OS-299 (7-08)

pennsylvania
DEPARTMENT OF TRANSPORTATION

TRANSMITTAL LETTER

PUBLICATION: 148

DATE: 12/12/2011

SUBJECT:

Traffic Standards - Signals (TC-8800 Series)

INFORMATION AND SPECIAL INSTRUCTIONS:

Project Development:

The accompanying revisions become effective December 21, 2011 or earlier as directed by the District Executive, for all projects with traffic signal supports as follows:

- All Department projects that have not submitted Plans, Specifications, and Estimate packages prior to effective date.
- All Highway Occupancy Permits or Municipal projects that do not have an approved Traffic Signal Permit prior to the effective date.

Shop Drawing Review:

In addition to the revisions made to the standards, , Publication 35, Bulletin 15 (Approved Construction Materials) Section 1104.02, will also be updated accordingly to indicate those manufacturers who have been recertified to provide traffic signal supports meeting the new criteria. Drawings for the approved manufacturers are available for Department representatives for reviewing and approving shop drawings. The approved manufacturer drawings are available at: ftp://ftp.dot.state.pa.us/transfer/Traffic Signals/Traffic Signal Structrual Supports/.

Maintenance:

If a traffic signal structural support needs to be replaced due to knockdown, the Department will allow the traffic signal structural support to be reinstalled using the standard in place at the time of initial installation. If the foundation needs to be modified or replaced as part of a knockdown, then the 2011 updated standard should be followed.

CANCEL AND DESTROY THE FOLLOWING:

This will replace the 10/14/2010 Publication 148 (Traffic Standards - Signals (TC-8800 Series)

ADDITIONAL COPIES ARE AVAILABLE FROM:

☒ PennDOT SALES STORE
(717) 787-6746 phone
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APPROVED FOR ISSUANCE BY:

Daryl St. Clair, P.E. /s

The following are changes from the October 14, 2010 update:

Traffic Control Standard #	Sheet #	Description of the Change
TC-8800 Series		All of the sheets have been updated to reflect the PennDOT reogranization which is expected in the upcoming weeks.
TC-8801	Sheet 1	An additional general note has been added to indicated that a mitigation device should be placed on sign mast arms over 50-feet.
TC-8801	Sheet 1	An additional general note has been added to indicate the limitations of a dual mast arm installation.
TC-8801	Sheet 3	The anchor bolt lengths have been modified to reflect appropriate design lengths instead of a 6-foot anchor bolt for all situations.
TC-8801	Sheet 3	The foundation design criteria has been modified addressing concerns that the previous traffic signal foundations were too conservative.
TC-8801	Sheet 3	Traffic signal pedestal supports are permitted to have a 4-anchor bolt configuration. The Traffic Signal Support Mast Arm and Strain Pole will still require 6-anchor bolts for new installations.
TC-8801	Sheet 3	Three additional rock cases have been added and are more clearly defined on sheet 4.
TC-8801	Sheet 3	An additional foundation note has been added providing instructions if weak soil conditions are encountered.
TC-8801	Sheet 4	An additional Note has been added referencing the additional pedestrian pushbutton details in TC-8803.
TC-8801	Sheet 4	An additional note indicating the Alternate Type A foundation details has been added.
TC-8801	Sheet 4	The foundation depths and associated notes are provided on Sheets 5 and 6.
TC-8801	Sheet 4	Three additional Rock cases have been added to provide alternative foundation depths when rock is encountered.
TC-8801	Sheet 4	The closed tie detail has been updated to eliminate the hooks.
TC-8801	Sheet 5	All of the Mast Arm and Pedestal Foundation Type A depths are indicated for all of the standard cases.
TC-8801	Sheet 6	All of the Strain Pole Foundation Type A depths are indicated for all of the standard cases.
TC-8801	Sheet 7	A new sheet has been added addressing an alternative reduced foundation diameter. The Bureau of Maintenance and Operations approval would be required to use this foundation alternative.
TC-8801	Sheet 9	The aluminum Z dimensions have been updated.
TC-8801	Sheet 9	The galvanized steel U-bolt nuts and lock washers dimensions contained within Note 5 have been updated.
TC-8801	Sheet 10	The handhole detail has been updated.
TC-8801	Sheet 10	A mitigation device detail has been added.
TC-8803	Sheet 1	An additional Note referencing the pedestrian pushbutton mounting details has been added.
TC-8803	Sheet 1	The pedestrian push button height requirements have been updated.
TC-8803	Sheet 2 and 3	Two additional sheets with 6 types of pedestrian pushbutton pole installation details have been added.
TC-8803	Sheet 2 and 3	An additional Note defining the pedestrian pushbutton extension requirements has been added.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION

pennsylvania

DEPARTMENT OF TRANSPORTATION

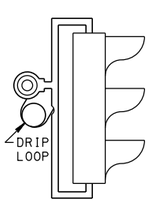
TRAFFIC STANDARDS – SIGNALS
TC–8800 SERIES

BUREAU OF MAINTENANCE AND OPERATIONS

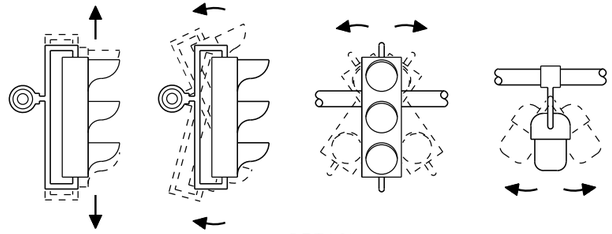
PUB. 148 (DEC. 2011)

INDEX OF TRAFFIC STANDARDS - SIGNALS

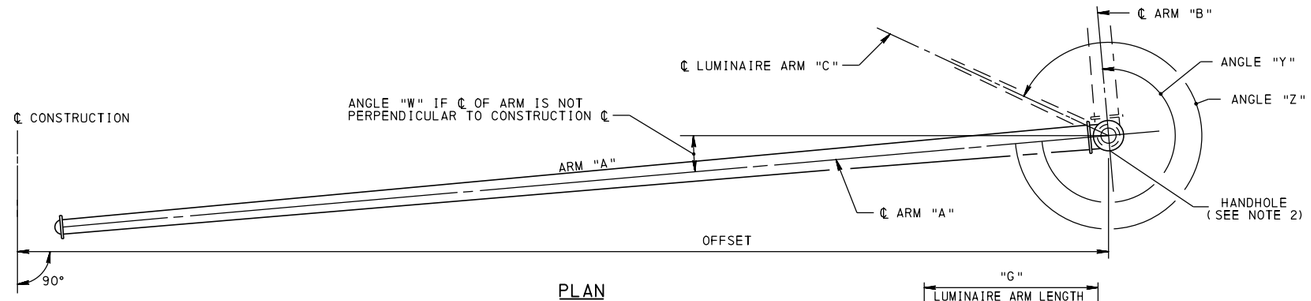
STANDARD DRAWING NO.	DATE	DESCRIPTION
TC-8801 (10 SHEETS)	DEC. 12, 2011	TRAFFIC SIGNAL SUPPORT
TC-8802	DEC. 12, 2011	CONTROLLER ASSEMBLY
TC-8803 (4 SHEETS)	DEC. 12, 2011	MISCELLANEOUS
TC-8804 (2 SHEETS)	DEC. 12, 2011	ELECTRICAL DISTRIBUTION
TC-8805	DEC. 12, 2011	SIGNAL HEADS
TC-8806 (2 SHEETS)	DEC. 12, 2011	DETECTORS



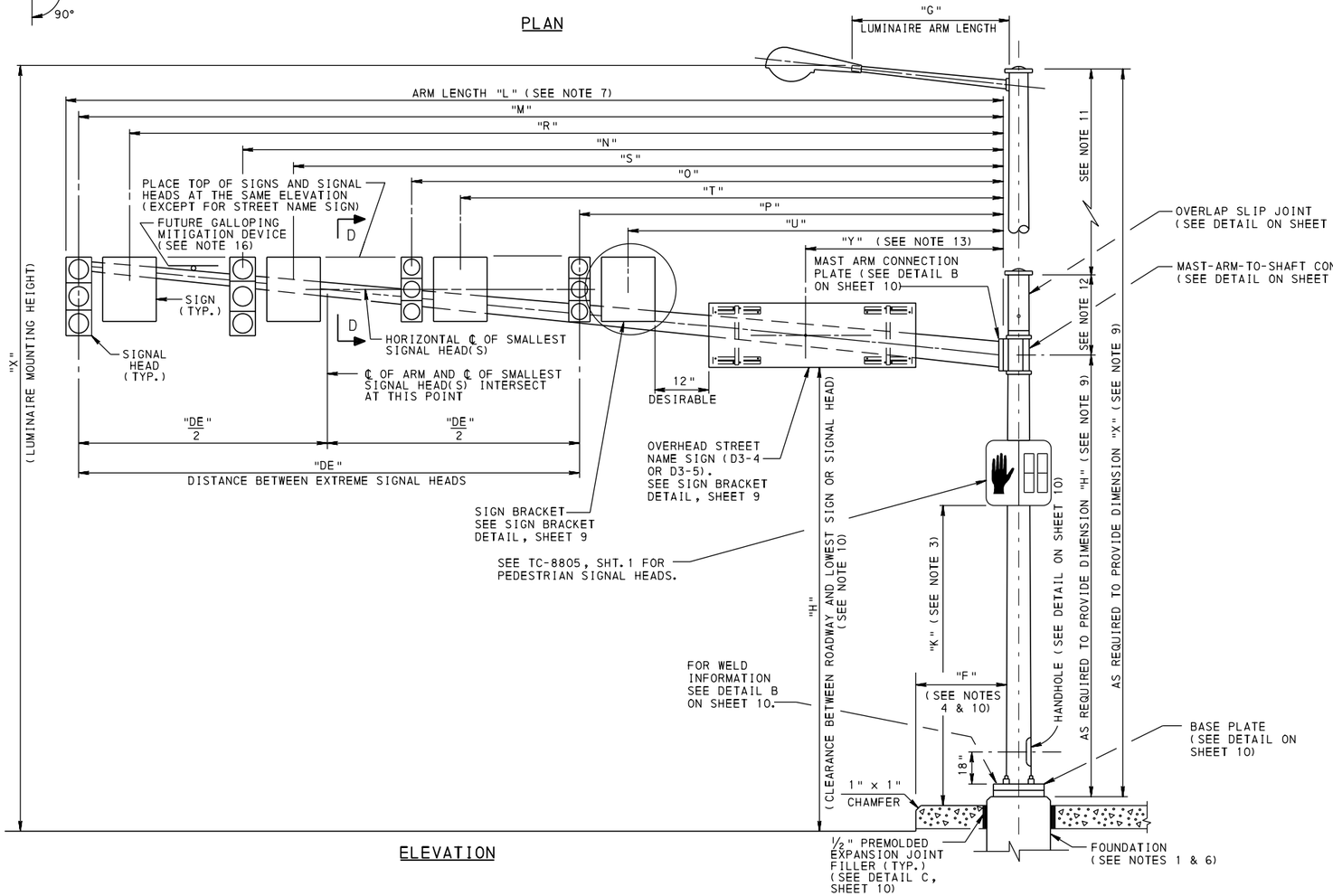
SECTION D-D



DETAIL A



PLAN



ELEVATION

GENERAL NOTES:

1. FOR FOUNDATION DETAILS, SEE SHEETS 3 THROUGH 8.
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 PUBLICATION 149, "CRITERIA FOR THE DESIGN OF TRAFFIC SIGNAL SUPPORTS".
14. FOR QUANTITY, SIZE, SIZE OF HOLES AND BOLT CIRCLE FOR ANCHOR BOLTS, SEE SHEET 3.
15. INSTALL MITIGATION DEVICE FOR MAST ARMS 50′ OR LONGER WITH SIGNS ONLY. FOR MITIGATION DEVICE DETAIL, SEE SHEET 10. (INCIDENTAL TO MAST ARM ITEM)
16. 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. PROVIDE GALLOPING MITIGATION DEVICE IN ACCORDANCE WITH PUB 408, SECTION 1104.02 (b) 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.
17. THE ANCHOR BOLT DIAMETERS, ANCHOR BOLT CIRCLES AND FOUNDATIONS PRESENTED IN THESE STANDARDS ARE APPLICABLE FOR ONE MAST ARM CONFIGURATIONS AND TWO MAST ARMS CONFIGURATIONS WHEN THE MAST ARMS ARE PERPENDICULAR TO ONE ANOTHER. ADDITIONAL STRUCTURAL ANALYSIS IS REQUIRED FOR THE ANCHOR BOLT DIAMETERS, ANCHOR BOLT CIRCLES AND FOUNDATIONS FOR TWO MAST ARMS AT ACUTE OR OBTUSE ANGLES TO EACH OTHER.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF MAINTENANCE AND OPERATIONS

STANDARD

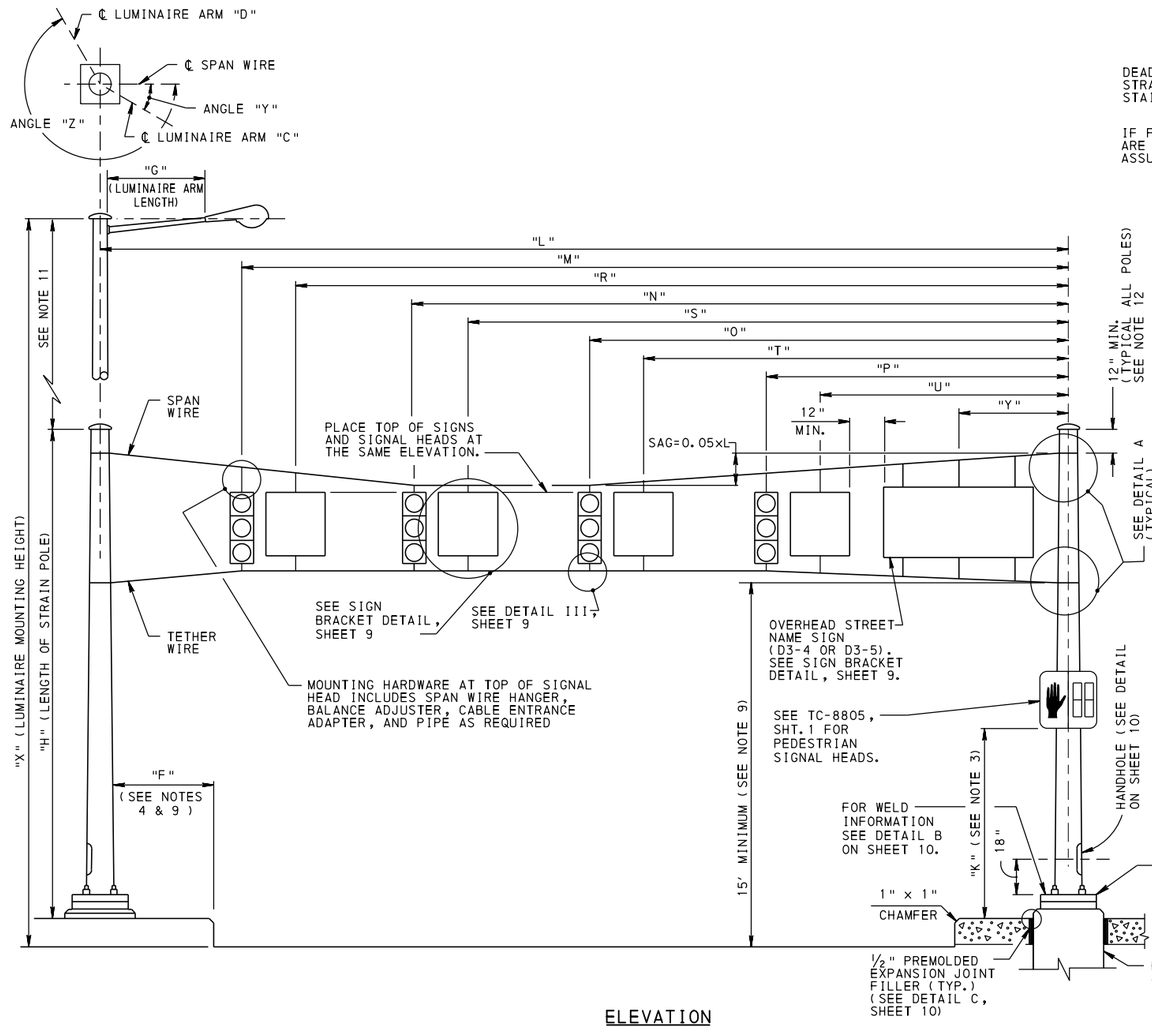
TRAFFIC SIGNAL SUPPORT

MAST ARM

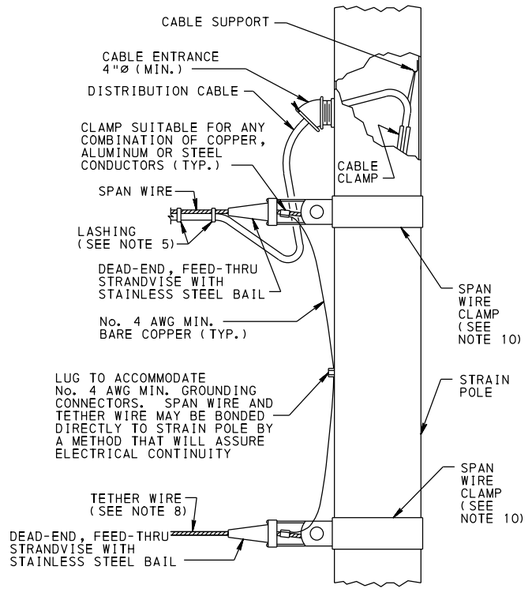
RECOMMENDED DEC. 12, 2011 CHIEF, TRAFFIC OPERATIONS SECTION	RECOMMENDED DEC. 12, 2011 CHIEF OF HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION	SHEET 1 OF 10 TC-8801

MINIMUM BREAKING STRENGTH OF SPAN WIRE

NOM. DIA. OF SPAN WIRE	ASTM A 475, CLASS A, SIEMENS-MARTIN GRADE	ASTM B 416
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

