

## SECTION 26 05 43.23

### MANHOLES AND HANDHOLES FOR ELECTRICAL SYSTEMS

#### PART 1 – GENERAL

##### 1.1 DESCRIPTION

- A. Scope:
  - 1. Provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install manholes and handholes for electrical systems Work.
  
- B. Coordination:
  - 1. Coordinate manhole and handhole installation with piping, sheeting other excavation supports, and other Underground Facilities, and locate clear of interferences.
  - 2. Review installation procedures under this and other Sections and coordinate installation of items to be installed with or before manhole and handhole for electrical systems Work.
  
- C. Related Sections:
  - 1. Section 31 23 05, Excavation and Fill.
  - 2. Section 03 20 00, Concrete Reinforcing.
  - 3. Section 03 30 00, Cast-in-Place Concrete.

##### 1.2 REFERENCES

- A. Standards referenced in this Section are:
  - 1. ANSI A14.3, Fixed Ladders – Safety Requirements.
  - 2. ANSI/SCTE 77, Specification for Underground Enclosure Integrity.
  - 3. ASTM A48/A48M, Specification for Gray Iron Castings.
  - 4. ASTM A615/A615M, Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
  - 5. ASTM C478, Specification for Precast Reinforced Concrete Manhole Sections
  - 6. ASTM C1028, Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method.
  - 7. ASTM D4101, Specification for Polypropylene Injection and Extrusion Materials

##### 1.3 QUALITY ASSURANCE

- A. Component Supply and Compatibility:
  - 1. Obtain all manholes and handholes furnished under this Section from a single Supplier, unless otherwise acceptable to ENGINEER.

2. Manhole and handhole Supplier shall review and approve the Shop Drawing submittals for the manholes and handholes furnished.

## 1.4 SUBMITTALS

- A. Action Submittals: Submit the following:
  1. Shop Drawings:
    - a. Manholes: Plan and section drawings showing arrangement of each manhole, including interior and exterior dimensions, elevations, location of manhole wall penetrations, details of typical openings, jointing, inserts, and reinforcing.
    - b. Handholes: Submit schedule of handholes to be furnished and dimensions and pertinent data for each.
    - c. Castings:
      - 1) Schedule of casting types and models to be furnished, with dimensional data and other pertinent data for each.
      - 2) Fabrication and erection of all frame and cover assemblies. Include plans, elevations, and details of sections and connections. Show anchorage and accessory items. Provide setting drawings for location and installation of castings and anchorage devices.
      - 3) Where Site-specific castings are specified with unique lettering on manhole or handhole cover, provide Shop Drawing for castings indicating appropriate detail to indicate conformance to the Contract Documents.
    - d. Layout of Manhole Electrical Systems: Where manholes have extensive electrical systems and supports for electrical systems, submit for each plans, sections, and details indicating proposed layout of such materials and equipment in each manhole.
  2. Product Data:
    - a. Manufacturer's technical information, specifications, and literature for manholes, handholes, castings, and accessories proposed for use.

## PART 2 – PRODUCTS

### 2.1 MATERIALS

- A. Material and Construction:
  1. Material shall be precast or cast-in-place reinforced concrete. Reinforcing shall be in accordance with Section 03 20 00, Concrete Reinforcing. Concrete shall be in accordance with Section 03 30 00, Cast-in-Place Concrete.
  2. Provide minimum interior dimensions as shown or indicated. Provide a 12-inch by 12-inch by six-inch deep sump in manhole floor
  3. Duct entrances shall be sized and located to suit the ductbanks.
  4. Precast Manholes:
    - a. Except where otherwise specified, precast manhole components shall consist of reinforced concrete pipe sections specially designed and

