

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| <b>OS-299 (7-08)</b><br><br><br><b>pennsylvania</b><br>DEPARTMENT OF TRANSPORTATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>TRANSMITTAL LETTER</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>PUBLICATION:</b><br><br>148    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>DATE:</b><br><b>10/14/2010</b> |
| <b>SUBJECT:</b><br><br><b>Traffic Standards - Signals (TC-8800 Series)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                   |
| <b>INFORMATION AND SPECIAL INSTRUCTIONS:</b><br><br><p>Conformance with the 2001 American Association of State Highway and Transportation Officials (AASHTO) "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals" including interim specifications up to 2006, the national Manual on Uniform Traffic Control Devices 2009 Edition, and the National Electric Code 2008 Edition.</p> <p>The accompanying revisions to Publication 148 (Traffic Standards – Signals [TC-8800 Series]) and Publication 149 (Traffic Signal Design Handbook), Chapter 20 "Criteria for the Design of Traffic Signal Supports", for all traffic signal structural supports as follows:</p> <ul style="list-style-type: none"> <li>• All Department projects submitting Plans, Specifications, and Estimate packages to Central Office.</li> <li>• All Highway Occupancy Permits or Municipal projects that do not have an approved Traffic Signal Permit.</li> <li>• For any traffic signal structural supports that require either removal or replacement. An exemption to this requirement will be considered only when the following conditions are met.           <ul style="list-style-type: none"> <li>o The affected municipality has an existing stockpile of NEW traffic signal structural supports purchased prior to this Strike-off letter.</li> <li>o The municipality provides verification (signed and sealed from a Professional Engineer, licensed in the State of Pennsylvania) attesting to the structural adequacy of the existing foundation and the suitability of the stockpiled signal support material for its intended use and location.               <ul style="list-style-type: none"> <li><input type="checkbox"/> A modified base plate configuration as indicated in "Attachment A" will be required.</li> </ul> </li> </ul> </li> </ul> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                   |
| <b>CANCEL AND DESTROY THE FOLLOWING:</b><br><br>This will replace the June 1989 Publication 148 (Traffic Standards - Signals (TC-7800 Series)) and the September 1988 "Criteria for the Design of Traffic-Related Structures" (currently Publication 149 (Traffic Signal Design Handbook), Chapter 20) on the effective date.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>ADDITIONAL COPIES ARE AVAILABLE FROM:</b> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> PennDOT SALES STORE<br/>         (717) 787-6746 phone<br/>         (717) 787-8779 fax<br/> <a href="mailto:ra-penndotsalesstore.state.pa.us">ra-penndotsalesstore.state.pa.us</a> </li> <li><input checked="" type="checkbox"/> PennDOT website - <a href="http://www.dot.state.pa.us">www.dot.state.pa.us</a><br/> <i>Click on Forms, Publications &amp; Maps</i> </li> <li><input checked="" type="checkbox"/> DGS warehouse (PennDOT employees ONLY)</li> </ul> |                                   |

**APPROVED FOR ISSUANCE BY:**

Allen D. Biehler, P.E.  
Secretary of Transportation

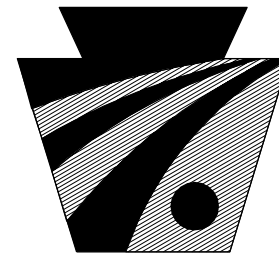
By:

A handwritten signature in black ink, appearing to read "Daryl St. Clair". The signature is written in a cursive, flowing style.

Daryl St. Clair, P.E.  
Acting Director, Bureau of Highway Safety  
and Traffic Engineering

# **COMMONWEALTH OF PENNSYLVANIA**

## **DEPARTMENT OF TRANSPORTATION**



**pennsylvania**

DEPARTMENT OF TRANSPORTATION

### **TRAFFIC STANDARDS – SIGNALS**

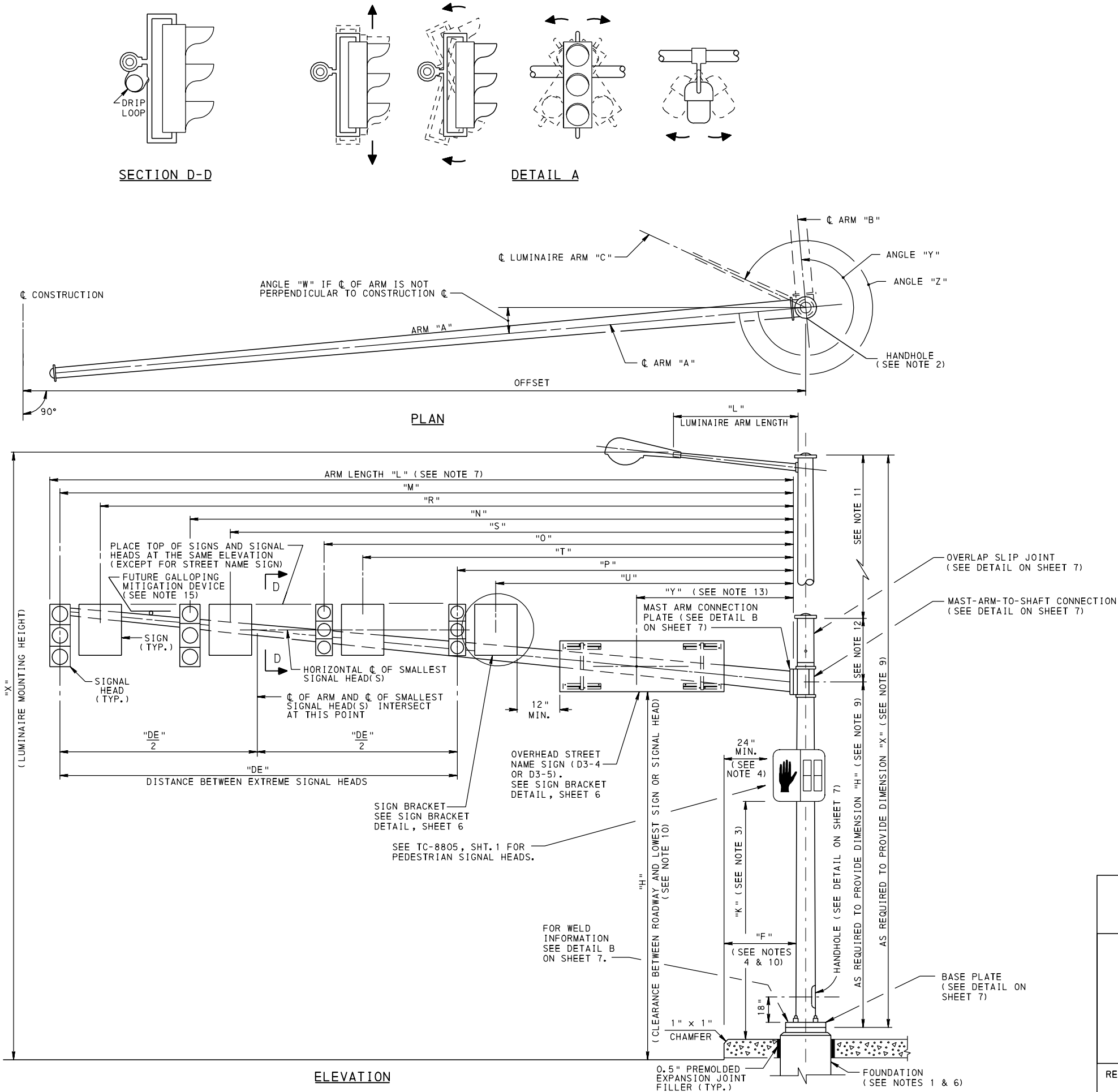
### **TC-8800 SERIES**

**BUREAU OF HIGHWAY SAFETY AND TRAFFIC ENGINEERING**

**PUB. 148 (10-10)**

# INDEX OF TRAFFIC STANDARDS – SIGNALS

| <u>STANDARD DRAWING NO.</u> | <u>DATE</u>      | <u>DESCRIPTION</u>      |
|-----------------------------|------------------|-------------------------|
| TC-8801 ( 7 SHEETS)         | October 14, 2010 | TRAFFIC SIGNAL SUPPORT  |
| TC-8802                     | October 14, 2010 | CONTROLLER ASSEMBLY     |
| <b>TC-8803</b> ( 2 SHEETS)  | October 14, 2010 | MISCELLANEOUS           |
| TC-8804 ( 2 SHEETS)         | October 14, 2010 | ELECTRICAL DISTRIBUTION |
| TC-8805                     | October 14, 2010 | SIGNAL HEADS            |
| TC-8806 ( 2 SHEETS)         | October 14, 2010 | DETECTORS               |



- NOTES:**
1. FOR FOUNDATION DETAILS, SEE SHEETS 3 THROUGH 5.
  2. PLACE HANDHOLE 90° OR 180° FROM CENTERLINE OF ARM "A".
  3. DIMENSION "K" IS FROM SIDEWALK. IF NO SIDEWALK, DIMENSION "K" IS FROM PAVEMENT GRADE AT CENTER OF ROADWAY. PROVIDE SPECIFIED DIMENSION "K" SUCH THAT CLEARANCE IS IN THE RANGE OF: 8' MINIMUM, 15' MAXIMUM FOR TRAFFIC SIGNAL HEADS; 7' MINIMUM, 10' MAXIMUM FOR PEDESTRIAN SIGNAL HEADS.
  4. DIMENSION "F" IS 2' MINIMUM FROM CURB OR FROM EDGE OF SHOULDER. PLACE POST-MOUNTED SIGNALS 2' MINIMUM BEHIND CURB OR EDGE OF SHOULDER.
  5. A "ROUND TAPERED" SUPPORT IS USED FOR ILLUSTRATION PURPOSES. THE TYPE OF SUPPORT MAY BE ANY OF THOSE INDICATED IN PUBLICATION 408.
  6. INSTALL A MINIMUM OF ONE GROUND ROD AT EACH FOUNDATION. SEE TC-8804.
  7. ARMS LESS THAN 31' WILL BE ONE SECTION.
  8. RIGIDLY MOUNT ALL SIGNAL HEADS ON THE MAST ARM UNLESS OTHERWISE INDICATED. PROVIDE MOUNTING BRACKETS THAT:
    - a. ATTACH TO THE TOP AND BOTTOM OF THE SIGNAL HEAD. FOR 5-SECTION HEADS, ATTACH EITHER TO THE TOP AND BOTTOM OF THE SIGNAL HEAD, OR TO THE BOTTOM AND BETWEEN THE RED AND YELLOW SECTIONS OF THE SIGNAL HEAD.
    - b. PERMIT THE ADJUSTMENTS SHOWN IN DETAIL A.
    - c. HAVE GROMMETED WIRE ENTRANCE.
    - d. DO NOT ENTRAP WATER INSIDE THE BRACKET.
  9. OBTAIN ELEVATION OF ROADWAY AND TOP OF FOUNDATION PRIOR TO DETERMINING THIS DIMENSION.
  10. PROVIDE SPECIFIED CLEARANCE IN ACCORDANCE WITH PUBLICATION 149 AND "THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES".
  11. USE ONE-PIECE SHAFT WHEN LUMINAIRE IS REQUIRED EXCEPT FOR ROUND STEPPED SUPPORTS, OR UNLESS ALTERNATE OVERLAP SLIP JOINT IS SPECIFIED OR APPROVED ON A PROJECT-BY-PROJECT BASIS.
  12. IF SPECIFIED, PROVIDE 36" MINIMUM STUB TO ALLOW FUTURE LUMINAIRE ATTACHMENT VIA OVERLAP SLIP JOINT.
  13. FOR MAXIMUM ALLOWABLE DIMENSION "Y", SEE THE DEPARTMENT'S "CRITERIA FOR THE DESIGN OF TRAFFIC SIGNAL SUPPORTS", PUBLICATION 149.
  14. FOR QUANTITY, SIZE, SIZE OF HOLES AND BOLT CIRCLE FOR ANCHOR BOLTS, SEE SHEET 3.
  15. DURING 30-DAY TEST PERIOD, VISUALLY INSPECT NEW MAST ARM INSTALLATION FOR GALLOPING IN 5 TO 20 MPH WIND CONDITION. CONTINUE VISUAL INSPECTION FOR ANOTHER 180-DAY PERIOD AS INDICATED IN PUB. 408. PROVIDE GALLOPING MITIGATION DEVICE AS RECOMMENDED BY THE FABRICATOR AND APPROVED BY THE OWNER IF THE MAXIMUM DISPLACEMENT (MAX. POSITIVE TO MAX. NEGATIVE) AT THE MAST ARM TIP EXCEEDS 8". IF A MITIGATION DEVICE IS INSTALLED, CONTINUE VISUAL INSPECTION OF MAST ARM FOR THE ABOVE CRITERIA DURING 180-DAY PERIOD. PROVIDE VISUAL INSPECTION RECORDS TO THE OWNER AT THE END OF THE 180-DAY PERIOD. GALLOPING MAY RESULT IN LARGE AMPLITUDE, RESONANT OSCILLATIONS IN A PLANE NORMAL TO THE DIRECTION OF WIND FROM UNIQUE COMBINATIONS OF ATTACHMENT GEOMETRY, ATTACHMENT ORIENTATION, ATTACHMENT WEIGHTS, WIND DIRECTION AND STRUCTURE STIFFNESS.

**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
**BUREAU OF HIGHWAY SAFETY AND TRAFFIC ENGINEERING**

**STANDARD**

**TRAFFIC SIGNAL SUPPORT**  
**MAST ARM**

RECOMMENDED **Oct. 14, 2010**  
*Sen C. Rowe*  
CHIEF, TRANSPORTATION OPERATIONS DIVISION

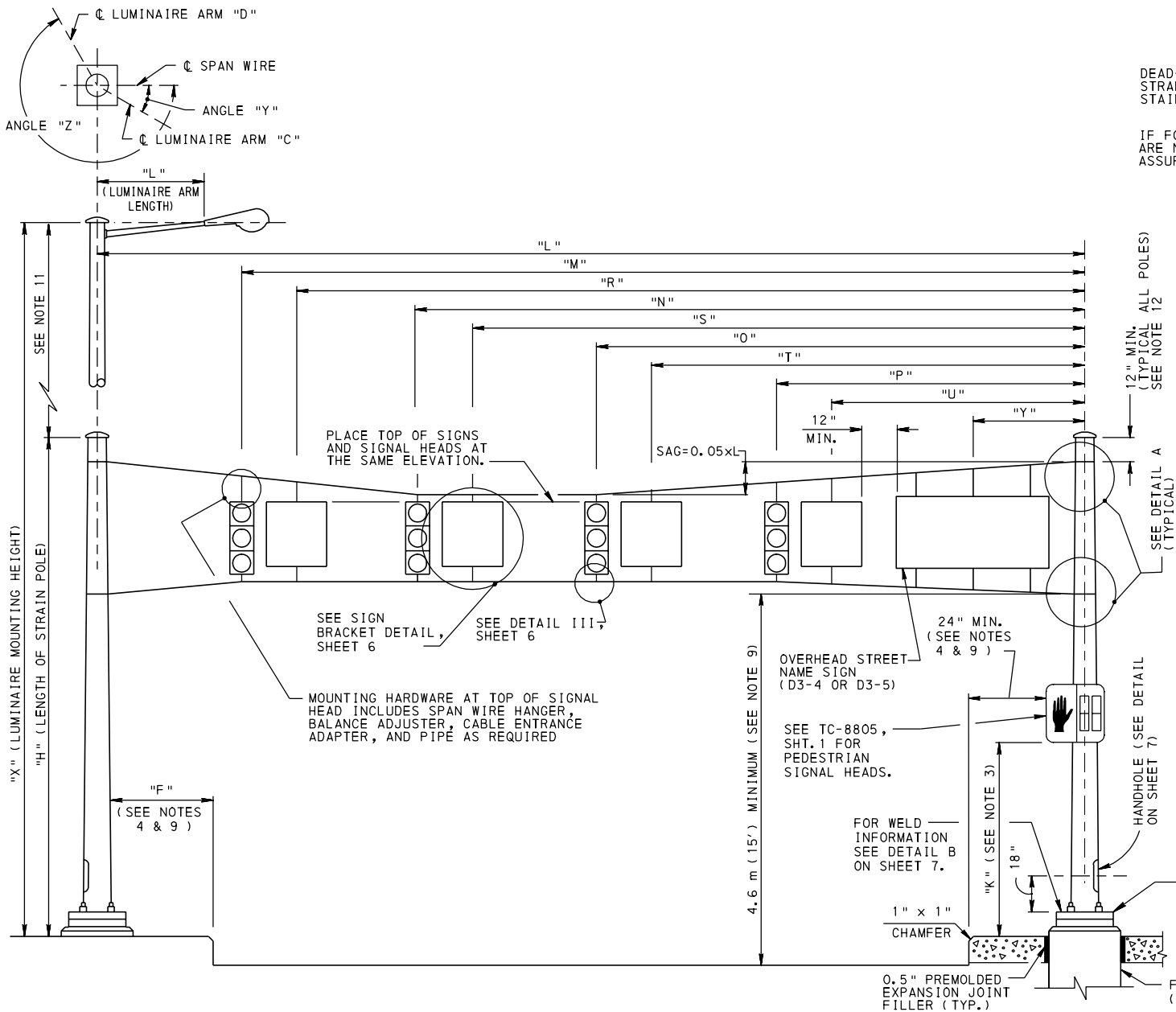
RECOMMENDED **Oct. 14, 2010**  
*Samuel J. Sella*  
ACTING DIR. BUR. OF HIGHWAY SAFETY AND TRAFFIC ENGINEERING

SHEET 1 OF 7  
**TC-8801**

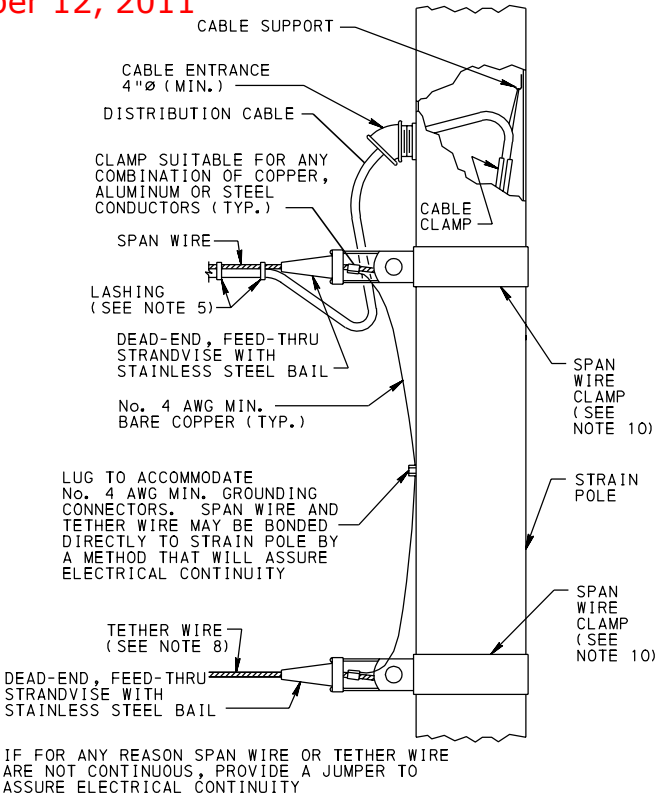
MINIMUM BREAKING STRENGTH OF SPAN WIRE

| NOM. DIA. OF SPAN WIRE (IN) | ASTM A 475, CLASS A, SIEMENS-MARTIN GRADE (lbs) | ASTM B 416 (lbs) |
|-----------------------------|-------------------------------------------------|------------------|
| 1/4"                        | 3150 lbs                                        | 6301 lbs         |
| 5/16"                       | 5350 lbs                                        | 10,020 lbs       |
| 3/8"                        | 6950 lbs                                        | 15,930 lbs       |
| 7/16"                       | 9350 lbs                                        | 19,060 lbs       |
| 1/2"                        | 12,100 lbs                                      | 23,000 lbs       |

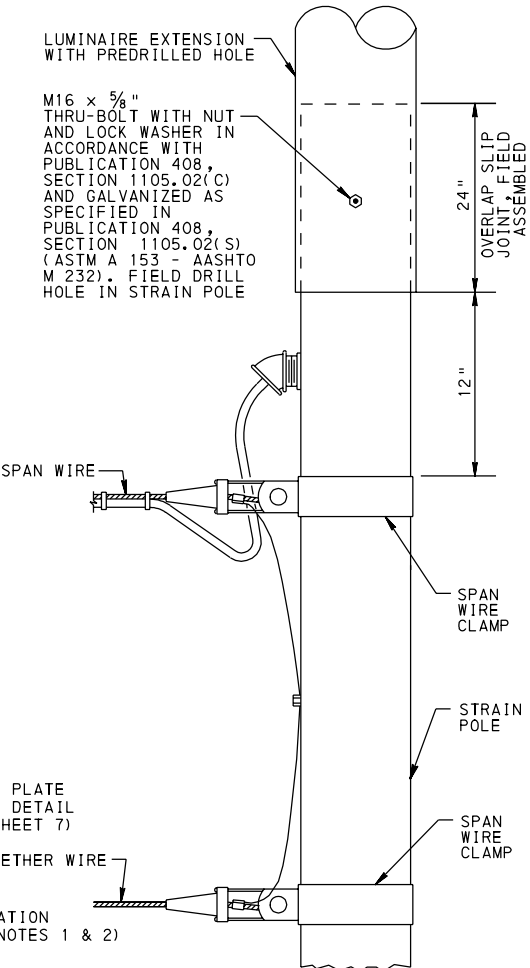
BREAKING STRENGTH OF SPAN WIRE WILL EQUAL OR EXCEED DESIGN TENSION OF THE STRAIN POLE



