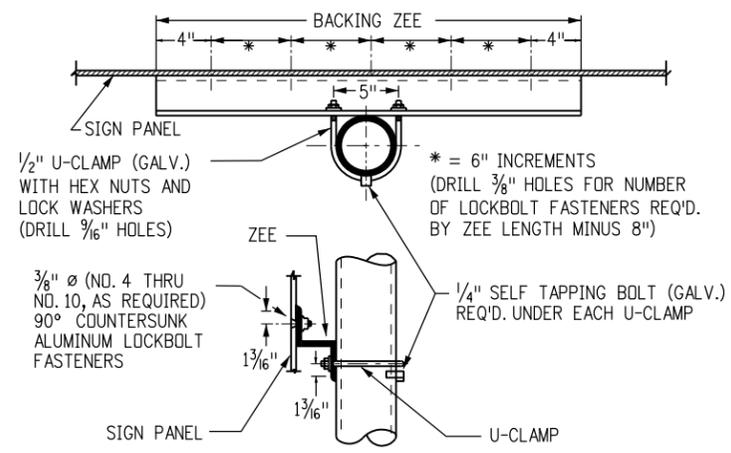
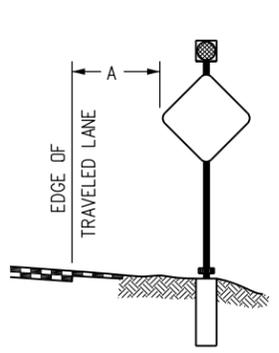


TYPICAL SIGNAL HEAD - 12 INCH LENS



TYPICAL PANEL ATTACHMENT DETAILS



TYPICAL SIGN PLACEMENT

LATERAL PLACEMENT ("A")

NORMAL LATERAL PLACEMENT "A" FOR WARNING SIGNS IS 12' PLUS CURB OR SHOULDER WIDTH.

NORMAL LATERAL PLACEMENT "A" FOR REGULATORY SIGNS IS 6' PLUS CURB OR SHOULDER WIDTH, OR IF NONE 12' FROM EDGE OF PAVEMENT.

2' SHALL BE CONSIDERED MINIMUM EXCEPT THAT IN URBAN AREAS 1' FROM THE CURB FACE IS PERMISSIBLE WHERE SIDEWALK WIDTH IS LIMITED OR WHERE EXISTING POLES ARE CLOSE TO THE CURB.

REFER TO COLORADO STANDARD PLAN S-614-1 FOR VERTICAL PLACEMENT REQUIREMENTS.

GENERAL NOTES

- ALL SIGN PANELS USED ON FLASHING BEACONS ARE CLASS II AND SHALL BE FABRICATED IN ACCORDANCE WITH:
  - PANELS SHALL BE SINGLE SHEET ALUMINUM 0.100 MINIMUM THICKNESS.
  - BACKING ZEES ARE 3 IN. X 2 1/16 IN. 2.33 LBS. PER FT. ALUMINUM.
  - ALL SIGNS SHALL BE FABRICATED USING RETROREFLECTIVE SHEETING CONFORMING TO ASTM D4956. THE TYPE SHALL BE DESCRIBED IN THE STANDARD SPECIFICATIONS AND/OR AS SHOWN ON THE PLANS.
  - BOLTS, U-CLAMPS, NUTS AND METAL WASHERS SHALL BE GALVANIZED OR CADMIUM PLATED.
- INSTALLATION DESIGN CONFORMS WITH AASHTO "STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS" AND SHALL BE FABRICATED IN ACCORDANCE WITH:
  - STEEL PIPE, POST ANCHOR PLATES AND BREAK-AWAY PLATES SHALL CONFORM TO AASHTO M270 (ASTM A709) GRADE 36.
  - HIGH STRENGTH BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM-A325 AND SHALL BE GALVANIZED OR CADMIUM PLATED.
  - HOLES SHALL BE DRILLED AND CUTS SHALL PREFERABLY BE SAW CUTS; HOWEVER, FLAME CUTTING WILL BE PERMITTED PROVIDED ALL EDGES ARE GROUND. METAL SHALL NOT PROJECT BEYOND THE PLANE OF THE PLATE FACE ON BREAK-AWAY PLATES.
  - ALL WELDING IS TO BE CONTINUOUS AND IN ACCORDANCE WITH CURRENT AWS SPECIFICATIONS.
  - A "KEEPER PLATE" OF THIN (28 GAGE) GALVANIZED SHEET METAL, FABRICATED TO MATCH BREAK-AWAY PLATE DIMENSIONS BUT WITH HOLES RATHER THAN SLOTS, SHALL BE USED TO RESTRAIN BOLT LOOSENING DUE TO WIND VIBRATION.
- CONCRETE FOOTINGS FOR FLASHING BEACON INSTALLATIONS SHALL CONFORM TO "DRILLED CAISSONS" AND "STRUCTURAL CONCRETE" (CLASS "BZ").

