

09/18/2020

Page 1 of 5

SSD: 10/08/10, 7/25/14, 6/22/16, 11/03/16, 11/19/2018

**PORTSMOUTH TO KITTEERY
16189B**

November 18, 2020

SPECIAL PROVISION**AMENDMENT TO SECTION 614 – ELECTRICAL CONDUIT****Item 614.74221 – 4” 2-Duct HDPE Conduit, SDR 13.5**

This special provision provides for installation of high density polyethylene (HDPE) plastic conduit for fiber optic communications. All provisions of Section 614, except as modified or changed below, shall apply.

Add to Description:

- 1.2** This work shall consist of furnishing and installing high density polyethylene (HDPE) plastic conduit. The work shall also include installation of HDPE inner ducts into the conduit at the locations indicated on the Plans, all in accordance with these Specifications. This work shall also include GPS as-built documentation of the ends and bends of the installed HDPE conduit.
- 1.3** When the work includes horizontal directional drilling of 4” 2-Duct HDPE conduit underneath roadways, the work shall follow the guidelines and Specifications contained in Special Provision Section 671.

Add to Materials:**2.7 High-Density Polyethylene (HDPE) Conduit**

2.7.1 When 4-inch high density polyethylene conduit is called for, the conduit duct shall be manufactured from high-density polyethylene (HDPE) with a standard dimension ratio (SDR) of 13.5. The nominal duct size shall be 4-inch, as needed to accommodate the inner ducts specified herein. The ducts shall have a smooth outer wall and a smooth or ribbed inner wall. The underground ducts shall be orange in color and all ducts shall be capable of being coiled on reels in continuous lengths, transported, stored outdoors and uncoiled for installation with no degradation in its properties or performance.

2.7.2 The duct shall be manufactured from high-density polyethylene (HDPE). The duct shall perform in underground and above ground installations in an ambient temperature range of minus 30 degrees F to 130 degrees F without degradation in its properties or performance. The duct shall be bendable to a minimum supported radius of ten times the duct diameter.

09/18/2020

Page 2 of 5

SSD: 10/08/10, 7/25/14, 6/22/16, 11/03/16, 11/19/2018

2.7.3 The duct shall be free of visible cracks, holes, or other physical defects that would degrade its properties or performance. The duct shall be as uniform as practicable in respect to overall dimensions, color, density and thickness. The duct shall be capable of being encased in concrete with no degradation to its properties or performance.

2.7.4 The duct shall be shipped on lightweight metal reels in maximum lengths possible. Ovality shall not exceed 7 percent when removed from the reels.

2.7.5 The ducts shall have a UV light stabilizer that will protect the duct such that there will be no degradation in duct properties or performance for a minimum of 12 months in direct sunlight during shipping and storage.

2.7.6 The duct shall have a durable identification showing the name of the Manufacturer, the duct size, and sequential markings every 2 feet printed on the duct.

2.7.7 Each duct shall be equipped with three 1-inch HDPE SDR 13.5 inner ducts suitable for installation in a 4-inch conduit. Both premanufactured conduit assemblies with inner duct installed by the manufacturer, as well as inner duct pulled in by the Contractor shall be acceptable.

2.7.7.1 Each duct shall be pre-lubricated during the manufacturing process such that the lubricant becomes permanently impregnated in the inner walls of the duct. The process shall provide a dynamic co-efficient of friction not to exceed 0.15.

2.7.7.2 The lubricant shall be compatible with the proposed fiber optic cable jacket. The lubricant shall not cause any chemical reaction to the fiber optic cable that results in damage to or degradation of the performance of the fiber optic cable.

2.7.7.3 HDPE inner ducts shall have a smooth or corrugated outer wall and a ribbed inner wall.

2.7.7.4 Each HDPE inner duct shall be supplied with a pull tape (no rope will be permitted) with a tensile strength of 600 pounds minimum. The length of the installed pull tape shall exceed the length of the duct by a minimum of 30 feet (minimum 15 feet slack at each end of the duct)

2.7.7.5 Each of the three HDPE inner ducts in any one conduit duct shall be of a different color to uniquely identify that inner duct for cable installation, or shall have other unique identifying markings as approved by the Owners.

2.7.7.6 The open ends of the inner ducts shall be sealed by caps to prevent the entrance of moisture and dirt prior to installation.

2.7.7.7 Only where specifically indicated in the Contract Documents, the Contractor may substitute fabric inner ducts for the required HDPE inner ducts. Fabric inner ducts shall only be installed where specifically called out in the Contract Documents.

2.7.7.8 Fabric inner ducts shall be three-cell fabric inner duct suitable for installation in a 4-

09/18/2020

Page 3 of 5

SSD: 10/08/10, 7/25/14, 6/22/16, 11/03/16, 11/19/2018

inch conduit providing at least three compartments for isolating installed cables. Each cell of the fabric inner duct shall include a factory installed pull tape with a tensile strength of 600 pounds minimum. Each cell of the fabric inner duct shall have a nominal inside diameter of 1.1 inches. Fabric inner ducts shall be in accordance with Special Provision for 3-Cell Fabric Innerduct for 4" Conduit.

2.7.8 The HDPE ducts (SDR13.5) and HDPE inner ducts shall meet the dimensional requirements as specified in Table 1 and Table 2 below.

