

SECTION 630 CONDUIT

630-1 Description.

Install conduit for traffic signals and other electrically powered or operated traffic control devices as shown in the plans and Design Standards, Index No. 17721.

630-2 Materials.

Use materials meeting the requirements of Section A630 of the current Minimum Specifications for Traffic Control Signal Devices (MSTCSD), except as provided in 603-2.2.

630-3 Installation Requirements.

630-3.1 General: Consider the locations of conduit as shown on the plans as approximate. Construct conduit runs as straight as possible, and obtain the Engineer's approval of all major deviations in conduit locations from those shown on the plans.

Do not place more than the equivalent of four quarter bends or 360 degree of bends, including the termination bends, between the two points of termination in the conduit, without a pullbox. Obtain the Engineer's approval to use corrugated flexible conduits for short runs 6 feet [1.8 m] or less.

Use only intermediate metal conduit, rigid galvanized conduit, rigid aluminum conduit or PVC coated intermediate metal conduit for above-ground or underground electrical power service installations. Meet the requirements of Section 562 for coating all field cut and threaded galvanized pipe.

Use either schedule 80 PVC or fiberglass reinforced epoxy conduit for installations on bridge decks.

Use either schedule 40 PVC or fiberglass reinforced epoxy, conduit for underground and under pavement installations, except for electrical power service.

When the installation of a conduit requires jacking under paved surfaces, railroads, etc., use an intermediate metal conduit as the sleeve for the underground conduit. Install the underground conduit as shown in the Design Standards, Index No. 17721.

When a conduit installation changes from underground to above-ground, make the change a minimum of 6 inches [150 mm] below finished grade.

Install a No. 12 AWG pull wire or polypropylene cord the full length of all conduits that are designated for future use. Ensure that a minimum of 24 inches [600 mm] of pull line approved by the Engineer is accessible at each conduit termination.

Install an expansion fitting when conduit crosses an expansion joint of a structure.

Use couplings and expansion joints made of the same material as the conduit.

Ensure that all joints are made as specified by the manufacturer and are waterproof.

For installations not specifically shown, install the conduit in accordance with NEC and/or National Electrical Safety Code requirements.

When earth backfill and tamping is required, place backfill material as per Section 120 in layers approximately 12 inches [300 mm] thick, and tamp each layer to a density equal to or greater than the adjacent soil.

When trenching, saw cut and repair all pavement and sidewalks encountered.

When backfilling trenches in existing pavement, use a commercially available sand-cement (approximately 10:1 mix ratio).

Provide a standard clearance between underground control cable and electrical service cable or another parallel underground electrical service cable that meets National Electrical Safety Code requirements.

630-3.2 Conduit Sizes: Size the conduit to be used on all installations, unless otherwise shown in the Contract Documents. Use conduit of sufficient size to allow the conductor to be installed without any damage and meeting NEC requirements. Use conduit that is at least 1 inch [25 mm] in diameter, except

for the conduit protecting the ground wire on the side of a pole, use conduit that is at least 1/2 inch [13 mm] in diameter.

630-3.3 Conduit Joints: Make conduit joints using materials as specified by the manufacturer. As an exception to the threaded coupling for intermediate metal conduit, at locations where it is not possible to screw the threaded coupling properly, the Contractor may use a waterproof slip-joint coupling approved by the Engineer. Secure the joint, and tighten threaded connections.

Prior to insertion into the coupling, clean, prime and coat the ends of PVC conduit with a solvent-type cement as specified by the manufacturer.

630-3.4 PVC Coating: Apply the PVC coating to the entire surface of the conduit, except for the threads, to attain a nominal thickness of 40 mils [1.02 mm]. Ensure that the coating is free of sags and/or drips. Ensure that the bond between the PVC coating and the conduit is greater than the tensile strength of the PVC coating.

Attach the coupling to the conduit prior to the application of the coating for conduit of 1 inch [25 mm] diameter or less.

Use a coupling with sleeve extensions on conduit larger than 1 inch [25 mm]. Ensure that the sleeve extensions on all threaded female openings have a length equal to the diameter of the conduit up to and including size number 53.

630-3.5 Conduit Terminations: Fit the terminating ends of all metal conduit and metal conduit sleeves with an appropriate bushing.

For conduit to be encased in concrete, wrap with tape or otherwise protect all terminations to prevent the entrance of concrete.

Connect new underground conduit(s) to existing underground conduit(s) with a pull box.