ELEVATION



DETAIL A



OVERLAP SLIP JOINT DETAIL  
(ALTERNATE METHOD TO PROVIDE LUMINAIRE)  
(SEE NOTES 11 AND 12)

NOTES:

- FOR FOUNDATION DETAILS, SEE SHEETS 3 THROUGH 5.
- INSTALL A MINIMUM OF ONE GROUND ROD AT EACH FOUNDATION, SEE TC-8804, SHT.1.
- DIMENSION "K" IS FROM SIDEWALK. IF NO SIDEWALK, DIMENSION "K" IS FROM PAVEMENT GRADE AT CENTER OF ROADWAY. PROVIDE SPECIFIED DIMENSION "K" SUCH THAT CLEARANCE IS IN THE RANGE OF: 8' MINIMUM, 15' MAXIMUM FOR TRAFFIC SIGNAL HEADS; 7' MINIMUM, 10' MAXIMUM FOR PEDESTRIAN SIGNAL HEADS.
- DIMENSION "F" IS 2' MINIMUM FROM CURB OR FROM EDGE OF SHOULDER. PLACE POST-MOUNTED SIGNALS 2' MINIMUM BEHIND CURB OR EDGE OF SHOULDER.
- LASH DISTRIBUTION CABLE TO THE SPAN WIRE WITH PREFORMED GALVANIZED STEEL RODS, SELF-LOCKING CABLE TIES OF THE OUTDOOR TYPE, SOLID COPPER WIRE, GALVANIZED STEEL WIRE, STAINLESS STEEL WIRE, OR CABLE RINGS AND SADDLES. MAKE ONE COMPLETE WRAP WITH WIRE LASHING AT INTERVALS NOT EXCEEDING 6". SECURE ENDS OF WIRE LASHING TO THE SPAN WIRE WITH AN ALL PURPOSE SPLIT BOLT CONNECTOR. PLACE CABLE TIES AT INTERVALS NOT EXCEEDING 12". PROVIDE PROPER SIZE AND SPACING OF CABLE RINGS AND SADDLES ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
- PROVIDE DEAD-ENDS THAT DEVELOP THE STRENGTH OF THE SPAN WIRE.
- FOR QUANTITY, SIZE, SIZE OF HOLES AND BOLT CIRCLE FOR ANCHOR BOLTS, SEE SHEET 3.
- TETHER WIRE - 1/4" DIAMETER (NOMINAL) WITH A BREAKING STRENGTH OF 1900 lbs MEETING ASTM A 475, CLASS A, COMMON GRADE.
- PROVIDE SPECIFIED CLEARANCE IN ACCORDANCE WITH PUBLICATION 149 AND THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES".
- EACH SPAN WIRE OR TETHER WIRE WILL HAVE AN INDIVIDUAL SPAN WIRE CLAMP.
- USE ONE-PIECE STRAIN POLE WHEN LUMINAIRE IS REQUIRED EXCEPT FOR ROUND STEPPED SUPPORTS, OR UNLESS ALTERNATE OVERLAP SLIP JOINT IS SPECIFIED OR APPROVED ON A PROJECT-BY-PROJECT BASIS.
- IF SPECIFIED, PROVIDE 36" MINIMUM STUB TO ALLOW FUTURE LUMINAIRE ATTACHMENT VIA OVERLAP SLIP JOINT.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF HIGHWAY SAFETY AND TRAFFIC ENGINEERING

STANDARD

TRAFFIC SIGNAL SUPPORT

STRAIN POLE

RECOMMENDED Oct. 14, 2010  
CHIEF, TRANSPORTATION OPERATIONS DIVISION

RECOMMENDED Oct. 14, 2010  
ACTING DIR. BUR. OF HIGHWAY SAFETY AND TRAFFIC ENGINEERING

SHEET 2 OF 7  
TC-8801

ANCHOR BOLT DESIGN TABLE, MAST ARM

| MAST ARM LENGTH (FT) | QTY. | ONE ARM   |            |            |           | TWO ARMS * |            |            |           |
|----------------------|------|-----------|------------|------------|-----------|------------|------------|------------|-----------|
|                      |      | DIA. (IN) | LGTH. (FT) | B. C. (IN) | HOLE (IN) | DIA. (IN)  | LGTH. (FT) | B. C. (IN) | HOLE (IN) |
| 0 - 10               | 6    | 1 3/4"    | **         | 18"        | 2"        | 1 3/4"     | **         | 18"        | 2"        |
| >10 - 15             | 6    | 1 3/4"    | **         | 18"        | 2"        | 1 3/4"     | **         | 18"        | 2"        |
| >15 - 20             | 6    | 1 3/4"    | **         | 18"        | 2"        | 1 3/4"     | **         | 18"        | 2"        |
| >20 - 25             | 6    | 1 3/4"    | **         | 18"        | 2"        | 1 3/4"     | **         | 18"        | 2"        |
| >25 - 30             | 6    | 1 3/4"    | **         | 21"        | 2"        | 1 3/4"     | **         | 21"        | 2"        |
| >30 - 35             | 6    | 1 3/4"    | **         | 21"        | 2"        | 1 3/4"     | **         | 21"        | 2"        |
| >35 - 40             | 6    | 2"        | **         | 24"        | 2 1/4"    | 2"         | **         | 24"        | 2 1/4"    |
| >40 - 45             | 6    | 2"        | **         | 24"        | 2 1/4"    | 2"         | **         | 24"        | 2 1/4"    |
| >45 - 50             | 6    | 2"        | **         | 24"        | 2 1/4"    | 2"         | **         | 24"        | 2 1/4"    |
| >50 - 60             | 6    | 2"        | **         | 24"        | 2 1/4"    | 2"         | **         | 24"        | 2 1/4"    |

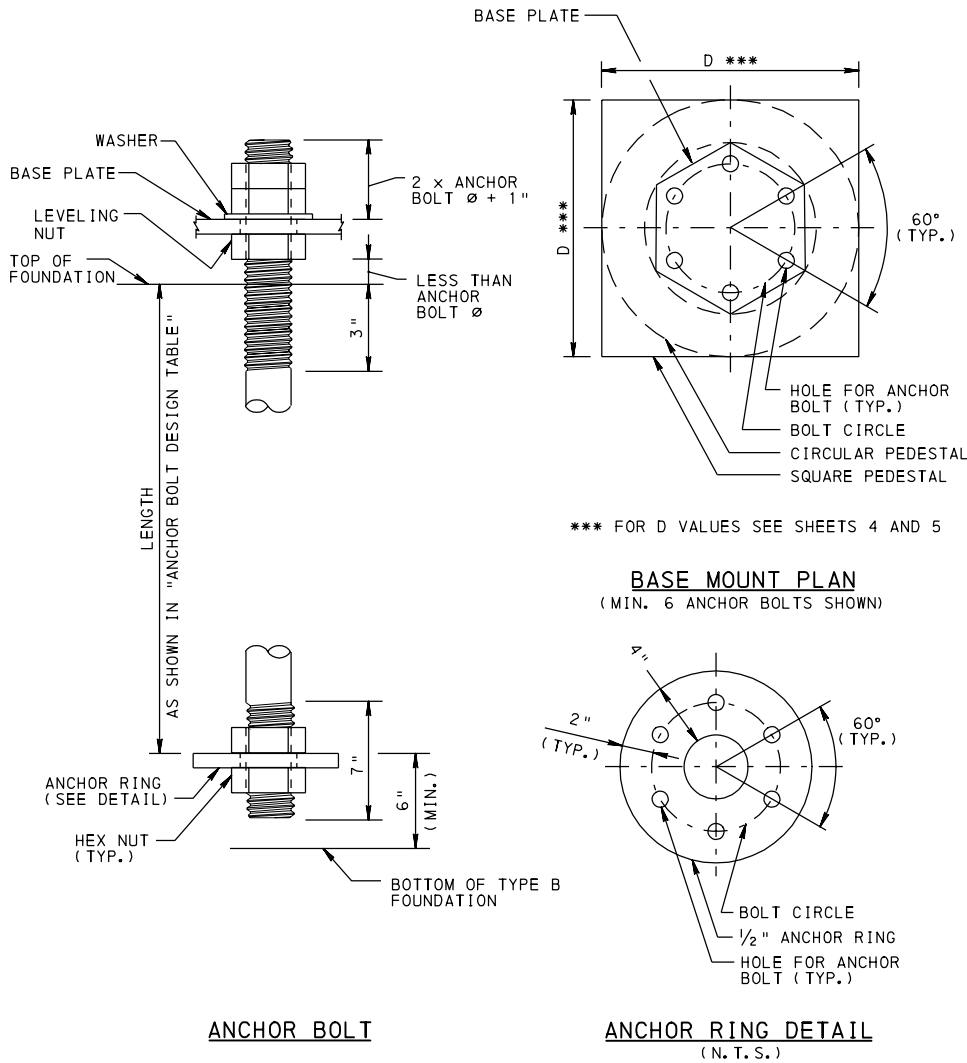
\* TWO ARMS PERPENDICULAR TO EACH OTHER. ADDITIONAL STRUCTURAL ANALYSIS IS REQUIRED FOR TWO MAST ARMS AT ACUTE OR OBTUSE ANGLES TO EACH OTHER  
\*\* FOR FOUNDATION TYPE A, ANCHOR BOLT LENGTH IS 6'. FOR FOUNDATION TYPE B, ANCHOR BOLT LENGTH IS EQUAL TO "Y" OR "Z" DEPTHS MINUS 6"  
B.C. = BOLT CIRCLE DIAMETER

ANCHOR BOLT DESIGN TABLE, STRAIN POLE

| DESIGN TENSION (LBS) | QTY. | SHAFT LENGTH 20' - 24' |            |            |           | SHAFT LENGTH 26' - 30' |            |            |           | SHAFT LENGTH 32' - 34' |            |            |           |
|----------------------|------|------------------------|------------|------------|-----------|------------------------|------------|------------|-----------|------------------------|------------|------------|-----------|
|                      |      | DIA. (IN)              | LGTH. (FT) | B. C. (IN) | HOLE (IN) | DIA. (IN)              | LGTH. (FT) | B. C. (IN) | HOLE (IN) | DIA. (IN)              | LGTH. (FT) | B. C. (IN) | HOLE (IN) |
| 1000                 | 6    | 1 3/4"                 | **         | 18"        | 2"        | 2"                     | **         | 18"        | 2 1/4"    | 2"                     | **         | 18"        | 2 1/4"    |
| 2000                 | 6    | 1 3/4"                 | **         | 18"        | 2"        | 2"                     | **         | 18"        | 2 1/4"    | 2"                     | **         | 18"        | 2 1/4"    |
| 3000                 | 6    | 1 3/4"                 | **         | 18"        | 2"        | 2"                     | **         | 18"        | 2 1/4"    | 2"                     | **         | 18"        | 2 1/4"    |
| 4000                 | 6    | 1 3/4"                 | **         | 18"        | 2"        | 2"                     | **         | 18"        | 2 1/4"    | 2"                     | **         | 18"        | 2 1/4"    |
| 5000                 | 6    | 1 3/4"                 | **         | 18"        | 2"        | 2"                     | **         | 18"        | 2 1/4"    | 2"                     | **         | 18"        | 2 1/4"    |
| 6000                 | 6    | 2 1/4"                 | **         | 18"        | 2 1/2"    | 2 1/4"                 | **         | 21"        | 2 1/2"    | 2 1/4"                 | **         | 21"        | 2 1/2"    |
| 7000                 | 6    | 2 1/4"                 | **         | 18"        | 2 1/2"    | 2 1/4"                 | **         | 21"        | 2 1/2"    | 2 1/4"                 | **         | 21"        | 2 1/2"    |
| 8000                 | 6    | 2 1/4"                 | **         | 18"        | 2 1/2"    | 2 1/4"                 | **         | 21"        | 2 1/2"    | 2 1/4"                 | **         | 21"        | 2 1/2"    |
| 9000                 | 6    | 2 1/4"                 | **         | 18"        | 2 1/2"    | 2 1/4"                 | **         | 21"        | 2 1/2"    | 2 1/2"                 | **         | 21"        | 2 3/4"    |
| 10,000               | 6    | 2 1/4"                 | **         | 18"        | 2 1/2"    | 2 1/4"                 | **         | 21"        | 2 1/2"    | 2 1/2"                 | **         | 21"        | 2 3/4"    |

FOUNDATION NOTES:

1. PROVIDE 3" CONCRETE COVER ON REINFORCEMENT BARS, EXCEPT AS NOTED.
2. USE CLASS A CEMENT CONCRETE f'c = 3000 PSI IN PEDESTALS, FOOTINGS AND CAISSONS.
3. PROVIDE GRADE 60 REINFORCING STEEL BARS THAT MEET THE REQUIREMENTS OF ASTM A615/A615M-96A FOR CONCRETE REINFORCEMENT. DO NOT WELD REINFORCING STEEL BARS.
4. RAKE-FINISH ALL HORIZONTAL CONSTRUCTION JOINTS, EXCEPT AS INDICATED.
5. CHAMFER EXPOSED CONCRETE EDGES 1" x 1".
6. DIMENSIONS ARE BASED ON A NORMAL TEMPERATURE OF 20°C (68°F).
7. GALVANIZE ALL STRUCTURAL STEEL IN ACCORDANCE WITH PUB. 408, SECTION 1104.02 (c) 9.
8. PROVIDE ANCHOR BOLT HOLES 1/4" LARGER THAN BOLT DIAMETER.
9. PROVIDE ANCHOR BOLTS CONFORMING TO ASTM F1554 GRADE 55 PER PUBLICATION 408, SECTION 1105.02 (c) 3.
10. USE STEEL TEMPLATE TO SET ANCHOR BOLTS IN ACCORDANCE WITH PUBLICATION 408, SECTION 1104.02 (d).
11. STEEL TEMPLATE TO BE PROVIDED BY MAST ARM OR STRAIN POLE FABRICATOR.
12. PROVIDE ANCHOR BOLTS WITH THREADS WHICH EXTEND A MINIMUM OF 3" BELOW THE TOP OF THE FOUNDATION.
13. SEE PENNDOT PUBLICATION 149 "CRITERIA FOR THE DESIGN OF TRAFFIC SIGNAL SUPPORTS".



DESIGN CRITERIA

(SEE NOTE 13)

ALL MAIN LOAD CARRYING TENSION MEMBERS GREATER THAN 1/2 INCH THICKNESS MUST MEET AASHTO ZONE 2, NON-FRACTURE CRITICAL MEMBER COMPONENTS (FCM) CHARPY V-NOTCH (CVN).

EXTERNAL LOADS

AASHTO SIGN SPEC †

ICE LOAD  
WIND LOAD

SECTION 3.7  
APPENDIX C, SECTION C.3,  
EQ. C-1, WITH 80 MPH WIND  
AND 30% GUST FACTOR

GROUP LOADS

AASHTO SIGN SPEC SECTION 3.4 †

BOLT CRITERIA

AASHTO SIGN SPEC †

BOLT CRITERIA  
ALLOWABLE ANCHOR BOLT STRESSES

SECTION 5.16  
SECTION 5.17

SPREAD FOOTINGS

MAXIMUM DESIGN PRESSURE  
MINIMUM AREA IN BEARING  
UNIT WEIGHT OF SOIL

1.5 TONS PER SQUARE FOOT  
100%  
100 POUNDS PER CUBIC FOOT

DRILLED SHAFTS (CAISSONS)

DM4 SECTION 10.7.3.8.2P

MAXIMUM DESIGN PRESSURE  
MAXIMUM DESIGN LATERAL DISPLACEMENT  
MODULUS OF SUBGRADE REACTION:  
ABOVE WATER TABLE  
BELOW WATER TABLE

1.5 TONS PER SQUARE FOOT  
0.5"  
K = 60.0 POUNDS PER CUBIC INCH  
K = 40.0 POUNDS PER CUBIC INCH  
3 FEET BELOW GRADE  
120 POUNDS PER CUBIC FOOT  
25°  
0 KIPS PER SQUARE FOOT

WATER TABLE  
UNIT WEIGHT OF SOIL  
ANGLE OF INTERNAL FRICTION  
COHESION

† LEGEND:

AASHTO SIGN SPEC:

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS,  
"STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS,  
LUMINAIRES AND TRAFFIC SIGNALS", 4TH EDITION (2001) INCLUDING INTERIM  
SPECIFICATIONS (2002, 2003 AND 2006)

DM4:

PENNSYLVANIA DEPARTMENT OF TRANSPORTATION, DESIGN MANUAL PART 4,  
SEPT. 2007 (INCLUDING CHANGE NO.1 DATED JUNE 2009)

U. N. O. :

UNLESS NOTED OTHERWISE

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF HIGHWAY SAFETY AND TRAFFIC ENGINEERING

STANDARD

TRAFFIC SIGNAL SUPPORT  
FOUNDATION NOTES AND  
ANCHOR BOLT DETAILS

RECOMMENDED Oct. 14, 2010

CHIEF, TRANSPORTATION OPERATIONS  
DIVISION

RECOMMENDED Oct. 14, 2010

ACTING DIR. BUR. OF HIGHWAY  
SAFETY AND TRAFFIC ENGINEERING

SHEET 3 OF 7

TC-8801

FOUNDATION FOR TRAFFIC SIGNAL SUPPORT, MAST ARM

| MAST ARM LENGTH (FT) | "D" (FT) | H (FT)  |           | "W" BAR |      |
|----------------------|----------|---------|-----------|---------|------|
|                      |          | ONE ARM | TWO ARMS* | QTY.    | SIZE |
| 0 - 10               | 3'-0"    | 10'-0"  | 10'-6"    | 12      | #9   |
| >10 - 15             | 3'-0"    | 11'-6"  | 12'-0"    | 12      | #9   |
| >15 - 20             | 3'-0"    | 13'-0"  | 13'-0"    | 12      | #9   |
| >20 - 25             | 3'-0"    | 13'-6"  | 14'-0"    | 12      | #9   |
| >25 - 30             | 3'-0"    | 14'-6"  | 15'-0"    | 12      | #9   |
| >30 - 35             | 3'-0"    | 15'-0"  | 15'-6"    | 12      | #9   |
| >35 - 40             | 3'-6"    | 15'-6"  | 16'-6"    | 14      | #9   |
| >40 - 45             | 3'-6"    | 15'-6"  | 17'-0"    | 14      | #9   |
| >45 - 50             | 3'-6"    | 16'-6"  | 17'-6"    | 14      | #9   |
| >50 - 60             | 3'-6"    | 17'-0"  | 18'-6"    | 14      | #9   |

\* TWO ARMS PERPENDICULAR TO EACH OTHER. ADDITIONAL STRUCTURAL ANALYSIS IS REQUIRED FOR TWO MAST ARMS AT ACUTE OR OBTUSE ANGLES TO EACH OTHER.

MAST ARM FOUNDATION NOTES:

1. WHEN THE SHAFT OF THE SUPPORT IS EXTENDED IN LENGTH AND PROVIDED WITH A LUMINAIRE ARM, OR WHEN THE SHAFT OF THE SUPPORT IS EXTENDED IN LENGTH BY 36" MINIMUM TO ALLOW FOR INSTALLATION OF A LUMINAIRE IN THE FUTURE VIA AN OVERLAP SLIP JOINT, THE DEPTH "H" REQUIRED BY THE DESIGN TABLE FOR THE TYPE "A" FOUNDATION SHALL BE INCREASED BY 8".
2. NO DEVIATION IN THE FOUNDATION DESIGN GIVEN HERE IS REQUIRED WHEN THE TRAFFIC SIGNAL CONTROLLER CABINET IS MOUNTED ON THE SHAFT.
3. MAST ARM FOUNDATIONS ARE BASED ON STANDARD STRUCTURE LOADINGS SHOWN IN THE DEPARTMENT'S "CRITERIA FOR THE DESIGN OF TRAFFIC SIGNAL SUPPORTS", PUBLICATION 149. FOUNDATION DESIGN ASSUMES :
  - (1) LUMINAIRE, WHEN USED, HAS A 30' MOUNTING HEIGHT AND A 15' ARM LENGTH.
  - (2) THE CENTROID OF SIGNALS AND SIGNS ON MAST ARM AT 20' MAXIMUM FROM TOP OF THE FOUNDATION.
  - (3) A CABINET, WHEN USED, HAS A 51" HEIGHT, 30" WIDTH, 22" DEPTH AND DEAD LOAD OF 281 LBS WITH CENTROID LOCATED AT 54" MAXIMUM FROM TOP OF THE FOUNDATION.
4. WHEN A MAST ARM SUPPORT HAS TWO ARMS WHICH ARE PERPENDICULAR TO EACH OTHER, USE THE FOUNDATION IN THE DESIGN TABLE FOR THE LENGTH OF THE LONGER ARM.