- constructed for use as manholes and manufactured in accordance with ASTM C478, except as modified in this Section.
- b. Precast, reinforced concrete manhole bases, riser sections, flat slabs, and other components shall be manufactured by wet-cast methods, using forms that provide smooth surfaces free of irregularities, honeycombing, and other imperfections.
  - c. Joints between manhole components shall be tongue-and-groove type employing a single, continuous rubber O-ring gasket. Circumferential and longitudinal steel reinforcing shall extend into bell and spigot ends of joint without breaking steel continuity. Joints between base sections, riser sections, and top slabs of manholes six feet in diameter and less shall be rubber and concrete joints. Joints for manhole components greater than six-foot diameter shall have steel bell and spigot rings.
  - d. Precast manhole components shall:
    - 1) Have sufficient strength to withstand loads imposed upon them; and
    - 2) Be constructed for minimum earth cover loading of 130 pounds per cubic foot, AASHTO H-20 wheel loading, and an allowance of 30 percent in roadways and 15 percent in rights-of-way for impact.
    - 3) Manhole bases shall have two cages of reinforcing steel in the walls, each reinforcing cage shall be of area equal to that required in the riser sections.
    - 4) Wall thickness shall be not less than five inches.
    - 5) Concrete top slabs shall be not less than eight inches thick.
  - e. Lifting holes, when provided, shall be tapered. Not more than two lifting holes shall be cast into each section. Provide tapered, solid rubber plugs to seal lifting holes. Lifting holes shall be made to be sealed by plugs driven from the outside face of section only.
  - f. Point of intersection (P.I.) of ductbank centerlines shall be marked with 1/4-inch diameter steel pin firmly enclosed in floor of each manhole base and protruding approximately one-inch above finished floor of base.
  - g. Mark date of manufacture and name or trademark of manufacturer on inside of manhole barrel.
  - h. Barrel of manhole shall be constructed of various lengths of riser pipe manufactured in increments of one foot to provide correct height with the fewest joints. Provide not less than one foot clear between openings in barrel of manholes for ductbanks or other penetrations and the nearest joint. Provide special manhole base or riser sections as required.
  - i. Provide at top of manhole barrel a precast or cast-in-place slab, or precast eccentric cone, as shown or approved, to receive manhole frame and cover.

B. Accessories:

1. Frames and Covers:

- a. Manufacturers: Provide products of one of the following:
  - 1) Neenah Foundry Company.
  - 2) Campbell Foundry Company.
  - 3) Or equal.

- b. Material: Cast iron complying with ASTM A48/A48M, Class 30A.
  - c. Covers: Watertight, sealed type marked “ELECTRICAL” or “COMMUNICATIONS” in raised two-inch letters. Identify covers as shown or indicated on the Drawings.
  - d. Grout the frame to the manhole or handhole.
2. Pulling Irons:
- a. Products and Manufacturers: Provide one of the following:
    - 1) Catalog No. 8119 by A.B. Chance Company.
    - 2) Catalog No. DU2T3 by McGraw Edison Company.
    - 3) Approved equivalent.
  - b. Material: Galvanized steel.
  - c. Cast in the wall opposite to centerline of each incoming ductbank and 12 inches below centerline of bottom line of ducts.
3. Cable Racks:
- a. Products and Manufacturers: Provide one of the following:
    - 1) Catalog No. CR28-B by Underground Devices Inc.
    - 2) Approved equivalent.
  - b. Material: Fiberglass.
  - c. Cable racks shall adequately support cables with space allowed for future cables.
  - d. Each rack shall be a vertical assembly of two-foot cable racks extending from within six inches of manhole roof slab to within six inches of manhole floor.
4. Cable Hooks:
- a. Products and Manufacturers: Provide one of the following:
    - 1) Catalog No. J5132A by MacLean Power Systems.
    - 2) Catalog No. C203-1132 by A.B. Chance Company.
    - 3) Approved equivalent.
  - b. Material: Galvanized steel.
  - c. Length: 7.5-inch minimum.
5. Insulators:
- a. Products and Manufacturers: Provide one of the following:
    - 1) Catalog No. J5122 by MacLean Power Systems.
    - 2) Catalog No. C203-1120 by A.B. Chance Company.
    - 3) Approved equivalent.
  - b. Material: Porcelain.
6. Manhole Steps - Aluminum:
- a. Products and Manufacturers: Provide one of the following:
    - 1) R-1982-W, by Neenah Foundry Company.
    - 2) Part No. FR14-OR, by Washington Aluminum Company
    - 3) Aluminum manhole step by Campbell Foundry Company.
    - 4) Approved equivalent.
  - b. Material: Extruded aluminum.
  - c. Provide manhole steps as shown or indicated. Comply with ANSI A14.3 and OSHA requirements
  - d. Space steps uniformly at maximum of 12 inches on centers, and project evenly from manhole or chamber walls.