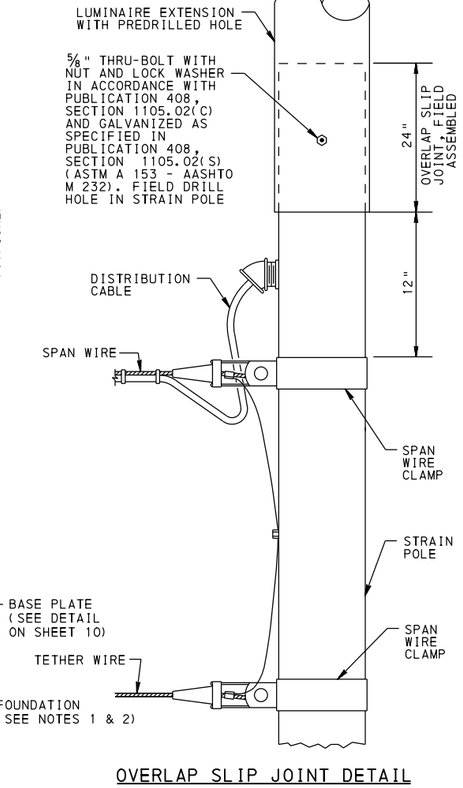


ELEVATION



IF FOR ANY REASON SPAN WIRE OR TETHER WIRE ARE NOT CONTINUOUS, PROVIDE A JUMPER TO ASSURE ELECTRICAL CONTINUITY

DETAIL A



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

GENERAL NOTES:

1. FOR FOUNDATION DETAILS, SEE SHEETS 3 THROUGH 7.
2. INSTALL A MINIMUM OF ONE GROUND ROD AT EACH FOUNDATION, SEE TC-8804, SHT. 1.
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. 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.
6. PROVIDE DEAD-ENDS THAT DEVELOP THE STRENGTH OF THE SPAN WIRE.
7. FOR QUANTITY, SIZE, SIZE OF HOLES AND BOLT CIRCLE FOR ANCHOR BOLTS, SEE SHEET 3.
8. TETHER WIRE - 1/4" DIAMETER (NOMINAL) WITH A BREAKING STRENGTH OF 1900 lbs MEETING ASTM A 475, CLASS A, COMMON GRADE.
9. PROVIDE SPECIFIED CLEARANCE IN ACCORDANCE WITH PUBLICATION 149 AND THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES".
10. EACH SPAN OR TETHER WIRE WILL HAVE AN INDIVIDUAL SPAN WIRE CLAMP.
11. 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.
12. IF SPECIFIED, PROVIDE 36" MINIMUM STUB TO ALLOW FUTURE LUMINAIRE ATTACHMENT VIA OVERLAP SLIP JOINT.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF MAINTENANCE AND OPERATIONS

STANDARD

TRAFFIC SIGNAL SUPPORT

STRAIN POLE

RECOMMENDED DEC. 12, 2011	RECOMMENDED DEC. 12, 2011	SHEET 2 OF 10
CHIEF, TRAFFIC OPERATIONS SECTION	CHIEF OF HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION	TC-8801

ANCHOR BOLT DESIGN, MAST ARM

MAST ARM LENGTH	QTY.	ONE ARM				TWO ARMS *			
		DIA.	LGTH.	B.C.	HOLE	DIA.	LGTH.	B.C.	HOLE
0 - 10′	6	1¾"	35"	18"	2"	1¾"	35"	18"	2"
>10′ - 15′	6	1¾"	35"	18"	2"	1¾"	35"	18"	2"
>15′ - 20′	6	1¾"	35"	18"	2"	1¾"	35"	18"	2"
>20′ - 25′	6	1¾"	35"	18"	2"	1¾"	35"	18"	2"
>25′ - 30′	6	1¾"	35"	21"	2"	1¾"	35"	21"	2"
>30′ - 35′	6	1¾"	35"	21"	2"	1¾"	35"	21"	2"
>35′ - 40′	6	2"	40"	24"	2¼"	2"	40"	24"	2¼"
>40′ - 45′	6	2"	40"	24"	2¼"	2"	40"	24"	2¼"
>45′ - 50′	6	2"	40"	24"	2¼"	2"	40"	24"	2¼"
>50′ - 60′	6	2"	40"	24"	2¼"	2"	40"	24"	2¼"

ANCHOR BOLT DESIGN, STRAIN POLE

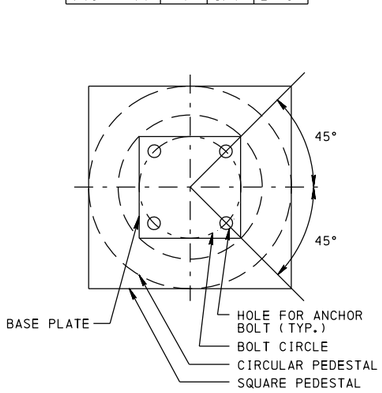
DESIGN TENSION (LBS)	QTY.	SHAFT LENGTH 20′ - 24′				SHAFT LENGTH 26′ - 30′				SHAFT LENGTH 32′ - 34′			
		DIA.	LGTH.	B.C.	HOLE	DIA.	LGTH.	B.C.	HOLE	DIA.	LGTH.	B.C.	HOLE
1000	6	1¾"	35"	18"	2"	2"	40"	18"	2¼"	2"	40"	18"	2¼"
2000	6	1¾"	35"	18"	2"	2"	40"	18"	2¼"	2"	40"	18"	2¼"
3000	6	1¾"	35"	18"	2"	2"	40"	18"	2¼"	2"	40"	18"	2¼"
4000	6	1¾"	35"	18"	2"	2"	40"	18"	2¼"	2"	40"	18"	2¼"
5000	6	1¾"	35"	18"	2"	2"	40"	18"	2¼"	2"	40"	18"	2¼"
6000	6	2¼"	45"	18"	2½"	2¼"	45"	21"	2½"	2¼"	45"	21"	2½"
7000	6	2¼"	45"	18"	2½"	2¼"	45"	21"	2½"	2¼"	45"	21"	2½"
8000	6	2¼"	45"	18"	2½"	2¼"	45"	21"	2½"	2¼"	45"	21"	2½"
9000	6	2¼"	45"	18"	2½"	2¼"	45"	21"	2½"	2½"	45"	21"	2¾"
10,000	6	2¼"	45"	18"	2½"	2¼"	45"	21"	2½"	2½"	45"	21"	2¾"

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

B.C. = BOLT CIRCLE DIAMETER

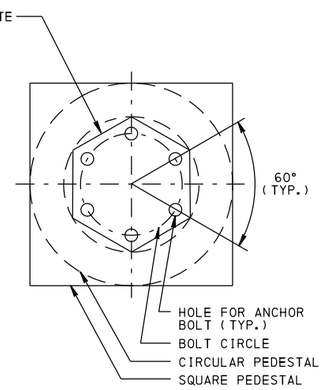
ANCHOR BOLT DESIGN, PEDESTAL POLE

PEDESTAL SHAFT LENGTH	ANCHOR BOLTS		
	QTY.	DIA.	LENGTH
7′ - 10′	4	3/4"	2′-0"
>10′ - 14′	4	3/4"	2′-0"



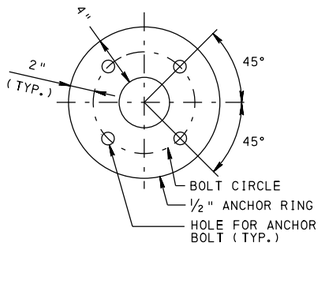
BASE MOUNT PLAN

NOTE: A MINIMUM OF 4 ANCHOR BOLTS IS REQUIRED FOR PEDESTAL TRAFFIC SIGNAL SUPPORTS.

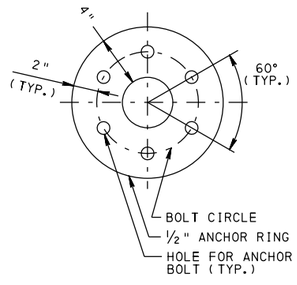


BASE MOUNT PLAN

NOTE: A MINIMUM OF 6 ANCHOR BOLTS IS REQUIRED FOR MAST ARM AND STRAIN POLE TRAFFIC SIGNAL SUPPORTS.



ANCHOR RING DETAIL
(N.T.S.)



ANCHOR RING DETAIL
(N.T.S.)

TRAFFIC SIGNAL SUPPORT
PEDESTAL POLE ANCHOR BOLT DETAILS

TRAFFIC SIGNAL SUPPORT
MAST ARM AND STRAIN POLE
ANCHOR BOLT DETAILS

DESIGN CRITERIA (SEE NOTE 13)

ALL MAIN LOAD CARRYING TENSION MEMBERS GREATER THAN ½ 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	SECTION 5.16
ALLOWABLE ANCHOR BOLT STRESSES	SECTION 5.17

SPREAD FOOTINGS

MAXIMUM DESIGN PRESSURE	1.5 TONS PER SQUARE FOOT
MINIMUM AREA IN BEARING	100%
UNIT WEIGHT OF SOIL	100 POUNDS PER CUBIC FOOT

DRILLED SHAFTS (CAISSONS) — PENNDOT DM4 APPENDIX J, PENNDOT COM624 COMPUTER PROGRAM, OR L-PILE

CASE 1 (SOIL)

MAXIMUM DESIGN PRESSURE	1.5 TONS PER SQUARE FOOT
MAXIMUM DESIGN LATERAL DISPLACEMENT	1.0"
MODULUS OF SUBGRADE REACTION:	
ABOVE WATER TABLE	K = 80.0 POUNDS PER CUBIC INCH
BELOW WATER TABLE	K = 60.0 POUNDS PER CUBIC INCH
COHESION:	
ABOVE WATER TABLE	15 POUNDS PER SQUARE FOOT
BELOW WATER TABLE	0 POUNDS PER SQUARE FOOT
WATER TABLE	5 FEET BELOW GRADE
UNIT WEIGHT OF SOIL	120 POUNDS PER CUBIC FOOT
ANGLE OF INTERNAL FRICTION	30°

CASES 2 THROUGH 4 (ROCK)

MAXIMUM DESIGN PRESSURE	1.5 TONS PER SQUARE FOOT
MAXIMUM DESIGN LATERAL DISPLACEMENT	1.0"
SOIL PARAMETERS ABOVE TOP OF ROCK:	
MODULUS OF SUBGRADE REACTION:	
ABOVE WATER TABLE	K = 80.0 POUNDS PER CUBIC INCH
BELOW WATER TABLE	K = 60.0 POUNDS PER CUBIC INCH
COHESION	0 POUNDS PER SQUARE FOOT
WATER TABLE	5 FEET BELOW GRADE
UNIT WEIGHT OF SOIL	120 POUNDS PER CUBIC FOOT
ANGLE OF INTERNAL FRICTION	30°
ROCK PARAMETERS:	
UNIT WEIGHT OF ROCK	120 POUNDS PER CUBIC FOOT
UNIAXIAL COMPRESSIVE STRENGTH	250 POUNDS PER SQUARE INCH

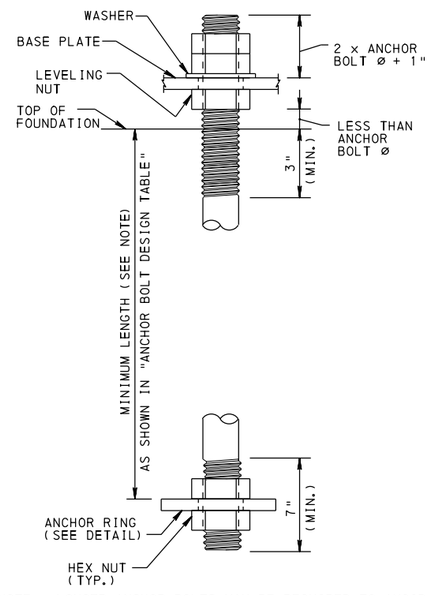
FOR ROCK CASE DEFINITION, SEE ROCK SOCKET NOTES ON SHEET 4.

† 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)
U.N.O.:	UNLESS NOTED OTHERWISE

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 68°F.
7. GALVANIZE ALL STRUCTURAL STEEL IN ACCORDANCE WITH PUB. 408, SECTION 1104.02 (a) 8.
8. PROVIDE ANCHOR BOLT HOLES ¼" 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 (e).
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".
14. IF WEAK SOIL CONDITIONS ARE ENCOUNTERED DURING CAISSON DRILLING OPERATION (I.E. SOIL MOVEMENT DURING DRILLING), NOTIFY CENTRAL OFFICE FOR APPROPRIATE FOUNDATION DEPTHS IN WEAK SOIL CONDITIONS.



NOTE: LONGER ANCHOR BOLTS MAY BE REQUIRED TO AVOID CONFLICTS WITH TOP LAYER OF REINFORCEMENT IN FOUNDATION TYPE B.

ANCHOR BOLT

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF MAINTENANCE AND OPERATIONS

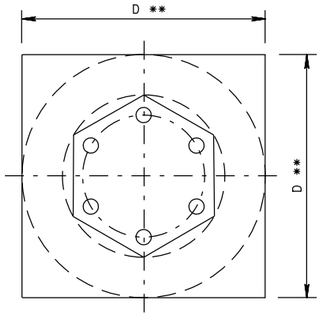
STANDARD

TRAFFIC SIGNAL SUPPORT
FOUNDATION NOTES AND
ANCHOR BOLT DETAILS

RECOMMENDED DEC. 12, 2011	RECOMMENDED DEC. 12, 2011	SHEET 3 OF 10
CHIEF, TRAFFIC OPERATIONS SECTION	CHIEF OF HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION	TC-8801

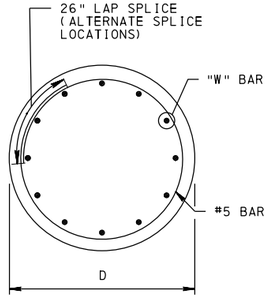
NOTES:

1. PROVIDE THE TYPE "A" FOUNDATION AT ALL LOCATIONS, EXCEPT THE TYPE "B" FOUNDATION (SHOWN ON SHEET 8) 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. GRADE ADJACENT PAVEMENT AWAY FROM ANCHOR BOLTS FOR DRAINAGE. IN UNPAVED AREAS TOP OF FOUNDATION TO BE 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.
6. FOR MAST ARM AND TRAFFIC SIGNAL PEDESTAL POLE TABLES, REFER TO SHEET 5. FOR STRAIN POLE TABLES, SEE SHEET 6.
7. FOR TRAFFIC SIGNAL PEDESTRIAN PUSH BUTTON POLE DETAIL, REFER TO TC-8803.
8. FOR MAST ARM LOCATIONS WITH SITE LIMITATIONS, ALTERNATE TYPE A FOUNDATIONS WITH SMALLER DIAMETERS MAY BE USED IF APPROVED BY THE BUREAU OF HIGHWAY SAFETY AND TRAFFIC ENGINEERING. SEE SHEET 7 FOR ALTERNATE TYPE A FOUNDATION DETAILS.



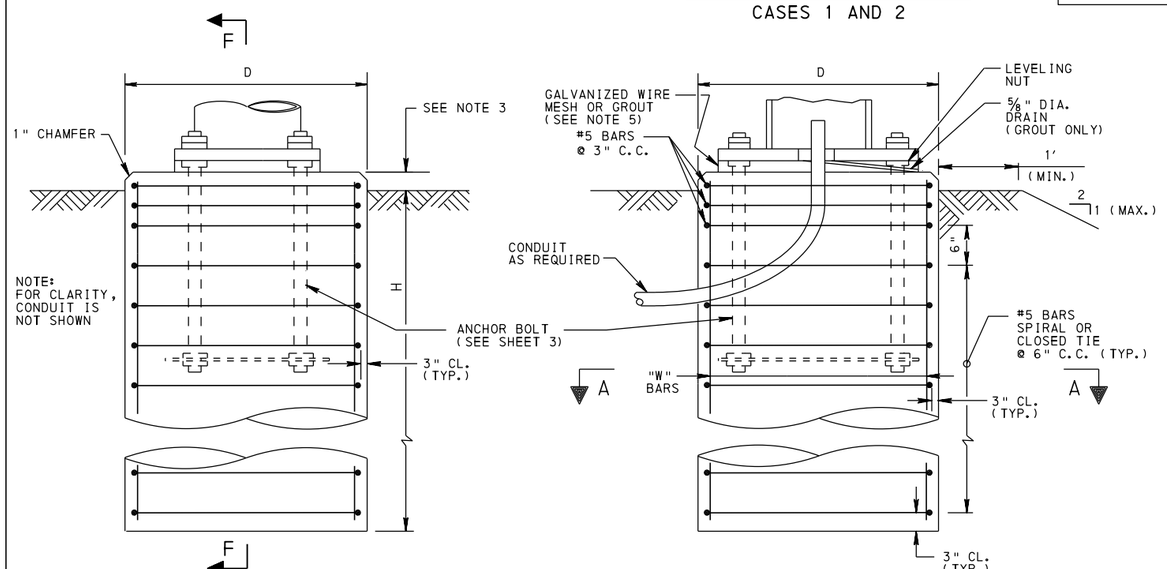
PLAN

** 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



SECTION A-A

CLOSED TIE DETAIL
CASES 1 AND 2

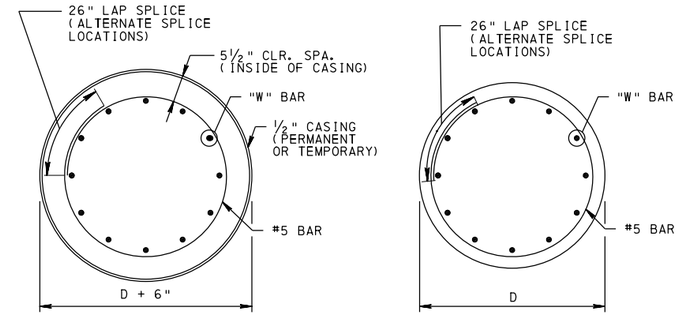


SECTION

SECTION F-F

NOTE: 6-ANCHOR BOLT CONFIGURATION SHOWN IS FOR MAST ARM & STRAIN POLE TRAFFIC SIGNAL SUPPORTS. 4-ANCHOR BOLT CONFIGURATION FOR PEDESTAL POLE TRAFFIC SIGNAL SUPPORTS IS SIMILAR.