FOUNDATION FOR TRAFFIC SIGNAL SUPPORT, STRAIN POLE

| DESIGN TENSION (LBS) | "D" (FT) | SHAFT LENGTH 20' - 34' |      |                         |                         |                         |                         |                         |                         |                         |                         |
|----------------------|----------|------------------------|------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
|                      |          | "W" BAR                |      | 20' SHAFT               | 22' SHAFT               | 24' SHAFT               | 26' SHAFT               | 28' SHAFT               | 30' SHAFT               | 32' SHAFT               | 34' SHAFT               |
|                      |          | QTY.                   | SIZE | FOUNDATION DEPTH H (FT) | FOUNDATION DEPTH H (FT) | FOUNDATION DEPTH H (FT) | FOUNDATION DEPTH H (FT) | FOUNDATION DEPTH H (FT) | FOUNDATION DEPTH H (FT) | FOUNDATION DEPTH H (FT) | FOUNDATION DEPTH H (FT) |
| 1000                 | 3'-0"    | 12                     | #9   | 11'-0"                  | 11'-6"                  | 11'-6"                  | 12'-0"                  | 12'-6"                  | 12'-6"                  | 13'-0"                  | 13'-0"                  |
| 2000                 | 3'-0"    | 12                     | #9   | 12'-6"                  | 13'-0"                  | 13'-0"                  | 13'-6"                  | 14'-0"                  | 14'-0"                  | 14'-6"                  | 14'-6"                  |
| 3000                 | 3'-0"    | 12                     | #9   | 14'-0"                  | 14'-0"                  | 14'-6"                  | 15'-0"                  | 15'-0"                  | 15'-0"                  | 15'-6"                  | 16'-0"                  |
| 4000                 | 3'-0"    | 12                     | #9   | 15'-0"                  | 15'-0"                  | 15'-6"                  | 16'-0"                  | 16'-0"                  | 16'-6"                  | 17'-0"                  | 17'-0"                  |
| 5000                 | 3'-0"    | 12                     | #9   | 16'-0"                  | 16'-0"                  | 16'-6"                  | 17'-0"                  | 17'-0"                  | 17'-6"                  | 18'-0"                  | 18'-0"                  |
| 6000                 | 3'-0"    | 12                     | #9   | 16'-6"                  | 17'-0"                  | 17'-0"                  | 17'-6"                  | 18'-0"                  | 18'-0"                  | 18'-6"                  | 19'-0"                  |
| 7000                 | 3'-0"    | 12                     | #9   | 17'-6"                  | 17'-6"                  | 18'-0"                  | 18'-6"                  | 19'-0"                  | 19'-0"                  | 19'-6"                  | 20'-6"                  |
| 8000                 | 3'-0"    | 16                     | #9   | 18'-0"                  | 18'-6"                  | 19'-0"                  | 19'-6"                  | 19'-6"                  | 20'-6"                  | 21'-0"                  | 21'-6"                  |
| 9000                 | 3'-0"    | 16                     | #9   | 19'-0"                  | 19'-0"                  | 19'-6"                  | 20'-6"                  | 21'-0"                  | 21'-6"                  | 22'-0"                  | 22'-6"                  |
| 10,000               | 3'-0"    | 16                     | #9   | 19'-6"                  | 20'-6"                  | 21'-0"                  | 21'-6"                  | 22'-0"                  | 22'-6"                  | 23'-6"                  | 24'-0"                  |

FOUNDATION FOR TRAFFIC SIGNAL SUPPORT, PEDESTAL DESIGN TABLE

| SHAFT LENGTH (FT) | "D" (FT) | ANCHOR BOLTS |           |             | DEPTH H (FT) | "W" BAR |      |
|-------------------|----------|--------------|-----------|-------------|--------------|---------|------|
|                   |          | QTY.         | DIA. (IN) | LENGTH (FT) |              | QTY.    | SIZE |
| 0' - 10'          | 3'-0"    | 6            | 3/4"      | 2'-0"       | 6'-0"        | 8       | #8   |
| >10' - 14'        | 3'-0"    | 6            | 3/4"      | 2'-0"       | 6'-6"        | 8       | #8   |

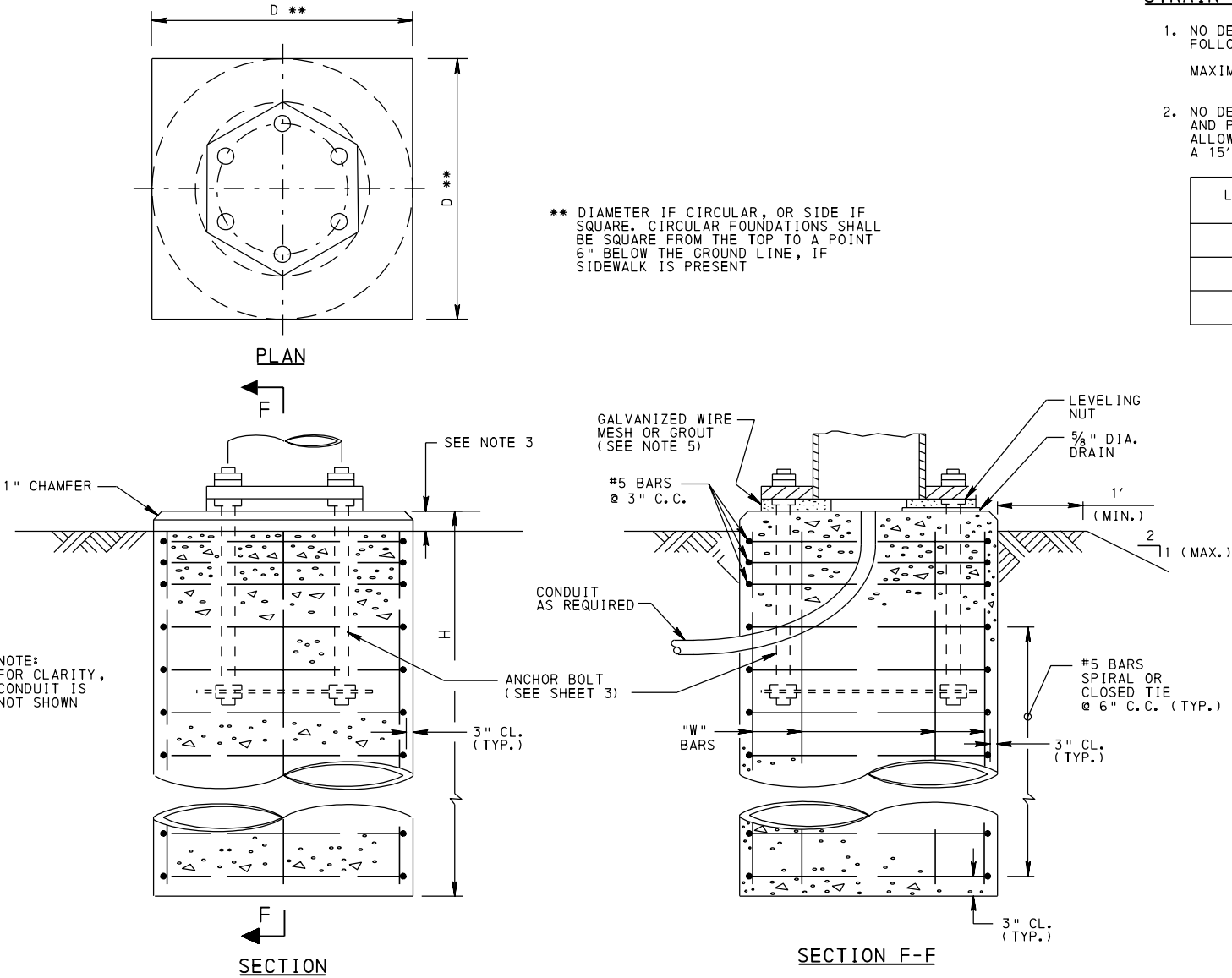
STRAIN POLE FOUNDATION NOTES:

1. NO DEVIATION IN THE FOUNDATION DESIGN GIVEN HERE IS REQUIRED WHEN A TRAFFIC SIGNAL CONTROLLER CABINET OF THE FOLLOWING SIZE IS MOUNTED ON THE SHAFT:  
MAXIMUM CABINET SIZE: 51" HEIGHT, 30" WIDTH, AND 22" DEPTH WITH DEAD LOAD OF 281 LBS AND CENTROID HEIGHT LOCATED AT 54" MAXIMUM FROM TOP OF THE FOUNDATION.
2. NO DEVIATION IN THE FOUNDATION DESIGN GIVEN HERE IS REQUIRED WHEN THE SHAFT OF THE SUPPORT IS EXTENDED IN LENGTH AND PROVIDED WITH A LUMINAIRE ARM, OR WHEN THE SHAFT OF THE SUPPORT IS EXTENDED IN LENGTH BY 36" MINIMUM TO ALLOW FOR INSTALLATION OF A LUMINAIRE IN THE FUTURE VIA AN OVERLAP SLIP JOINT. THE FOUNDATION DESIGN ASSUMES A 15' LUMINAIRE ARM LENGTH AND THE FOLLOWING LUMINAIRE MOUNTING HEIGHTS:

| LENGTH OF STRAIN POLE (FT) | LUMINAIRE MOUNTING HEIGHT "X" (FT) |
|----------------------------|------------------------------------|
| 20', 22', AND 24'          | 30'                                |
| 26', 28', AND 30'          | 35'                                |
| 32' AND 34'                | 40'                                |

NOTES:

1. PROVIDE THE TYPE "A" FOUNDATION AT ALL LOCATIONS, EXCEPT THE TYPE "B" FOUNDATION (SHOWN ON SHEET 5) MAY BE USED WHEN PHYSICAL CONDITIONS PREVENT PLACING THE TYPE "A" FOUNDATION TO ITS REQUIRED DEPTH.
2. FOR DESIGN CRITERIA SEE SHEET 3.
3. IN A PAVED AREA, PLACE THE TOP OF FOUNDATION FLUSH WITH THE SURFACE OF THE ADJACENT PAVEMENT. IN UNPAVED AREAS TOP OF FOUNDATION TO BE AT LEAST 6" ABOVE TOP OF GROUND.
4. FOR GROUND ROD SIZE AND INSTALLATION DETAILS, SEE TC-8804.
5. IN A PAVED AREA, GROUT SHALL BE PLACED.



COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF HIGHWAY SAFETY AND TRAFFIC ENGINEERING

STANDARD

TRAFFIC SIGNAL SUPPORT  
FOUNDATION TYPE A

RECOMMENDED Oct. 14, 2010  
CHIEF, TRANSPORTATION OPERATIONS DIVISION

RECOMMENDED Oct. 14, 2010  
ACTING DIR. BUR. OF HIGHWAY SAFETY AND TRAFFIC ENGINEERING

SHEET 4 OF 7

TC-8801

FOUNDATION FOR TRAFFIC SIGNAL SUPPORT, MAST ARM

| MAST ARM<br>LENGTH<br>(FT) | "D"<br>(FT) | "W" BAR |      | "L"<br>BAR | Y<br>(FT) | S (FT)     |              | Z<br>(FT) | S (FT)     |              |
|----------------------------|-------------|---------|------|------------|-----------|------------|--------------|-----------|------------|--------------|
|                            |             | QTY.    | SIZE |            |           | ONE<br>ARM | TWO<br>ARMS* |           | ONE<br>ARM | TWO<br>ARMS* |
|                            |             |         |      |            |           |            |              |           |            |              |
| 0 - 10                     | 3'-0"       | 12      | #9   | #4         | 4'-0"     | 9'-6"      | 9'-6"        | 5'-0"     | 9'-6"      | 9'-6"        |
| >10 - 15                   | 3'-0"       | 12      | #9   | #4         | 4'-0"     | 10'-6"     | 10'-6"       | 5'-0"     | 10'-6"     | 10'-6"       |
| >15 - 20                   | 3'-0"       | 12      | #9   | #5         | 4'-0"     | 11'-6"     | 11'-6"       | 5'-6"     | 11'-6"     | 11'-6"       |
| >20 - 25                   | 3'-0"       | 12      | #9   | #6         | 4'-0"     | 12'-0"     | 12'-0"       | 6'-0"     | 12'-0"     | 12'-0"       |
| >25 - 30                   | 3'-0"       | 12      | #9   | #6         | 4'-6"     | 12'-6"     | 13'-0"       | 6'-6"     | 12'-6"     | 12'-6"       |
| >30 - 35                   | 3'-0"       | 12      | #9   | #7         | 4'-6"     | 13'-0"     | 13'-6"       | 7'-0"     | 13'-0"     | 13'-6"       |
| >35 - 40                   | 3'-6"       | 14      | #9   | #7         | 5'-0"     | 13'-6"     | 14'-0"       | 7'-0"     | 13'-0"     | 13'-6"       |
| >40 - 45                   | 3'-6"       | 14      | #9   | #7         | 5'-0"     | 13'-6"     | 14'-6"       | 7'-6"     | 13'-0"     | 13'-6"       |
| >45 - 50                   | 3'-6"       | 14      | #9   | #7         | 5'-6"     | 14'-0"     | 14'-6"       | 8'-0"     | 13'-0"     | 13'-6"       |
| >50 - 60                   | 3'-6"       | 14      | #9   | #8         | 5'-6"     | 14'-6"     | 16'-0"       | 8'-0"     | 13'-6"     | 14'-6"       |

\* TWO ARMS PERPENDICULAR TO EACH OTHER. ADDITIONAL STRUCTURAL ANALYSIS IS REQUIRED FOR TWO MAST ARMS AT ACUTE OR OBTUSE ANGLES TO EACH OTHER.

FOUNDATION FOR TRAFFIC SIGNAL SUPPORT, STRAIN POLE

| DESIGN TENSION (LBS) | SHAFT LENGTH 20' - 24' |         |      |         |        |                     |        |        |                     |        | SHAFT LENGTH 26' - 30' |         |      |         |        |                     |        |        |                     |        | SHAFT LENGTH 32' - 34' |         |      |         |        |                     |        |        |                     |        |
|----------------------|------------------------|---------|------|---------|--------|---------------------|--------|--------|---------------------|--------|------------------------|---------|------|---------|--------|---------------------|--------|--------|---------------------|--------|------------------------|---------|------|---------|--------|---------------------|--------|--------|---------------------|--------|
|                      | "D" (FT)               | "W" BAR |      | "L" BAR | Y (FT) | S <sup>L</sup> (FT) | S (FT) | Z (FT) | S <sup>L</sup> (FT) | S (FT) | "D" (FT)               | "W" BAR |      | "L" BAR | Y (FT) | S <sup>L</sup> (FT) | S (FT) | Z (FT) | S <sup>L</sup> (FT) | S (FT) | "D" (FT)               | "W" BAR |      | "L" BAR | Y (FT) | S <sup>L</sup> (FT) | S (FT) | Z (FT) | S <sup>L</sup> (FT) | S (FT) |
|                      |                        | QTY.    | SIZE | SIZE    |        |                     |        |        |                     |        |                        | QTY.    | SIZE | SIZE    |        |                     |        |        |                     |        |                        | QTY.    | SIZE | SIZE    |        |                     |        |        |                     |        |
| 1000                 | 3'-0"                  | 12      | #9   | #4      | 4'-0"  | 9'-6"               | 9'-0"  | 4'-0"  | 9'-6"               | 9'-0"  | 3'-0"                  | 12      | #9   | #4      | 4'-0"  | 10'-6"              | 10'-6" | 4'-0"  | 10'-6"              | 10'-0" | 3'-0"                  | 12      | #9   | #4      | 4'-0"  | 11'-0"              | 10'-6" | 4'-0"  | 11'-0"              | 10'-6" |
| 2000                 | 3'-0"                  | 12      | #9   | #4      | 4'-0"  | 10'-6"              | 10'-6" | 4'-0"  | 10'-6"              | 10'-6" | 3'-0"                  | 12      | #9   | #5      | 4'-0"  | 12'-0"              | 12'-0" | 4'-0"  | 12'-0"              | 11'-6" | 3'-0"                  | 12      | #9   | #5      | 4'-0"  | 12'-6"              | 12'-0" | 4'-0"  | 12'-6"              | 12'-0" |
| 3000                 | 3'-0"                  | 12      | #9   | #5      | 4'-0"  | 11'-6"              | 11'-6" | 4'-0"  | 12'-0"              | 11'-6" | 3'-0"                  | 12      | #9   | #5      | 4'-0"  | 13'-0"              | 13'-0" | 5'-0"  | 12'-6"              | 12'-0" | 3'-0"                  | 12      | #9   | #6      | 4'-0"  | 13'-6"              | 13'-0" | 5'-0"  | 12'-6"              | 12'-6" |
| 4000                 | 3'-0"                  | 12      | #9   | #5      | 4'-0"  | 12'-6"              | 12'-0" | 5'-0"  | 12'-0"              | 12'-6" | 3'-0"                  | 12      | #9   | #6      | 4'-6"  | 14'-0"              | 14'-0" | 6'-0"  | 12'-6"              | 12'-6" | 3'-0"                  | 12      | #9   | #6      | 4'-6"  | 14'-0"              | 14'-0" | 6'-0"  | 13'-0"              | 13'-0" |
| 5000                 | 3'-0"                  | 12      | #9   | #6      | 4'-6"  | 13'-0"              | 12'-6" | 6'-0"  | 12'-0"              | 12'-6" | 3'-0"                  | 12      | #9   | #6      | 5'-0"  | 14'-6"              | 14'-6" | 6'-6"  | 13'-0"              | 13'-0" | 3'-0"                  | 12      | #9   | #7      | 5'-0"  | 14'-6"              | 14'-6" | 6'-6"  | 13'-6"              | 13'-0" |
| 6000                 | 3'-0"                  | 12      | #9   | #6      | 5'-0"  | 13'-0"              | 13'-0" | 6'-6"  | 12'-6"              | 12'-6" | 3'-0"                  | 12      | #9   | #7      | 5'-6"  | 14'-6"              | 14'-6" | 7'-0"  | 13'-6"              | 13'-0" | 3'-0"                  | 12      | #9   | #7      | 5'-6"  | 14'-6"              | 14'-6" | 7'-0"  | 14'-0"              | 13'-6" |
| 7000                 | 3'-0"                  | 12      | #9   | #7      | 5'-0"  | 13'-6"              | 13'-6" | 7'-0"  | 13'-0"              | 13'-0" | 3'-0"                  | 12      | #9   | #7      | 6'-0"  | 15'-0"              | 15'-0" | 8'-0"  | 13'-6"              | 13'-6" | 3'-0"                  | 16      | #9   | #8      | 6'-0"  | 15'-0"              | 15'-0" | 8'-0"  | 14'-0"              | 13'-6" |
| 8000                 | 3'-0"                  | 12      | #9   | #7      | 5'-6"  | 14'-0"              | 14'-0" | 7'-6"  | 13'-0"              | 13'-0" | 3'-0"                  | 12      | #9   | #8      | 6'-6"  | 15'-6"              | 15'-6" | 8'-6"  | 13'-6"              | 13'-6" | 3'-0"                  | 16      | #9   | #8      | 6'-6"  | 15'-6"              | 15'-6" | 8'-6"  | 14'-0"              | 14'-0" |
| 9000                 | 3'-0"                  | 12      | #9   | #7      | 6'-0"  | 14'-0"              | 14'-0" | 8'-0"  | 13'-6"              | 13'-6" | 3'-0"                  | 16      | #9   | #8      | 7'-0"  | 15'-6"              | 15'-6" | 9'-0"  | 14'-0"              | 13'-6" | 3'-0"                  | 16      | #9   | #9      | 7'-0"  | 15'-6"              | 15'-6" | 9'-0"  | 14'-6"              | 14'-6" |
| 10,000               | 3'-0"                  | 12      | #9   | #8      | 6'-6"  | 14'-6"              | 14'-0" | 8'-6"  | 13'-6"              | 13'-6" | 3'-0"                  | 16      | #9   | #9      | 7'-6"  | 15'-6"              | 15'-6" | 10'-0" | 14'-0"              | 14'-0" | 3'-0"                  | 16      | #9   | #9      | 7'-6"  | 15'-6"              | 15'-6" | 10'-0" | 14'-6"              | 14'-6" |

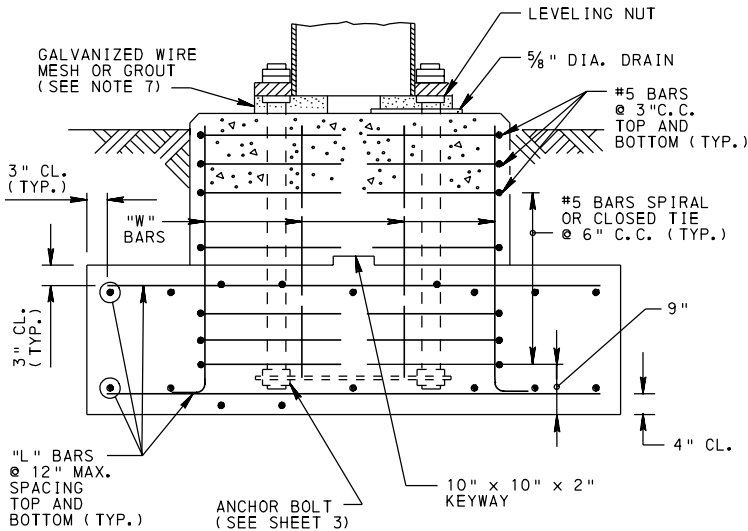
S<sup>L</sup> = WITH LUMINAIRE

MAST ARM FOUNDATION NOTES:

1. NO DEVIATION IN THE FOUNDATION DESIGN GIVEN HERE IS REQUIRED WHEN THE SHAFT OF THE SUPPORT IS EXTENDED IN LENGTH AND PROVIDED WITH A LUMINAIRE ARM, OR WHEN THE SHAFT OF THE SUPPORT IS EXTENDED IN LENGTH BY 36" MINIMUM TO ALLOW FOR INSTALLATION OF A LUMINAIRE IN THE FUTURE VIA AN OVERLAP SLIP JOINT. THE FOUNDATION DESIGN ASSUMES A 15' LUMINAIRE ARM LENGTH AND A 30' MOUNTING HEIGHT.
2. NO DEVIATION IN THE FOUNDATION DESIGN GIVEN HERE IS REQUIRED WHEN A TRAFFIC SIGNAL CONTROLLER CABINET OF SIZE SPECIFIED ON SHEET 4 IS MOUNTED ON THE SHAFT.
3. MAST ARM FOUNDATIONS ARE BASED ON STANDARD STRUCTURE LOADINGS SHOWN IN THE DEPARTMENT'S "CRITERIA FOR THE DESIGN OF TRAFFIC SIGNAL SUPPORTS", PUBLICATION 149. FOUNDATION DESIGN ASSUMES THAT THE CENTROID OF SIGNALS AND SIGNS ON MAST ARM AT 20' MAXIMUM FROM TOP OF THE FOUNDATION.
4. WHEN A MAST ARM SUPPORT HAS TWO ARMS WHICH ARE PERPENDICULAR TO EACH OTHER, USE THE FOUNDATION IN THE DESIGN TABLE FOR THE LENGTH OF THE LONGER ARM.

