

COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF MAINTENANCE AND OPERATIONS		
STANDARD		
TRAFFIC SIGNAL SUPPORT		
STRAIN POLE		
RECOMMENDED XXX. X, 20XX	RECOMMENDED XXX. X, 20XX	SHEET 2 OF 10
CHIEF, TRAFFIC OPERATIONS SECTION	CHIEF OF HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION	TC-8801

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

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 $\frac{1}{4}$ " 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.

ANCHOR BOLT DESIGN, MAST ARM

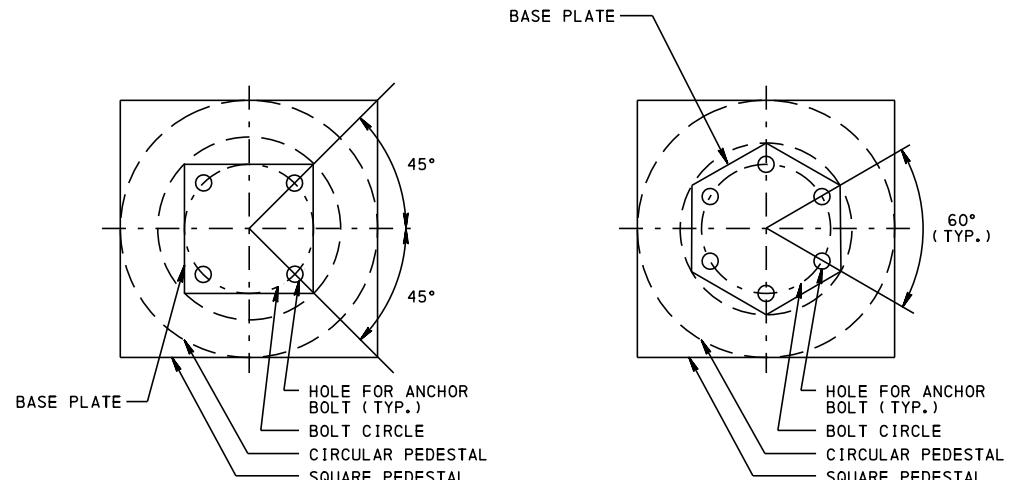
MAST ARM LENGTH	QTY.	ONE ARM				TWO ARMS *			
		DIA.	LGTH.	B.C.	HOLE	DIA.	LGTH.	B.C.	HOLE
0 - 10'	6	1 3/4"	35"	18"	2"	1 3/4"	35"	18"	2"
>10' - 15'	6	1 3/4"	35"	18"	2"	1 3/4"	35"	18"	2"
>15' - 20'	6	1 3/4"	35"	18"	2"	1 3/4"	35"	18"	2"
>20' - 25'	6	1 3/4"	35"	18"	2"	1 3/4"	35"	18"	2"
>25' - 30'	6	1 3/4"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

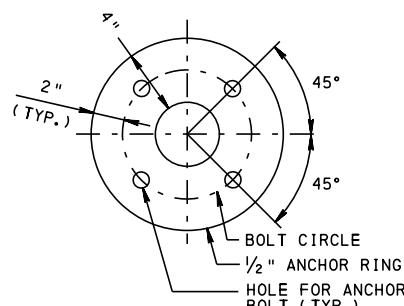
ANCHOR BOLT DESIGN, PEDESTAL POLE

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.



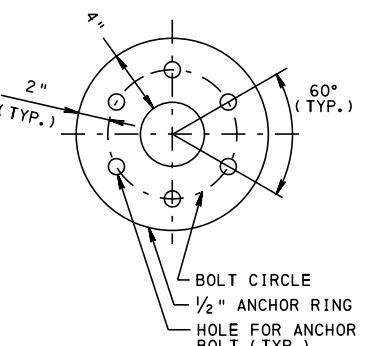
ANCHOR RING DETAIL

(N.T.S.)

TRAFFIC SIGNAL SUPPORT PEDESTAL POLE ANCHOR BOLT DETAILS

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 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"	40"	18"	2 1/4"	2"	40"	18"	2 1/4"	
2000	6	1 3/4"	35"	18"	2"	40"	18"	2 1/4"	2"	40"	18"	2 1/4"	
3000	6	1 3/4"	35"	18"	2"	40"	18"	2 1/4"	2"	40"	18"	2 1/4"	
4000	6	1 3/4"	35"	18"	2"	40"	18"	2 1/4"	2"	40"	18"	2 1/4"	
5000	6	1 3/4"	35"	18"	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 1/2"	45"	21"	2 3/4"

DESIGN CRITERIA

(SEE NOTE 13)

ALL MAIN LOAD CARRYING TENSION MEMBERS GREATER THAN $\frac{1}{2}$ 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 (CAISSENS)

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

CASE 1 (SOIL)

1.5 TONS PER SQUARE FOOT

MAXIMUM DESIGN LATERAL DISPLACEMENT

1.0"

MODULUS OF SUBGRADE REACTION:

K = 80.0 POUNDS PER CUBIC INCH

COHESION: ABOVE WATER TABLE
BELOW WATER TABLE

K = 60.0 POUNDS PER CUBIC INCH

WATER TABLE
UNIT WEIGHT OF SOIL

15 POUNDS PER SQUARE FOOT

ANGLE OF INTERNAL FRICTION

5 FEET BELOW GRADE

30°

120 POUNDS PER CUBIC FOOT

CASES 2 THROUGH 4 (ROCK)

1.5 TONS PER SQUARE FOOT

MAXIMUM DESIGN LATERAL DISPLACEMENT

1.0"

SOIL PARAMETERS ABOVE TOP OF ROCK:

K = 80.0 POUNDS PER CUBIC INCH

MODULUS OF SUBGRADE REACTION:

K = 60.0 POUNDS PER CUBIC INCH

COHESION: ABOVE WATER TABLE
BELOW WATER TABLE

0 POUNDS PER CUBIC INCH

WATER TABLE
UNIT WEIGHT OF SOIL

5 FEET BELOW GRADE

ANGLE OF INTERNAL FRICTION

120 POUNDS PER CUBIC FOOT

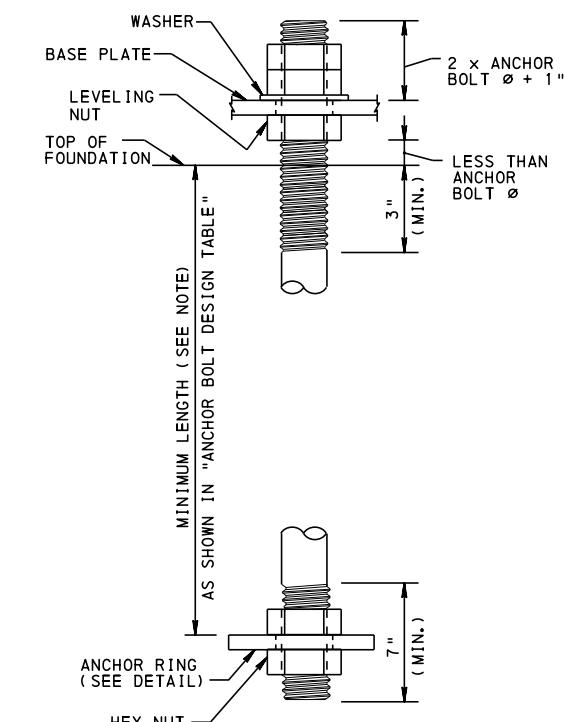
30°

250 POUNDS PER SQUARE INCH

ROCK PARAMETERS: UNIT WEIGHT OF ROCK

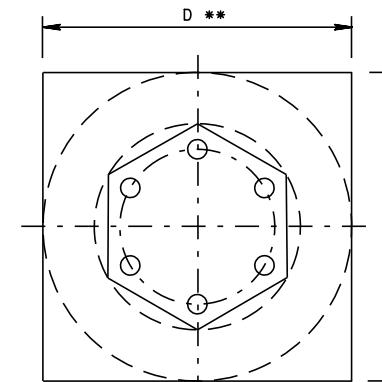
UNIAXIAL COMPRESSIVE STRENGTH

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



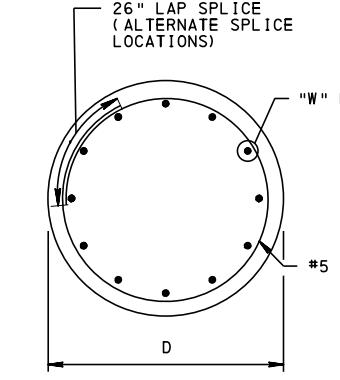
NOTES:

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.

