

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 Structural 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 (717) 787-8779 fax ra-penndotsalesstore@state.pa.us ☒ PennDOT website - www.dot.state.pa.us <i>Click on Forms, Publications & Maps</i> ☒ DGS warehouse (PennDOT employees ONLY)	
	APPROVED FOR ISSUANCE BY: Daryl St. Clair, P.E. /s	

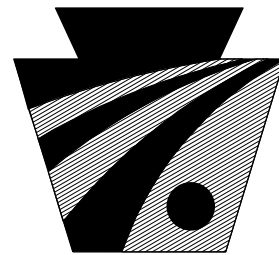
The following are changes from the October 14, 2010 update:

Traffic Control Standard #	Sheet #	Description of the Change
TC-8800 Series		All of the sheets have been updated to reflect the PennDOT reorganization 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.

12/12/2011

COMMONWEALTH OF PENNSYLVANIA

DEPARTMENT OF TRANSPORTATION



pennsylvania

DEPARTMENT OF TRANSPORTATION

TRAFFIC STANDARDS – SIGNALS

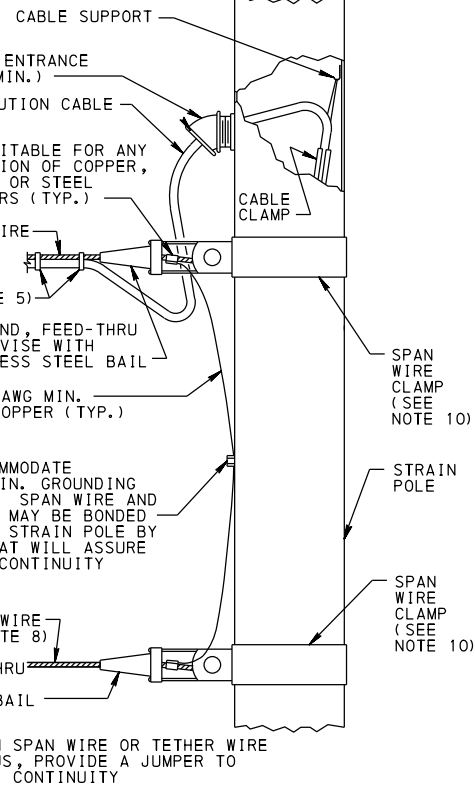
TC-8800 SERIES

BUREAU OF MAINTENANCE AND OPERATIONS

INDEX OF TRAFFIC STANDARDS – SIGNALS

<u>STANDARD DRAWING NO.</u>	<u>DATE</u>	<u>DESCRIPTION</u>
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

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



LUMINAIRE EXTENSION WITH PREDRILLED HOLE
 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 STRAIN POLE
 24" OVERLAP SLIP JOINT, FIELD ASSEMBLED
 12"
 DISTRIBUTION CABLE
 SPAN WIRE
 SPAN WIRE CLAMP
 STRAIN POLE
 SPAN WIRE CLAMP
 TETHER WIRE
 SE PLATE SEE DETAIL SHEET 10)
 DATATION NOTES 1 & 2)

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

1. FOR FOUNDATION DETAILS, SEE SHEETS 3 THROUGH 9.
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.

STRAIN POLE

TC-8801

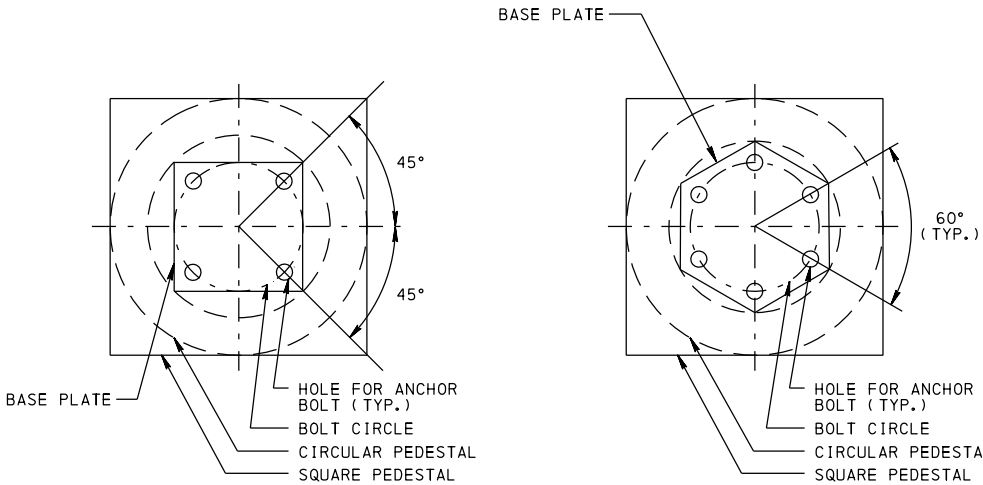
ANCHOR BOLT DESIGN, MAST ARM

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

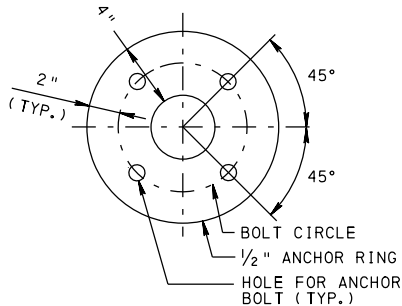


BASE MOUNT PLAN

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

BASE MOUNT PLAN

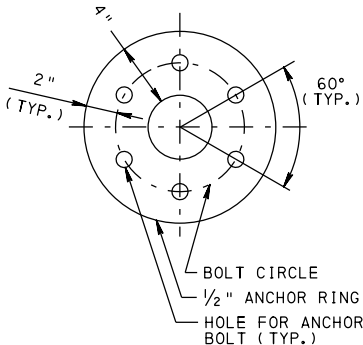
NOTE: A MINIMUM OF 6 ANCHOR BOLTS IS REQUIRED FOR MAST ARM AND STRAIN POLE TRAFFIC SIGNAL SUPPORTS.



ANCHOR RING DETAIL

(N. T. S.)

TRAFFIC SIGNAL SUPPORT
PEDESTAL POLE ANCHOR BOLT DETAILS



ANCHOR RING DETAIL

(N. T. S.)

TRAFFIC SIGNAL SUPPORT
MAST ARM AND STRAIN POLE
ANCHOR BOLT DETAILS

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	1 3/4"	35"	18"	2"	2"	40"	18"	2 1/4"	2"	40"	18"	2 1/4"
2000	6	1 3/4"	35"	18"	2"	2"	40"	18"	2 1/4"	2"	40"	18"	2 1/4"
3000	6	1 3/4"	35"	18"	2"	2"	40"	18"	2 1/4"	2"	40"	18"	2 1/4"
4000	6	1 3/4"	35"	18"	2"	2"	40"	18"	2 1/4"	2"	40"	18"	2 1/4"
5000	6	1 3/4"	35"	18"	2"	2"	40"	18"	2 1/4"	2"	40"	18"	2 1/4"
6000	6	2 1/4"	45"	18"	2 1/2"	2 1/4"	45"	21"	2 1/2"	2 1/4"	45"	21"	2 1/2"
7000	6	2 1/4"	45"	18"	2 1/2"	2 1/4"	45"	21"	2 1/2"	2 1/4"	45"	21"	2 1/2"
8000	6	2 1/4"	45"	18"	2 1/2"	2 1/4"	45"	21"	2 1/2"	2 1/4"	45"	21"	2 1/2"
9000	6	2 1/4"	45"	18"	2 1/2"	2 1/4"	45"	21"	2 1/2"	2 1/2"	45"	21"	2 3/4"
10,000	6	2 1/4"	45"	18"	2 1/2"	2 1/4"	45"	21"	2 1/2"	2 1/2"	45"	21"	2 3/4"

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)

PENNDOT DM4 APPENDIX J, PENNDOT
COM624 COMPUTER PROGRAM, OR L-PILE

CASE 1 (SOIL)

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

1.5 TONS PER SQUARE FOOT
1.0"
K = 80.0 POUNDS PER CUBIC INCH
K = 60.0 POUNDS PER CUBIC INCH

COHESION:

ABOVE WATER TABLE
BELOW WATER TABLE

15 POUNDS PER SQUARE FOOT
0 POUNDS PER SQUARE FOOT
5 FEET BELOW GRADE
120 POUNDS PER CUBIC FOOT
30°

WATER TABLE

UNIT WEIGHT OF SOIL
ANGLE OF INTERNAL FRICTION

CASES 2 THROUGH 4 (ROCK)

MAXIMUM DESIGN PRESSURE
MAXIMUM DESIGN LATERAL DISPLACEMENT

1.5 TONS PER SQUARE FOOT
1.0"

SOIL PARAMETERS ABOVE TOP OF ROCK:

MODULUS OF SUBGRADE REACTION:
ABOVE WATER TABLE
BELOW WATER TABLE

K = 80.0 POUNDS PER CUBIC INCH
K = 60.0 POUNDS PER CUBIC INCH
0 POUNDS PER SQUARE FOOT
5 FEET BELOW GRADE
120 POUNDS PER CUBIC FOOT
30°

COHESION

WATER TABLE
UNIT WEIGHT OF SOIL
ANGLE OF INTERNAL FRICTION

ROCK PARAMETERS:

UNIT WEIGHT OF ROCK
UNIAXIAL COMPRESSIVE STRENGTH

120 POUNDS PER CUBIC FOOT
250 POUNDS PER SQUARE INCH

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

† LEGEND:

AASHTO SIGN SPEC:

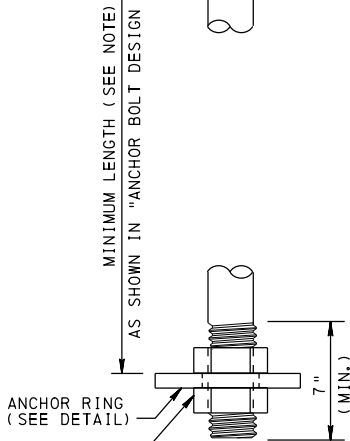
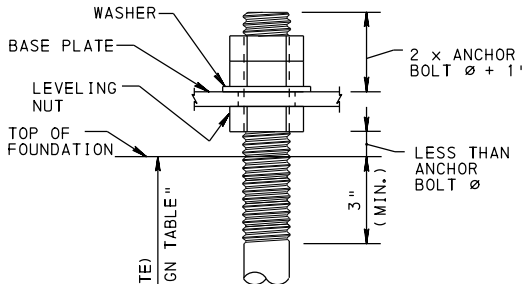
AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS,
"STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS,
LUMINAIRES AND TRAFFIC SIGNALS", 4TH EDITION (2001) INCLUDING INTERIM
SPECIFICATIONS (2002, 2003 AND 2006)

U. N. O.:

UNLESS NOTED OTHERWISE

FOUNDATION NOTES:

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

CHIEF, TRAFFIC OPERATIONS

RECOMMENDED DEC. 12, 2011

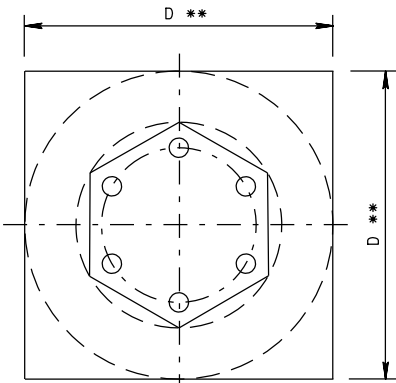
CHIEF OF HIGHWAY SAFETY AND
TRAFFIC OPERATIONS DIVISION

SHEET 3 OF 10

TC-8801

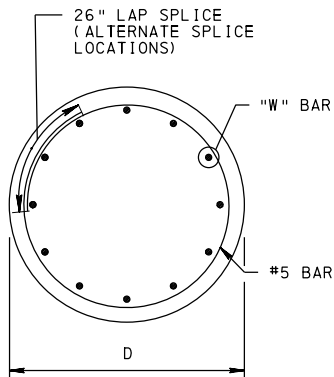
NOTES:

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.



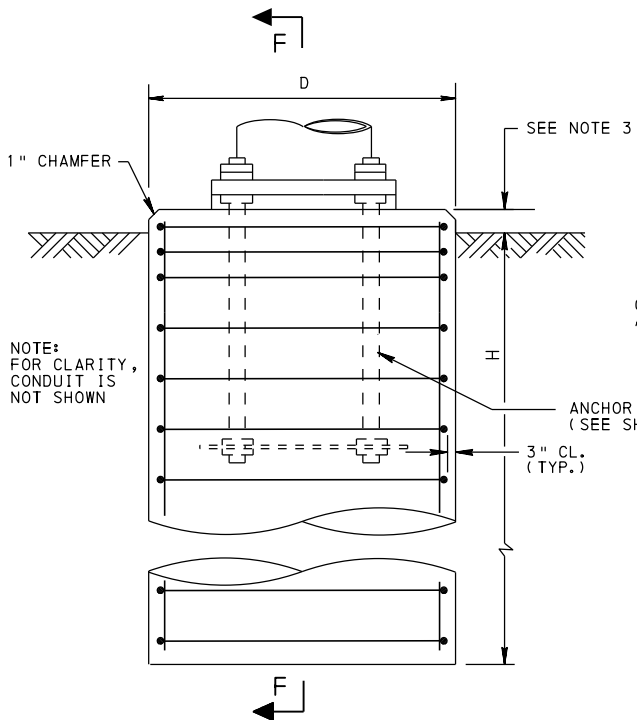
PLAN

** 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



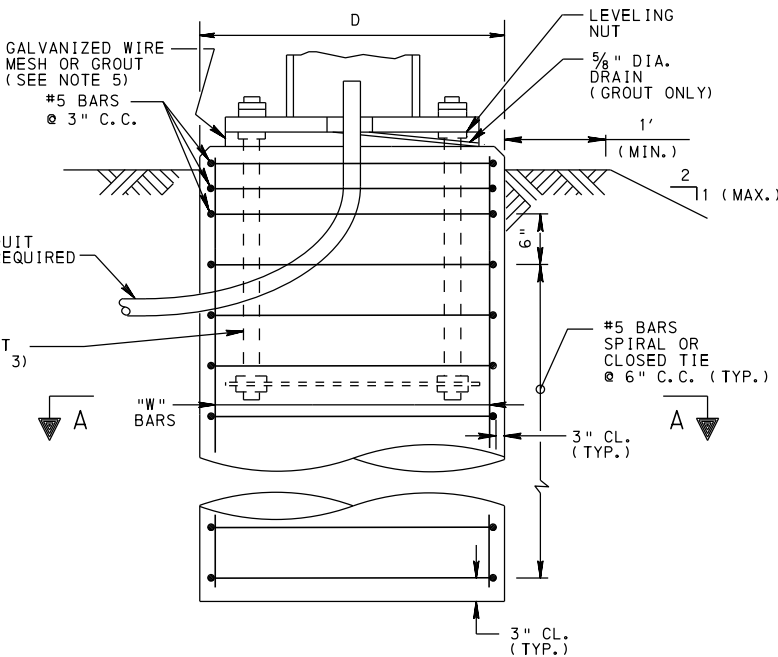
SECTION A-A

CLOSED TIE DETAIL
CASES 1 AND 2



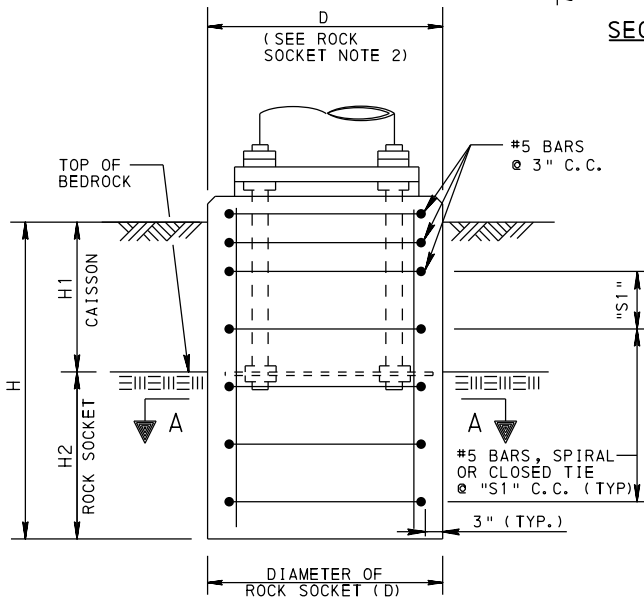
SECTION

TYPE A FOUNDATION
CASE 1



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.

