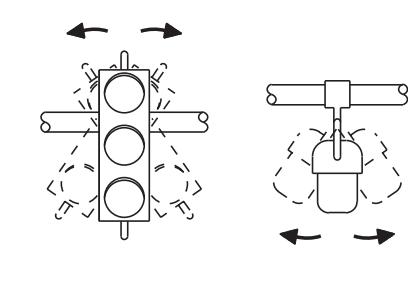
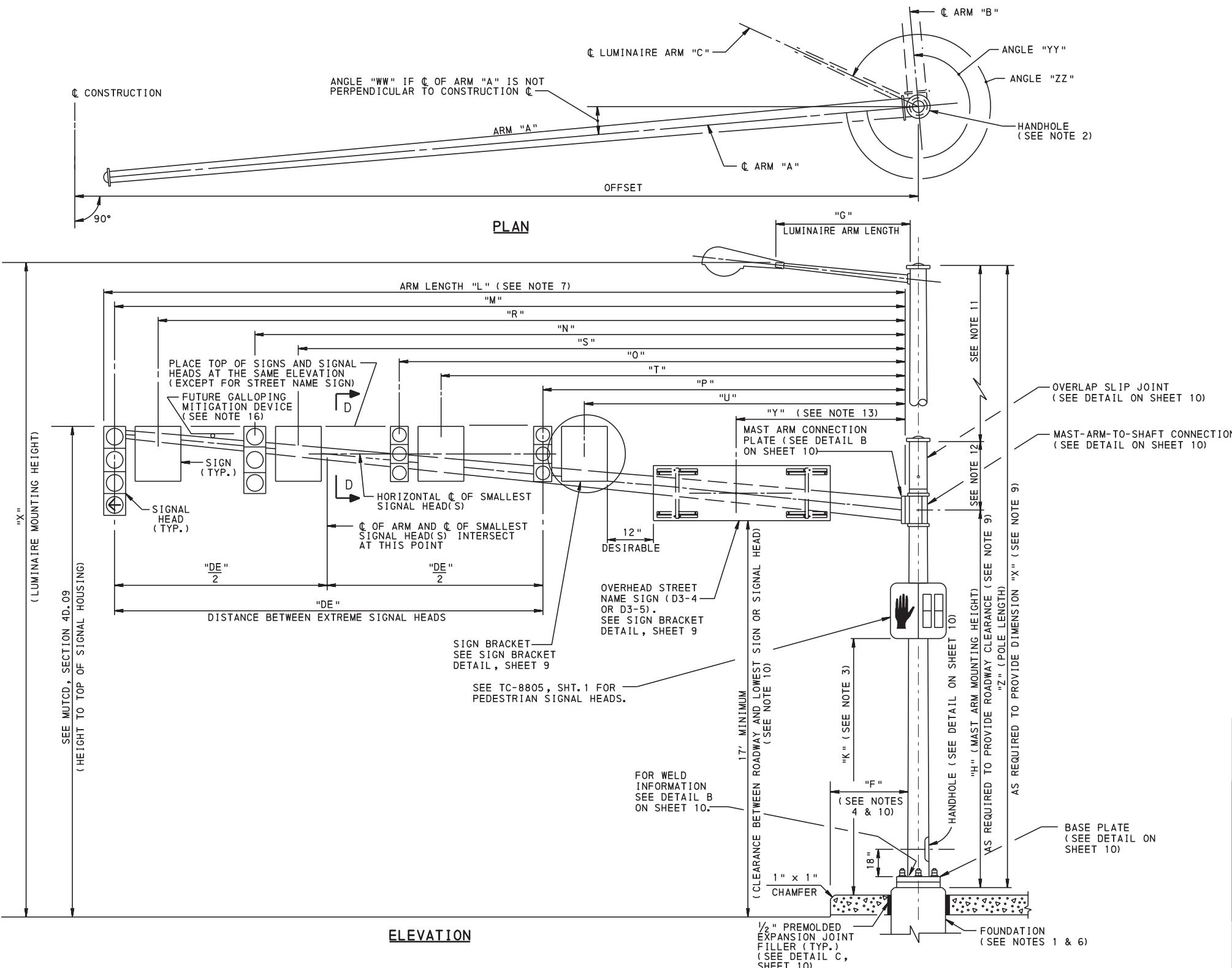


SECTION D-D



DETAIL A



#### 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 30' OR LESS MUST 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 MITIGATION DEVICE DETAIL ON SHEET 10 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 OPERATIONS

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## STANDARD

## TRAFFIC SIGNAL SUPPORT

## MAST ARM

RECOMMENDED XXX XX, 2024

RECOMMENDED XXX XX, 2024 SHE

ET 1 OF 10

CHIEF, TSMO ARTERIALS AND  
PLANNING SECTION

DEPARTMENT OF HIGHWAY SAFETY AND  
TRAFFIC OPERATIONS DIVISION

- 8801

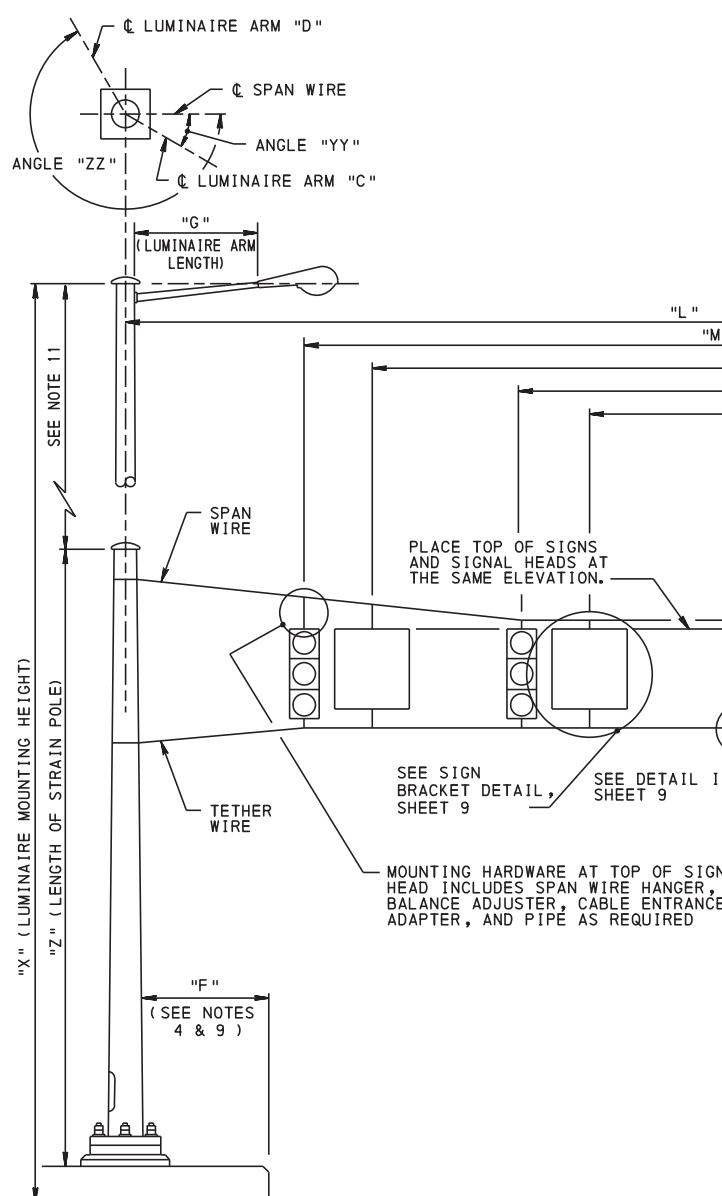
CHIEF, TSMO ARTERIALS AND PLANNING SECTION	CHIEF OF HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION	TC-8801
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DEPARTMENT OF TRANSPORTATION  
HIGHWAY SAFETY AND  
AFFIC OPERATIONS DIVISION

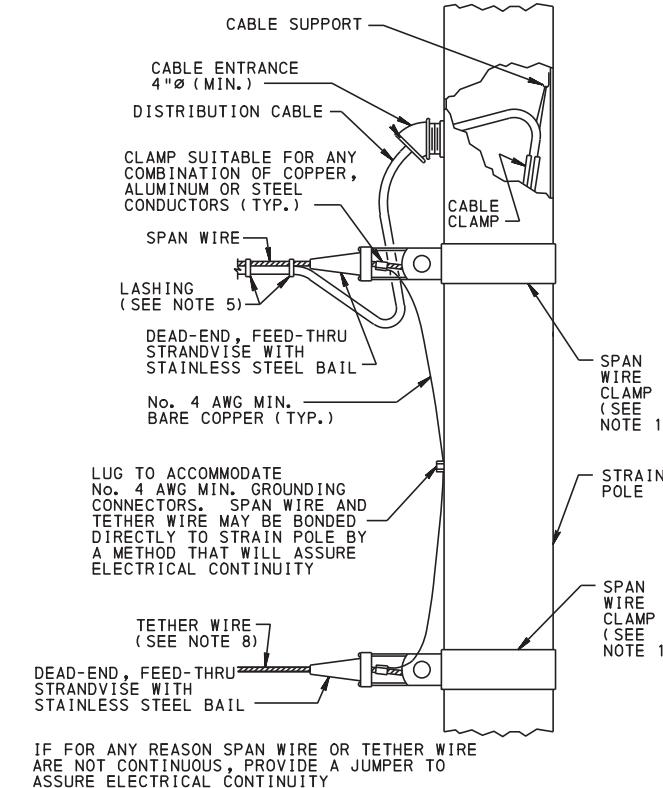
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MINIMUM BREAKING STRENGTH OF SPAN WIRE

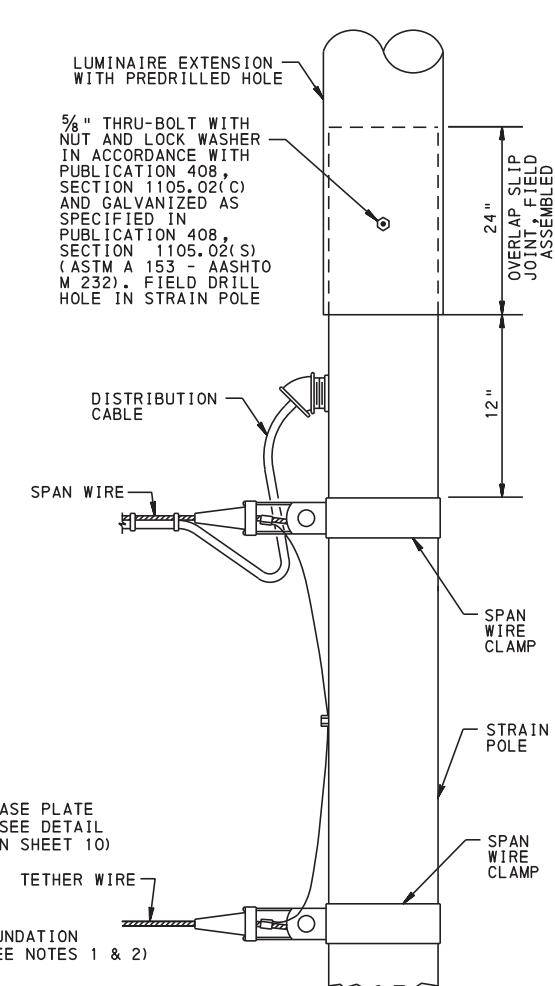
NOM. DIA. OF SPAN WIRE	ASTM A 475, CLASS A, SIEMENS-MARTIN GRADE	ASTM B 416
1/4 "	3150 lbs	6301 lbs
5/16 "	5350 lbs	10,020 lbs
3/8 "	6950 lbs	15,930 lbs
7/16 "	9350 lbs	19,060 lbs
1/2 "	12,100 lbs	23,000 lbs



ELEVATION



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 OPERATIONS

STANDARD  
TRAFFIC SIGNAL SUPPORT  
STRAIN POLE

### ANCHOR BOLT DESIGN, MAST ARM

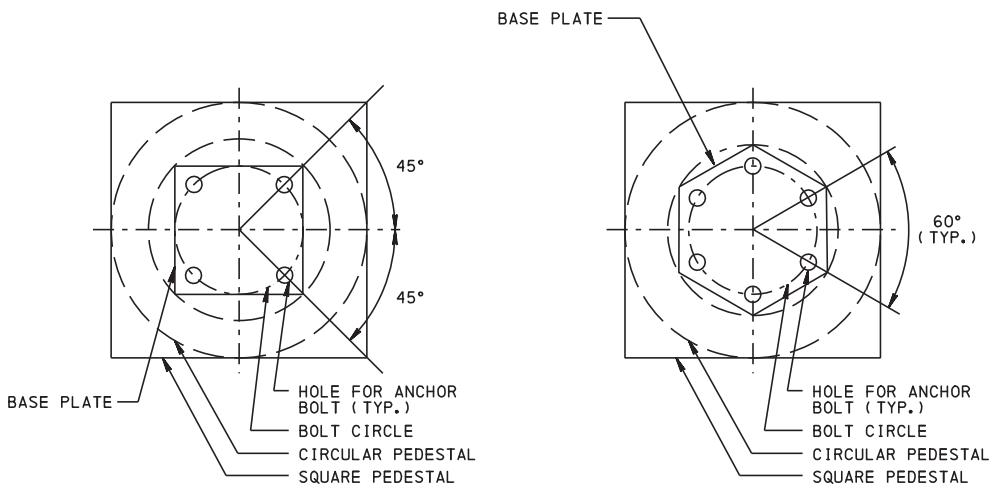
MAST ARM LENGTH	QTY.	ONE ARM				TWO ARMS *			
		DIA.	LGTH.	B.C.	HOLE	DIA.	LGTH.	B.C.	HOLE
0 - 10'	6	1 3/4"	35"	18"	2"	1 3/4"	35"	18"	2"
>10' - 15'	6	1 3/4"	35"	18"	2"	1 3/4"	35"	18"	2"
>15' - 20'	6	1 3/4"	35"	18"	2"	1 3/4"	35"	18"	2"
>20' - 25'	6	1 3/4"	35"	18"	2"	1 3/4"	35"	18"	2"
>25' - 30'	6	1 3/4"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

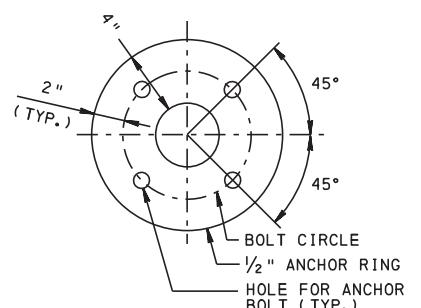
### ANCHOR BOLT DESIGN, PEDESTAL POLE

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

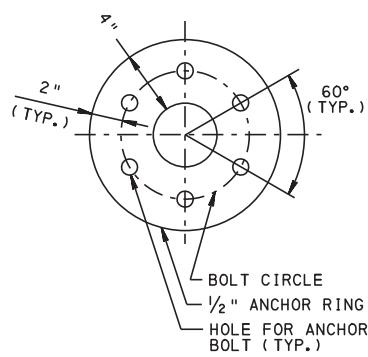
NOTE: A MINIMUM OF 4 ANCHOR BOLTS IS REQUIRED FOR PEDESTAL TRAFFIC SIGNAL SUPPORTS.