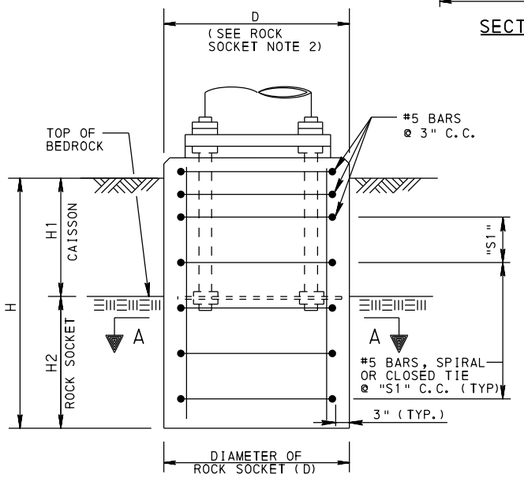
TYPE A FOUNDATION
CASE 1



SECTION B-B

SECTION C-C

CLOSED TIE DETAILS
CASES 3 AND 4

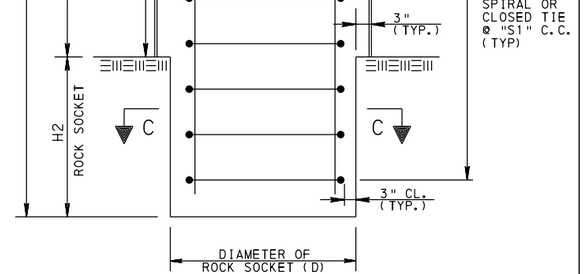


TYPE A FOUNDATION
CASE 2

STIRRUP SPACING	
COMBINATION	S1
32 FT STRAIN POLE, 10,000 LB (CASE 5)	5"
34 FT STRAIN POLE, 10,000 LB (CASE 5)	5"
ALL OTHER COMBINATIONS	6"

ROCK SOCKET NOTES:

1. IF ROCK STRATUM IS ENCOUNTERED, USE THE TABLES PRESENTED FOR CASES 2 THROUGH 4. ROCK STRATUM IS DEFINED IN ACCORDANCE WITH PUB. 408, SECTION 1006.1(d). FOR CASES 3 AND 4, INCREASE CAISSON DIAMETER "D" BY 6" AND INSTALL STEEL CASING TO TOP OF ROCK TO STABILIZE SOIL DURING ROCK AUGERING. STEEL CASING MAY BE PERMANENTLY LEFT IN PLACE OR REMOVED IN ACCORDANCE WITH PUB. 408, SECTION 1006. IF A STEEL CASING IS REQUIRED FOR CASE 2, INCREASE CAISSON DIAMETER "D" BY 6".
2. ROCK CASES ARE DEFINED AS FOLLOWS:
   - CASE 2: 0' ≤ H1 < 5'
   - CASE 3: 5' ≤ H1 < 10'
   - CASE 4: H1 ≥ 10'
3. THE ROCK SOCKET DETAILS PRESENTED WITHIN THIS STANDARD ARE BASED ON ROCK PARAMETERS ON SHEET 3. ALTERNATE FOUNDATION SIZES AND TYPES MAY BE PERMITTED FOR DIFFERENT ROCK CONDITIONS PROVIDED THAT ACTUAL GEOTECHNICAL CONDITIONS ARE VALIDATED AND THE FOUNDATION DESIGN MEETS APPLICABLE CRITERIA FOR STRENGTH AND SERVICEABILITY. SUBMIT ALTERNATE FOUNDATION DESIGNS TO THE DISTRICT FOR REVIEW AND APPROVAL.
4. THE TOTAL CAISSON AND ROCK SOCKET DEPTH "H" NEED NOT EXCEED THE TOTAL CAISSON DEPTH "H" FOR CASE 1 UNLESS DIRECTED OTHERWISE.
5. FOR DETAILS NOT SHOWN, SEE TYPE A FOUNDATION DETAIL FOR CASE 1 ON THIS SHEET.



TYPE A FOUNDATION
CASES 3 AND 4

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF MAINTENANCE AND OPERATIONS

STANDARD

TRAFFIC SIGNAL SUPPORT

FOUNDATION TYPE A

RECOMMENDED DEC. 12, 2011 CHIEF, TRAFFIC OPERATIONS SECTION	RECOMMENDED DEC. 12, 2011 CHIEF OF HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION	SHEET 4 OF 10 TC-8801

MAST ARM FOUNDATION NOTES:

1. FOUNDATION DESIGN IS BASED ON STANDARD STRUCTURAL LOADINGS SHOWN IN THE PUBLICATION 149 AND THE FOLLOWING DESIGN ASSUMPTIONS:

   a. CENTROIDAL HEIGHT OF SIGNALS AND SIGNS ATTACHED TO THE MAST ARM AT 20' MAXIMUM FROM THE TOP OF FOUNDATION.

   b. A LUMINAIRE WITH A 15' ARM LENGTH AND A 30' MOUNTING HEIGHT FROM THE TOP OF ROADWAY.

   c. A CABINET WITH A 4'-3" HEIGHT, 2'-6" WIDTH, 1'-10" DEPTH AND A DEAD LOAD OF 281 LBS. THE CENTROIDAL HEIGHT IS LOCATED 4'-6" FROM THE TOP OF THE FOUNDATION.

2. WHEN THE 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.

3. FOR DEFINITION OF CASES, SEE DRILLED SHAFT DESIGN CRITERIA ON SHEET 3 AND DETAILS ON SHEET 4.

FOUNDATION FOR TRAFFIC SIGNAL SUPPORT, MAST ARM (SOIL CONDITION)

CASE 1					
MAST ARM LENGTH	"D"	H		"W" BAR	
		ONE ARM	TWO ARMS*	QTY.	SIZE
0' - 10'	3'-0"	7'-0"	7'-6"	12	#9
>10' - 15'	3'-0"	8'-0"	8'-0"	12	#9
>15' - 20'	3'-0"	8'-6"	9'-0"	12	#9
>20' - 25'	3'-0"	9'-0"	9'-0"	12	#9
>25' - 30'	3'-0"	9'-6"	10'-0"	12	#9
>30' - 35'	3'-0"	10'-0"	10'-6"	12	#9
>35' - 40'	3'-6"	10'-0"	10'-6"	14	#9
>40' - 45'	3'-6"	10'-0"	11'-0"	14	#9
>45' - 50'	3'-6"	10'-6"	11'-6"	14	#9
>50' - 60'	3'-6"	11'-0"	12'-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.

FOUNDATION FOR TRAFFIC SIGNAL SUPPORT, MAST ARM (ROCK CONDITION)

MAST ARM LENGTH	"D" **	CASE 2 [0' ≤ H1 < 5']		CASE 3 [5' ≤ H1 < 10']		CASE 4 [H1 ≥ 10']		"W" BAR	
		H2		H2 ***		H2 ***			
		ONE ARM	TWO ARMS*	ONE ARM	TWO ARMS*	ONE ARM	TWO ARMS*	QTY.	
0 - 10'	3'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	12	#9
>10' - 15'	3'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	12	#9
>15' - 20'	3'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	12	#9
>20' - 25'	3'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	12	#9
>25' - 30'	3'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	12	#9
>30' - 35'	3'-0"	4'-0"	4'-6"	4'-0"	4'-0"	4'-0"	4'-0"	12	#9
>35' - 40'	3'-6"	4'-0"	4'-6"	4'-0"	4'-0"	4'-0"	4'-0"	14	#9
>40' - 45'	3'-6"	4'-0"	4'-6"	4'-0"	4'-6"	4'-0"	4'-0"	14	#9
>45' - 50'	3'-6"	4'-0"	4'-6"	4'-0"	4'-6"	4'-0"	4'-0"	14	#9
>50' - 60'	3'-6"	4'-6"	5'-6"	4'-6"	5'-0"	4'-0"	4'-0"	14	#9

** INCREASE CAISSON DIAMETER BY 6" AS APPLICABLE IN ACCORDANCE WITH ROCK SOCKET NOTE 1 ON SHEET 4.

*** SEE ROCK SOCKET NOTE 4 ON SHEET 4 FOR TOTAL "H" DEPTH REQUIREMENTS.

FOUNDATION FOR TRAFFIC SIGNAL SUPPORT, PEDESTAL POLE DESIGN TABLE (SOIL CONDITION)

CASE 1				
SHAFT LENGTH	"D"	H	"W" BAR	
			QTY.	SIZE
7' - 10'	3'-0"	5'-0"	8	#8
>10' - 14'	3'-0"	5'-6"	8	#8

FOUNDATION FOR TRAFFIC SIGNAL SUPPORT, PEDESTAL POLE DESIGN TABLE (ROCK CONDITION)

SHAFT LENGTH	"D"	CASE 2 [0' ≤ H1 < 5']		
		H2	"W" BAR	
			QTY.	SIZE
7' - 10'	3'-0"	4'-0"	8	#8
>10' - 14'	3'-0"	4'-0"	8	#8

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF MAINTENANCE AND OPERATIONS

STANDARD

TRAFFIC SIGNAL SUPPORT - MAST ARM & PEDESTAL

FOUNDATION TYPE A

RECOMMENDED DEC. 12, 2011 CHIEF, TRAFFIC OPERATIONS SECTION	RECOMMENDED DEC. 12, 2011 CHIEF OF HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION	SHEET 5 OF 10 TC-8801

FOUNDATION FOR TRAFFIC SIGNAL SUPPORT, STRAIN POLE (SOIL CONDITION)

DESIGN TENSION (LBS)	"D"	SHAFT LENGTH 20' - 34' (CASE 1)								
		"W" BAR		20' SHAFT	22' SHAFT	24' SHAFT	26' SHAFT	28' SHAFT	30' SHAFT	32' SHAFT	34' SHAFT
		QTY.	SIZE	FOUNDATION DEPTH H	FOUNDATION DEPTH H	FOUNDATION DEPTH H	FOUNDATION DEPTH H	FOUNDATION DEPTH H	FOUNDATION DEPTH H	FOUNDATION DEPTH H	FOUNDATION DEPTH H
1000	3'-0"	12	#9	7'-6"	7'-6"	7'-6"	8'-0"	8'-0"	8'-0"	8'-6"	8'-6"
2000	3'-0"	12	#9	8'-6"	8'-6"	8'-6"	9'-0"	9'-0"	9'-0"	9'-6"	9'-6"
3000	3'-0"	12	#9	9'-0"	9'-0"	9'-6"	9'-6"	10'-0"	10'-0"	10'-6"	10'-6"
4000	3'-0"	12	#9	9'-6"	10'-0"	10'-0"	10'-6"	10'-6"	11'-0"	11'-0"	11'-6"
5000	3'-0"	12	#9	10'-0"	10'-6"	10'-6"	11'-0"	11'-6"	11'-6"	12'-0"	12'-0"
6000	3'-0"	12	#9	11'-0"	11'-0"	11'-6"	12'-0"	12'-0"	12'-6"	12'-6"	13'-0"
7000	3'-0"	18	#9	11'-6"	11'-6"	12'-0"	12'-6"	12'-6"	13'-0"	13'-6"	14'-0"
8000	3'-0"	18	#9	12'-0"	12'-6"	12'-6"	13'-0"	13'-6"	14'-0"	14'-6"	14'-6"
9000	3'-0"	18	#9	12'-6"	13'-0"	13'-6"	14'-0"	14'-6"	14'-6"	15'-0"	15'-6"
10000	3'-0"	18	#9	13'-0"	13'-6"	14'-0"	14'-6"	15'-0"	15'-0"	15'-6"	16'-0"

FOUNDATION FOR TRAFFIC SIGNAL SUPPORT, STRAIN POLE (ROCK CONDITION)

DESIGN TENSION (LBS)	"D" *	CASE 2 [0' ≤ H1 < 5']								
		"W" BAR		20' SHAFT	22' SHAFT	24' SHAFT	26' SHAFT	28' SHAFT	30' SHAFT	32' SHAFT	34' SHAFT
		QTY.	SIZE	ROCK SOCKET EMBEDMENT H2	ROCK SOCKET EMBEDMENT H2	ROCK SOCKET EMBEDMENT H2	ROCK SOCKET EMBEDMENT H2	ROCK SOCKET EMBEDMENT H2	ROCK SOCKET EMBEDMENT H2	ROCK SOCKET EMBEDMENT H2	ROCK SOCKET EMBEDMENT H2
1000	3'-0"	12	#9	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"
2000	3'-0"	12	#9	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"
3000	3'-0"	12	#9	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-6"	4'-6"
4000	3'-0"	12	#9	4'-0"	4'-0"	4'-0"	4'-6"	4'-6"	4'-6"	4'-6"	5'-0"
5000	3'-0"	12	#9	4'-0"	4'-6"	4'-6"	4'-6"	4'-6"	5'-0"	5'-0"	5'-0"
6000	3'-0"	12	#9	4'-6"	4'-6"	4'-6"	5'-0"	5'-0"	5'-6"	5'-6"	5'-6"
7000	3'-0"	12	#9	4'-6"	5'-0"	5'-0"	5'-6"	5'-6"	5'-6"	6'-0"	6'-0"
8000	3'-0"	16	#9	5'-0"	5'-0"	5'-6"	5'-6"	5'-6"	6'-0"	6'-0"	6'-6"
9000	3'-0"	16	#9	5'-0"	5'-6"	5'-6"	6'-0"	6'-0"	6'-0"	6'-6"	6'-6"
10,000	3'-0"	16	#9	5'-6"	5'-6"	6'-0"	6'-0"	6'-6"	6'-6"	7'-0"	7'-0"

DESIGN TENSION (LBS)	"D" *	CASE 3 [5' ≤ H1 < 10']								
		"W" BAR		20' SHAFT	22' SHAFT	24' SHAFT	26' SHAFT	28' SHAFT	30' SHAFT	32' SHAFT	34' SHAFT
		QTY.	SIZE	ROCK SOCKET EMBEDMENT H2 **	ROCK SOCKET EMBEDMENT H2 **	ROCK SOCKET EMBEDMENT H2 **	ROCK SOCKET EMBEDMENT H2 **	ROCK SOCKET EMBEDMENT H2 **	ROCK SOCKET EMBEDMENT H2 **	ROCK SOCKET EMBEDMENT H2 **	ROCK SOCKET EMBEDMENT H2 **
1000	3'-0"	12	#9	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"
2000	3'-0"	12	#9	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"
3000	3'-0"	12	#9	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"
4000	3'-0"	12	#9	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-6"	4'-6"	4'-6"
5000	3'-0"	12	#9	4'-0"	4'-0"	4'-6"	4'-6"	4'-6"	4'-6"	5'-0"	5'-0"
6000	3'-0"	18	#9	4'-6"	4'-6"	4'-6"	5'-0"	5'-0"	5'-0"	5'-6"	5'-6"
7000	3'-0"	18	#9	4'-6"	5'-0"	5'-0"	5'-6"	5'-6"	5'-6"	6'-0"	6'-0"
8000	3'-0"	18	#9	5'-0"	5'-0"	5'-6"	5'-6"	5'-6"	6'-0"	6'-0"	6'-6"
9000	3'-0"	18	#9	5'-6"	5'-6"	5'-6"	6'-0"	6'-0"	6'-0"	6'-6"	6'-6"
10,000	3'-0"	18	#9	5'-6"	5'-6"	6'-0"	6'-0"	6'-6"	6'-6"	7'-0"	7'-0"

DESIGN TENSION (LBS)	"D" *	CASE 4 [H1 ≥ 10']								
		"W" BAR		20' SHAFT	22' SHAFT	24' SHAFT	26' SHAFT	28' SHAFT	30' SHAFT	32' SHAFT	34' SHAFT
		QTY.	SIZE	ROCK SOCKET EMBEDMENT H2 **	ROCK SOCKET EMBEDMENT H2 **	ROCK SOCKET EMBEDMENT H2 **	ROCK SOCKET EMBEDMENT H2 **	ROCK SOCKET EMBEDMENT H2 **	ROCK SOCKET EMBEDMENT H2 **	ROCK SOCKET EMBEDMENT H2 **	ROCK SOCKET EMBEDMENT H2 **
1000	3'-0"	12	#9	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"
2000	3'-0"	12	#9	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"
3000	3'-0"	12	#9	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"
4000	3'-0"	12	#9	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"
5000	3'-0"	12	#9	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"
6000	3'-0"	12	#9	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"
7000	3'-0"	18	#9	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-6"	4'-6"
8000	3'-0"	18	#9	4'-0"	4'-0"	4'-0"	4'-0"	4'-6"	4'-6"	5'-0"	5'-0"
9000	3'-0"	18	#9	4'-0"	4'-0"	4'-6"	4'-6"	4'-6"	5'-0"	5'-0"	5'-6"
10,000	3'-0"	18	#9	4'-6"	4'-6"	4'-6"	5'-0"	5'-0"	5'-6"	5'-6"	5'-6"

* INCREASE CAISSON DIAMETER BY 6" AS APPLICABLE IN ACCORDANCE WITH ROCK SOCKET NOTE 1 ON SHEET 4.

** SEE ROCK SOCKET NOTE 4 ON SHEET 4 FOR TOTAL "H" DEPTH REQUIREMENTS.

STRAIN POLE FOUNDATION NOTES:

1. FOUNDATION DESIGN IS BASED ON STANDARD STRUCTURAL LOADINGS SHOWN IN THE PUBLICATION 149 AND THE FOLLOWING DESIGN ASSUMPTIONS:

   a. A CABINET WITH A 4'-3" HEIGHT, 2'-6" WIDTH, 1'-10" DEPTH AND A DEAD LOAD OF 281 LBS. THE CENTROIDAL HEIGHT IS LOCATED 4'-6" FROM THE TOP OF THE FOUNDATION.

   b. A LUMINAIRE WITH A 15' ARM LENGTH AND THE FOLLOWING MOUNTING HEIGHTS FROM THE TOP OF ROADWAY:

LENGTH OF STRAIN POLE	LUMINAIRE MOUNTING HEIGHT "Y"
20', 22', AND 24'	30'
26', 28', AND 30'	35'
32' AND 34'	40'

2. FOR DEFINITION OF CASES, SEE DRILLED SHAFT NOTES ON SHEET 3 AND DETAILS ON SHEET 4.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF MAINTENANCE AND OPERATIONS

STANDARD

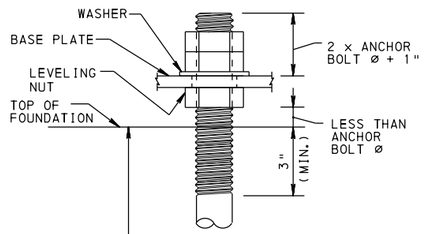
TRAFFIC SIGNAL SUPPORT - STRAIN POLE

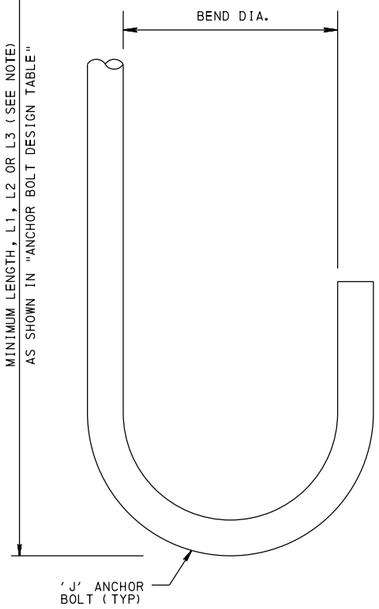
FOUNDATION TYPE A

RECOMMENDED DEC. 12, 2011
CHIEF, TRAFFIC OPERATIONS SECTION

RECOMMENDED DEC. 12, 2011
CHIEF OF HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION

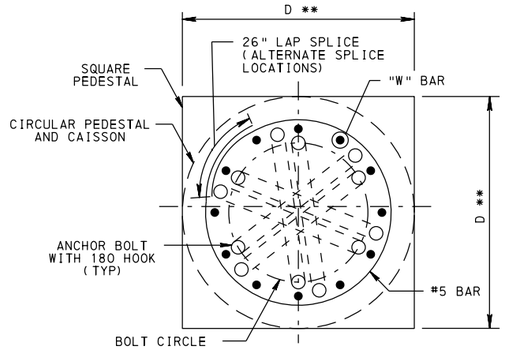
TC-8801



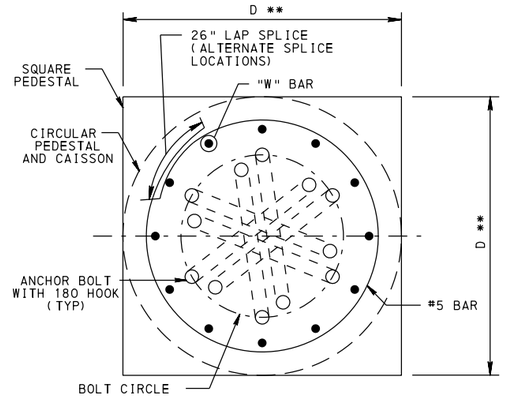


'J' ANCHOR BOLT

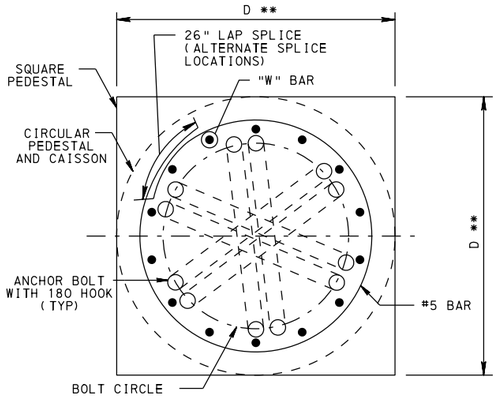
NOTE: DUE TO OVERLAPPING 'J' ANCHOR BOLTS, VARY EMBEDMENT BY 6" FOR EACH 2-BOLT PAIR FOR 1¾" DIA. BOLTS AND BY 12" FOR EACH 2-BOLT PAIR FOR 2" DIA. BOLTS. SEE L1, L2 AND L3 EMBEDMENT DEPTHS IN ANCHOR BOLT DESIGN TABLE.