NOTES:

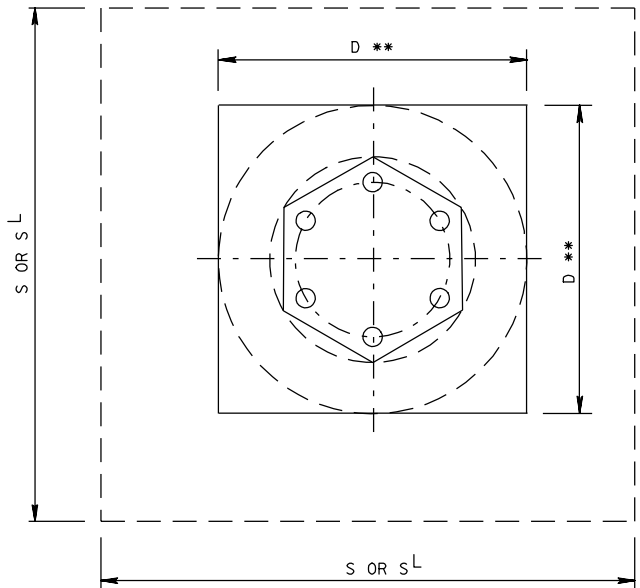
1. THE TYPE "B" FOUNDATION MAY BE AUTHORIZED FOR USE WHERE CONDITIONS PREVENT PLACING THE TYPE "A" FOUNDATION (AS SHOWN ON SHEET 4) TO ITS REQUIRED DEPTH.
2. FOR DESIGN CRITERIA SEE SHEET 3.
3. IN A PAVED AREA, PLACE THE TOP OF FOUNDATION FLUSH WITH THE SURFACE OF THE ADJACENT PAVEMENT. IN UNPAVED AREAS, TOP OF FOUNDATION TO BE AT LEAST 6" ABOVE TOP OF GROUND.
4. FOR GROUND ROD SIZE AND INSTALLATION DETAILS, SEE TC-8804.
5. DISTANCE "F" AS REQUIRED TO AVOID PAVEMENT AND/OR CURB EXCAVATION.
6. SEE SHEET 4 FOR CLOSED TIE DETAIL.
7. IN A PAVED AREA, GROUT SHALL BE PLACED.



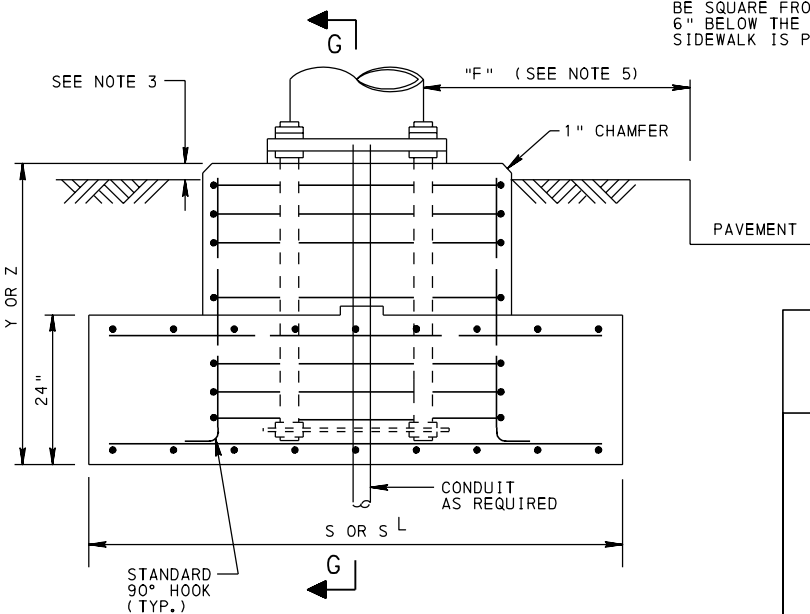
SECTION G-G

(FOR CLARITY, CONDUIT IS NOT SHOWN)

TYPE B FOUNDATION



PLAN



SECTION

STRAIN POLE FOUNDATION NOTES:

1. NO DEVIATION IN THE FOUNDATION DESIGN GIVEN HERE IS REQUIRED WHEN A TRAFFIC SIGNAL CONTROLLER CABINET OF SIZE SPECIFIED ON SHEET 4 IS MOUNTED ON THE SHAFT.
2. USE S FOUNDATION SIZE WHEN THE SHAFT OF THE SUPPORT IS EXTENDED IN LENGTH AND PROVIDED WITH A LUMINAIRE ARM, OR WHEN THE SHAFT OF THE SUPPORT IS EXTENDED IN LENGTH BY 36" MINIMUM TO ALLOW FOR INSTALLATION OF A LUMINAIRE IN THE FUTURE VIA AN OVERLAP SLIP JOINT. THE FOUNDATION DESIGN ASSUMES A 15' LUMINAIRE ARM LENGTH AND THE FOLLOWING LUMINAIRE MOUNTING HEIGHTS:

| LENGTH OF STRAIN POLE (FT) | LUMINAIRE MOUNTING HEIGHT "X" (FT) |
|----------------------------|------------------------------------|
| 20', 22', AND 24'          | 30'                                |
| 26', 28' AND 30'           | 35'                                |
| 32' AND 34'                | 40'                                |

\*\* DIAMETER IF CIRCULAR, OR SIDE IF SQUARE. CIRCULAR FOUNDATIONS SHALL BE SQUARE FROM THE TOP TO A POINT 6" BELOW THE GROUND LINE, IF SIDEWALK IS PRESENT.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF HIGHWAY SAFETY AND TRAFFIC ENGINEERING

STANDARD

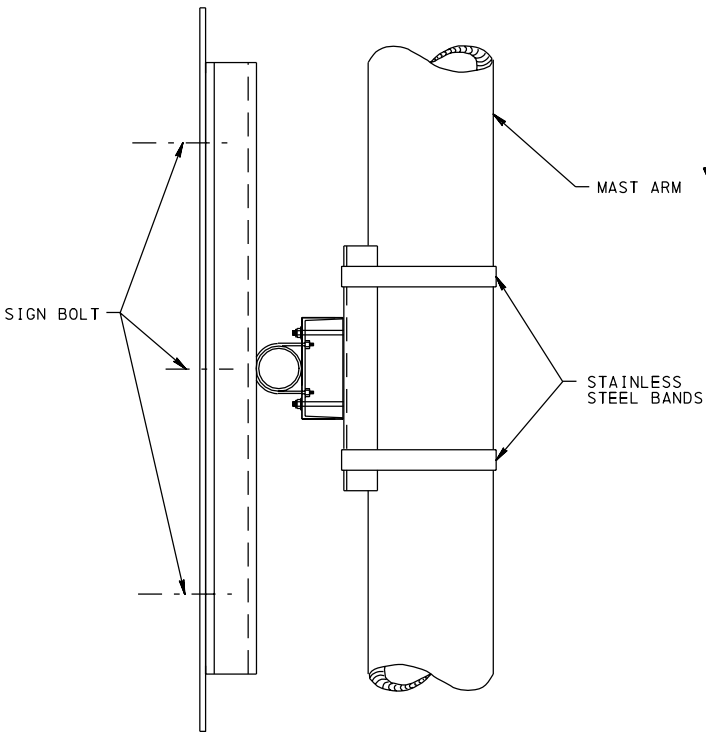
TRAFFIC SIGNAL SUPPORT  
FOUNDATION TYPE B

RECOMMENDED Oct. 14, 2010  
CHIEF, TRANSPORTATION OPERATIONS DIVISION

RECOMMENDED Oct. 14, 2010  
ACTING DIR. BUR. OF HIGHWAY SAFETY AND TRAFFIC ENGINEERING

SHEET 5 OF 7

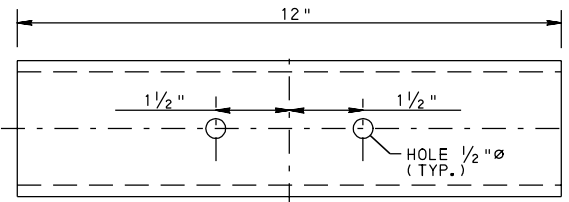
TC-8801



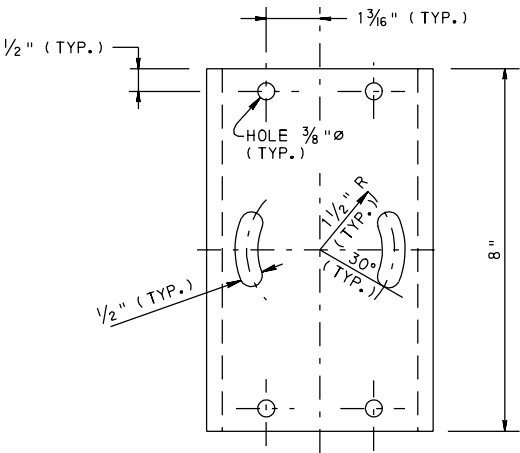
SECTION H-H

**SIGN BRACKET - MAST ARM**

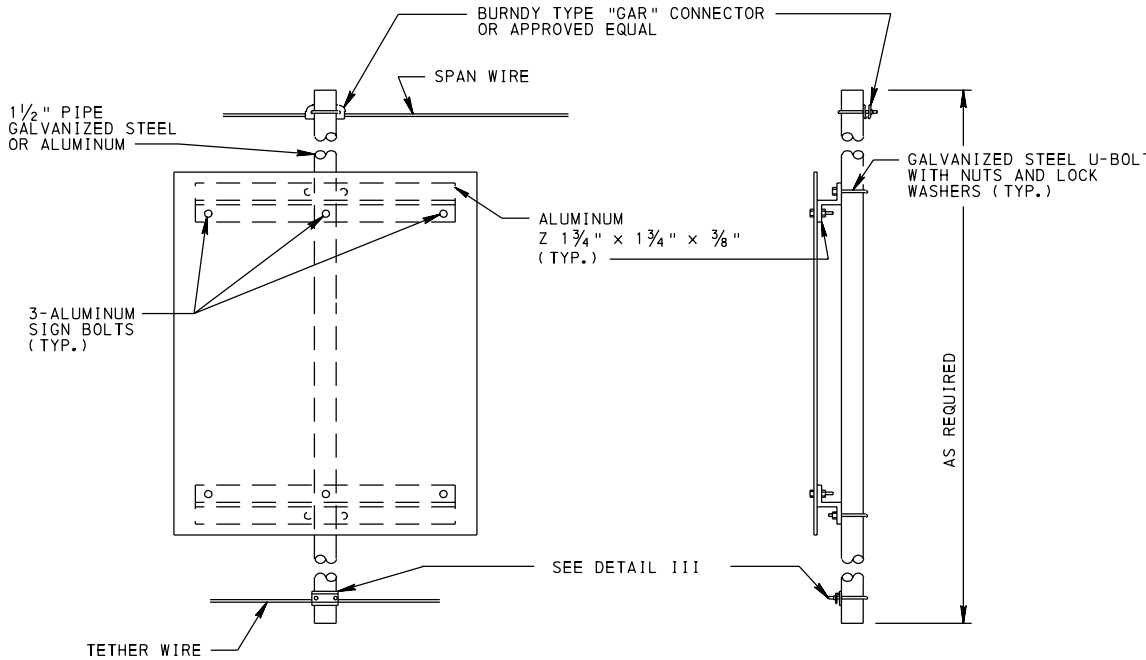
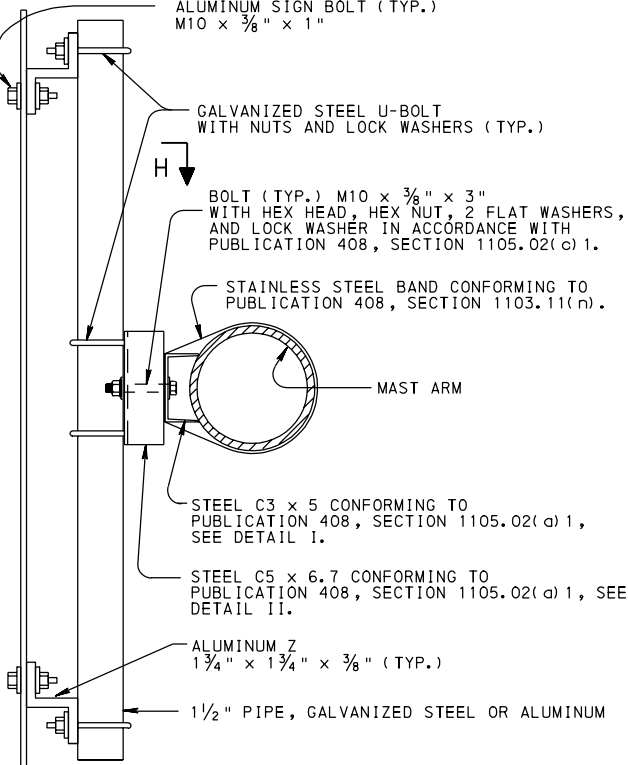
(AN ALTERNATE METHOD FOR ATTACHING SIGNS TO THE MAST ARM MAY BE USED IF APPROVED BY THE ENGINEER)



STEEL C3 x 5  
GALVANIZED AFTER FABRICATION  
DETAIL I

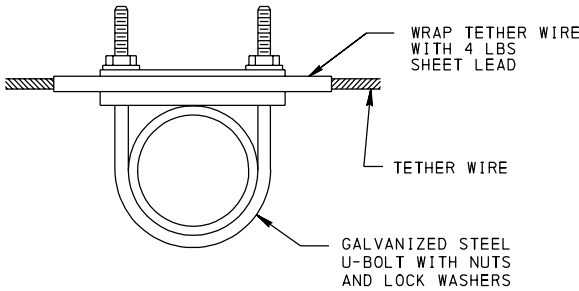
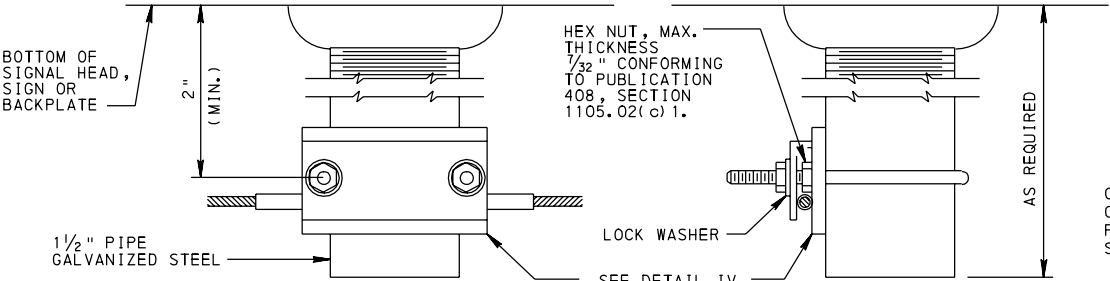


STEEL C5 x 6.7  
GALVANIZED AFTER FABRICATION  
DETAIL II

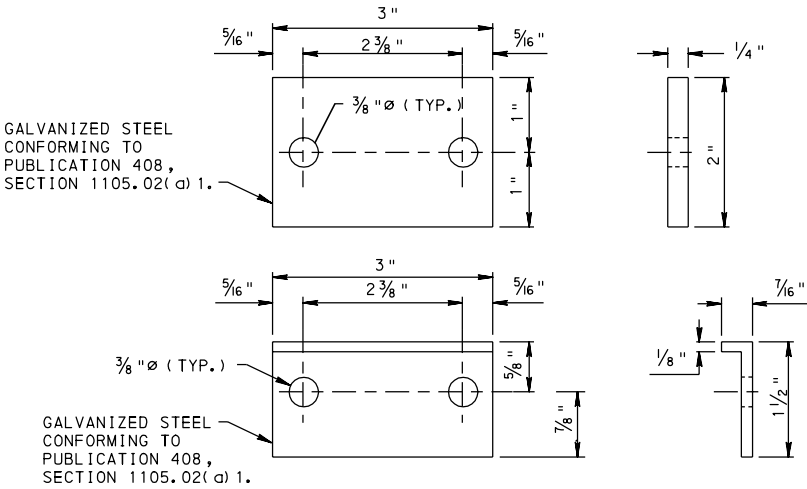


**SIGN BRACKET - SPAN WIRE**

(AN ALTERNATE METHOD FOR ATTACHING SIGNS TO THE SPAN WIRE MAY BE USED IF APPROVED BY THE ENGINEER)



DETAIL III



DETAIL IV

**NOTES:**

1. USE ONE BRACKET FOR SIGNS WITH A WIDTH OF 36" OR LESS. USE TWO BRACKETS FOR SIGNS WITH WIDTHS GREATER THAN 36" AND NOT EXCEEDING 48". USE THREE BRACKETS FOR SIGNS WITH WIDTHS GREATER THAN 48" AND NOT EXCEEDING 96".
2. Z 1 3/4" x 1 3/4" x 3/8" SHALL BE MANUFACTURED FROM ALUMINUM CONFORMING TO ASTM B 209M, ALLOY 6061-T6.
3. 1.5" GALVANIZED STEEL PIPE SHALL CONFORM TO PUBLICATION 408, SECTION 1105.02(j) 1.
4. ALUMINUM SIGN BOLTS, NUTS, WASHERS AND NYLON WASHERS SHALL CONFORM TO PUBLICATION 408, SECTION 1103.11(c) 1, SECTION 1103.11(d) 1, SECTION 1103.11(e) 1 AND SECTION 1103.11(f) 2 RESPECTIVELY.
5. GALVANIZED STEEL U-BOLTS, NUTS AND LOCK WASHERS SHALL BE CONFORM TO PUBLICATION 408, SECTION 1105.02(c) 1, AND SHALL BE OF M6 x 1/4" x 3" x 2 3/8".

**COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF HIGHWAY SAFETY AND TRAFFIC ENGINEERING**

**STANDARD**

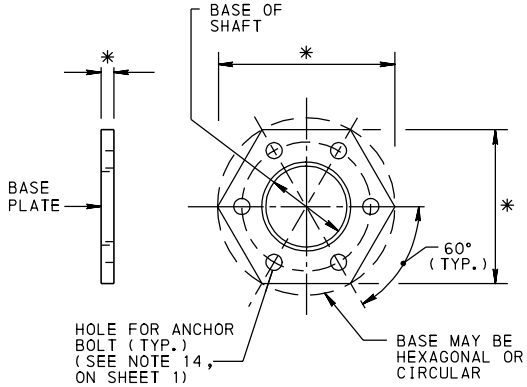
**TRAFFIC SIGNAL SUPPORT  
BRACKETS**

RECOMMENDED Oct. 14, 2010  
*Sen C. Rowe*  
CHIEF, TRANSPORTATION OPERATIONS  
DIVISION

RECOMMENDED Oct. 14, 2010  
*Samuel R. S. S. S.*  
ACTING DIR. BUR. OF HIGHWAY  
SAFETY AND TRAFFIC ENGINEERING

SHEET 6 OF 7

TC-8801

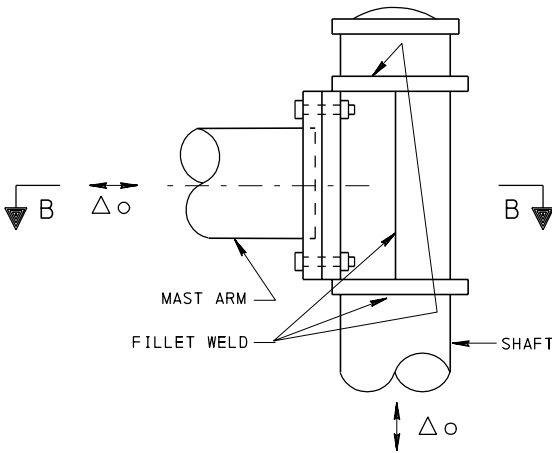


\* AS REQUIRED TO MEET THE DEPARTMENT'S "CRITERIA FOR THE DESIGN OF TRAFFIC SIGNAL SUPPORTS", PUBLICATION 149.