#### ANCHOR RING DETAIL (N.T.S.)

#### 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

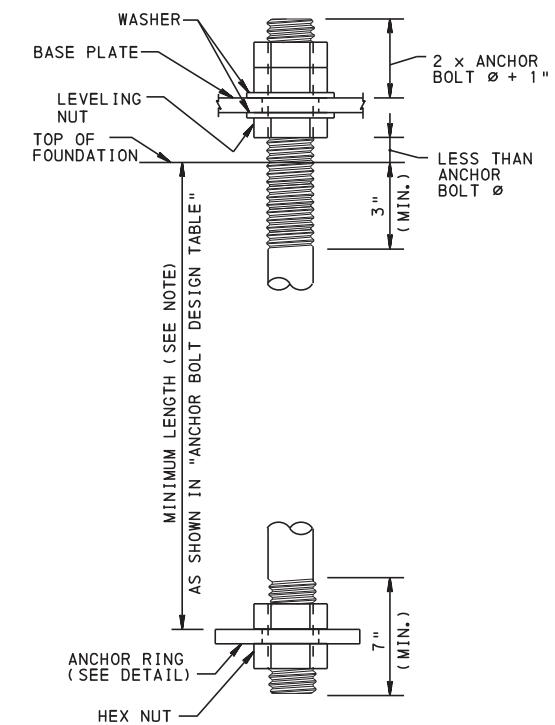
#### TRAFFIC SIGNAL SUPPORT MAST ARM AND STRAIN POLE ANCHOR BOLT DETAILS

### 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 1/4"	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 1/4"	45"	21"	2 3/4"

### FOUNDATION NOTES:

1. PROVIDE 3" CONCRETE COVER ON REINFORCEMENT BARS, EXCEPT AS NOTED.
2. USE CLASS A CEMENT CONCRETE  $f'c = 3000$  PSI IN PEDESTALS, FOOTINGS AND CAISSENS.
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 951.2(c) 1.d.
8. PROVIDE ANCHOR BOLT HOLES  $1/4$ " LARGER THAN BOLT DIAMETER.
9. PROVIDE ANCHOR BOLTS CONFORMING TO ASTM F1554 GRADE 55 PER PUBLICATION 408, SECTION 1105.02 (c) 3.
10. USE STEEL TEMPLATE TO SET ANCHOR BOLTS IN ACCORDANCE WITH PUBLICATION 408, SECTION 951.2(c) 5.
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 OPERATIONS

#### STANDARD

#### TRAFFIC SIGNAL SUPPORT FOUNDATION NOTES AND ANCHOR BOLT DETAILS

RECOMMENDED XXX XX, 2023	RECOMMENDED XXX XX, 2024	SHEET 3 OF 10
CHIEF, TSMO ARTERIALS AND PLANNING SECTION		CHIEF OF HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION

TC-8801

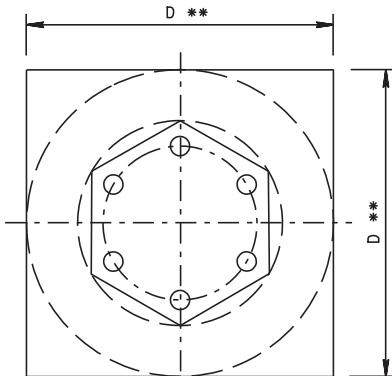
#### † LEGEND:

AASHTO SIGN SPEC:  
U.N.O.:

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)  
UNLESS NOTED OTHERWISE

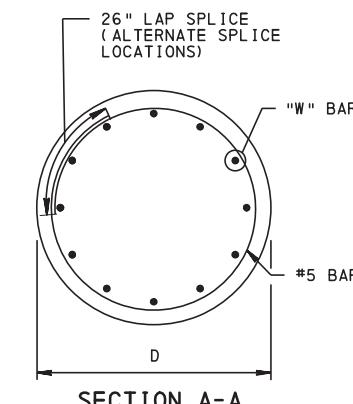
**NOTES:**

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 SIDEWALK AND 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. FOR MAST ARM AND TRAFFIC SIGNAL PEDESTAL POLE TABLES, REFER TO SHEET 5. FOR STRAIN POLE TABLES, SEE SHEET 6.
6. FOR TRAFFIC SIGNAL PEDESTRIAN PUSH BUTTON POLE DETAIL, REFER TO TC-8803.
7. 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.
8. EMBANKMENT SLOPE AS ILLUSTRATED IN PUBLICATION 72M (RC-83M) SHEET 3 OF 3. 2:1 MAXIMUM SLOPE. STEEPER SLOPES REQUIRE SPECIAL DESIGN.

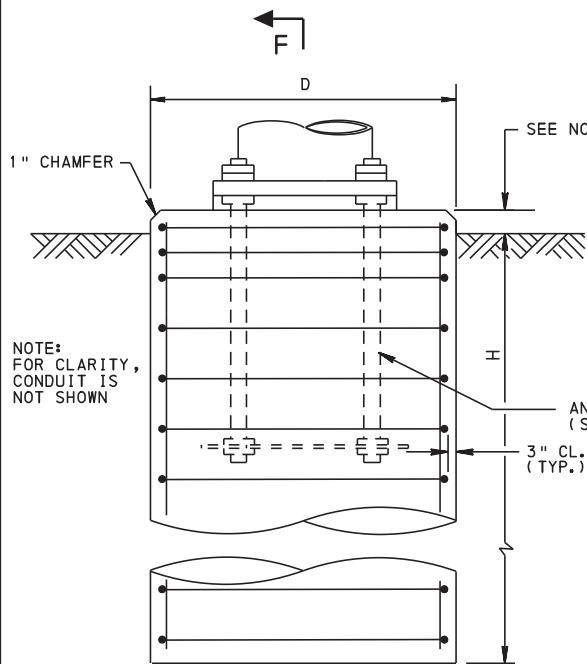


**PLAN**

\*\* 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**

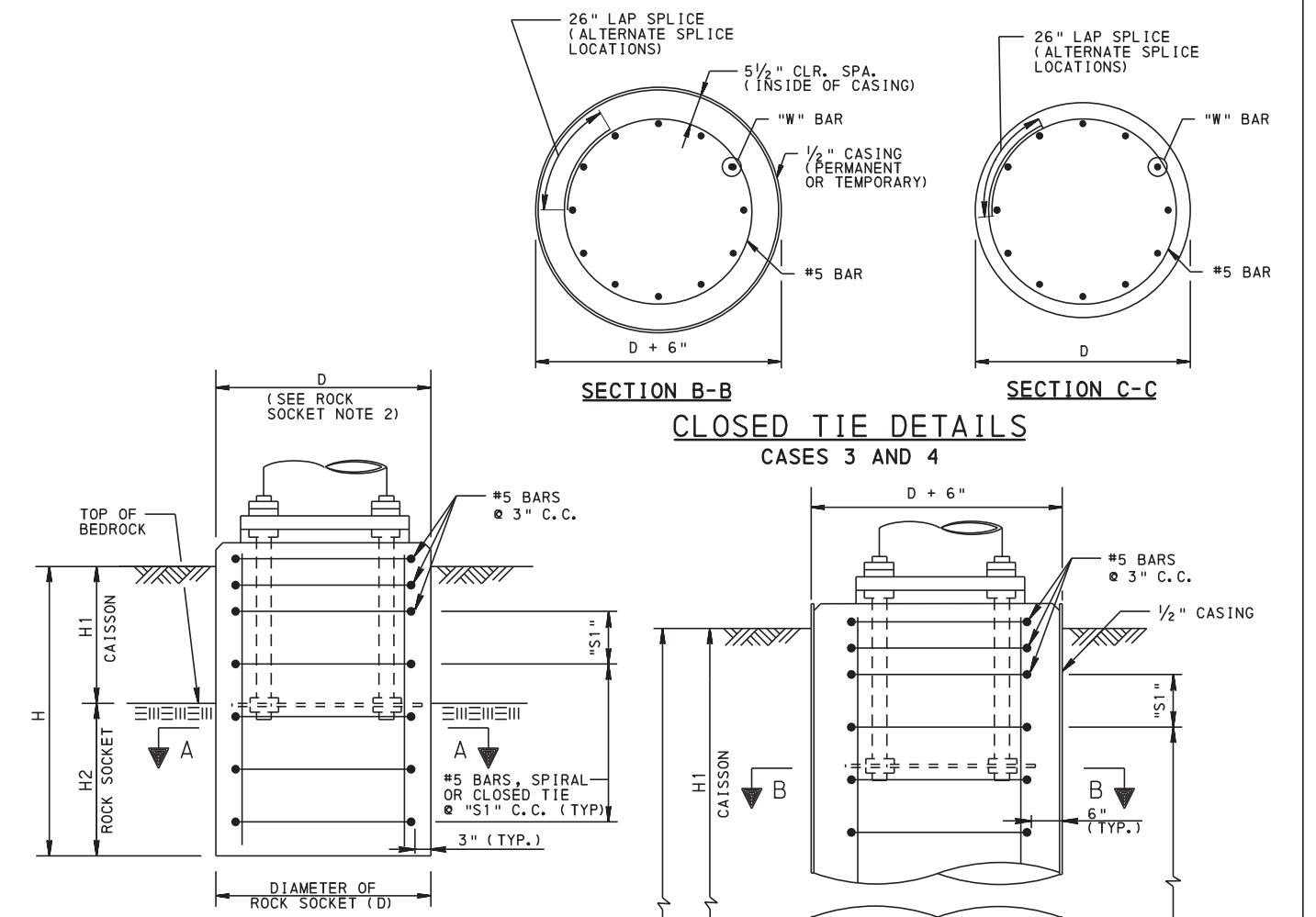


**SECTION**

**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:  $0' \leq H1 < 5'$
  - CASE 3:  $5' \leq H1 < 10'$
  - CASE 4:  $H1 \geq 10'$
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.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF OPERATIONS

STANDARD

TRAFFIC SIGNAL SUPPORT

FOUNDATION TYPE A

RECOMMENDED XXX XX, 2024

RECOMMENDED XXX XX, 2024

SHEET 4 OF 10

CHIEF, TSMO ARTERIALS AND PLANNING SECTION

CHIEF OF HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION

TC-8801

MAST ARM FOUNDATION NOTES:

- FOUNDATION DESIGN IS BASED ON STANDARD STRUCTURAL LOADINGS SHOWN IN THE PUBLICATION 149 AND THE FOLLOWING DESIGN ASSUMPTIONS:
  - CENTROIDAL HEIGHT OF SIGNALS AND SIGNS ATTACHED TO THE MAST ARM AT 20' MAXIMUM FROM THE TOP OF FOUNDATION.
  - A LUMINAIRE WITH A 15' ARM LENGTH AND A 30' MOUNTING HEIGHT FROM THE TOP OF ROADWAY.
  - 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.
- 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.
- FOR DEFINITION OF CASES, SEE DRILLED SHAFT DESIGN CRITERIA ON SHEET 3 AND DETAILS ON SHEET 4.
- EMBANKMENT SLOPE AS ILLUSTRATED IN PUBLICATION 72M (RC-83M) SHEET 3 OF 3. 2:1 MAXIMUM SLOPE. STEEPER SLOPES REQUIRE SPECIAL DESIGN.

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

MAST ARM LENGTH	"D"	CASE 1			"W" BAR	
		H		QTY.		
		ONE ARM	TWO ARMS*			
0' - 10'	3'-0"	7'-0"	7'-6"	12	#9	
>10' - 15'	3'-0"	8'-0"	8'-6"	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*		
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'-6"	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)

SHAFT LENGTH	"D"	H	"W" BAR		"W" BAR	
			QTY.	SIZE		
			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']		"W" BAR	
		H2			
		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 OPERATIONS

STANDARD

TRAFFIC SIGNAL SUPPORT -  
MAST ARM & PEDESTAL  
FOUNDATION TYPE A

## 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							
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							
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"

**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.
3. EMBANKMENT SLOPE AS ILLUSTRATED IN PUBLICATION 72M (RC-83M) SHEET 3 OF 3. 2:1 MAXIMUM SLOPE. STEEPER SLOPES REQUIRE SPECIAL DESIGN.

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 **							
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.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF OPERATIONS

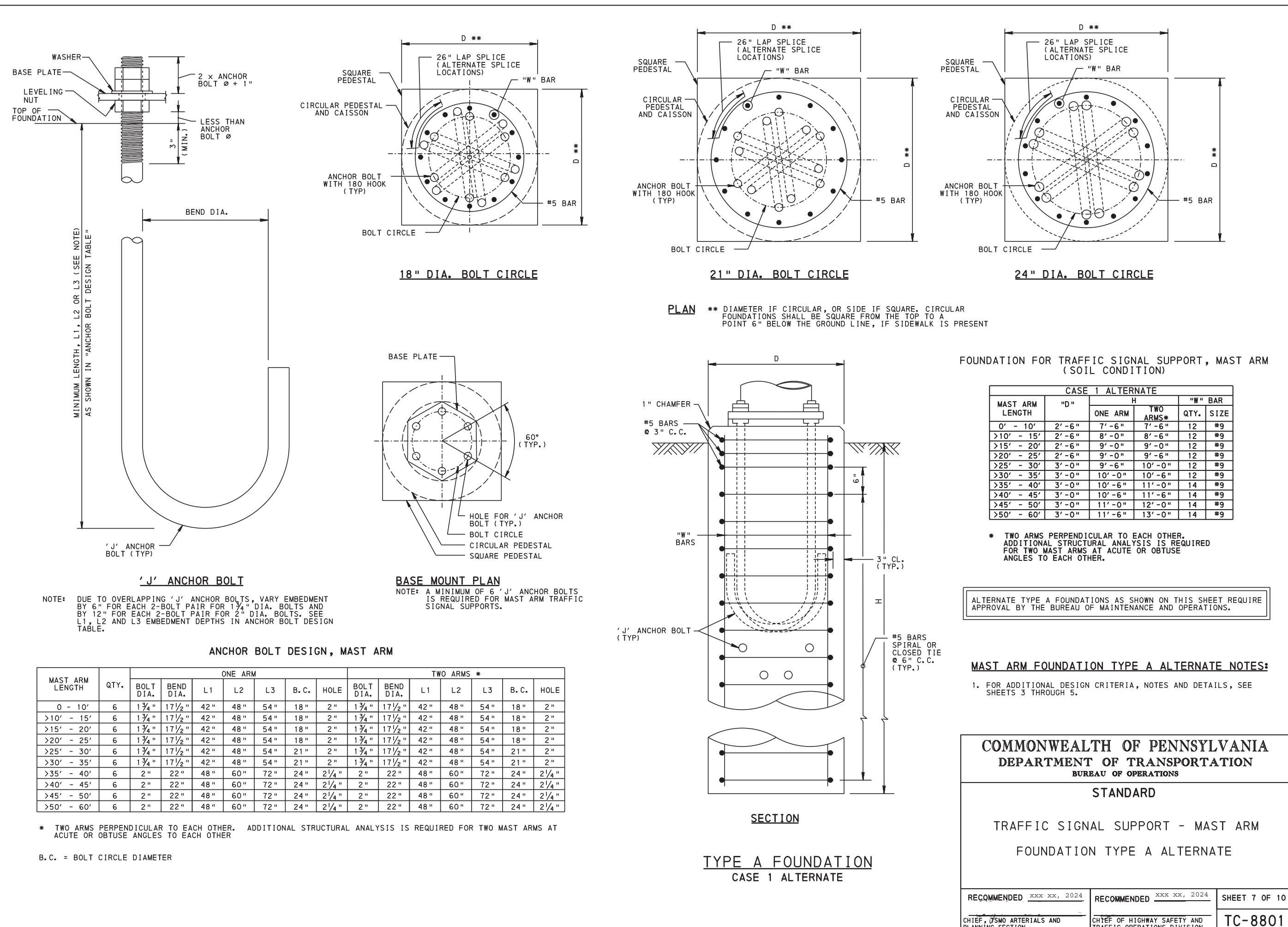
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## STANDARD

TRAFFIC SIGNAL SUPPORT - STRAIN POLE  
FOUNDATION TYPE A

COMMENDED XXX XX, 2024	RECOMMENDED XXX XX, 2024	SHEET 6 OF 10
TSMO ARTERIALS AND NING SECTION	CHIEF OF HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION	TC-8801

TC-8801



### FOUNDATION FOR TRAFFIC SIGNAL SUPPORT, MAST ARM

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

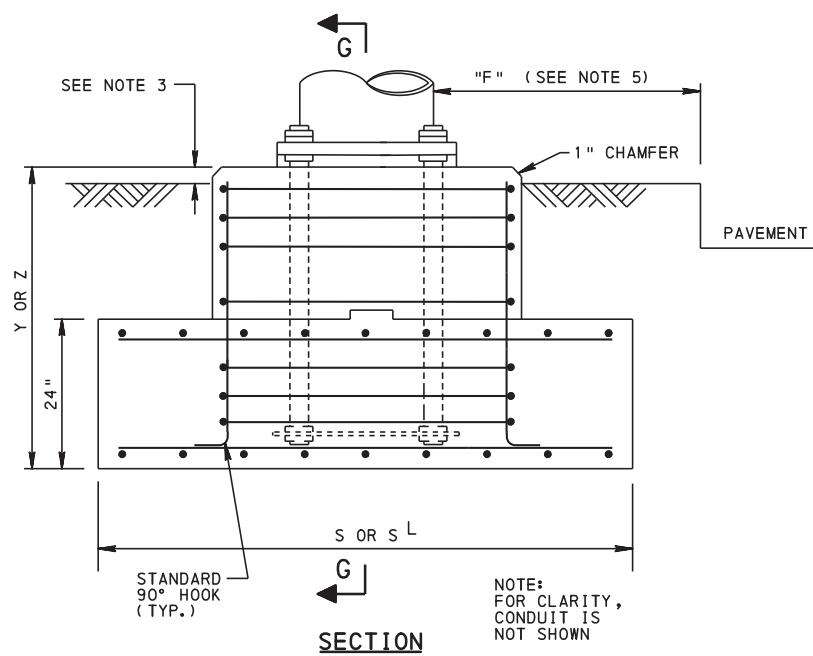
### FOUNDATION FOR TRAFFIC SIGNAL SUPPORT, STRAIN POLE

DESIGN TENSION (LBS)	"D"	SHAFT LENGTH 20' - 24'						SHAFT LENGTH 26' - 30'						SHAFT LENGTH 32' - 34'						SHAFT LENGTH 32' - 34'										
		QTY.	SIZE	Y	S <sup>L</sup>	S	Z	S <sup>L</sup>	S	"D"	QTY.	SIZE	Y	S <sup>L</sup>	S	Z	S <sup>L</sup>	S	"D"	QTY.	SIZE	Y	S <sup>L</sup>	S	Z	S <sup>L</sup>	S			
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'-0"	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'-0"	8'-6"	13'-6"	13'-6"	3'-0"	16	#9	9	7'-6"	15'-6"	15'-6"	10'-0"	14'-0"	14'-0"	3'-0"	16	#9	9	7'-6"	15'-6"	15'-6"	10'-0"	14'-6"	14'-6"	

