

II. GROUND RODS

A. MATERIALS

- All ground rods installed at electrical services, including supplemental lightning protection ground rods specified by the plans in other locations such as pole bases, shall be copper coated steel and labeled by a NRE. Rods shall be a minimum diameter of 5/8 inch. The length shall be a minimum of 8 feet. Larger diameter or longer length rods may be called for in some specific locations, see the individual plans sheets.
- Ground rod clamps shall be fitted to be in direct contact with the soil. Where concrete encasement is required, the clamp shall be fitted for concrete encasement.

B. CONSTRUCTION METHODS

- Ground rods installed in locations such as pole bases, to provide supplemental lightning protection need not be totally in contact with the soil. Where called for by the plans, rods may be encased in soil or concrete or any combination of soil and concrete. When concrete encased, the connection of the conductor to the rod shall be readily accessible for inspection or repairs. When driven into the soil the upper end shall be between 2 to 4 inches below finished grade.
- Ground rods shall not be placed in the same drilled hole as a timber pile.
- Ground rods shall be installed such that the end imprinted with the rod's part number is installed on the upper end.
- Non-conductive coatings such as concrete spallers shall be removed from the rod at the clamp location.
- Routing of lightning protection ground rod wires shall be run as short and straight as possible. Where bends are required they shall have a minimum radius of four inches.
- Unless specifically called for by the plans, conductors used for ground rod wires shall be non-metallic. Where metal conductors are specified, a grounding bushing and properly sized bending jumper shall be provided and properly installed on each end.
- Where rocky soil or a solid rock bottom is encountered when driving a ground rod and the horizontal trench placement method is the only viable solution, written authorization from the town must be required.

III. GROUND BOX

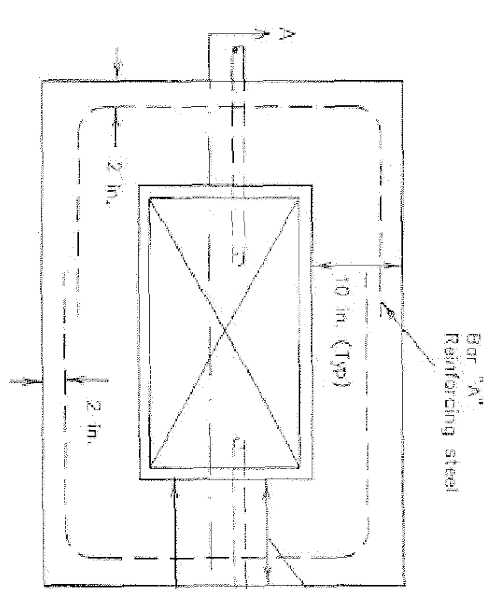
A. MATERIALS

- Ground boxes 16x36x4 inches (MIL-STD) or smaller shall be polymer concrete of the type required by the descriptive code shown elsewhere. Larger ground boxes shall be as shown elsewhere in the plans.
- All ground boxes and covers shall be permanently marked either by impress or by permanent ink, with manufacturer's model number and manufacturer's 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 meet the following requirements:
  - Ground boxes and covers will be manufactured from polymer concrete reinforced with continuous strands of woven or aggregate, and shall have a minimum compressive strength of 11,000 psi. Polymer concrete containing chopped fiberglass or fiberglass reinforced plastic is not acceptable.
  - 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 15.25 inches x 28.25 inches x 10 inches. (182941)
    - Type C shall be 15.25 inches x 28.25 inches x 20 inches. (162922)
    - Type D shall be 11.5 inches x 21 inches x 15 inches. (122317)
    - Type E shall be 11.5 inches x 21 inches x 15 inches. (122317)
  - Bottom edge of box or extension shall be finished with a minimum 1/4 inch flange.
  - Ground boxes shall withstand 600 lbs. per sq. ft. applied over the entire surface with less than 1/4 inch deflection per foot length of box. Ground boxes and covers shall withstand a test loading of 20,000 lbs. over a 10 inch by 16 inch area, centered on the cover with less than 1/2 inch deflection. Ground boxes and covers shall meet Western Underground Standards 356. Manufacturer shall supply certification by an independent laboratory or sealed by a Texas-Licensed Professional Engineer.
  - Covers shall be 2 inch (nominal) thick polymer concrete. All hardware shall be stainless steel. Cover shall be secured with two 1/2 inch stainless steel bolts. Bolts shall be self-retaining and shall withstand a minimum of 70 foot-lb. torque and shall have a minimum 750 lbs. straight pull out strength. Nuts shall be locking and shall provide a minimum of 1/2 inch movement from the center of the nut. Covers shall be skid resistant, minimum 0.5 coefficient of friction. Covers shall be interchangeable between manufacturers and shall conform to the dimensions shown here. Unless otherwise approved by the Engineer, cover shall be legibly imprinted with the following words in minimum 1 inch letters:
    - Ground Boxes containing wiring for traffic signals shall be labeled, Danger High Voltage Traffic Signal.
    - Ground boxes containing wiring for illumination systems shall be labeled, Danger High Voltage Illumination.
    - Ground boxes containing wiring for traffic management systems shall be labeled, Danger High Voltage Traffic Management.
    - Ground boxes containing wiring for sign illumination systems shall be labeled, Danger High Voltage Sign Illumination.