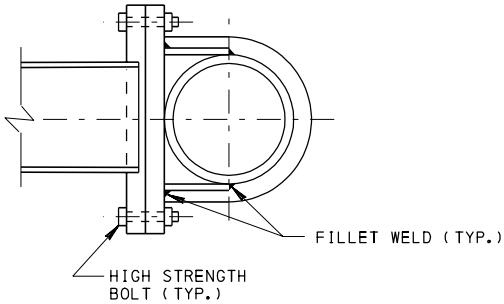
**BASE PLATE**  
(MIN. 6 ANCHOR BOLTS SHOWN)

**BASE PLATE AND CONNECTION PLATE THICKNESS**

| SHAFT OR COLUMN CONNECTION DIAMETER (IN) | PLATE THICKNESS MINIMUM (IN) |
|------------------------------------------|------------------------------|
| LESS THAN 6"                             | 1"                           |
| 6" TO 13"                                | 2"                           |
| GREATER THAN 13" BUT LESS THAN 19"       | 2½"                          |
| GREATER THAN OR EQUAL TO 19"             | 3"                           |

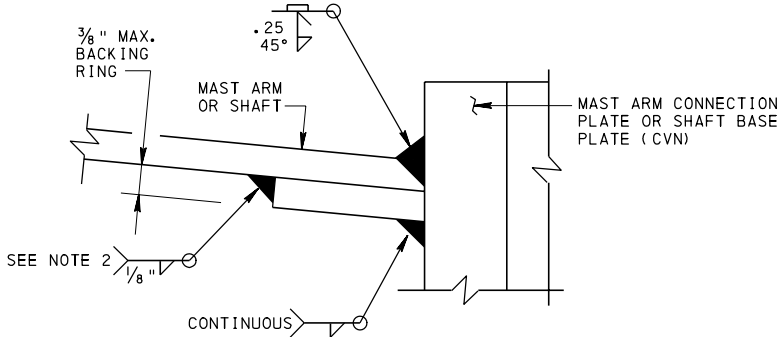


**ELEVATION**



**SECTION B-B**

**MAST-ARM-TO-SHAFT CONNECTION DETAIL**  
(RING-STIFFENED BUILT-UP BOX)

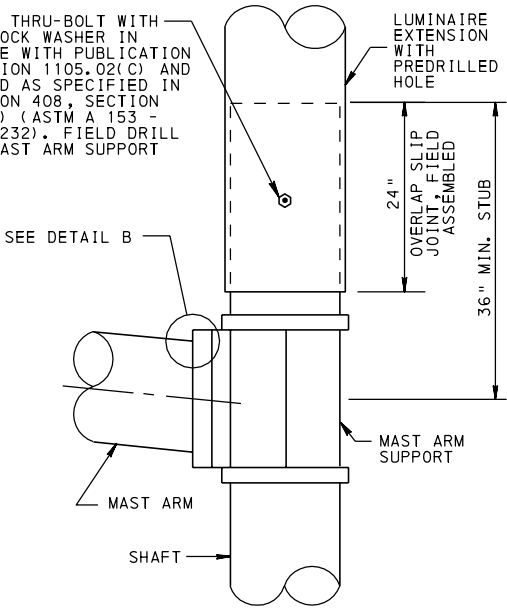


**DETAIL B**

(MAST ARM CONNECTION SHOWN, SHAFT CONNECTION TO BASE PLATE SIMILAR)

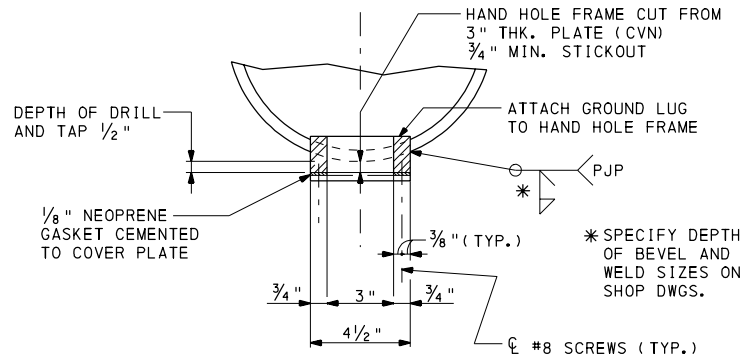
- BACKING RING MUST BE FITTED/SIZED TO THE MAST ARM OR SHAFT AND CONTINUOUSLY FILLET WELDED TO THE CONNECTION PLATE OR BASE PLATE BEFORE THE FULL PENETRATION GROOVE WELD IS MADE. BACKING RING MUST BE FABRICATED AS A CONTINUOUS RING.
- FOR MAST ARMS OR SHAFTS LESS THAN 18"Ø, THIS FILLET WELD IS NOT REQUIRED BUT SHOP IS TO APPLY SILICON CAULKING TO THIS LOCATION AFTER POLE ASSEMBLY IS GALVANIZED.

M16 x 5/8" THRU-BOLT WITH NUT AND LOCK WASHER IN ACCORDANCE WITH PUBLICATION 408, SECTION 1105.02(C) AND GALVANIZED AS SPECIFIED IN PUBLICATION 408, SECTION 1105.02(S) (ASTM A 153 - AASHTO M 232). FIELD DRILL HOLE IN MAST ARM SUPPORT

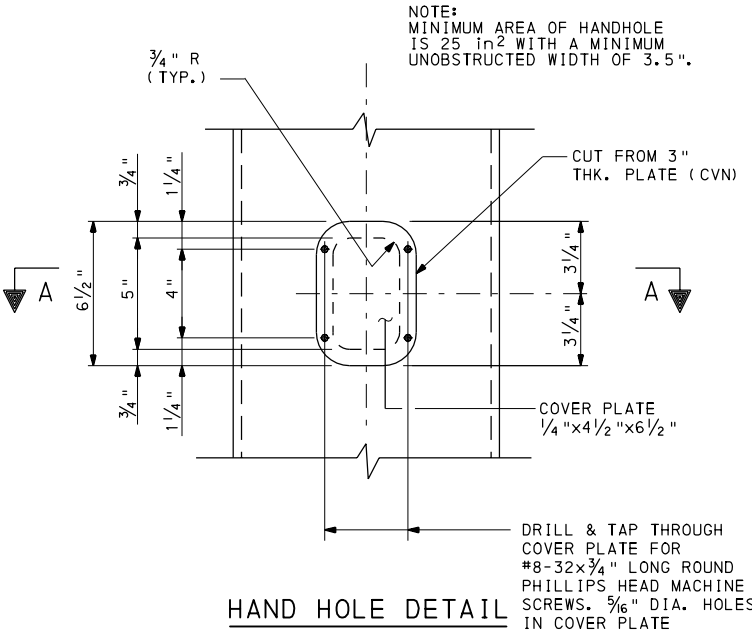


**OVERLAP SLIP JOINT DETAIL**

(ALTERNATE METHOD TO PROVIDE LUMINAIRE)  
(SEE NOTES 11 AND 12 ON SHEET 1)



**SECTION A-A**



**HAND HOLE DETAIL**

**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
**BUREAU OF HIGHWAY SAFETY AND TRAFFIC ENGINEERING**

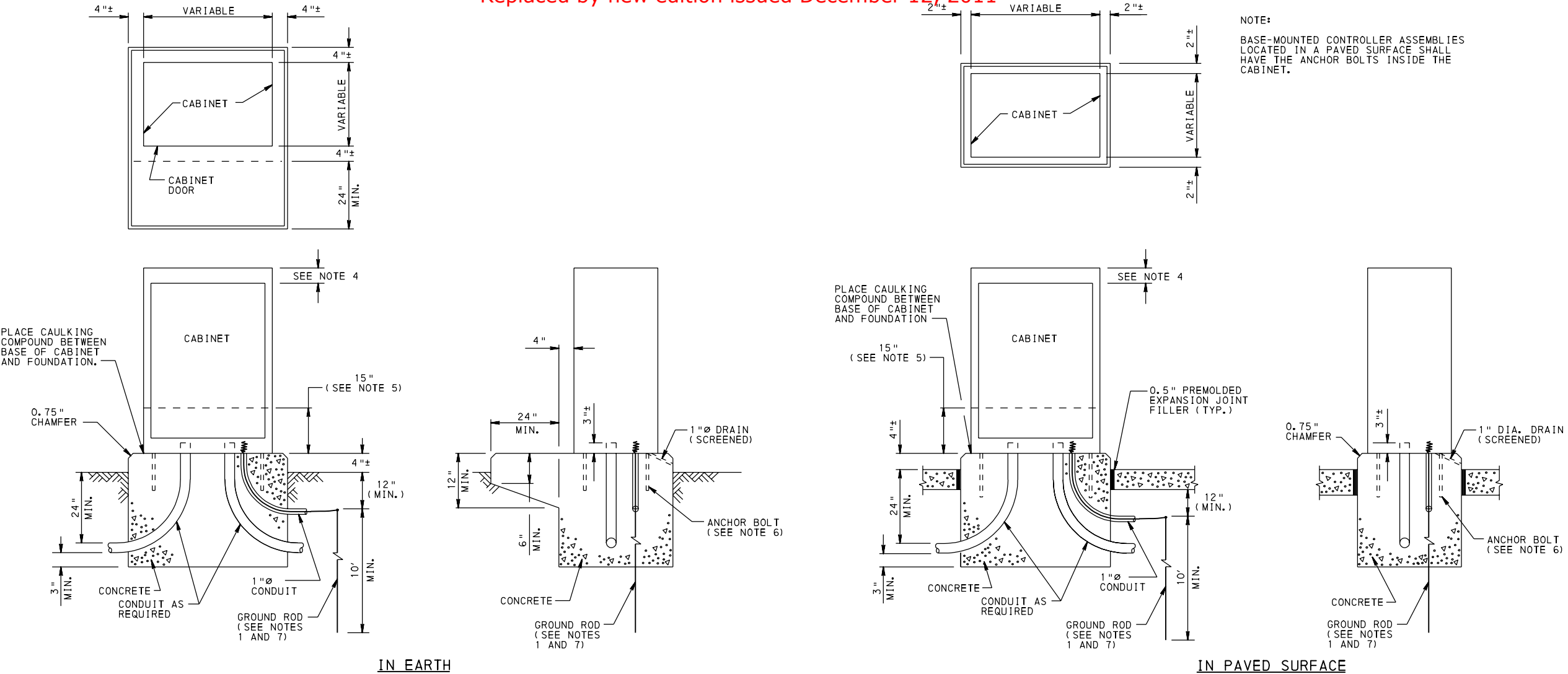
**STANDARD**

**TRAFFIC SIGNAL SUPPORT**  
**MISCELLANEOUS DETAILS**

RECOMMENDED **Oct. 14, 2010**  
*Sen C. Rowe*  
CHIEF, TRANSPORTATION OPERATIONS DIVISION

RECOMMENDED **Oct. 14, 2010**  
*Samuel R. S. S. S.*  
ACTING DIR. OF HIGHWAY SAFETY AND TRAFFIC ENGINEERING

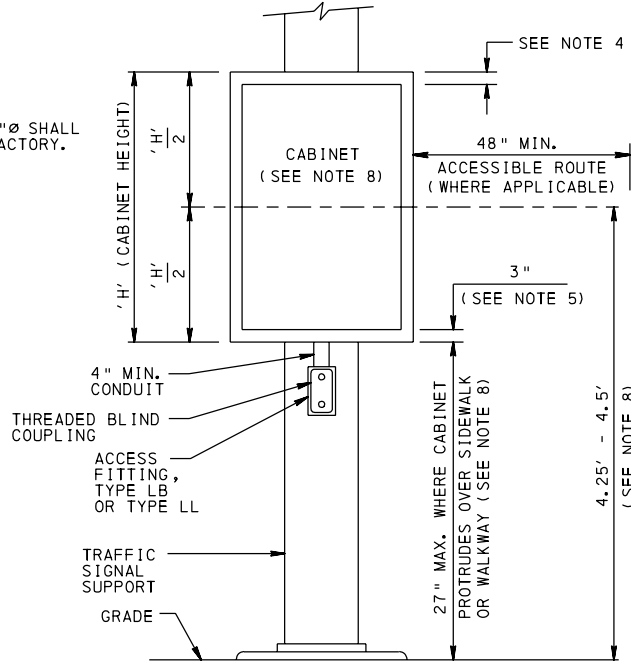
SHEET 7 OF 7  
**TC-8801**



CONTROLLER ASSEMBLY ON CEMENT CONCRETE FOUNDATION  
TYPE I MOUNTING

NOTE:

ANY HOLE LARGER THAN 1"Ø SHALL BE REINFORCED AT THE FACTORY.



CONTROLLER ASSEMBLY ON TRAFFIC SIGNAL SUPPORT  
TYPE II MOUNTING

NOTES:

1. PROVIDE GROUND ROD AS SPECIFIED IN SECTION 1101.11(J) OF PUBLICATION 408.
2. ANCHOR BOLT, NUT AND WASHER SHALL BE GALVANIZED.
3. HARDWARE FOR ATTACHING CABINET TO TRAFFIC SIGNAL SUPPORT SHALL BE ALUMINUM, GALVANIZED STEEL, OR STAINLESS STEEL.
4. NO PORTION OF ANY EQUIPMENT, EXCEPT FAN, BETWEEN THE TOP OF DOOR OPENING AND TOP OF CABINET.
5. MINIMUM CLEARANCE BETWEEN BOTTOM OF CABINET AND TERMINALS, EQUIPMENT OR DEVICES.
6. ANCHOR BOLTS M12 x 1/2" x 12" OR DRILL CONCRETE TO RECEIVE 1/2" DIA x 3.75" LONG EXPANSION BOLT OR APPROVED EQUAL.
7. FOR GROUND ROD SIZE AND INSTALLATION DETAILS, SEE TC-8804.
8. MOUNT CABINET ON TRAFFIC SIGNAL SUPPORT IN A MANNER NOT TO PROTRUDE OVER EXISTING SIDEWALK. WHERE THIS IS NOT POSSIBLE, COMPLY WITH TYPE II MOUNTING DETAIL AND PUBLICATION 13M, CHAPTER 6.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF HIGHWAY SAFETY AND TRAFFIC ENGINEERING

STANDARD

CONTROLLER ASSEMBLY

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CHIEF, TRANSPORTATION OPERATIONS DIVISION  
*Sen C. Rome*

RECOMMENDED Oct. 14, 2010  
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*Joseph R. Sella*

SHT. 1 OF 1

TC-8802

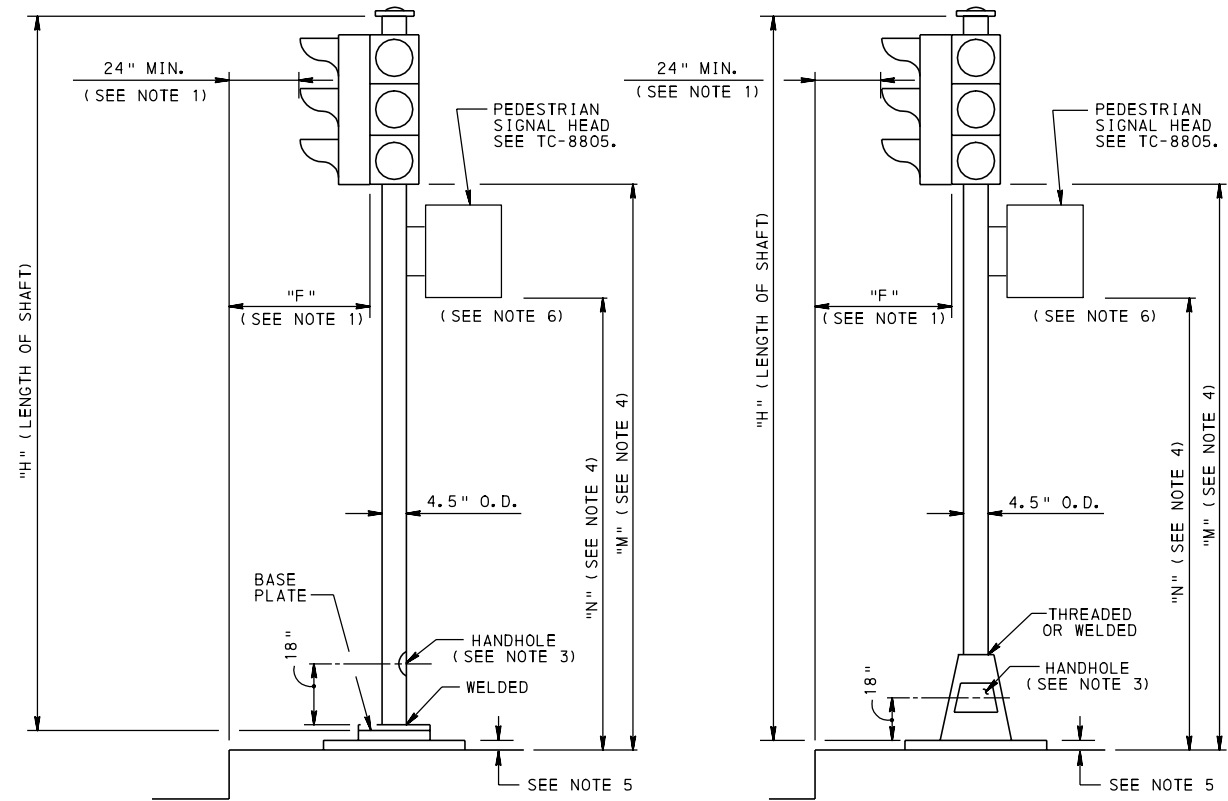


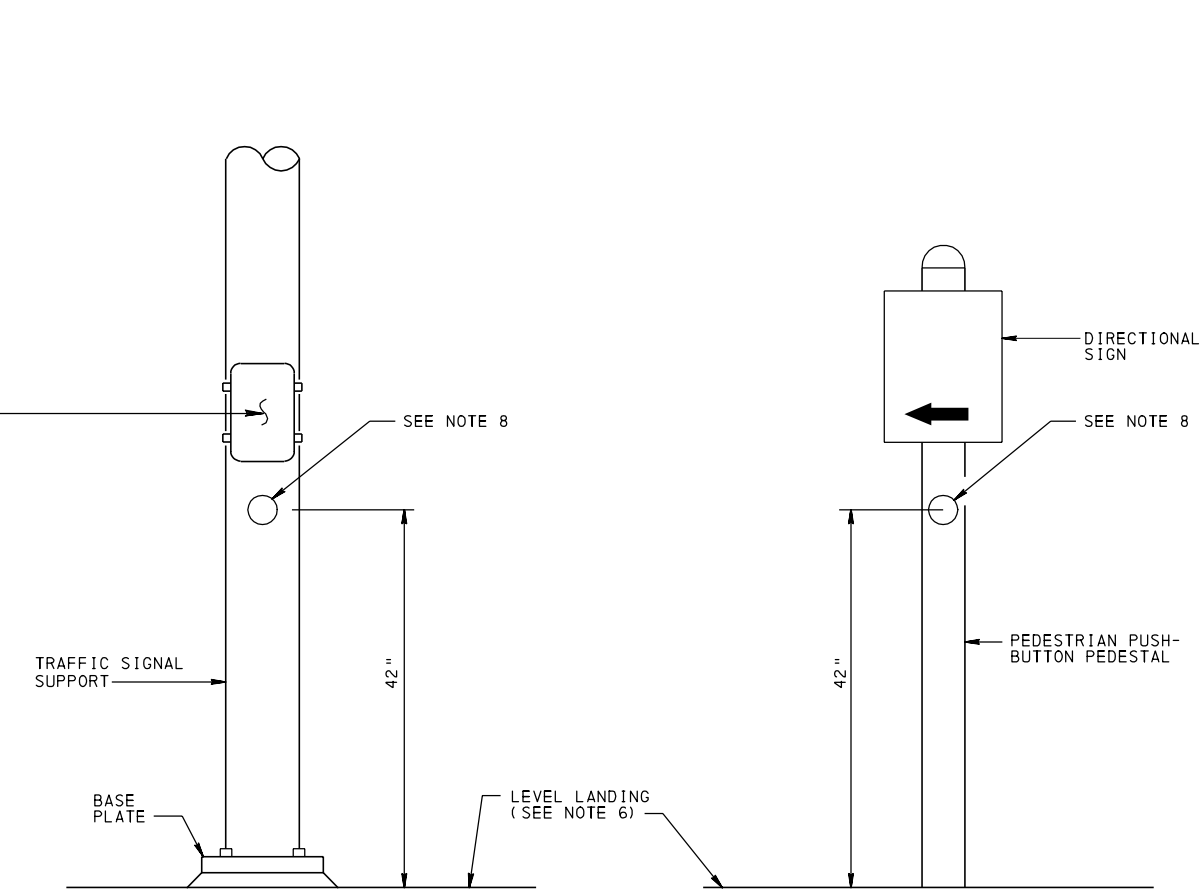
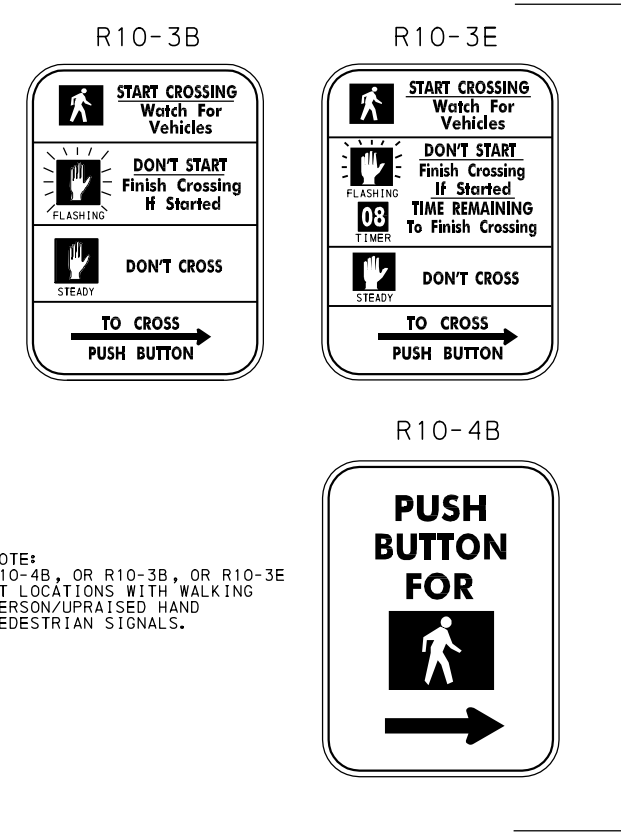
PLATE BASE