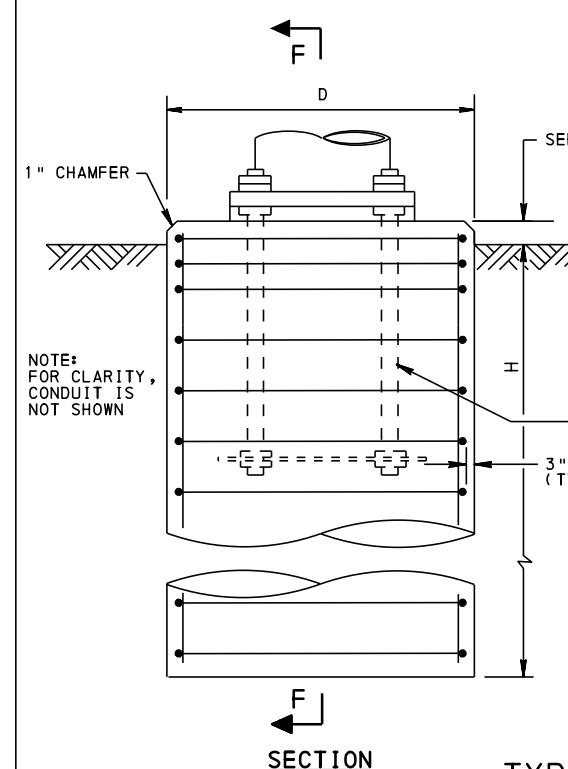


PLAN

** 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

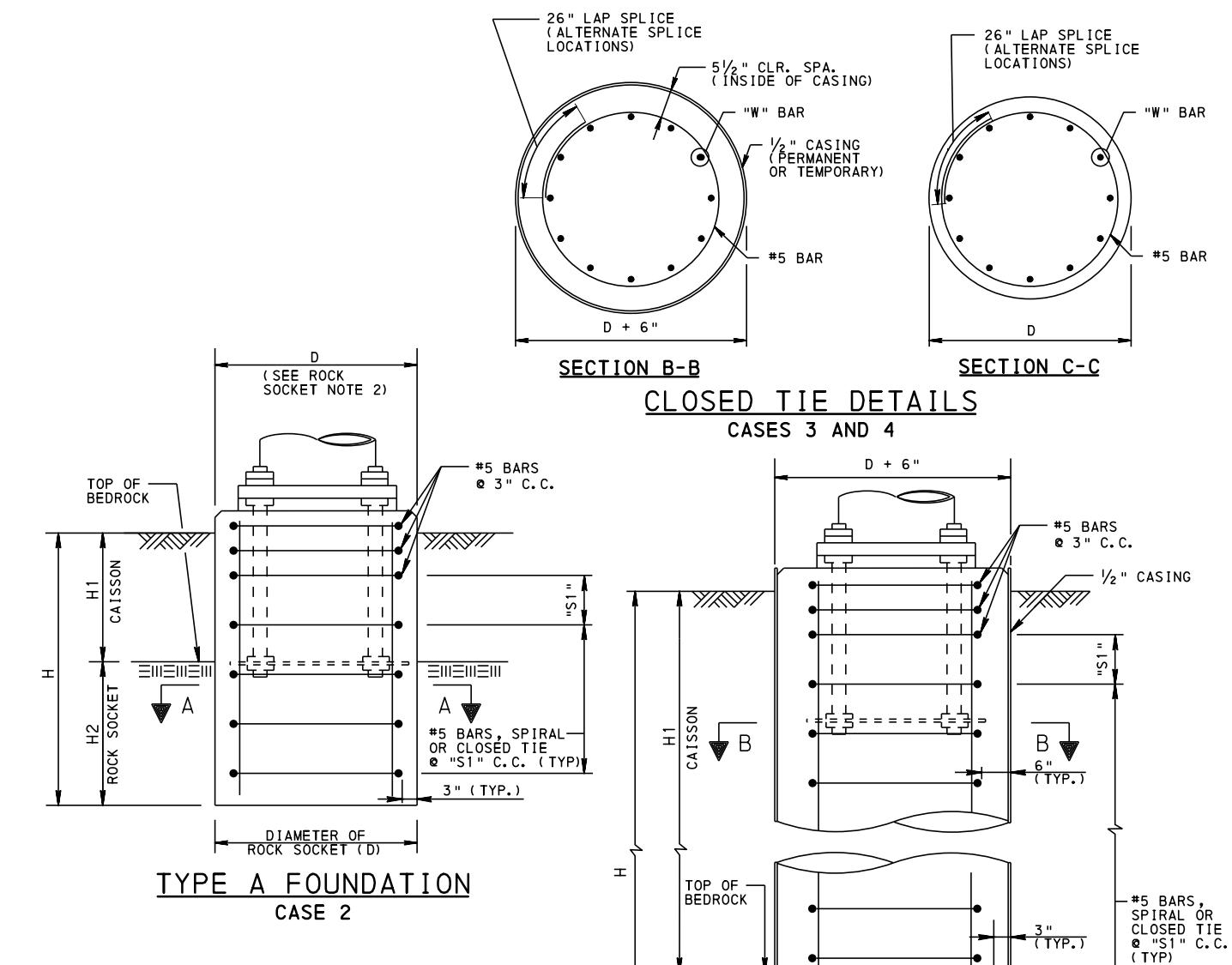


SECTION

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 MAINTENANCE AND OPERATIONS

STANDARD

TRAFFIC SIGNAL SUPPORT

FOUNDATION TYPE A

RECOMMENDED XXX. X, 20XX

RECOMMENDED XXX. X, 20XX

SHEET 4 OF 10

CHIEF, TRAFFIC OPERATIONS 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.

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

MAST ARM LENGTH	"D"	CASE 1			"W" BAR
		ONE ARM	TWO ARMS*	QTY.	
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	H2 ***	H2	H2 ***	
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'-6"	4'-6"	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	CASE 1		"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']		"W" BAR
		H2	QTY.	
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 XXX. X, 20XX	RECOMMENDED XXX. X, 20XX	SHEET 5 OF 10
CHIEF, TRAFFIC OPERATIONS SECTION	CHIEF OF HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION	TC-8801

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

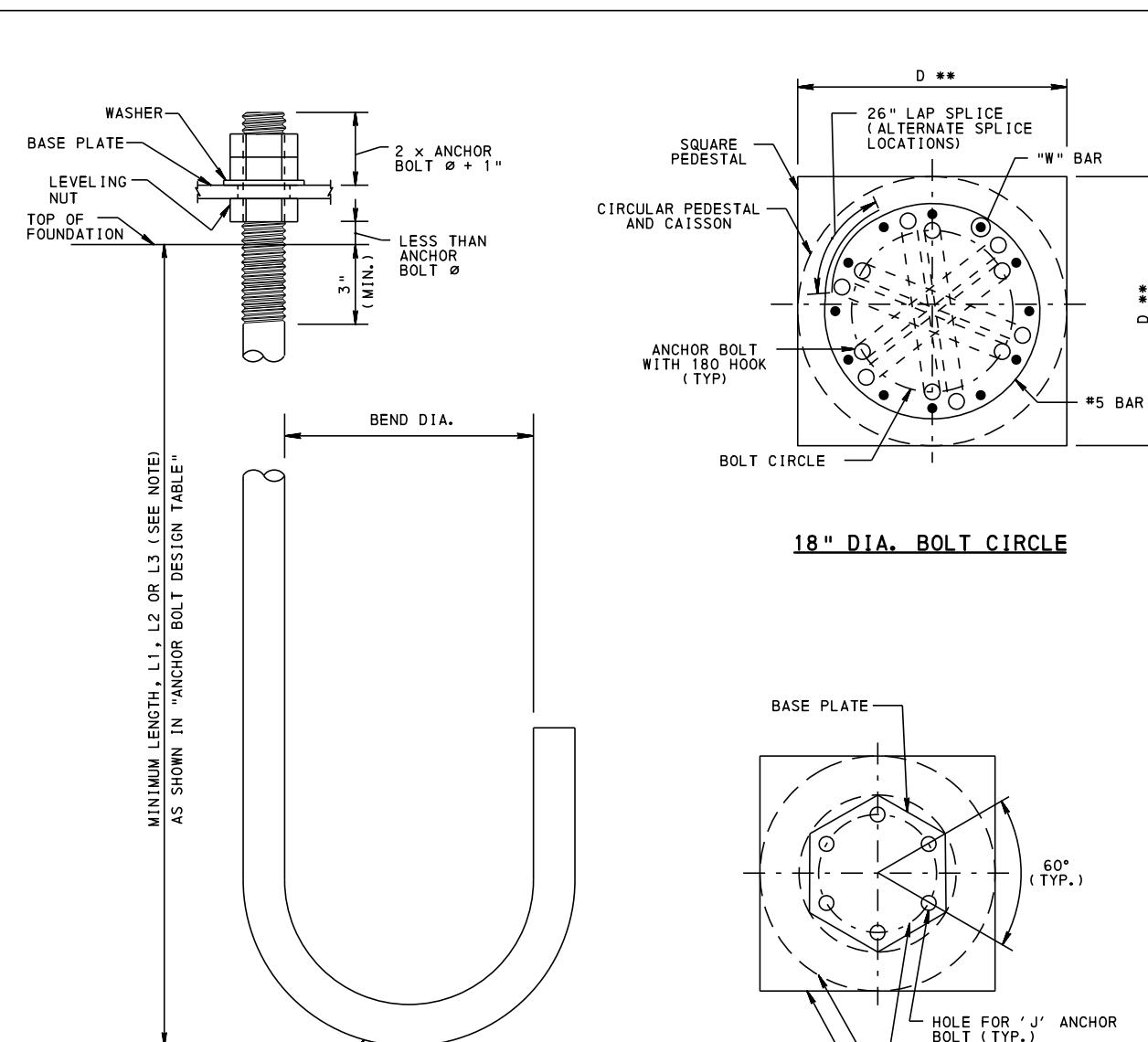
DESIGN TENSION (LBS)	"D" *	SHAFT LENGTH 20' - 34' (CASE 1)									
		QTY.	SIZE	20' SHAFT	22' SHAFT	24' SHAFT	26' SHAFT	28' SHAFT	30' SHAFT	32' SHAFT	34' SHAFT
				FOUNDATION DEPTH H							
1000	3'-0"	12	#9	7'-6"	7'-6"	7'-6"	8'-0"	8'-0"	8'-0"	8'-6"	8'-6"
2000	3'-0"	12	#9	8'-6"	8'-6"	8'-6"	9'-0"	9'-0"	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'-6"	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'-6"	15'-6"	16'-0"

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

DESIGN TENSION (LBS)	"D" *	CASE 2 [0' ≤ H1 < 5']									
		QTY.	SIZE	20' SHAFT	22' SHAFT	24' SHAFT	26' SHAFT	28' SHAFT	30' SHAFT	32' SHAFT	34' SHAFT
				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']									
		QTY.	SIZE	20' SHAFT	22' SHAFT	24' SHAFT	26' SHAFT	28' SHAFT	30' SHAFT	32' SHAFT	34' SHAFT
				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'-6"	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']									
		QTY.	SIZE	20' SHAFT	22' SHAFT	24' SHAFT	26' SHAFT	28' SHAFT	30' SHAFT	32' SHAFT	34' SHAFT
				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"</td				



MINIMUM LENGTH, L1, L2 OR L3 (SEE NOTE)

'J' ANCHOR BOLT

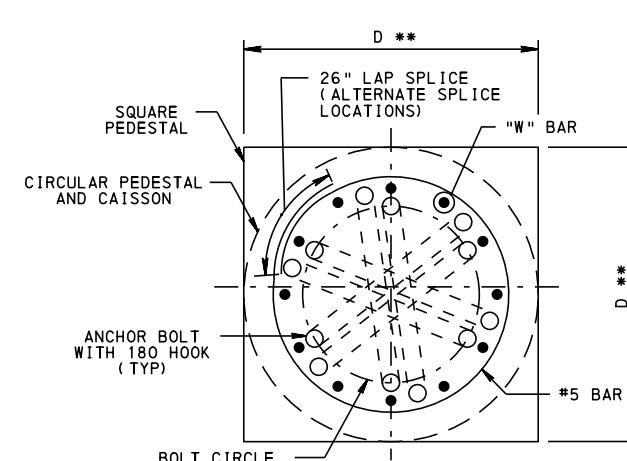
NOTE: DUE TO OVERLAPPING 'J' ANCHOR BOLTS, VARY EMBEDMENT BY 6" FOR EACH 2-BOLT PAIR FOR 1 3/4" DIA. BOLTS AND BY 12" FOR EACH 2-BOLT PAIR FOR 2" DIA. BOLTS. SEE L1, L2 AND L3 EMBEDMENT DEPTHS IN ANCHOR BOLT DESIGN TABLE.

ANCHOR BOLT DESIGN, MAST ARM

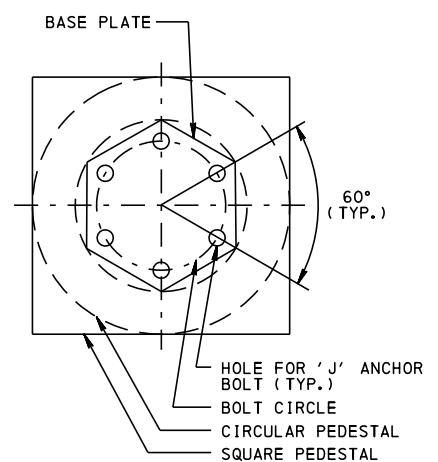
MAST ARM LENGTH	QTY.	ONE ARM						TWO ARMS *							
		BOLT DIA.	BEND DIA.	L1	L2	L3	B.C.	HOLE	BOLT DIA.	BEND DIA.	L1	L2	L3	B.C.	HOLE
0 - 10'	6	1 3/4"	17 1/2"	42"	48"	54"	18"	2"	1 3/4"	17 1/2"	42"	48"	54"	18"	2"
>10' - 15'	6	1 3/4"	17 1/2"	42"	48"	54"	18"	2"	1 3/4"	17 1/2"	42"	48"	54"	18"	2"
>15' - 20'	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