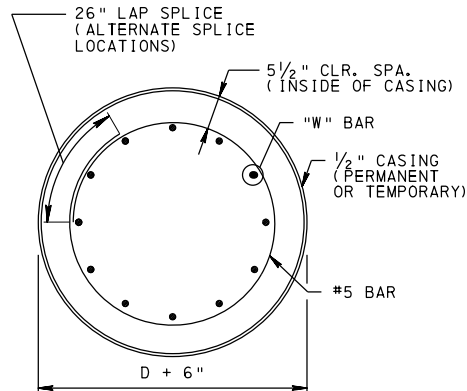


TYPE A FOUNDATION
CASE 2

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"

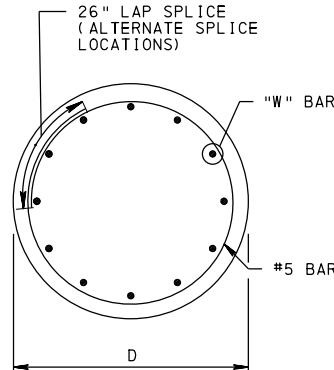
ROCK SOCKET NOTES:

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: $0' \leq H_1 < 5'$
 - CASE 3: $5' \leq H_1 < 10'$
 - CASE 4: $H_1 \geq 10'$
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.

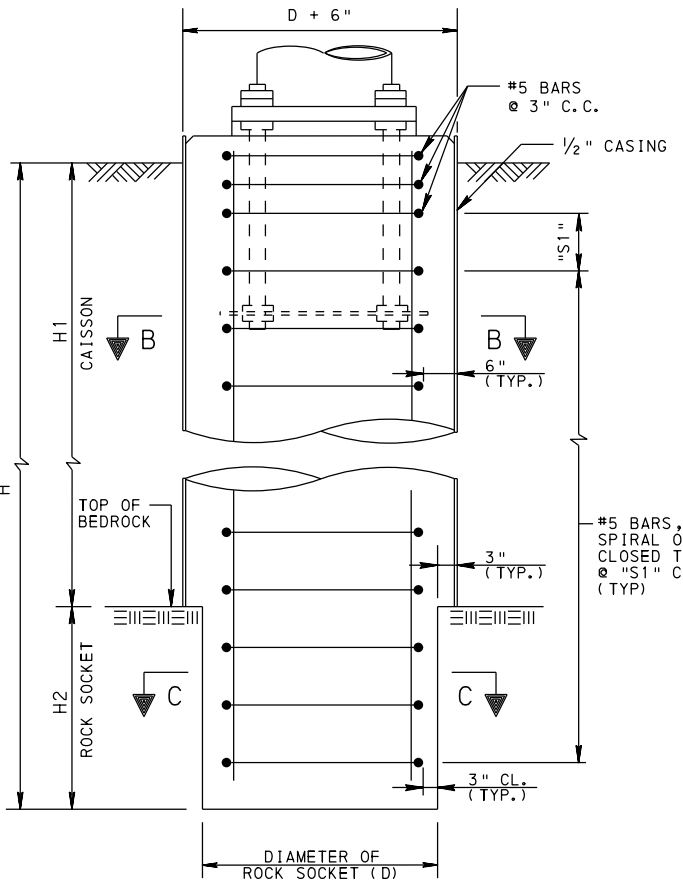


SECTION B-B

CLOSED TIE DETAILS
CASES 3 AND 4



SECTION C-C



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

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 "X"
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

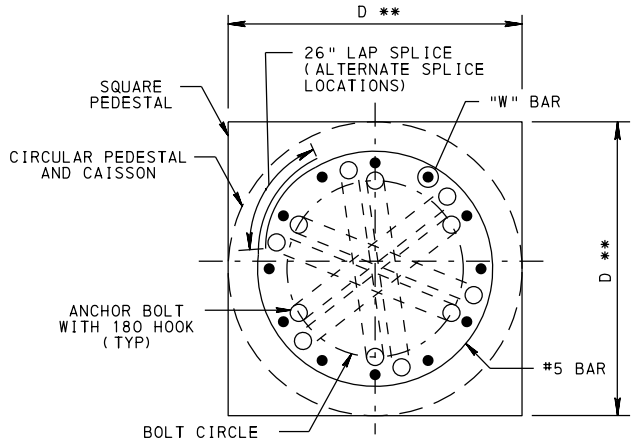
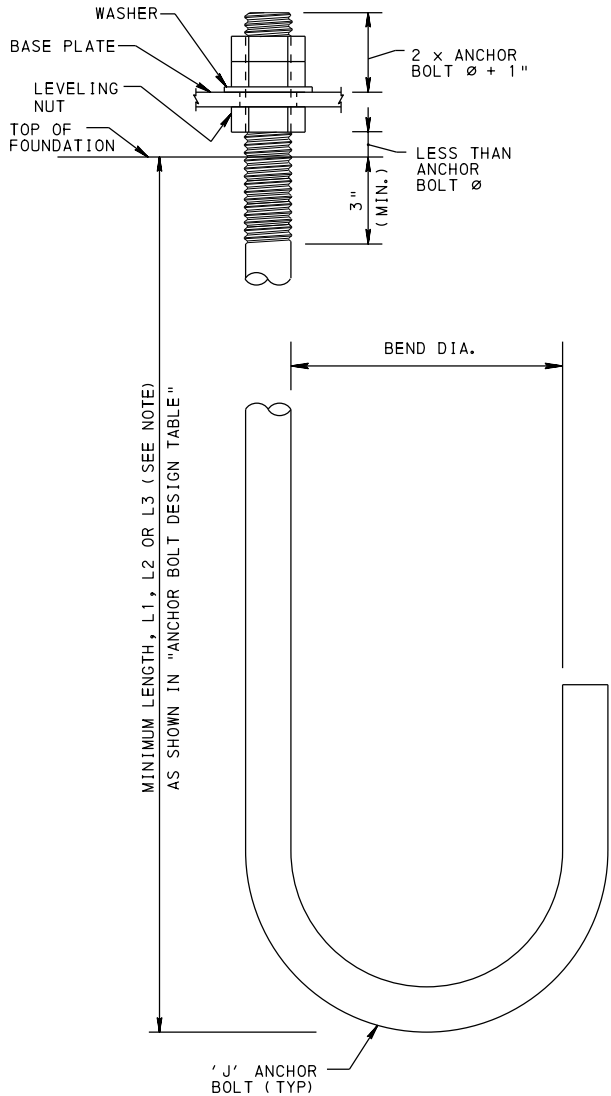
CHIEF, TRAFFIC OPERATIONS SECTION

RECOMMENDED DEC. 12, 2011

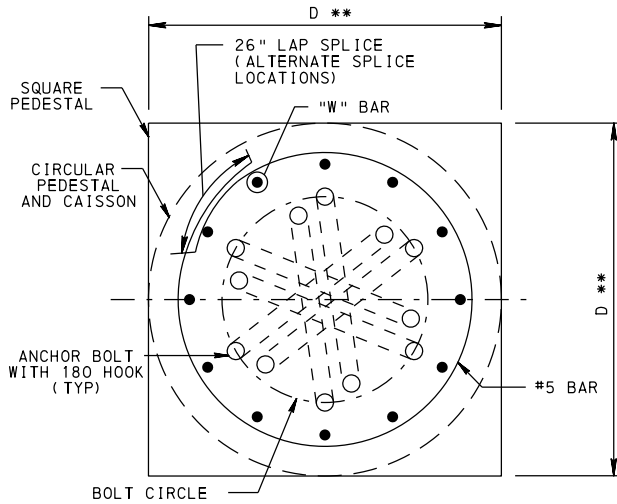
CHIEF OF HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION

SHEET 6 OF 10

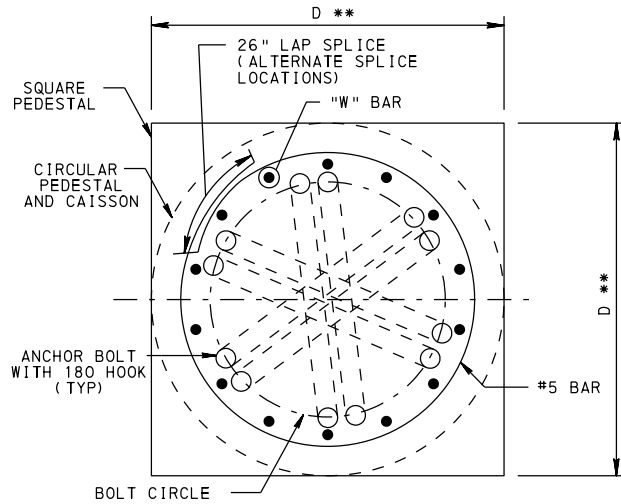
TC-8801



18" DIA. BOLT CIRCLE

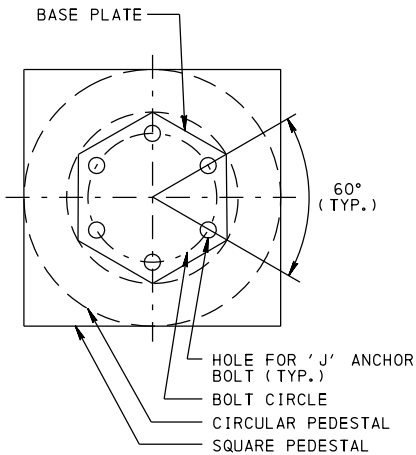


21" DIA. BOLT CIRCLE



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.

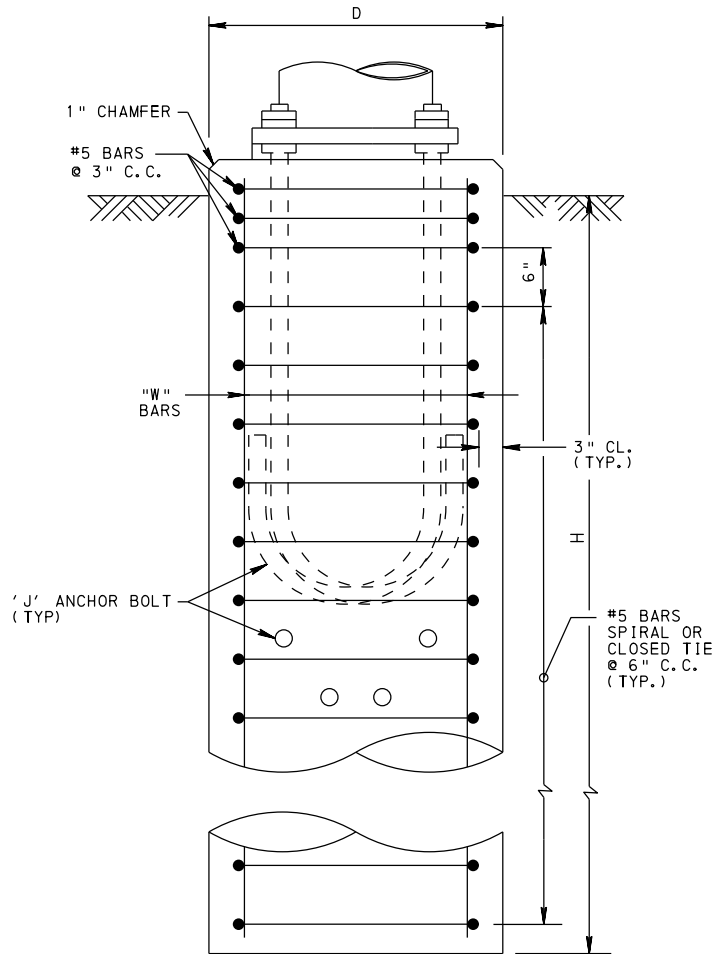
NOTE: DUE TO OVERLAPPING 'J' ANCHOR BOLTS, VARY EMBEDMENT BY 6" FOR EACH 2-BOLT PAIR FOR 1 3/4" DIA. BOLTS AND BY 12" FOR EACH 2-BOLT PAIR FOR 2" DIA. BOLTS. SEE L1, L2 AND L3 EMBEDMENT DEPTHS IN ANCHOR BOLT DESIGN TABLE.

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	1 3/4"	17 1/2"	42"	48"	54"	18"	2"	1 3/4"	17 1/2"	42"	48"	54"	18"	2"
>10' - 15'	6	1 3/4"	17 1/2"	42"	48"	54"	18"	2"	1 3/4"	17 1/2"	42"	48"	54"	18"	2"
>15' - 20'	6	1 3/4"	17 1/2"	42"	48"	54"	18"	2"	1 3/4"	17 1/2"	42"	48"	54"	18"	2"
>20' - 25'	6	1 3/4"	17 1/2"	42"	48"	54"	18"	2"	1 3/4"	17 1/2"	42"	48"	54"	18"	2"
>25' - 30'	6	1 3/4"	17 1/2"	42"	48"	54"	21"	2"	1 3/4"	17 1/2"	42"	48"	54"	21"	2"
>30' - 35'	6	1 3/4"	17 1/2"	42"	48"	54"	21"	2"	1 3/4"	17 1/2"	42"	48"	54"	21"	2"
>35' - 40'	6	2"	22"	48"	60"	72"	24"	2 1/4"	2"	22"	48"	60"	72"	24"	2 1/4"
>40' - 45'	6	2"	22"	48"	60"	72"	24"	2 1/4"	2"	22"	48"	60"	72"	24"	2 1/4"
>45' - 50'	6	2"	22"	48"	60"	72"	24"	2 1/4"	2"	22"	48"	60"	72"	24"	2 1/4"
>50' - 60'	6	2"	22"	48"	60"	72"	24"	2 1/4"	2"	22"	48"	60"	72"	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

B. C. = BOLT CIRCLE DIAMETER



SECTION

TYPE A FOUNDATION
CASE 1 ALTERNATE

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

MAST ARM LENGTH	"D"	H		"W" BAR
		ONE ARM	TWO ARMS*	
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

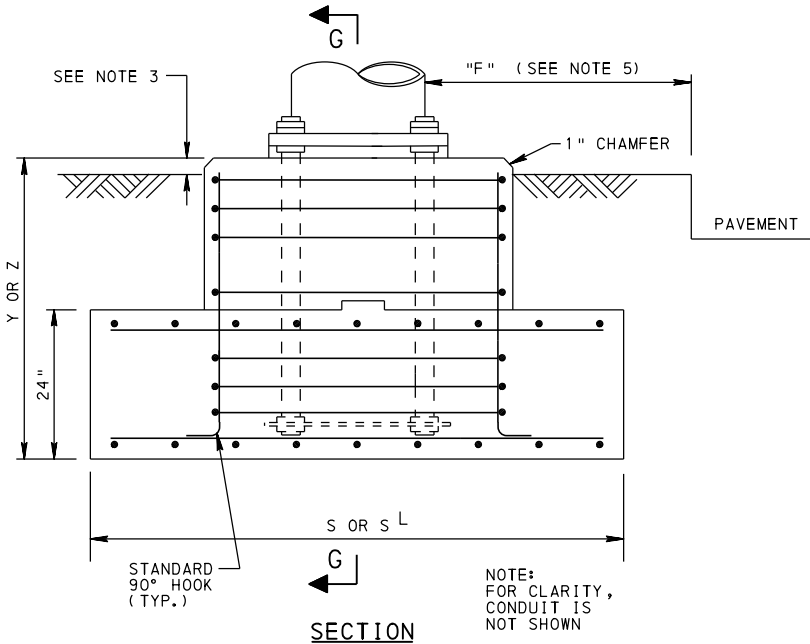
FOUNDATION FOR TRAFFIC SIGNAL SUPPORT, MAST ARM

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'-6"	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.

NOTES:

- 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.
- FOR DESIGN CRITERIA SEE SHEET 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.
- FOR GROUND ROD SIZE AND INSTALLATION DETAILS, SEE TC-8804.
- DISTANCE "F" AS REQUIRED TO AVOID PAVEMENT AND/OR CURB EXCAVATION.
- SEE SHEET 4 FOR CLOSED TIE DETAIL.
- IN A PAVED AREA, GROUT SHALL BE PLACED.
- SEE MAST ARM FOUNDATION NOTES 1 AND 2 ON SHEET 5.