18" DIA. BOLT CIRCLE



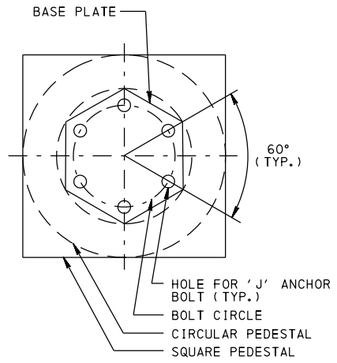
21" DIA. BOLT CIRCLE



24" DIA. BOLT CIRCLE

PLAN

** 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



BASE MOUNT PLAN

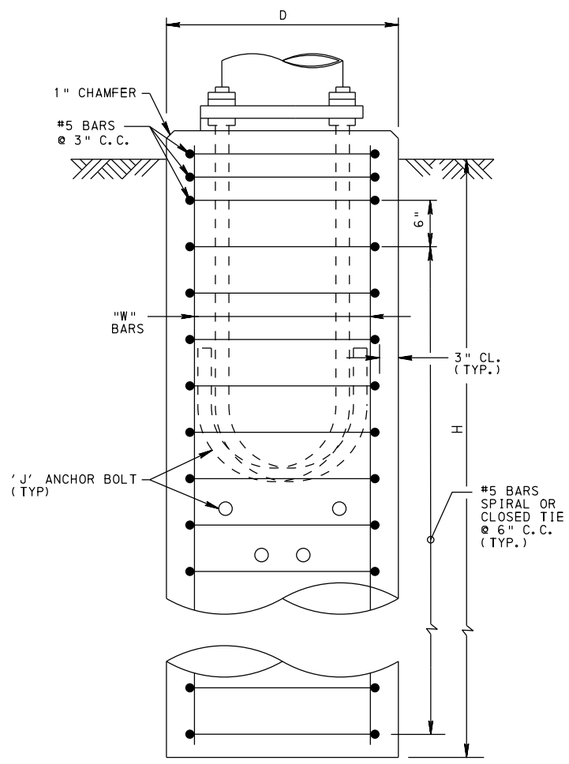
NOTE: A MINIMUM OF 6 'J' ANCHOR BOLTS IS REQUIRED FOR MAST ARM TRAFFIC SIGNAL SUPPORTS.

ANCHOR BOLT DESIGN, MAST ARM

MAST ARM LENGTH	QTY.	ONE ARM							TWO ARMS *						
		BOLT DIA.	BEND DIA.	L1	L2	L3	B.C.	HOLE	BOLT DIA.	BEND DIA.	L1	L2	L3	B.C.	HOLE
0 - 10'	6	1¾"	17½"	42"	48"	54"	18"	2"	1¾"	17½"	42"	48"	54"	18"	2"
>10' - 15'	6	1¾"	17½"	42"	48"	54"	18"	2"	1¾"	17½"	42"	48"	54"	18"	2"
>15' - 20'	6	1¾"	17½"	42"	48"	54"	18"	2"	1¾"	17½"	42"	48"	54"	18"	2"
>20' - 25'	6	1¾"	17½"	42"	48"	54"	18"	2"	1¾"	17½"	42"	48"	54"	18"	2"
>25' - 30'	6	1¾"	17½"	42"	48"	54"	21"	2"	1¾"	17½"	42"	48"	54"	21"	2"
>30' - 35'	6	1¾"	17½"	42"	48"	54"	21"	2"	1¾"	17½"	42"	48"	54"	21"	2"
>35' - 40'	6	2"	22"	48"	60"	72"	24"	2¼"	2"	22"	48"	60"	72"	24"	2¼"
>40' - 45'	6	2"	22"	48"	60"	72"	24"	2¼"	2"	22"	48"	60"	72"	24"	2¼"
>45' - 50'	6	2"	22"	48"	60"	72"	24"	2¼"	2"	22"	48"	60"	72"	24"	2¼"
>50' - 60'	6	2"	22"	48"	60"	72"	24"	2¼"	2"	22"	48"	60"	72"	24"	2¼"

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

B.C. = BOLT CIRCLE DIAMETER



SECTION

TYPE A FOUNDATION
CASE 1 ALTERNATE

FOUNDATION FOR TRAFFIC SIGNAL SUPPORT, MAST ARM (SOIL CONDITION)

CASE 1 ALTERNATE					
MAST ARM LENGTH	"D"	H		"W" BAR	
		ONE ARM	TWO ARMS*	QTY.	SIZE
0' - 10'	2'-6"	7'-6"	7'-6"	12	#9
>10' - 15'	2'-6"	8'-0"	8'-6"	12	#9
>15' - 20'	2'-6"	9'-0"	9'-0"	12	#9
>20' - 25'	2'-6"	9'-0"	9'-6"	12	#9
>25' - 30'	3'-0"	9'-6"	10'-0"	12	#9
>30' - 35'	3'-0"	10'-0"	10'-6"	12	#9
>35' - 40'	3'-0"	10'-6"	11'-0"	14	#9
>40' - 45'	3'-0"	10'-6"	11'-6"	14	#9
>45' - 50'	3'-0"	11'-0"	12'-0"	14	#9
>50' - 60'	3'-0"	11'-6"	13'-0"	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.

ALTERNATE TYPE A FOUNDATIONS AS SHOWN ON THIS SHEET REQUIRE APPROVAL BY THE BUREAU OF MAINTENANCE AND OPERATIONS.

MAST ARM FOUNDATION TYPE A ALTERNATE NOTES:

1. FOR ADDITIONAL DESIGN CRITERIA, NOTES AND DETAILS, SEE SHEETS 3 THROUGH 5.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF MAINTENANCE AND OPERATIONS

STANDARD

TRAFFIC SIGNAL SUPPORT - MAST ARM

FOUNDATION TYPE A ALTERNATE

RECOMMENDED DEC. 12, 2011
CHIEF, TRAFFIC OPERATIONS SECTION

RECOMMENDED DEC. 12, 2011
CHIEF OF HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION

SHEET 7 OF 10

TC-8801

FOUNDATION FOR TRAFFIC SIGNAL SUPPORT, MAST ARM

MAST ARM LENGTH	"D"	"W" BAR		"L" BAR	Y	S		Z	S	
		QTY.	SIZE	SIZE		ONE ARM	TWO ARMS*		ONE ARM	TWO 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.

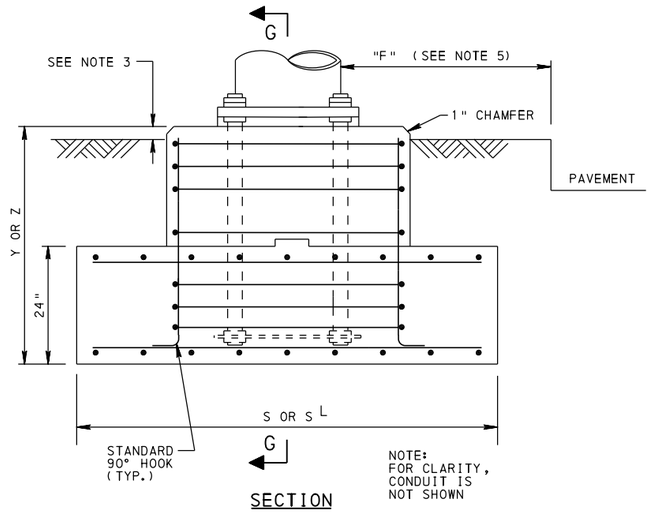
FOUNDATION FOR TRAFFIC SIGNAL SUPPORT, STRAIN POLE

DESIGN TENSION (LBS)	SHAFT LENGTH 20′ - 24′										SHAFT LENGTH 26′ - 30′										SHAFT LENGTH 32′ - 34′									
	"D"	"W" BAR		"L" BAR	Y	S^L	S	Z	S^L	S	"D"	"W" BAR		"L" BAR	Y	S^L	S	Z	S^L	S	"D"	"W" BAR		"L" BAR	Y	S^L	S	Z	S^L	S
		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"

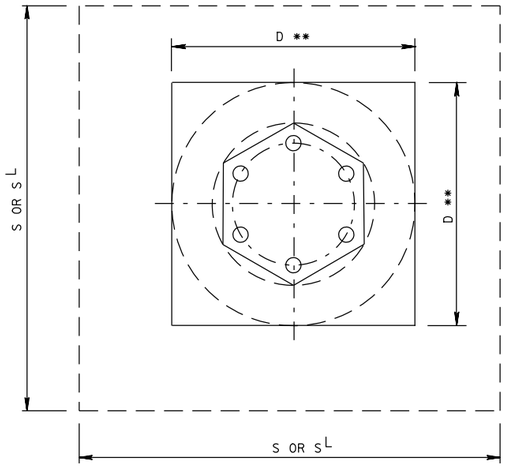
S^L = WITH LUMINAIRE

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.
8. SEE MAST ARM FOUNDATION NOTES 1 AND 2 ON SHEET 5.

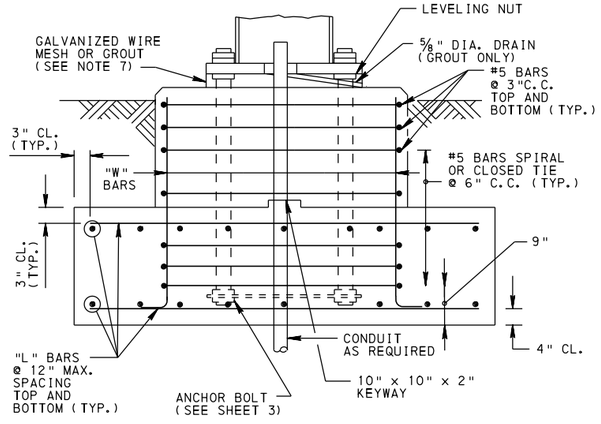


SECTION



PLAN

** 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.



SECTION G-G

STRAIN POLE FOUNDATION NOTES:

1. FOUNDATION DESIGN IS BASED ON STANDARD STRUCTURAL LOADINGS SHOWN IN THE PUBLICATION 149 AND THE FOLLOWING DESIGN ASSUMPTIONS:
   a. A CABINET WITH A 4′-3" HEIGHT, 2′-6" WIDTH, 1′-10" DEPTH AND A DEAD LOAD OF 281 LBS. THE CENTROIDAL HEIGHT IS LOCATED 4′-6" FROM THE TOP OF THE FOUNDATION.
2. USE DIMENSION "S^L" IN THE TABLE WHEN A LUMINAIRE ARM OR A STUB IS SPECIFIED (STUB UTILIZED FOR AN OVERLAP SLIP JOINT FOR FUTURE LUMINAIRE ARM INSTALLATION). THE DESIGN ASSUMES A 15′ LUMINAIRE ARM LENGTH AND THE FOLLOWING MOUNTING HEIGHTS FROM THE TOP OF ROADWAY:

LENGTH OF STRAIN POLE	LUMINAIRE MOUNTING HEIGHT "X"
20′, 22′, AND 24′	30′
26′, 28′ AND 30′	35′
32′ AND 34′	40′

TYPE B FOUNDATION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF MAINTENANCE AND OPERATIONS

STANDARD

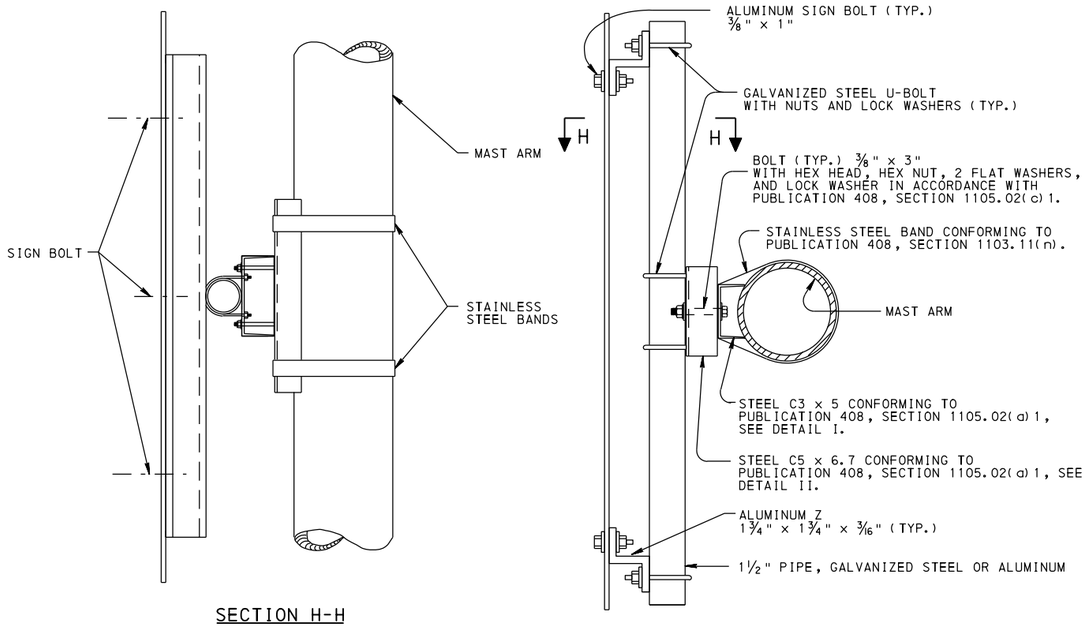
TRAFFIC SIGNAL SUPPORT

FOUNDATION TYPE B

RECOMMENDED DEC. 12, 2011
CHIEF, TRAFFIC OPERATIONS SECTION

RECOMMENDED DEC. 12, 2011
CHIEF OF HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION

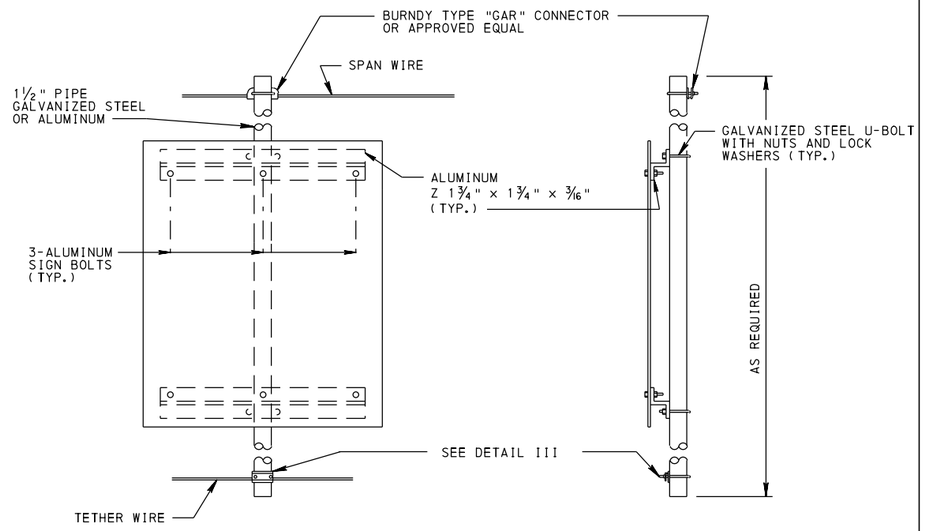
TC-8801



SECTION H-H

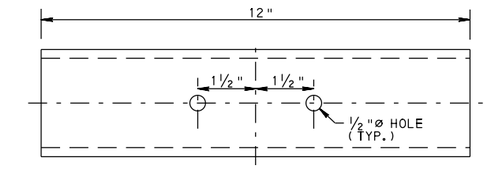
SIGN BRACKET - MAST ARM

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

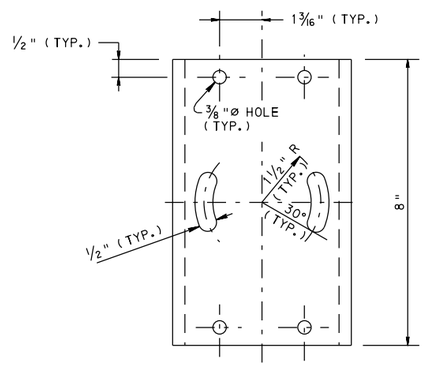


SIGN BRACKET - SPAN WIRE

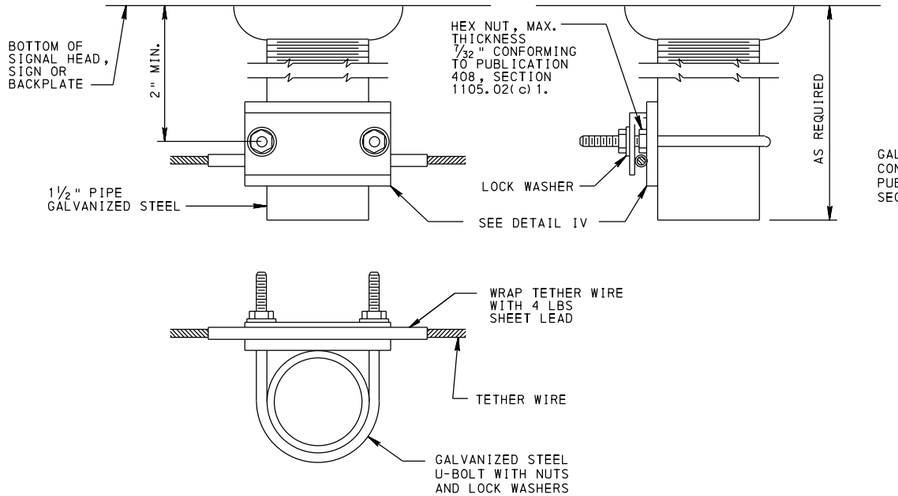
(ALTERNATE METHOD FOR ATTACHING SIGNS TO THE SPAN WIRE MAY BE USED IF APPROVED BY THE ENGINEER)



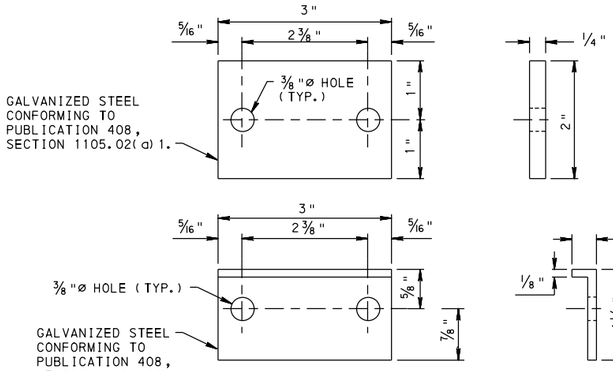
STEEL C3 x 5 GALVANIZED AFTER FABRICATION DETAIL I



STEEL C5 x 6.7 GALVANIZED AFTER FABRICATION DETAIL II



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 3/16" 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(o), SECTION 1103.11(p), SECTION 1103.11(b)1 AND SECTION 1103.11(b)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 1/4" x 3" x 1 1/8".

