

I. ELECTRICAL CONDUCTORS

A. MATERIALS

- Insulated conductors shall be NEC Type XHHW. Conductors shall be color coded in accordance with the NEC, articles 200, 250, and 310; i.e. Grounded conductors (neutrals) shall be white, Grounding conductors (ground wires) shall be bare or green, Ungrounded conductors (hots) shall be any color except green, white, or grey. Identification of conductors #10 AWG and smaller shall be by continuous jacket color. Color coding of electrical conductors #8 AWG and larger shall be either by continuous color jacket or by colored tape. Colored tape marker shall consist of a half-lap of tape covering a 6 inch length of conductor.
- Where two or more circuits are present in one conduit or enclosure, the conductors of each circuit shall be identified by a permanent non-metallic tag at each accessible location. The tag shall be fastened to the conductors by plastic straps.
- Grounding electrode conductors #6 AWG or smaller, for bonding to ground rods at electrical services, shall be solid. Connection of conductors to ground rods shall be made using UL Listed connectors designed for such purposes.
- Heat Shrink Tape filler shall be used to seal the ends of heat shrink tubing around two or more conductors that are insulated with heat shrink tubing. Tape material shall have a minimum dielectric strength of 225 volts per mil and may be either cross-linked butyl rubber or silicone gel strip. Tape shall be supplied in rolls and shall have a backing (release paper) to prevent the tape from sticking to itself.

B. CONSTRUCTION METHODS

- After conductors have been installed 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 no expense to the State.
- Conductors in illumination poles shall be supported by a J-hook in the top of the pole.
- A sufficient length of conductor for making up connections shall be left in ground boxes (2 feet minimum to point of splice, 3 feet minimum when conductor is pulled through with no splice), enclosures, and pole bases (1 foot minimum and typical).
- 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 and shall be watertight. Heat shrink sleeve shall overlap conductor insulation a minimum of 2 inches on both sides of the splice. Heat shrink tape filler is required where two or more conductors enter one heat shrink tube to ensure watertight splice. Heat shrink tape shall be either butyl rubber or silicone gel strip.
- Wire nuts may be used for #8 AWG 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.

II. GROUND BOX

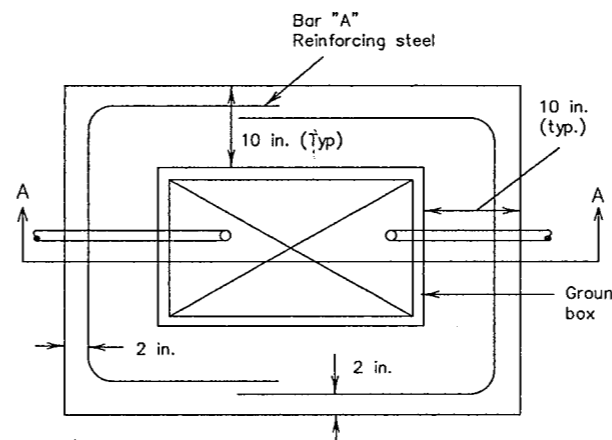
A. MATERIALS

- Ground boxes shall be concrete or polymer concrete, as required by the descriptive code shown elsewhere.
- All precast ground boxes and covers shall be permanently marked either by impress or by permanent ink, with manufacturer's model number, name or logo.
- Covers shall be bolted down, and bolt holes in the box shall be arranged to drain dirt.
- Ground box Types A, B, C, D & E shall be Polymer Concrete and shall meet the following requirements:
 - 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.
 - Minimum inside dimensions shall be as follows (width x length x depth):

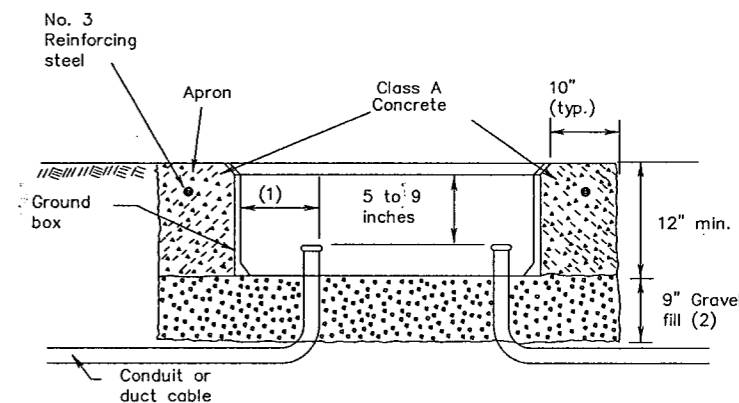
Type A shall be 11.5 inches x 21 inches x 10 inches	(122311)
Type B shall be 11.5 inches x 21 inches x 20 inches	(122322)
Type C shall be 15.25 inches x 28.25 inches x 10 inches	(162911)
Type D shall be 15.25 inches x 28.25 inches x 20 inches	(162922)
Type E shall be 11.5 inches x 21 inches x 16 inches	(122317)
 - Bottom edge of box or extension shall be footed with a minimum 1 1/4 inch flange.
 - Ground boxes shall withstand a test loading of 20,000 lbs. over a 10 in. by 10 in. 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.
 - Covers shall be 2 inch (nominal) thick polymer concrete. Cover shall be secured with two 1/2 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. Nuts shall be floating. 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 1 inch letters. When required, other cover lettering shall be as shown elsewhere on the plans.
- Cast in place and precast concrete boxes shall be as shown elsewhere in the plans.