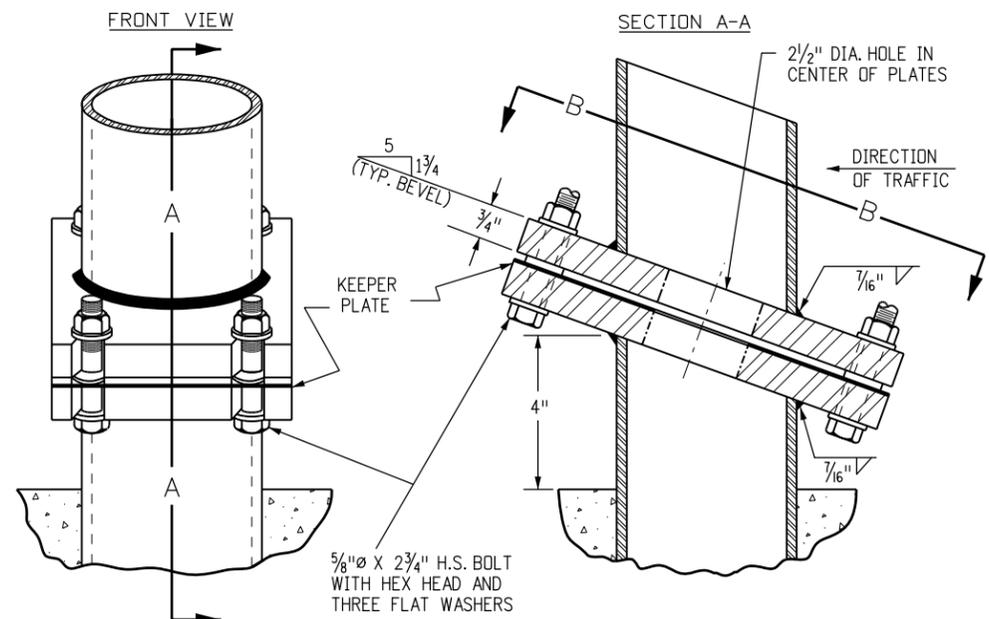
GENERAL NOTES CONTINUED ON SHEET 2.

TYPICAL ELEVATION FACING TRAFFIC

WITH PANELS NOT ILLUSTRATED

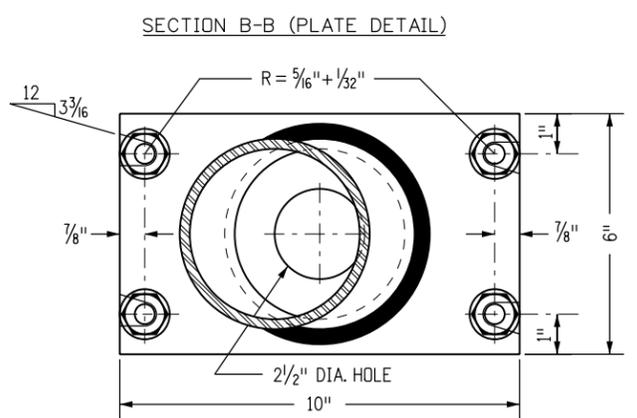
- 48" CIRCLE (12" YELLOW LENS)  
VERTICAL SPACING: 10 1/2"-27"-10 1/2"  
BACKING ZEES: 20"
- 48" PENTAGON (12" YELLOW LENS)  
VERTICAL SPACING TOP TO BOTTOM: 12"-25 3/4"-9"
- 24" X 48" RECTANGLE (12" YELLOW LENS) (SCHOOL SPEED LIMIT)  
VERTICAL SPACING: 12"-24"-12"  
BACKING ZEES: 20"