Table 1: HDPE Duct (SDR13.5) Dimensions	
Nominal Outside Diameter (O.D.)	4.50" +/-0.15"
Minimum Inside Diameter (I.D.)	3.794" +/-0.10"
Minimum Wall Thickness	0.333" +/-0.005"

Table 2: HDPE Inner Duct Dimensions	
Nominal Outside Diameter (O.D.)	1.315" +/-0.012"
Minimum Inside Diameter (I.D.)	1.101" +/-0.010"
Minimum Wall Thickness	0.097" +/-0.020"

2.8 Underground Warning Tape. When HDPE conduit is installed underground, warning tape shall be buried directly above the underground conduit 12 inches below the finished grade of the pavement, sidewalk, or ground. The warning tape shall be orange in color with a width of 6 inches and a thickness of at least 4 mils. Underground warning tape shall be a heavy duty polyethylene material that is compounded for direct burial service and which shall resist acids, alkalis and other soil substances. The tape shall be continuously labeled with a message that reads "CAUTION BURIED FIBER OPTIC CABLE", and the printing shall be sealed by a protective layer on the tape.

2.9 Duct Plugs. Duct plugs shall be installed at all below surface locations where the HDPE conduit is open ended. The duct plugs shall seal the duct and prevent water or debris from entering the duct. Split plugs for sealing the duct and cable shall be installed at all underground open ended duct locations that contain cable. The duct plugs shall be provided by the same manufacturer of the HDPE duct.

2.10 Tracer Wire. The Contractor shall supply and install a tracer wire system as specified in the Contract Documents.

2.11 Conduit Installed by Directional Drilling. When the work requires horizontal directional drilling of the 4-inch 2-duct HDPE conduit underneath roadways, the materials required shall follow the guidelines and Specifications contained in Special Provision Section 671.

2.12 Documentation. Complete and accurate as-built diagrams showing the entire conduit, duct and pull box/splice vault system shall be clearly labeled with the project name, number, marked as Fiber Optic As-Built and forwarded to the State Project Manager. The documentation shall include

09/18/2020

Page 4 of 5

SSD: 10/08/10, 7/25/14, 6/22/16, 11/03/16, 11/19/2018

plan and profile information in addition to GPS as-built documentation of the ends and bends of the installed HDPE conduit.

2.13 Drawings, manufacturer's specifications, and applicable catalog cuts for conduit, inner ducts, and duct plugs shall be submitted in accordance with Section 105.02 within 60 days after award of the contract.

Add to Construction Requirements:

3.7 HDPE Conduit

3.7.1 All ducts installed underground shall be located a minimum of 30 inches below final grade of the pavement, sidewalk, or ground unless encased in concrete or as specified in the Contract Documents. The ducts shall be installed side by side where called for on the Plans or shown in the details. The ducts shall not be stacked on top of one another, nor shall they cross over one another anywhere within the trench. There shall be a separation between the ducts of at least one duct diameter.

3.7.2 The warning tape shall be placed directly above underground ducts 12 inches below the finished grade of the pavement, sidewalk or ground. Warning tape and tracer wire shall extend the full length of the ducts from termination to termination. All excavated material unsuitable for backfill shall be removed and legally disposed of by the Contractor.

3.7.3 Ducts shall be installed in continuous lengths to the maximum extent possible. Splicing of duct shall be permitted as required to facilitate the installation. No more than one splice point shall be permitted between adjacent pulling points.

3.8 When ducts are to be installed under active roadways (travel lanes, ramps, local streets), conduit shall be directionally drilled following the guidelines and specifications contained in Special Provision Section 671. The ducts shall be installed below the top of sub-grade elevation or a minimum of 36 inches below the surface, whichever is greater. Contractor may request to trench across paved roadways at the discretion of the Owners and the Local Authority that maintains the roadway. If trenching is permitted, the Contractor shall repair the roadway to pre-existing conditions using appropriate repair materials.

3.8.1 Where ducts are spliced, the inner ducts shall also be spliced, except that splicing of fabric inner ducts shall not be permitted.

3.8.2 Duct splicing method and material shall be submitted to the Owners for approval and shall be in accordance with the duct manufacturer's approved splicing methods and materials. Splices shall not impair the pulling or blowing of fiber optic cable into the inner ducts. Splicing of the duct shall result in a watertight seal between spliced sections.

3.9 All ducts shall be sealed during installation and when being stored to prevent contaminants from entering the ducts. All ducts terminating in pull boxes, manholes, or splice vaults without installed wires or cables shall have a terminating plug installed in accordance with the

09/18/2020

Page 5 of 5

SSD: 10/08/10, 7/25/14, 6/22/16, 11/03/16, 11/19/2018

manufacturer's instructions. Unused ducts shall terminate in the pull box, manhole, or splice vault with terminating plugs. All plugs shall create a watertight seal.

3.10 Fabric inner ducts shall be installed such that at least two feet but not more than four feet of the fabric innerduct extends into the terminal pull box, manhole, or splice vault.

3.11 HDPE Conduit As-Builts. The Contractor shall document the as-built global positioning system (GPS) coordinates for the location of each end and each bend of each HDPE conduit installed.

3.11.1 The GPS coordinates shall be accurate to +/- 2 feet to assist the Owners in locating equipment in the future.

Add to Method of Measurement:

4.3 Warning tape, tracer wire, and duct plugs shall not be measured but shall be subsidiary to the installation of the conduit.

4.4 Testing and documentation shall be subsidiary to the installation of the conduit.

4.5 Conduit installed by trenching, placing in open excavation, and by directional drilling will be measured as indicated in 4.1.

Modify 5.1 to read:

5.1 The accepted quantities of conduit will be paid for at the Contract unit price per linear foot (linear meter) of the type, size, and number of ducts specified complete in place, including common structure excavation to the depth specified in 206.4.1, bedding as required, replacement backfill materials, warning tape, tracer wire, duct plugs, documentation, as-built GPS coordinates, and testing. The price shall also include all directional drilling materials, tools, equipment, labor, and incidentals as specified in Section 671 for conduit to be installed under active roadways.

Add to pay items and units:

614.74221	4" 2-Duct HDPE Conduit, SDR 13.5	Linear Foot
-----------	----------------------------------	-------------