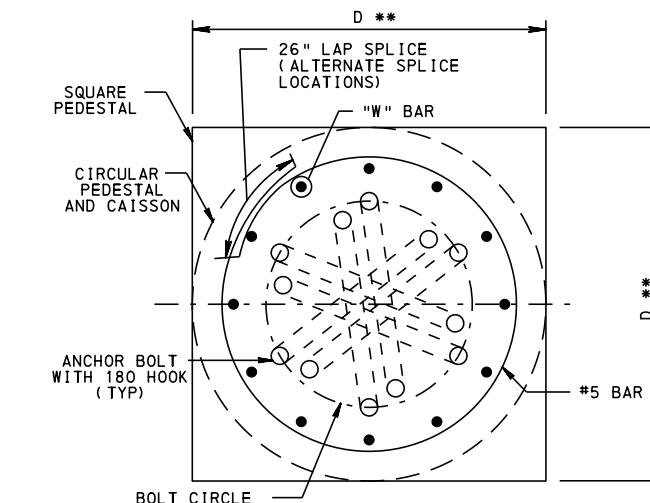


18" DIA. BOLT CIRCLE

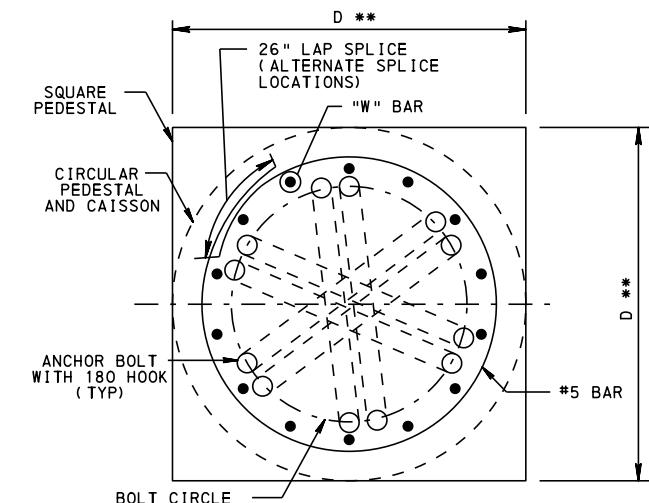


BASE MOUNT PLAN

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

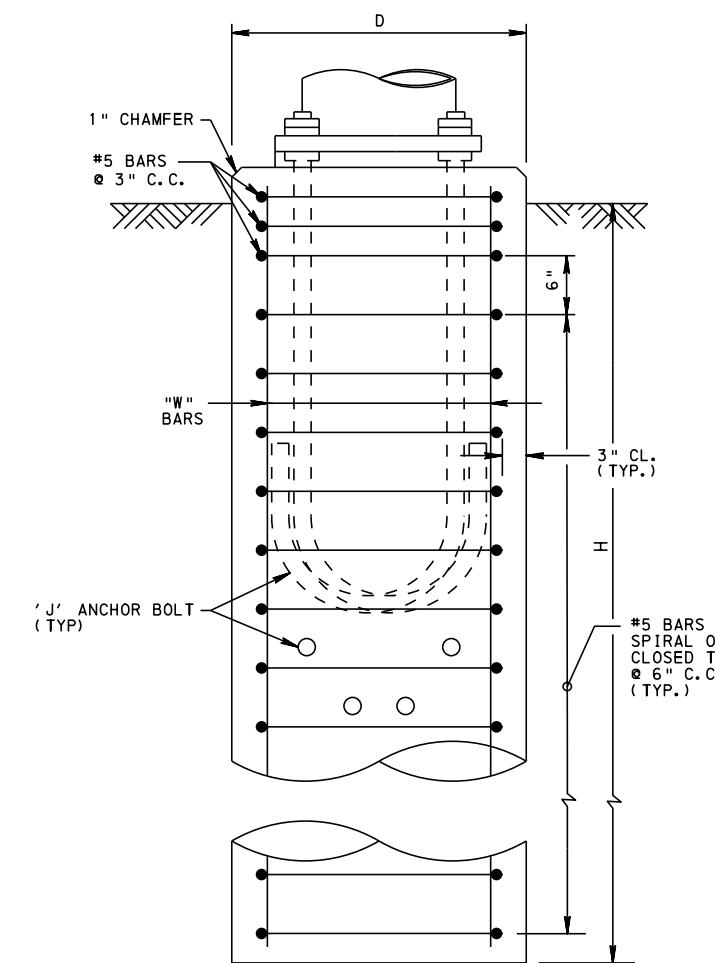


21" DIA. BOLT CIRCLE



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



SECTION

TYPE A FOUNDATION
CASE 1 ALTERNATE

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

MAST ARM LENGTH	"D"	H		"W" BAR QTY.	SIZE
		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
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STANDARD

TRAFFIC SIGNAL SUPPORT - MAST ARM

FOUNDATION TYPE A ALTERNATE

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		ONE ARM	TWO ARMS*		ONE ARM	TWO ARMS*
0 - 10'	3'-0"	12	#9	#4	4'-0"	9'-6"	9'-6"	5'-0"	9'-6"	9'-6"			
>10' - 15'	3'-0"	12	#9	#4	4'-0"	10'-6"	10'-6"	5'-0"	10'-6"	10'-6"			
>15' - 20'	3'-0"	12	#9	#5	4'-0"	11'-6"	11'-6"	5'-6"	11'-6"	11'-6"			
>20' - 25'	3'-0"	12	#9	#6	4'-0"	12'-0"	12'-0"	6'-0"	12'-0"	12'-0"			
>25' - 30'	3'-0"	12	#9	#6	4'-6"	12'-6"	13'-0"	6'-6"	12'-6"	12'-6"			
>30' - 35'	3'-0"	12	#9	#7	4'-6"	13'-0"	13'-6"	7'-0"	13'-0"	13'-6"			
>35' - 40'	3'-6"	14	#9	#7	5'-0"	13'-6"	14'-0"	7'-0"	13'-0"	13'-6"			
>40' - 45'	3'-6"	14	#9	#7	5'-0"	13'-6"	14'-6"	7'-6"	13'-0"	13'-6"			
>45' - 50'	3'-6"	14	#9	#7	5'-6"	14'-0"	14'-6"	8'-0"	13'-0"	13'-6"			
>50' - 60'	3'-6"	14	#9	#8	5'-6"	14'-6"	16'-0"	8'-0"	13'-6"	14'-6"			

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

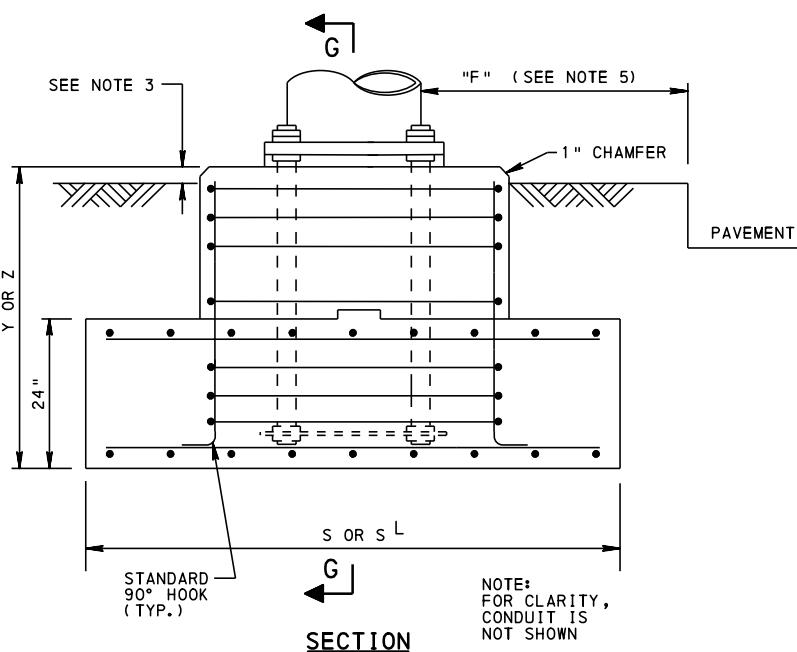
FOUNDATION FOR TRAFFIC SIGNAL SUPPORT, STRAIN POLE

DESIGN TENSION (LBS)	SHAFT LENGTH 20' - 24'								SHAFT LENGTH 26' - 30'								SHAFT LENGTH 32' - 34'																						
	"D"	"W" BAR			"L" BAR			Y	S ^L	S	Z	S ^L	S	"D"	"W" BAR			"L" BAR			Y	S ^L	S	Z	S ^L	S	"D"	"W" BAR			"L" BAR			Y	S ^L	S	Z	S ^L	S
		QTY.	SIZE	SIZE	QTY.	SIZE	SIZE								QTY.	SIZE	SIZE	QTY.	SIZE	SIZE	QTY.							SIZE	SIZE	QTY.	SIZE	SIZE							
1000	3'-0"	12	#9	#4	4'-0"	9'-6"	9'-6"	5'-0"	9'-6"	9'-6"					12	#9	#4	4'-0"	10'-6"	10'-6"	4'-0"	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"					12	#9	#5	4'-0"	12'-0"	12'-0"	4'-0"	12'-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"					12	#9	#5	4'-0"	13'-0"	13'-0"	5'-0"	12'-6"	2'-0"	12	#9	#6	4'-0"	13'-6"	13'-0"	5'-0"	12'-6"	6'-0"							
4000	3'-0"	12	#9	#5	4'-0"	12'-6"	12'-6"	5'-0"	12'-0"	12'-6"					12	#9	#6	4'-6"	14'-0"	14'-0"	6'-0"	12'-6"	2'-0"	12	#9	#6	4'-6"	14'-0"	14'-0"	6'-0"	13'-0"	0"							
5000	3'-0"	12	#9	#6	4'-6"	12'-6"	13'-0"	6'-0"	12'-0"	12'-6"					12	#9	#6	5'-0"	14'-6"	14'-6"	6'-6"	13'-0"	3'-0"	12	#9	#7	5'-0"	14'-6"	14'-6"	6'-6"	13'-0"	0"							
6000	3'-0"	12	#9	#6	5'-0"	13'-0"	13'-0"	6'-6"	12'-6"	12'-6"					12	#9	#7	5'-6"	14'-6"	14'-6"	7'-0"	13'-6"	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"					12	#9	#7	6'-0"	15'-0"	15'-0"	8'-0"	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"					12	#9	#8	6'-6"	15'-6"	15'-6"	8'-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"					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'-0"	14'-6"						
10,000	3'-0"	12	#9	#8	6'-6"	14'-6"	14'-0"	8'-6"	13'-6"	13'-6"					16	#9	#9	7'-6"	15'-6"	15'-6"	10'-0"	14'-0"	13'-0"	3'-0"	16	#9	#9	7'-6"	15'-6"	15'-6"	10'-0"	14'-0"	14'-6"						

S^L = WITH LUMINAIRE

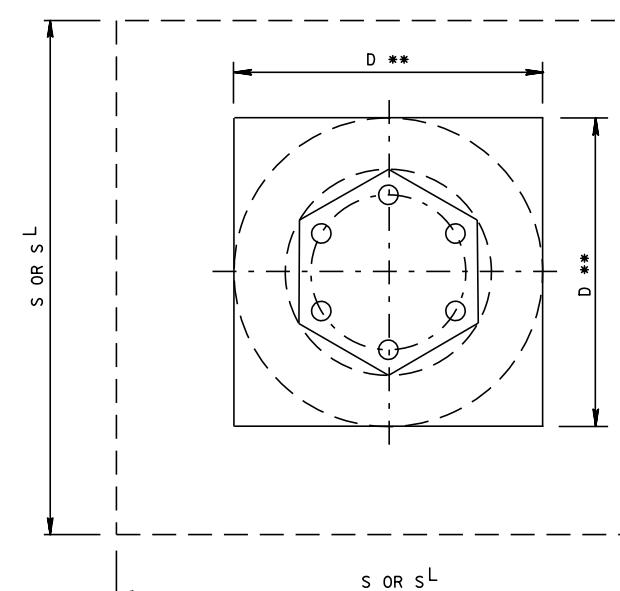
NOTES:

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



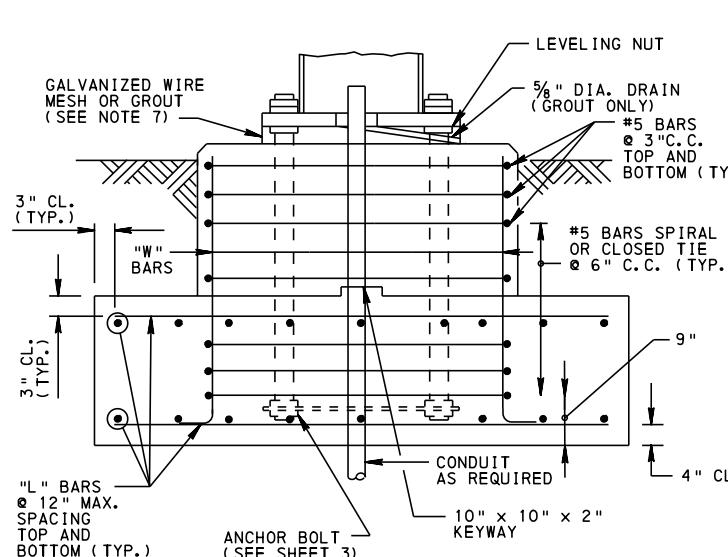
SECTION G-G

TYPE B FOUNDATION



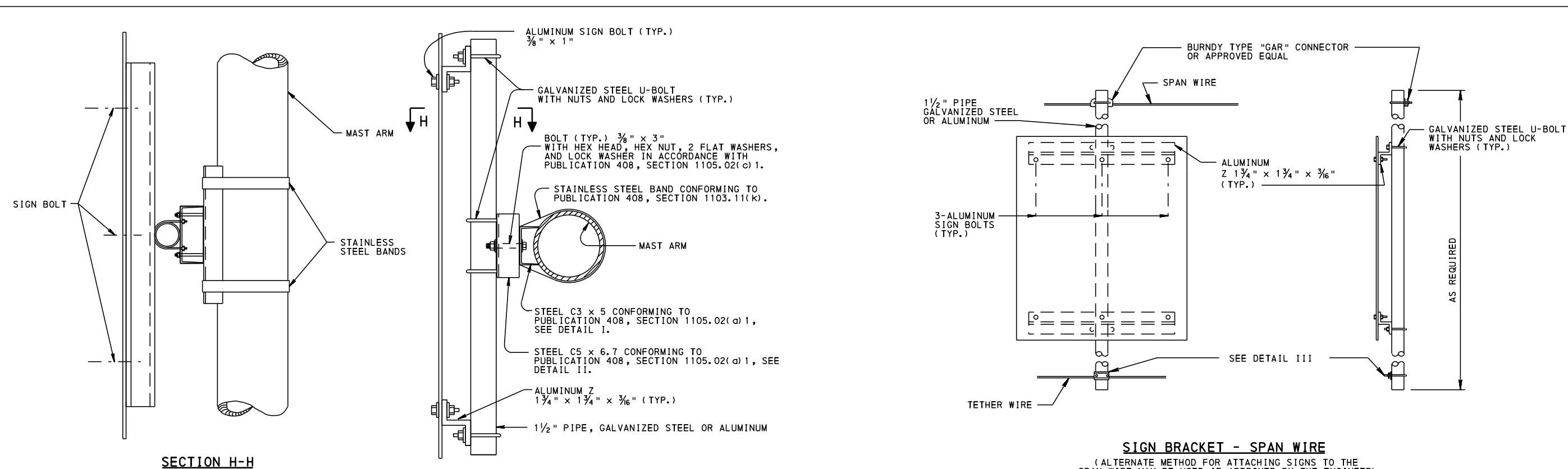
PLAN

** 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.



COMMONWEALTH OF PENNSYLVANIA
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STANDARD
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FOUNDATION TYPE B

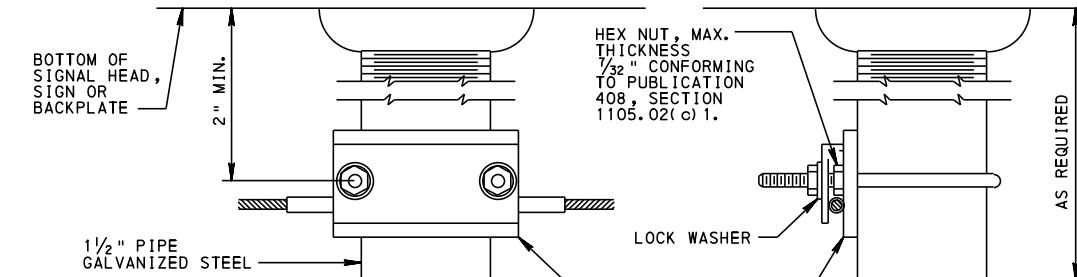
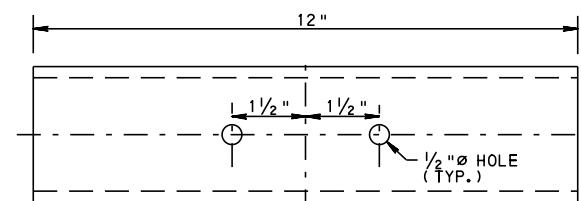
RECOMMENDED XXX. X, 20XX	RECOMMENDED XXX. X, 20XX	SHEET 8 OF 10
CHIEF, TRAFFIC OPERATIONS SECTION		CHIEF OF HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION



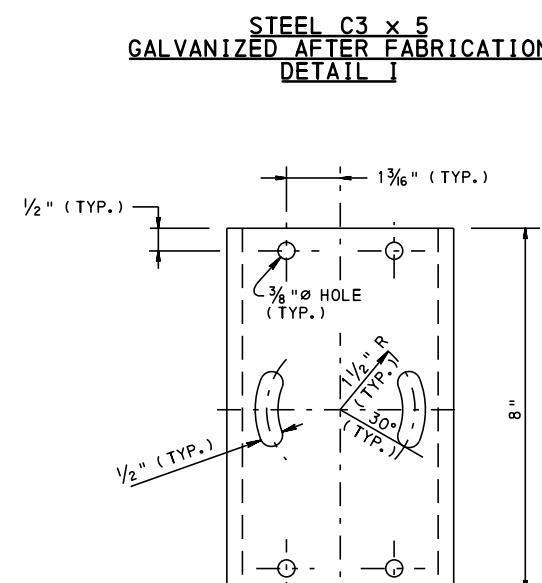
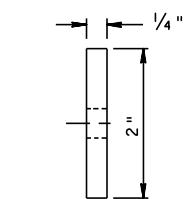
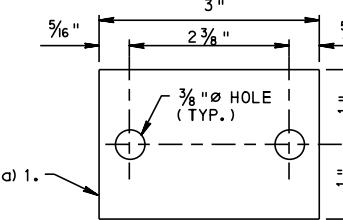
SECTION H-H

SIGN BRACKET - MAST ARM

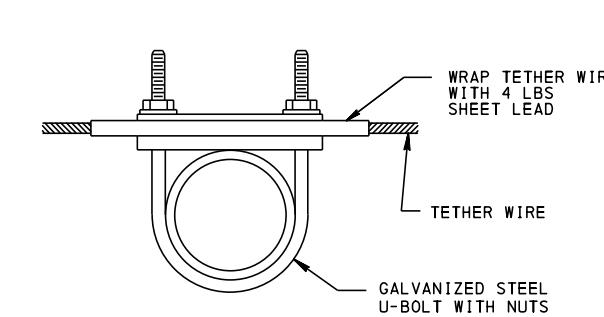
(ALTERNATE METHOD FOR ATTACHING SIGNS TO THE MAST ARM MAY BE USED IF APPROVED BY THE ENGINEER)



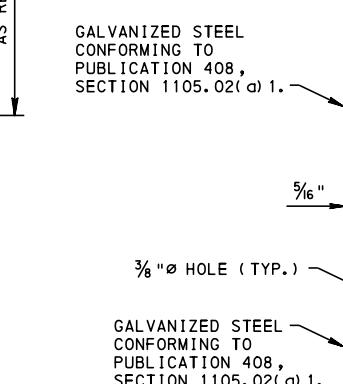
SIGN BRACKET - SPAN WIRE
(ALTERNATE METHOD FOR ATTACHING SIGNS TO THE SPAN WIRE MAY BE USED IF APPROVED BY THE ENGINEER)



**STEEL C3 x 5
GALVANIZED AFTER FABRICATION
DETAIL I**



DETAIL III



DETAIL IV

NOTES:

1. USE ONE BRACKET FOR SIGNS WITH A WIDTH OF 36" OR LESS. USE TWO BRACKETS FOR SIGNS WITH WIDTHS GREATER THAN 36" AND NOT EXCEEDING 48". USE THREE BRACKETS FOR SIGNS WITH WIDTHS GREATER THAN 48" AND NOT EXCEEDING 96".
2. Z 1 3/4" x 1 3/4" x 3/16" SHALL BE MANUFACTURED FROM ALUMINUM CONFORMING TO ASTM B 209M, ALLOY 6061-T6.
3. 1.5" GALVANIZED STEEL PIPE SHALL CONFORM TO PUBLICATION 408, SECTION 1105.02(j) 1.
4. ALUMINUM SIGN BOLTS, NUTS, WASHERS AND NYLON WASHERS SHALL CONFORM TO PUBLICATION 408, SECTION 1103.11(m), SECTION 1103.11(n), SECTION 1103.11(o) AND SECTION 1103.11(o) 2 RESPECTIVELY.
5. GALVANIZED STEEL U-BOLTS, NUTS AND LOCK WASHERS SHALL BE CONFORM TO PUBLICATION 408, SECTION 1105.02(c) 1, AND SHALL BE OF 1/4" x 3" x 1 1/8".

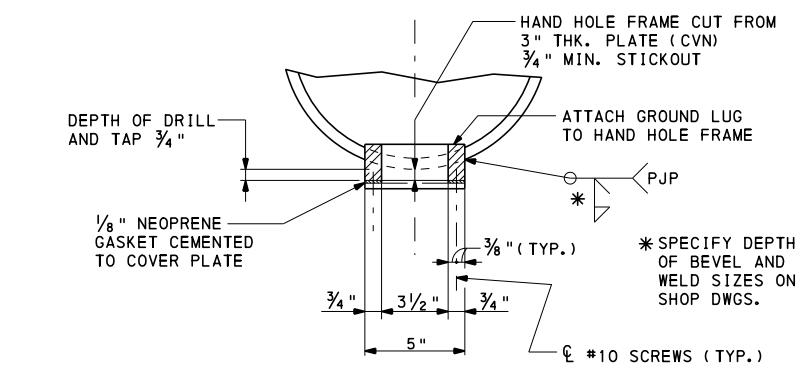
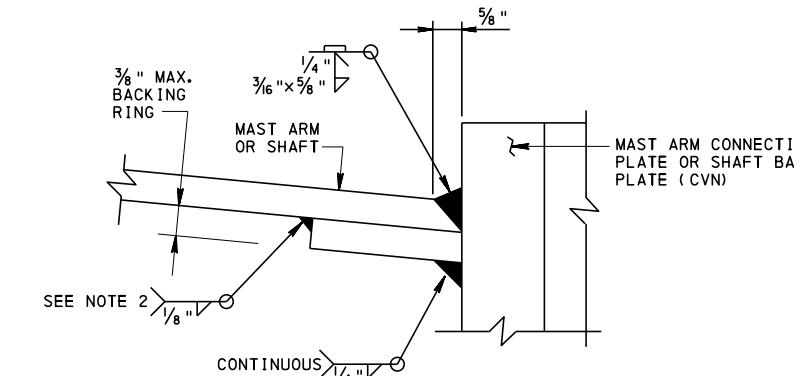
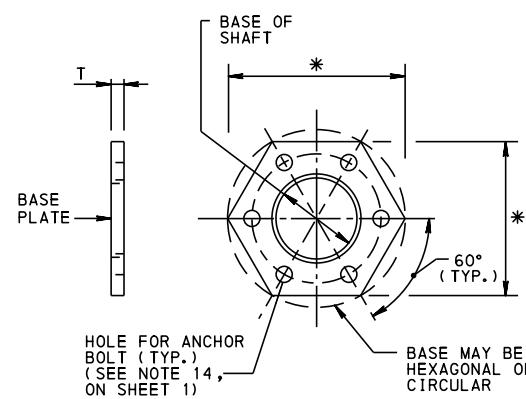
**COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF MAINTENANCE AND OPERATIONS**

STANDARD

TRAFFIC SIGNAL SUPPORT

BRACKETS

RECOMMENDED XXX. X, 20XX	RECOMMENDED XXX. X, 20XX	SHEET 9 OF 10
CHIEF, TRAFFIC OPERATIONS SECTION	CHIEF OF HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION	TC-8801