Install conduit terminating in a concrete strain pole through the cable entry hole and up the center of the pole to a location approximately 6 inches [150 mm] below the handhole.

Seal conduits terminating in a controller base, pole, pull box, junction box, or pedestal base with Appleton Duct Seal, Permagem Duct Seal, GB Duct Seal, or an equivalent moisture resistant sealant approved by the Engineer.

For a controller base, pole or pedestal base, and junction boxes, terminate conduit runs into the center of the base or box at least 2 inches [50 mm] above the surface of the base.

630-3.6 Existing Underground Facilities: Coordinate with any potential conflicting underground utilities prior to starting all excavating or jacking operations at the project site.

630-3.7 Restoration of Trench Areas: Restore the conduit trench construction area to an acceptable condition. Such work includes replacement of all pavement areas, sidewalks, curbs, structures, or grass areas disturbed by the conduit trench.

630-3.8 Jacking Conduit: Use either intermediate metal conduit or rigid galvanized conduit as the sleeve when installation of a conduit requires jacking under paved surfaces, railroads, etc., with either polyvinyl chloride or fiberglass reinforced epoxy conduit installed in the jacked sleeve. Do not disturb any pavement without the approval of the Engineer.

630-3.9 Above-Ground Installation: Securely attach above-ground conduit installations to the surface of the supporting structure using conduit straps. As a minimum, use conduit straps located on 5 feet [1.5 m] centers. Use galvanized metal conduit straps when installing intermediate metal conduit, fiberglass reinforced epoxy conduit, rigid galvanized conduit, rigid aluminum conduit or PVC coated intermediate metal conduit above ground.

Use the same PVC coating for the metal straps as the conduit, when using PVC coated intermediate metal conduit.

630-3.10 Elbows: Use only preformed or field constructed conduit elbows. The radius of curvature of the inner edge of any bend shall not be less than shown below:

Size	Standard Radius
1/2 inch [13 mm]	4 inches [100 mm]
3/4 inch [19 mm]	4 1/2 inches [115 mm]
1 inch [25 mm]	5 1/2 inches [145 mm]
1 1/4 inches [32 mm]	7 1/4 inches [185 mm]
1 1/2 inches [38 mm]	8 1/4 inches [210 mm]
2 inches [50 mm]	9 1/2 inches [240 mm]
2 1/2 inches [63 mm]	10 1/2 inches [265 mm]
3 inches [75 mm]	13 inches [330 mm]
3 1/2 inches [90 mm]	15 inches [380 mm]
4 inches [100 mm]	16 inches [405 mm]
5 inches [125 mm]	24 inches [610 mm]
6 inches [150 mm]	30 inches [760 mm]

630-4 Method of Measurement.

630-4.1 General: Measurement for payment will be in accordance with the following work tasks.

630-4.2 Furnish and Install: The Contract unit price per foot [meter] of Conduit, furnished and installed, will include furnishing all hardware and materials as specified in the Contract Documents, and all labor, trenching, backfilling, and restoration materials necessary for a complete and accepted installation.

Payment for conduit placed in the ground or used on bridge decks will be based on the horizontal path of the installed conduit as measured in a straight line between the centers of pull boxes, cabinets, poles, etc. No allowance will be made for sweeps or vertical distances above or below the ground or the bridge deck.

Due to conditions which may exist on the project site, the Contractor may furnish conduit in variable lengths.

630-4.3 Furnish: The Contract unit price per foot [meter] of Conduit, furnished, will include the cost of materials, and hardware as specified in the Contract Documents, plus all shipping and handling cost involved in delivery as specified in the Contract Documents.

The Contractor shall furnish conduit in 20 foot [6 m] sections with one coupling per section.

630-4.4 Install: The Contract unit price per foot [meter] of Conduit, installed, will include all miscellaneous hardware and materials, labor, trenching, backfilling, and restoration materials necessary for a complete and accepted installation.

The Engineer will supply conduit in sections with one coupling per section and elbows as required.

Payment for conduit placed in the ground or used on bridge decks will be based on the horizontal path of the installed conduit as measured in a straight line between the centers of pull boxes, cabinets, poles, etc. No allowance will be made for sweeps or vertical distances above or below the ground or the bridge deck.

630-5 Basis of Payment.

Price and payment will be full compensation for all work specified in this Section.

Payment will be made under:

Item No. 630-	1-	Conduit - per foot.
Item No. 2630-	1-	Conduit - per meter.