TYPE B FOUNDATION

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"

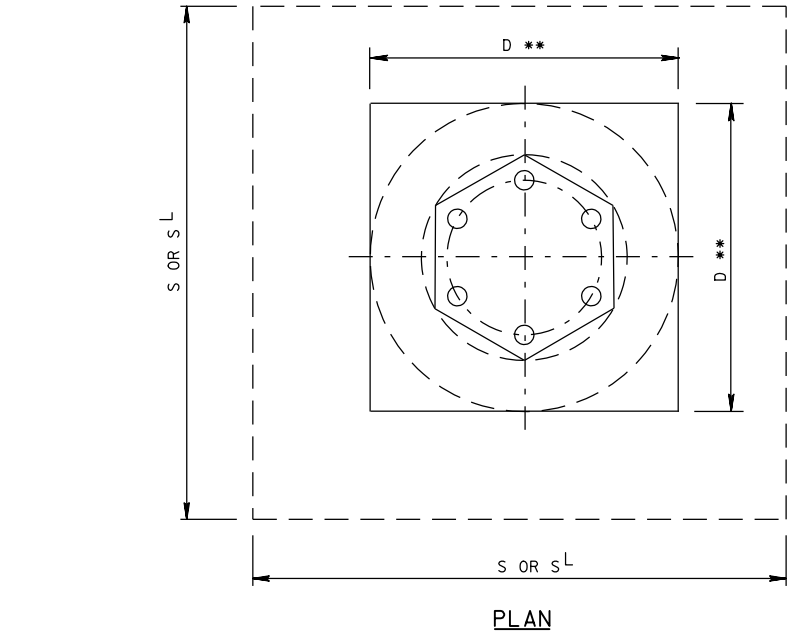
S^L = WITH LUMINAIRE

STRAIN POLE FOUNDATION NOTES:

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

** 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 MAINTENANCE AND OPERATIONS

STANDARD

TRAFFIC SIGNAL SUPPORT
FOUNDATION TYPE B

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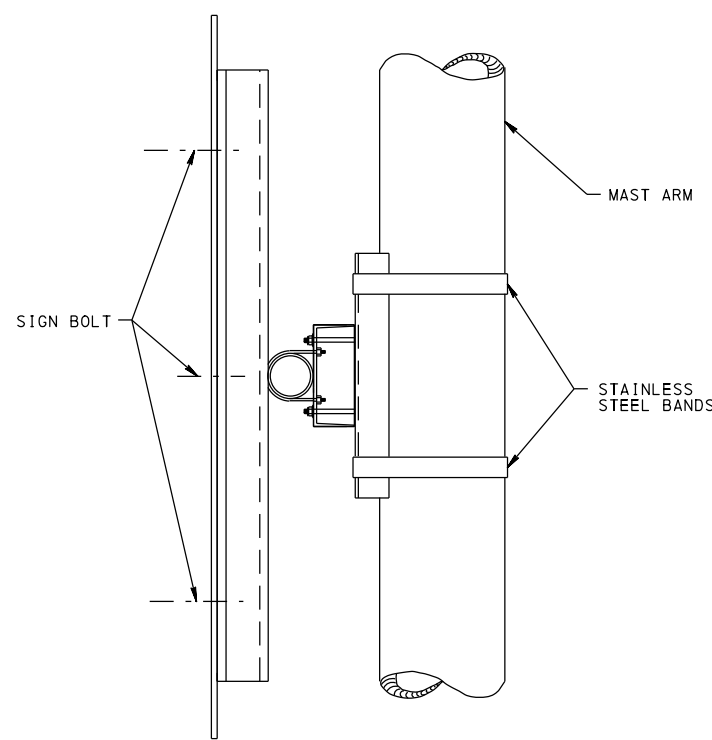
CHIEF, TRAFFIC OPERATIONS SECTION

RECOMMENDED DEC. 12, 2011

CHIEF OF HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION

SHEET 8 OF 10

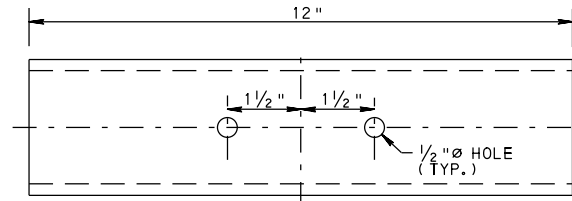
TC-8801



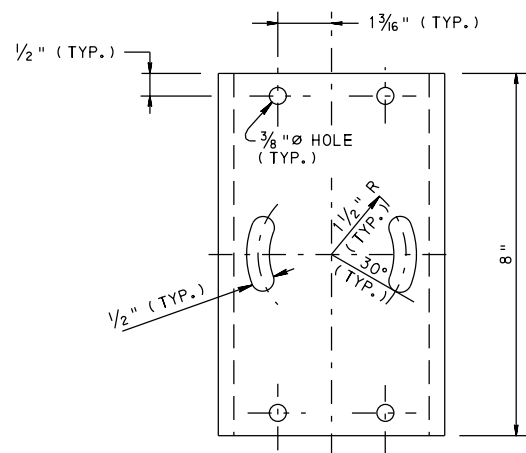
SECTION H-H

SIGN BRACKET - MAST ARM

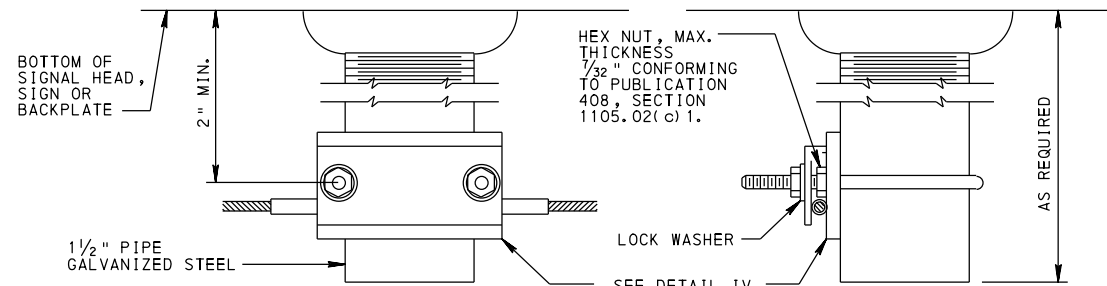
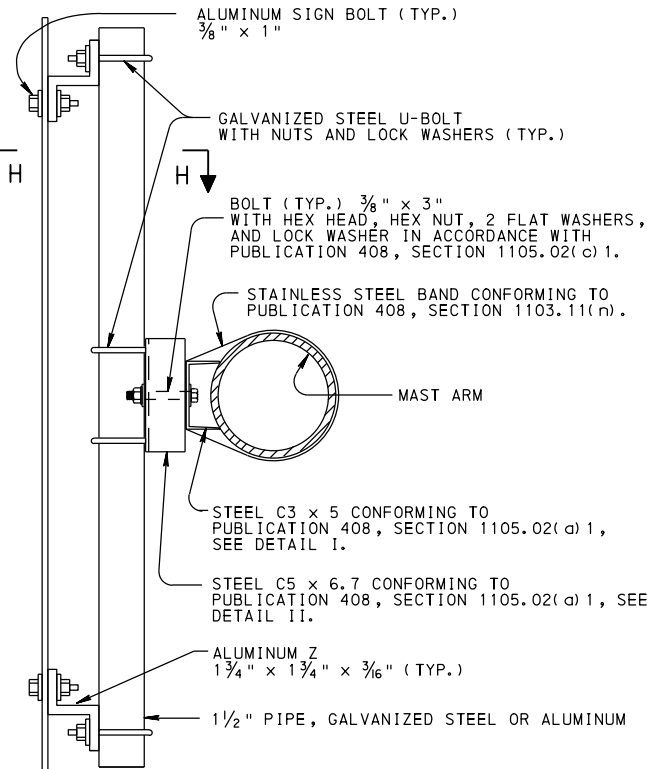
(ALTERNATE METHOD FOR ATTACHING SIGNS TO THE MAST ARM MAY BE USED IF APPROVED BY THE ENGINEER)



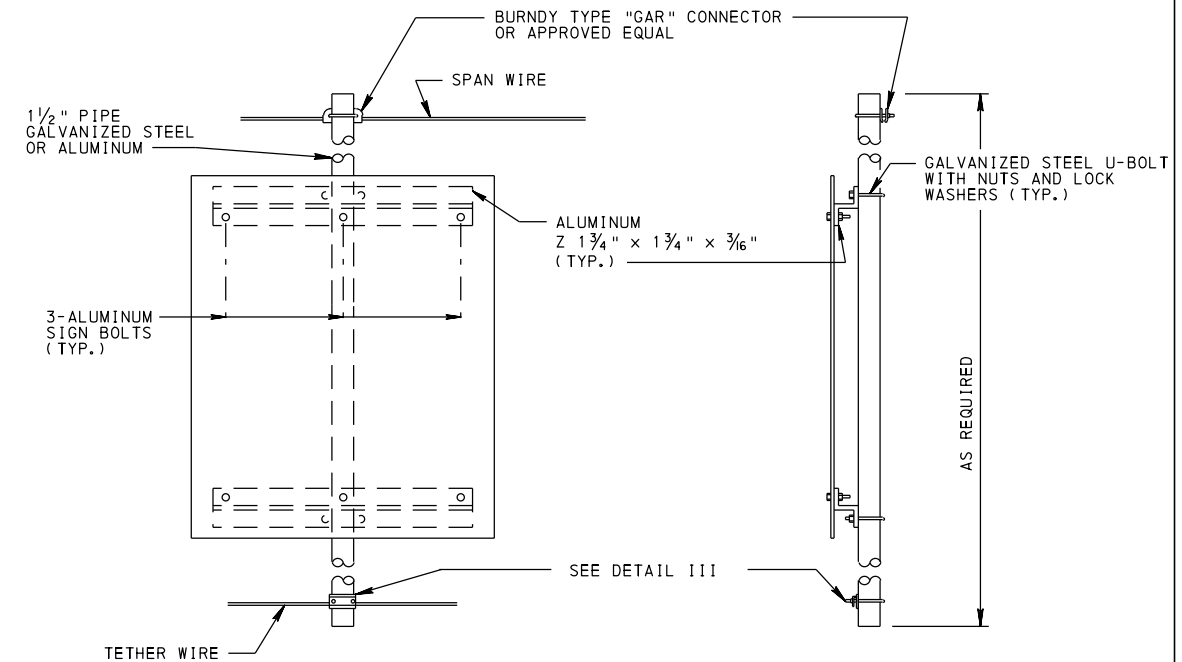
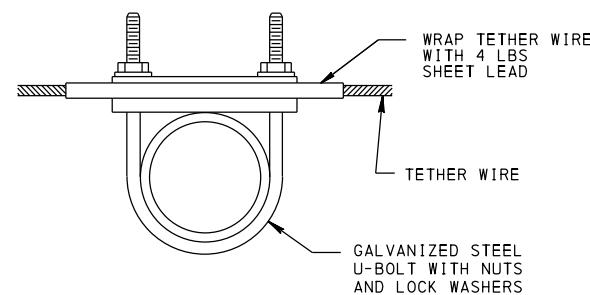
STEEL C3 x 5
GALVANIZED AFTER FABRICATION
DETAIL I



STEEL C5 x 6.7
GALVANIZED AFTER FABRICATION
DETAIL II

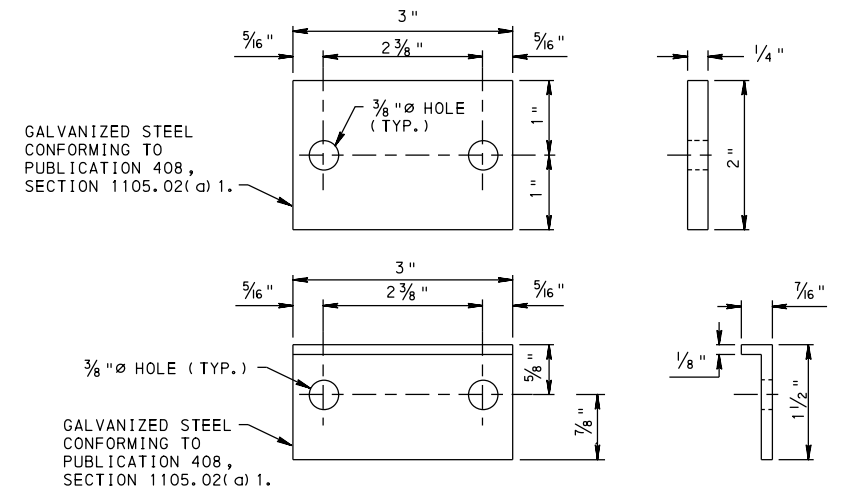


DETAIL III



SIGN BRACKET - SPAN WIRE

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



DETAIL IV

NOTES:

- 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".
- Z 1 3/4" x 1 3/4" x 3/16" SHALL BE MANUFACTURED FROM ALUMINUM CONFORMING TO ASTM B 209M, ALLOY 6061-T6.
- 1.5" GALVANIZED STEEL PIPE SHALL CONFORM TO PUBLICATION 408, SECTION 1105.02(j) 1.
- ALUMINUM SIGN BOLTS, NUTS, WASHERS AND NYLON WASHERS SHALL CONFORM TO PUBLICATION 408, SECTION 1103.11(c), SECTION 1103.11(d), SECTION 1103.11(e) 1 AND SECTION 1103.11(b) 2 RESPECTIVELY.
- 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 7/8".

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF MAINTENANCE AND OPERATIONS

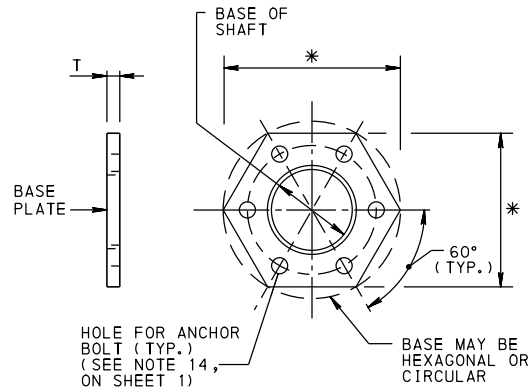
STANDARD

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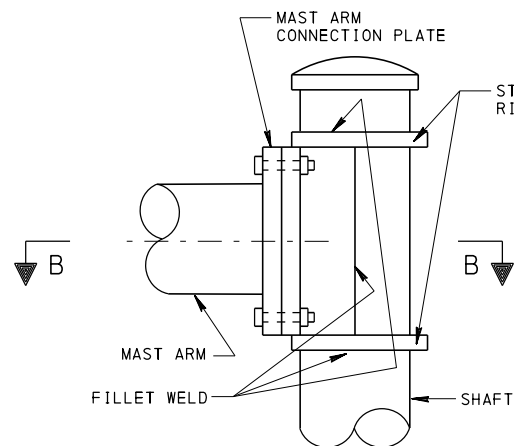
* AS REQUIRED TO MEET THE DEPARTMENT'S "CRITERIA FOR THE DESIGN OF TRAFFIC SIGNAL SUPPORTS", PUBLICATION 149.

BASE PLATE

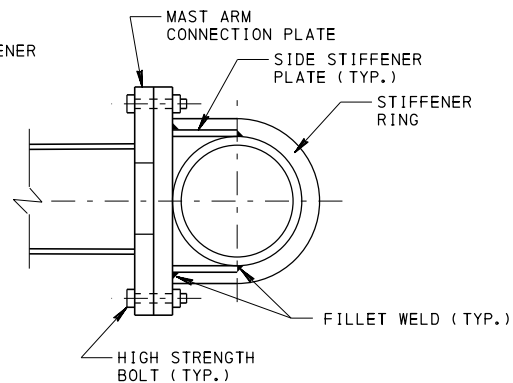
NOTE: A MINIMUM OF 6 ANCHOR BOLTS IS REQUIRED FOR MAST ARM AND STRAIN POLE TRAFFIC SIGNAL SUPPORTS (SHOWN). 4 ANCHOR BOLTS ARE REQUIRED FOR PEDESTAL POLE TRAFFIC SIGNAL SUPPORTS.

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"	2 1/2"
GREATER THAN OR EQUAL TO 19"	3"



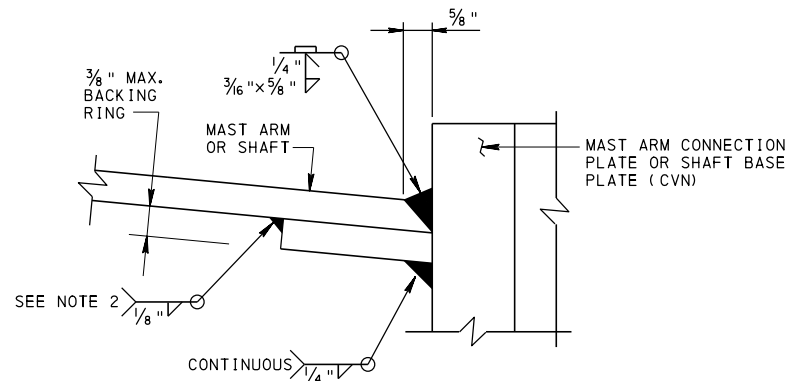
ELEVATION



SECTION B-B

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

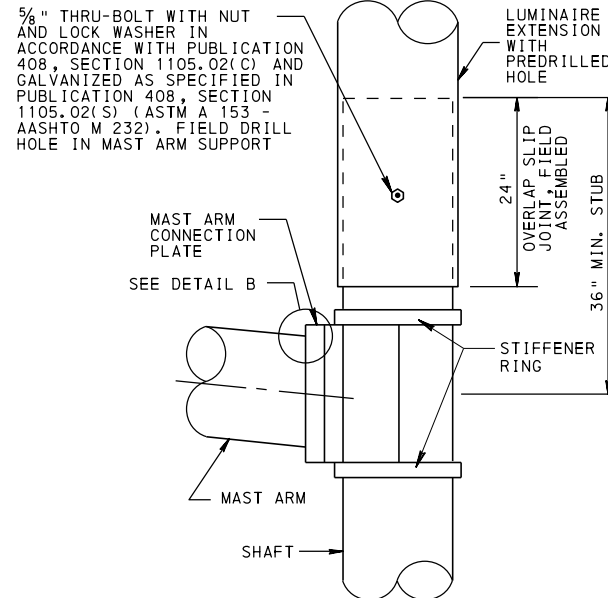
NOTE: SEAL ALL NON-WELDED JOINTS WITH SILICONE CAULK.