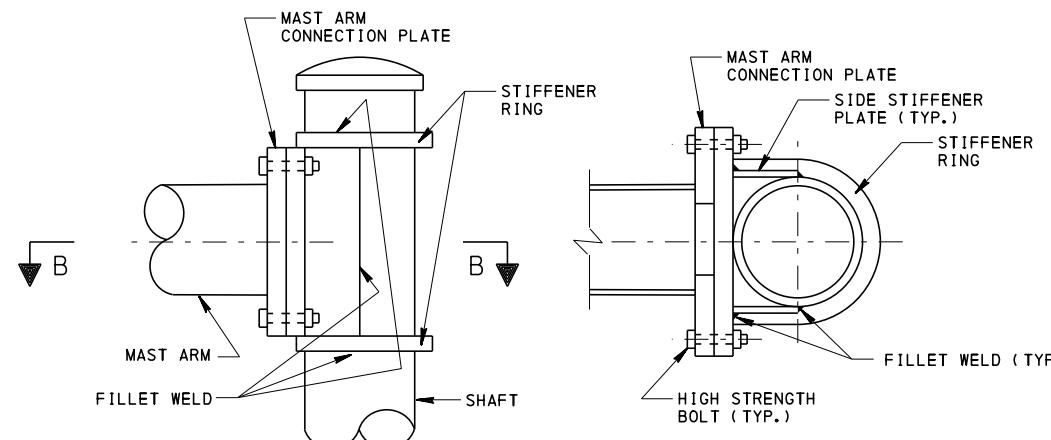
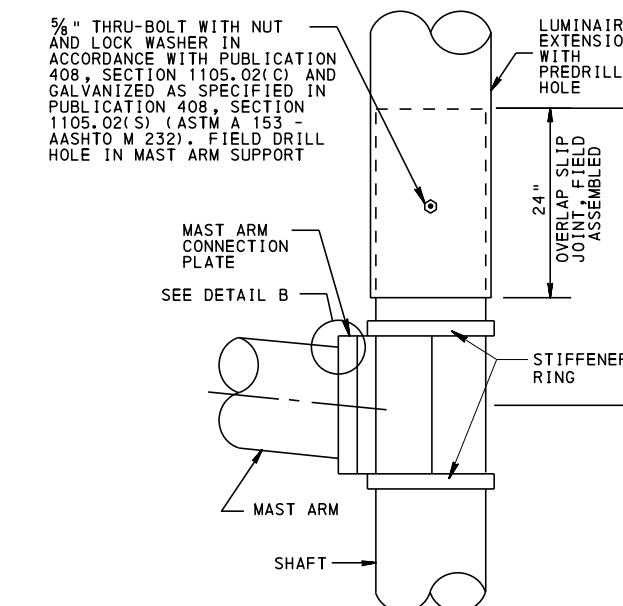
SECTION A-A

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.

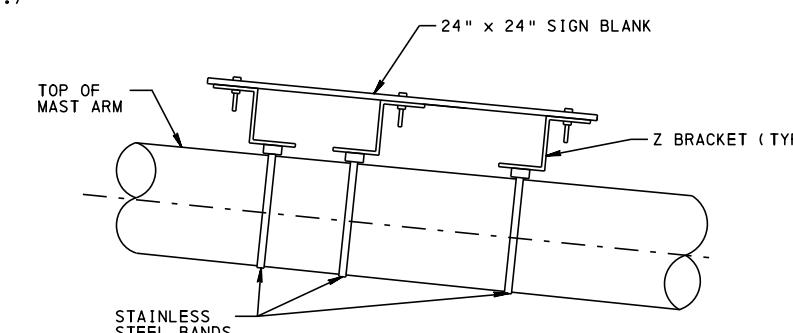
BASE PLATE AND CONNECTION PLATE THICKNESS

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"



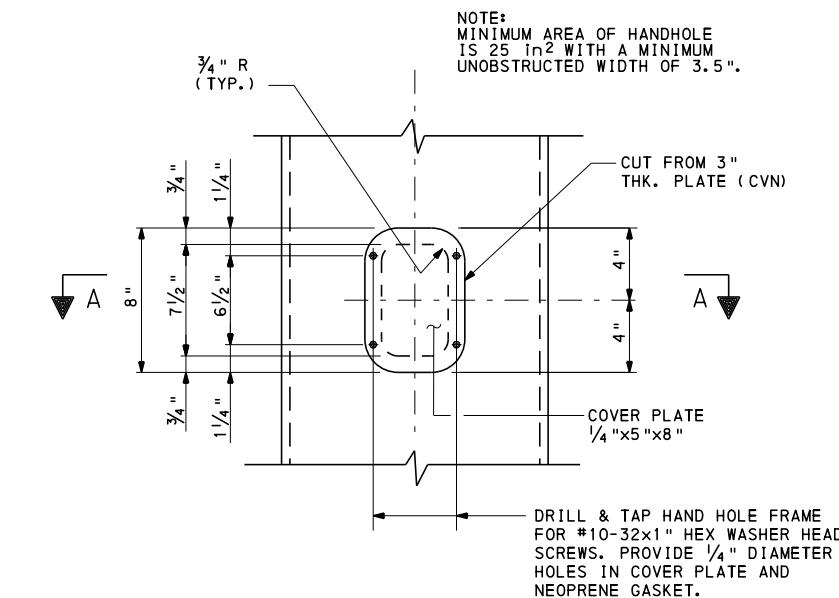
MAST-ARM-TO-SHAFT CONNECTION DETAIL (RING-STIFFENED BUILT-UP BOX)

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

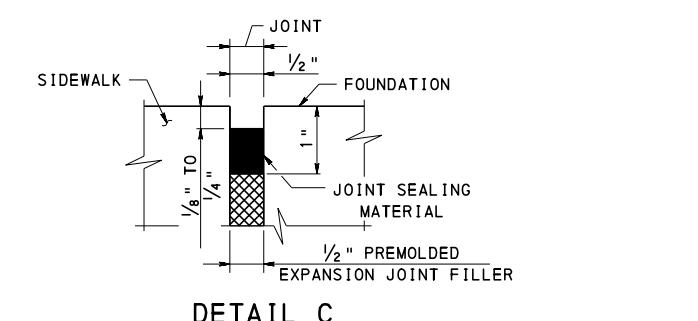


MITIGATION DEVICE DETAIL

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



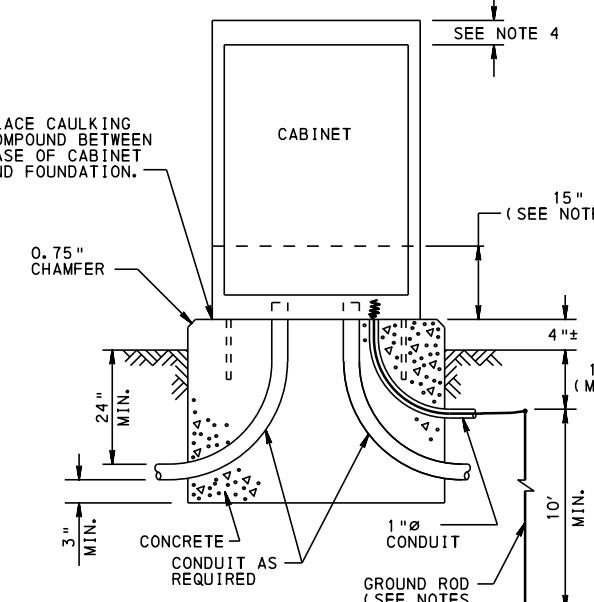
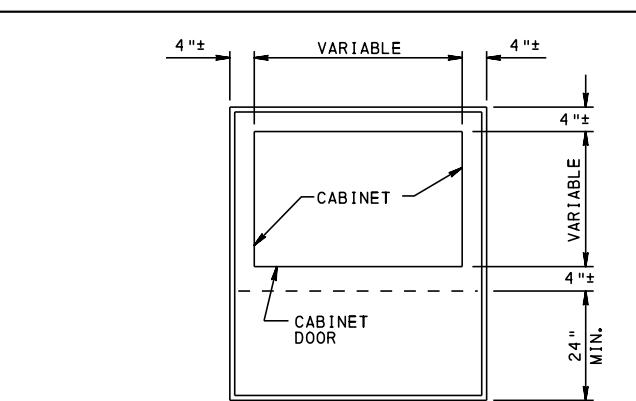
HAND HOLE DETAIL



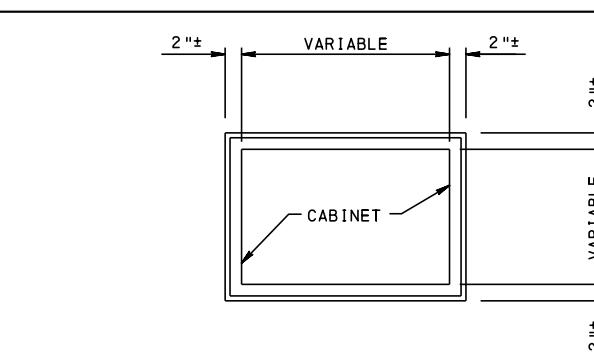
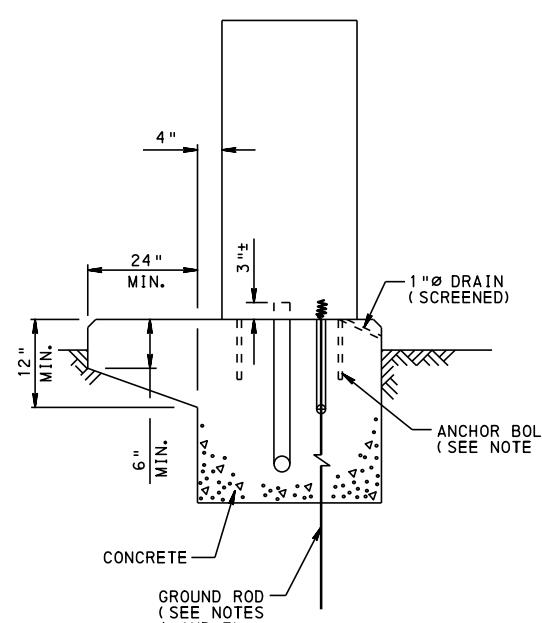
**COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF MAINTENANCE AND OPERATIONS**

STANDARD

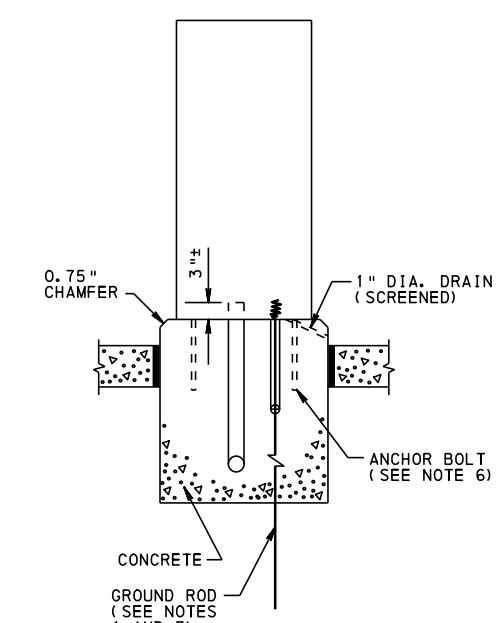
**TRAFFIC SIGNAL SUPPORT
MISCELLANEOUS DETAILS**



IN EARTH



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

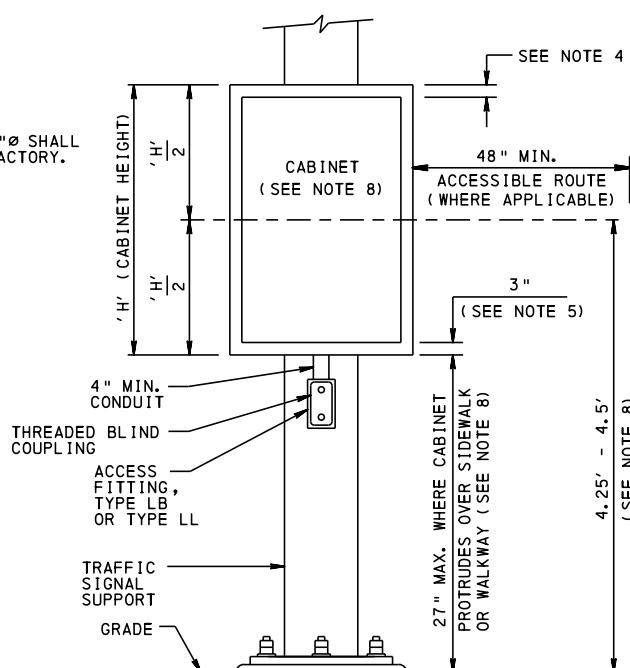


IN PAVED SURFACE

CONTROLLER ASSEMBLY ON CEMENT CONCRETE FOUNDATION
TYPE I MOUNTING

NOTE:

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



CONTROLLER ASSEMBLY ON TRAFFIC SIGNAL SUPPORT
TYPE II MOUNTING

NOTE

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

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CONTROLLER ASSEMBLY

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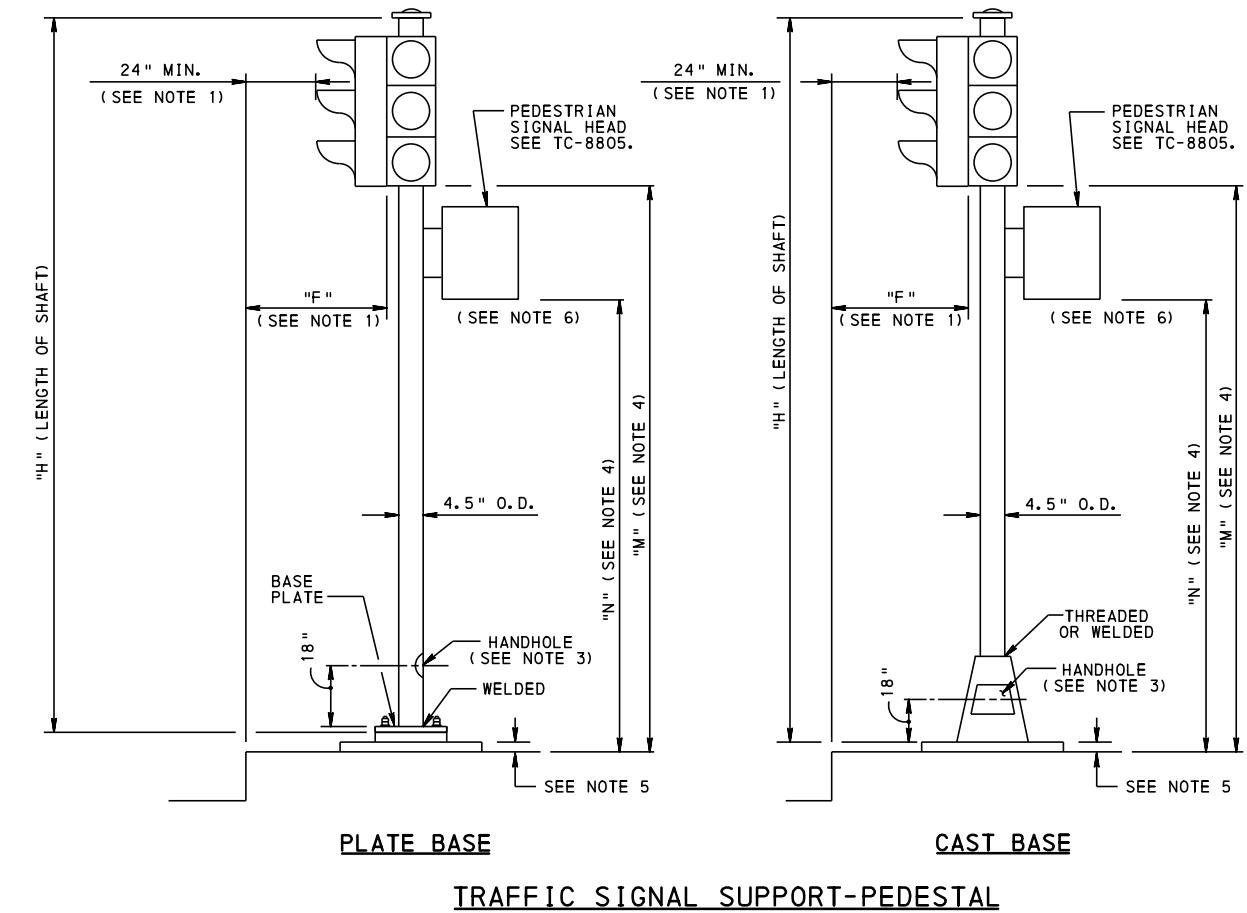
SHT 1 OF 1

CHIEF - TRAFFIC OPERATIONS

CHIEF HIGHWAY SAFETY AND

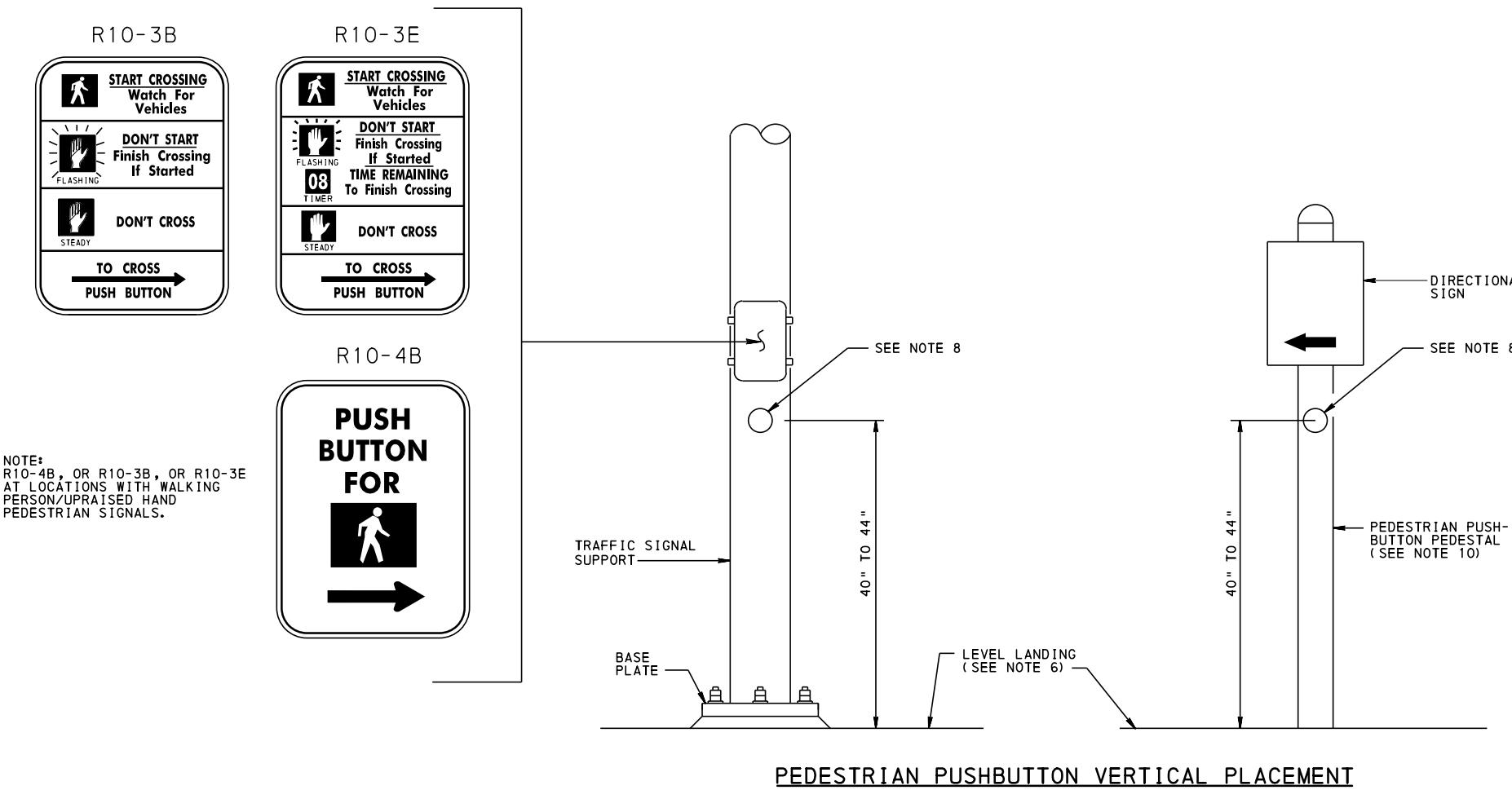
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TC=8802



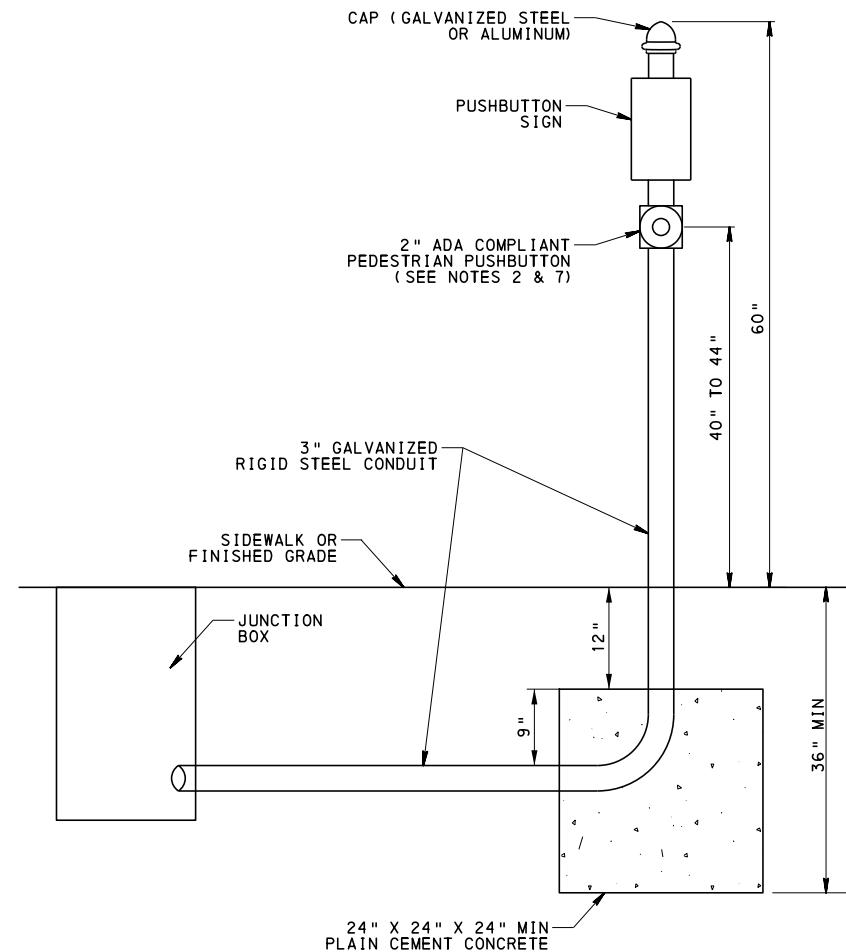
NOTES:

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.