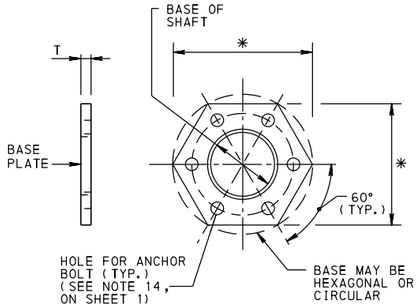
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF MAINTENANCE AND OPERATIONS

STANDARD

TRAFFIC SIGNAL SUPPORT

BRACKETS

RECOMMENDED DEC. 12, 2011 CHIEF, TRAFFIC OPERATIONS SECTION	RECOMMENDED DEC. 12, 2011 CHIEF OF HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION	SHEET 9 OF 10 TC-8801



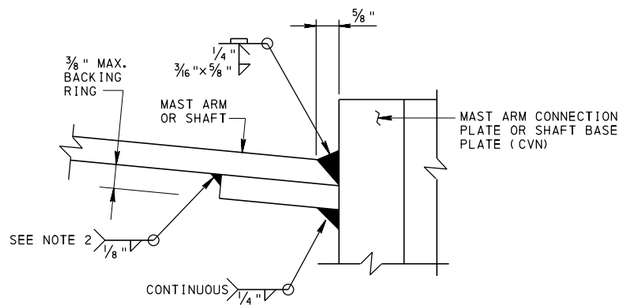
* AS REQUIRED TO MEET THE DEPARTMENT'S "CRITERIA FOR THE DESIGN OF TRAFFIC SIGNAL SUPPORTS", PUBLICATION 149.

BASE PLATE

NOTE: A MINIMUM OF 6 ANCHOR BOLTS IS REQUIRED FOR MAST ARM AND STRAIN POLE TRAFFIC SIGNAL SUPPORTS (SHOWN). 4 ANCHOR BOLTS ARE REQUIRED FOR PEDESTAL POLE TRAFFIC SIGNAL SUPPORTS.

BASE PLATE AND CONNECTION PLATE THICKNESS

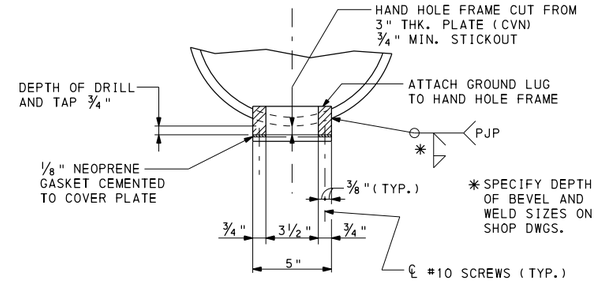
SHAFT OR COLUMN CONNECTION DIAMETER (IN)	PLATE THICKNESS MINIMUM, "T" (IN)
LESS THAN 6"	1"
6" TO 13"	2"
GREATER THAN 13" BUT LESS THAN 19"	2½"
GREATER THAN OR EQUAL TO 19"	3"



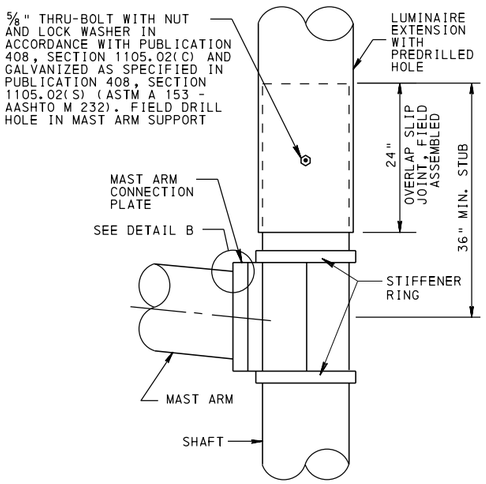
DETAIL B

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

1. 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.
2. FOR MAST ARMS OR SHAFTS LESS THAN 18"ø, THIS FILLET WELD IS NOT REQUIRED BUT SHOP IS TO APPLY SILICONE CAULKING TO THIS LOCATION AFTER POLE ASSEMBLY IS GALVANIZED.

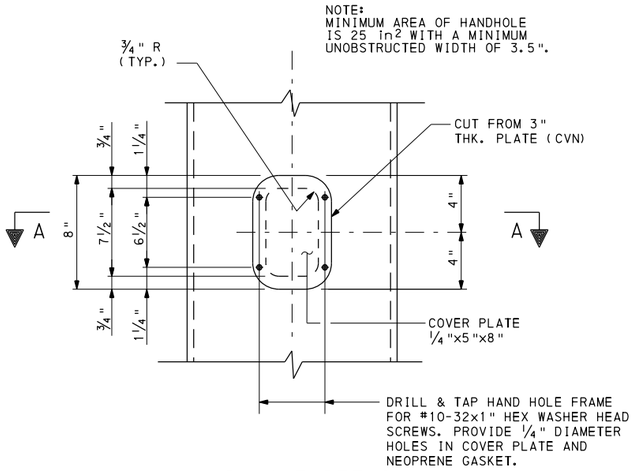


SECTION A-A

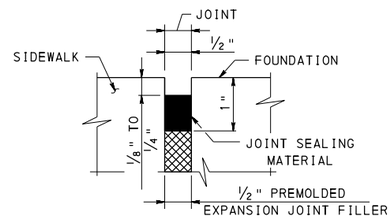


OVERLAP SLIP JOINT DETAIL

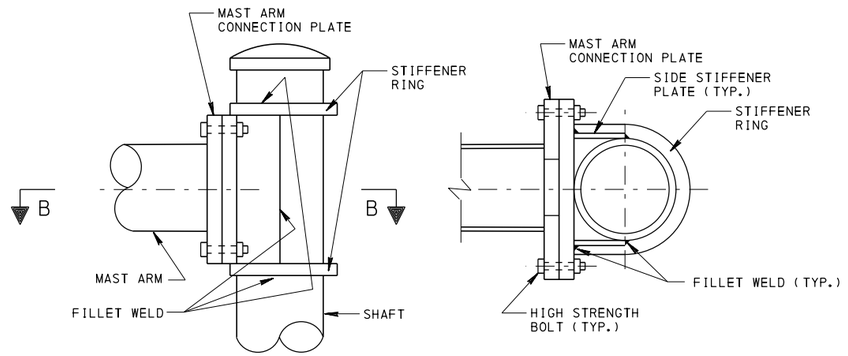
(ALTERNATE METHOD TO PROVIDE LUMINAIRE)
(SEE NOTES 11 AND 12 ON SHEET 1)



HAND HOLE DETAIL



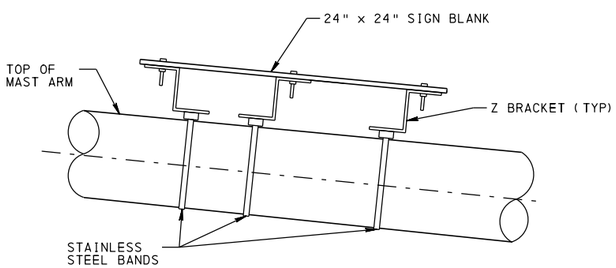
DETAIL C



ELEVATION SECTION B-B

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

NOTE: SEAL ALL NON-WELDED JOINTS WITH SILICONE CAULK.



MITIGATION DEVICE DETAIL

NOTE: INSTALL MITIGATION DEVICE WITHIN 5' OF MAST ARM TIP WHEN REQUIRED.

COMMONWEALTH OF PENNSYLVANIA
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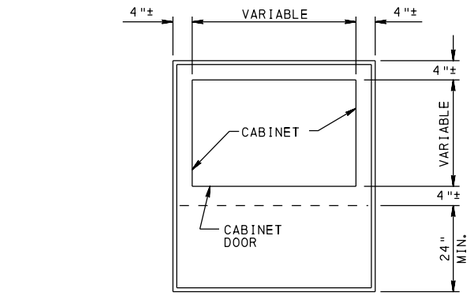
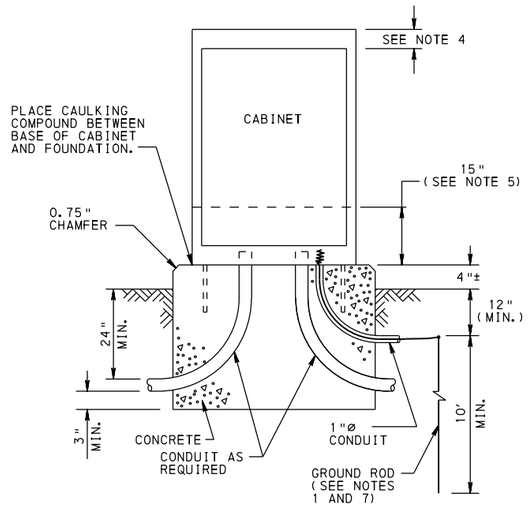
STANDARD

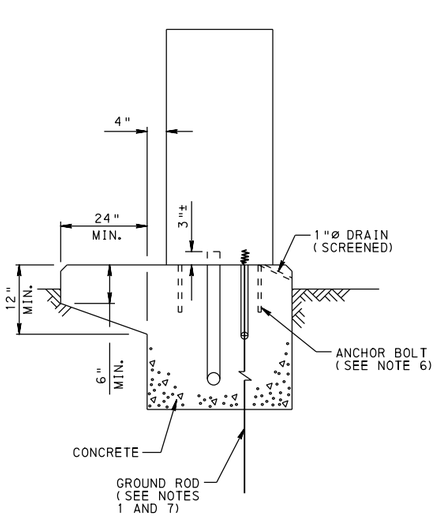
TRAFFIC SIGNAL SUPPORT

MISCELLANEOUS DETAILS

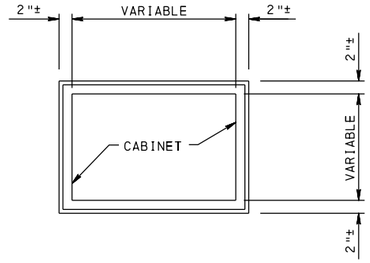
RECOMMENDED DEC. 12, 2011	RECOMMENDED DEC. 12, 2011	SHEET 10 OF 10
CHIEF, TRAFFIC OPERATIONS SECTION	CHIEF OF HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION	TC-8801





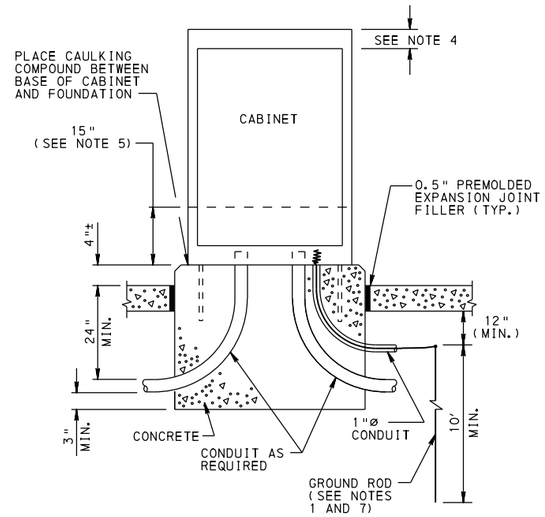


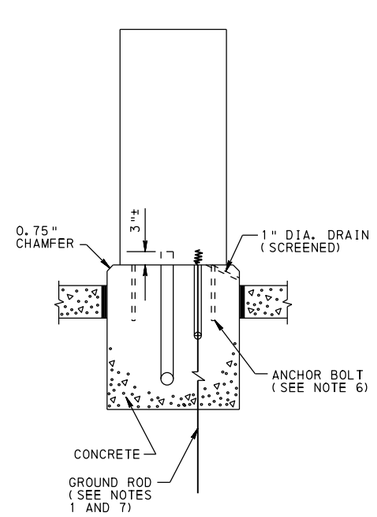
IN EARTH



NOTE:

BASE-MOUNTED CONTROLLER ASSEMBLIES LOCATED IN A PAVED SURFACE SHALL HAVE THE ANCHOR BOLTS INSIDE THE CABINET.



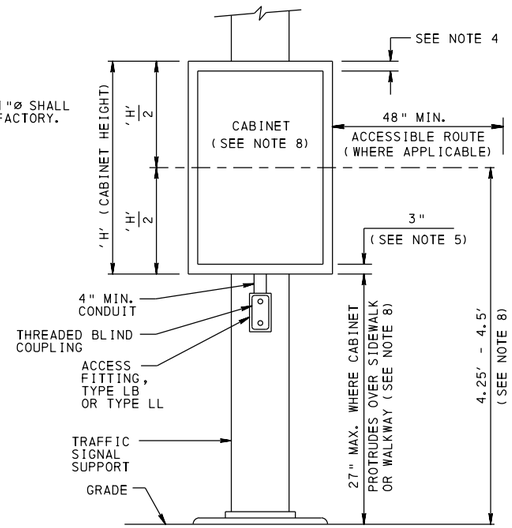


IN PAVED SURFACE

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 ½" x 12" OR DRILL CONCRETE TO RECEIVE ½" 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.

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CONTROLLER ASSEMBLY

RECOMMENDED DEC. 12, 2011	RECOMMENDED DEC. 12, 2011	SHT. 1 OF 1
CHIEF, TRAFFIC OPERATIONS SECTION	CHIEF, HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION	TC-8802

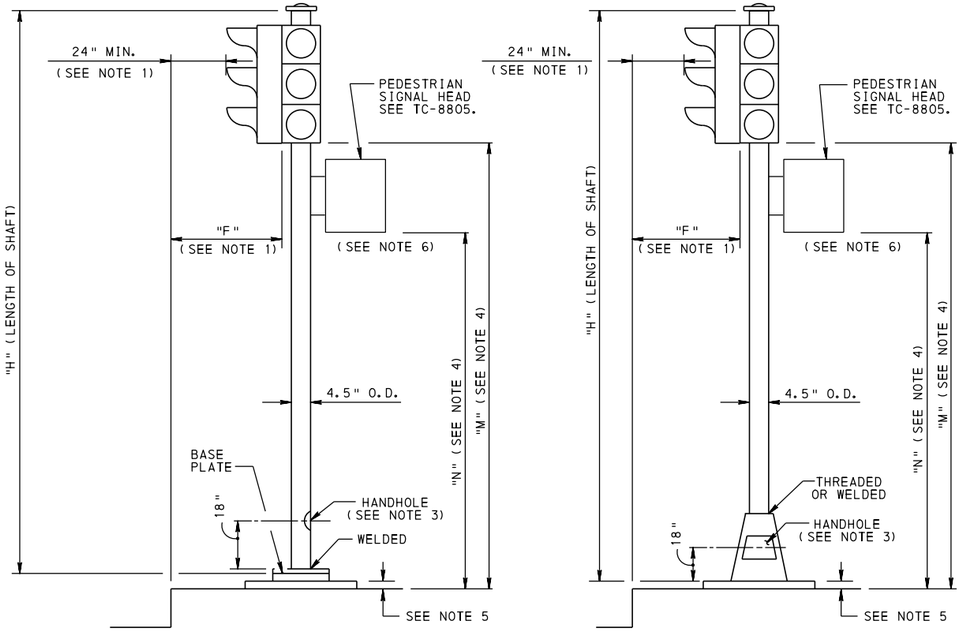


PLATE BASE

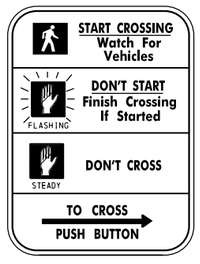
CAST BASE

TRAFFIC SIGNAL SUPPORT-PEDESTAL

NOTES:

1. PROVIDE 24" LATERAL MINIMUM CLEARANCE. IF THERE IS NO CURB, MINIMUM CLEARANCE IS MEASURED FROM THE EDGE OF SHOULDER.
2. FOR DETAIL OF PEDESTAL FOUNDATION, SEE TC-8801.
3. PROVIDE 3" x 5" HANDHOLE OPENING WITH A MINIMUM FRAME THICKNESS OF ⅜".
4. DIMENSIONS "M" AND "N" ARE REFERENCED FROM TOP OF SIDEWALK. IF NO SIDEWALK IS PRESENT, DIMENSIONS ARE TO BE TAKEN FROM THE TOP OF PAVEMENT AT CENTER OF ROADWAY. PROVIDE DIMENSION "M" SUCH THAT VERTICAL CLEARANCE IS 8' MINIMUM TO 19' MAXIMUM FOR TRAFFIC SIGNAL HEADS. PROVIDE DIMENSION "N" SUCH THAT VERTICAL CLEARANCE IS 7' MINIMUM TO 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. PROVIDE ½" PREMOLDED EXPANSION JOINT FILLER BETWEEN FOUNDATION AND ADJACENT PAVEMENT. SEE DETAIL C ON SHEET 9 OF TC-8801.
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 (BULLETIN 15).
8. PEDESTRIAN PUSHBUTTONS SHALL 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.
10. FOR PEDESTRIAN PUSHBUTTON MOUNTING DETAILS, SEE SHEET 2.