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

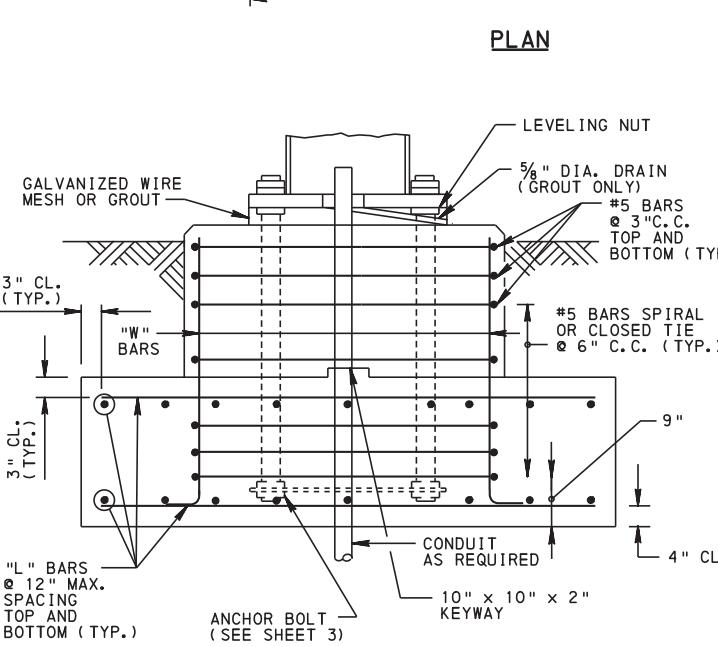
### NOTES:

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



SECTION G-G

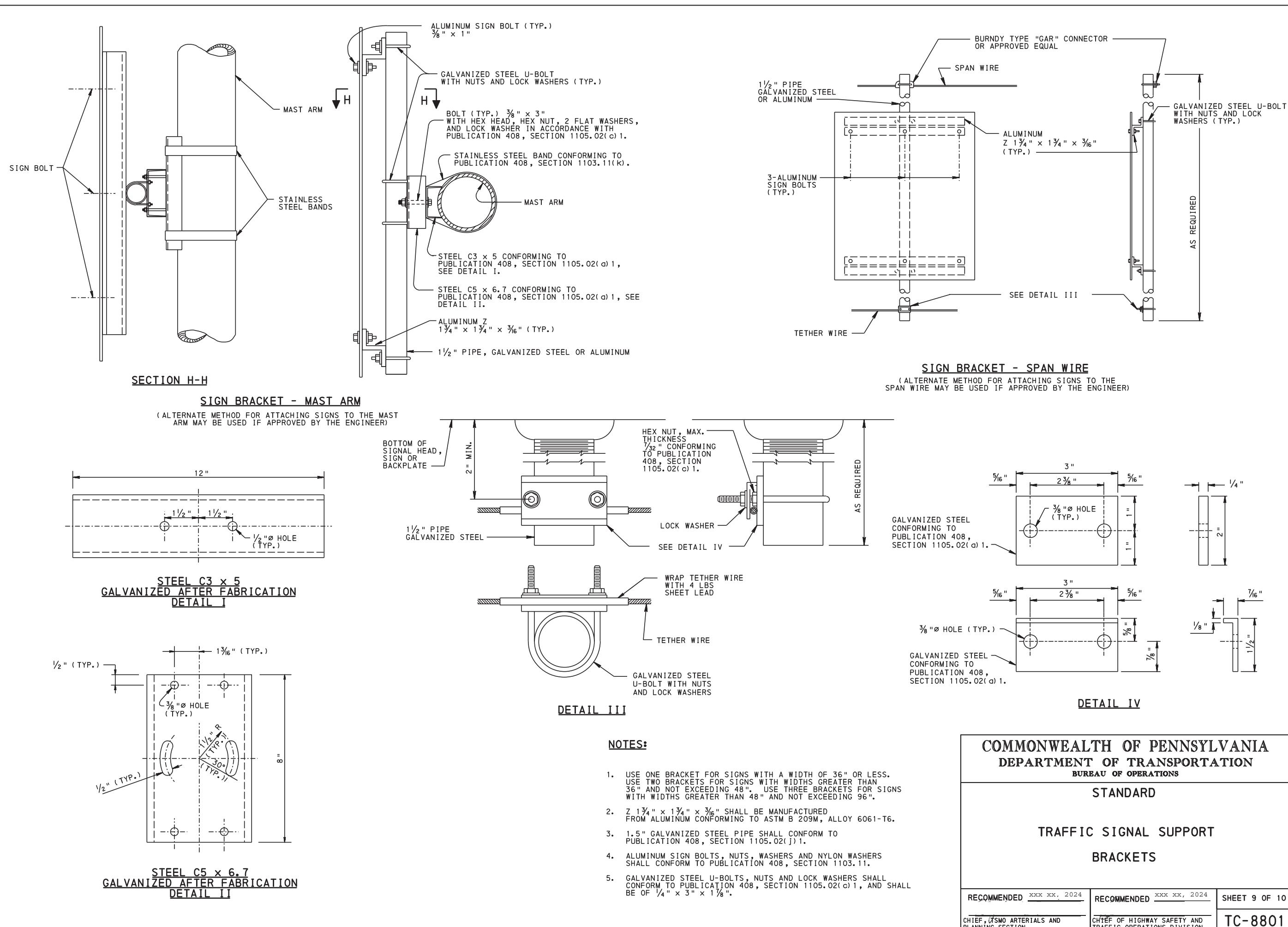
TYPE B FOUNDATION

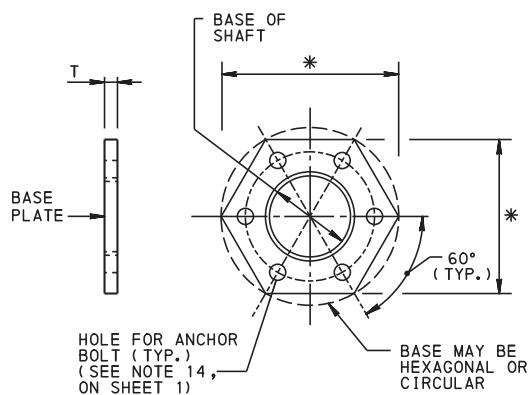


\*\* DIAMETER IF CIRCULAR, OR SIDE IF SQUARE. CIRCULAR FOUNDATIONS SHALL BE SQUARE FROM THE TOP TO A POINT 6" BELOW THE GROUND LINE, IF SIDEWALK IS PRESENT.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF OPERATIONS  
STANDARD  
TRAFFIC SIGNAL SUPPORT  
FOUNDATION TYPE B

RECOMMENDED XXX XX, 2024 RECOMMENDED XXX XX, 2024 SHEET 8 OF 10  
CHIEF, TSMO ARTERIALS AND PLANNING SECTION CHIEF OF HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION  
TC-8801



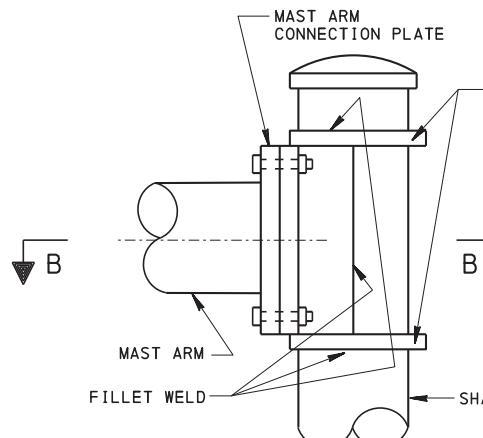


#### BASE PLATE

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

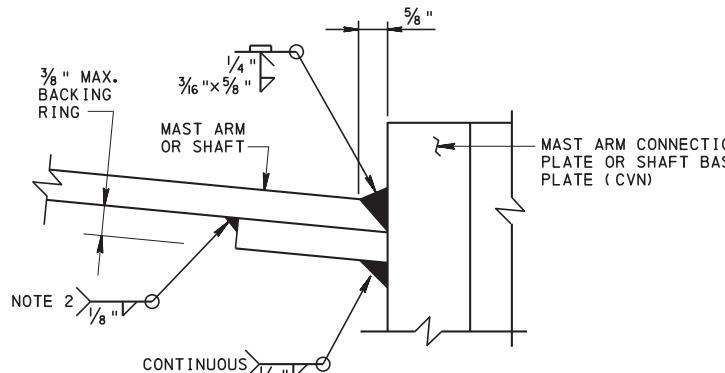
SHAFT OR COLUMN CONNECTION DIAMETER (IN)	PLATE THICKNESS MINIMUM, "T" (IN)
LESS THAN 6"	1"
6" TO 13"	2"
GREATER THAN 13" BUT LESS THAN 19"	2 1/2"
GREATER THAN OR EQUAL TO 19"	3"



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

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

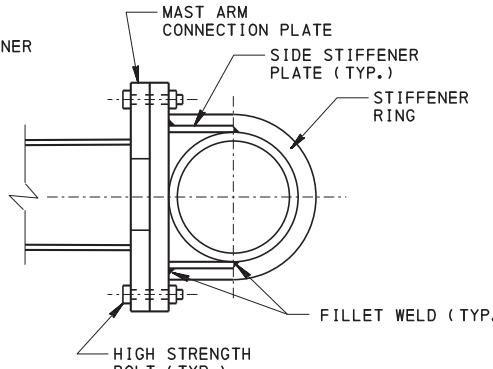
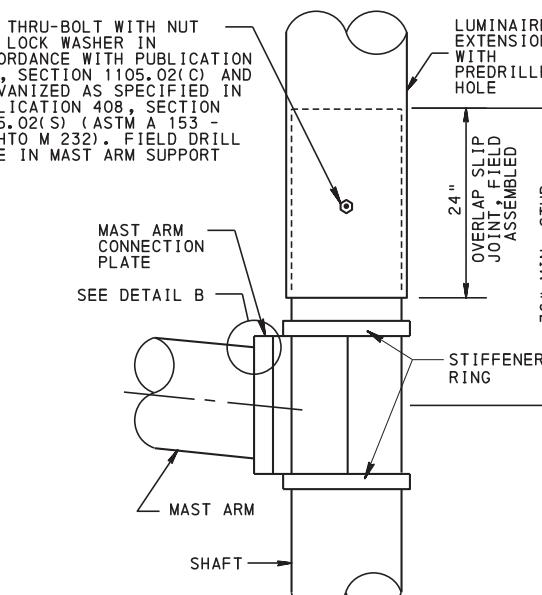
#### SECTION B-B



#### DETAIL B

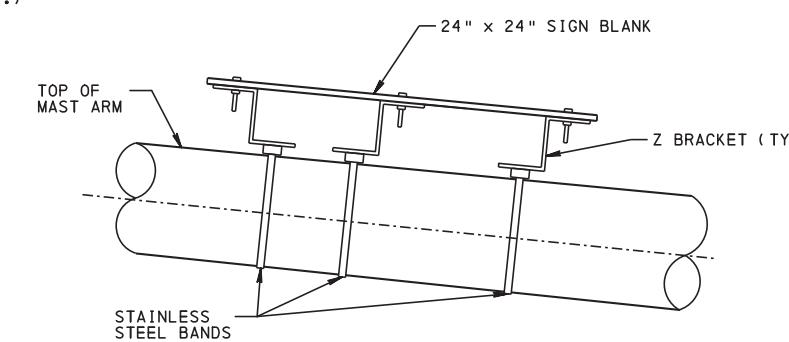
(MAST ARM CONNECTION SHOWN, SHAFT CONNECTION TO BASE PLATE SIMILAR)

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.



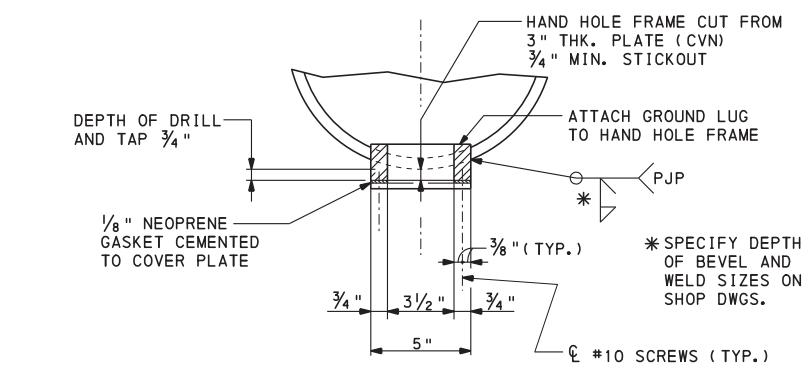
#### OVERLAP SLIP JOINT DETAIL

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

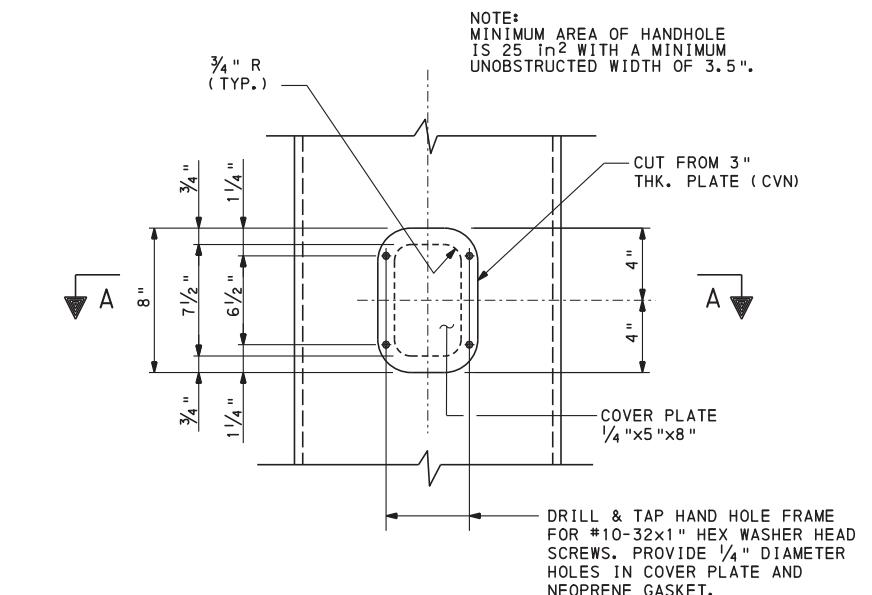


#### MITIGATION DEVICE DETAIL

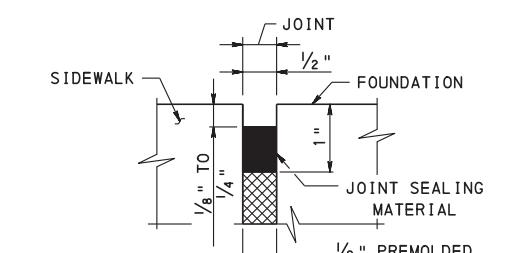
NOTE: INSTALL MITIGATION DEVICE WITHIN 5' OF MAST ARM TIP WHEN REQUIRED.



