B. CONSTRUCTION METHODS.

1. A non-metallic pull rope shall be use in pulling conductor in non-metallic conduit.
2. After conductor is placed in conduit, a pull test will be made on conductors. When any length of conductor cannot be freely pulled the Contractor shall make any needed alterations or repairs at the Contractor's expense.
3. Conductors in illumination poles shall be supported by a J-hook in the top of the pole.
4. A sufficient length of conductor shall be left in ground boxes (610 mm minimum to point of splice, 914 mm minimum when conductor is pulled through with no splice), enclosures, and pole bases (305 mm minimum) for making up connections.
5. Except for overhead wiring, splices shall be made only in junction boxes, ground boxes, pole bases, or electrical enclosures and shall be made with approved compression sleeves or split bolt connectors. Splices shall be insulated with heavy wall heat shrink tubing containing factory applied sealant. Heat shrink sleeves shall lap conductors insulation a minimum of 2 inches on both sides of the splices.
6. When approved by the Engineer, wire nuts may be used for No. 8 and smaller conductors in above-ground junction boxes, but not in pole bases or ground boxes. Wire nuts shall be positioned upright to prevent the accumulation of water.

IV. DUCT CABLE.

A. Duct cable shall be placed by the open trench method, except where otherwise noted, at a minimum depth of 18 inches unless otherwise indicated. Bends in duct cable shall be made in the manner recommended by the manufacturer. Minimum bending radius shall be 15 inches for one inch duct and 18 inches for 1¼" duct. Handling of duct cable reels and installation of duct shall be as recommended by the manufacturer. Duct entering ground boxes shall be placed so that the duct ends are not less than 5 inches or more than 9 inches from the box cover. Duct for duct cable is designed as a conduit system and shall be considered as such in NEC interpretations. Duct shall not be spliced. Ends of duct shall be cut neat and straight and shall be reamed to remove sharp edges.

B. After duct cable has been installed, a pull test will be made on conductors. If conductors cannot be freely pulled, Contractor shall replace or otherwise adjust installation to free up the conductors. Duct cable ends shall be sealed with approved compound or with heat-shrink material after pull test is completed.

C. Where noted on plans, duct cable shall be placed on a 2 inch sand cushion and backfilled with a minimum 6 inches of additional sand.

D. Duct cable shall be encased in conduit when shown on the plans. Duct cable shall be extended through the conduit casing in one continuous length.

V. GROUND BOX.

A. MATERIALS.

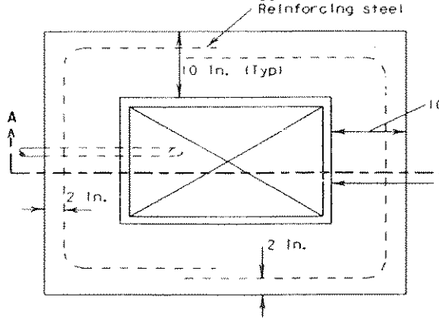
1. Ground boxes shall be concrete or polymer concrete, as required by the descriptive code shown elsewhere.
2. All precast ground boxes and covers shall be permanently marked with manufacturer's name or logo and manufacturer's model number.
3. Covers shall be bolted down. Bolt holes shall be arranged to drain dirt.
4. When steel covers are required, covers shall be provided with a grounding lug with 1/2 - 13 NC female threads on the underside of the cover.
5. Polymer Concrete boxes shall meet the following requirements:
   a. Boxes shall be manufactured from Reinforced Polymer Concrete (RPM) composed of borosilicate glass fiber, a catalyzed polyester resin and an aggregate. Side walls may be fiber reinforced polymer.
   b. Minimum inside dimensions shall be as follows (width x length x depth):

      Type A shall be 11.5 inches x 21 inches x 10 inches. (122311)
      Type B shall be 11.5 inches x 21 inches x 20 inches. (122322)
      Type C shall be 15.25 inches x 28.25 inches x 10 inches. (162911)
      Type D shall be 15.25 inches x 28.25 inches x 20 inches. (162922)
      Type E shall be 11.5 inches x 21 inches x 16 inches. (122317)