DETAIL B

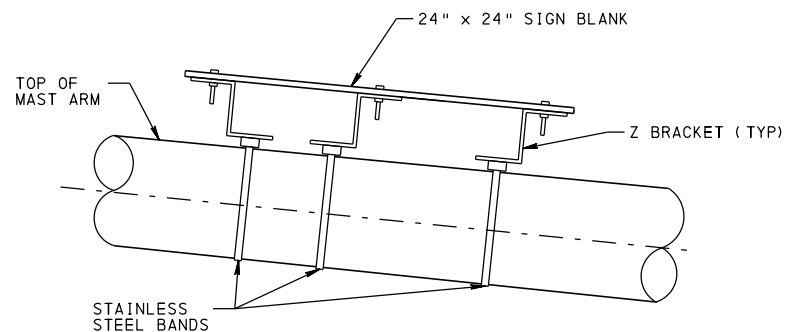
(MAST ARM CONNECTION SHOWN, SHAFT CONNECTION TO BASE PLATE SIMILAR)

- 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 SILICONE CAULKING TO THIS LOCATION AFTER POLE ASSEMBLY IS GALVANIZED.



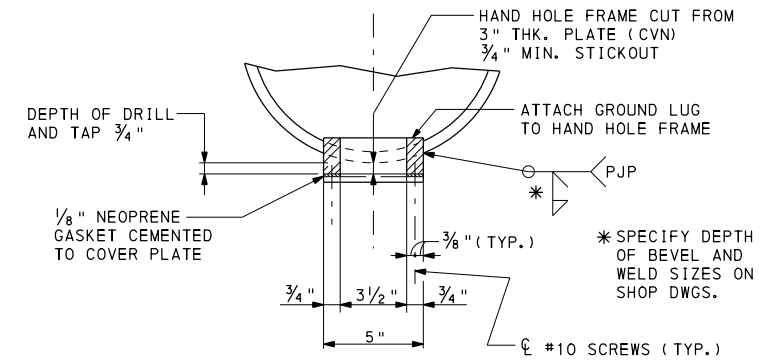
OVERLAP SLIP JOINT DETAIL

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

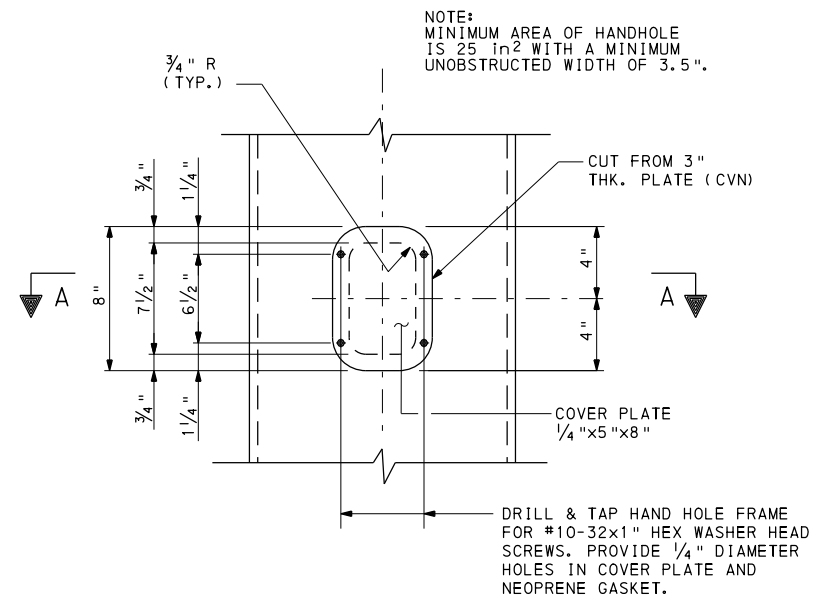


MITIGATION DEVICE DETAIL

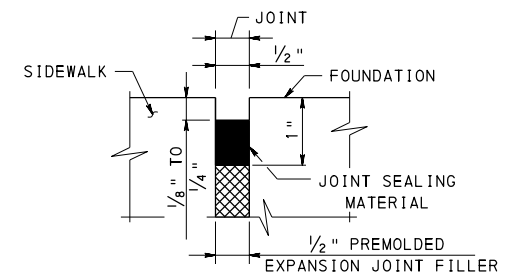
NOTE: INSTALL MITIGATION DEVICE WITHIN 5' OF MAST ARM TIP WHEN REQUIRED.



SECTION A-A



HAND HOLE DETAIL



DETAIL C

COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF MAINTENANCE AND OPERATIONS

STANDARD

TRAFFIC SIGNAL SUPPORT MISCELLANEOUS DETAILS

RECOMMENDED DEC. 12, 2011

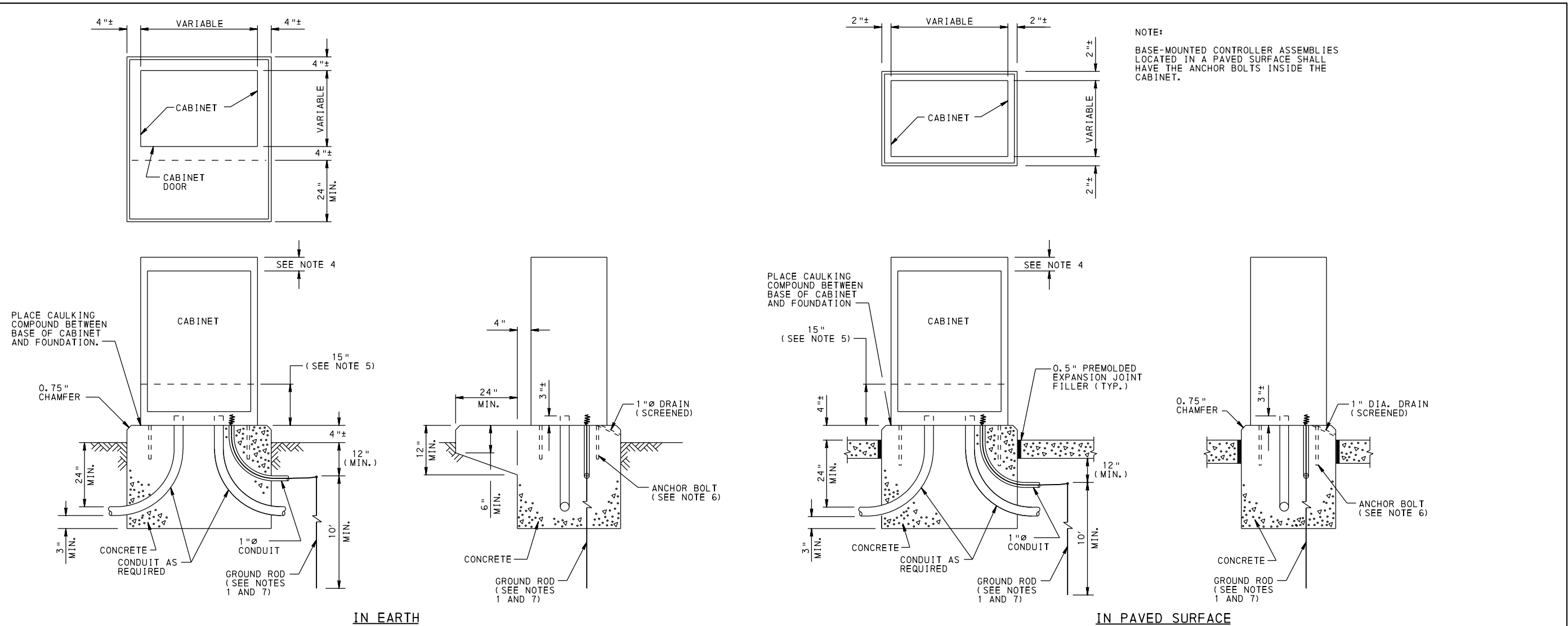
CHIEF, TRAFFIC OPERATIONS SECTION

RECOMMENDED DEC. 12, 2011

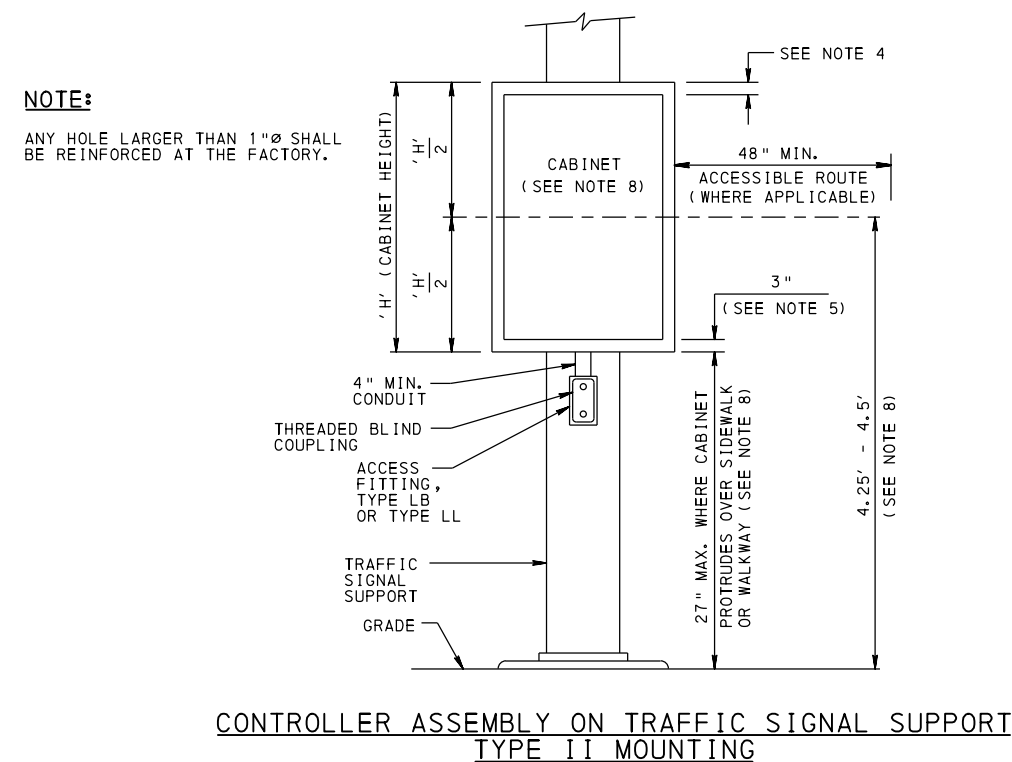
CHIEF OF HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION

SHEET 10 OF 10

TC-8801



CONTROLLER ASSEMBLY ON CEMENT CONCRETE FOUNDATION
TYPE I 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.

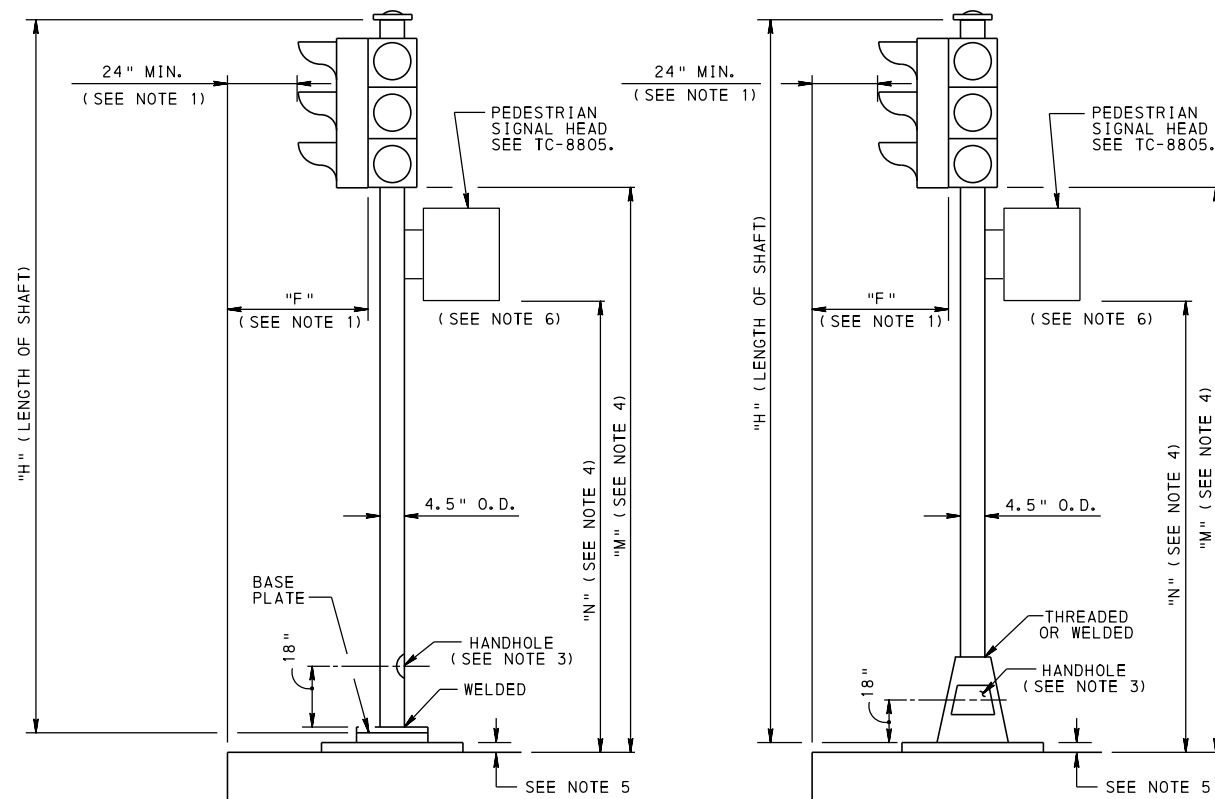


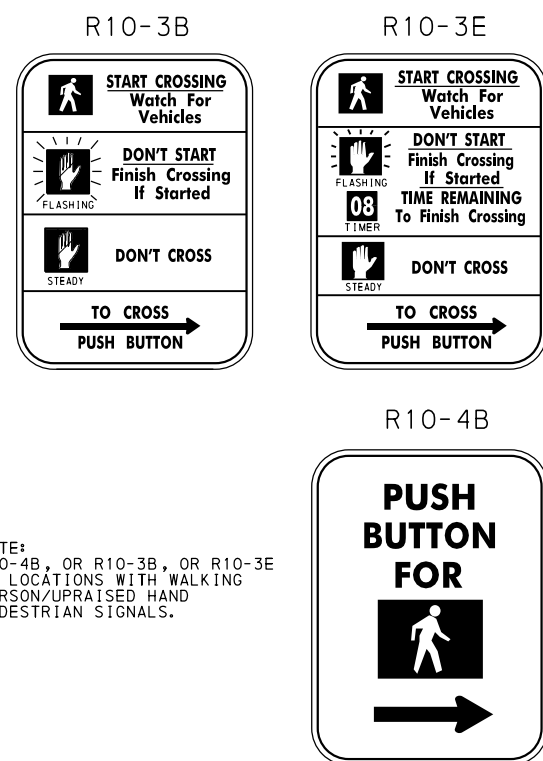
PLATE BASE

CAST BASE

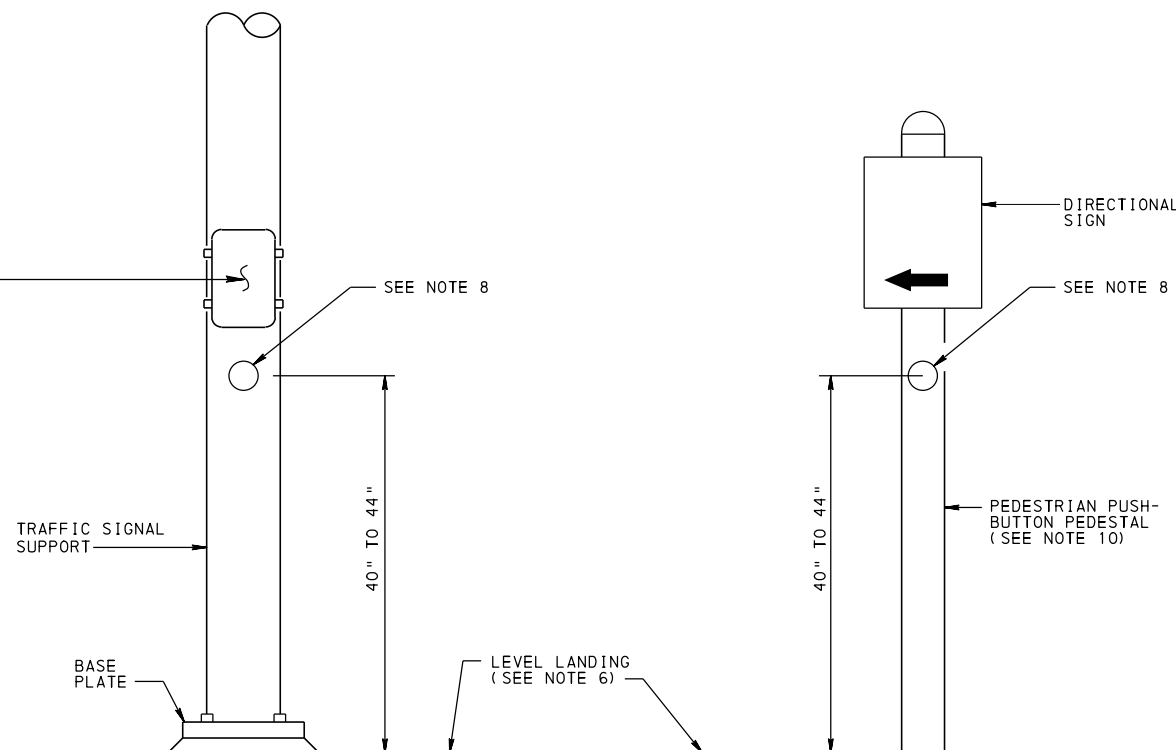
TRAFFIC SIGNAL SUPPORT-PEDESTAL

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 $\frac{3}{8}$ ".
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 $\frac{1}{2}$ " 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.