#### SECTION A-A



#### HAND HOLE DETAIL



#### DETAIL C

### COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF OPERATIONS

#### STANDARD

#### TRAFFIC SIGNAL SUPPORT MISCELLANEOUS DETAILS

RECOMMENDED XXX XX, 2024

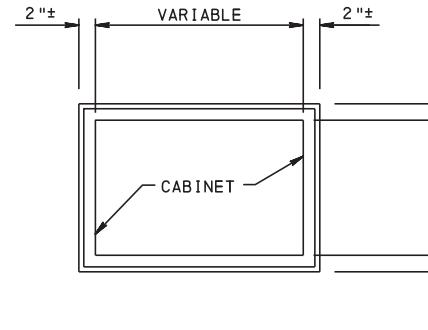
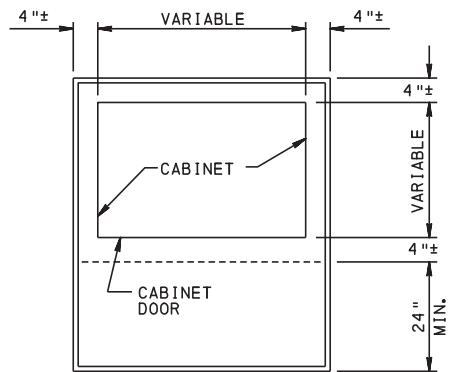
RECOMMENDED XXX XX, 2024

SHEET 10 OF 10

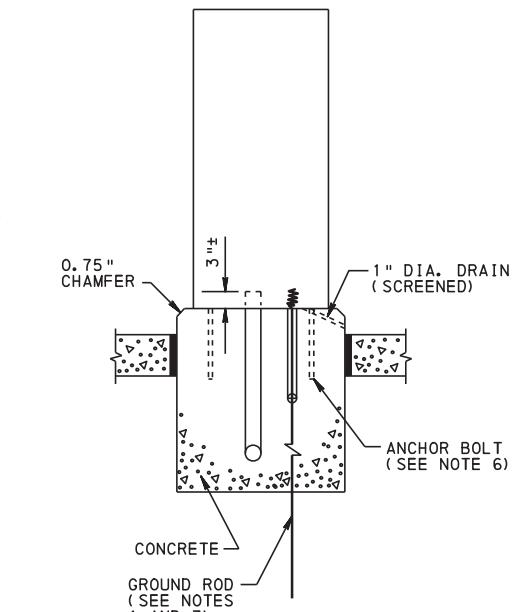
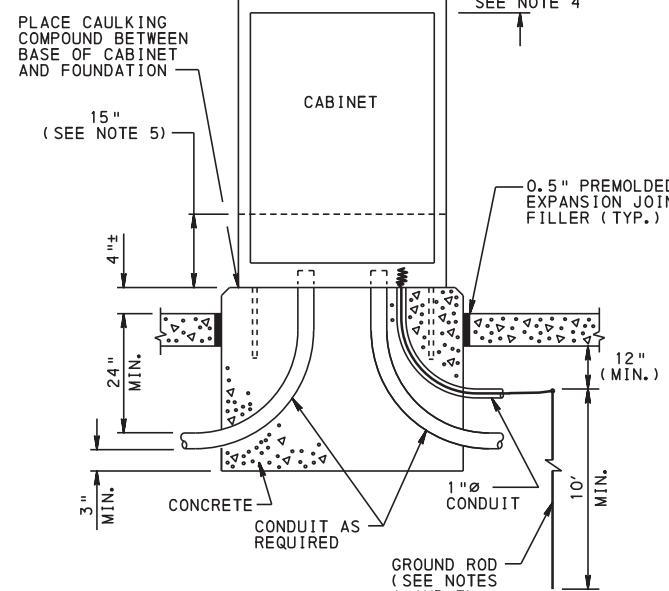
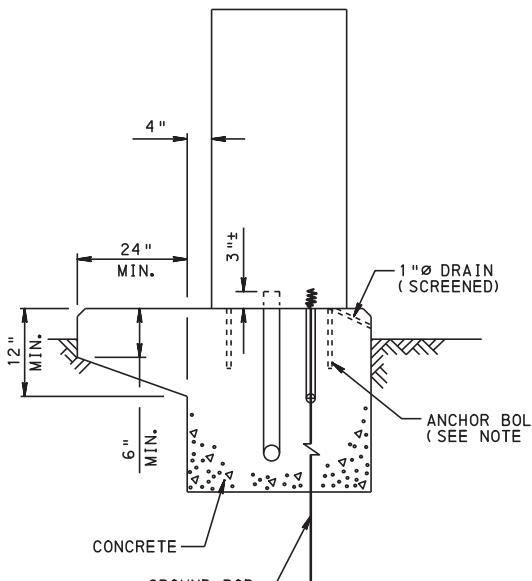
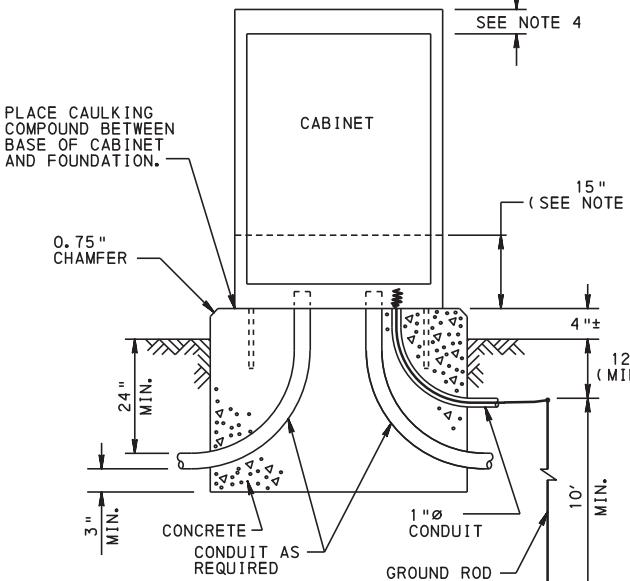
CHIEF, TSMO ARTERIALS AND PLANNING SECTION

CHIEF OF HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION

TC-8801



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



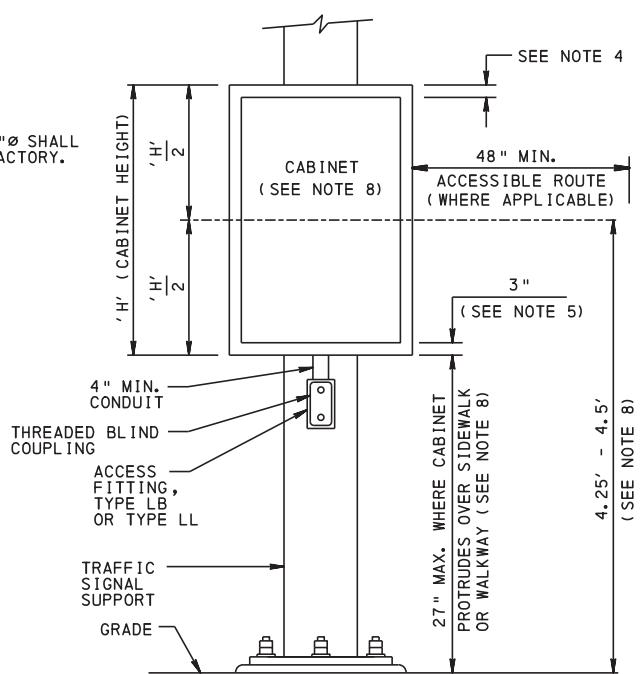
IN EARTH

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 1/2" x 12" OR DRILL CONCRETE TO RECEIVE 1/2" DIA x 3.75" LONG EXPANSION BOLT OR APPROVED EQUAL.
7. FOR GROUND ROD SIZE AND INSTALLATION DETAILS, SEE TC-8804.
8. MOUNT CABINET ON TRAFFIC SIGNAL SUPPORT IN A MANNER NOT TO PROTRUDE OVER EXISTING SIDEWALK. WHERE THIS IS NOT POSSIBLE, COMPLY WITH TYPE II MOUNTING DETAIL AND PUBLICATION 13M, CHAPTER 6.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF OPERATIONS

STANDARD

CONTROLLER ASSEMBLY

RECOMMENDED XXX XX, 2024

RECOMMENDED XXX XX, 2024

SHT. 1 OF 1

CHIEF, TSMO ARTERIALS AND  
PLANNING SECTION

CHIEF, HIGHWAY SAFETY AND  
TRAFFIC OPERATIONS DIVISION

TC-8802

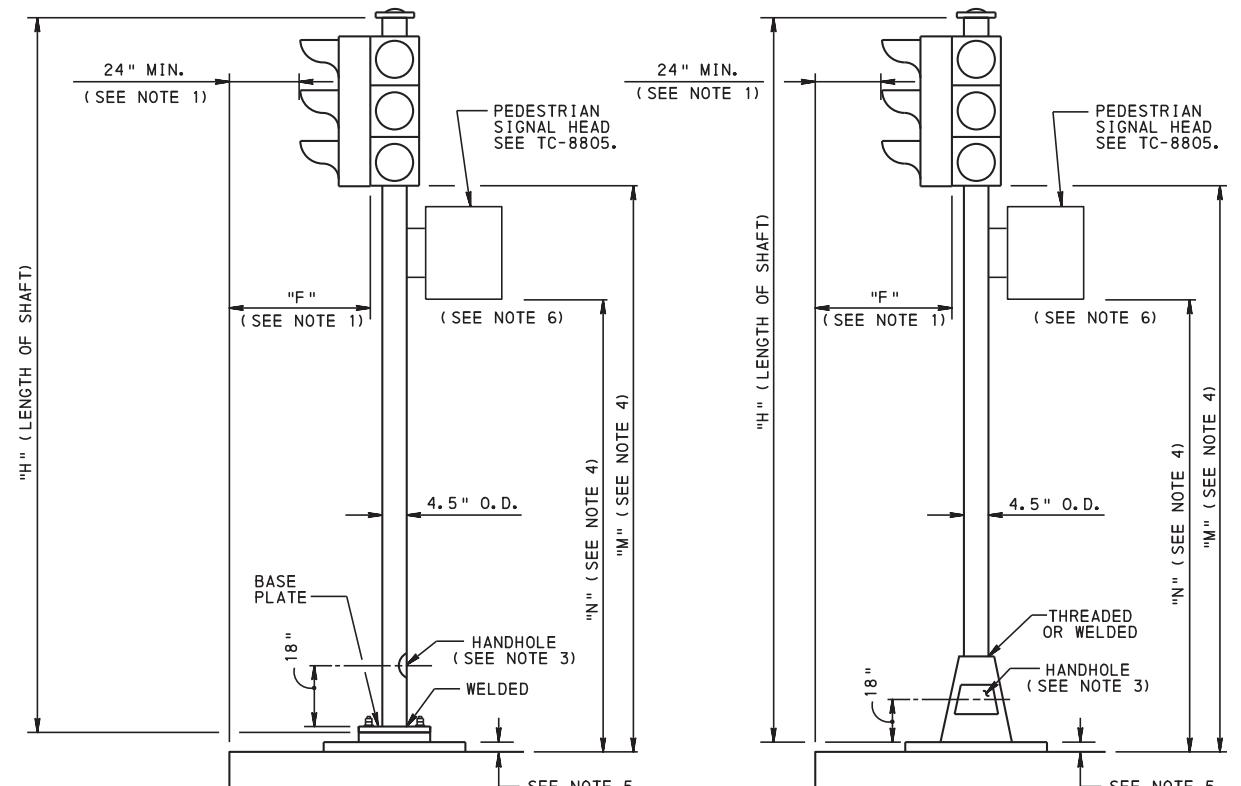
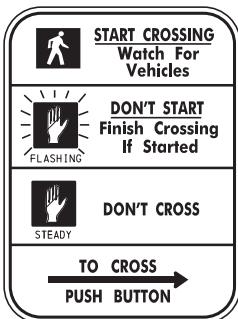


PLATE BASE

CAST BASE

TRAFFIC SIGNAL SUPPORT-PEDESTAL

R10-3B



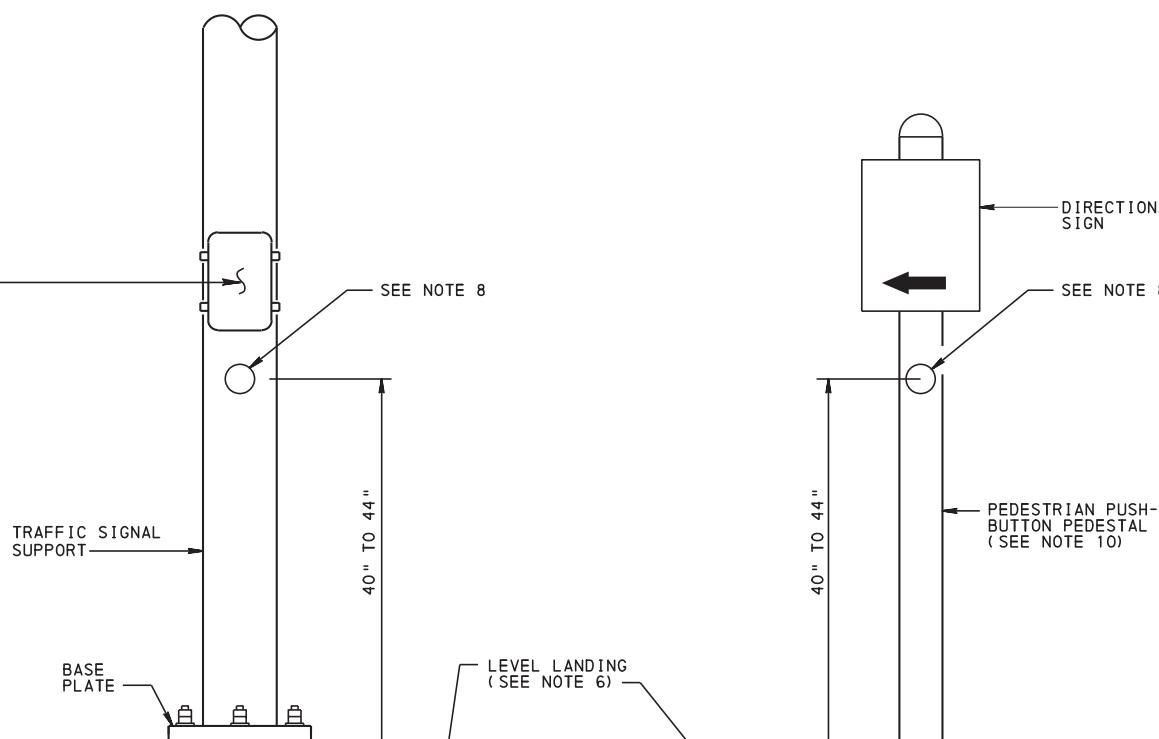
R10-3E



R10-4B



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



PEDESTRIAN PUSHBUTTON VERTICAL PLACEMENT

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" HANHOLE 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 10 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.

COMMONWEALTH OF PENNSYLVANIA  
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STANDARD