<b>Computer File Information</b>		<b>Sheet Revisions</b>		<b>Colorado Department of Transportation</b>		<b>FLASHING BEACON AND SIGN INSTALLATIONS</b>	<b>STANDARD PLAN NO.</b>
Creation Date: 07/04/12	Initials: KEN	Date:	Comments:	4201 East Arkansas Avenue Denver, Colorado 80222 Phone: (303) 757-9543 Fax: (303) 757-9219			S-614-14
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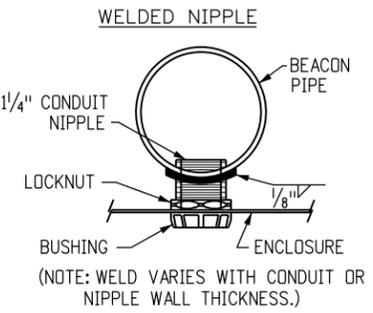
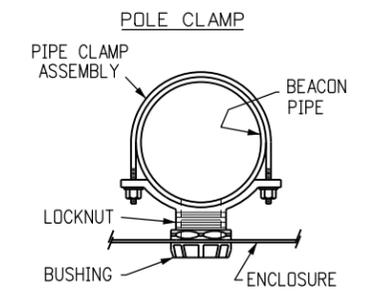
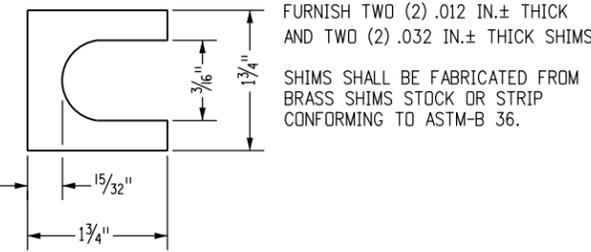


**BREAK-AWAY ASSEMBLY BOLTING PROCEDURE**

1. ASSEMBLE POST TO FOOTING WITH BOLTS- ONE FLAT WASHER ON EACH BOLT TOP AND BOTTOM, AND ONE FLAT WASHER AND THE KEEPER PLATE BETWEEN THE BREAK-AWAY PLATES. USE BRASS SHIMS TO PLUMB THE POST.
2. TIGHTEN ALL BOLTS TO MAXIMUM POSSIBLE WITH A 12 TO 15 INCH PIPE WRENCH TO BED WASHERS AND SHIMS TO CLEAN BOLT THREADS, THEN LOOSEN EACH BOLT IN TURN AND RETIGHTEN IN A SYSTEMATIC ORDER TO 450 INCH-POUNDS TORQUE.
3. BURR THREADS AT JUNCTION WITH NUT USING A CENTER PUNCH TO PREVENT NUT LOOSENING.