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

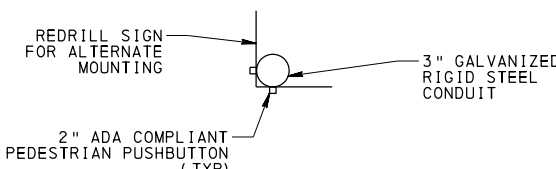
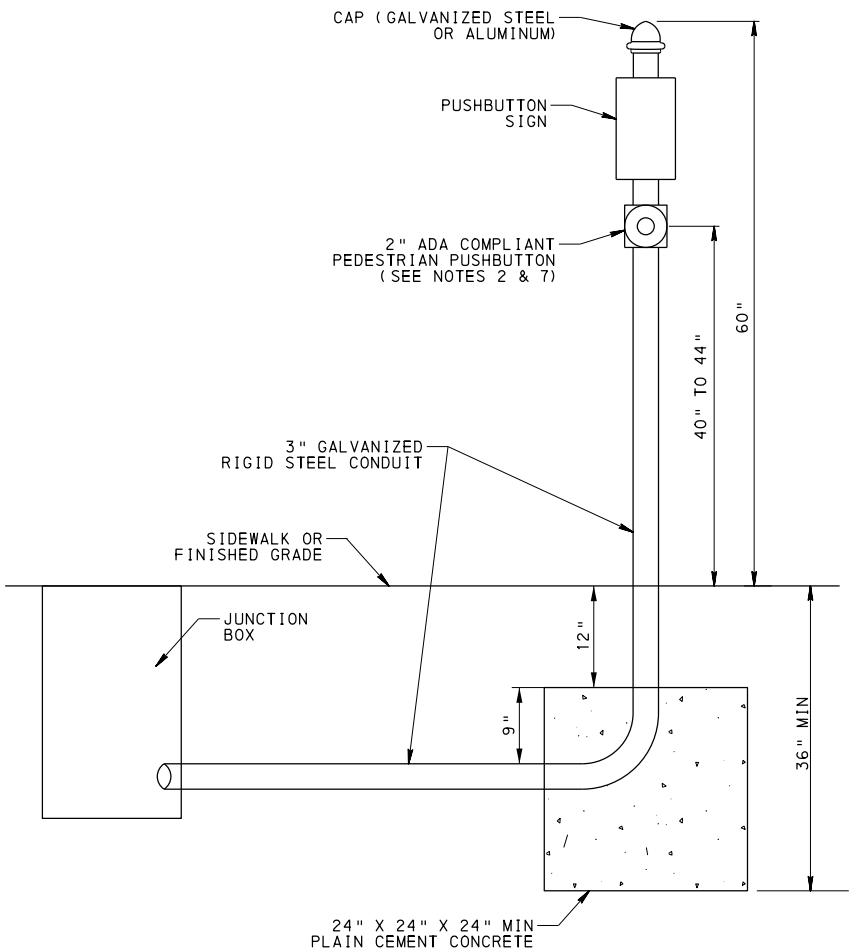
RECOMMENDED DEC. 12, 2011
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CHIEF, TRAFFIC OPERATIONS SECTION

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

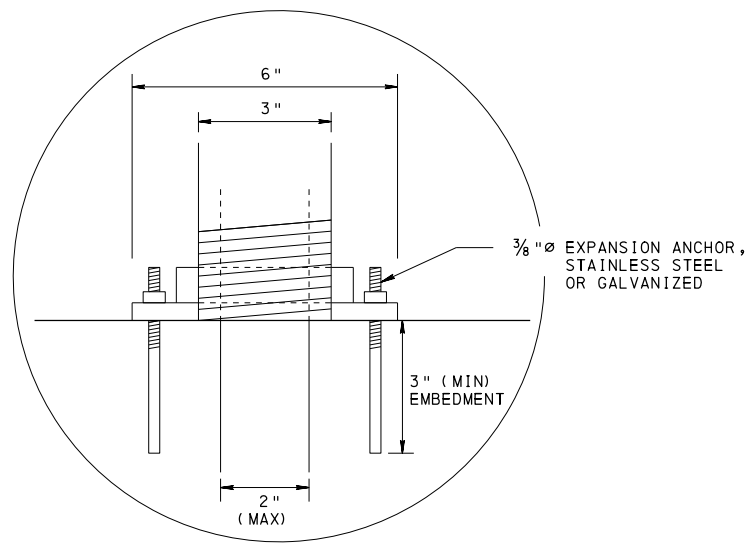
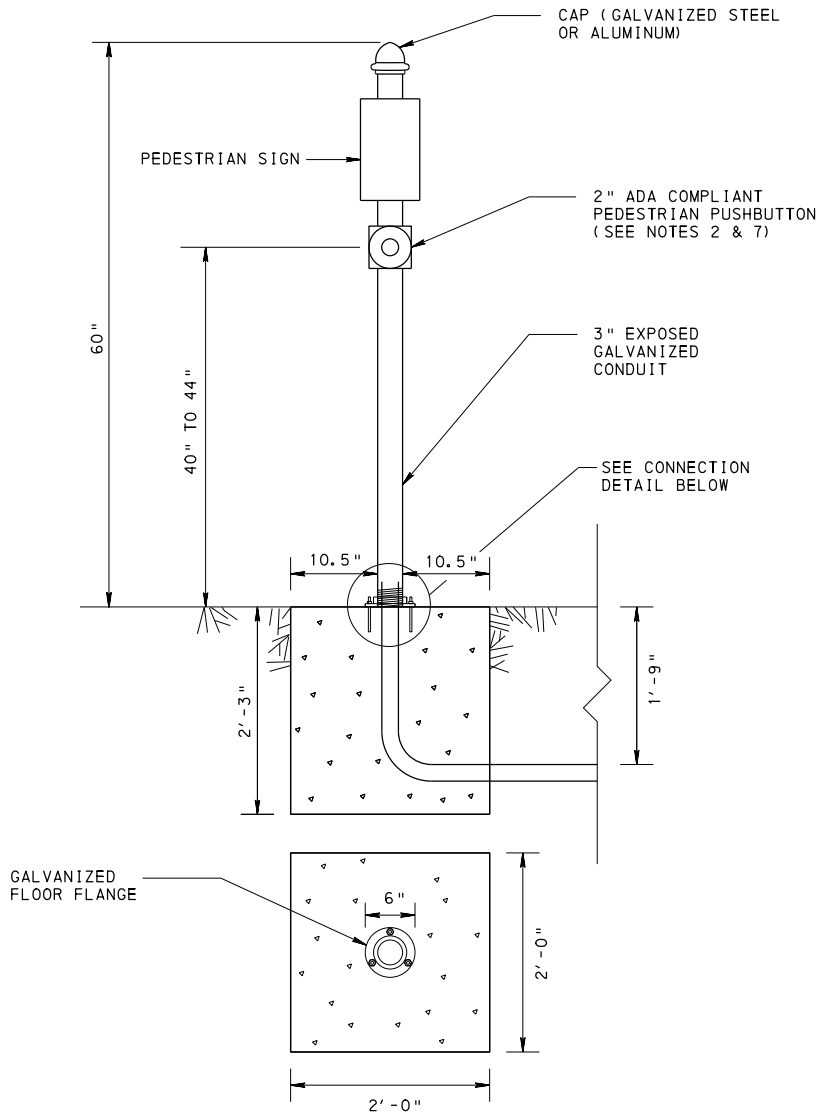
SHT. 1 OF 4

TC-8803

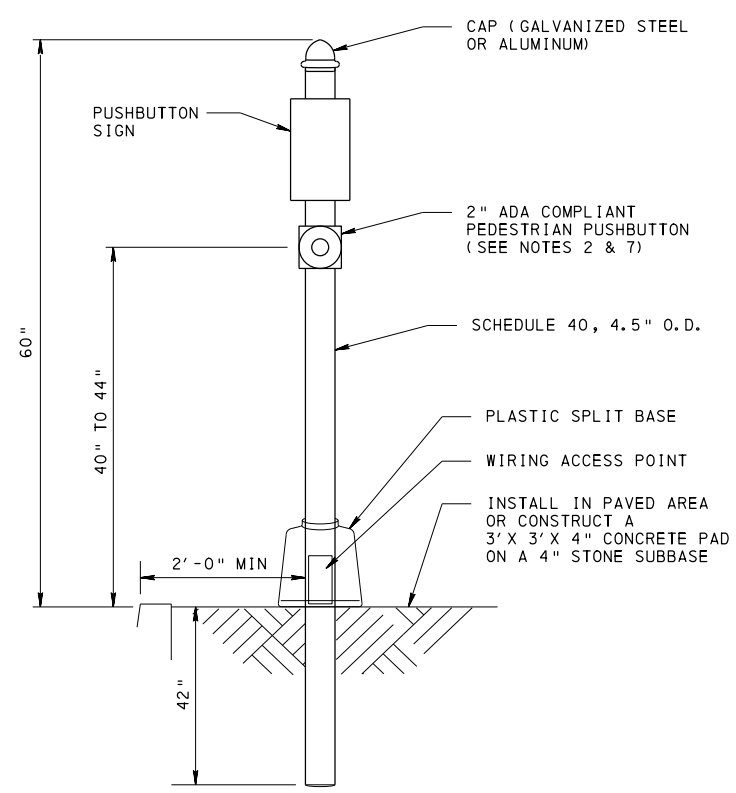
TYPE A



TYPE B



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 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 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.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF MAINTENANCE AND OPERATIONS

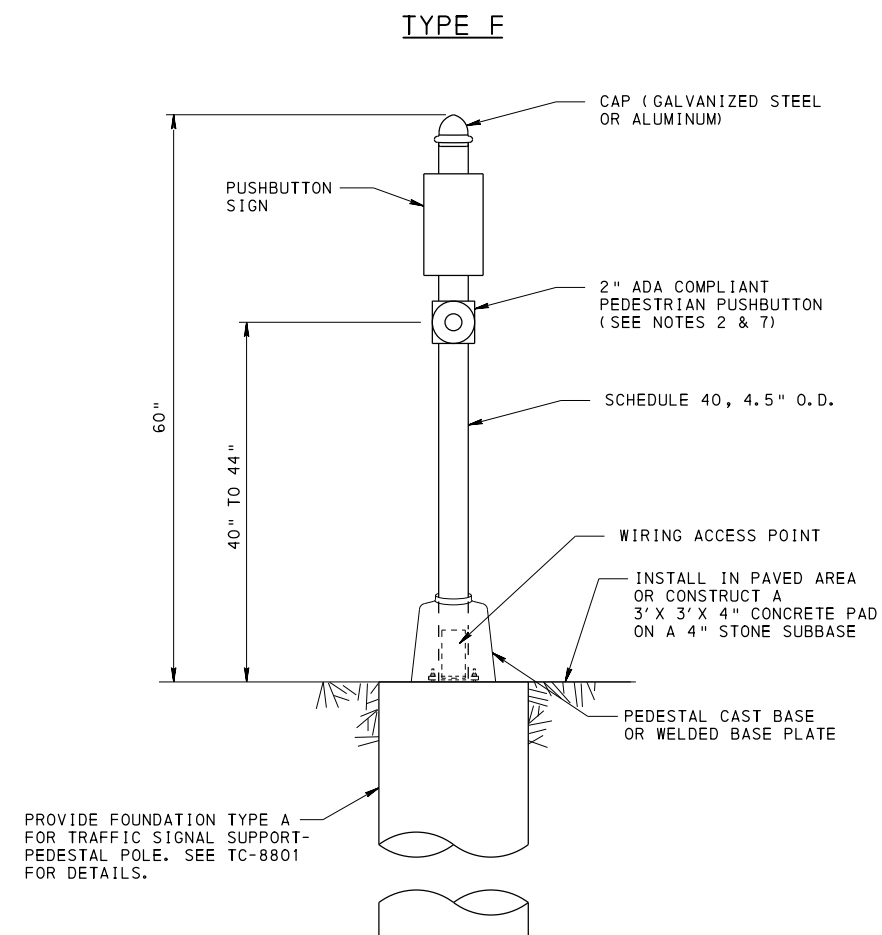
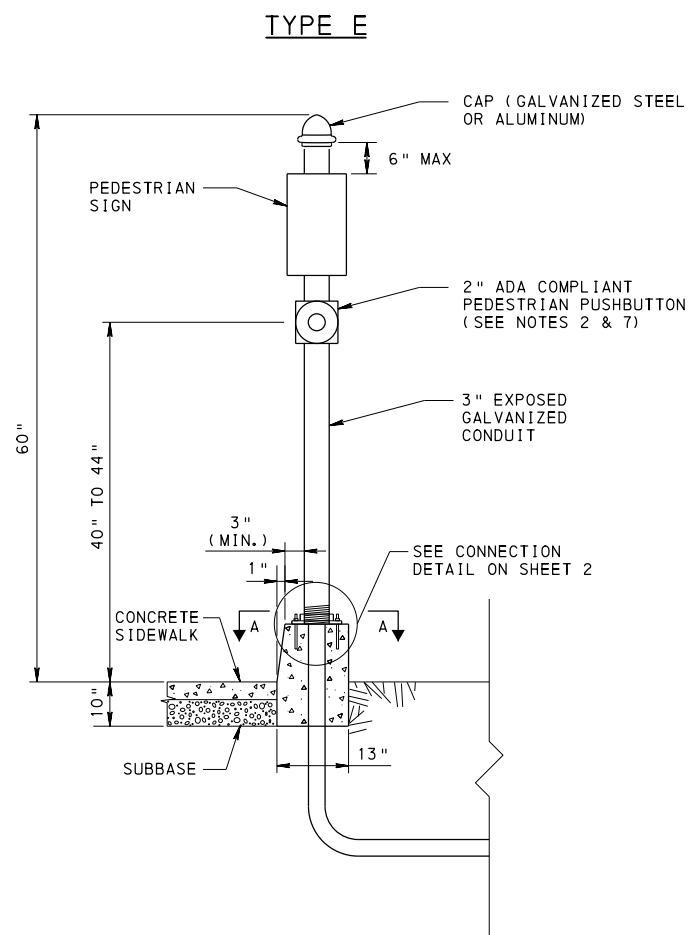
STANDARD

MISCELLANEOUS
PEDESTRIAN PUSHBUTTON
MOUNTING DETAILS

RECOMMENDED DEC. 12, 2011
CHIEF, TRAFFIC OPERATIONS SECTION

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

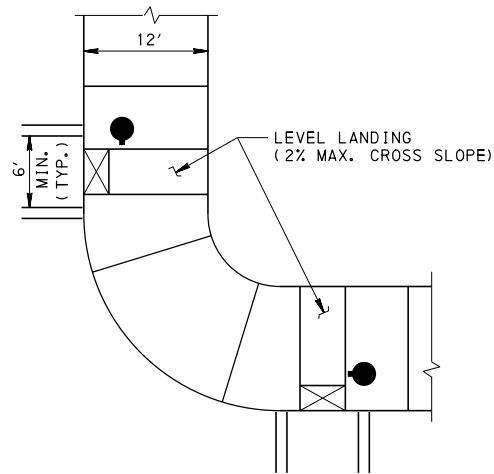
SHT. 2 OF 4
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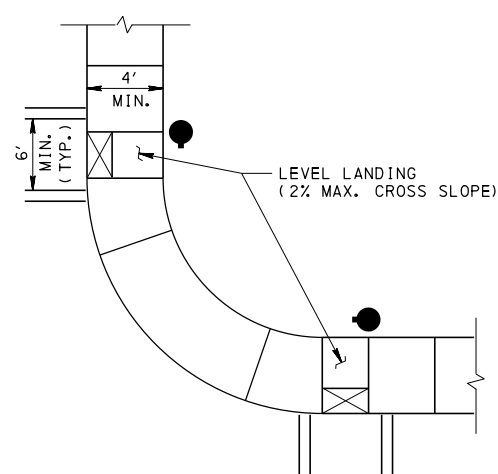
1. REFER TO RC-67M FOR CURB RAMP AND SIDEWALK DETAILS.
2. MOUNT PEDESTRIAN PUSHBUTTON BETWEEN 40" TO 44" ABOVE SIDEWALK OR FINISHED GRADE TO THE CENTER OF THE PUSHBUTTON AND 10" MAX Laterally FROM LANDING.
3. ALL ACCESSIBILITY FEATURES MUST BE COMPLIANT TO PENNDOT PUBLICATION 13M (DM-2), CHAPTER 6, PUBLICATION 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 1/2" PREMOLED EXPANSION JOINT FILLER BETWEEN FOUNDATION AND ADJACENT PAVEMENT. SEE DETAIL C ON SHEET 9 OF TC-8801.
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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.