**MISCELLANEOUS  
TRAFFIC SIGNAL SUPPORT-PEDESTAL  
PEDESTRIAN PUSHBUTTON**

RECOMMENDED XXX XX, 2024

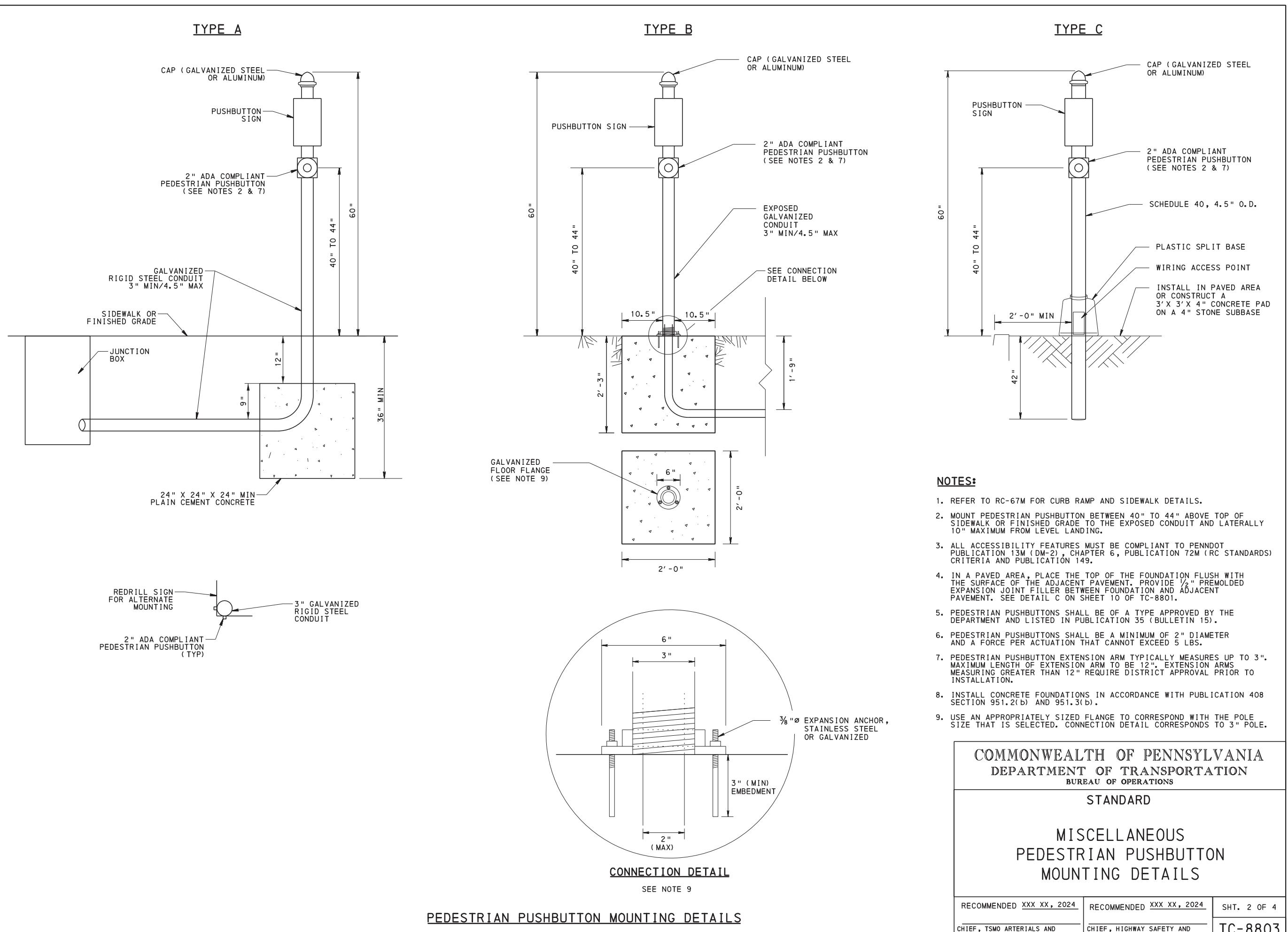
RECOMMENDED XXX XX, 2024

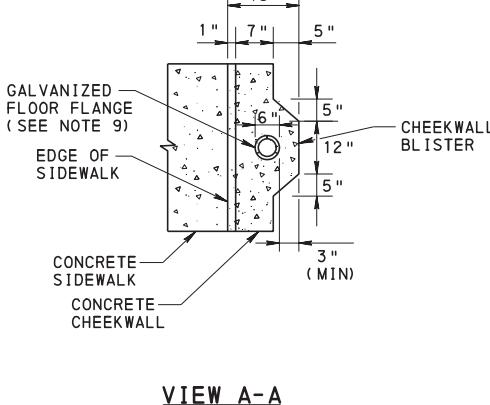
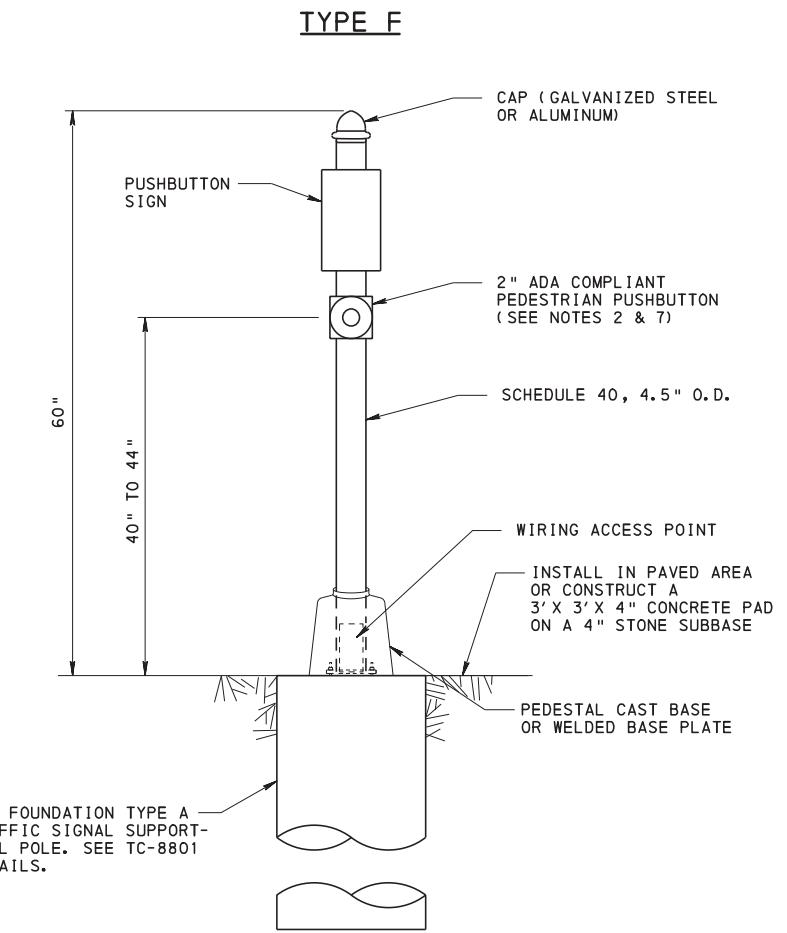
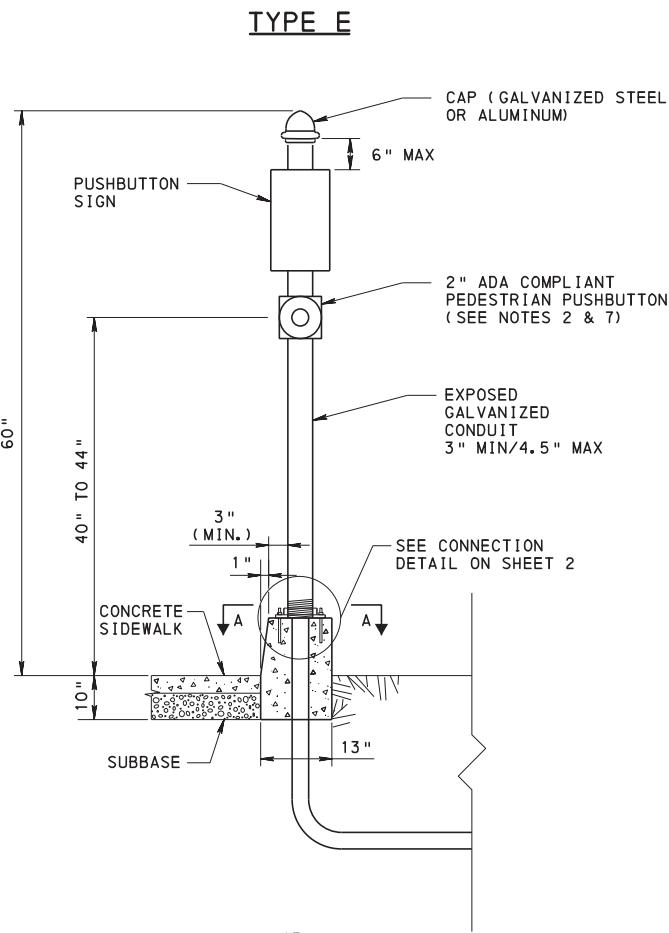
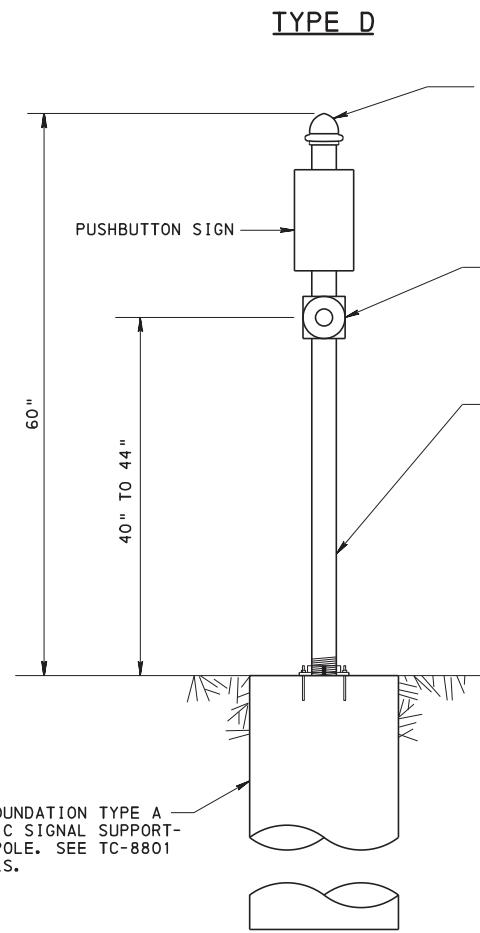
SHT. 1 OF 4

CHIEF, TSMO ARTERIALS AND  
PLANNING SECTION

CHIEF, HIGHWAY SAFETY AND  
TRAFFIC OPERATIONS DIVISION

TC-8803





**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 10 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 GREATER THAN 12" REQUIRE DISTRICT APPROVAL PRIOR TO INSTALLATION.
8. INSTALL CONCRETE FOUNDATIONS IN ACCORDANCE WITH PUBLICATION 408 SECTION 951.2(b) AND 951.3(b).
9. USE AN APPROPRIATELY SIZED FLANGE TO CORRESPOND WITH THE POLE SIZE THAT IS SELECTED. VIEW A-A DETAIL CORRESPONDS TO 3" POLE.

COMMONWEALTH OF PENNSYLVANIA  
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BUREAU OF OPERATIONS

STANDARD

MISCELLANEOUS  
PEDESTRIAN PUSHBUTTON  
MOUNTING DETAILS

RECOMMENDED XXX XX, 2024

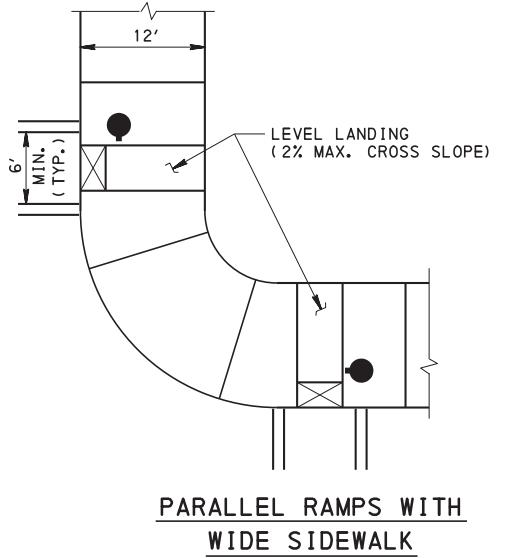
RECOMMENDED XXX XX, 2024

SHT. 3 OF 4

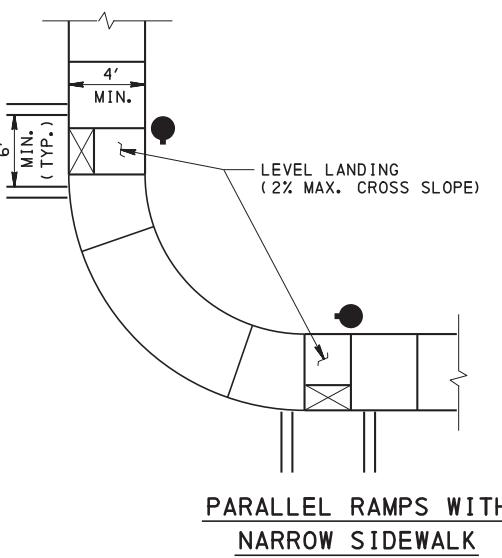
CHIEF, TSMO ARTERIALS AND  
PLANNING SECTION

CHIEF, HIGHWAY SAFETY AND  
TRAFFIC OPERATIONS DIVISION

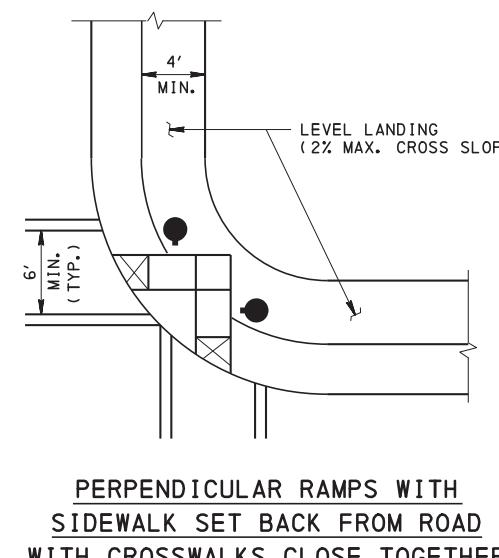
TC-8803



PARALLEL RAMPS WITH  
WIDE SIDEWALK

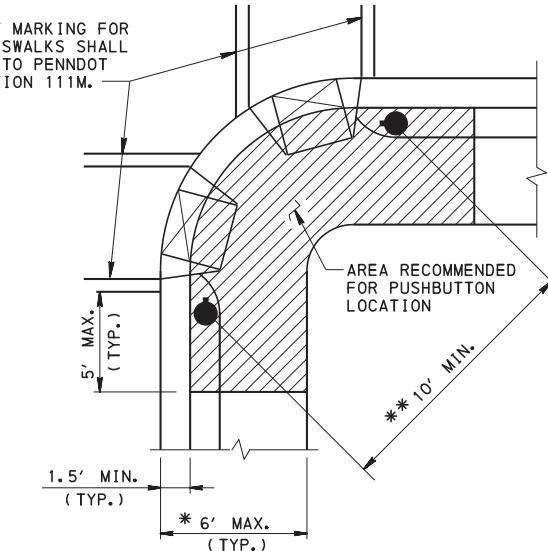


PARALLEL RAMPS WITH  
NARROW SIDEWALK



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

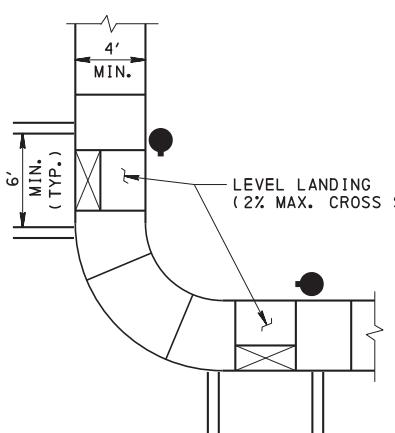
PAVEMENT MARKING FOR  
THE CROSSWALKS SHALL  
CONFORM TO PENNDOT  
PUBLICATION 111M.



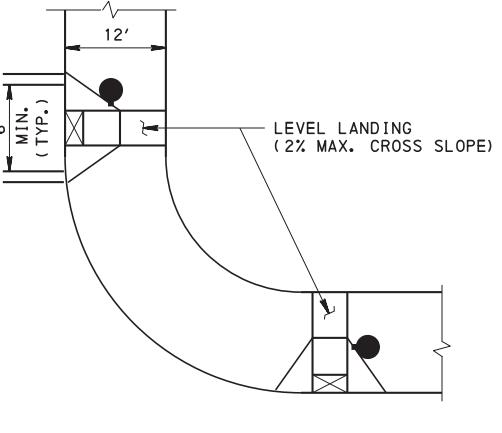
#### RECOMMENDED PUSHBUTTON LOCATIONS

\* 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.

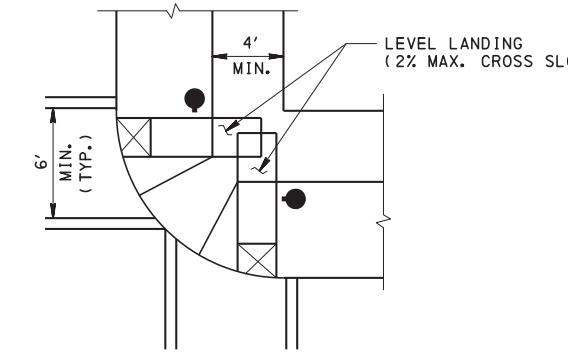
\*\* WHERE THERE ARE CONSTRAINTS ON A PARTICULAR CORNER THAT MAKE IT IMPRACTICAL TO PROVIDE 10' SEPARATION BETWEEN THE TWO PEDESTRIAN PUSHBUTTONS, THE PUSHBUTTONS MAY BE PLACED CLOSER TOGETHER OR ON THE SAME POLE.