**SHIM DETAIL**

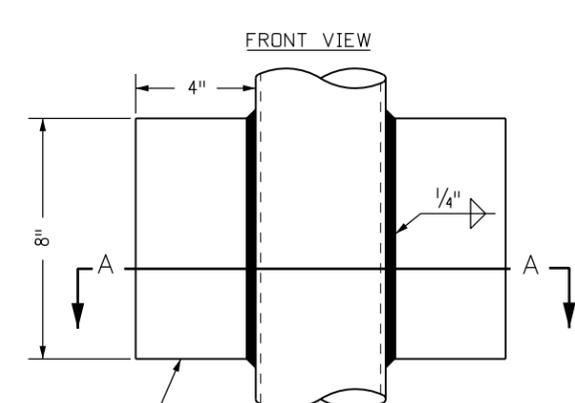


**TYPICAL PIPE ATTACHMENTS**

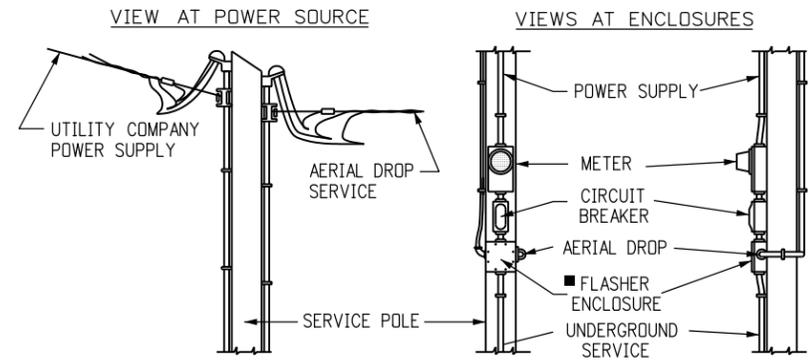
**GENERAL NOTES (CONTINUED)**

4. ALL ELECTRICAL MATERIALS AND WORKMANSHIP SHALL CONFORM TO THE LATEST REQUIREMENTS OF THE NEC, NEMA, UL OR EIA WHEREVER APPLICABLE; THE COLORADO PUC AND ANY LOCAL CODES OR ORDINANCES WHICH MAY APPLY; AND THE FOLLOWING:
  - A. THE CONTRACTOR IS TO PROVIDE ALL NECESSARY WIRING WITHIN THE BEACON AND FROM THERE TO THE POWER SOURCE PROVIDED BY THE UTILITY COMPANY. THE UTILITY COMPANY WILL MAKE THE CONNECTION WITH THE CONTRACTOR'S WIRING.
  - B. THE ELECTRICAL SERVICE BETWEEN THE POWER SOURCE AND THE FLASHING BEACON SHALL BE UNDERGROUND UNLESS AN AERIAL DROP IS AUTHORIZED BY THE ENGINEER. ALL WIRING EXCLUDING THE AERIAL DROP WIRE SHALL BE IN CONDUIT.
  - C. THE "FLASHER" SHALL BE HOUSED IN A SUITABLE ENCLOSURE ON THE UTILITY POLE AT THE POWER SOURCE UNLESS THE ENGINEER DIRECTS THAT THE ENCLOSURE BE MOUNTED ON THE BEACON PIPE OR THAT THE DEVICE MAY BE CONTAINED WITHIN THE SIGNAL HEAD ITSELF.
  - D. A SUITABLE ENCLOSURE FOR THE FLASHER SHALL BE IN ACCORDANCE WITH "A RAIN TIGHT JUNCTION BOX OR CAN, APPROXIMATELY 8 IN. X 8 IN. X 4 IN., SURFACE MOUNT, WITH A FLANGED SCREW ATTACHED COVER, AND FABRICATED FROM NOT LESS THAN 16 GAGE GALVANIZED STEEL".
  - E. A BUILT-IN RADIO INTERFERENCE SUPPRESSION DEVICE AND A PHOTOCELL SENSOR TYPE SIGNAL LAMP DIMMER SHALL BE PROVIDED FOR EACH FLASHING BEACON.
  - F. BEACONS SHALL FLASH AT A RATE OF NOT LESS THAN 50 AND NOT MORE THAN 60 TIMES PER MINUTE.
5. WHEN SPECIFIED IN THE PLANS, A PEDESTAL BASE INSTALLATION (AS DETAILED ON SHEET 3) MAY BE USED IN PLACE OF THE BREAKAWAY BASE SHOWN ON THIS SHEET.

**TYPICAL BREAK-AWAY ASSEMBLY DETAILS**

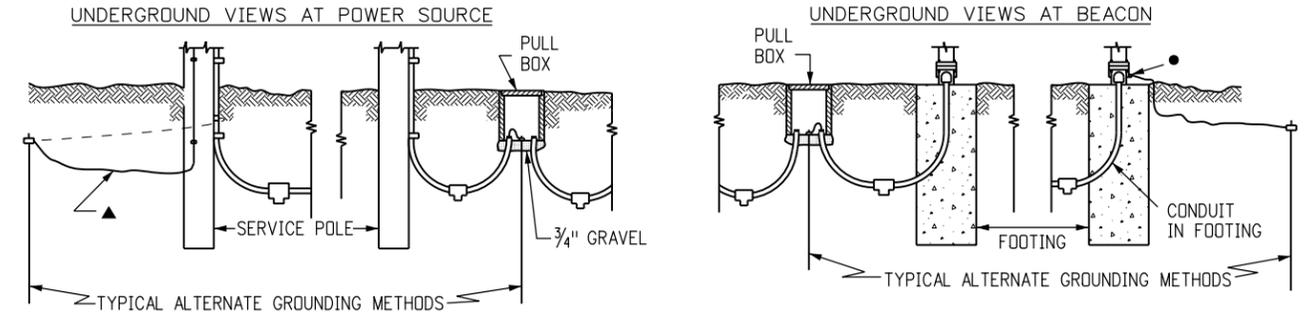
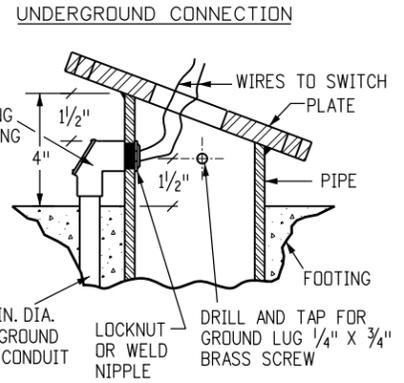
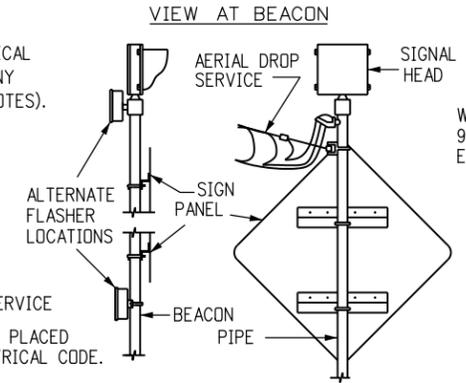


