

DUCT BANK

**\*\*From Danville FEGC 028-3(32)**

xx. DESCRIPTION. This work shall consist of the construction of underground concrete encased and direct burial conduit systems for cable television, electrical power, communication cable, and telephone service; and the furnishing and installing of all conduit, appurtenances, and hardware for transitioning from underground to aerial service. The work shall be performed in conformance with the lines, grades, dimensions, locations, and details shown on the Plans or as determined by the Engineer.

xx. MATERIALS. Conduit shall be PVC Schedule 40 Rigid Wall Conduit conforming to NEMA Standard TC-2. Electrical, telephone, and cable television conduit bends (sweeps) shall be galvanized steel with a minimum bend radius of 900 mm (36 inches).

Concrete shall conform to the requirements of Section 541 for Concrete, Class B.

Sand borrow shall conform to the requirements of Subsection 703.03.

xx. GENERAL REQUIREMENTS. The Contractor shall coordinate and work with each utility company, as necessary, to ensure the conduit systems installed are constructed in accordance with the Plans and the utility company's specifications.

The terms "Duct" and "Conduit" are used interchangeably in these provisions.

xx. EXCAVATION. The conduit trench shall be excavated to the required depth shown on the Plans and to a width sufficient to install the conduit and concrete encasement. The depth of excavation shall also be sufficient for an initial 75 mm (3 inch) leveling layer of approved backfill material raked smooth so that conduit sections will be either level or on a uniform gradient. The Contractor shall maintain a minimum 300 mm (12 inch) spacing between all parallel duct bank runs unless otherwise noted. For parallel concrete encased duct banks, the Contractor shall provide forms to allow 300 mm (12 inches) of backfill material between the concrete encased duct banks.

All excavation shall be confined to as minimum a surface area as possible, keeping within all applicable safety requirements.

xx. INSTALLATION OF CONDUIT. Conduit bends shall match bends as noted on the Plans. Conduits shall be installed with minimum bends, and no more than the maximum allowed as described in each individual utility owner specifications. No sharp bends shall be allowed except for at poles. For all other directional changes, a minimum 2750 mm (9 foot) radius is allowed, but a 6 m (20 foot) radius is preferred.

Random "main" conduit may be mandreled at the direction of the Engineer and utility companies' inspector with a 100 mm (4 inch) diameter solid mandrel. The conduit structure shall be mandreled as follows:

Ten conduits or less: Mandrel two diametrically opposite conduit.

If at the time the cable is being installed in the conduit by the utility, and the cable cannot be pulled through the conduit, then the Contractor shall replace/repair (at the Contractor's expense) the conduit.

Conduit spacers, as approved by the Engineer and utility companies' inspector must be used to ensure separation between the conduits as shown on the Plans. Spacers are to be placed at 1800 mm (6 foot) intervals or as recommended by the product manufacturer.

The Contractor shall furnish and install a nylon pull cord. The pull-in cords shall be installed and the completed ducts shall be capped, plugged, and labeled as directed by the Engineer with concurrence of the utility company inspector. Electrical ducts shall have a minimum 135 kg (300 lb) pull cord. One telephone conduit shall have a measuring tape with a minimum 135 kg (300 lb) pull capacity.

The Contractor shall install furnished plastic warning tape, describing buried electrical lines, along the entire length of the duct bank.

Tape shall be installed approximately 150 mm (6 inches) deep or as directed by the utility companies' inspector.

Where lateral takeoffs of ducts from concrete envelopes are made, the forms shall be slotted for the installation of the elbow with slotted metal forms placed over the elbow to retain the concrete during pouring. The lateral takeoff conduits shall be rigidly supported during concrete pouring and curing.

Duct joints shall be made watertight by the use of a brush-applied cement as recommended by the manufacturer.

All conduit placement will require approval by the utility companies' inspector prior to concrete placement. Any field modifications will be done only with the approval of the inspectors.