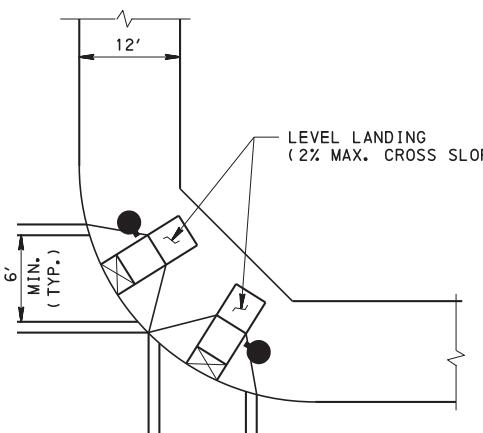
PARALLEL RAMPS WITH NARROW SIDEWALK  
AND TIGHT CORNER RADIUS



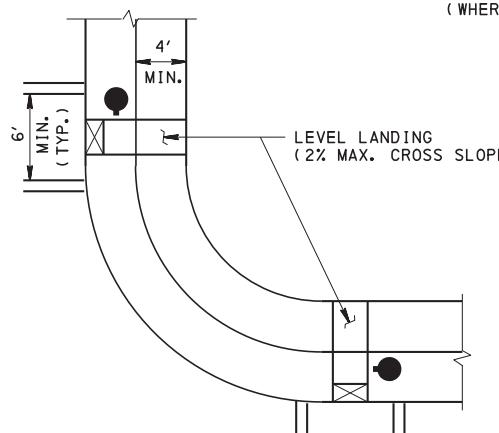
PERPENDICULAR RAMPS WITH  
CROSSWALKS FAR APART



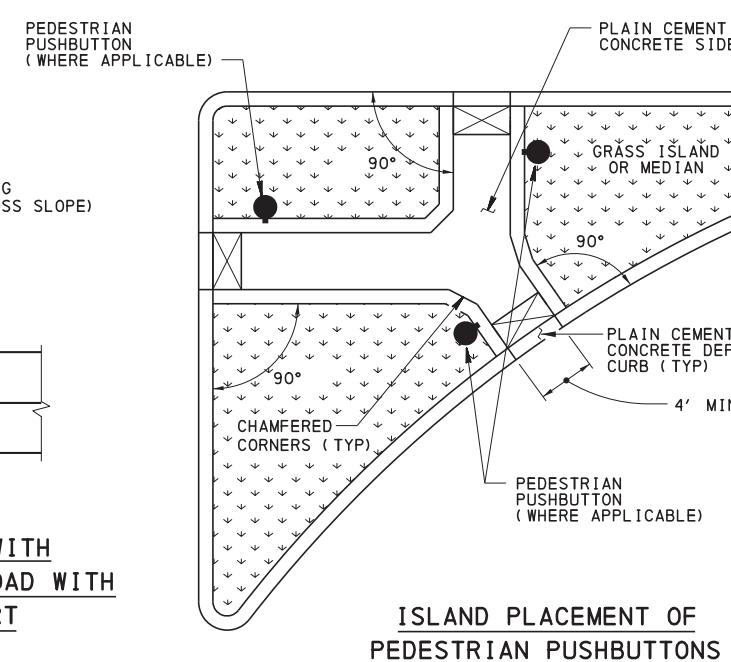
PERPENDICULAR RAMPS WITH  
SIDEWALK SET BACK FROM ROAD WITH  
CONTINUOUS SIDEWALK BETWEEN RAMPS



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 OPERATIONS

STANDARD

MISCELLANEOUS  
TYPICAL PEDESTRIAN PUSHBUTTON  
LOCATIONS

RECOMMENDED XXX XX, 2024

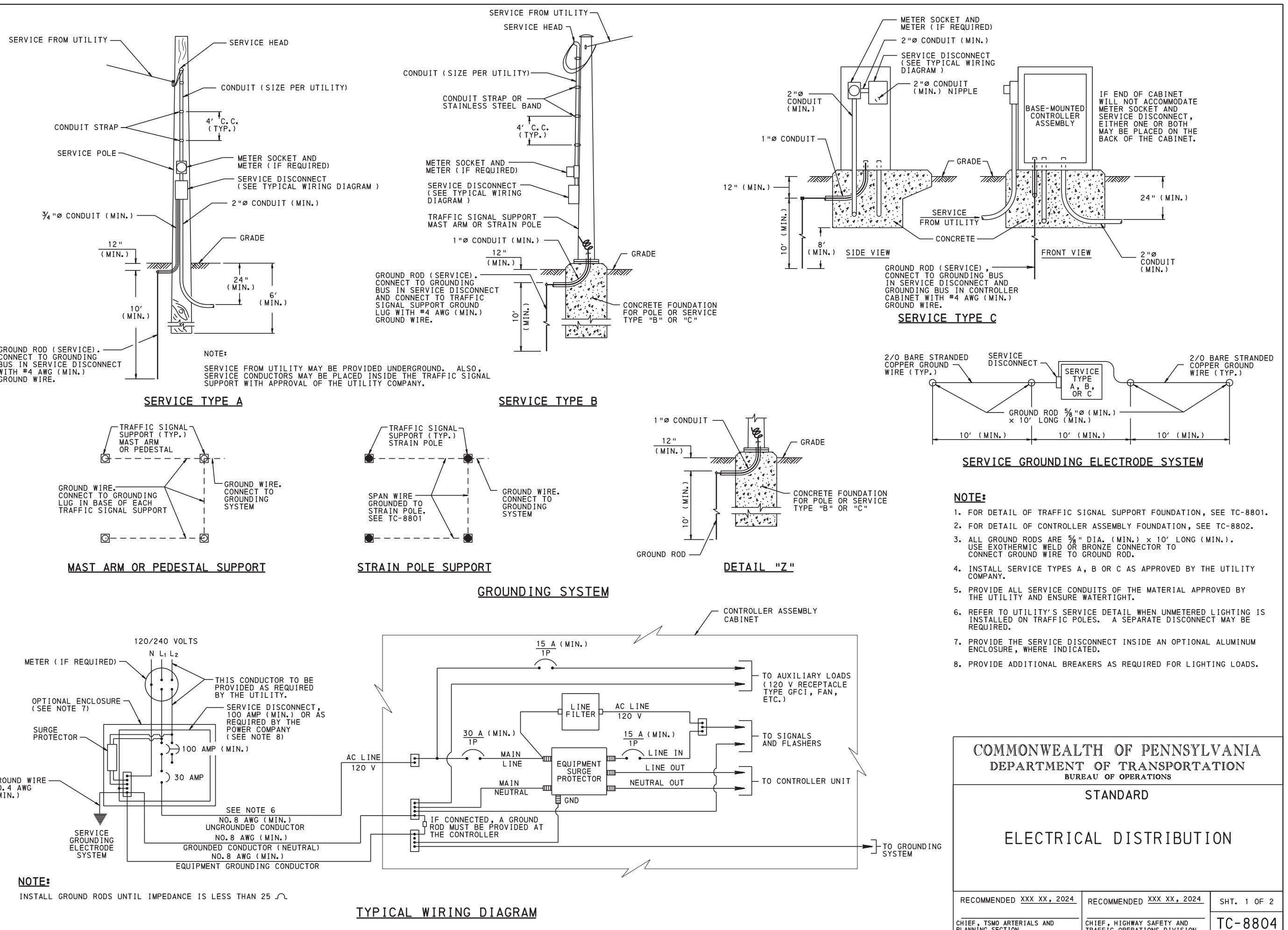
CHIEF, TSMO ARTERIALS AND  
PLANNING SECTION

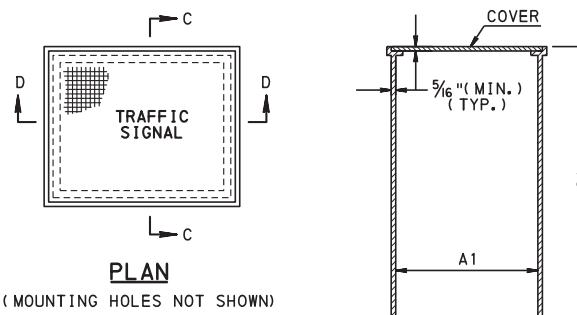
RECOMMENDED XXX XX, 2024

CHIEF, HIGHWAY SAFETY AND  
TRAFFIC OPERATIONS DIVISION

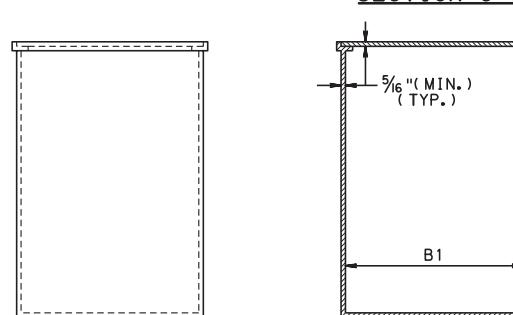
SHT. 4 OF 4

TC-8803





**PLAN**  
(MOUNTING HOLES NOT SHOWN)



**ELEVATION**

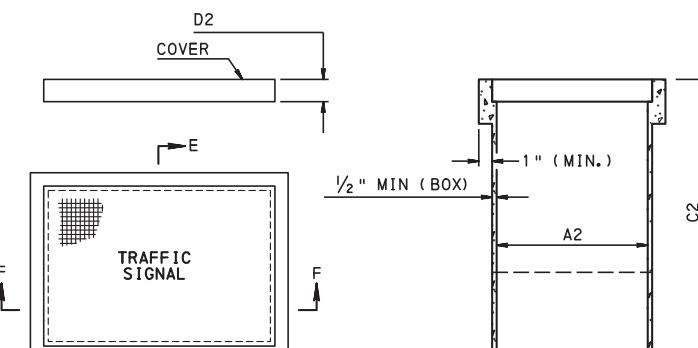
**TABLE OF DIMENSIONS FOR  
CAST IRON OR STEEL JUNCTION BOX**

	JB-26	JB-27
A1	12" MIN	12" MIN
B1	12" MIN	18" MIN
C1	12" MIN	24" MIN

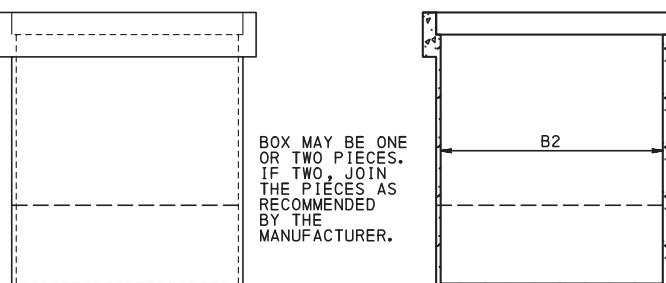
**SECTION D-D**

**CAST IRON OR STEEL**

**JUNCTION BOX, TYPE JB-26  
OR TYPE JB-27**



**PLAN**  
(MOUNTING HOLES NOT SHOWN)



**ELEVATION**

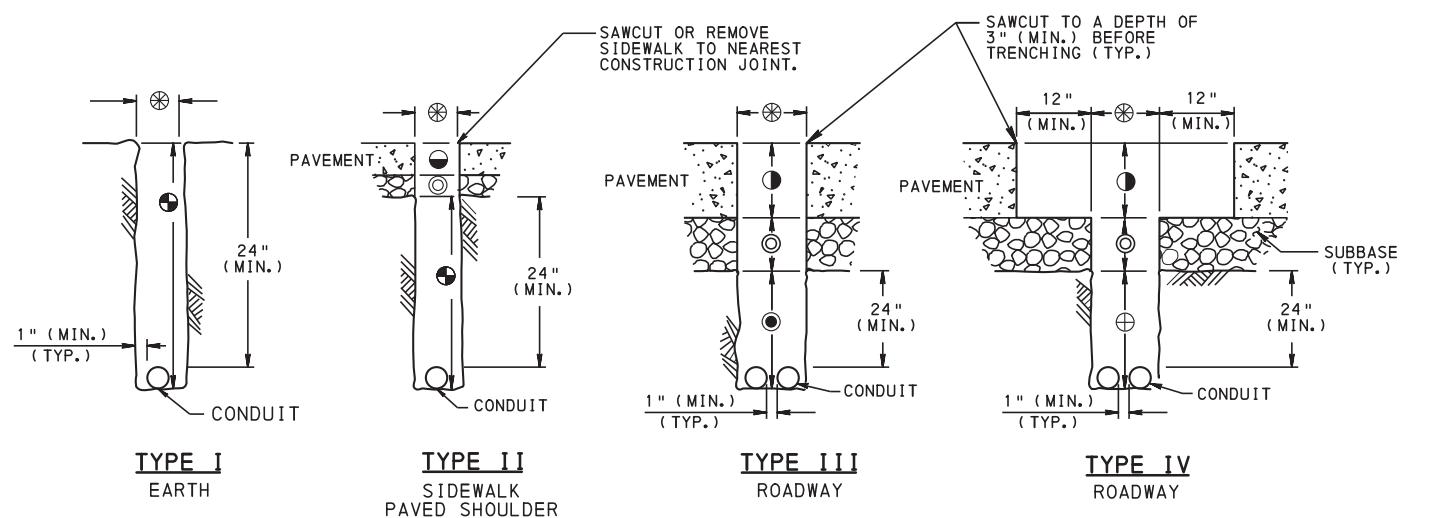
**REINFORCED PLASTIC MORTAR OR  
HIGH-DENSITY POLYMER CONCRETE**

**JUNCTION BOX, TYPE JB-26  
TYPE JB-27 OR TYPE JB-30**

**TABLE OF DIMENSIONS FOR  
REINFORCED PLASTIC MORTAR OR  
HIGH-DENSITY POLYMER CONCRETE**

	JB-26	JB-27	JB-30
A2	11 1/2" MIN	12" MIN	15 1/2" MIN
B2	11 1/2" MIN	18" MIN	28 1/2" MIN
C2	12" MIN	24" MIN	24" MIN
D2	3/4" MIN	3/4" MIN	2"

**SECTION F-F**

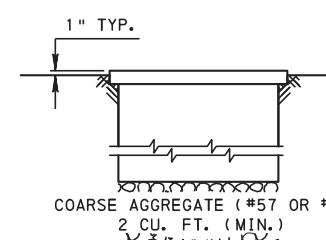


- ⊕ WIDTH OF TRENCH AS REQUIRED TO PROPERLY INSTALL CONDUIT AND BACKFILL.
- ⊕ BACKFILL WITH SUITABLE ON-SITE MATERIAL AS SPECIFIED.
- ⊕ RESTORE PAVEMENT AS SPECIFIED IN SECTION 954, PUBLICATION 408.
- BACKFILL WITH CLASS A CEMENT CONCRETE TO BOTTOM OF EXISTING SUBBASE.
- BACKFILL AS SPECIFIED IN SECTION 910.3(c), PUBLICATION 408.
- REPLACE SUBBASE IN KIND.
- REPLACE IN KIND.

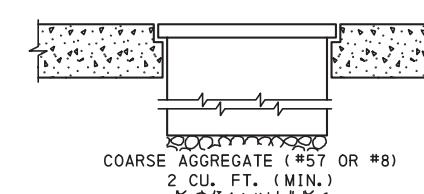
**TRENCH AND BACKFILL**

**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, JB-27 AND JB-30 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.



**JUNCTION BOX IN EARTH**



**JUNCTION BOX IN PAVED  
SURFACE AND SIDEWALK**

**TYPICAL JUNCTION BOX  
INSTALLATION**

**COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF OPERATIONS**

**STANDARD**

**ELECTRICAL DISTRIBUTION**

RECOMMENDED xxx xx, 2024

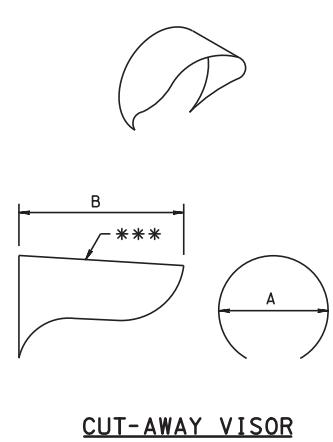
RECOMMENDED xxx xx, 2024

SHT. 2 OF 2

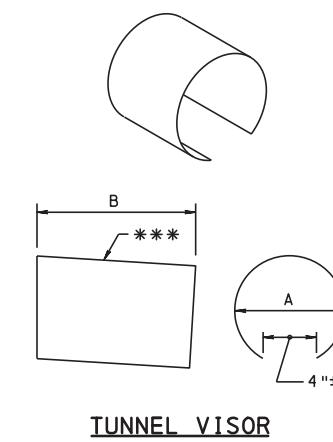
CHIEF TSMS ARTERIALS AND  
PLANNING SECTION

CHIEF, HIGHWAY SAFETY AND  
TRAFFIC OPERATIONS DIVISION

TC-8804



CUT-AWAY VISOR

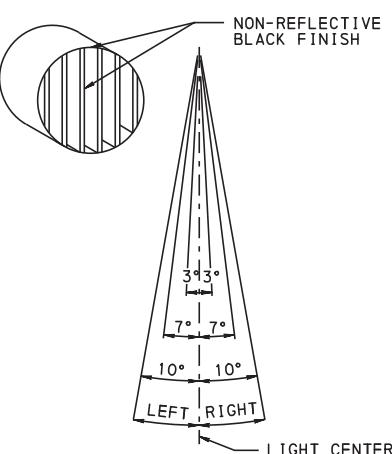


TUNNEL VISOR

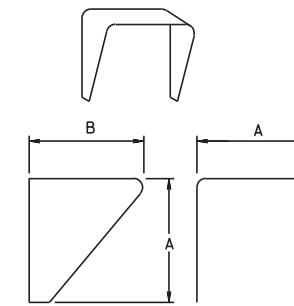
VISOR DIMENSION TABLE	
A	B
8"	7" MIN
12"	9.5" MIN

\*\*\* THE VISOR SHALL HAVE A DOWNWARD TILT OF AT LEAST 3°.  
CUT-AWAY VISORS SHALL BE USED FOR ALL SIGNAL FACES, UNLESS OTHERWISE INDICATED ON THE PLAN.

