Special Specification 6326
Steel Encased and Grouted Multiple Conduit Bank

1. DESCRIPTION

Furnish and install polyvinyl chloride (PVC) conduit encased in steel pipe and grouted as shown in the plans.

2. MATERIALS

Provide new materials that comply with the details shown on the plans, the requirements of this Item, and the requirements of the following Items:

- Item 400, “Excavation and Backfill for Structures,”
- Item 402, “Trench Excavation Protection,”
- Item 421, “Hydraulic Cement Concrete,”
- Item 476, “Jacking, Boring, or Tunneling Pipe or Box,” and
- Item 618, “Conduit”

Furnish conduit from new materials in accordance with Departmental Materials Specification DMS 11030, “Conduit”.

Provide prequalified conduit from the Department’s MPL. When required by the Engineer, notify the Department in writing of selected materials from the MPL intended for use on each project.

Provide other types of conduit not on the MPL that comply with the details shown on the plans and the NEC. Fabricate fittings such as expansion joints from a material like the connecting conduit, unless otherwise shown on the plans. Use watertight fittings. Do not use set screw and pressure-cast fittings.

Provide conduit materials that have been tested and listed as defined in the NEC for the specific use to meet the following industry standards:

- ASTM-D1785, Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120

3. MIXES

Pressure Grout Mix. Submit the proposed grout mix, methods, plans, and criteria of the grouting operations. Provide grouting system with sufficient gauges, monitoring devices, and test to determine the effectiveness of the grouting operation and to ensure compliance with the pipe specifications and design parameters.

Recommend using grouts meeting the requirements of DMS 4675.

Design the density of the grout mix design to prevent floating of the PVC conduits during installation.
4. **EQUIPMENT**

4.1. **General Requirements.**

4.2. **Fittings.** Provide all required sweeps, bends, repair couplings, adapters, lubrication access fittings, tug-plugs, and accessories to complete the conduit system as incidentals. Provide fittings with the same material to the connecting conduit unless otherwise shown on the plans.

4.2.1.

4.2.2. **Flexural Modulus.** Do not exceed the ovality of the conduit system by 5%.

4.2.3. **Free of Defects.** Provide a conduit system free of visible cracks, holes, or other physical defects that would degrade its performance.

4.2.4. **Uniformity.** Provide conduit that is uniform as practical in respect to overall dimensions, color, density, and thickness.

4.3. **Outer Casing.** Provide steel casing pipe with a minimum yield strength of 35,000 psi. and in accordance with ASTM A-36, ASTM A-568, ASTM A-135, ASTM A-139, or approved equal. Provide pipe coated and lined in accordance with AWWA C-210 or approved equal. Provide pipe joints that are welded in accordance with AWWA C-206. After pipe is welded, repair coating and lining. Minimum wall thickness for 36" diameter steel casing pipe is 0.50".

4.3.1. **Bore Spacers.** Hold together the conduit with bore spacers located throughout steel encasement pipe, as per manufacturer's instructions and as detailed on the plans. Factory install the system of spacers to hold conduits in place during installation of bore and to maintain alignment with the outer casing.

4.3.2. **Grouting Equipment.** The materials should be mixed in equipment of sufficient size and capacity to provide the desired amount of grout material for each stage in a single operation. Provide equipment capable of mixing the grout at densities required for the approved procedure and capable of changing density as dictated by field conditions any time during the grouting operation.

4.3.3. **Pull Cord.** Provide a flat pull cord in all empty conduit. Provide a pull cord with a tensile strength of 1,250 lb. minimum and have foot markings to determine length installed.

4.4. **CONSTRUCTION**

Perform work in accordance with the details shown on the plans and the requirements of this Item.

Ream conduit to remove burrs and sharp edges. Use a standard conduit cutting die with a 3/4-in. taper per foot when conduit is threaded in the field.

Fit PVC conduit terminations with bushings or bell ends. Conduit terminating in threaded bossed fittings does not need a bushing. Before final acceptance, pull a properly sized mandrel or piston through the conduit to ensure that it is free from obstruction. Cap or plug empty conduit placed for future use.

Perform trench excavation and backfilling as shown on the plans or as directed, and in accordance with Item 400, “Excavation and Backfill for Structures.” Excavation and backfilling will be subsidiary to the installation of the conduit.

Jack and bore as shown on the plans or as directed, and in accordance with Item 476, “Jacking, Boring, or Tunneling Pipe or Box.”

Install pressure grout mix in the annular void space between the carrier pipe and the casing pipe and
between the outside of the casing pipe and the excavation. Do not allow the gauged pumping pressure to exceed the conduit pipe’s critical collapse pressure or the pipe manufacturer’s approved recommendations. Provide pumping equipment of a size sufficient to inject grout at a velocity and pressure relative to the size of the annular space.

Grout fittings will be fabricated into casing pipe, as needed. Remove and plug grout fittings after pressure grouting. Gauges to monitor grout pressure must be attached immediately adjacent to each injection point.

For bore or jacks with casing pipe, install pressure grout mix immediately upon completion of setting casing pipe. Install pressure grout from the low end for crossing where grout fittings are not used. Seal the low end and pressure grout until grout is extruded from the opposite end.

6. **MEASUREMENT**

This Item will be measured by the foot of steel encased and grouted multiple conduit bank.

This is a plans quantity measurement Item. The quantity to be paid is the quantity shown in the proposal, unless modified by Article 9.2., “Plans Quantity Measurement.” Additional measurements or calculations will be made if adjustments of quantities are required.

7. **PAYMENT**

The work performed and materials furnished in accordance with this Item and measured as provided under “Measurement” will be paid for at the unit price bid for “Steel Encased and Grouted Multiple Conduit Bank” of the type and size specified. This price is full compensation for furnishing and installing multiple conduits in steel encasement pipe including bore spacers; pressure grouting; furnishing and installing fittings; and materials, equipment, labor, tools, and incidentals.

Steel pipe for encasement will be paid for in accordance with Item 476, “Jacking, Boring, or Tunneling Pipe or Box.”