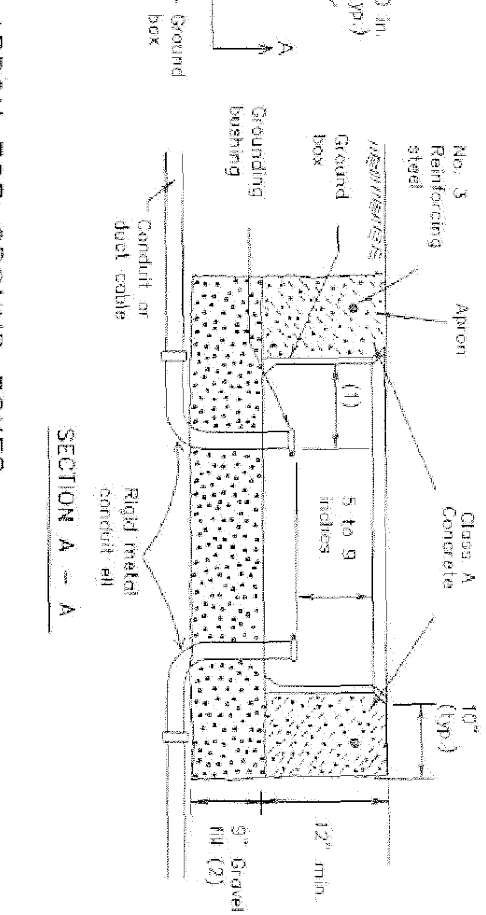
B. CONSTRUCTION METHODS

- Ground boxes shall be set on a 6 inch (minimum) bed of coarse No. 1 aggregate as defined by Item 421. Gravel shall be in place prior to setting box and contents shall be capped. Any gravel or silt in contact shall be removed.
- When required by item descriptive code, construction of an open 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 laid bent.
- Concrete for covers shall be considered cast-in-place concrete for testing purposes. Covers shall be cast in place.
- Concrete holes may be cut in the walls of Type B & D boxes of least 18 inches beneath the cover.
- It, within the limits of this project, the Contractor must utilize an existing ground box equipped with a metal cover. The Contractor shall bond the cover to the grounding conductor with a 3 foot long flexible stranded jumper the same size as the grounding conductor. Connection of bonding jumper to metal ground cover shall not be paid for directly but shall be subsidiary to various bid items. The bond(s) must be clearly shown on the plans with plan notes fully describing the work required.
- If there are other ground boxes with metal covers within the project limits but not involved in the contract, the Engineer may direct the Contractor to ground the covers, designating and identifying the specific boxes in writing. This work will be paid for separately.
- Termination to metal ground box covers shall be made using a lock ground type lug.

NO.	DATE	REVISION	APPROX.
1			
2			
3			

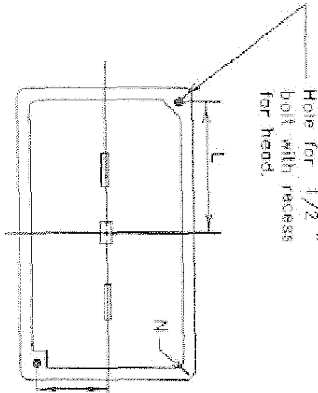


PLAN VIEW

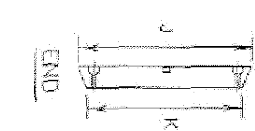


SECTION A - A

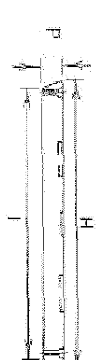
- Final position of end of conduit shall not exceed one-half the distance to the side of box opposite the conduit entry.
- Place gravel under the box, not in the box. Gravel should not encroach on the interior volume of the box.
- Install bushing on the upper end of all sills.
- Where a ground rod is present in the ground box, connect it to any and all equipment grounding conductors using a listed connector.
- Maintain sufficient space between all conduits so as to allow for proper installation of bushings.
- All conduits shall be installed in a neat and workmanlike manner.



PLAN VIEW

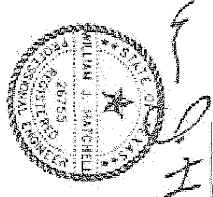


END



SIDE

GROUND BOX COVER DIMENSIONS										
BOX SIZE	H	I	J	K	L	M	N	P		
A, B & E	23 1/4	25	13 3/4	13 1/2	9 7/8	5 1/8	1 3/8	2		
C & D	30 1/2	30 1/4	17 1/2	17 1/4	13 1/4	6 3/4	1 3/8	2		



WE SEAL APPROVING ON THIS PRESENT WAS AUTHORIZED BY WILLIAM J. HATCHER ON 7-21-04.

DATE: MAY 2004 SCALE: NOT TO SCALE JOB NO.: 320  
 DRAWN: GVA/DESIGN ENG REVIEWER: BNS/DWG. 320/EMLMS-ELEC  
 STANDARD CONSTRUCTION DETAILS  
 TRAFFIC SIGNAL ELECTRICAL SHEET 2  
 TOWN OF ADDISON  
 Grantham & Associates, Inc.  
 821 S. SHILOH ROAD SUITE 100, EL PASO, TEXAS 79902  
 972.864.2000 FAX 972.864.2001 FAX  
 SHEET 5-6