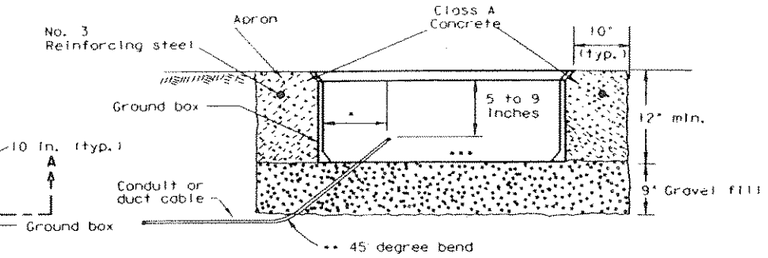
   c. Bottom edge of box or extension shall be footed with a minimum 1¼" flange.
   d. Ground boxes shall withstand a test loading of 20,000 lbs. over a 10 inch by 10 inch area centered on the lid and 600 lbs. per sq. ft. applied over the entire side wall. The model of ground box proposed shall have been tested by a laboratory independent of the manufacturer to meet loading requirements. Certification of such tests shall be submitted to the Engineer for approval.
   e. Covers shall be 2 inch (nominal) thick polymer concrete. Cover shall be secured with two ½ inch stainless steel bolts. Bolts shall be captive and shall withstand a minimum of 70 ft-lbs torque and shall have a minimum 750 lbs. straight pull out strength. Covers shall be skid resistant, minimum 0.5 coefficient of friction. Covers shall be interchangeable between manufacturers and shall conform to the dimensions shown below. Cover shall be legibly imprinted with the words "Danger High Voltage" in minimum 2 inch letters. When required, other cover lettering shall be as shown elsewhere on the plans.

B. CONSTRUCTION METHODS.

1. Steel covers shall be bonded to grounding conductor with a 3 foot jumper.
2. Where indicated on the plans, ground box will be encased in concrete apron as detailed below. Construction of apron including concrete and reinforcing steel shall not be paid for directly but shall be subsidiary to the ground box. Field bending of reinforcing steel will be allowed.
3. A minimum gravel fill of 9 inches shall be placed under each ground box. Gravel shall be coarse aggregate grade No. 1 in accordance with Item 421.
4. The Contractor may cut the necessary conduit holes in box extensions only. Holes must be 18 inches or more below the cover.
5. Concrete for aprons shall be considered miscellaneous concrete for testing purposes.



PLAN VIEW



SECTION A - A

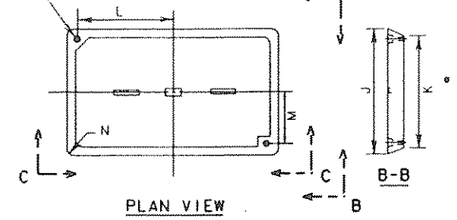
* Final position of end of conduit shall not exceed one-half of the distance to the side of the box opposite of the conduit entry.

** 90 degree when approved by the Engineer.

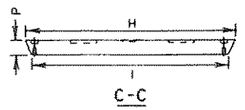
*** Place gravel "under" the box, not "in" the box. Gravel should not encroach on the interior volume of the box.

APRON FOR GROUND BOXES

(Where required)



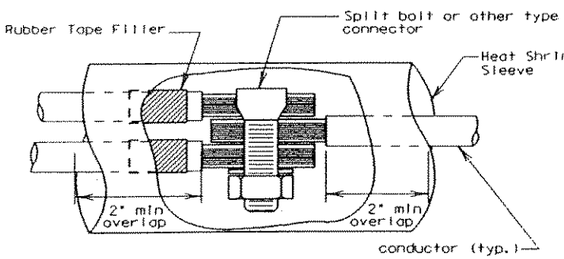
PLAN VIEW



C-C

GROUND BOX COVER

GROUND BOX COVER DIMENSIONS								
BOX SIZE (WXL)	DIMENSIONS (INCHES)							
	H	I	J	K	L	M	N	P
12 in x 23 in	23¾	23	13¾	13½	9⅛	⅝	1⅜	2
16 in x 29 in	30½	30¼	17½	17¼	13¼	6¼	1⅜	2



SPLICE DETAIL

* Tape filler required where two or more conductors enter one heat shrink tube to ensure watertight splice.

STANDARD PLANS
TEXAS DEPARTMENT OF TRANSPORTATION
Traffic Operations Division

ELECTRICAL DETAILS- CONDUCTORS, DUCT CABLE, GROUND BOXES

ED(2)-93

DGN: ED(2)-93	DATE: January 1992	DW: KB	CK: TB	DW: RS	CK: TB	REG. NO.:
REVISIONS: 5-93, 10-93	STATE DISTRICT: 18	FEDERAL REGION: 6	FEDERAL AID PROJECT: STP 96(830)MM			SHEET: 85
	COUNTY: ROCKWALL		CONTROL: 1014	SECTION: 03	JOB: 041	HIGHWAY: FM740

718