CAST BASE

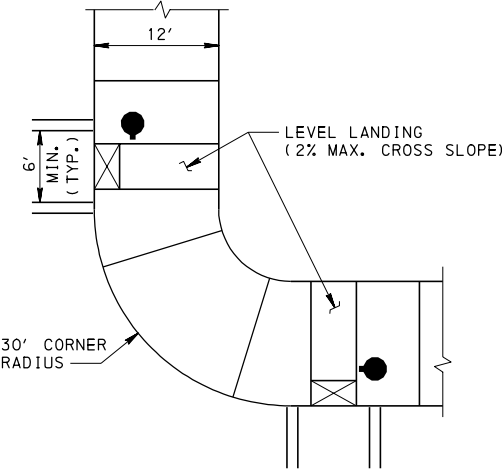
TRAFFIC SIGNAL SUPPORT-PEDESTAL

NOTES:

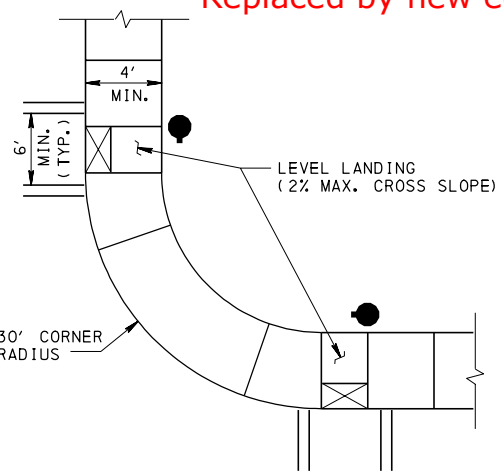
1. PROVIDE 24" MINIMUM CLEARANCE. IF THERE IS NO CURB, CLEARANCE IS FROM EDGE OF SHOULDER.
2. FOR DETAIL OF FOUNDATION, SEE TC-8801.
3. PROVIDE 3" x 5" HANDHOLE OPENING WITH A MINIMUM FRAME THICKNESS OF 3/8".
4. DIMENSIONS "M" AND "N" ARE FROM SIDEWALK. IF NO SIDEWALK, DIMENSIONS ARE FROM PAVEMENT GRADE AT CENTER OF ROADWAY. PROVIDE SPECIFIED DIMENSION "M" SUCH THAT CLEARANCE IS IN THE RANGE OF 8' MINIMUM, 19' MAXIMUM FOR TRAFFIC SIGNAL HEADS. PROVIDE SPECIFIED DIMENSION "N" SUCH THAT CLEARANCE IS IN THE RANGE OF 7' MINIMUM, 10' MAXIMUM FOR PEDESTRIAN SIGNAL HEADS.
5. IN A PAVED AREA, PLACE THE TOP OF THE FOUNDATION FLUSH WITH THE SURFACE OF THE ADJACENT PAVEMENT.
6. ALL ACCESSIBILITY FEATURES MUST BE COMPLIANT TO PENNDOT PUBLICATION 13M (DM-2), CHAPTER 6, PUBLICATION 72M (RC STANDARDS) CRITERIA AND PUBLICATION 149.
7. PEDESTRIAN PUSHBUTTONS SHALL BE OF A TYPE APPROVED BY THE DEPARTMENT AND LISTED IN PUBLICATION 35 (BULLITIN 15).
8. PEDESTRIAN PUSHBUTTONS SHOULD BE A MINIMUM OF 2" DIAMETER AND A FORCE PER ACTUATION THAT CANNOT EXCEED 5 LBS.
9. PROVIDE 4'-0" x 4'-0" MINIMUM LANDING WITH 2.00% MAXIMUM SLOPE IN ALL DIRECTIONS WHERE PEDESTRIANS PERFORM 180° TURNING MANEUVERS.



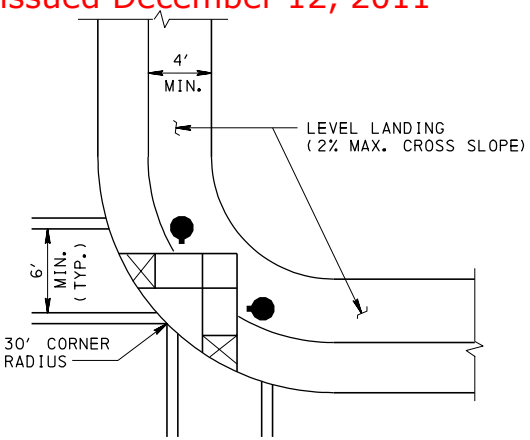
PEDESTRIAN PUSHBUTTON VERTICAL PLACEMENT



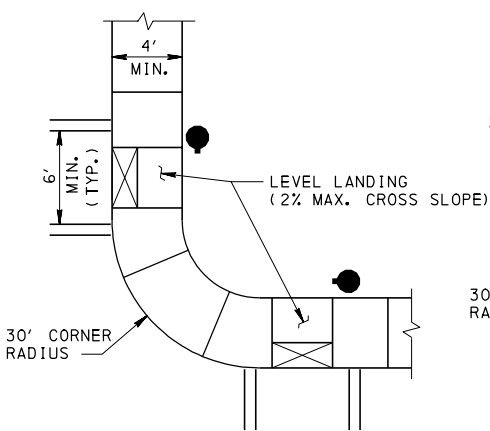
PARALLEL RAMPS WITH  
WIDE SIDEWALK



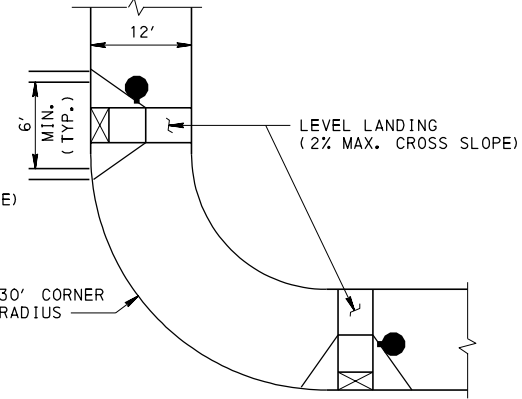
PARALLEL RAMPS WITH  
NARROW SIDEWALK



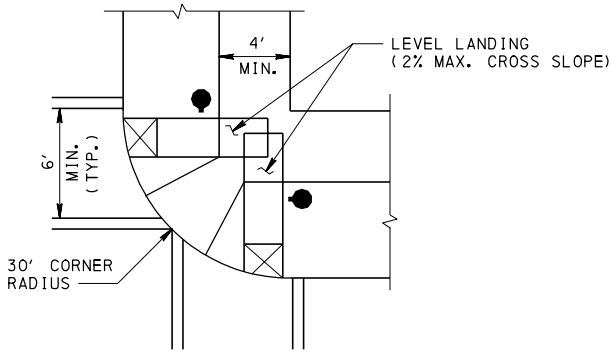
PERPENDICULAR RAMPS WITH  
SIDEWALK SET BACK FROM ROAD  
WITH CROSSWALKS CLOSE TOGETHER



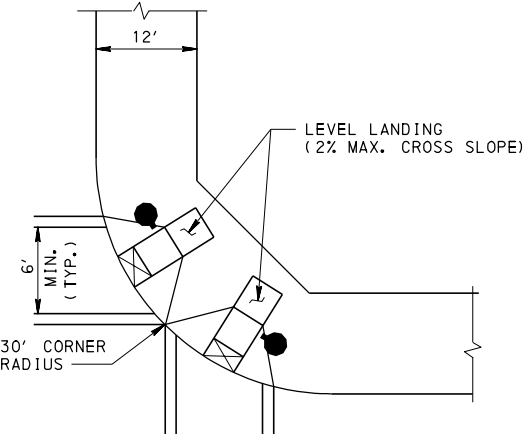
PARALLEL RAMPS WITH NARROW SIDEWALK  
AND TIGHT CORNER RADIUS



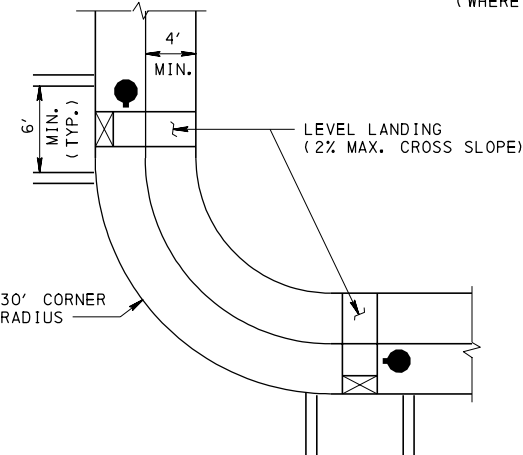
PERPENDICULAR RAMPS WITH  
CROSSWALKS FAR APART



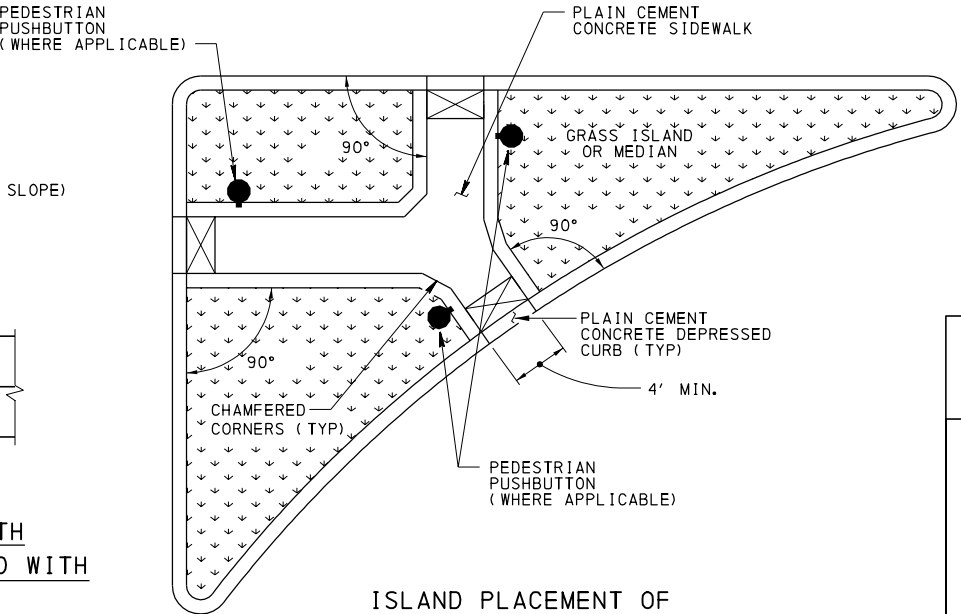
PERPENDICULAR RAMPS WITH  
SIDEWALK SET BACK FROM ROAD WITH  
CONTINUOUS SIDEWALK BETWEEN RAMPS



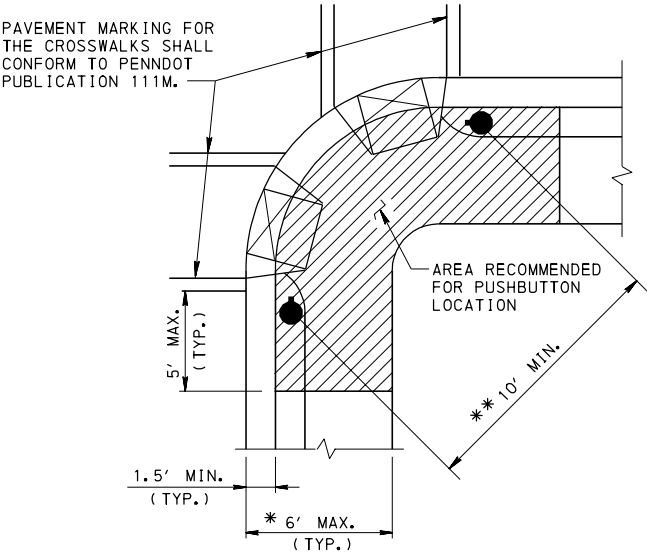
PERPENDICULAR RAMPS WITH  
CROSSWALKS CLOSE TOGETHER



PERPENDICULAR RAMPS WITH  
SIDEWALK SET BACK FROM ROAD WITH  
CROSSWALKS FAR APART



ISLAND PLACEMENT OF  
PEDESTRIAN PUSHBUTTONS



RECOMMENDED PUSHBUTTON LOCATIONS

- \* WHERE THERE ARE CONSTRAINTS THAT MAKE IT IMPRACTICAL TO PLACE THE PEDESTRIAN PUSHBUTTON BETWEEN 1.5' AND 6' FROM THE EDGE OF THE CURB, SHOULDER, OR PAVEMENT, IT SHOULD NOT BE FURTHER THAN 10' FROM THE EDGE OF CURB, SHOULDER, OR PAVEMENT.
- \*\* WHERE THERE ARE CONSTRAINTS ON A PARTICULAR CORNER THAT MAKE IT IMPRACTICAL TO PROVIDE 10' SEPARATION BETWEEN THE TWO PEDESTRIAN PUSHBUTTONS, THE PUSHBUTTONS MAY BE PLACED CLOSER TOGETHER OR ON THE SAME POLE.

LEGEND

- - PEDESTRIAN PUSHBUTTON
- ⊠ - DETECTABLE WARNING SURFACE

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STANDARD

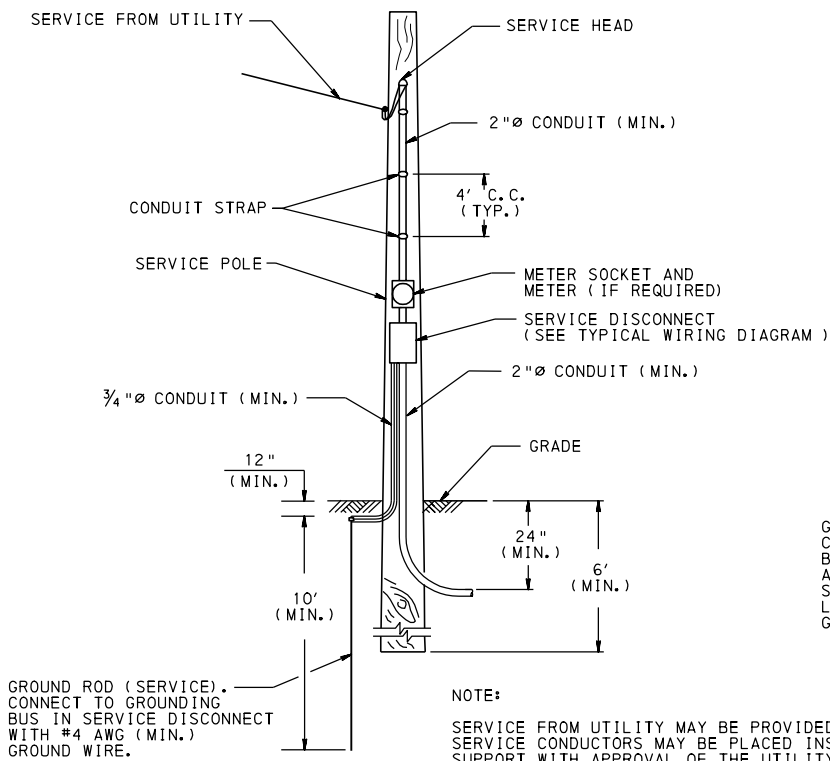
MISCELLANEOUS  
TYPICAL PEDESTRIAN PUSHBUTTON  
LOCATIONS

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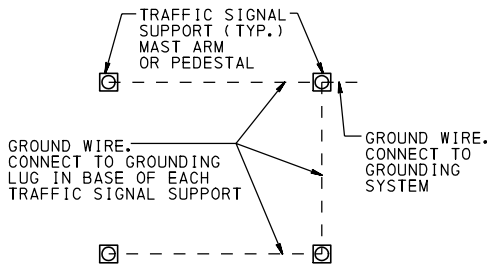
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SHT. 2 OF 2

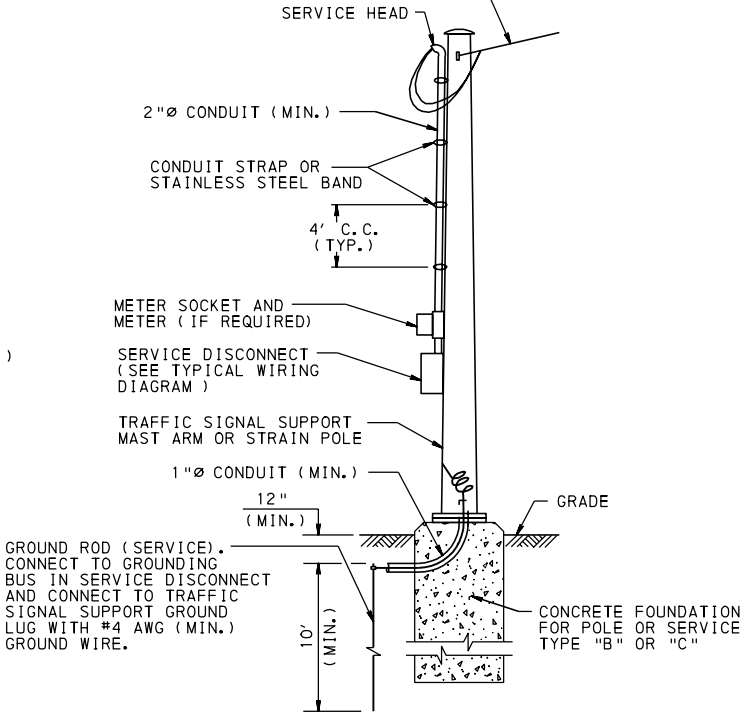
TC-8803



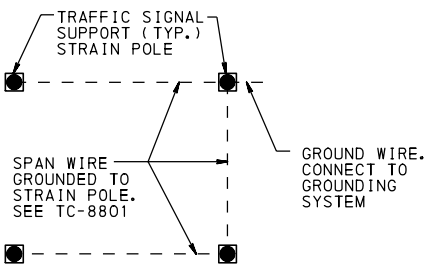
SERVICE TYPE A



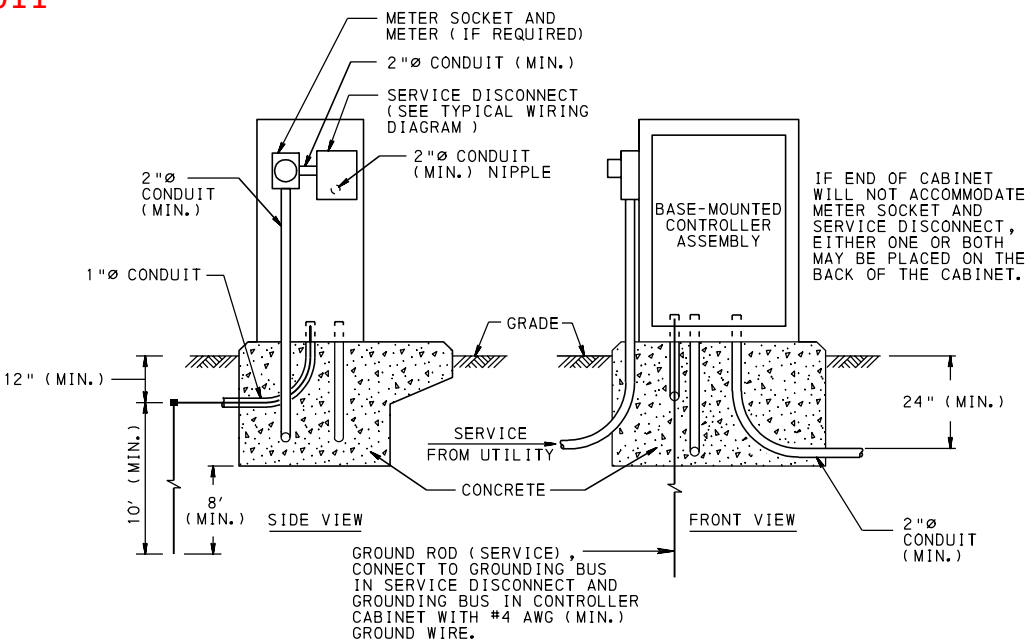
MAST ARM OR PEDESTAL SUPPORT



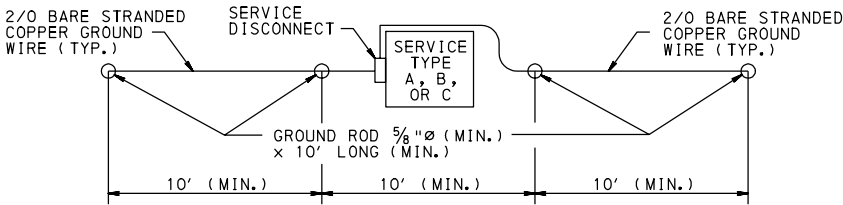
SERVICE TYPE B



STRAIN POLE SUPPORT



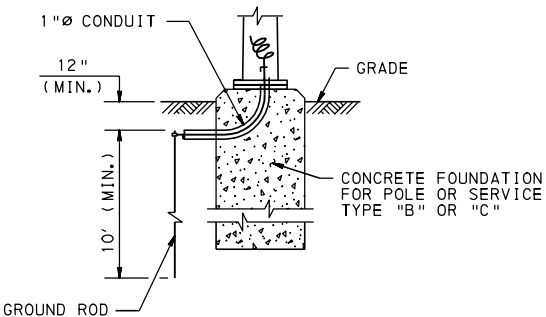
SERVICE TYPE C



SERVICE GROUNDING ELECTRODE SYSTEM

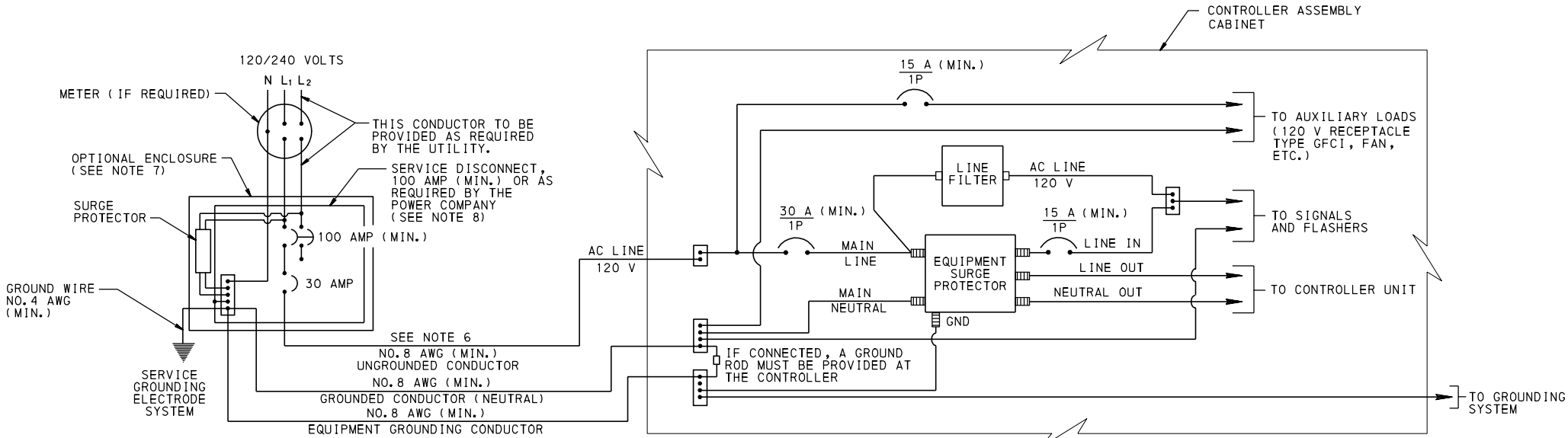
NOTE:

1. FOR DETAIL OF TRAFFIC SIGNAL SUPPORT FOUNDATION, SEE TC-8801.
2. FOR DETAIL OF CONTROLLER ASSEMBLY FOUNDATION, SEE TC-8802.
3. ALL GROUND RODS ARE 5/8" DIA. (MIN.) x 10' LONG (MIN.). USE EXOTHERMIC WELD OR BRONZE CONNECTOR TO CONNECT GROUND WIRE TO GROUND ROD.
4. INSTALL SERVICE TYPES A, B OR C AS APPROVED BY THE UTILITY COMPANY.
5. PROVIDE ALL SERVICE CONDUITS OF THE HDG RIGID METALLIC TYPE WITH WATERTIGHT CONDUIT HUBS.
6. REFER TO UTILITY'S SERVICE DETAIL WHEN UNMETERED LIGHTING IS INSTALLED ON TRAFFIC POLES. A SEPARATE DISCONNECT MAY BE REQUIRED.
7. PROVIDE THE SERVICE DISCONNECT INSIDE AN OPTIONAL ALUMINUM ENCLOSURE, WHERE INDICATED.
8. PROVIDE ADDITIONAL BREAKERS AS REQUIRED FOR LIGHTING LOADS.



