

**SPECIFICATION SECTION 12850 - CONDUIT AND MANHOLES  
FOR CABLES**

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## SPECIFICATION SECTION 12850 - CONDUIT AND MANHOLES FOR CABLES

### 1. DESCRIPTION

#### 1.1 General

This Specification Section prescribes the provision and installation of Conduit and Manholes for Cables in accordance with Drawings and/or as required by the Engineer.

Conduit work includes; underground conduit in trenches, conduit attached to the culverts and manholes. Pull boxes shall be provided for cable installation, cable splicing and cable branching.

#### 1.2 Location and Requirements of Conduit and Others on Expressway

The locations and requirements of conduit, manholes and pull boxes are shown in the table below.

Item		Requirements	
		Thruway	Ramp way
Location	Road Section	Under side slopes (both sides), 600mm depth from the surface	Under side slopes, 600mm depth from the surface
Conduit	Nos.	For Communication: 1 nos. For Power for Lighting: 1 nos.	
	Type and Size	HDPE $\phi$ 112mm x 1 : Communication HDPE $\phi$ 65mm x 1 : Power for Lighting	
	Min. Curve Radius	Communication Cable: $R \geq 300\text{mm}$ ( $R \geq 20D$ , D: expected 15mm) Power Cable: $R \geq 600\text{mm}$ ( $R \geq 20D$ , D: expected 30mm)	
Manhole: MH-C	Size	L1600 x W1440 x D1350 [mm]	
	Interval	Communication Cable: 250m pitch Power Cable: 50m pitch	
Pull Box : PB-E	Size	L1200 x W350 x D200 [mm]	
	Interval	Communication Cable: 250m pitch Power Cable: 50m pitch	

## **2. MATERIAL REQUIREMENTS**

### **2.1 Materials**

- (a) HDPE Conduit shall conform with the following Technical Standards:

Vietnamese Standard TCVN8699: 2011

[Type] HDPE<sub>x</sub> /(dn) (dn: outside diameter of HDPE conduit)

[Material] High density Polyethylene

[Size] dn= 65 and 112 [mm]

- (b) Manholes shall follow the dimensions shown on the Drawings for cable installation.

The Contractor shall submit all manhole designs and materials to Engineer for his approval.

[Standards] Vietnamese Standard TCN 68 - 153: 1995

- i) Bedding

Fine sand fill/bedding shall be black sand complying with the requirements of Table 1 of Vietnamese Standard TCVN 7570-2006, with a fineness modulus of 0.7 to 2.0. Organic and other impurities shall be in accordance with Table 2 of Vietnamese Standard TCVN 7570-2006:

Clay and balled impurities shall be less than 0.5%

Mud and dirt shall be less than 10%

It will not be necessary to determine the alkali reactivity or the chloride content of the sand for this use.

Sand shall be sampled and tested in accordance with Vietnamese Standard TCVN 7572-2006 (aggregates for concrete and mortar – test methods)

Granular material for bedding shall be in accordance with paragraph 4.2, Table 4 of Vietnamese Standard TCVN 7570–2006 and subject to the approval of the Engineer.

Lean concrete for bedding or blinding shall be class C10 and shall conform to the requirements of Specification Section 07100 Concrete and Concrete Structures.

- ii) Concrete

Precast and cast insitu concrete used for all structural work described in this Specification Section shall be of the classes indicated on the drawings and shall conform to the requirements of Specification Section 07100 Concrete and Concrete Structures.

iii) Reinforcing Steel for Concrete

All reinforcing steel used in the works shall conform to the requirements of Specification Section 07500 Reinforcing Steel.

iv) Cast Iron Manhole Covers and Frames

Manhole covers and frames shall conform to Vietnamese Standard TCN 68-153:1995

- (c) Materials and specification of pull box are shown on the Drawings.

