

Underground Civil Installations

1. Scope

Normally, the developer is responsible for the provision of civil works (trenching, ducts and transformer bases) related to the installation of the electrical system for new developments. This specification, related standard drawings, along with the Ottawa River Power (ORPC) project drawing(s) outline the requirements for the civil work. The installation is to meet the requirement of CSA C22.3 No 7.

The developer/contractor is responsible for coordinating the requirements of other utilities (gas, water, sewer, telephone, cablevision, etc.) to assure a timely and cost effective installation.

The contractor must advise the utility five (5) days in advance prior to commencing work.

It is imperative that the work be organized in such a manner to minimize the cost. No trench shall be backfilled until inspected and authorized by the inspector.

2. Site Preparation

The developer is responsible for all utility locates required for the trenching. The trench route is to be rough graded to within +/- 15 cm of final grade prior to commencing the trenching. The developer is responsible for setting grade markers and survey pins so the location of the trench and service laterals are correctly located.

3. Road Crossings

The location and number of ducts required for road crossings is shown on project drawing. The construction of the duct bank is to be in accordance with ORPC standard drawing **SDUG004**. The duct concrete envelope is to be extended 1 meter either side of the curb or edge of pavement with the PVC ducts extended a minimum of 15 cm beyond the concrete envelope (for connection of the direct buried duct).

Duct to be 3 in (75mm) PVC type II. As noted on the standard drawing where the duct is on fill that is not compacted, reinforcing is required.

ORPC is to be contacted for inspection of the duct installation prior to back filling.

4. Transformer Foundations and Pads

Transformer pads are to be constructed of pre-cast concrete or fiberglass in accordance with ORPC drawing **SDUG003** (or **SDUG002** for commercial three phase installations).

For residential developments, the foundation/pad is located centered on a lot pin 1 m from edge of the ROW (right of way). This may change due to particular site conflicts and will be shown on the ORPC project drawings.

For commercial projects, the location will be as shown on the project site plan. The finished elevations of the pad surface must be 6" (15 cm) above the finished grade as identified by the developer. The developer will be responsible for re-establishing the proper grade if the grade is not maintained.

Protective bollards are required when the location of the transformer pad is subject to traffic/snowplow damage. Bollard requirements are detailed on ORPC drawing **SDUG008**.

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Four ground rods per pad (transformer or switch), located diagonally opposite, shall be $\frac{3}{4}$ " X 10' feet, using 2/0 flex copper and approved connectors. They shall be supplied, installed and connected by the contractor. The ground wire shall encircle the pad with both tails entering for connection as shown on ORPC drawing **SDUG006**.

Grounding will be inspected by ORPC (and in the case of commercial installations, ESA as well) prior to backfilling.

5. Padmounted Switch Foundations

Switchgear foundations may be constructed of pre-cast concrete or fiberglass. ORPC will provide information for the procurement of the foundation to suit the particular switchgear. Grounding and protective bollard requirements are the same as transformer pads.

6. Main Trench

The main trench for the primary, secondary and street light cable is located along the road in the approved location established by the local municipality.

Trench to be as shown on ORPC drawing **SDUG005**. Gas is normally located in a separate trench. If a joint use trench with gas is used, gas is located on a "shelf" to maintain a 300mm horizontal clearance hydro cable.

Three (3) inch (75mm) diameter duct to be installed for all cables (1 cable or triplex per duct). Duct will be 3" DB II duct only. Use only long sweep 90-degree elbows or 45 degree bends. All open ducts must be fitted with proper caps (no rags or cardboard). 1/4" or 3/16" synthetic continuous (no knots) pull rope to be installed in all ducts.

The underground warning tape shall be standard "High Voltage – Caution" and installed 15 cm below the finished grade.

Ducts must be back-filled with sand to a depth of 20 cm above and below the ducts. Fill to the finished grade should be free of stones greater than 100 cm in size.

The end of duct runs must be identified and marked by the installation of 2" X 6" X 8' pressure-treated plank, buried a minimum of 4' in the ground, exposed vertically. The end of the ducts is not to be back-filled until the cables have been installed and the utility grants permission to do so. The cable will then be brought to the surface and left in a coil fastened to the underground marker and identified. Ducts to be identified with waterproof marker in transformer bases, switch bases and riser poles.

Primary ducts are to be installed on the bottom layer with secondary ducts and the streetlights to be installed on the top layer (three on the bottom and three on the top layer).

If a three-phase duct is required, each phase is to have one conductor and the ducts must not cross between pull areas.



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7. Secondary Service Trench

The service trench from the main trench to the meter base is to be in accordance with drawing **SDUG010** (or **SDUG009** for four party trench). All angles to be 90 degrees with trench parallel or perpendicular to the lot line. Duct/cable to be placed 600 mm (2 ft) from lot line.

Three inch duct have a long sweep up to meter conduit with a reducer for 75 mm (3 in) to 50 mm (2") located just below finished grade.

8. Meter Base (Underground)

The meter base is to be located at the front of the dwelling or on the driveway side within 3 m of the front of the front of the building.

The meter base to be located so that the centre of the meter is 1650 mm to 1850 mm (65" to 73") above finished grade.

Meter base for underground service to be as follows:

Application	Cutler Hammer (Eaton)	Microelectric
Single service	LU2	BS2-TV
Multi-Position (2 to 6 services)	2KU4CLX to 6KU4CLX	BSC42-VG to BSC46-VG

9. Riser Pole Transition

Ducts brought to a riser pole for future connection should use a long 90 degree elbow and be brought 15 cm above finished grade clustered tight to the pole to allow the installation of cable guards. Preferred location for riser is on the side of the pole to minimize likelihood of damage by snow plows.

Rev	Rev Date	Revision	Approved
0	June 30, 2006	New	D. Fee, P.Eng
1	October 23, 2006	Service trench and meter info added	D. Fee P.Eng