

**SECTION 02583**  
**UNDERGROUND ELECTRIC DUCT INSTALLATION**

**PART 1. GENERAL**

**1.01 SCOPE OF WORK**

- A. Equipment shall mean trucks, trailers, backhoes, ditch witch, and other apparatus which are owned and operated by CONTRACTOR and which are required to be maintained by CONTRACTOR for the performance of the Work.
- B. The intention of the documents is to include all supervision, supplies, materials not furnished by OWNER, labor, terrain difficulties, hand digging, rock holes, weather conflicts, transportation and equipment reasonably required for the proper execution of the Work. OWNER will furnish the material as noted in the Project Manual or on the Drawings for the performance of the Contract or Agreement.
- C. OWNER WILL FURNISH THE NECESSARY DRAWINGS FOR THIS WORK: Should it appear that the Work intended, or any of the matters' relative thereto, are not sufficiently detailed or explained in the Contract Documents, CONTRACTOR shall apply to OWNER for such further explanations as may be necessary, and CONTRACTOR shall conform to the same as a part of this Agreement, so far as they may be consistent with the original Project Plans or Drawings, the matter shall be submitted to OWNER in writing, whose decision shall be final and conclusive.
- D. Material or Work described in words that have a well-known or recognized technical or trade meaning shall, when used in the Specification, be so interpreted.
- E. Wherever and whenever the term " Work" or "Works" is used in the Contract documents, it shall be understood to include all supervision, material not furnished by OWNER, supplies, labor, transportation, and equipment. With particular reference to CONTRACTOR, "Work" or "Works" refers to everything that is agreed to be done and furnished by him.
- F. CONTRACTOR shall in a workmanlike manner furnish all necessary supervision, labor, transportation, equipment, tools, and supplies as required to complete the Underground Construction Work.
- G. The Work of CONTRACTOR shall be in accordance with the Contract Documents, Project Plans and Drawings. All Work performed by

CONTRACTOR shall be subject to the inspection of OWNER and Resident Project Representative and at the direction of OWNER, a Reasonable amount will be withheld for any Work not complying with the Contract Documents until defects are corrected.

- H. CONTRACTOR shall install underground duct at the approximate locations indicated in the layout plans. The Engineer shall indicate specific locations as the Work progresses. Duct shall be of the size, material, and type indicated in the plans or specifications. All duct shall be laid so as to grade toward hand holes, manholes, and duct ends for drainage. Grades shall be at least 4 INCHES per 100 FEET. On runs where it is not practicable to maintain the grade all one way, the duct shall be graded from the center in both directions toward manholes, hand holes, or duct ends. Pockets or traps where moisture may accumulate shall be avoided.
- I. The CONTRACTOR shall mandrel each duct. An iron-shod mandrel, not more than ¼ -INCH smaller than the bore of the duct shall be pushed through each duct by means of jointed conduit rods. The mandrel shall have a leather or rubber gasket slightly larger than the duct hole.

## 1.02 DRAWINGS AND REPORTS

- A. The drawings shall be a record of the Work as it is installed by CONTRACTOR. The drawings shall include all the information as shown on the Project Drawings as well as any deviations, modifications, and changes to the Project Drawings, however minor. CONTRACTOR shall submit one full sized set of marked up prints fully detailing the conditions.

## PART 2. PRODUCTS

### 2.01 CONDUIT AND CONDUIT ACCESSORIES

- A. All conduit and other material's as specified in Project Manual will be used in the Work specified herein will be supplied by OWNER unless otherwise specifically Indicated. CONTRACTOR shall supply all materials required by his labor forces and their equipment to support installation of the material. CONTRACTOR shall transport, handle, and store OWNER supplied material and equipment in a manner, which prohibits theft, damage, or defacing of such OWNER furnished items will require repair or replacement at CONTRACTOR'S expense.
- B. Conduit shall be the standard product of a manufacturer regularly engaged in the manufacture of the product and shall essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening date. Items of the same classification shall be identical in detail and composition.