### **3. CONSTRUCTION REQUIREMENTS**

#### **3.1 Conduit Installation**

- (a) Where the conduit installation is wholly or partly of a non-metallic material then, a separate ground continuity conductor shall be supplied to ensure complete electrical continuity of the conduit system.
- (b) An adequate number of manholes and pull boxes, approved by the Engineer, shall be included in the conduit installation to facilitate wiring without undue strain or damage against the cables.
- (c) All edges of conduits shall be smoothed, and internal bores of conduit edges shall be taper reamed to prevent damage to wires and insulation.
- (d) All exposed metals shall be cleaned and protected against corrosion by the use of materials compatible with the original protective coating.
- (e) Any bends in the conduit run shall be made in a manner that does not cause any damage or indent in the conduit section.
- (f) The radius of bends shall not be less than the minimum values provided in relevant codes of practice and wiring regulations.
- (g) Not more than two right angle elbows shall be installed between pull boxes.
- (h) Conduits buried on ground will be installed not less than 600 mm below the ground surface complete with suitable protection against traffic or other loads.
- (i) In locations subject to heavy loads the depth shall be more than 600 mm.
- (j) The conduit which is not buried shall be protected by concrete.
- (k) The buried conduit system will be provided with suitable manholes where required.
- (l) Conduit should be connected with Manhole or pull box arranged within 250m.
- (m) Conduit which has been crushed or deformed shall not be used in the Works.

- (n) All joints and terminations shall comply with the weather proof or explosion proof requirements as applicable.
- (o) All exposed threads will be given two coats of zinc based paint of approved type after installation.
- (p) The box lid shall be fitted with a label to indicate the presence of a "Thermal Seal".
- (q) Conduit ends shall be reamed and cleaned internally prior to assembly if it is required.
- (r) Drilling of the structural steelwork will not be permitted.
- (s) The bush shall be tightened using a purpose designed spanner.
- (t) The minimum distance shall be 150mm when two or more conduits buried on ground are installed horizontally. And conduits shall not cross.
- (u) The routes of all surface conduits shall be subject to the Engineer's approval before the installation.
- (v) A pull wire shall be installed in all conduits that are to receive future conductors.
- (w) At least 60 cm of pull wire shall be doubled back into the conduit at each termination.
- (x) Conduits shall be sealed with an expanding polyurethane foam sealant and so on to prevent entry of water, insects or vermin.

### **3.2 Manhole Construction**

#### **a) Shop Drawings and Schedule**

##### **i) Shop Drawings**

The Contractor shall prepare shop drawings and a method statement showing his proposed construction details for the manholes indicated on the Drawings or as directed by the Engineer. Shop drawings and the method statement shall be submitted to the Engineer for his approval prior to the start of the any construction works, including the start of any precast concrete Works.

##### **ii) Work Scheduling**

The construction of the manholes shall not begin until the Engineer has approved the Contractor's shop drawings and method statement. The Contractor shall allow sufficient time in his programme for the submission and approval of his shop drawings and the method statement and for any revision and resubmission of such documents that may be required to incorporate the comments of the Engineer.

### iii) Site Preparation

The Contractor shall carry out any excavation that may be required for manholes in accordance with the requirements of Specification Section 03200 Structural Excavations. The Contractor shall be responsible for all dewatering and temporary support works for the excavations and all other necessary Temporary Works that may be required during construction.

### b) Delivery, Storage and Handling

Materials delivered to Site shall be inspected for damage, unloaded, and stored with minimum handling. Any damaged materials shall be rejected and replaced at the Contractor's expense.

### c) Manhole Covers, and Frames

Covers to manholes shall be supplied and installed complete with steel frames as indicated on the Drawings.

## 4. MEASUREMENT AND PAYMENT

### 4.1 Method of Measurement

- a) Manholes shall be measured for payment according to the number of each type constructed on Site in accordance with the Drawings, and to the satisfaction of the Engineer. The unit rates shall include, inter alia, covers, excavation, backfill, disposal of spoil on or off Site, compaction, bedding, concrete, reinforcing steel, formwork, step irons and all incidental or other supplementary work.
- b) Conduit shall be measured for payment in linear meters of each type and configuration installed in accordance with the Drawings. The unit rates shall include, inter alia, draw wires, continuity wire, excavation, backfill, bedding, bedding materials, disposal of spoil on or off Site, fittings, supports, fixings, accessories installed in accordance with the Drawings, and to the satisfaction of the Engineer.
- c) The description for pay items for conduit are measured in linear meters. However, various conduits run in the same nest. Accordingly the measurement of the conduit takes this into account. For example the following descriptions denote the following:

Pipe  $\phi 65 \times 2$  = Pair (2) of 65mm diameter conduits (i.e. for each meter there are 2 m of 65 mm diameter conduit)

Pipe  $\phi 61 \times 1$ ,  $\phi 112 \times 1$  = One 65mm diameter conduit (i.e. for each meter there is 1 m of 65 mm diameter conduit) + one 112mm diameter conduit (i.e. for each meter there is 1 m of 112 mm diameter conduit)

- c) The diameters of conduit indicated in the pay item descriptions are outside

diameters.

- d) The Conduit and Manholes for Cables provisions, material requirements and construction requirements identified in this Specification Section shall be measured for payment in pay items 12850-01, 12850-02, 12850-03, 12850-04, 12850-05, 12850-06, 12850-07, 12850-08, 12850-10, 12850-13, 12850-15, 12850-16, 12850-17, 12850-22, 12850-28, 12850-28-1, 12850-40 and 12850-41.
- e) Any Conduit and Manholes for Cables Works not specifically identified in this Specification Section but which are necessary for the performance of the Works shall be deemed to be included in pay items 12850-01, 12850-02, 12850-03, 12850-04, 12850-05, 12850-06, 12850-07, 12850-08, 12850-10, 12850-13, 12850-15, 12850-16, 12850-17, 12850-22, 12850-28, 12850-28-1, 12850-40 and 12850-41 .
- f) Pull Boxes and expansion joints shall be measured for payment according to the number of each type installed on Site in accordance with the Drawings and to the satisfaction of the Engineer. The unit rates shall include, inter alia, covers, excavation, backfill, disposal of spoil on or off Site, compaction, bedding, fittings, fixing clips and all incidental or other supplementary work.

## 4.2 Basis of Payment

The work under this Specification` Section shall be paid for in accordance with the applicable unit prices as indicated in the Bill of Quantities and given below. Payment shall constitute full compensation for performing the requirements of the Contract for the item of work as specified including furnishing all necessary labor, materials, tools, equipment, incidentals and tests.

<u>Pay Item</u>	<u>Description</u>	<u>Unit</u>
<b>12850</b>	<b>Conduit and Manholes for Cables</b>	
12850-01	Conduit, Embankment section, (Road Crossing Point), HDPE Pipe Φ65x2	m
12850-02	Conduit, Embankment section, HDPE Pipe Φ65x1	m
12850-03	Conduit, Embankment section, (Road Crossing Point), HDPE Pipe Φ112x1	m
12850-04	Conduit, Embankment section, (Road Crossing Point), HDPE Pipe Φ65x1	m
12850-05	Conduit, Embankment section, HDPE Pipe Φ65x2	m
12850-06	Conduit, Embankment section, HDPE Pipe Φ112x1, Φ65x1	m
12850-07	Conduit, Embankment section, HDPE Pipe Φ112x1	m

12850-08	Conduit, Embankment section, (Road Crossing Point), HDPE Pipe Φ112x1, Φ65x1	m
12850-10	Conduit, Cut section, HDPE Pipe Φ112x1 (Type-1)	m
12850-13	Conduit, Culvert section, HDPE Pipe Φ112x1 (Type-1)	m
12850-15	Conduit for Electrical and communication Cables, Tollgate, Reinforced Concrete Culvert Φ400x1	m
12850-16	Manhole, Communication	no
12850-17	Pull Box, Bridge Section	no
12850-22	Conduit, Culvert section, HDPE Pipe Φ112x1 (Type-2)	m
12850-28	Conduit, Bridge Section, HDPE Pipe Φ65/50x2	m
12850-28-1	Conduit, Bridge Section, HDPE Pipe Φ112/90	m
12850-40	Conduit, Bridge Section, Steel Pipe Φ75x2, □200x100 (Expansion Joint)	no
12850-41	Conduit, Bridge Section, Steel Pipe Φ125, L=220mm (Expansion Joint)	no