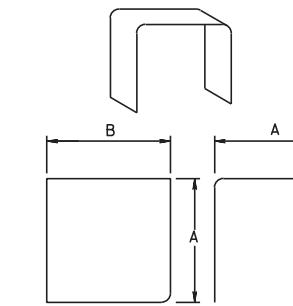
VISOR TYPES FOR VEHICULAR SIGNAL HEAD



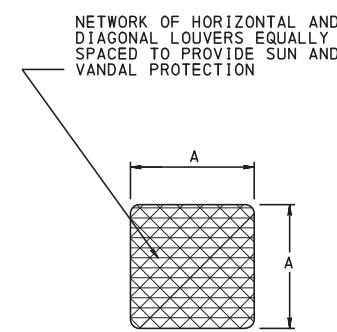
LOUVER FOR VEHICULAR SIGNAL HEAD  
(DO NOT USE WITH CUT-AWAY VISOR)



CUT-AWAY VISOR

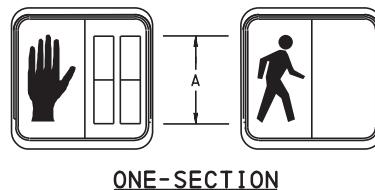


DIMENSION A AS REQUIRED.  
DIMENSION B ≈ DIMENSION A

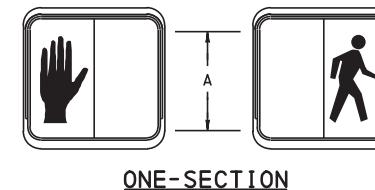


TUNNEL VISOR  
LOUVER VISOR  
(FOR PEDESTRIAN SIGNAL HEAD ONLY)

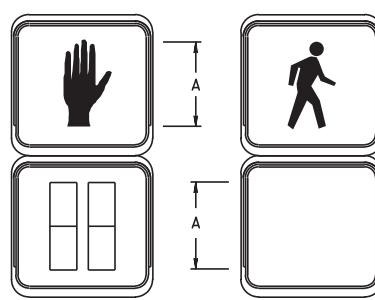
VISOR TYPES FOR PEDESTRIAN SIGNAL HEAD AND LANE-USE TRAFFIC CONTROL SIGNAL HEAD



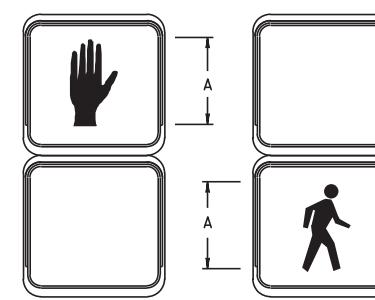
ONE-SECTION



ONE-SECTION



TWO-SECTIONS



TWO-SECTIONS

TYPE A  
(COUNTDOWN) \*

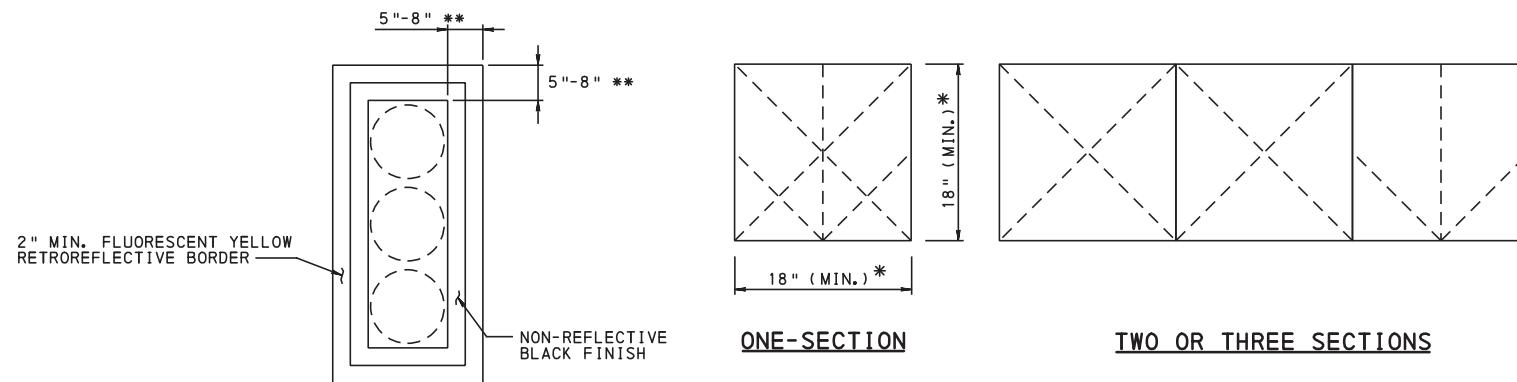
TYPE B  
(SYMBOL) \*\*

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" SHOULD BE AT LEAST 9" HIGH.

PEDESTRIAN SIGNAL HEAD



BACKPLATE FOR VEHICULAR SIGNAL HEAD \*

\* BACKPLATE CONFORMING TO PUBLICATION 408 SECTION 955.2(B)3 SHALL BE ONE PIECE ALUMINUM  
\*\* 5" BORDER TO BE USED FOR 12" SIGNAL LENSES.  
8" BORDER TO BE USED FOR 8" SIGNAL LENSES.

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

LANE-USE TRAFFIC CONTROL SIGNAL HEAD

NOTE:

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

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF OPERATIONS

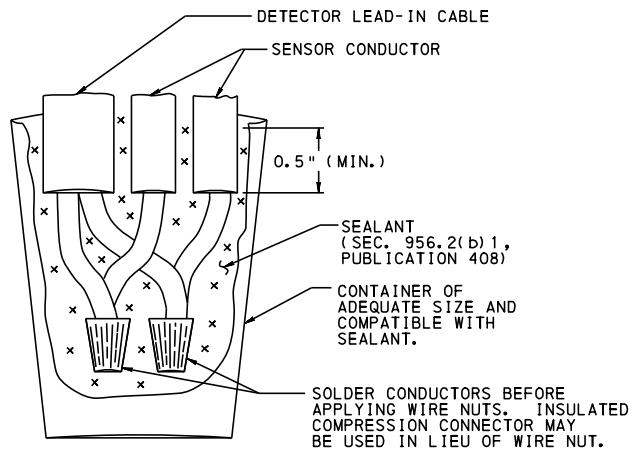
STANDARD

SIGNAL HEADS

RECOMMENDED XXX XX, 2024	RECOMMENDED XXX XX, 2024	SHT. 1 OF 1
CHIEF, TSMO ARTERIALS AND PLANNING SECTION		CHIEF, HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION

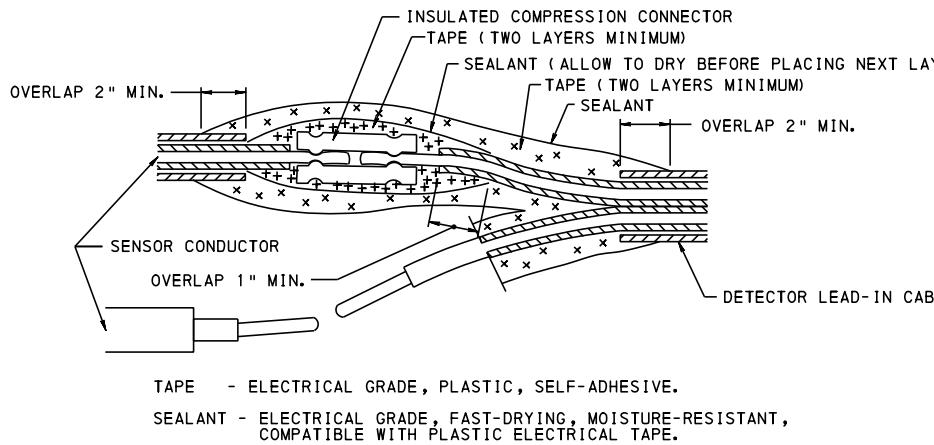
TC-8805





PLACE SEALANT IN CONTAINER,  
IMMERSE SPLICE IN SEALANT,  
SUPPORT IN RIGID POSITION  
UNTIL SEALANT HAS SET.

ALTERNATE A

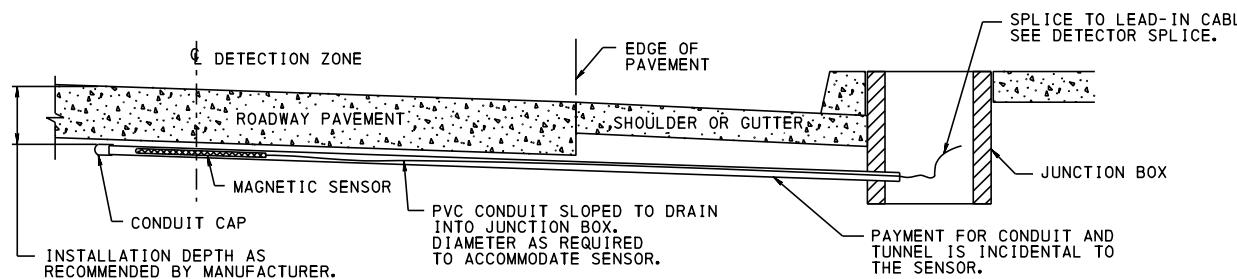
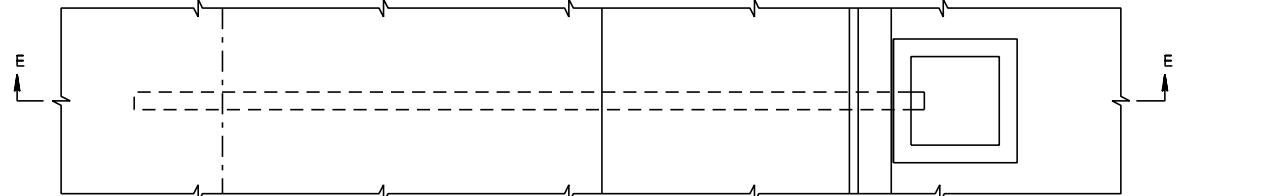


TAPE - ELECTRICAL GRADE, PLASTIC, SELF-ADHESIVE.  
SEALANT - ELECTRICAL GRADE, FAST-DRYING, MOISTURE-RESISTANT,  
COMPATIBLE WITH PLASTIC ELECTRICAL TAPE.

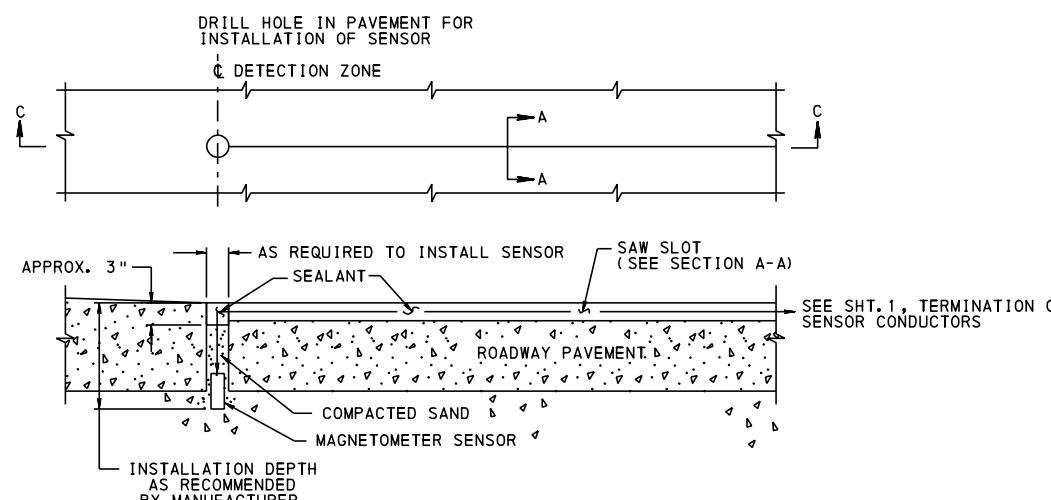
ALTERNATE B

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 CABLES; OR  
A RE-ENTERABLE SPLICE KIT AS SPECIFIED IN  
SEC. 956.2(b) 4, PUBLICATION 408.

ALTERNATE C



SECTION E-E  
TYPICAL SENSOR INSTALLATION - MAGNETIC DETECTOR



TYPICAL SENSOR INSTALLATION - MAGNETOMETER DETECTOR

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STANDARD

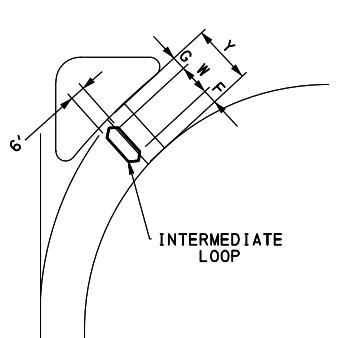
DETECTORS

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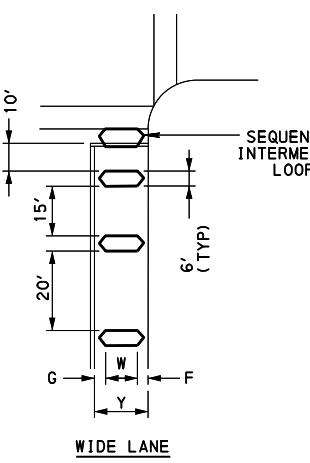
CHIEF, TSMO ARTERIALS AND  
PLANNING SECTION

CHIEF, HIGHWAY SAFETY AND  
TRAFFIC OPERATIONS DIVISION

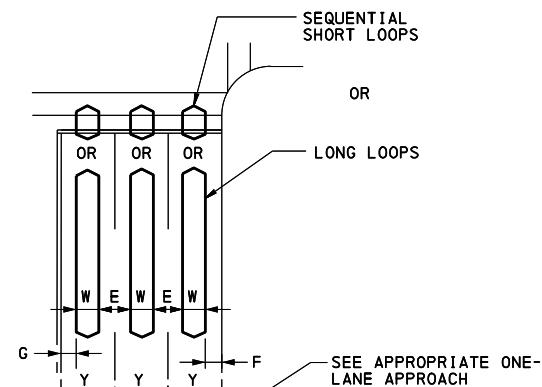
TC-8806



RIGHT TURN LANE / NO PARKING



WIDE LANE

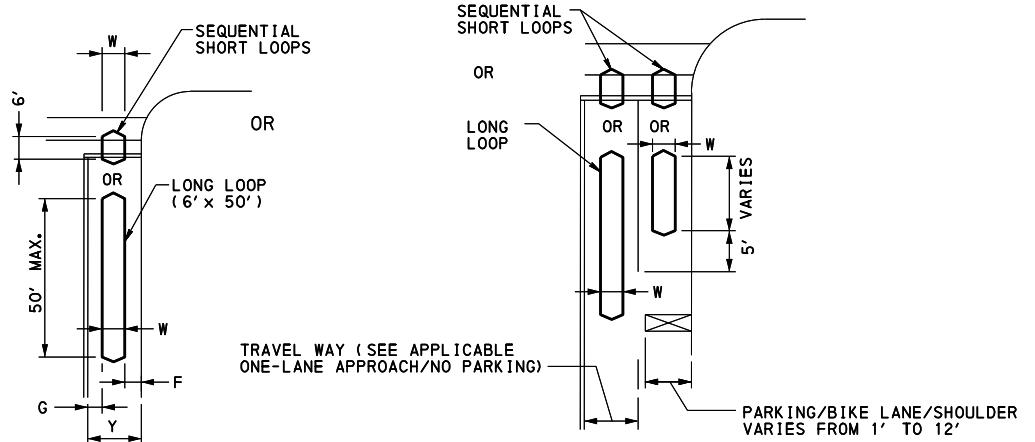


MULTILANE APPROACH / WITH INDIVIDUAL LANE DETECTION

RIGHT TURN LANE / NO PARKING  
WIDE LANE

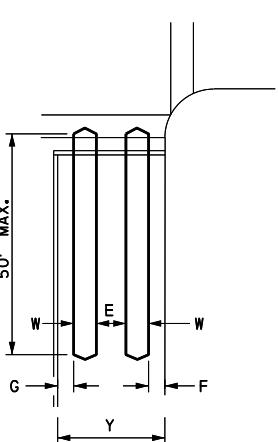
Y	G	W	F
LANE WIDTH	DISTANCE FROM LANE LINE OR ISLAND CURB TO LOOP	WIDTH OF LOOP	DIST. FROM CURB OR EDGE OF PAVEMENT TO LOOP
14'	4'	6'	4'
15'	4'	7'	4'
16'	4'	8'	4'
17'	4'	9'	4'
18'	4'	10'	4'
19'	4'	11'	4'
20'	4'	12'	4'
21'	4'	13'	4'
22'	4'	14'	4'
23'	4'	15'	4'
24'	4'	16'	4'
25'	4'	17'	4'
26'	4'	18'	4'

Y	G	E	W	F
APPROACH WIDTH	DIST. FROM CENTERLINE TO LOOP	DIST. BETWEEN LOOPS	WIDTH OF LOOP	DIST. FROM LOOP TO CURB OR EDGE EDGE OF ROAD
10+10+10 = 30'	3'	5'	5'	2'
11+11+11 = 33'	3'	5'	6'	2'
12+12+12 = 36'	3'	6'	6'	3'



ONE-LANE APPROACH / NO PARKING

ONE-LANE APPROACH WITH PARKING, BIKE LANE OR SHOULDER  
(SEE APPLICABLE ONE-LANE APPROACH/NO PARKING)



ONE / TWO-LANE APPROACH / NO PARKING

ONE-LANE APPROACH / NO PARKING

Y	G	W	F
APPROACH WIDTH	DISTANCE FROM CENTERLINE TO LOOP	WIDTH OF LOOP	DIST. FROM CURB OR EDGE OF PAVEMENT TO LOOP
9'	3'	4'	2'
10'	3'	5'	2'
11'	3'	6'	2'
12'	3'	6'	3'
13'	3'	7'	3'

ONE / TWO-LANE APPROACH / NO PARKING

Y	G	E	W	F
18'	2'	2'	6'	2'
19'	3'	2'	6'	2'
20'	3'	2'	6'	3'
21'	3'	3'	6'	3'
22'	3'	4'	6'	3'
23'	3'	5'	6'	3'
24'	3'	6'	6'	3'
25'	3'	6'	6'	4'

FOR 26' LANES, THREE 6' LOOPS SHOULD BE USED  
WITH 2' SPACING BETWEEN THEM AND KEEPING 2'  
BETWEEN THE LOOP AND CURB OR EDGE OF PAVEMENT  
AND 2' BETWEEN THE LOOP AND LANE LINE OR  
ISLAND CURB.

