z/Gedney Type THS.
O. Expansion Fittings: Hot-dipped galvanized Malleable iron with bonding jumpers.
    1. Linear - O-Z/Gedney Type AX and TX.
    2. Linear with Deflection - O-Z/Gedney Type AXDX
P. Escutcheons: Chrome plated sectional floor and ceiling plates, Crane No. 10.
Q. Accessories: Reducers, brushings, washers, etc., shall be cadmium plated malleable iron on the forms and dimensions best suited for the application.
R. Identifying Type for Underground Conduits: Polyethylene tape, 6 inches wide, with continuous printing along length, Brady Identoline:
    1. For Electric Power Conduits: Yellow with black letters.

PART 3 – EXECUTION

3.01 INSPECTION

A. Examine surfaces to which conduits are to be secured for:
    1. Defects, which will adversely affect the execution and quality of work.
    2. Deviations from allowable tolerances for the building material.
B. Do not start work until defects and deviations are corrected.

3.02 INSTALLATION

A. Sizes of Conduits as indicated on the drawings and as required by the NEC for the number and sizes of wires to be drawn into the conduit. Do not use conduits size less than ½" unless specified otherwise.
B. Conceal conduit from view in all areas except mechanical and electrical equipment rooms and crawl spaces. Should it appear necessary to expose any conduit:
    1. Bring to the attention of the Owner's Representative immediately, and rearrange the work to facilitate an approved installation
C. Install all conduits at elevations and locations to avoid interference with grading of other work, the structure, finished ceilings and walls. Avoid cutting of masonry units.
D. To prevent displacement, securely support and hold in place all conduits installed in advance of other work and to be concealed in the building structure. Carefully lay out conduit run within the structure, such as floors, beams, and walls to avoid

densities excessive for the construction. Relocate those conduits when excessive densities occur.

E. Run conduits imbedded in structural slabs in the middle of the slab below the top and above the bottom reinforcing steel. Maintain a minimum 1½" cover except where penetration is made. Do not install conduits larger than 1" in slabs.

F. Ream, remove burrs, and swab inside conduits before conductors are pulled in.

G. Cap or plug conduits with standard manufactured accessories as soon as the conduits have been permanently installed in place.

H. Bends and offsets in 1" and smaller conduits may be done with approved bending devices. Do not install conduits, which have had their walls, crushed or deformed and their surface finish damaged due to bending.

I. Where space conditions prohibit the use of standard ells, elbows and conduits, use cast ferrous alloy fittings of such forms and dimensions as best required for the application.

J. Make all conduit joints mechanically tight, electrically continuous, and watertight. Pitch conduits in a manner to avoid creating moisture traps.

K. Install insulation throat threaded hubs on conduits entering enclosures without threaded hubs.

L. Connect and couple E.M.T. with compression type fittings. Do not use indent or set screw fittings.

M. Install insulated throat threaded hubs on conduits entering enclosures without threaded hubs.

N. Route and suspend conduits crossing expansion joints to permit expansion contraction, and deflection utilizing approved fittings to prevent damage to the building, conduits, and supporting devices.

O. Do not run conduits exposed on the roof unless approval is obtained prior to installation.

P. Do not place conduits in close proximity to equipment, systems, and service lines, such as hot water supply and return lines, which could detrimental to the conduit and its contents, maintain a minimum 3" separation, except in crossing, which shall be minimum 1".

Q. Connect motors, equipment containing motors, equipment mounted on an isolated foundation, transformers, and other equipment and devices which are subject to vibration and which require adjustment with flexible metallic conduit from the device to the conduit serving it. Size the flexible conduit length more than 12 diameters, but less than 18 diameters. Rightly support the points of attachment on each side of the connection. Use external bonding jumpers on sizes 1½" and above.

R. Install escutcheons on all exposed conduits passing though interior floors, walls, or ceilings. Install fire seals on all conduits passing through interior floors, walls, or ceilings. Install fire seals on all conduits passing through fire seals on all exposed conduits passing through fire rated partitions. Install wall and floor fire seals on all conduits passing through exterior walls and floors, or use standard galvanized steel sleeves; diameters ½" greater than outside diameter of the sleeved conduit and fill annular space with mastic or caulk with lead.

S. Install rigid metal electrical conduit for feeders and sub-feeders, and for all uses in damp or wet locations, in concrete slabs, and hazardous areas.

T. Install electrical metallic tubing for branch circuits concealed in walls and above ceilings for sizes 2” and smaller.

U. Install rigid non-metallic tubing in concrete with manufactured spacers buried exterior to the building. Use rigid metal electrical conduits for elbow and where exposed.

V. Install end bells on conduits stubbed through slabs and foundation into electrical enclosures.

W. Flexible conduits are not allowed except for fixture whip (limited to 6’) and connection to vibrating equipment.

X. Install a pull rope with each end properly marked for use and termination of the other end in each conduit installed and in which no conductors are installed under this Division of Work.

END OF SECTION