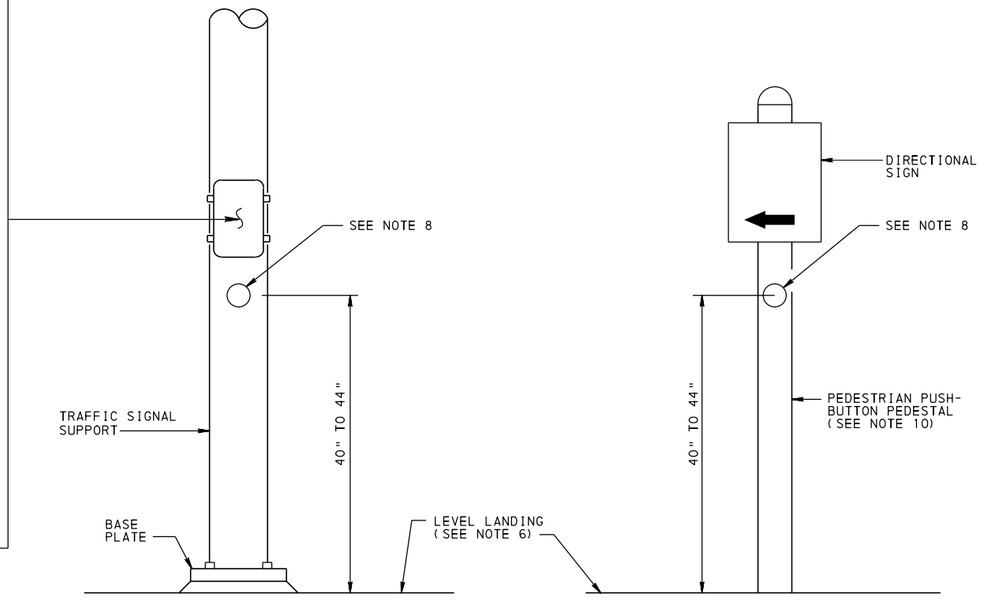
R10-3B



R10-3E

R10-4B

NOTE:
R10-4B, OR R10-3B, OR R10-3E AT LOCATIONS WITH WALKING PERSON/UPRAISED HAND PEDESTRIAN SIGNALS.



PEDESTRIAN PUSHBUTTON VERTICAL PLACEMENT

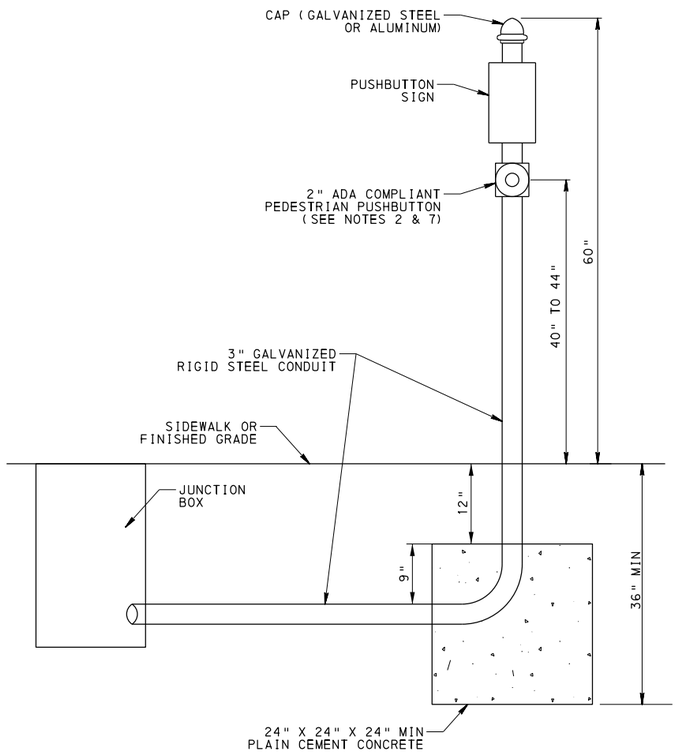
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF MAINTENANCE AND OPERATIONS

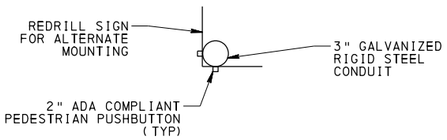
STANDARD

MISCELLANEOUS
TRAFFIC SIGNAL SUPPORT-PEDESTAL
PEDESTRIAN PUSHBUTTON

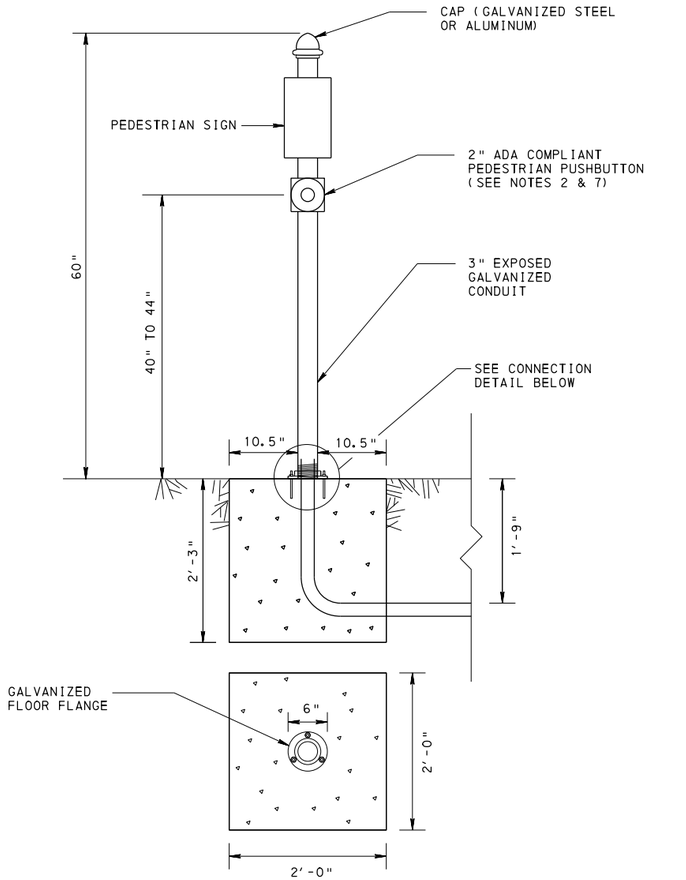
RECOMMENDED DEC. 12, 2011	RECOMMENDED DEC. 12, 2011	SHT. 1 OF 4
CHIEF, TRAFFIC OPERATIONS SECTION	CHIEF, HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION	TC-8803

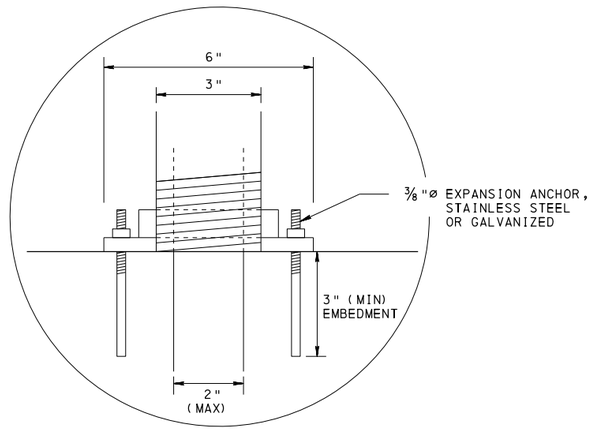
TYPE A





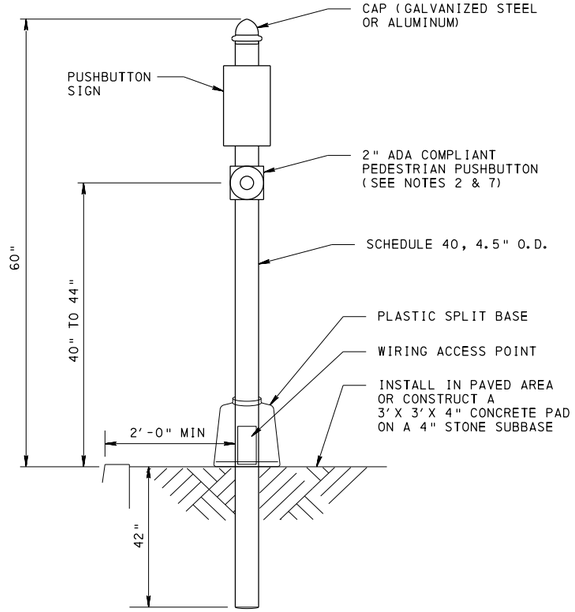
TYPE B





CONNECTION DETAIL

TYPE C



NOTES:

1. REFER TO RC-67M FOR CURB RAMP AND SIDEWALK DETAILS.
2. MOUNT PEDESTRIAN PUSHBUTTON BETWEEN 40" TO 44" ABOVE TOP OF SIDEWALK OR FINISHED GRADE TO THE EXPOSED CONDUIT AND LATERALLY 10" MAXIMUM FROM LEVEL LANDING.
3. ALL ACCESSIBILITY FEATURES MUST BE COMPLIANT TO PENNDOT PUBLICATION 13M (DM-2), CHAPTER 6, PUBLICATION 72M (RC STANDARDS) CRITERIA AND PUBLICATION 149.
4. IN A PAVED AREA, PLACE THE TOP OF THE FOUNDATION FLUSH WITH THE SURFACE OF THE ADJACENT PAVEMENT. PROVIDE ½" PREMOLDED EXPANSION JOINT FILLER BETWEEN FOUNDATION AND ADJACENT PAVEMENT. SEE DETAIL C ON SHEET 9 OF TC-8801.
5. PEDESTRIAN PUSHBUTTONS SHALL BE OF A TYPE APPROVED BY THE DEPARTMENT AND LISTED IN PUBLICATION 35 (BULLETIN 15).
6. PEDESTRIAN PUSHBUTTONS SHALL BE A MINIMUM OF 2" DIAMETER AND A FORCE PER ACTUATION THAT CANNOT EXCEED 5 LBS.
7. PEDESTRIAN PUSHBUTTON EXTENSION ARM TYPICALLY MEASURES UP TO 3". MAXIMUM LENGTH OF EXTENSION ARM TO BE 12". EXTENSION ARMS MEASURING BETWEEN 3" TO 12" REQUIRE DISTRICT APPROVAL PRIOR TO INSTALLATION.

PEDESTRIAN PUSHBUTTON MOUNTING DETAILS

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF MAINTENANCE AND OPERATIONS

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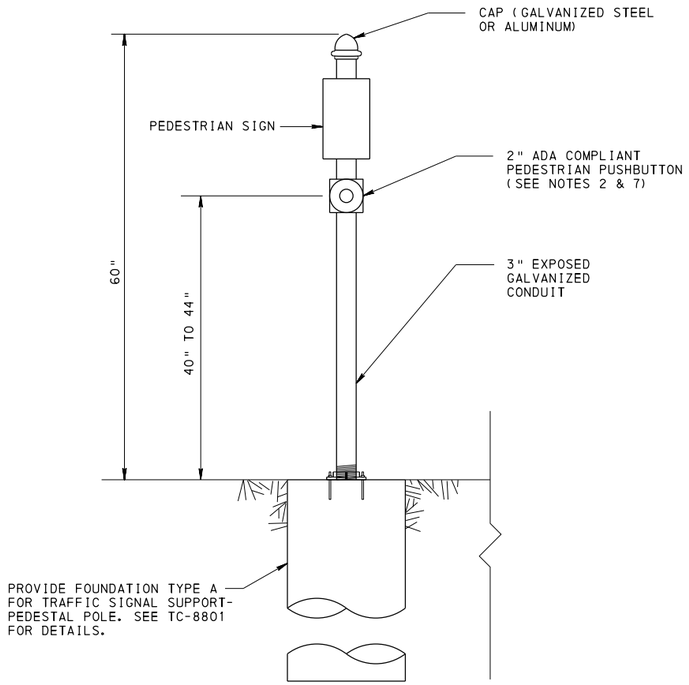
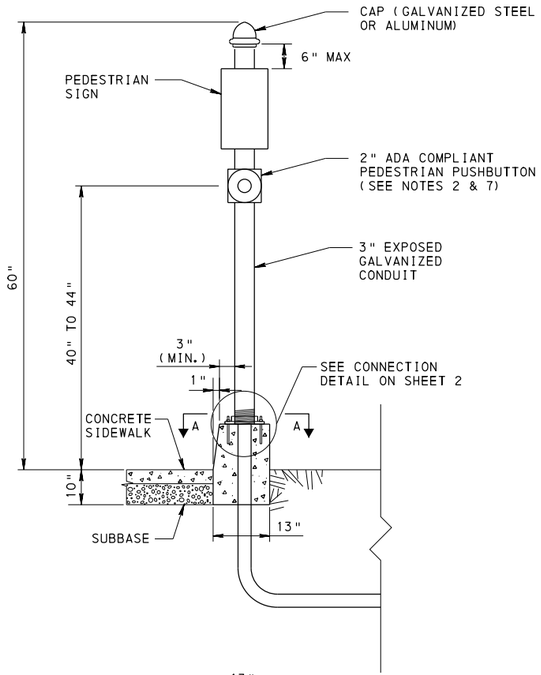
MISCELLANEOUS PEDESTRIAN PUSHBUTTON MOUNTING DETAILS

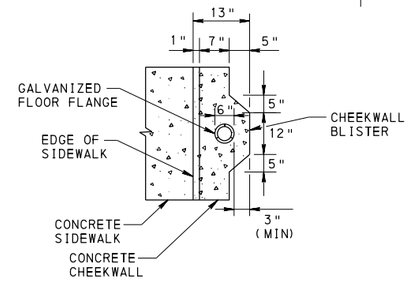
RECOMMENDED DEC. 12, 2011	RECOMMENDED DEC. 12, 2011	SHT. 2 OF 4
CHIEF, TRAFFIC OPERATIONS SECTION	CHIEF, HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION	TC-8803

TYPE D



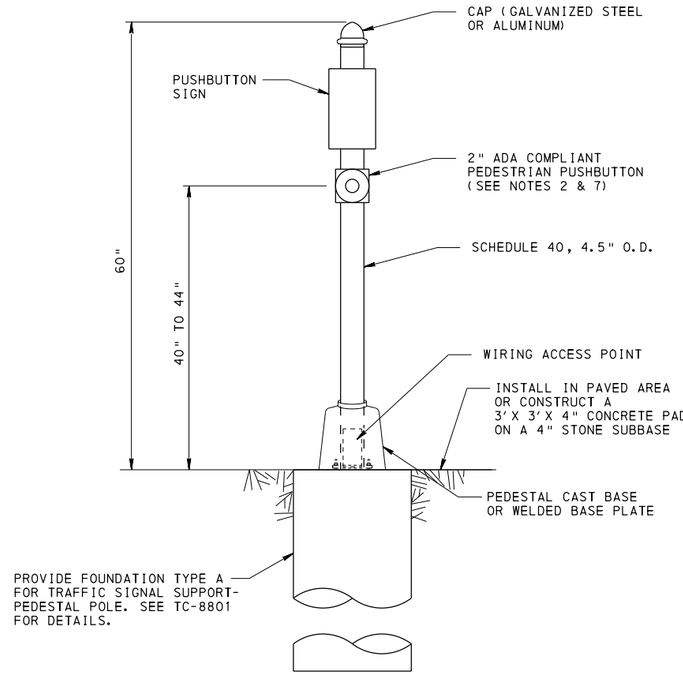
TYPE E





VIEW A-A

TYPE F



NOTES:

1. REFER TO RC-67M FOR CURB RAMP AND SIDEWALK DETAILS.
2. MOUNT PEDESTRIAN PUSHBUTTON BETWEEN 40" TO 44" ABOVE SIDEWALK OR FINISHED GRADE TO THE CENTER OF THE PUSHBUTTON AND 10" MAX LATERALLY FROM LANDING.
3. ALL ACCESSIBILITY FEATURES MUST BE COMPLIANT TO PENNDOT PUBLICATION 13M (DM-2), CHAPTER 6, PUBLICATION 72M (RC STANDARDS) CRITERIA AND PUBLICATION 149.
4. IN A PAVED AREA, PLACE THE TOP OF THE FOUNDATION FLUSH WITH THE SURFACE OF THE ADJACENT PAVEMENT. PROVIDE $\frac{1}{2}$" PREMOLDED EXPANSION JOINT FILLER BETWEEN FOUNDATION AND ADJACENT PAVEMENT. SEE DETAIL C ON SHEET 9 OF TC-8801.
5. PEDESTRIAN PUSHBUTTONS SHALL BE OF A TYPE APPROVED BY THE DEPARTMENT AND LISTED IN PUBLICATION 35 (BULLETIN 15).
6. PEDESTRIAN PUSHBUTTONS SHALL BE A MINIMUM OF 2" DIAMETER AND A FORCE PER ACTUATION THAT CANNOT EXCEED 5 LBS.
7. PEDESTRIAN PUSHBUTTON EXTENSION ARM IS TYPICALLY UP TO 3". MAXIMUM EXTENSION ARM OF 12". EXTENSION ARMS BETWEEN 3" TO 12" REQUIRE DISTRICT APPROVAL PRIOR TO INSTALLATION.