**POST ANCHOR DETAILS**

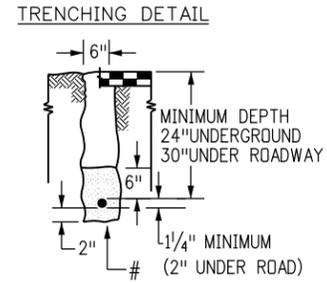


**NOTES**

- LOCATION AND CONFIGURATION OF ELECTRICAL EQUIPMENT IS DIAGRAMATIC ONLY (USE ANY METHOD COMPLYING WITH THE GENERAL NOTES).
- ▲ EXISTING GROUND AT SERVICE POLE; OTHERWISE PULL THRU CONDUIT OR ATTACH TO CONDUIT AND TAP OFF UNDERGROUND.
  - DRILL AND TAP PIPE FOR 1/4" ROUND ROUND HEAD BRASS SCREW, 3/4" LONG, FOR GROUND LUG.
  - PROVIDE WEEP HOLE WITH AERIAL DROP SERVICE
  - # BEDDING MATERIAL FOR CONDUIT SHALL BE PLACED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE.



**TYPICAL ELECTRICAL SERVICE DETAIL**



**TRENCHING DETAIL**

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**Sheet Revisions**

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**Safety & Traffic Engineering Branch**      **KCM/KEN**

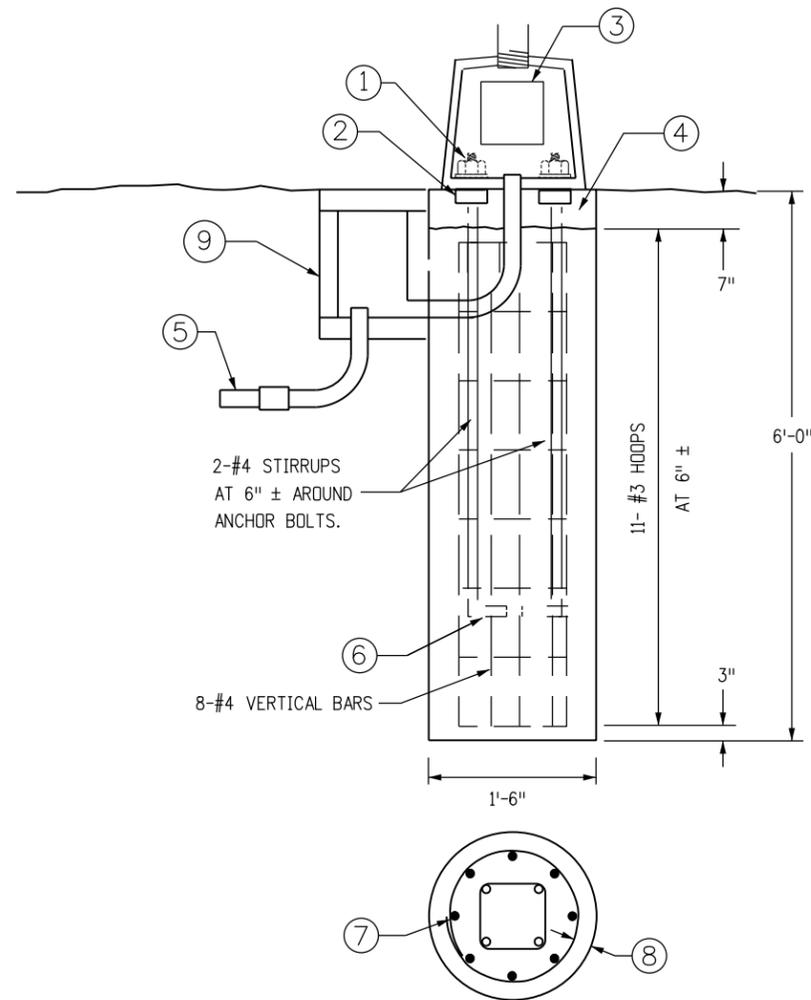
**FLASHING BEACON AND SIGN INSTALLATIONS**