MISCELLANEOUS
PEDESTRIAN PUSHBUTTON
MOUNTING DETAILS

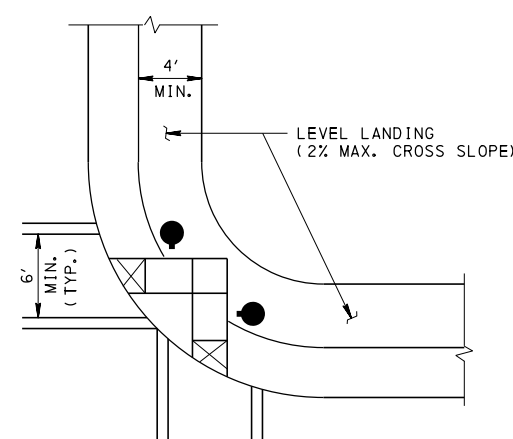
C-8803



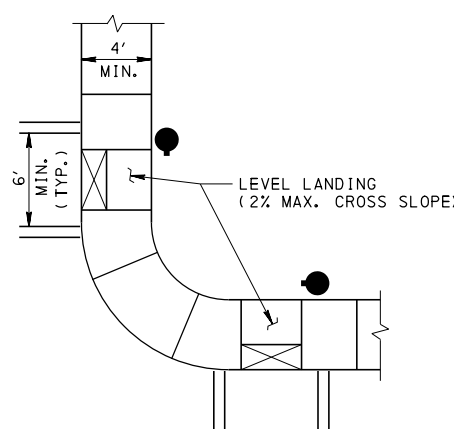
PARALLEL RAMPS WITH
WIDE SIDEWALK



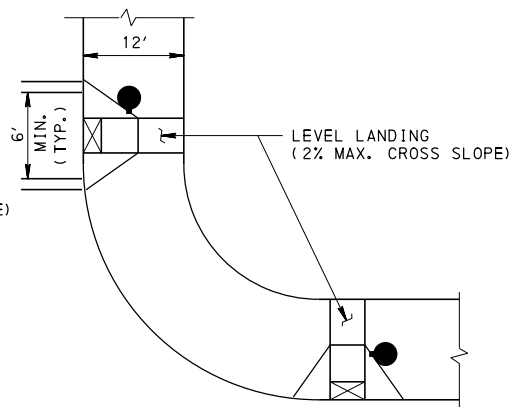
PARALLEL RAMPS WITH
NARROW SIDEWALK



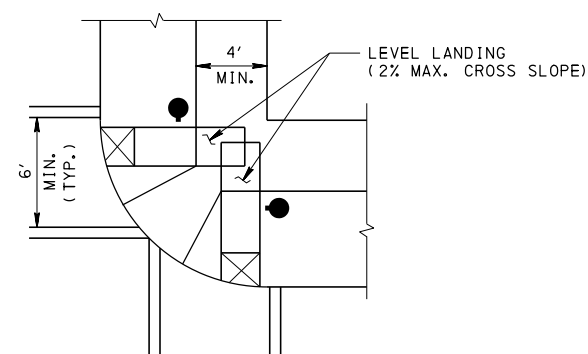
PERPENDICULAR RAMPS WITH
SIDEWALK SET BACK FROM ROAD
WITH CROSSWALKS CLOSE TOGETHER



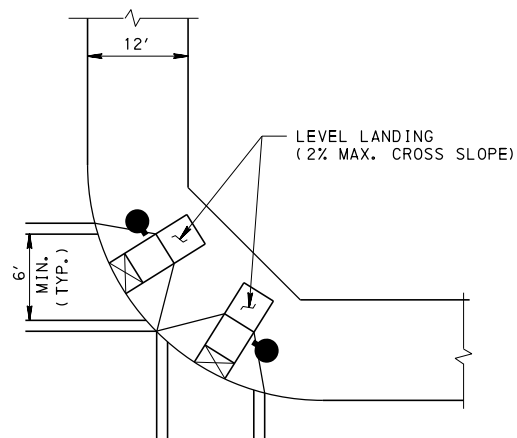
PARALLEL RAMPS WITH NARROW SIDEWALK
AND TIGHT CORNER RADIUS



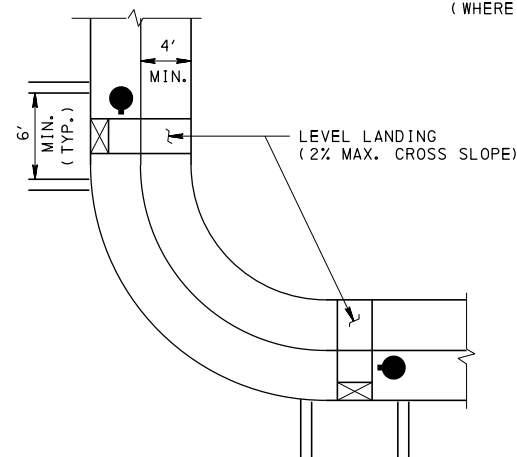
PERPENDICULAR RAMPS WITH
CROSSWALKS FAR APART



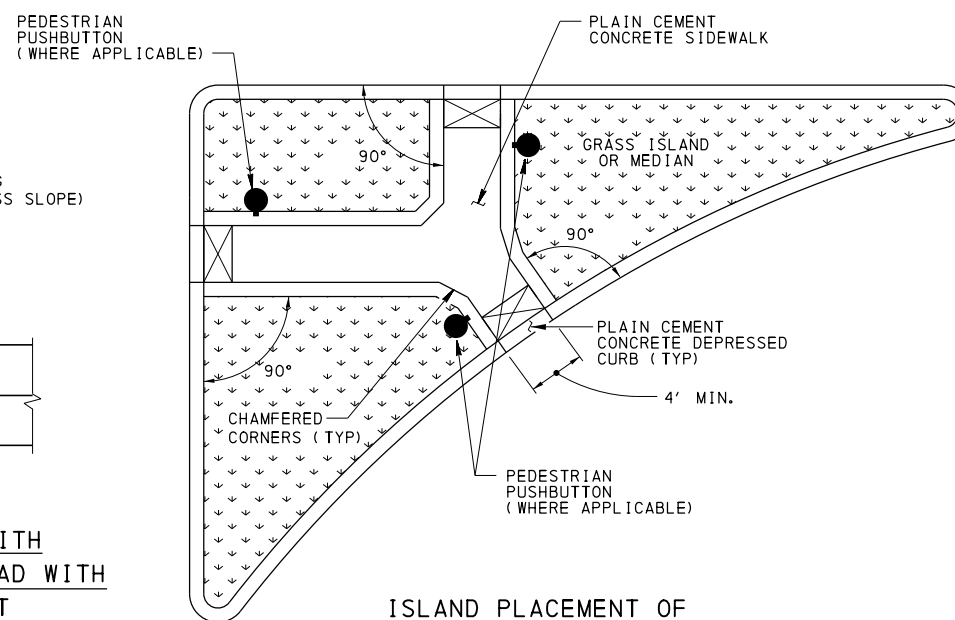
PERPENDICULAR RAMPS WITH
SIDEWALK SET BACK FROM ROAD WITH
CONTINUOUS SIDEWALK BETWEEN RAMPS



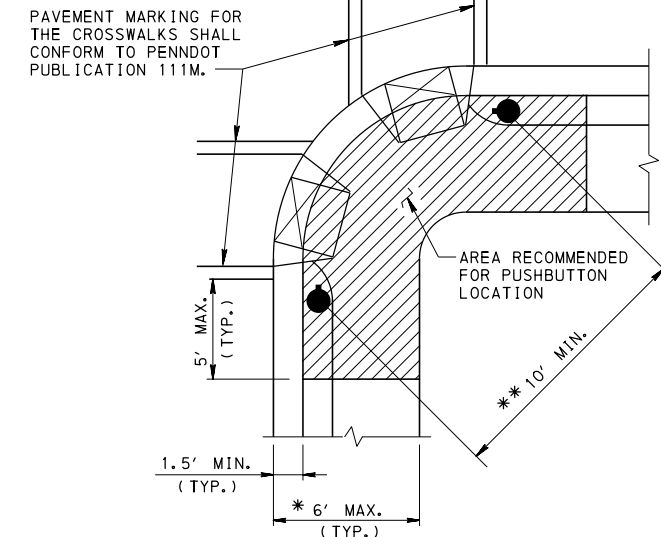
PERPENDICULAR RAMPS WITH
CROSSWALKS CLOSE TOGETHER



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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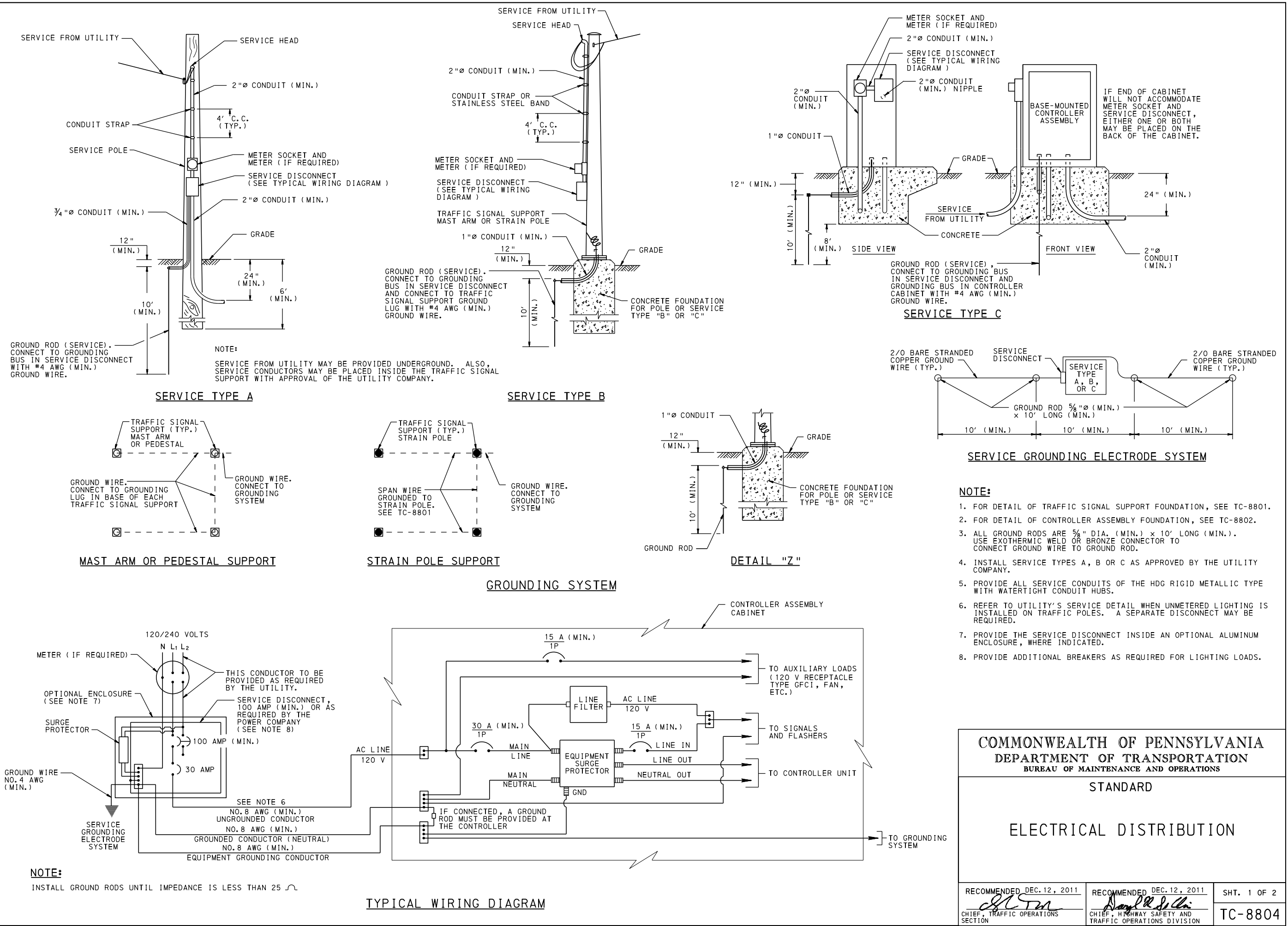
MISCELLANEOUS
TYPICAL PEDESTRIAN PUSHBUTTON
LOCATIONS

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SECTION

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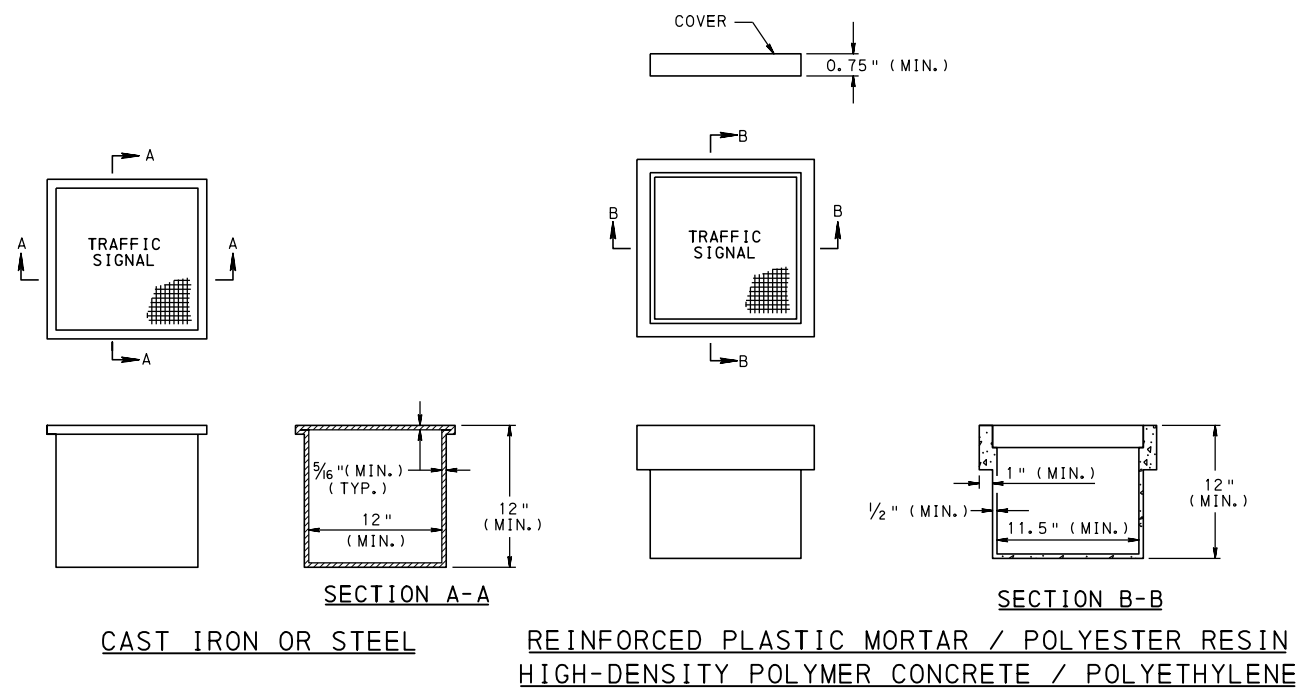
GROUND ROD (SERVICE).
CONNECT TO GROUNDING
BUS IN SERVICE DISCONNECT
WITH #4 AWG (MIN.)
GROUND WIRE.