DETAIL "Z"

GROUNDING SYSTEM



NOTE:

INSTALL GROUND RODS UNTIL IMPEDANCE IS LESS THAN 25 ohms

TYPICAL WIRING DIAGRAM

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF HIGHWAY SAFETY AND TRAFFIC ENGINEERING

STANDARD

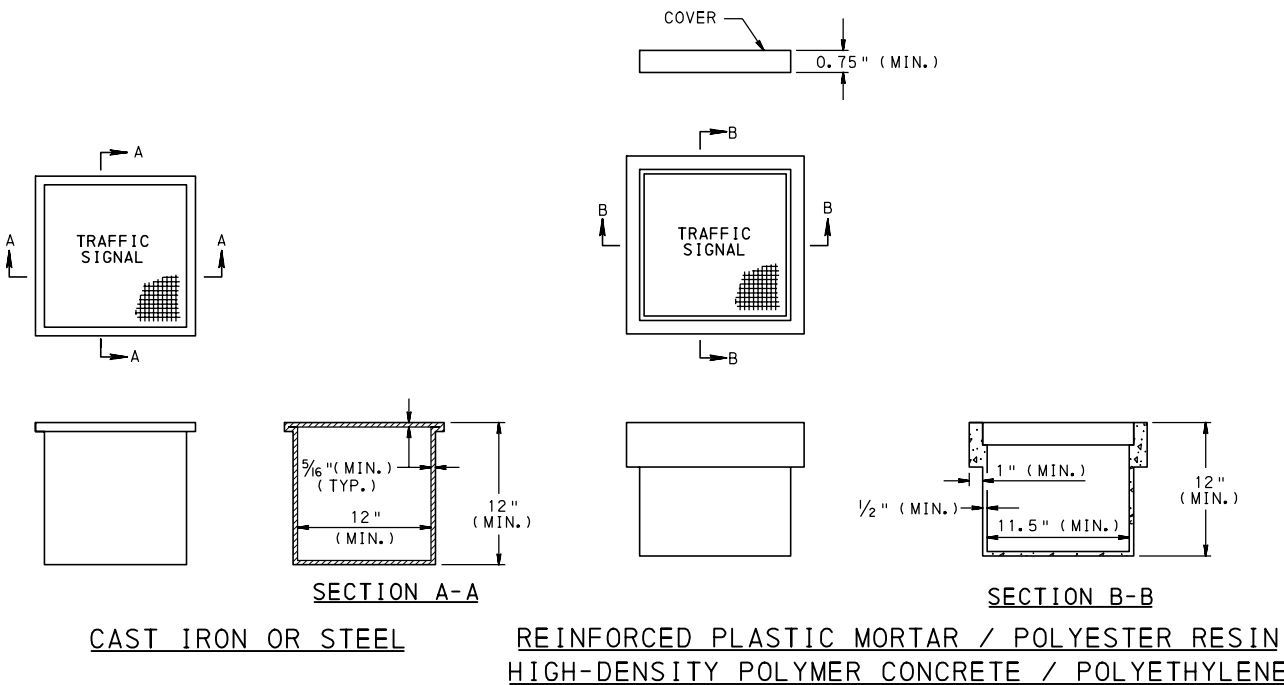
ELECTRICAL DISTRIBUTION

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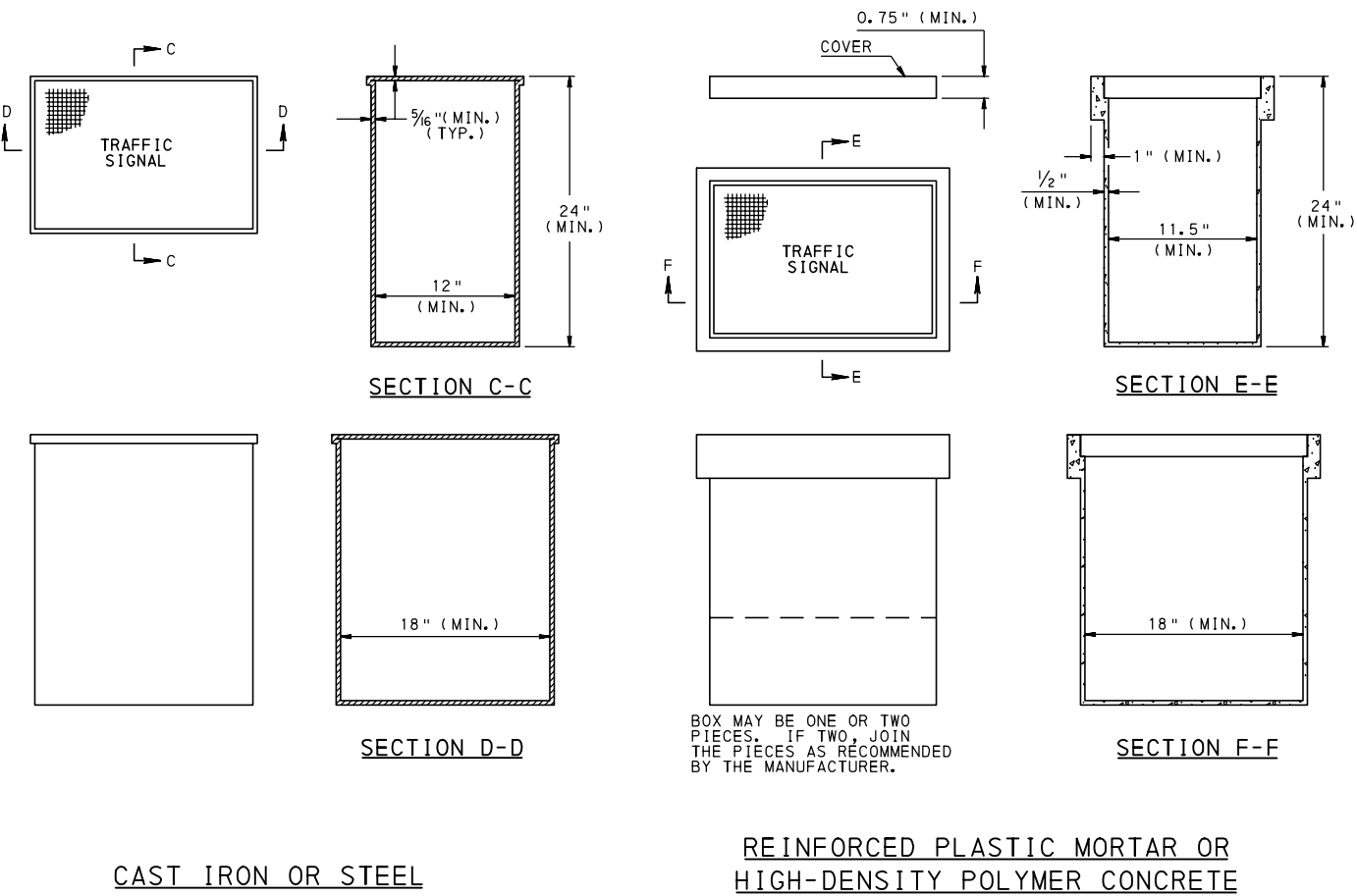
RECOMMENDED Oct. 14, 2010  
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SHT. 1 OF 2

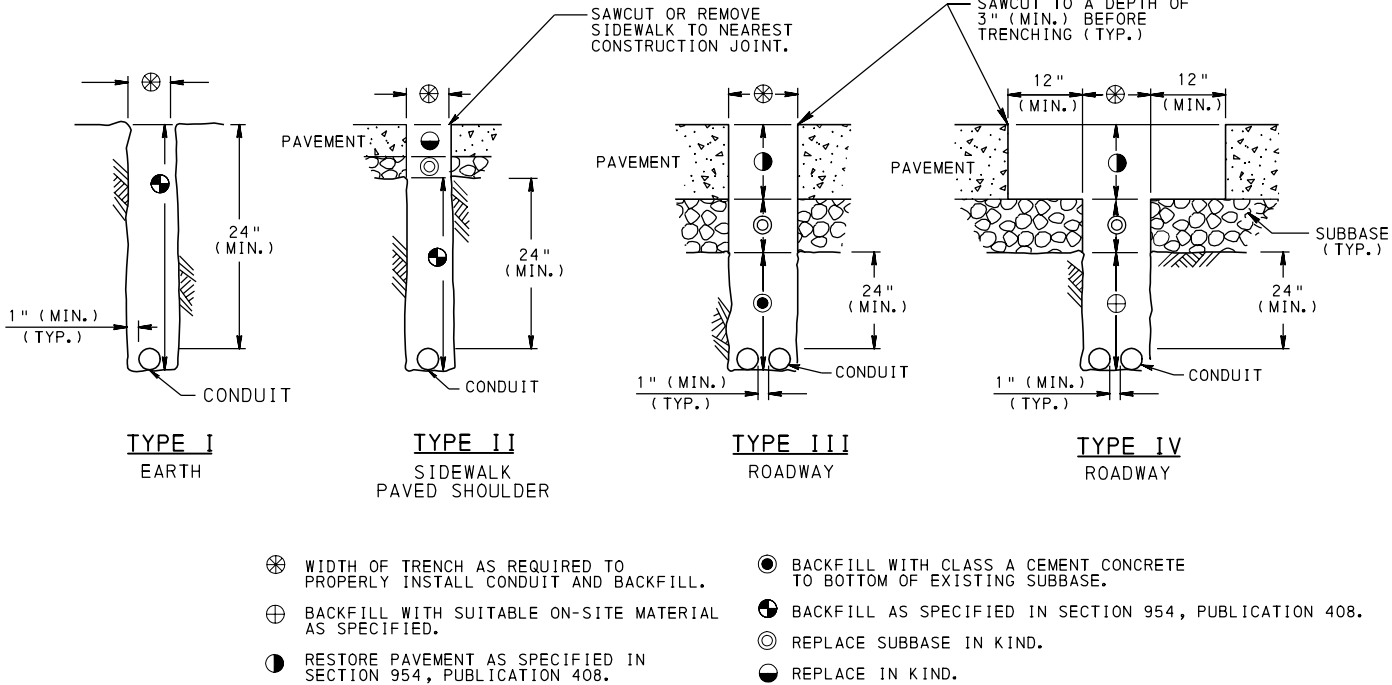
TC-8804



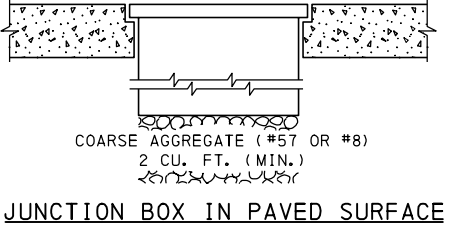
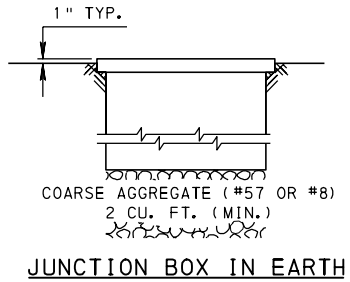
JUNCTION BOX, TYPE JB-26



JUNCTION BOX, TYPE JB-27



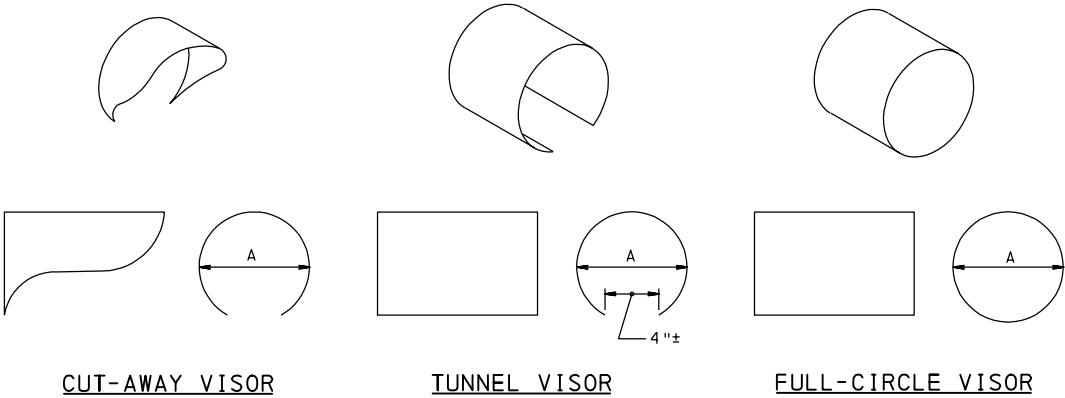
TRENCH AND BACKFILL



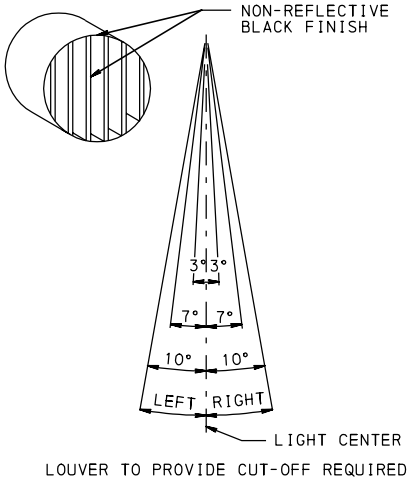
TYPICAL JUNCTION BOX  
INSTALLATION

- NOTES:
- JUNCTION BOXES -- PROVIDE COVER WITH A NON-SLIP SURFACE AND A MINIMUM OF TWO CORROSION RESISTANT FASTENERS.
  - JUNCTION BOXES -- USE JB-26 AND JB-27 ONLY IN AREAS NOT SUBJECT TO VEHICULAR TRAFFIC.
  - JUNCTION BOXES -- BOTTOM MAY BE OPEN OR CLOSED. IF CLOSED, PROVIDE A DRAIN HOLE 2" DIAMETER MINIMUM.
  - FOR DETAIL OF JUNCTION BOXES JB-1, JB-2, JB-11 AND JB-12, SEE STANDARD DRAWINGS, RC-81M AND RC-82M OF PENNDOT PUB. 72M.
  - GROUND EXPOSED METAL PARTS OF JUNCTION BOXES. USE GROUNDING LUGS. DO NOT CONNECT GROUND WIRE DIRECTLY TO LID.

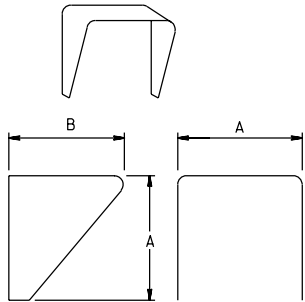
THE VISOR SHALL BE A MINIMUM OF 9.5" FOR A 12" SIGNAL LENS AND 7" FOR AN 8" SIGNAL LENS WITH A DOWNWARD TILT OF 3.5 DEGREES.



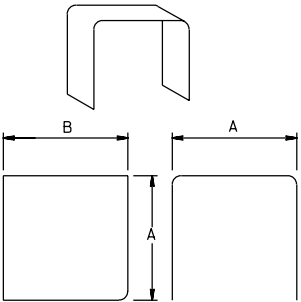
VISOR TYPES FOR VEHICULAR SIGNAL HEAD



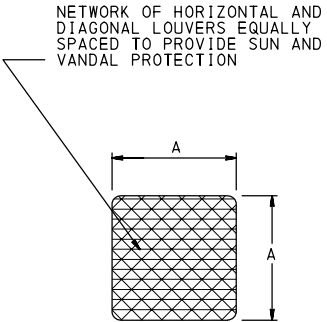
LOUVER FOR VEHICULAR SIGNAL HEAD  
(DO NOT USE WITH CUT-AWAY VISOR)



CUT-AWAY VISOR

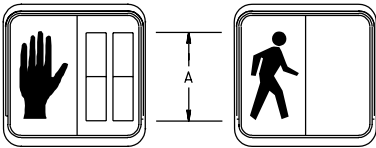


TUNNEL VISOR

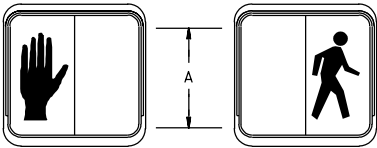


LOUVER VISOR  
(FOR PEDESTRIAN  
SIGNAL HEAD ONLY)

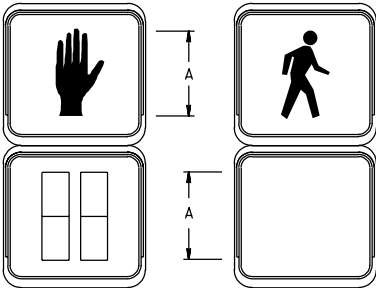
VISOR TYPES FOR PEDESTRIAN SIGNAL HEAD AND  
LANE-USE TRAFFIC CONTROL SIGNAL HEAD



ONE-SECTION

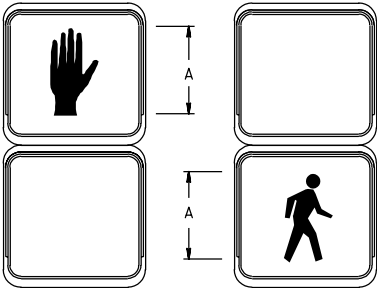


ONE-SECTION



TWO-SECTIONS

TYPE A  
(COUNTDOWN) \*



TWO-SECTIONS

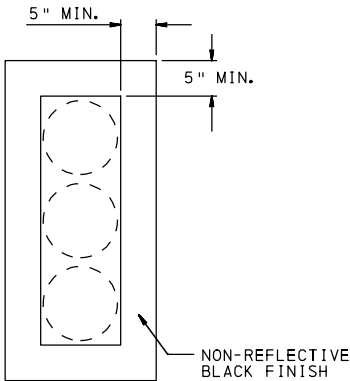
TYPE B  
(SYMBOL) \*\*

| TYPE | DIMENSION A |
|------|-------------|
| A    | 6" *        |
| B    | 6" **       |

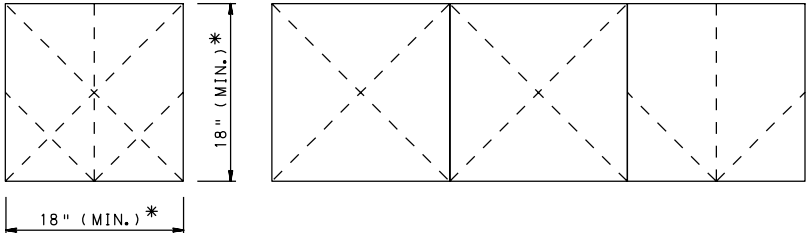
\* COUNTDOWN PEDESTRIAN SIGNALS SHALL CONSIST OF PORTLAND ORANGE NUMBERS THAT ARE AT LEAST 6" IN HEIGHT. FOR CROSSWALKS WHERE THE PEDESTRIAN ENTERS THE CROSSWALK MORE THAN 100' FROM THE COUNTDOWN PEDESTRIAN SIGNAL DISPLAY, THE NUMBERS SHOULD BE AT LEAST 9" IN HEIGHT.