When it is expected that there will be an interval of four hours or longer between pours of concrete, reinforcement bars shall be installed across the construction joint. The bars shall be size #16M (#4) and not less than 1800 mm (6 feet) in length. One bar shall be installed in each corner, and between ducts in the top and bottom of the concrete envelope, 100 mm (4 inches) from the outside surface. Each reinforcement bar shall extend an equal distance into the two pours of concrete.

Prior to pouring concrete, the duct shall be securely anchored to prevent movement during the pour. Anchors shall be within 600 mm (2 feet) and on each side of a joint, at each end of a bend, and at a maximum distance of 3 meters (10 feet) between anchors.

The Contractor shall confirm, before placing forms or duct lines, that the surface on which concrete is to be poured is undisturbed original ground or firmly compacted earth free from voids, rock, or rubble.

Duct envelope shall be square or rectangular in cross section and shall provide for concrete thickness over the outside ducts as shown on the Plans.

Slump tests shall be performed on all concrete deliveries. The concrete shall be placed carefully so as not to disturb or damage the conduit. The concrete shall be consolidated as directed by the Engineer to eliminate honeycombing or other defects. The Contractor shall ensure that all clearances shown on the Plans are maintained during concrete placement.

The Contractor may place 150 mm (6 inch) of loose approved backfill material on the concrete as soon as the surface is set to aid in curing. However, actual backfilling shall not begin until at least 24 hours after placement of concrete.

- xx. BACKFILL. After the concrete has cured for a minimum of 24 hours, and after approval by the Engineer and utilities companies' inspectors, approved material shall be placed over the encased ducts in 150 mm (6 inch) layers and compacted in accordance with Subsection 203.11(d) by using air or mechanical tampers. Hand tampers will not be permitted. The material shall be brought to subgrade beneath roadway, grass belt, and any other paved or gravel areas. For grassed areas outside the highway construction limits, the material shall be brought to within 100 mm (4 inches) of the finished grade, a 100 mm (4 inch) layer of topsoil placed, and the area seeded and mulched in accordance with the applicable requirements of Section 651. Paved, concrete, or gravel areas outside the highway construction limits shall be replaced in kind as directed by the Engineer. Backfill for conduit shall have maximum 40 mm (1½ inch) stone.

- xx. METHOD OF MEASUREMENT. The quantities of Special Provision (Concrete Encased Duct Bank) and Special Provision (Direct Burial Duct Bank) of the number and size of ducts specified to be measured for payment will be the number of meters (linear feet) installed in the complete and accepted work, measured to the nearest meter (linear foot) along the center of the duct bank.

The pay limit for temporary pavement patching material will be as detailed in the Plans.

- xx. BASIS OF PAYMENT. The quantities of Special Provision (Concrete Encased Duct Bank) and Special Provision (Direct Burial Duct Bank) will be paid for at the Contract unit price per meter (linear foot). Payment will be full compensation for furnishing, transporting, handling, and placing the materials specified, including conduit, conduit spacers, transition couplings, elbows and other fittings; caps, plugs, pulling wire, bedding material, concrete encasement, and all other material needed for a complete concrete encased or direct burial duct system; excavation and backfill; placing of concrete; and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Any additional depth of excavation required to construct conduit under other utilities, and the cost thereof, shall be considered incidental to Special Provision (Concrete Encased Duct Bank) or Special Provision (Direct Burial Duct Bank), as applicable.

Payment for temporary pavement patch will be made separately under Contract item 900.680 Special Provision (Bituminous Concrete Pavement, Small Quantity).

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.640 Special Provision (Concrete Encased Duct Bank, <input checked="" type="checkbox"/> Ducts)( <input checked="" type="checkbox"/> mm ( <input checked="" type="checkbox"/> "))	Meter (Linear Foot)
900.640 Special Provision (Direct Burial Duct Bank, <input checked="" type="checkbox"/> Ducts)( <input checked="" type="checkbox"/> mm ( <input checked="" type="checkbox"/> "))	Meter (Linear Foot)