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.

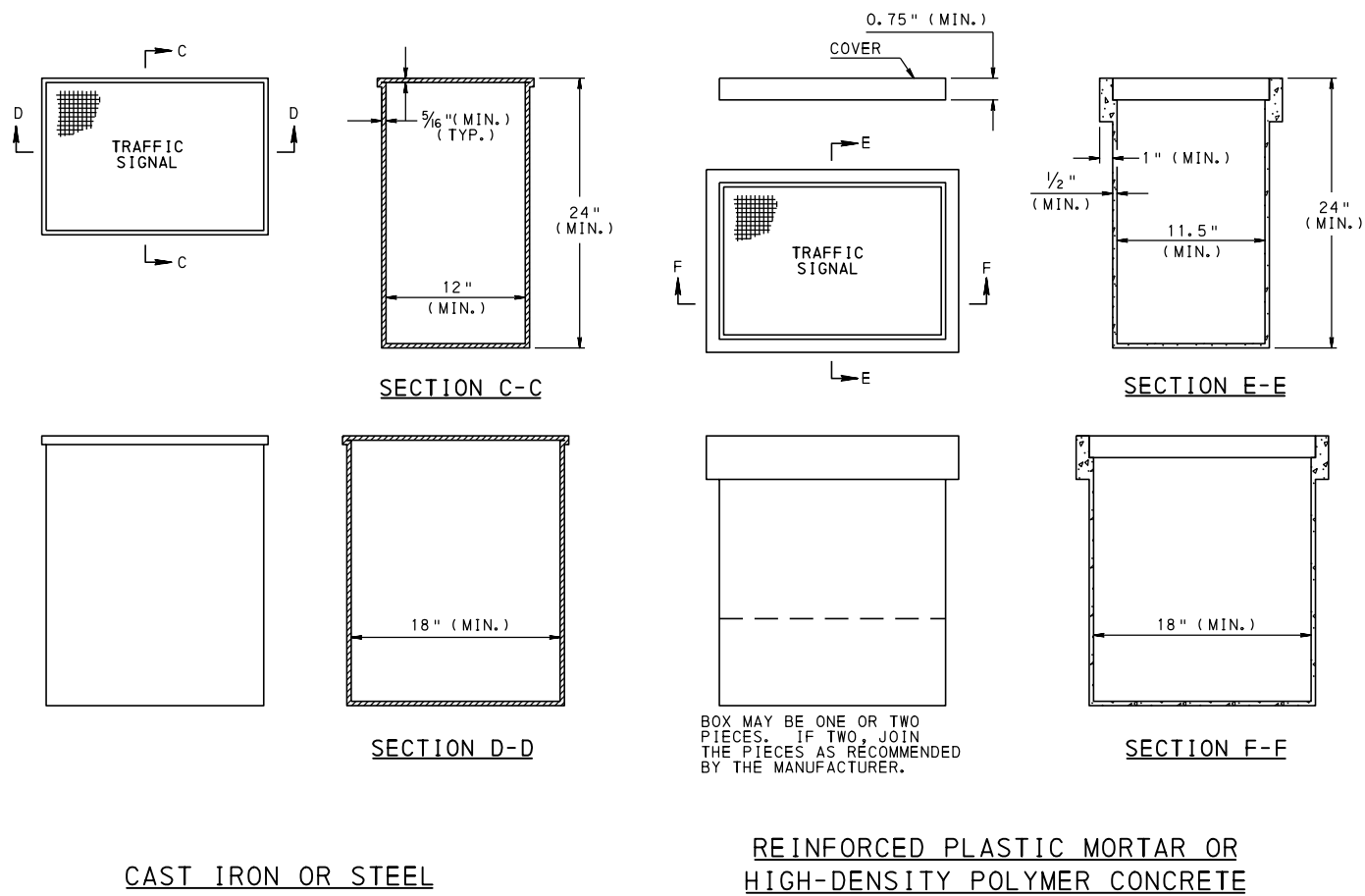
GROUND ROD (SERVICE),
CONNECT TO GROUNDING BUS
IN SERVICE DISCONNECT AND
GROUNDING BUS IN CONTROLLER
CABINET WITH #4 AWG (MIN.)
GROUND WIRE.

- 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.

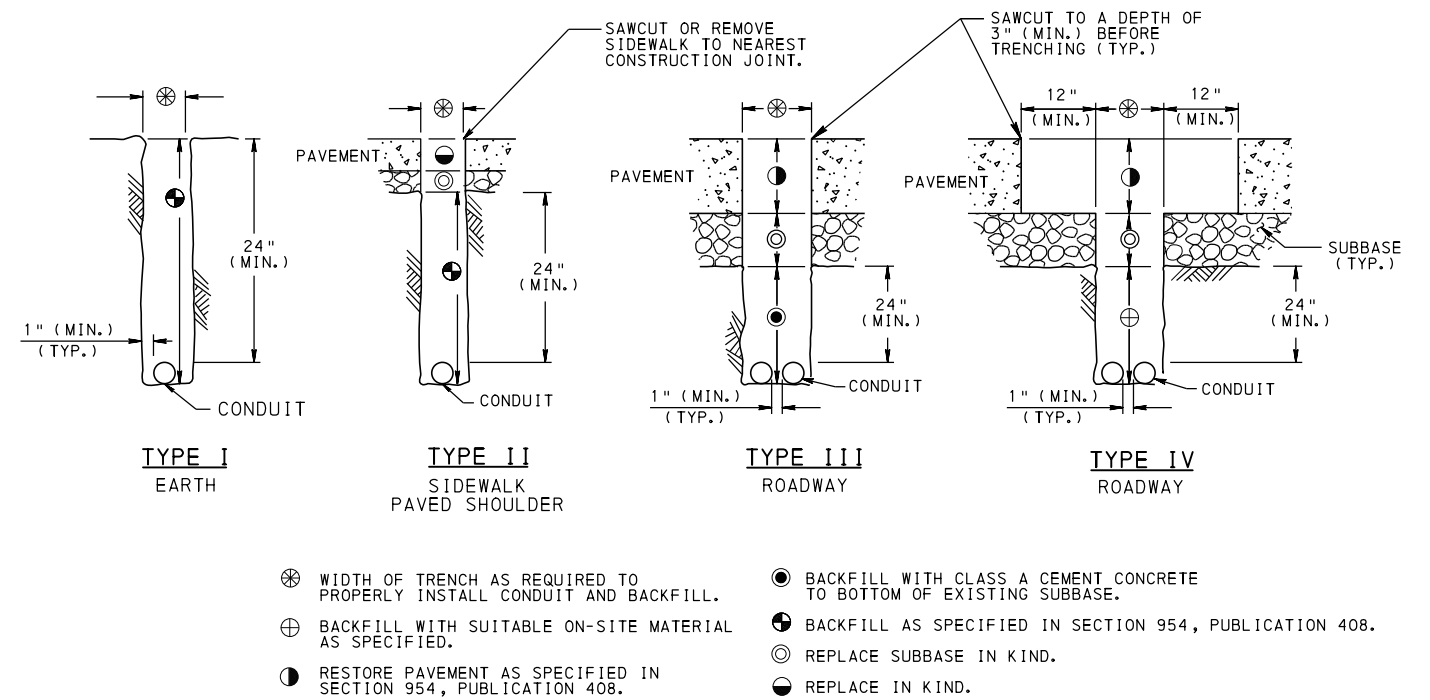
NOTE:
INSTALL GROUND RODS UNTIL IMPEDANCE IS LESS THAN 25 Ω



JUNCTION BOX, TYPE JB-26



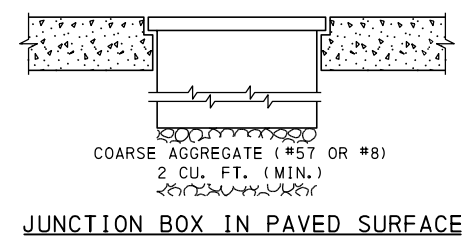
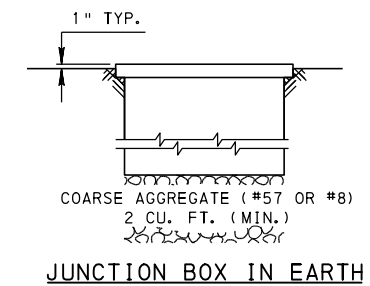
JUNCTION BOX, TYPE JB-27



TRENCH AND BACKFILL

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.



TYPICAL JUNCTION BOX
INSTALLATION

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ELECTRICAL DISTRIBUTION

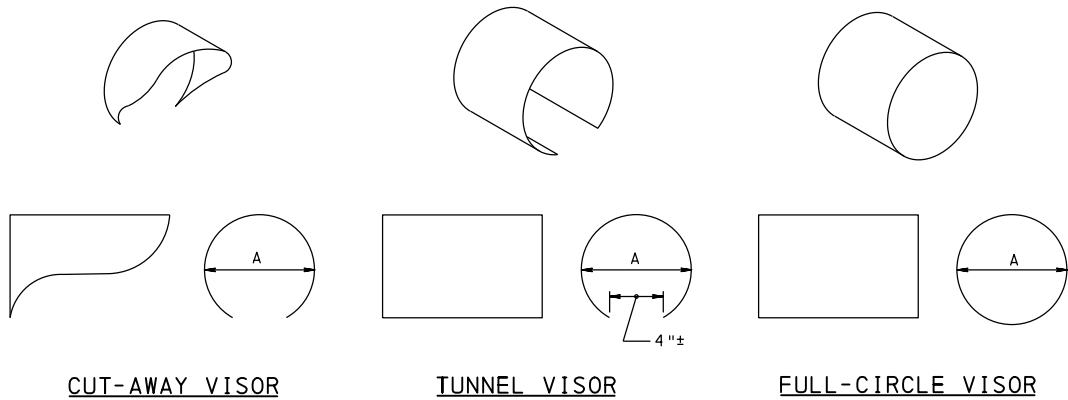
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TRAFFIC OPERATIONS DIVISION

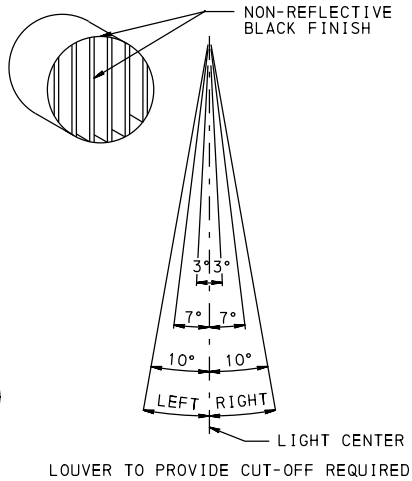
SHT. 2 OF 2

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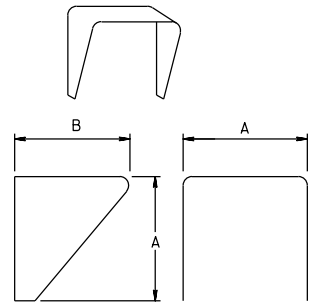
THE VISOR SHALL BE A MINIMUM OF 9.5" FOR A 12" SIGNAL LENS AND 7" FOR AN 8" SIGNAL LENS WITH A DOWNWARD TILT OF 3.5 DEGREES.



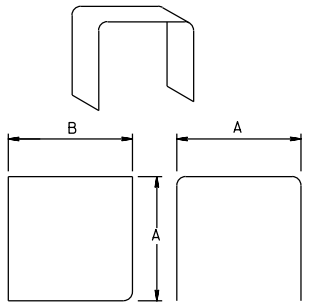
VISOR TYPES FOR VEHICULAR SIGNAL HEAD



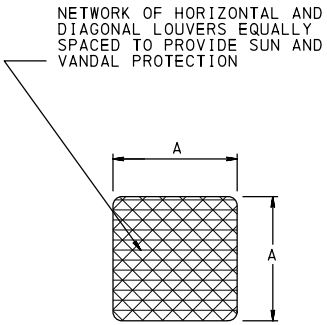
LOUVER FOR VEHICULAR SIGNAL HEAD
(DO NOT USE WITH CUT-AWAY VISOR)



CUT-AWAY VISOR

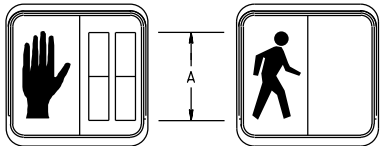


TUNNEL VISOR

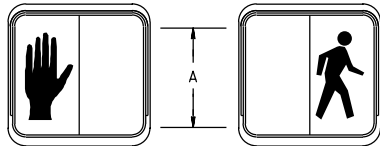


LOUVER VISOR
(FOR PEDESTRIAN SIGNAL HEAD ONLY)

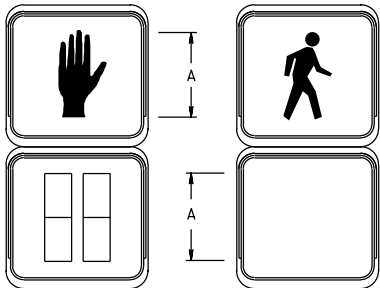
VISOR TYPES FOR PEDESTRIAN SIGNAL HEAD AND
LANE-USE TRAFFIC CONTROL SIGNAL HEAD



ONE-SECTION

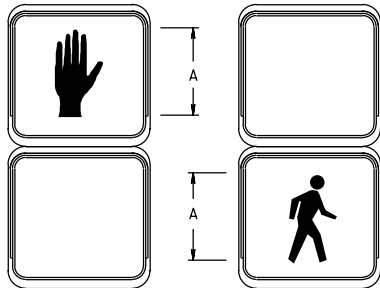


ONE-SECTION



TWO-SECTIONS

TYPE A
(COUNTDOWN) *



TWO-SECTIONS

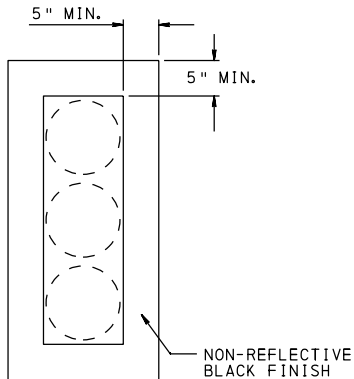
TYPE B
(SYMBOL) **

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

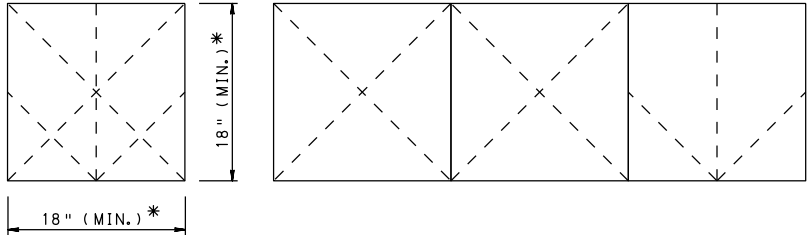
* COUNTDOWN PEDESTRIAN SIGNALS SHALL CONSIST OF PORTLAND ORANGE NUMBERS THAT ARE AT LEAST 6" IN HEIGHT. FOR CROSSWALKS WHERE THE PEDESTRIAN ENTERS THE CROSSWALK MORE THAN 100' FROM THE COUNTDOWN PEDESTRIAN SIGNAL DISPLAY, THE NUMBERS SHOULD BE AT LEAST 9" IN HEIGHT.