- C. CONDUIT COUPLINGS, ADAPTERS, BENDS, CAPS, ETC., shall be products of the conduit manufacturer and shall be secured to the conduit with an adhesive approved by the conduit manufacturer and applied in strict accordance with the conduit manufacturer's recommendations. Solvent cement and fittings for PVC shall be furnished by the same manufacturer.
- D. CONDUIT SEALING COMPOUND: Compounds for sealing ducts and conduit shall be compatible with the insulation of the cable as recommended by the cable manufacturer. The compound shall adhere to plastic conduit, metallic conduit, concrete, masonry, cable sheaths, jackets, covers, etc. Compounds shall provide a moisture resistant seal.
- E. END BELLS: Provide plastic end bells as required to provide a smooth and rounded surface at cut edges of the conduit to prevent damage to the conductor during the installation and normal movement. End bells shall also be provided where conduits enter hand holes. End bells shall be compatible with the type conduit and as recommended by the conduit manufacturer.
- F. DELIVERY, STORAGE, AND HANDLING; CONTRACTOR shall visually inspect all conduit and material before accepting and removing such from OWNER'S warehouse facility. CONTRACTOR shall alert OWNER'S warehouse personnel of any damage or suspected damage to such material before moving or transporting to the Project Site. CONTRACTOR shall handle and store all material and equipment in a manner, which prohibits damage or defacing. Stored items shall be protected from the environment in accordance with the manufacturer's requirements. Material and/or equipment damaged or mishandled by CONTRACTOR personnel shall be replaced at CONTRACTOR'S expense.

### PART 3. EXECUTION

#### 3.01 GENERAL INSTALLATION REQUIREMENTS:

- A. Equipment, materials, and devices shall be installed in accordance with the manufacturer's published instruction and the requirements of the Contract Documents. Except as covered herein excavation, trenching, and backfilling shall conform to the requirements of Section 02321.
- B. No alleged oral admission of condonation or inadvertent neglect on the part of OWNER or Resident Project Representative will be taken as an excuse for Work not in accordance with the Contract Documents or Agreement. Verbal instructions contrary to the Specifications or Drawings when received from employees of OWNER shall not be binding upon OWNER in case of dispute.

- C. Short radius manufactured 90-degree duct elbows must be rigid metal conduit and may only be used for pole or equipment risers, unless specifically indicated as acceptable or otherwise approved by the Design Engineer.
- D. Verification of Dimensions: CONTRACTOR shall become familiar with the details of the Work, shall verify dimensions in the field, and shall advise the OWNER of any discrepancy before performing the Work. Verify that required trenching has been completed and trenches are clear of obstacles and for duct installation.
- E. Joining Plastic Duct: Conduit shall be clean before using and installing. Conduit shall be kept clean and free of concrete, dirt, and other foreign substance during construction. Conduits shall be joined using the proper adhesive as supplied by the OWNER or fused in accordance with the HDPE conduit manufacturer's standards.
- F. Handholes and Pullboxes: Hand-holes shall be located approximately as shown. Hand-holes shall be of the type noted on the drawings and shall be constructed in accordance with the details shown. Pull-box tops shall be flush with sidewalks or curbs or placed ½ INCH above surrounding grades when remote from curbed roadways or sidewalks.
- G. Slope Of Duct Banks: Duct banks shall have a continuous slope downward toward underground structures and away from buildings with a minimum pitch of 4 INCHES in 100 FEET. Except at conduit risers, accomplish changes in direction of run exceeding a total of 0.175 radius 10 degrees, either vertical or horizontal, by long sweep bends having a minimum radius of curvature of 25 FEET; sweep bends may be made up of one or more curved or straight sections or combinations thereof. Manufactured bends shall have minimum radius of 18 INCHES for use with conduits of less than 3 INCHES in diameter and a minimum radius of 36 INCHES for ducts of 3 INCHES in diameter and larger. Excavate trenches along straight lines from structure to structure before ducts are laid or structure constructed so the elevation can be adjusted, if necessary, to avoid unseen obstruction.
- H. Preparation: Ducts shall be kept clean of concrete, dirt, or foreign substances during construction. Field cuts requiring tapers shall be made with proper tools and match factory tapers. The cut end of each conduit shall be reamed smooth. Field-cut conduits shall be joined with double-ended couplings designed for that purpose. A coupling recommended by the duct manufacturer shall be used whenever an existing duct is connected to a duct of different material or shape. Ducts shall be stored to avoid warping and deterioration with ends sufficiently plugged to prevent entry of water or any foreign substance. Ducts shall be