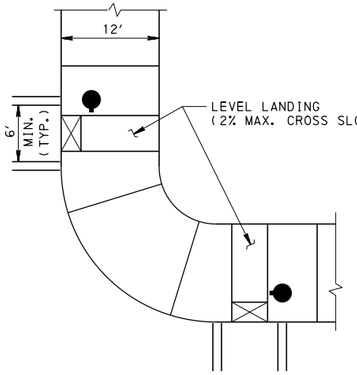
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF MAINTENANCE AND OPERATIONS

STANDARD

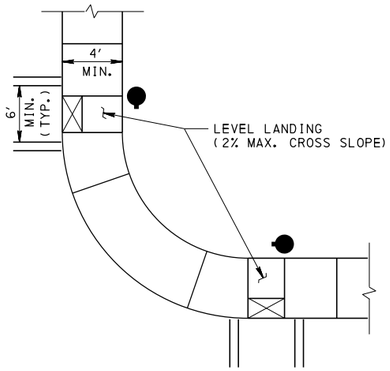
MISCELLANEOUS PEDESTRIAN PUSHBUTTON MOUNTING DETAILS

RECOMMENDED DEC. 12, 2011	RECOMMENDED DEC. 12, 2011	SHT. 3 OF 4
CHIEF, TRAFFIC OPERATIONS SECTION	CHIEF, HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION	TC-8803

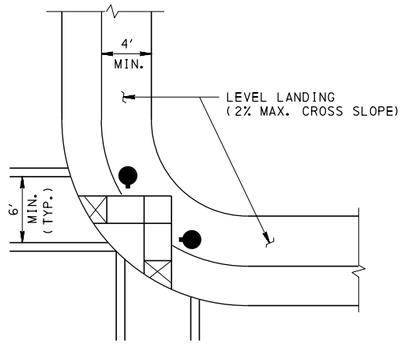
PEDESTRIAN PUSHBUTTON MOUNTING DETAILS



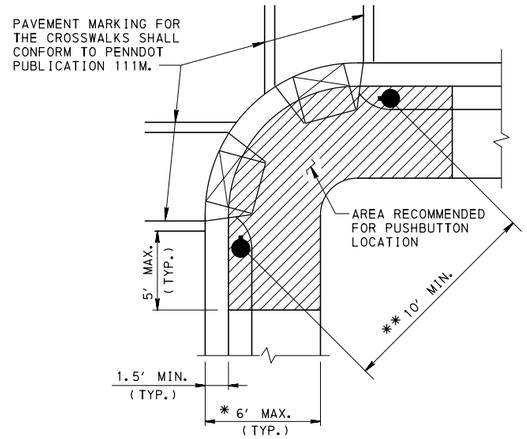
PARALLEL RAMPS WITH WIDE SIDEWALK



PARALLEL RAMPS WITH NARROW SIDEWALK



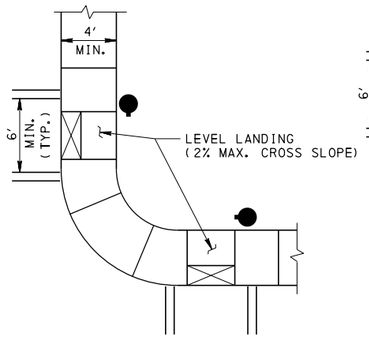
PERPENDICULAR RAMPS WITH SIDEWALK SET BACK FROM ROAD WITH CROSSWALKS CLOSE TOGETHER



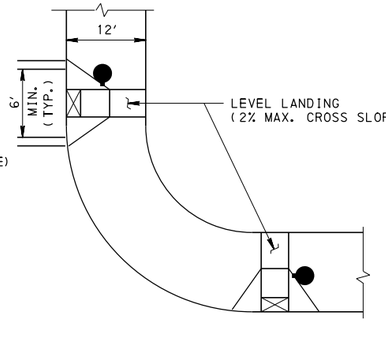
RECOMMENDED PUSHBUTTON LOCATIONS

* 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.

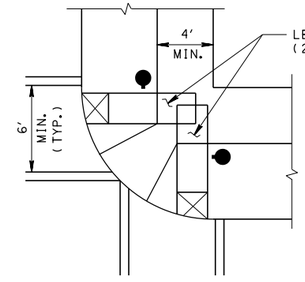
** WHERE THERE ARE CONSTRAINTS ON A PARTICULAR CORNER THAT MAKE IT IMPRACTICAL TO PROVIDE 10′ SEPARATION BETWEEN THE TWO PEDESTRIAN PUSHBUTTONS, THE PUSHBUTTONS MAY BE PLACED CLOSER TOGETHER OR ON THE SAME POLE.



PARALLEL RAMPS WITH NARROW SIDEWALK AND TIGHT CORNER RADIUS



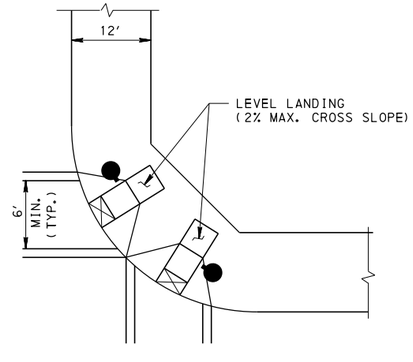
PERPENDICULAR RAMPS WITH CROSSWALKS FAR APART



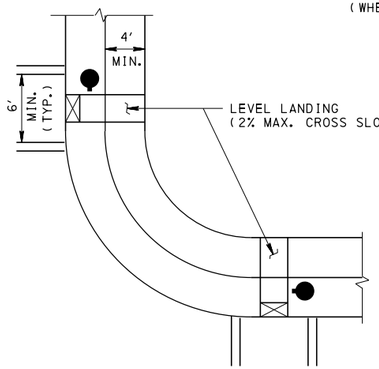
PERPENDICULAR RAMPS WITH SIDEWALK SET BACK FROM ROAD WITH CONTINUOUS SIDEWALK BETWEEN RAMPS

LEGEND

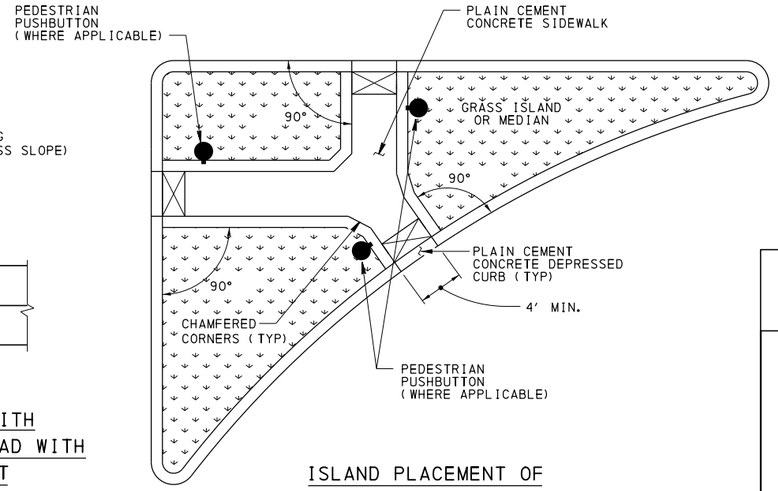
- PEDESTRIAN PUSHBUTTON
- DETECTABLE WARNING SURFACE



PERPENDICULAR RAMPS WITH CROSSWALKS CLOSE TOGETHER



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



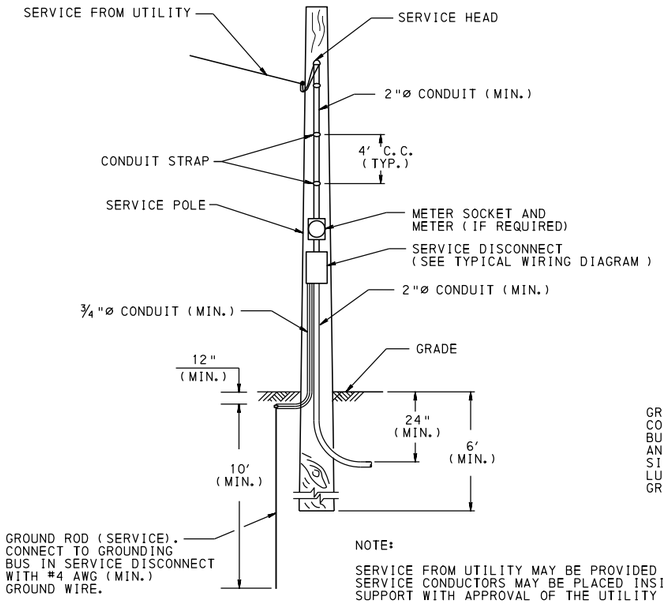
ISLAND PLACEMENT OF PEDESTRIAN PUSHBUTTONS

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF MAINTENANCE AND OPERATIONS

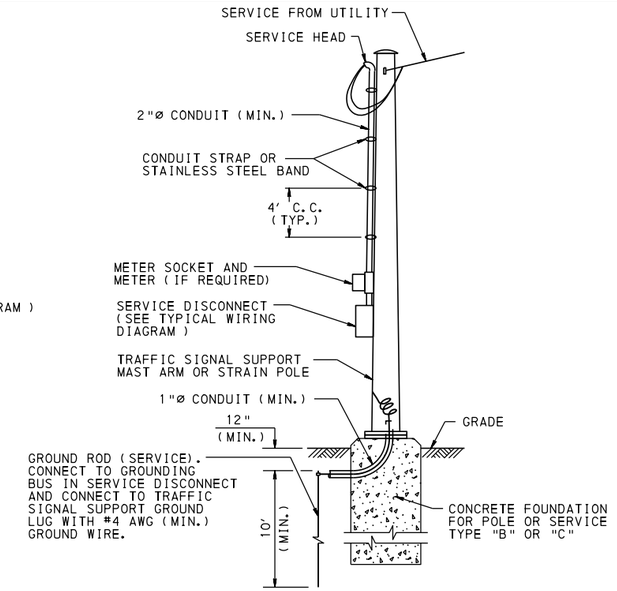
STANDARD

MISCELLANEOUS
TYPICAL PEDESTRIAN PUSHBUTTON LOCATIONS

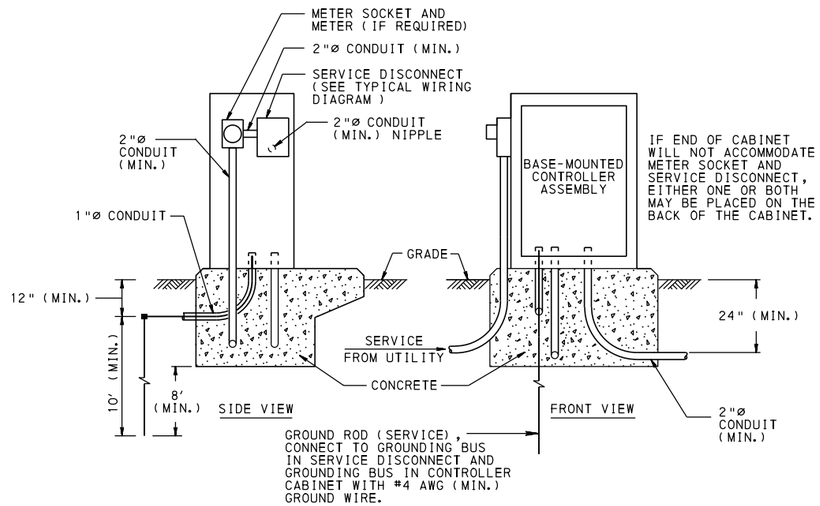
RECOMMENDED DEC. 12, 2011	RECOMMENDED DEC. 12, 2011	SHT. 4 OF 4
CHIEF, TRAFFIC OPERATIONS SECTION	CHIEF, HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION	TC-8803



SERVICE TYPE A



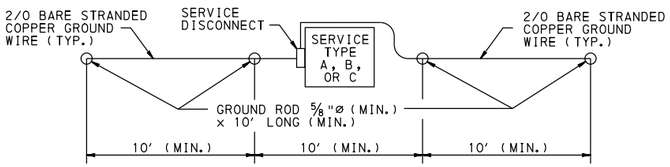
SERVICE TYPE B



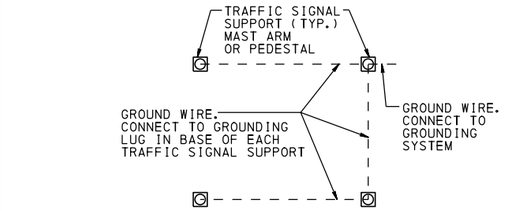
SERVICE TYPE C

NOTE:

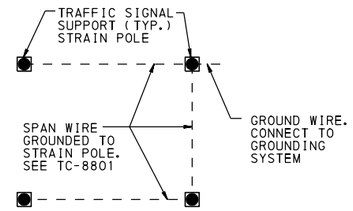
SERVICE FROM UTILITY MAY BE PROVIDED UNDERGROUND. ALSO, SERVICE CONDUCTORS MAY BE PLACED INSIDE THE TRAFFIC SIGNAL SUPPORT WITH APPROVAL OF THE UTILITY COMPANY.



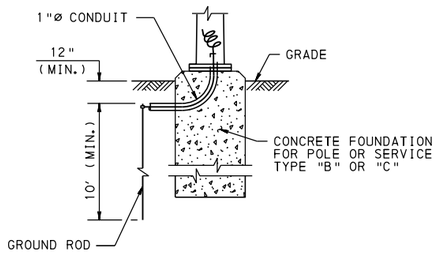
SERVICE GROUNDING ELECTRODE SYSTEM



MAST ARM OR PEDESTAL SUPPORT

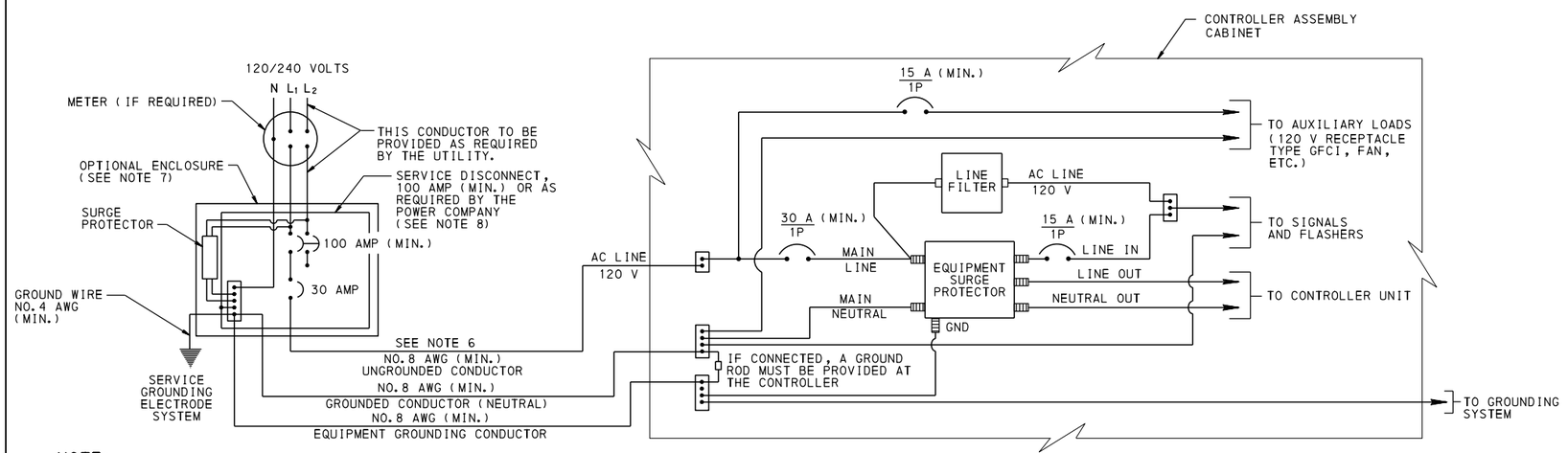


STRAIN POLE SUPPORT



DETAIL "Z"

GROUNDING SYSTEM



NOTE:

INSTALL GROUND RODS UNTIL IMPEDANCE IS LESS THAN 25 Ω

TYPICAL WIRING DIAGRAM

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 ⅝" 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.

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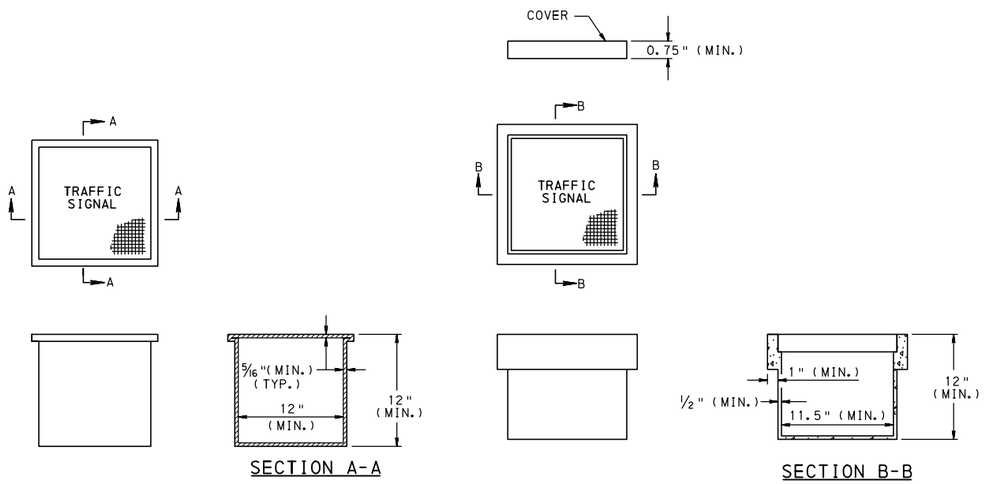


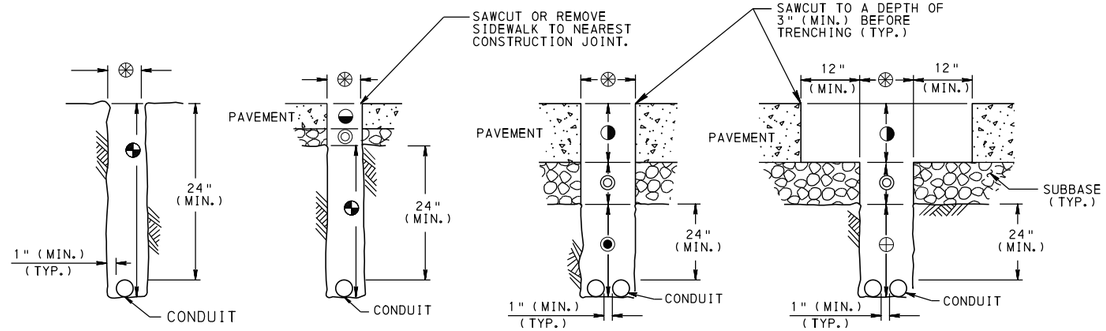
SECTION A-A

SECTION B-B

CAST IRON OR STEEL

REINFORCED PLASTIC MORTAR / POLYESTER RESIN
HIGH-DENSITY POLYMER CONCRETE / POLYETHYLENE

JUNCTION BOX, TYPE JB-26



TYPE I
EARTH

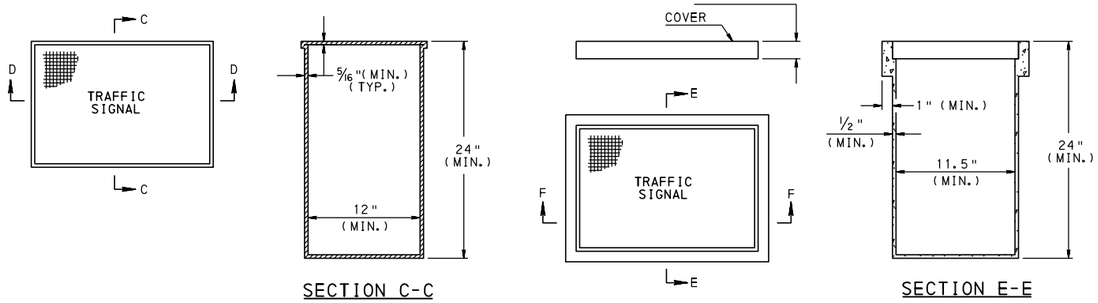
TYPE II
SIDEWALK
PAVED SHOULDER

TYPE III
ROADWAY

TYPE IV
ROADWAY

- WIDTH OF TRENCH AS REQUIRED TO PROPERLY INSTALL CONDUIT AND BACKFILL.
- BACKFILL WITH SUITABLE ON-SITE MATERIAL AS SPECIFIED.
- RESTORE PAVEMENT AS SPECIFIED IN SECTION 954, PUBLICATION 408.
- BACKFILL WITH CLASS A CEMENT CONCRETE TO BOTTOM OF EXISTING SUBBASE.
- BACKFILL AS SPECIFIED IN SECTION 954, PUBLICATION 408.
- REPLACE SUBBASE IN KIND.
- REPLACE IN KIND.