Issued By: Safety & Traffic Engineering Branch July 4, 2012

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Sheet No. 2 of 3



**ALTERNATE PEDESTAL BASE INSTALLATION**

**GENERAL NOTES**

- POLE AND PEDESTAL MUST BE DESIGNED TO MEET THE REQUIREMENTS OUTLINED IN THE "STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS LUMINAIRES AND TRAFFIC SIGNALS", PUBLISHED BY AASHTO, FOR A WIND VELOCITY OF 100 MPH. THE CONTRACTOR SHALL SUBMIT TWO SETS OF WORKING DRAWINGS, SIGNED AND SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF COLORADO, IN ACCORDANCE WITH SECTION 105.02 OF THE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.

**DESIGN DATA**

THE DESIGNS HEREIN ASSUME THAT FLASHING BEACONS ARE INSTALLED WITHIN THE ROADWAY PRISM WITH THE FOLLOWING SOIL PARAMETERS:  
 SOIL DENSITY  $\gamma = 110$  LB./CU.FT.  
 SOIL COHESION = 750 LB./SQ.FT. FOR MEDIUM STIFF COHESIVE SOIL  
 SOIL  $\phi$  ANGLE = 30 DEG. FOR MEDIUM DENSE COHESIONLESS SOIL  
 SF = 3.0 FOR FLEXURAL RESISTANCE

CONTACT THE ENGINEER IF THE FLASHING BEACON WILL NOT BE INSTALLED WITHIN THE ROADWAY PRISM OR IF ANY OF THE FOLLOWING SOIL CONDITIONS ARE ENCOUNTERED DURING DRILLING:

- THE SOIL HAS A HIGH ORGANIC CONTENT OR CONSISTS OF SATURATED SILT AND CLAY.
- THE SITE WON'T SUPPORT THE WEIGHT OF THE DRILLING RIG.
- THE FOUNDATION SOILS ARE NOT HOMOGENOUS.
- FIRM BEDROCK IS ENCOUNTERED.
- A HIGH GROUNDWATER TABLE IS ENCOUNTERED.
- LARGE BOULDERS ARE ENCOUNTERED.

FOOTING DESIGN IS BASED ON 100 MPH WIND LOAD ON A 48 IN. X 48 IN. DIAMOND SIGN PANEL MOUNTED 9 FT. ABOVE THE GROUND, WITH A 24 IN. X 24 IN. RECTANGULAR PLAQUE UNDERNEATH AND A FLASHING BEACON 12 IN. ABOVE. IF A SIGN CONFIGURATION IS PROPOSED THAT EXCEEDS THESE DIMENSIONS, THE FOOTING DESIGN MUST BE ENGINEERED AND SIGNED AND SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF COLORADO.

**FOOTING NOTES**

- HEX NUTS
  - SQUARE NUTS
  - HAND HOLE SHALL BE PROVIDED.
  - 4 IN. MIN. NON-SHRINKABLE GROUT OVER ROUGH FOUNDATION
  - SCHEDULE 80 PVC (24 IN. MIN. DEPTH, 30 IN. MIN. DEPTH UNDER ROADWAY) CONDUIT STUB FROM PULL BOX TO POLE SHALL BE 1-1/4" MIN. DIAMETER.
  - INSTALL ANCHOR BOLTS (FURNISHED WITH POLE) PER MANUFACTURER'S TEMPLATE PRINT (FURNISHED WITH ORDER)
  - MINIMUM OVERLAP OF 12 IN.
  - 1-1/2 IN. CLEARANCE FOR HOOPS
  - PULL BOX
- CAISSON DESIGNS REQUIRE THAT THE CAISSON BE FOUNDED IN COMPACT SAND, CLAY OR SANDY CLAY. IF, BY VISUAL INSPECTION OF THE HOLE, OTHER MATERIAL IS PRESENT, THE CAISSON DESIGN SHALL BE MODIFIED AS DETERMINED BY THE ENGINEER.

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