** 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.

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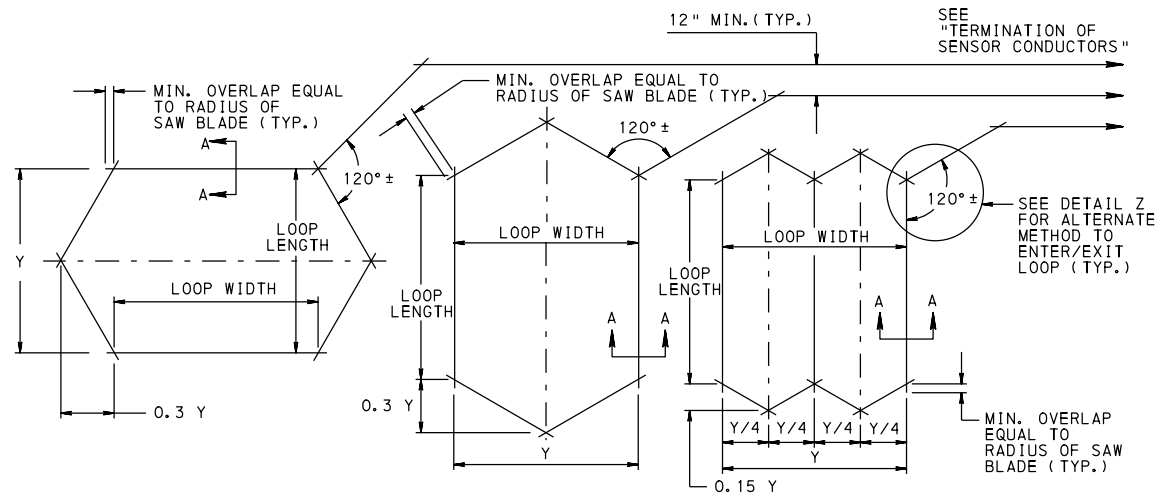
SIGNAL HEADS

RECOMMENDED DEC. 12, 2011
CHIEF, TRAFFIC OPERATIONS SECTION

RECOMMENDED DEC. 12, 2011
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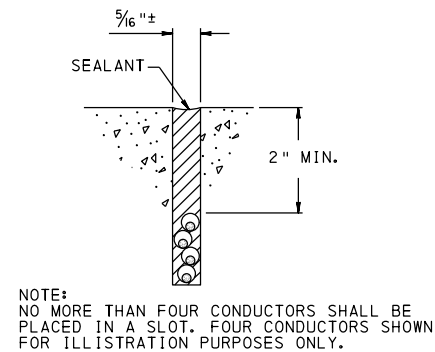


LOOP TYPE I
WIDTH > LENGTH

LOOP TYPE II
WIDTH ≤ LENGTH

LOOP TYPE III

TYPICAL SENSOR INSTALLATION - LOOP DETECTOR

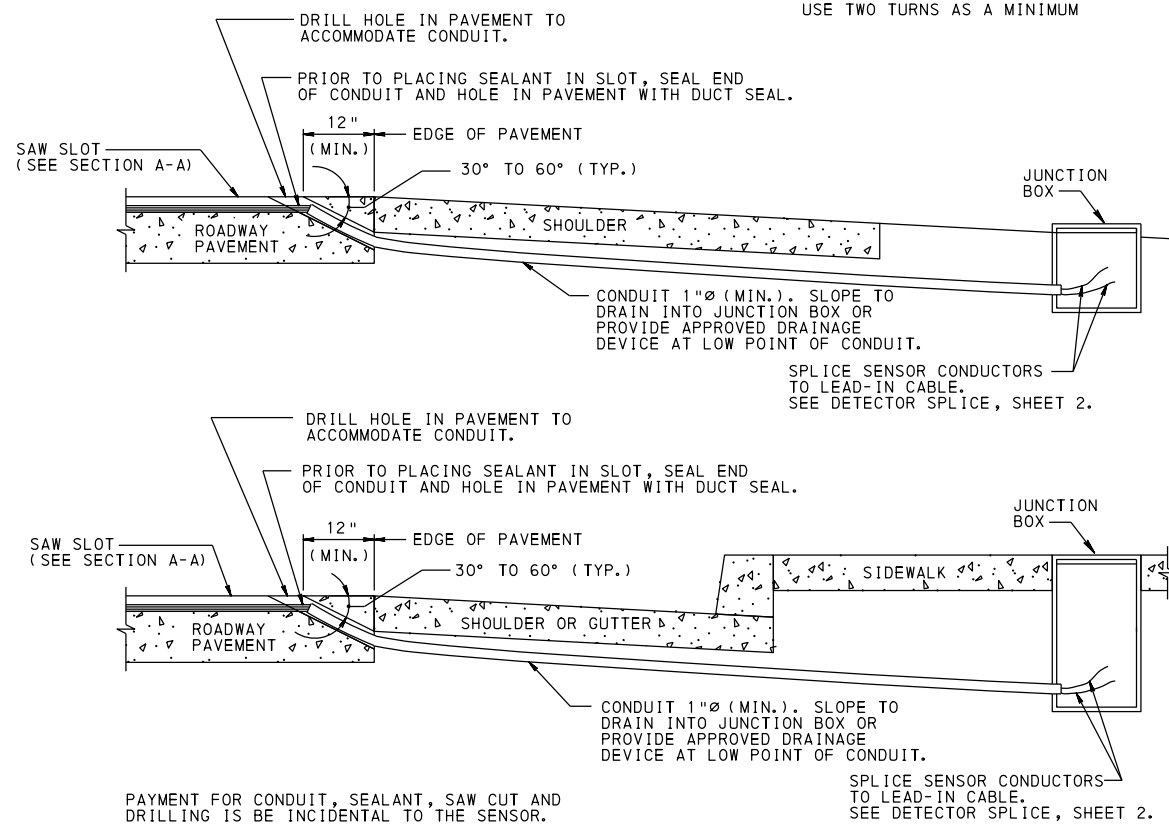


SECTION A-A

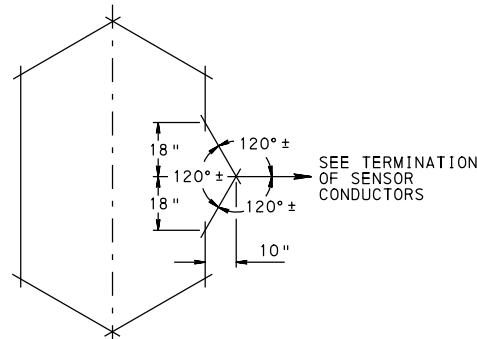
THIS TABLE (FOR INFORMATION ONLY) APPROXIMATES THE RESULTANT INDUCTANCE OF A LOOP BASED ON SIZE OF THE LOOP AND NUMBER OF SENSOR TURNS.

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

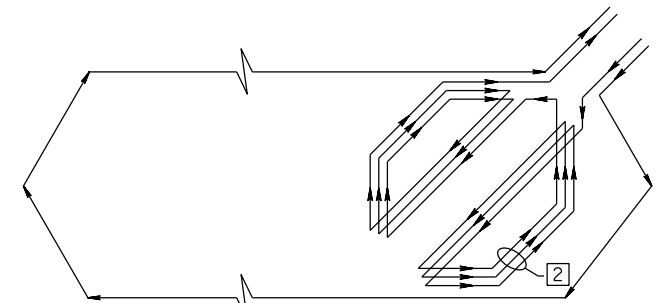
USE TWO TURNS AS A MINIMUM



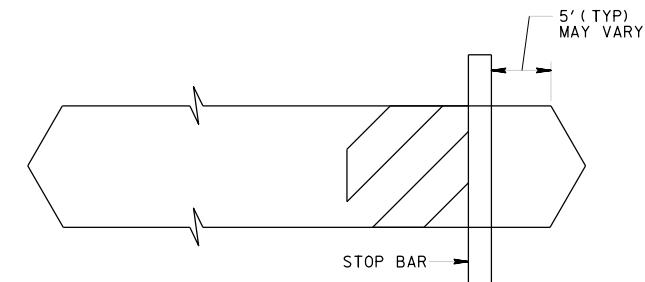
TERMINATION OF SENSOR CONDUCTORS



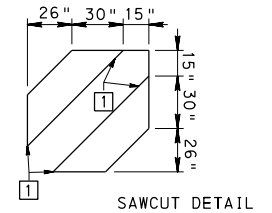
DETAIL Z



DETECTOR WIRING DETAIL



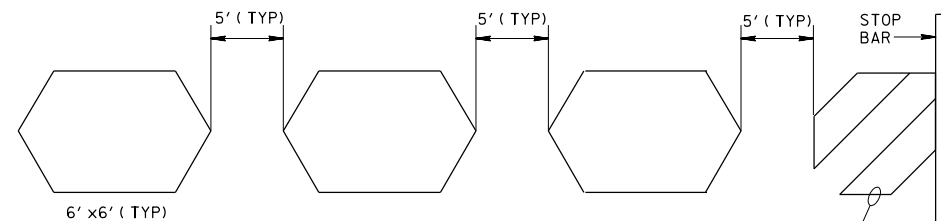
ALTERNATE TYPE A
DETECTOR LAYOUT



DETECTOR SAWCUT DETAIL

ALTERNATE DETECTOR NOTES:

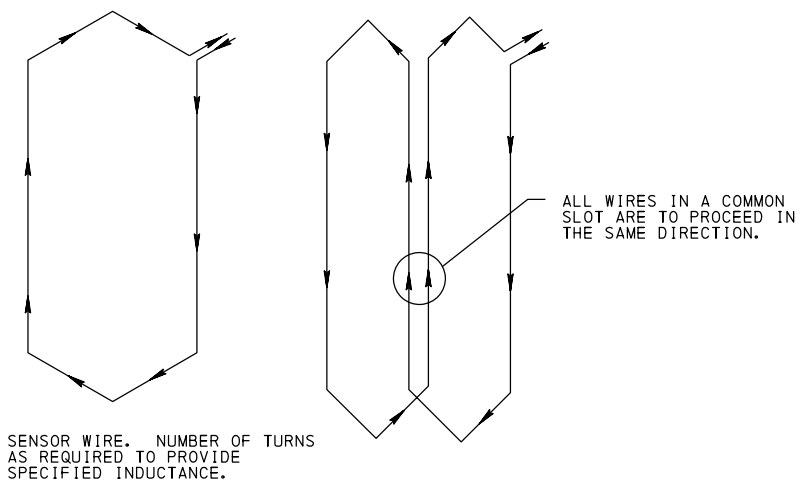
- 1 ROUND CORNERS OF ACUTE SAWCUTS TO PREVENT DAMAGE TO CONDUCTORS.
- 2 INSTALL 3 TURNS WHEN ONLY ONE LOOP IS ON A SENSOR UNIT CHANNEL. INSTALL 5 TURNS WHEN ONE LOOP IS CONNECTED IN SERIES WITH 3 ADDITIONAL 6' x 6' LOOPS ON A SENSOR UNIT CHANNEL.



ALTERNATE TYPE B
SERIES LAYOUT

ALTERNATE SENSOR INSTALLATION - LOOP DETECTOR

FOR ENHANCED BICYCLE AND MOTORCYCLE DETECTION



TYPES I & II

TYPE III

TYPICAL LAYOUT OF LOOP SENSOR

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BUREAU OF MAINTENANCE AND OPERATIONS

STANDARD

DETECTORS

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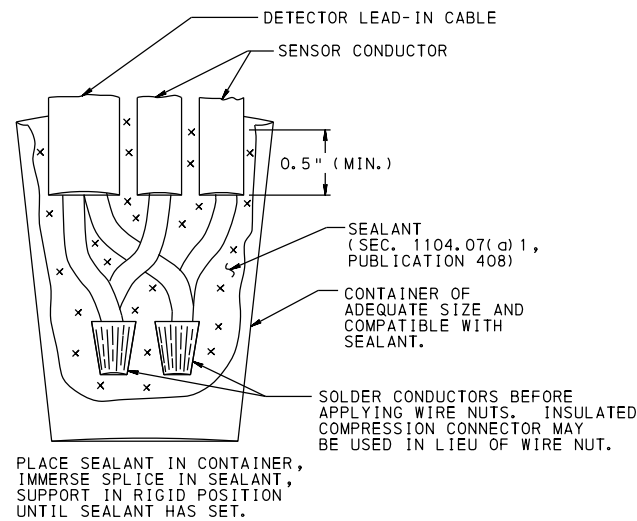
CHIEF, TRAFFIC OPERATIONS SECTION

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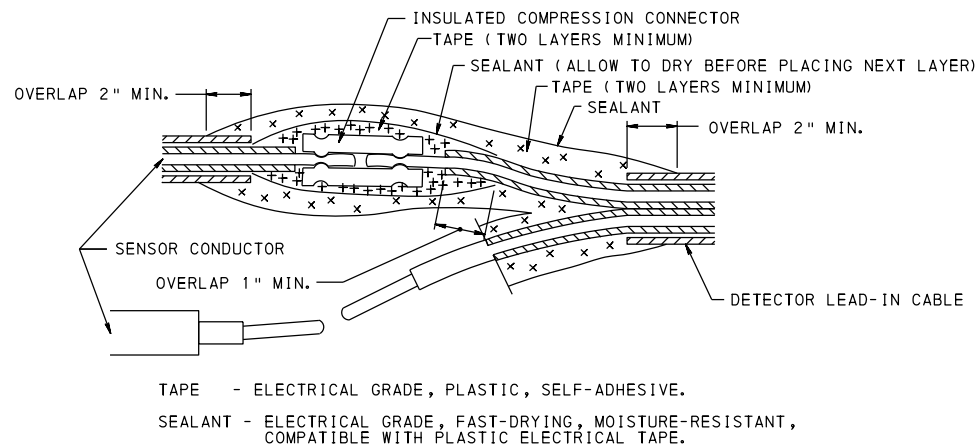
CHIEF, HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION

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ALTERNATE A

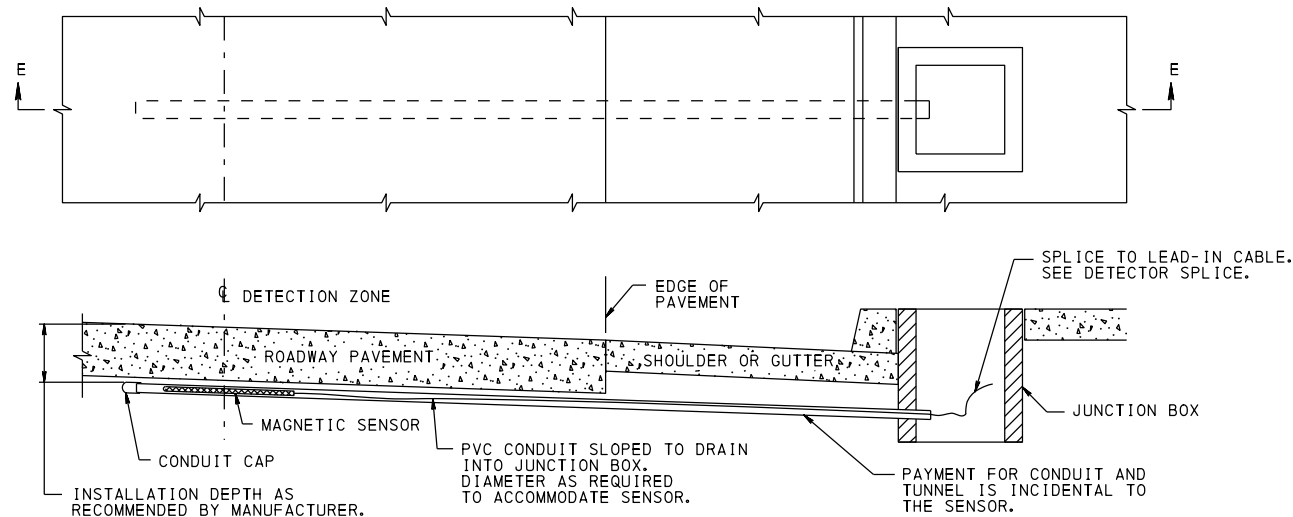


ALTERNATE B

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(d) 4, PUBLICATION 408.

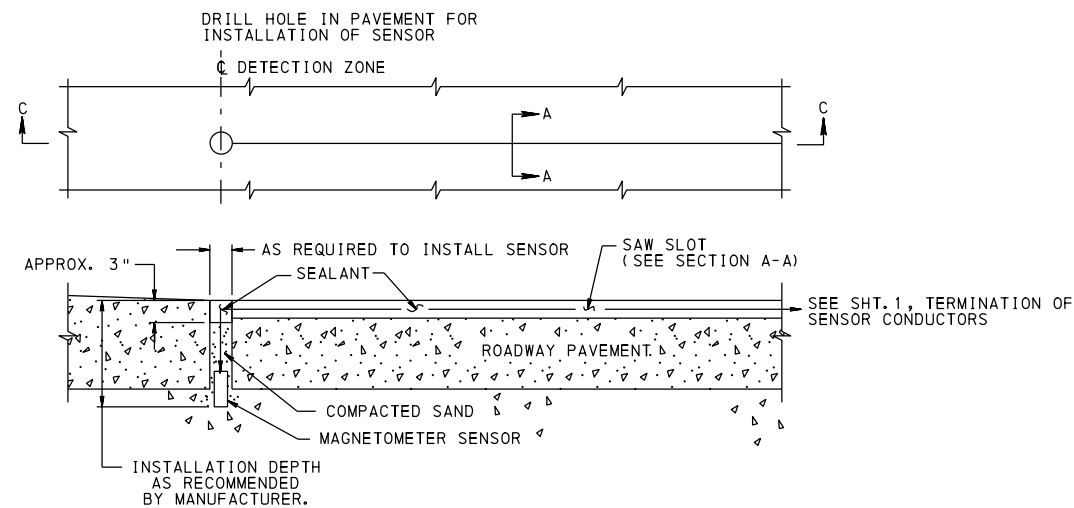
ALTERNATE C

DETECTOR SPLICE



SECTION E-E

TYPICAL SENSOR INSTALLATION - MAGNETIC DETECTOR



SECTION C-C

TYPICAL SENSOR INSTALLATION - MAGNETOMETER DETECTOR

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DETECTORS

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