\*\* FOR CROSSWALKS WHERE THE PEDESTRIAN ENTERS THE CROSSWALK MORE THAN 100' FROM THE PEDESTRIAN SIGNAL HEAD INDICATIONS, DIMENSION "A" SHOULD BE AT LEAST 9" HIGH.

PEDESTRIAN SIGNAL HEAD



BACKPLATE FOR VEHICULAR SIGNAL HEAD



ONE-SECTION

TWO OR THREE SECTIONS

\* NOMINAL. ACTUAL DIMENSIONS ARE AS REQUIRED TO PROVIDE SYMBOLS IN ACCORDANCE WITH ITE STANDARD FOR "LANE-USE TRAFFIC CONTROL SIGNAL HEADS" AND CURRENT ADDITION OF MUTCD.

LANE-USE TRAFFIC CONTROL SIGNAL HEAD

NOTE:

1. PEDESTRIAN SIGNALS MAY INCLUDE A COUNTDOWN TIMER THAT OPERATES DURING THE "FLASHING UPRaised HAND" PHASE.

COMMONWEALTH OF PENNSYLVANIA  
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BUREAU OF HIGHWAY SAFETY AND TRAFFIC ENGINEERING

STANDARD

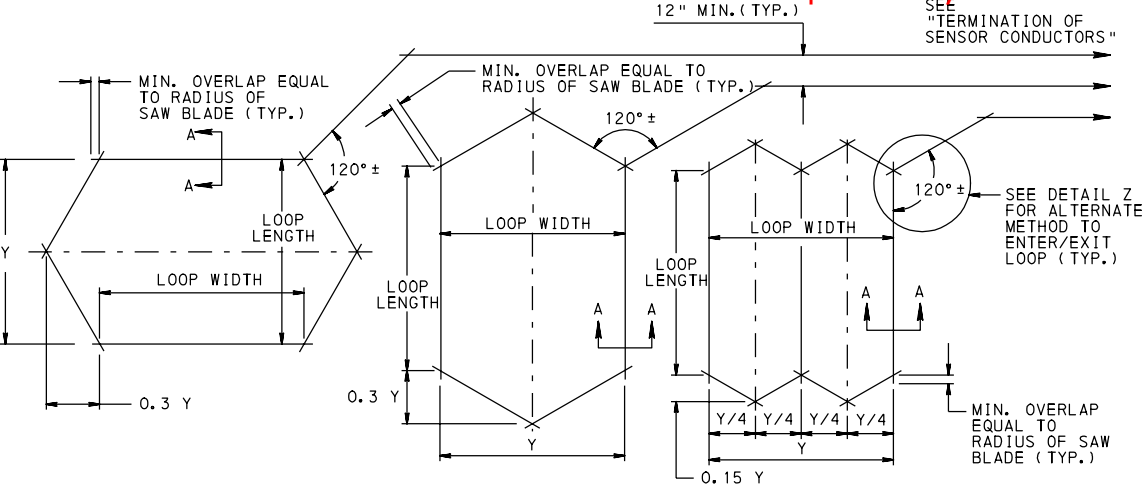
SIGNAL HEADS

RECOMMENDED Oct. 14, 2010  
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RECOMMENDED Oct. 14, 2010  
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TC-8805

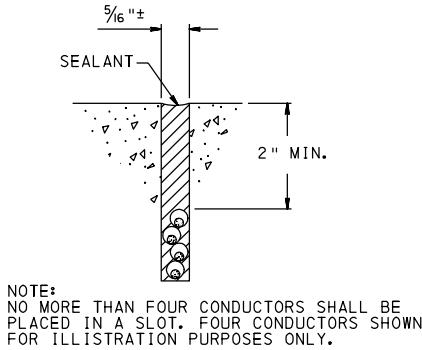


LOOP TYPE I  
WIDTH > LENGTH

LOOP TYPE II  
WIDTH < LENGTH

LOOP TYPE III

TYPICAL SENSOR INSTALLATION - LOOP DETECTOR

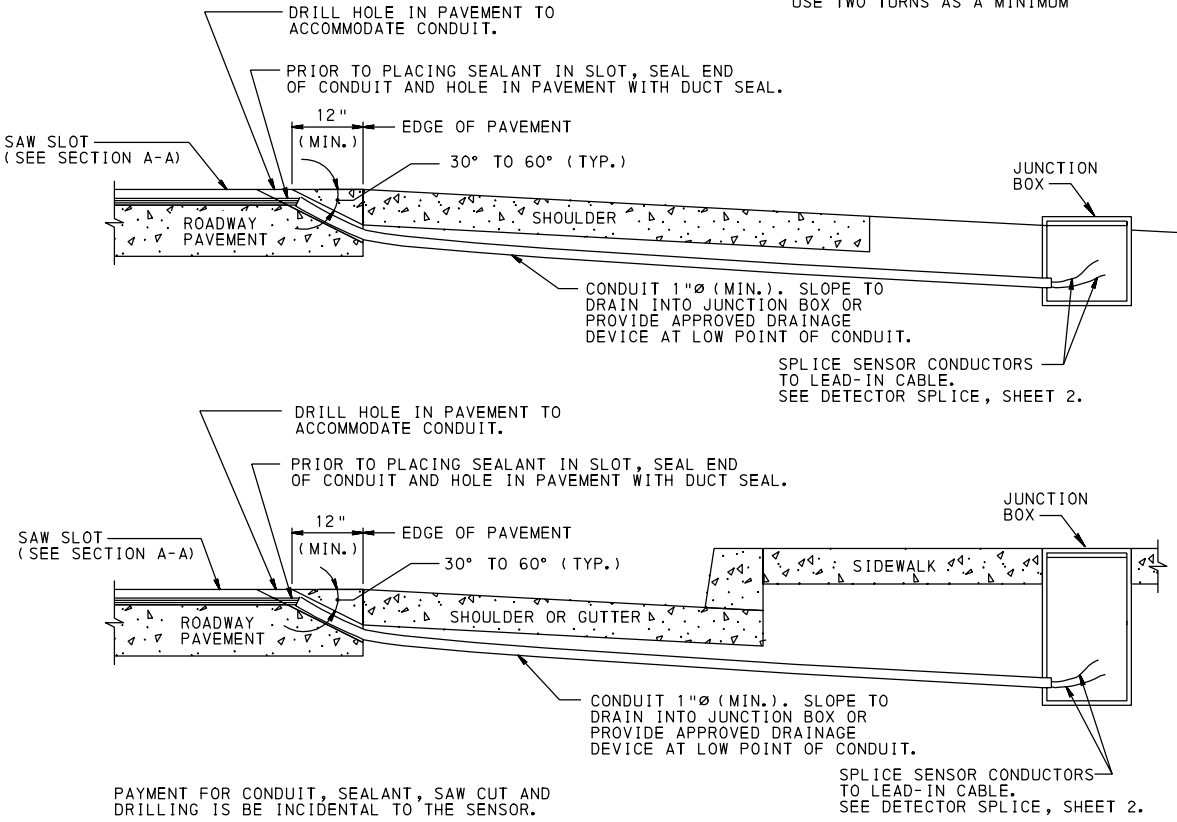


SECTION A-A

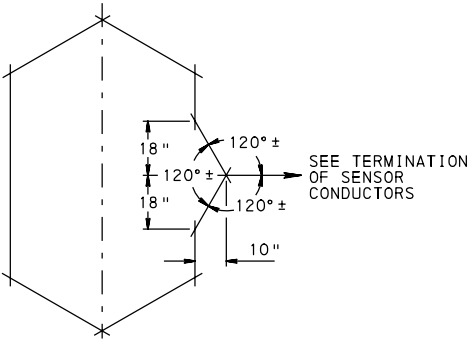
THIS TABLE (FOR INFORMATION ONLY) APPROXIMATES THE RESULTANT INDUCTANCE OF A LOOP BASED ON SIZE OF THE LOOP AND NUMBER OF SENSOR TURNS.

| LOOP SIZE (FT) | LOOP INDUCTANCE (MICROHENRIES) |     |     |
|----------------|--------------------------------|-----|-----|
|                | NUMBER OF TURNS                |     |     |
|                | 2                              | 3   | 4   |
| 5' x 5'        | ---                            | 62  | 104 |
| 6' x 6'        | ---                            | 76  | 129 |
| 6' x 10'       | 51                             | 107 | 181 |
| 6' x 15'       | 69                             | 147 | 249 |
| 6' x 20'       | 88                             | 187 | 320 |
| 6' x 22'       | 96                             | 204 | 349 |
| 6' x 25'       | 107                            | 229 | 392 |
| 6' x 30'       | 126                            | 272 | 461 |
| 6' x 35'       | 146                            | 315 | 542 |
| 6' x 40'       | 165                            | 359 | 618 |
| 6' x 45'       | 185                            | 402 | 695 |
| 6' x 50'       | 205                            | 447 | 773 |

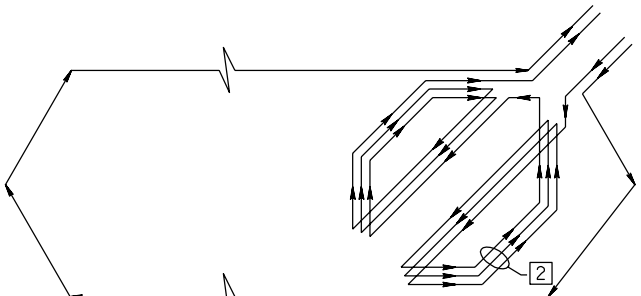
USE TWO TURNS AS A MINIMUM



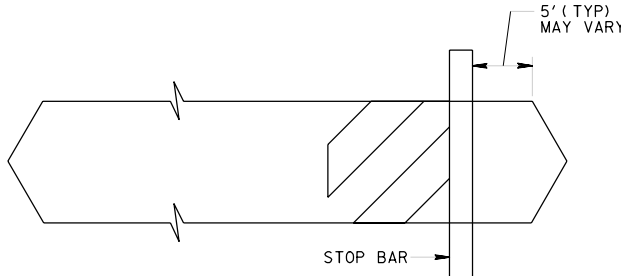
TERMINATION OF SENSOR CONDUCTORS



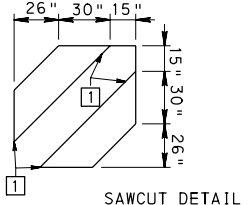
DETAIL Z



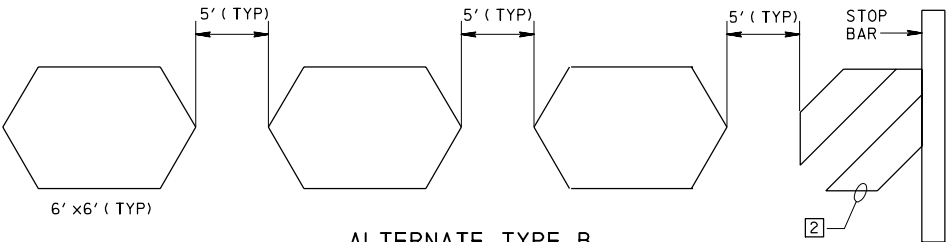
DETECTOR WIRING DETAIL



ALTERNATE TYPE A  
DETECTOR LAYOUT



DETECTOR SAWCUT DETAIL



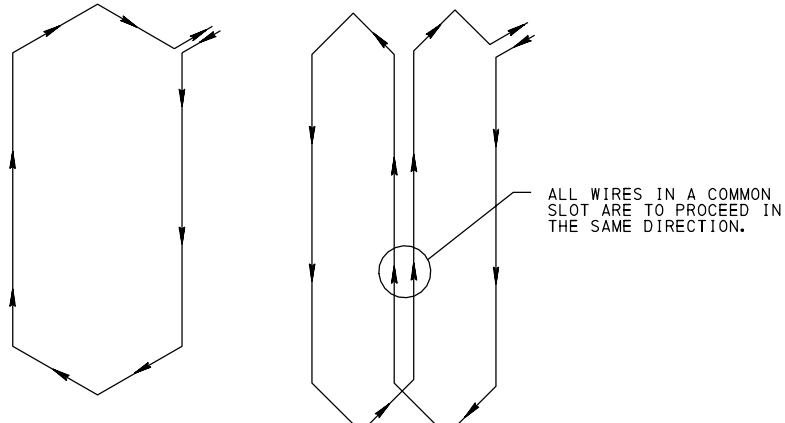
ALTERNATE TYPE B  
SERIES LAYOUT

ALTERNATE DETECTOR NOTES:

- 1 ROUND CORNERS OF ACUTE SAWCUTS TO PREVENT DAMAGE TO CONDUCTORS.
- 2 INSTALL 3 TURNS WHEN ONLY ONE LOOP IS ON A SENSOR UNIT CHANNEL. INSTALL 5 TURNS WHEN ONE LOOP IS CONNECTED IN SERIES WITH 3 ADDITIONAL 6' x 6' LOOPS ON A SENSOR UNIT CHANNEL.

ALTERNATE SENSOR INSTALLATION - LOOP DETECTOR

FOR ENHANCED BICYCLE AND MOTORCYCLE DETECTION



TYPES I & II

TYPE III

TYPICAL LAYOUT OF LOOP SENSOR

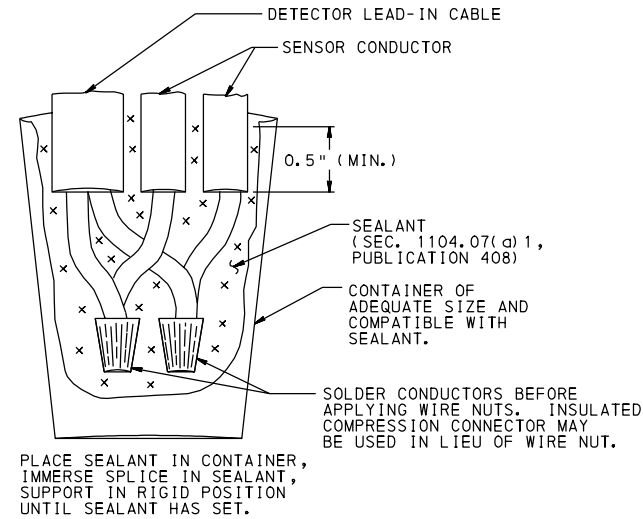
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF HIGHWAY SAFETY AND TRAFFIC ENGINEERING

STANDARD  
  
DETECTORS

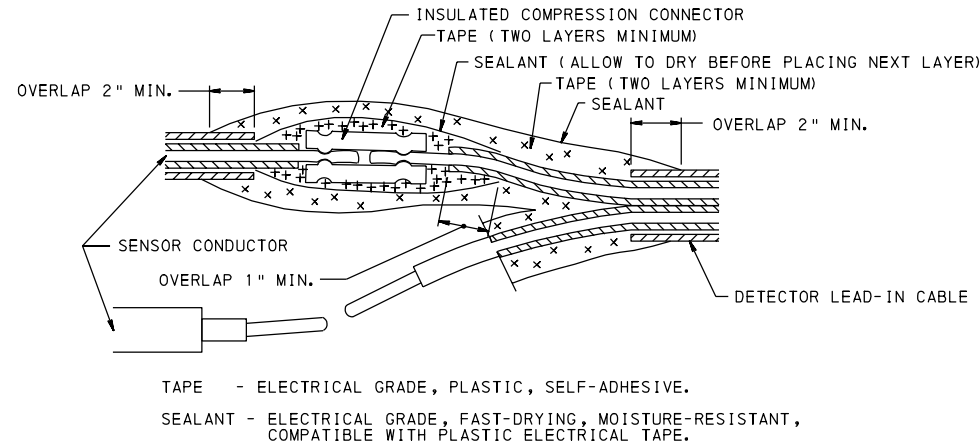
RECOMMENDED Oct. 14, 2010  
*Sen C. Brown*  
CHIEF, TRANSPORTATION OPERATIONS DIVISION

RECOMMENDED Oct. 14, 2010  
*Angela R. L. L.*  
ACTING DIR. BUR. OF HIGHWAY SAFETY AND TRAFFIC ENGINEERING

SHT. 1 OF 2  
TC-8806



ALTERNATE A

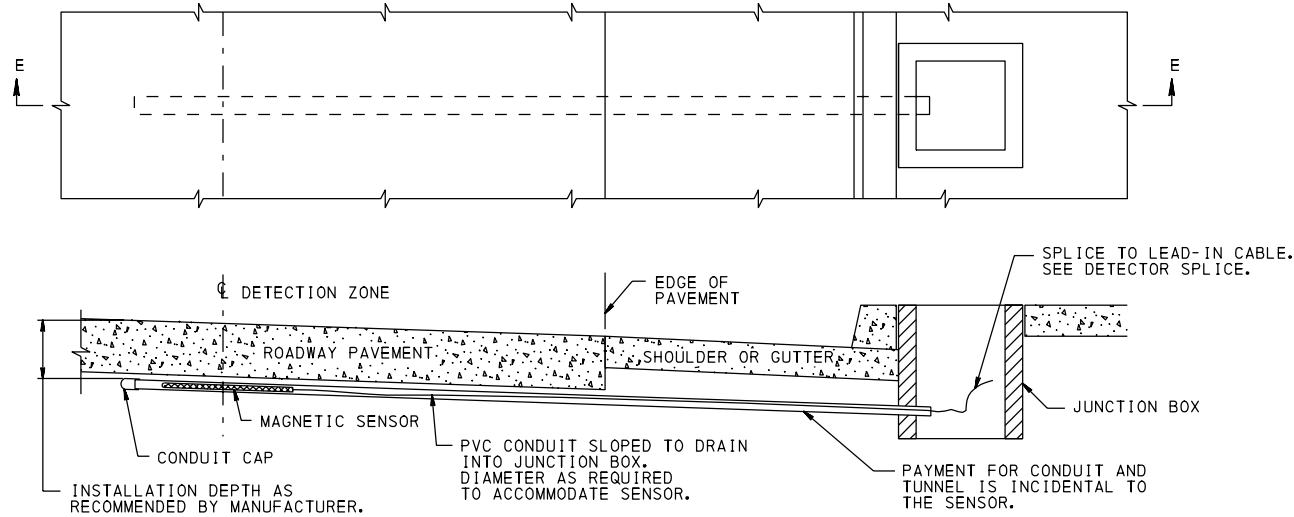


ALTERNATE B

ALTERNATE C SPLICE WILL BE MADE ELECTRICALLY SECURE WITH INSULATED COMPRESSION CONNECTORS THEN COVERED WITH A SPLICING KIT THAT IS MOISTURE-PROOF, SPLICE ENCAPSULATING (INCLUDING CABLE JACKET), AND DESIGNED FOR INSULATING AND SPLICING ELECTRIC CABLE; OR A RE-ENTERABLE SPLICE KIT AS SPECIFIED IN SEC. 1104.07(g) 4, PUBLICATION 408.

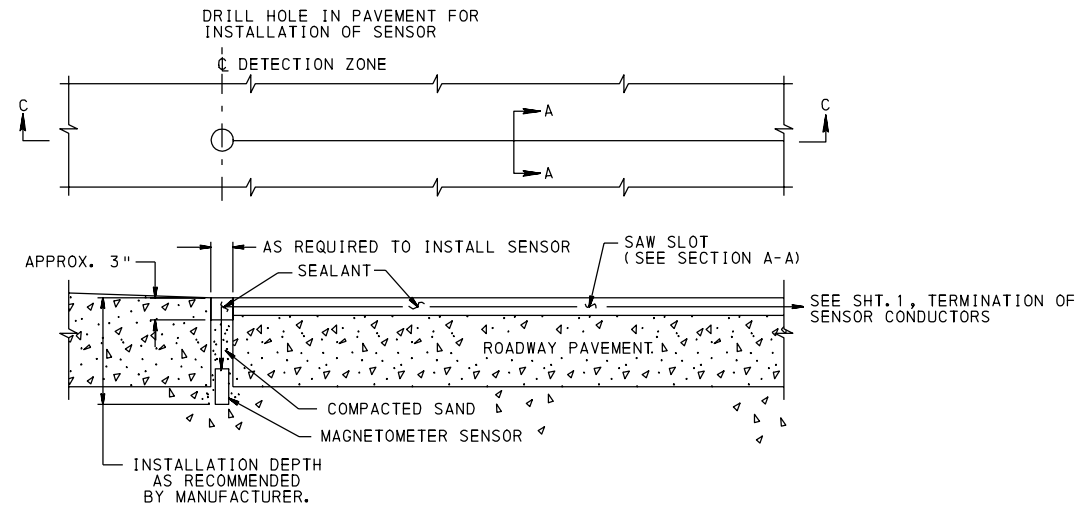
ALTERNATE C

DETECTOR SPLICE



SECTION E-E

TYPICAL SENSOR INSTALLATION - MAGNETIC DETECTOR



SECTION C-C

TYPICAL SENSOR INSTALLATION - MAGNETOMETER DETECTOR

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF HIGHWAY SAFETY AND TRAFFIC ENGINEERING

STANDARD

DETECTORS

RECOMMENDED Oct. 14, 2010  
Sen C. Romo  
CHIEF, TRANSPORTATION OPERATIONS  
DIVISION

RECOMMENDED Oct. 14, 2010  
D. R. S. S. S.  
ACTING DIR. BUR. OF HIGHWAY  
SAFETY AND TRAFFIC ENGINEERING

SHT. 2 OF 2

TC-8806