inspected for cleanliness prior to being laid in trench. Ducts shall be free of cracks and chipped ends. Plastic duct shall be stored on a flat surface and shall be protected from direct sunlight.

- I. CONTRACTOR to furnish and install polyethylene 200LB-test “Poly line” pull-string in each spare conduit. CONTRACTOR shall provide and install pull lines in all spare ducts. Spare ducts shall have the pull strings secured and the ends sealed with non-permanent and removable sealing compound and end cap.
- J. Primary conduit to be installed as straight as practical. Any defined changes in direction shall have a bending radius of not less than 50 feet unless otherwise directed by OWNER. Bottom of trench shall be clean, even, undisturbed earth or gravel. Conduit is subject mandrel testing for roundness.
- K. Required primary conduit trench depth is 48 INCHES (MIN) unless otherwise directed by OWNER. Contact OWNER if required depth cannot be obtained. Additional depth may be required for joint-use trenches.
- L. Multiple primary conduits shall be installed side by side on bottom of trench with minimum separation of 7½ INCHES center to center. Up to two conduits may be stacked vertically as long as a minimum depth of 48 inches is maintained to the top of the shallowest conduit.
- M. Bottom 15 INCHES of trench backfill (conduit envelope) to be ¾ INCHES clean gravel, clean sand, or well-tamped soil, free of hard materials larger than ¾ INCHES or any material which could damage conduit. Remaining backfill to be gravel or well-tamped soil, free of hard materials larger than 4 INCHES unless otherwise approved by OWNER.

### 3.02 RELATED WORK

- A. Where trench is within public Right-Of-Way, backfill requirements by City, County, or State shall prevail over any conflicting requirements in the specifications or drawings.
- B. Conduit installed under paved roads, drives, parking, etc. shall be installed by the most practical trenchless method which does not damage the paved service. The method shall be as selected by the CONTRACTOR and the CONTRACTOR shall repair any and all damage to paved surfaces at his expense.
- C. A burial depth of 30INCHES or more for service conduits (secondary) is recommended to reduce chances of future DIG-INS. Minimum burial depth of service conduits to be determined by STATE/LOCAL Electrical Inspector.

- D. Conduit shall be installed parallel to curb line and/or property line when possible providing as straight a line of installation as possible.
- E. Underground warning tape furnished by OWNER and installed by CONTRACTOR during backfill should be placed in trench 15 INCHES below final grade.
- F. Clearance area of 2 FEET horizontally and vertically for OWNER'S primary conduit to be free of all other utilities, structures, and service conduits.

3.03 ROCK CONDITIONS: CONTRACTOR shall install the following for trench depth less than 48 INCHES (Because of Rock) as approved by the OWNER:

- A. If trench depth is 36 INCHES to 48 INCHES use Schedule-40 P. V. C. conduit.
- B. If trench depth is 24 INCHES to 36 INCHES use Schedule-80 P. V. C. conduit.
- C. A minimum of 3 INCHES of concrete cover thickness will be needed if trench depth is 14 INCHES to 24 INCHES. A minimum of 6 INCHES of concrete cover thickness will be needed if trench depth is 10 INCHES to 14 INCHES.
- D. Conduit tie-downs required every 5FT to prevent floating during concrete pouring.
- E. Minimum conduit cover shall be not less than 24 INCHES under vehicular traffic on thoroughfares, driveways, and parking lots.

END OF SECTION