TRENCH AND BACKFILL



SECTION C-C

SECTION E-E

SECTION D-D

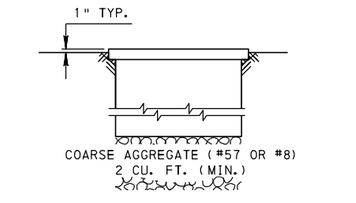
BOX MAY BE ONE OR TWO PIECES. IF TWO, JOIN THE PIECES AS RECOMMENDED BY THE MANUFACTURER.

SECTION F-F

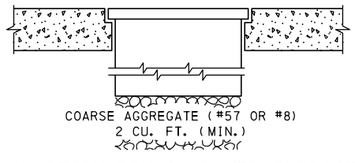
CAST IRON OR STEEL

REINFORCED PLASTIC MORTAR OR
HIGH-DENSITY POLYMER CONCRETE

JUNCTION BOX, TYPE JB-27



JUNCTION BOX IN EARTH



JUNCTION BOX IN PAVED SURFACE

TYPICAL JUNCTION BOX INSTALLATION

NOTES:

1. JUNCTION BOXES -- PROVIDE COVER WITH A NON-SLIP SURFACE AND A MINIMUM OF TWO CORROSION RESISTANT FASTENERS.
2. JUNCTION BOXES -- USE JB-26 AND JB-27 ONLY IN AREAS NOT SUBJECT TO VEHICULAR TRAFFIC.
3. JUNCTION BOXES -- BOTTOM MAY BE OPEN OR CLOSED. IF CLOSED, PROVIDE A DRAIN HOLE 2" DIAMETER MINIMUM.
4. 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.
5. GROUND EXPOSED METAL PARTS OF JUNCTION BOXES. USE GROUNDING LUGS. DO NOT CONNECT GROUND WIRE DIRECTLY TO LID.

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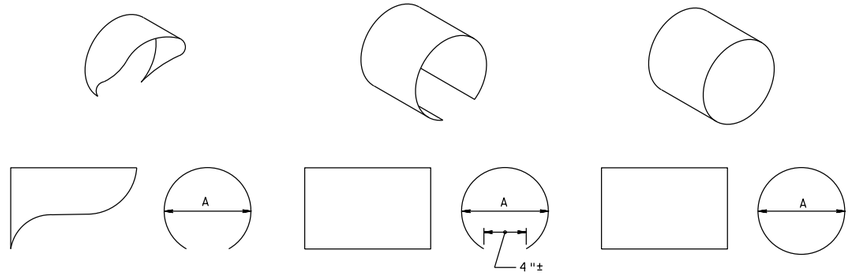
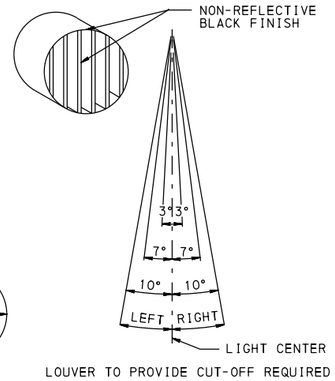
THE VISOR SHALL BE A MINIMUM OF 9.5" FOR A 12" SIGNAL LENS AND 7" FOR AN 8" SIGNAL LENS WITH A DOWNWARD TILT OF 3.5 DEGREES.



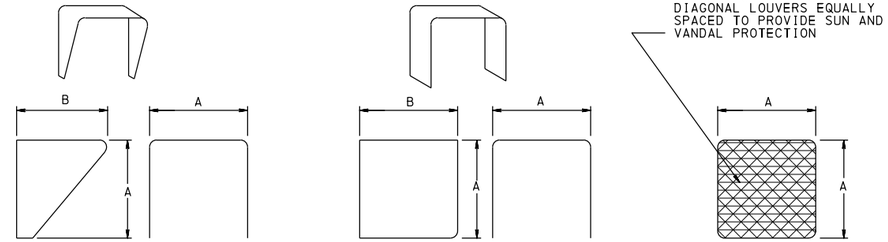
CUT-AWAY VISOR TUNNEL VISOR FULL-CIRCLE VISOR

VISOR TYPES FOR VEHICULAR SIGNAL HEAD



LOUVER TO PROVIDE CUT-OFF REQUIRED

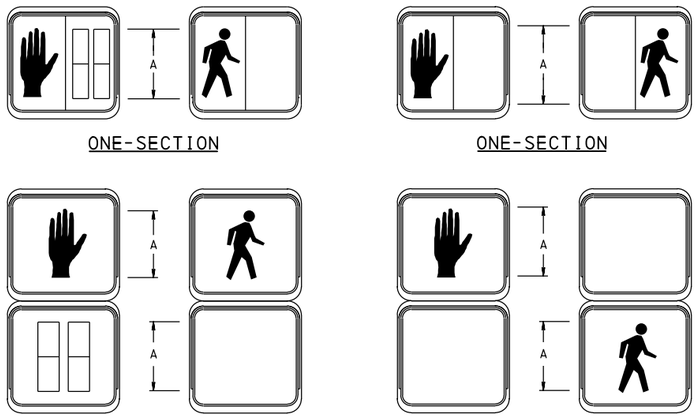
LOUVER FOR VEHICULAR SIGNAL HEAD
(DO NOT USE WITH CUT-AWAY VISOR)



DIMENSION A AS REQUIRED.
DIMENSION B ≈ DIMENSION A

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 TWO-SECTIONS

TYPE A
(COUNTDOWN) *

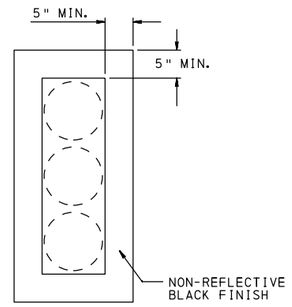
TYPE B
(SYMBOL) **

TYPE	DIMENSION A
A	6" *
B	6" **

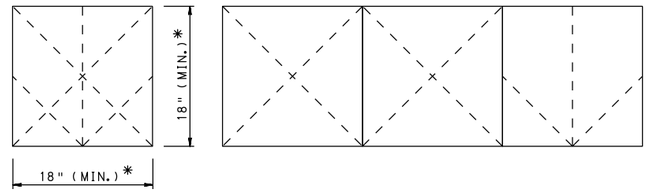
* COUNTDOWN PEDESTRIAN SIGNALS SHALL CONSIST OF PORTLAND ORANGE NUMBERS THAT ARE AT LEAST 6" IN HEIGHT. FOR CROSSWALKS WHERE THE PEDESTRIAN ENTERS THE CROSSWALK MORE THAN 100' FROM THE COUNTDOWN PEDESTRIAN SIGNAL DISPLAY, THE NUMBERS SHOULD BE AT LEAST 9" IN HEIGHT.

** FOR CROSSWALKS WHERE THE PEDESTRIAN ENTERS THE CROSSWALK MORE THAN 100' FROM THE PEDESTRIAN SIGNAL HEAD INDICATIONS, DIMENSION "A" SHOUD 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.

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SIGNAL HEADS

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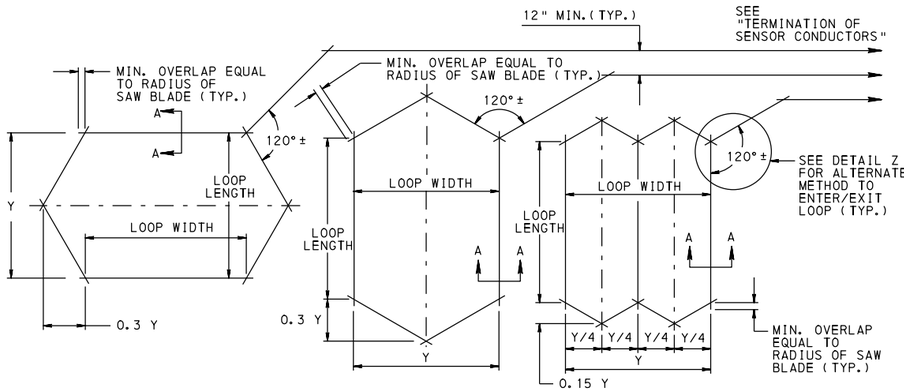
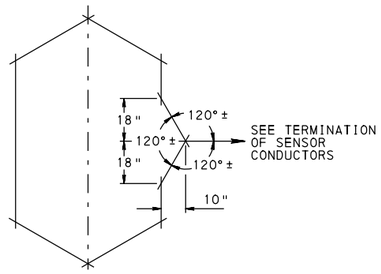


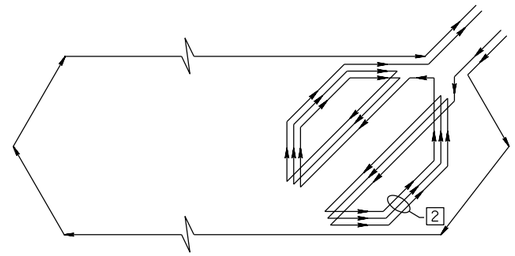
LOOP TYPE I
WIDTH > LENGTH

LOOP TYPE II
WIDTH ≤ LENGTH

LOOP TYPE III

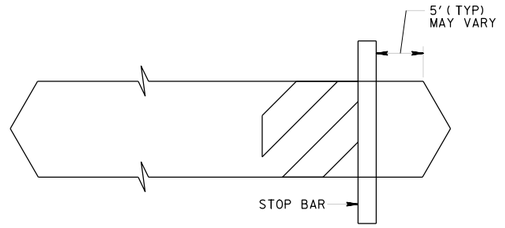


DETAIL Z

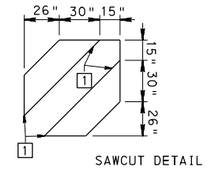


DETECTOR WIRING DETAIL

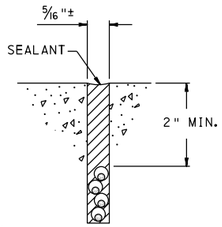
TYPICAL SENSOR INSTALLATION - LOOP DETECTOR



ALTERNATE TYPE A
DETECTOR LAYOUT



DETECTOR SAWCUT DETAIL



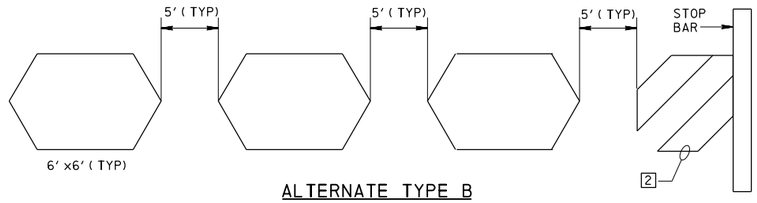
NOTE:
NO MORE THAN FOUR CONDUCTORS SHALL BE PLACED IN A SLOT. FOUR CONDUCTORS SHOWN FOR ILLISTRATION PURPOSES ONLY.

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 INDUCTANCE (MICROHENRIES)			
LOOP SIZE (FT)	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



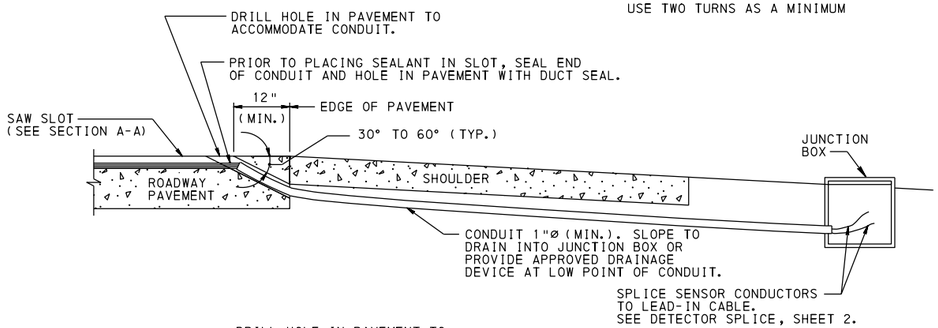
ALTERNATE TYPE B
SERIES LAYOUT

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'x6' LOOPS ON A SENSOR UNIT CHANNEL.

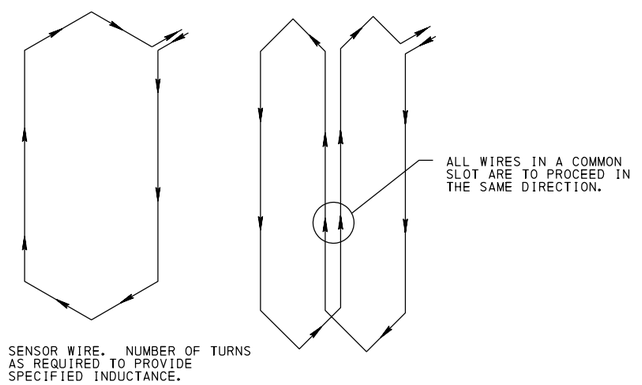
ALTERNATE SENSOR INSTALLATION - LOOP DETECTOR

FOR ENHANCED BICYCLE AND MOTORCYCLE DETECTION



PAYMENT FOR CONDUIT, SEALANT, SAW CUT AND DRILLING IS BE INCIDENTAL TO THE SENSOR.

TERMINATION OF SENSOR CONDUCTORS



SENSOR WIRE. NUMBER OF TURNS AS REQUIRED TO PROVIDE SPECIFIED INDUCTANCE.

TYPES I & II

TYPE III

TYPICAL LAYOUT OF LOOP SENSOR

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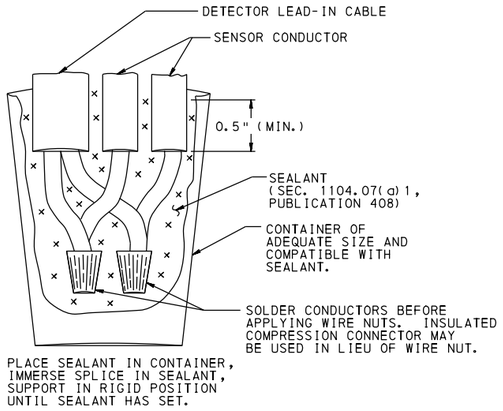
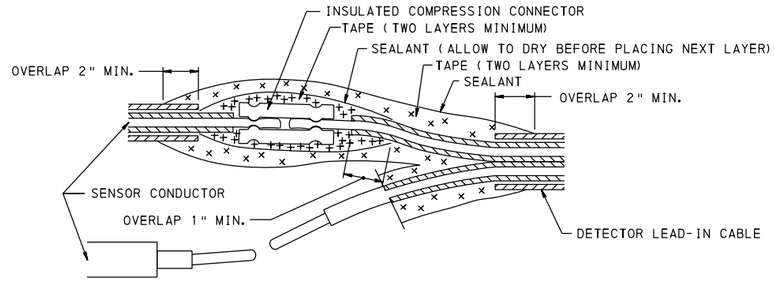


ALTERNATE A



TAPE - ELECTRICAL GRADE, PLASTIC, SELF-ADHESIVE.

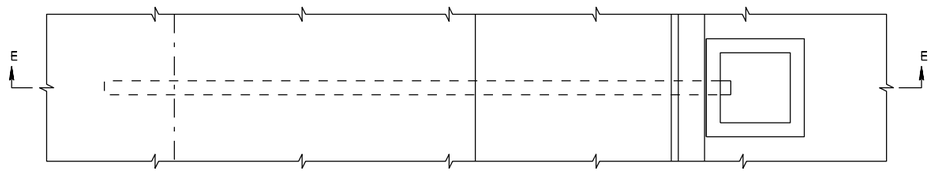
SEALANT - ELECTRICAL GRADE, FAST-DRYING, MOISTURE-RESISTANT, COMPATIBLE WITH PLASTIC ELECTRICAL TAPE.

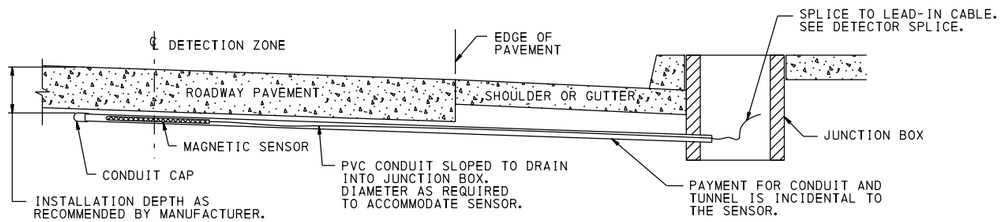
ALTERNATE B

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(a)4, PUBLICATION 408.

ALTERNATE C

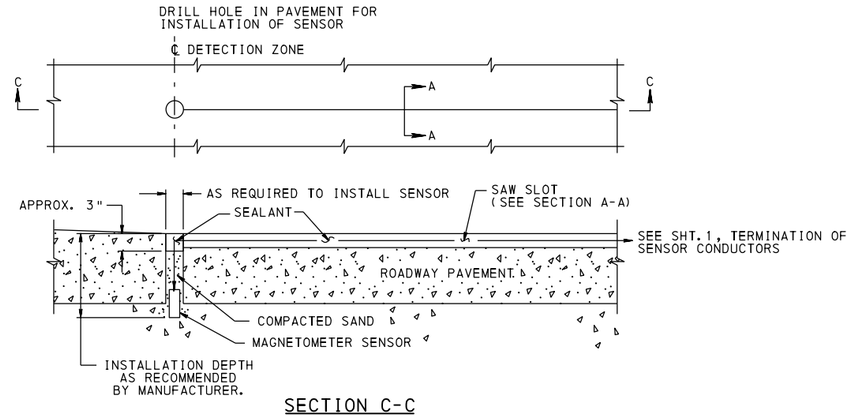
DETECTOR SPLICE





SECTION E-E

TYPICAL SENSOR INSTALLATION - MAGNETIC DETECTOR



SECTION C-C

TYPICAL SENSOR INSTALLATION - MAGNETOMETER DETECTOR

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