## 2.2 SMALL HANDHOLES

- A. Material and Construction:
1. Manufacturer: Provide products of one of the following:
    - a. Strongwell Quazite
    - b. Or equal
  2. Material: Precast polymer concrete.
  3. Duct entrances sized and located to suit ductbanks.
  4. Enclosures and covers shall be UL-listed.
  5. Enclosures, boxes, and covers shall comply with test provisions of ANSI/SCTE 77 for Tier 1 applications.
  6. Covers shall have coefficient of friction of not less than 0.50, in accordance with ASTM C1028.

## PART 3 – EXECUTION

### 3.1 INSPECTION

- A. Examine conditions under which the Work will be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

### 3.2 INSTALLATION

- A. Excavation and Backfill:
1. Provide manholes and handholes for electrical systems where shown or indicated and verify at the Site the required locations.
  2. Perform excavation and filling required for installing manholes and handholes for electrical systems, in accordance with Section 31 23 05, Excavation and Fill.
  3. Provide manholes and handholes on granular subbase course as shown or indicated. If not shown, provide layer of compacted select fill not less than six inches deep on which manhole or handhole for electrical systems will be installed.
  4. Carefully set, level, and align at proper grade manhole bases and handholes.
- B. Precast Manholes:
1. Set manhole sections vertical with steps and sections in true alignment. Butter the base of each bell or groove end at joints between components with one-to-two proportion cement-sand mortar to provide uniform bearing between components. Seal joints with cement mortar inside and out and trowel smooth to contour of wall surface. Raised or rough joint finishes are unacceptable.
  2. Install sections, joints, and gaskets in accordance with manufacturer's recommendations.

3. Tightly seal each lifting hole with solid rubber plug driven into hole from outside of barrel; fill remaining void with one-to-two proportion cement-sand mortar.
- C. Manhole and handhole structures shall be watertight. Provide foam sealant to seal all penetrations into manholes and handholes for electrical systems.
- D. Cable Supports in Manholes:
1. Attach cable racks with three-inch by 3/8-inch diameter “tamp-in” studs mounted in one-inch holes drilled into walls of manholes in absence of inserts. Provide PVC coating on racks.
  2. Provide cable hooks to support each cable on each rack along the cable run within manholes. Provide PVC coating on hooks.
  3. Individually support each cable at each hook on porcelain insulators. Provide sufficient slack for each cable.
  4. Securely tie each cable in place at each insulator block to prevent excessive movement of insulators, cables, or fireproof tape. Tie cables with non-metallic 3/4-inch strapping tape manufactured by 3M or equal, or tie down with nylon straps.
- E. Grounding:
1. Provide 3/4-inch by 10-foot copper-clad ground rod for each manhole.
  2. Bond all exposed metal manhole accessories and concrete reinforcing rods with No. 4 AWG minimum bare copper wire and connect to ground rod and to the ductbank ground cable.
- F. Grade Rings:
1. Provide grade rings for manholes when required to adjust cover to proper grade. Construct grade ring on manhole roof slab or cone section on which manhole frame and cover will be placed.
  2. Height of grade ring shall be as required to bring frame to proper grade and shall not exceed 12 inches in height.
- G. Grading at Manholes and Handholes:
1. Unpaved Areas:
    - a. Install manholes and handholes in unpaved areas as shown or directed by ENGINEER to rim elevation higher than finished grade.
    - b. Grade the ground surface to drain away from manholes and handholes.
    - c. Provide fill around manholes and handholes to level of upper rim of manhole or handhole frame, and evenly grade the surface to a one (vertical)-to-five (horizontal) slope to surrounding grade, unless otherwise shown or directed by ENGINEER.
  2. Paved or Travelled Areas:
    - a. Install manholes and handholes in paved or travelled areas to meet final grade of paved or concrete surface.
    - b. In paved areas in state or county highways or municipal streets or roads, manholes and handholes shall be 1/2-inch below elevation of final

- surface course (also known as top course or wearing course) of pavement.
- c. Manholes and handholes shall not project above finished roadway pavement.
3. CONTRACTOR shall be solely responsible for proper height of manholes and handholes necessary to reach final grade. ENGINEER's review of Shop Drawings and other submittals for manholes and handholes is general in nature. Provide random-length precast manhole riser sections to adjust manholes to accommodate field conditions for final grading and final elevations.

### 3.3 FIELD QUALITY CONTROL

- A. Watertightness:
  1. Manholes and handholes for electrical systems shall be free of visible leakage. Inspect each manhole and handhole accompanied by ENGINEER, and repair leaks.

++ END OF SECTION ++