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LOOP DETECTOR LAYOUTS

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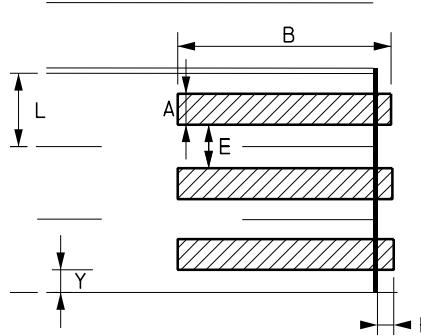
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CHIEF, TSMO ARTERIALS AND  
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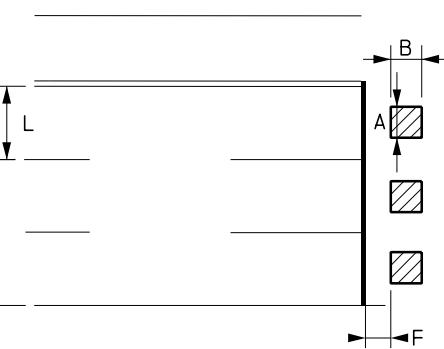
DIMENSION	STOP BAR PRESENCE ZONE
A	① ②
B	40' MIN.
E	2' MIN.
F	3'
Y	1' MIN.

USE SEPARATE DETECTION INPUT (CHANNEL) FOR EACH ZONE (DESIRABLE), BUT MAY COMBINE ZONES IN LANES WHICH ACTUATE THE SAME PHASE WHEN THE NUMBER OF DETECTOR INPUTS TO THE CONTROLLER IS LIMITED.

① FOR LOOPS, 5 TO 6' TYPICAL, BUT PROVIDE 1' MIN. BUFFER TO EDGE OF LANE.

① FOR NON-INTRUSIVE DETECTION, WIDTH VARIES BASED ON MANUFACTURER RECOMMENDATIONS.

#### STOP BAR PRESENCE ZONE

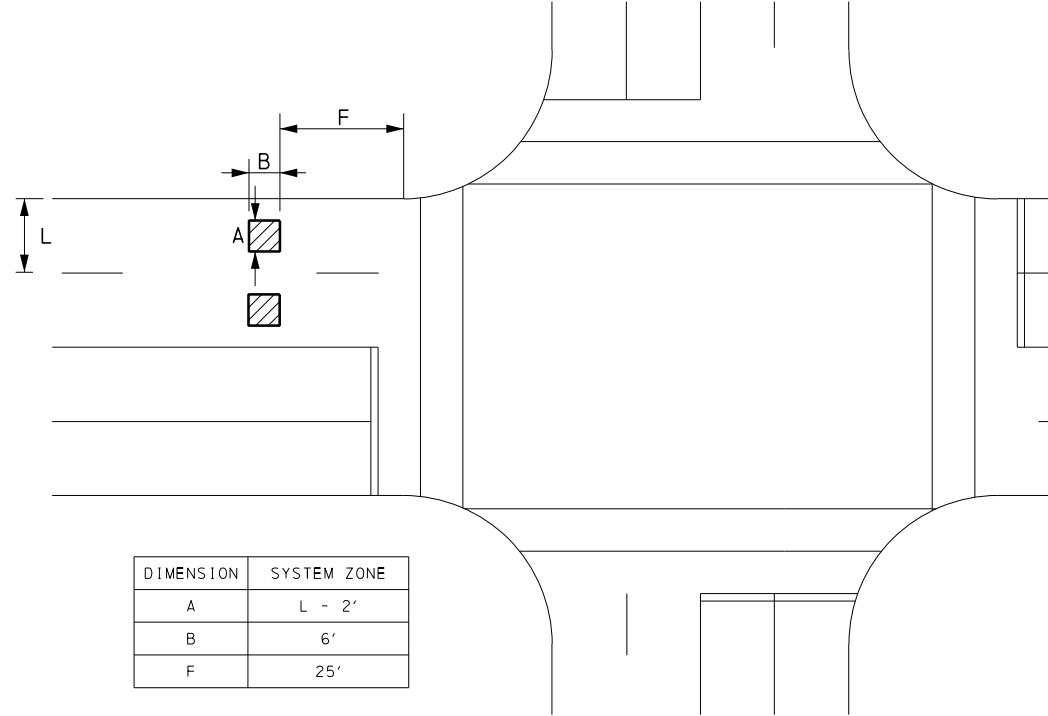


DIMENSION	STOP BAR LANE-BY-LANE COUNT ZONE
A	L - 2'
B	6'
F	6' ①

USE SEPARATE DETECTION INPUT (CHANNEL) FOR EACH ZONE.

① DIMENSION "F" MAY BE ADJUSTED TO AVOID OVERLAP WITH OTHER ZONES WHEN THE DETECTION TECHNOLOGY DOES NOT SUPPORT OVERLAP.

#### STOP BAR LANE-BY-LANE COUNT ZONE



DIMENSION	SYSTEM ZONE
A	L - 2'
B	6'
F	25'

USE SEPARATE DETECTION INPUT (CHANNEL) FOR EACH ZONE.

#### SYSTEM ZONE

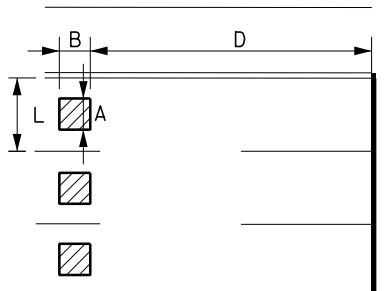


TABLE OF ADVANCE DISTANCES BASED ON APPROACH SPEED	
APPROACH SPEED	DISTANCE "D"
25 MPH	165'
30 MPH	200'
35 MPH	230'
40 MPH	275'
45 MPH	330'
50 MPH	365'
55 MPH	400'

DIMENSION	ADVANCE ZONE
A	L - 2'
B	6'

DISTANCE "D" MAY BE ADJUSTED AS FOLLOWS WHEN THE ADVANCE ZONE IS ONLY USED FOR AUTOMATED TRAFFIC SIGNAL PERFORMANCE MEASURES (WITH APPROVED JUSTIFICATION):

1. IF THE INTERSECTION APPROACH GEOMETRY PRECLUDES THE ABILITY TO COLLECT DATA AT THE DISTANCE INDICATED IN THE TABLE, DIMENSION "D" MAY BE REDUCED IF THE QUEUE DOES NOT REGULARLY EXTEND PAST THE PROPOSED SETBACK DISTANCE.
2. IF A CLOSER LOCATION IS NOT FEASIBLE, EXIT DETECTION FROM AN UPSTREAM INTERSECTION MAY BE USED WITH PEER-TO-PEER COMMUNICATION TO PASS THE DETECTOR CALL TO THE SUBJECT INTERSECTION. EXIT DETECTION SHOULD NOT BE USED WHERE SIGNIFICANT MID-BLOCK TRAFFIC GENERATORS EXIST OR THE DISTANCE TO THE UPSTREAM DETECTOR WOULD EXCEED 1,000 FEET.

DISTANCE "D" SHOULD NOT BE REDUCED WHEN THE ADVANCE ZONE IS USED FOR VOLUME-DENSITY OPERATION.

EXIT DETECTION SHOULD NOT BE USED WHEN THE ADVANCE ZONE IS USED FOR VOLUME-DENSITY OPERATION.

USE SEPARATE DETECTION INPUT (CHANNEL) FOR EACH ZONE (DESIRABLE). A SINGLE ZONE MAY BE USED WHERE EQUIPMENT CANNOT DIFFERENTIATE LANES OR DETECTOR INPUTS TO THE CONTROLLER ARE LIMITED.

#### ADVANCE ZONE

TRIP LINE	TRIP LINE METHOD ①		TRIP LINE METHOD FOR HIGH SPEED LOCATIONS		
	LOCATION	SPEED RANGE (MPH)	LOCATION	SPEED RANGE (MPH)	EXTENSION (SEC)
1	380'	45 TO 60	470'	55 TO 65	1.5
2	310'	45 TO 60	390'	50 TO 65	2.0
3	255'	40 TO 60	340'	42 TO 55	2.0
4	205'	35 TO 50	270'	37 TO 50	1.5
5	135'	30 TO 45	220'	35 TO 45	2.0

① UTILIZE 0.5 SEC. EXTENSION.

SET CONTROLLER PASSAGE TO 0.2 SEC.

#### DILEMMA ZONE - TRIP LINE

 AREA OF DETECTION

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DETECTION ZONE PLACEMENT

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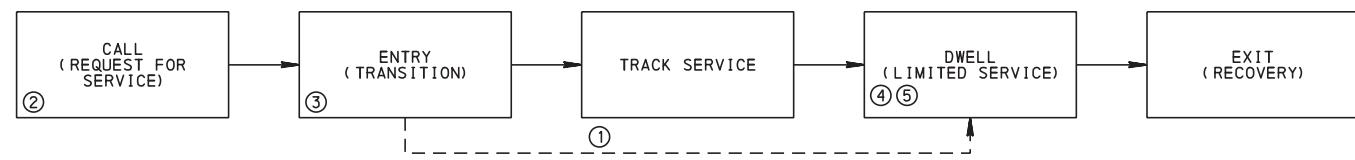
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CHIEF, TSMO ARTERIALS AND  
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## PREEMPTION STATES



- ① TRACK SERVICE STATE IS ONLY USED FOR RAILROAD PREEMPTION. OTHERWISE, SEQUENCE PROCEEDS DIRECTLY FROM ENTRY TO DWELL.
- ② DELAY DURATION (TIME FROM CALL RECEIVED UNTIL GOING TO ENTRY STATE) IS TO BE ZERO UNLESS OTHERWISE INDICATED ON THE TRAFFIC SIGNAL PLAN.
- ③ THE RIGHT-OF-WAY TRANSFER IS EXECUTED DURING THE ENTRY STATE AS FOLLOWS:
  - A) THE CONTROLLER SHALL STAY IN A NORMAL SEQUENCE PHASE IF THAT PHASE IS ALSO DEFINED AS A PREEMPTION PHASE.
  - B) PHASES OTHER THAN THE PREEMPTION PHASE SHALL BE TERMINATED TO PROVIDE SERVICE ONLY TO THE PREEMPTION PHASE(S). NORMAL CHANGE AND CLEARANCE TIMES FOR THE PHASE BEING TERMINATED SHOULD BE USED, INCLUDING PEDESTRIAN CLEARANCE INTERVAL, YELLOW CHANGE INTERVAL, AND RED CLEARANCE INTERVAL.
  - C) AVOID YELLOW TRAPS, IF PRACTICAL.
- ④ FOR RAILROAD PREEMPTION WHEN PREEMPTION IS EXPECTED TO RUN FOR A LONG DURATION, THE SIGNAL MAY BE OPERATED WITH LIMITED SERVICE FOR NON-CONFLICTING MOVEMENTS DURING THE DWELL STATE (CYCLING PHASES).
- ⑤ DURING THE DWELL STATE, CONTROLLER SHALL REMAIN IN GREEN INTERVAL FOR THE DWELL PHASE(S) INDICATED ON THE TRAFFIC SIGNAL PLAN.

## EMERGENCY VEHICLE PREEMPTION GENERAL NOTES

1. NORMAL TRAFFIC SIGNAL OPERATION SHALL ONLY BE PREEMPTED BY EMERGENCY VEHICLES RESPONDING TO EMERGENCY CALLS.
2. IF A SIGNAL FACE IS DISPLAYING A FLASHING YELLOW ARROW INDICATION WHEN THE CALL FOR PREEMPTION IS RECEIVED AND THE OPPONDING MOVEMENT IS A PREEMPTION PHASE, THE FLASHING YELLOW ARROW INDICATION MAY CONTINUE TO BE DISPLAYED DURING THE ENTRY AND DWELL STATES.
3. IF A SIGNAL FACE IS DISPLAYING A FLASHING YELLOW ARROW INDICATION WHEN THE PREEMPTION CALL IS RECEIVED AND THE PROTECTED PHASE ASSOCIATED WITH THE SIGNAL FACE IS A PREEMPTION PHASE, THE FLASHING YELLOW ARROW INDICATION SHALL CONTINUE TO BE DISPLAYED DURING THE ENTRY STATE AND THEN FOLLOWED DIRECTLY BY THE GREEN ARROW INDICATION DURING THE DWELL STATE.
4. IF THE SIGNALS ARE IN FLASHING MODE WHEN A PREEMPTION CALL IS RECEIVED, THE SIGNALS SHALL REMAIN IN FLASHING MODE.
5. IN EMERGENCY PREEMPTION, NO PRIORITY SHOULD BE ESTABLISHED. PREEMPTION SHALL BE ON A "FIRST COME, FIRST SERVED" OPERATION. ONCE THE FIRST PRIORITY VEHICLE CALLS THE SYSTEM, IT SHALL PREVENT OTHER PREEMPTIVE VEHICLES FROM ENTERING CALLS UNTIL THE FIRST EMERGENCY VEHICLE RELEASES CONTROL AND CLEARS THE INTERSECTION.
6. IF THE PREEMPTION EQUIPMENT HAS ENCODING CAPABILITIES FOR VEHICLE IDENTIFICATION, IT IS RECOMMENDED TO HAVE THE ZERO "00" POSITION ON TO GIVE UNENCODED EMITTERS THE ABILITY TO ACTIVATE THE EMERGENCY PREEMPTION.
7. LOCATION OF EMERGENCY VEHICLE DETECTORS ARE TO BE FIELD ADJUSTED TO ACHIEVE MAXIMUM OPERATION.
8. A WHITE CONFIRMATION LIGHT SHALL BE PROVIDED FACING EACH APPROACH EQUIPPED FOR EMERGENCY VEHICLE PREEMPTION. THE CONFIRMATION LIGHT FOR THE APPROACH WHICH HAS ACTIVE PREEMPTION SHALL FLASH AT A RATE OF NO LESS THAN 50 NOR MORE THAN 60 TIMES PER MINUTE DURING THE ENTIRE DURATION OF THE DWELL STATE. THE CONFIRMATION LIGHTS FOR NON-PREEMPTED PHASES SHALL BE OFF.

## PREEMPTION CONTROLLER SETTINGS

THE FOLLOWING CONTROLLER SETTINGS SHALL BE USED FOR PREEMPTION UNLESS OTHERWISE INDICATED ON THE TRAFFIC SIGNAL PLAN:

PARAMETER	NTCIP 1202 OBJECT	PENNSYLVANIA DEFAULT VALUE
MIN DURATION	preemptMinimumDuration	10
DELAY	preemptDelay	0
MIN GREEN	preemptMinimumGreen	255 ①
ENTER YELLOW	preemptEnterYellowChange	25.5 ①
ENTER RED	preemptEnterRedClear	25.5 ①
MIN DWELL	preemptDwellGreen	5
MAX PRESENCE	preemptMaximumPresence	60
EXIT TYPE	preemptExitType	Coord
EXIT PHASES	preemptExitPhase	2+6 ②

- ① NTCIP 1202 SPECIFIES THE CONTROLLER WILL USE THE SMALLER OF THE VALUE SET FOR THE NORMAL PHASE TIMING OR THE VALUE IN PREEMPTION SETTINGS. BY SETTING THE PREEMPTION SETTINGS TO THE MAXIMUM POSSIBLE VALUES, THE CONTROLLER WILL ALWAYS USE THE NORMAL TIMINGS FOR THE PHASE.
- ② SINCE EXIT TO COORD IS THE DEFAULT, EXIT PHASES ARE NOT TYPICALLY USED. USE SPECIFIED EXIT PHASES IF CONTROLLER WILL FALL BACK TO THOSE PHASES. IF EXIT PHASES OVERRIDE THE EXIT TO COORD SETTING, LEAVE BLANK.

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