B. CONSTRUCTION METHODS

- Ground boxes shall be set on a 9 inch (minimum) bed of course No. 1 aggregate as defined by item 421. Gravel shall be in place prior to setting box and conduits shall be capped. Any gravel or dirt in conduit shall be removed.
- When required by item descriptive code, construction of an apron encasing a ground box including concrete and reinforcing steel shall not be paid for directly but shall be subsidiary to the ground box. Reinforcing steel may be field bent. Concrete for aprons shall be considered miscellaneous concrete for testing purposes.
- Conduit holes may be cut into the walls of deep boxes at least 18 inches beneath the cover.
- Steel covers shall be bonded to grounding conductor with a 3 feet long flexible jumper.



PLAN VIEW

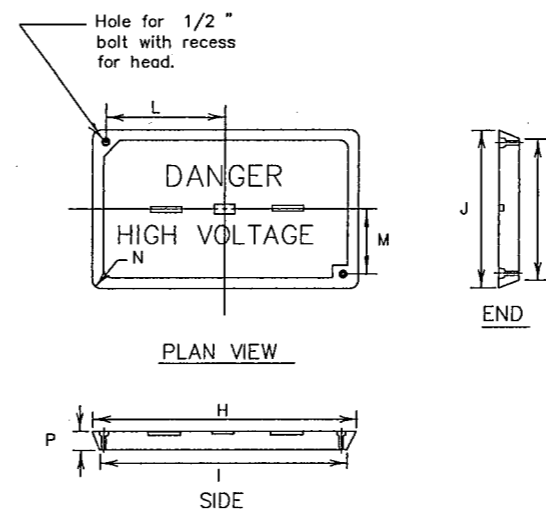


SECTION A - A

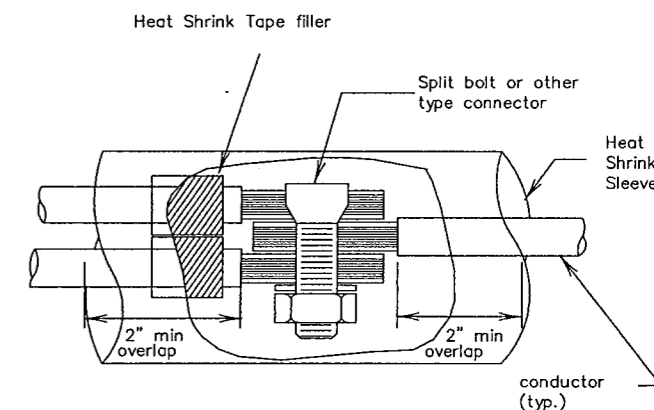
- Final position of end of conduit shall not exceed one-half of the distance to the side of the box opposite of the conduit entry.
- Place gravel "under" the box, not "in" the box. Gravel should not encroach on the interior volume of the box.

APRON FOR GROUND BOXES

(Where required)



GROUND BOX COVER



SPLICE DETAIL

GROUND BOX COVER DIMENSIONS								
BOX SIZE (WXL)	DIMENSIONS (INCHES)							
	H	I	J	K	L	M	N	P
12 x 23	23 1/4	23	13 3/4	13 1/2	9 7/8	5 1/8	1 3/8	2
16 x 29	30 1/2	30 1/4	17 1/2	17 1/4	13 1/4	6 3/4	1 3/8	2

STANDARD PLANS
TEXAS DEPARTMENT OF TRANSPORTATION
Traffic Operations Division

ELECTRICAL DETAILS—
CONDUCTORS,
GROUND BOXES

ED(2)-98

© TxDOT January 1992		DR - JM	CK - KB	DR - DN	CK - JM	REV NO.
REVISIONS	STATE DISTRICT	FEDERAL AID PROJECT		SHEET		
5-93	DALLAS	CM 97 (449)		75		
10-93		COUNTY	CONTROL	SECTION	JOB	HIGHWAY
4-98		DALLAS	8050	18	034	BELT LINE

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DN: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
CK: 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
DW: 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48
CK: 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
LEVELS DISPLAYED
DATE: 12/13/16
ACC: 71819
FILE: 53343515161718192021222324252627282930313233343536373839404142434445464748495051525354555657585960616263