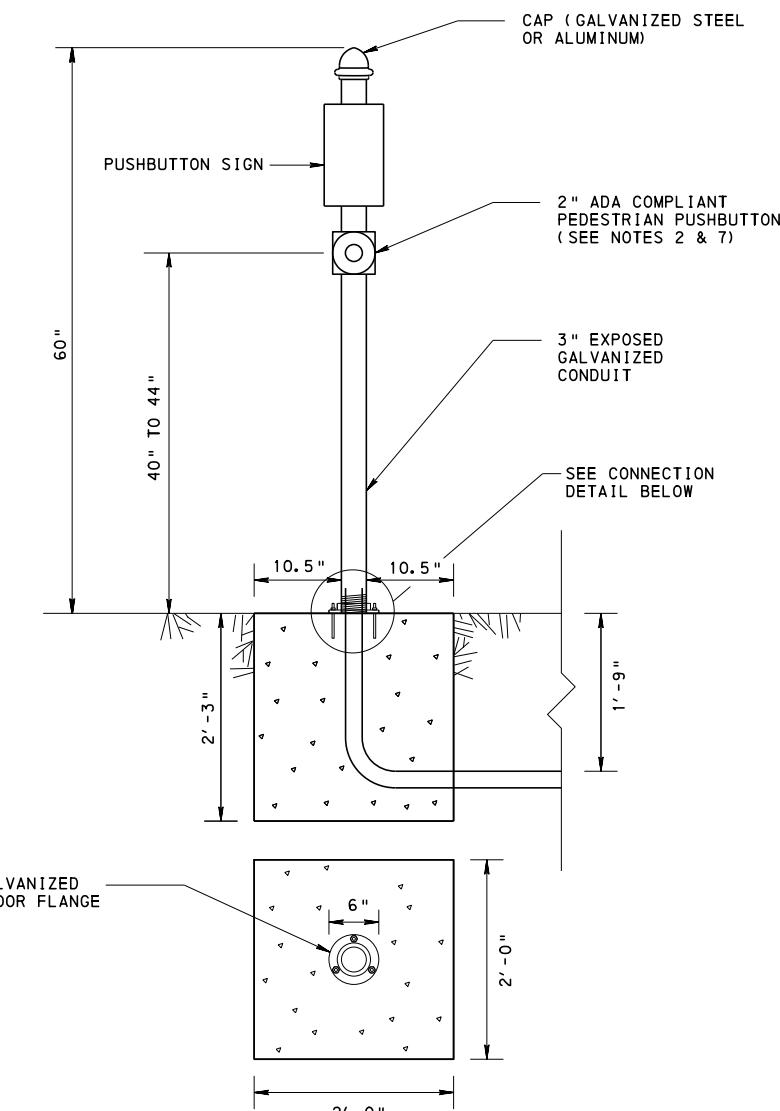


COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF MAINTENANCE AND OPERATIONS		
STANDARD		
MISCELLANEOUS TRAFFIC SIGNAL SUPPORT-PEDESTAL PEDESTRIAN PUSHBUTTON		
RECOMMENDED XXX. X, 20XX	RECOMMENDED XXX. X, 20XX	SHT. 1 OF 4
CHIEF, TRAFFIC OPERATIONS SECTION	CHIEF, HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION	TC-8803

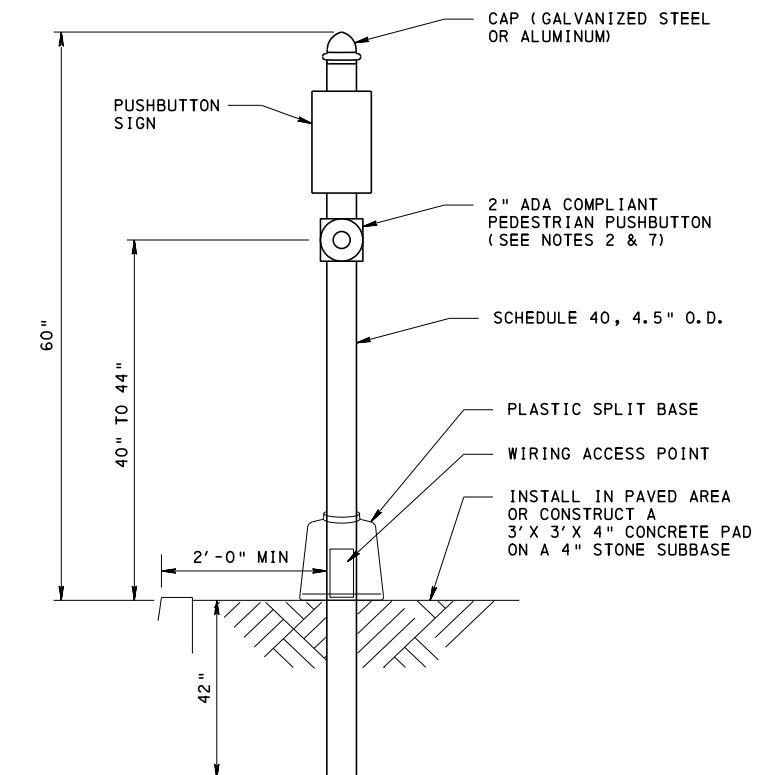
TYPE A



TYPE B

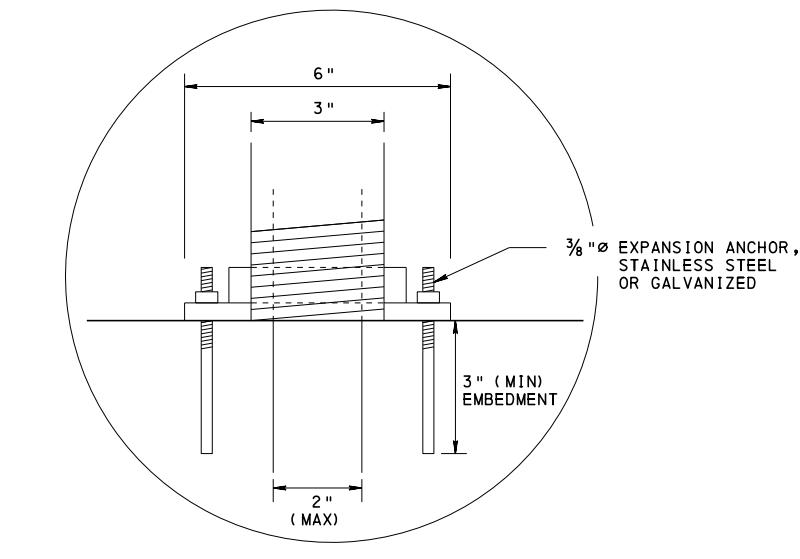


TYPE C



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 $\frac{1}{2}$ " PREMOLDED EXPANSION JOINT FILLER BETWEEN FOUNDATION AND ADJACENT PAVEMENT. SEE DETAIL C ON SHEET 9 OF TC-8801.
5. PEDESTRIAN PUSHBUTTONS SHALL BE OF A TYPE APPROVED BY THE DEPARTMENT AND LISTED IN PUBLICATION 35 (BULLETIN 15).
6. PEDESTRIAN PUSHBUTTONS SHALL BE A MINIMUM OF 2" DIAMETER AND A FORCE PER ACTUATION THAT CANNOT EXCEED 5 LBS.
7. PEDESTRIAN PUSHBUTTON EXTENSION ARM 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.
8. INSTALL CONCRETE FOUNDATIONS IN ACCORDANCE WITH PUBLICATION 408 SECTION 951.2(b) AND 951.3(b).



PEDESTRIAN PUSHBUTTON MOUNTING DETAILS

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MISCELLANEOUS
PEDESTRIAN PUSHBUTTON
MOUNTING DETAILS

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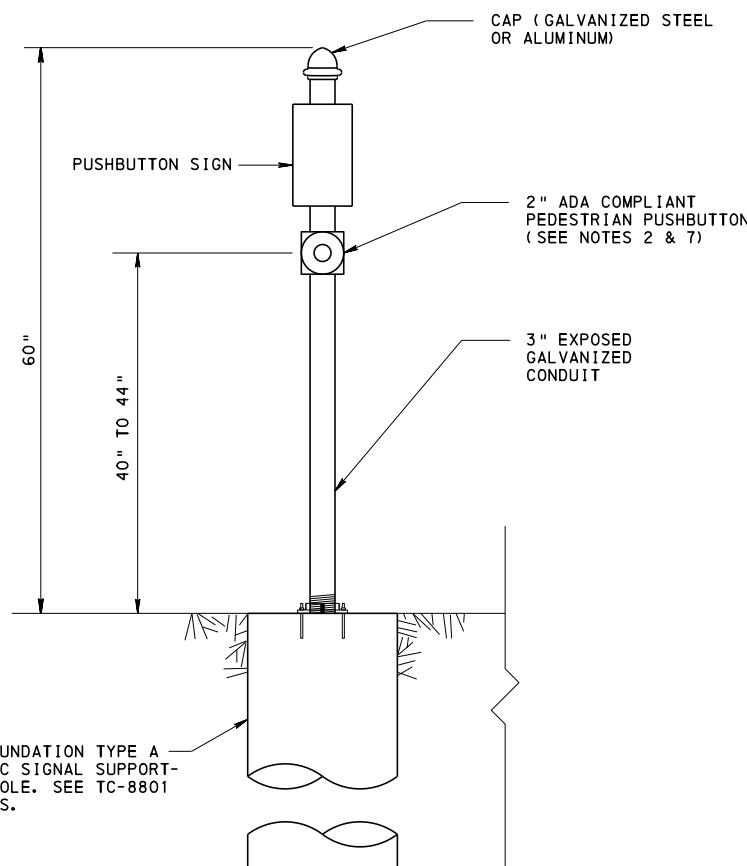
SHT. 2 OF 4

CHIEF, TRAFFIC OPERATIONS SECTION

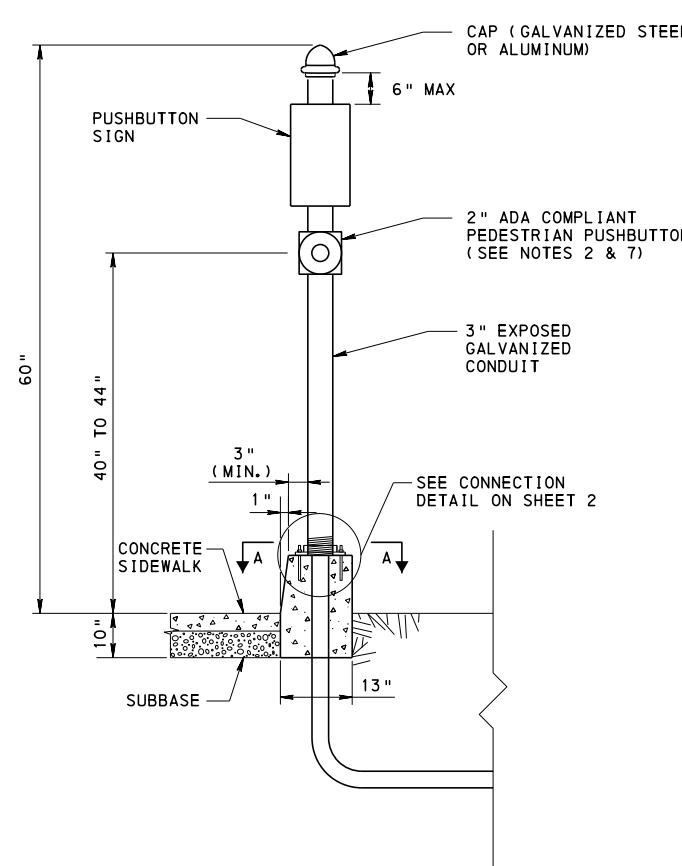
CHIEF, HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION

TC-8803

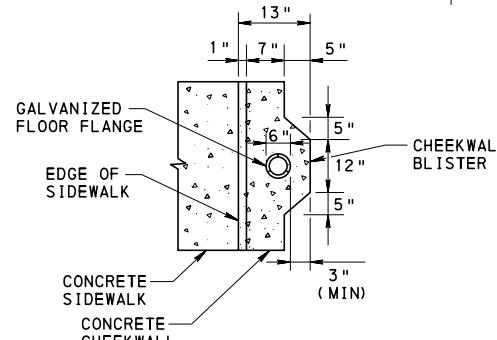
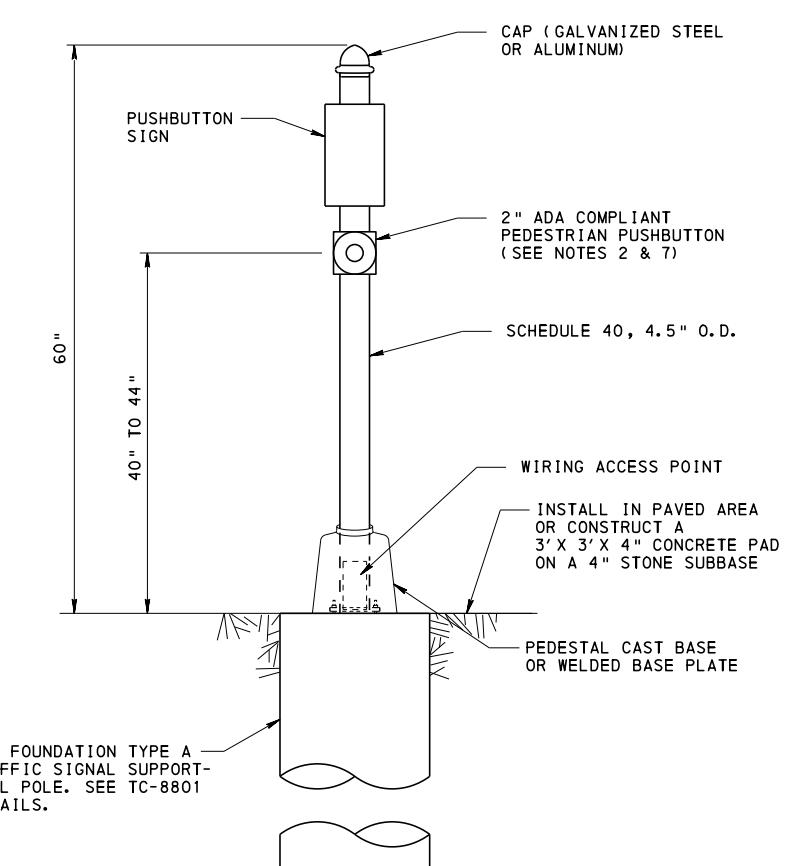
TYPE D



TYPE E



TYPE F



VIEW A-A

NOTES:

1. REFER TO RC-67M FOR CURB RAMP AND SIDEWALK DETAILS.
2. MOUNT PEDESTRIAN PUSHBUTTON BETWEEN 40" TO 44" ABOVE SIDEWALK OR FINISHED GRADE TO THE CENTER OF THE PUSHBUTTON AND 10" MAX LATERALLY FROM LANDING.
3. ALL ACCESSIBILITY FEATURES MUST BE COMPLIANT TO PENNDOT PUBLICATION 13M (DM-2), CHAPTER 6, PUBLICATION 72M (RC STANDARDS CRITERIA) AND PUBLICATION 149.
4. IN A PAVED AREA, PLACE THE TOP OF THE FOUNDATION FLUSH WITH THE SURFACE OF THE ADJACENT PAVEMENT. PROVIDE $\frac{1}{2}$ " PREMOLDED EXPANSION JOINT FILLER BETWEEN FOUNDATION AND ADJACENT PAVEMENT. SEE DETAIL C ON SHEET 9 OF TC-8801.
5. PEDESTRIAN PUSHBUTTONS SHALL BE OF A TYPE APPROVED BY THE DEPARTMENT AND LISTED IN PUBLICATION 35 (BULLETIN 15).
6. PEDESTRIAN PUSHBUTTONS SHALL BE A MINIMUM OF 2" DIAMETER AND A FORCE PER ACTUATION THAT CANNOT EXCEED 5 LBS.
7. PEDESTRIAN PUSHBUTTON EXTENSION ARM IS TYPICALLY UP TO 3". MAXIMUM EXTENSION ARM OF 12". EXTENSION ARMS BETWEEN 3" TO 12" REQUIRE DISTRICT APPROVAL PRIOR TO INSTALLATION.
8. INSTALL CONCRETE FOUNDATIONS IN ACCORDANCE WITH PUBLICATION 408 SECTION 951.2(b) AND 951.3(b).

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MISCELLANEOUS
PEDESTRIAN PUSHBUTTON
MOUNTING DETAILS

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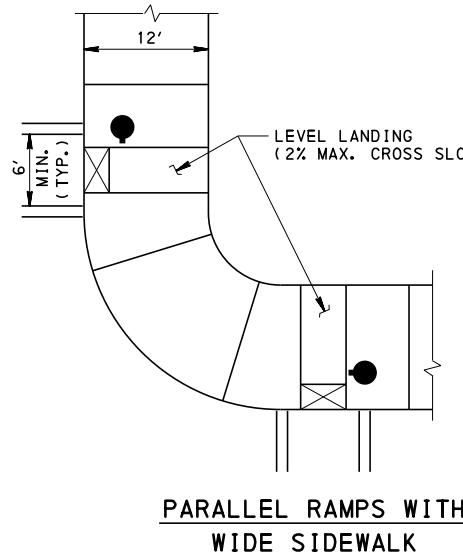
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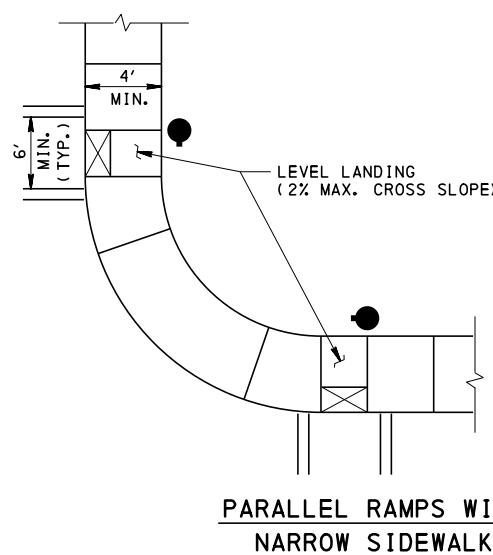
CHIEF, TRAFFIC OPERATIONS SECTION

CHIEF, HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION

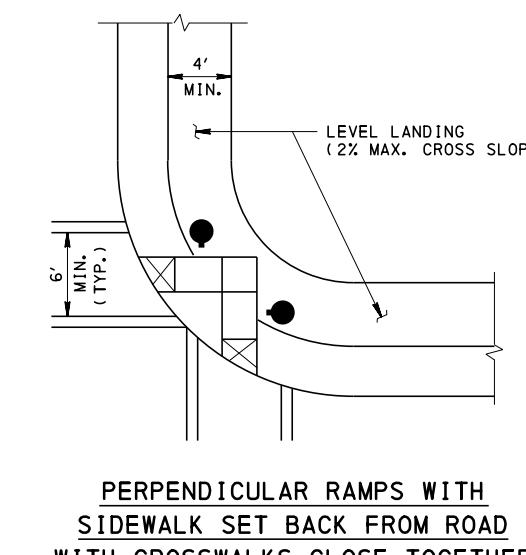
TC-8803



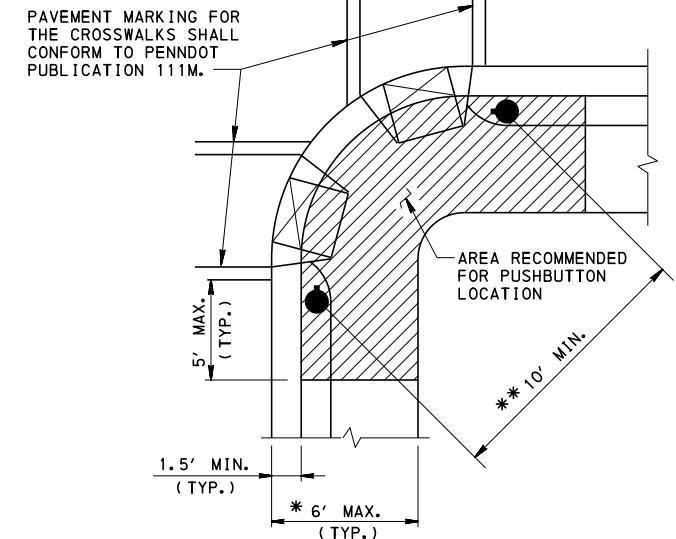
PARALLEL RAMPS WITH
WIDE SIDEWALK



PARALLEL RAMPS WITH
NARROW SIDEWALK



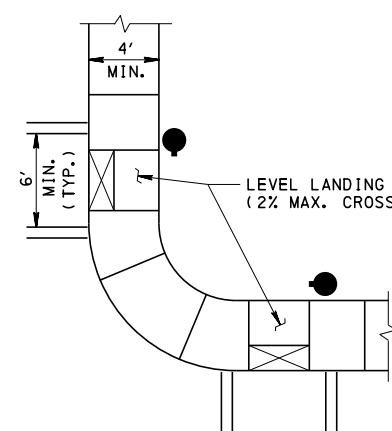
PERPENDICULAR RAMPS WITH
SIDEWALK SET BACK FROM ROAD
WITH CROSSWALKS CLOSE TOGETHER



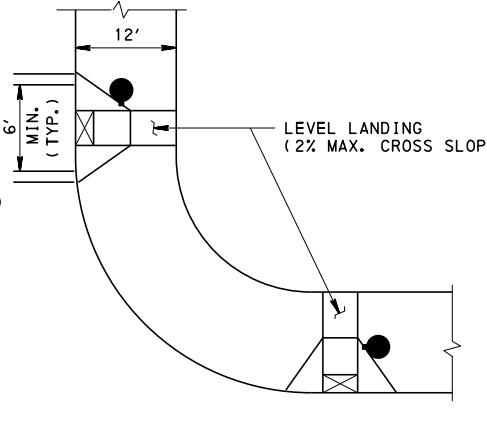
RECOMMENDED PUSHBUTTON LOCATIONS

* 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.

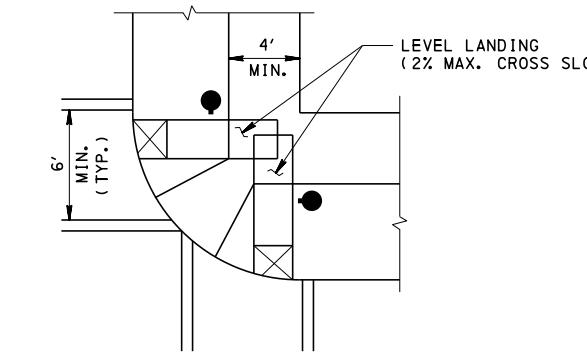
** WHERE THERE ARE CONSTRAINTS ON A PARTICULAR CORNER THAT MAKE IT IMPRACTICAL TO PROVIDE 10' SEPARATION BETWEEN THE TWO PEDESTRIAN PUSHBUTTONS, THE PUSHBUTTONS MAY BE PLACED CLOSER TOGETHER OR ON THE SAME POLE.



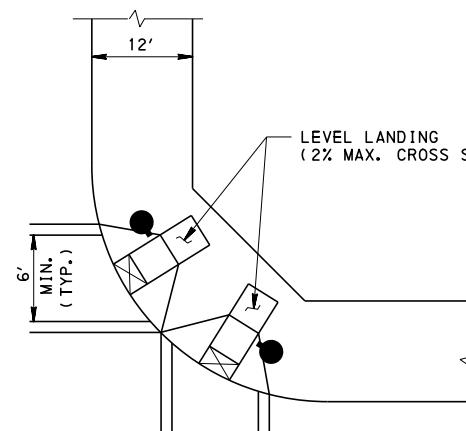
PARALLEL RAMPS WITH NARROW SIDEWALK
AND TIGHT CORNER RADIUS



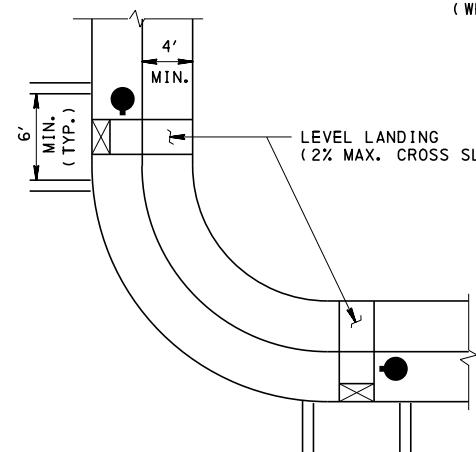
PERPENDICULAR RAMPS WITH
CROSSWALKS FAR APART



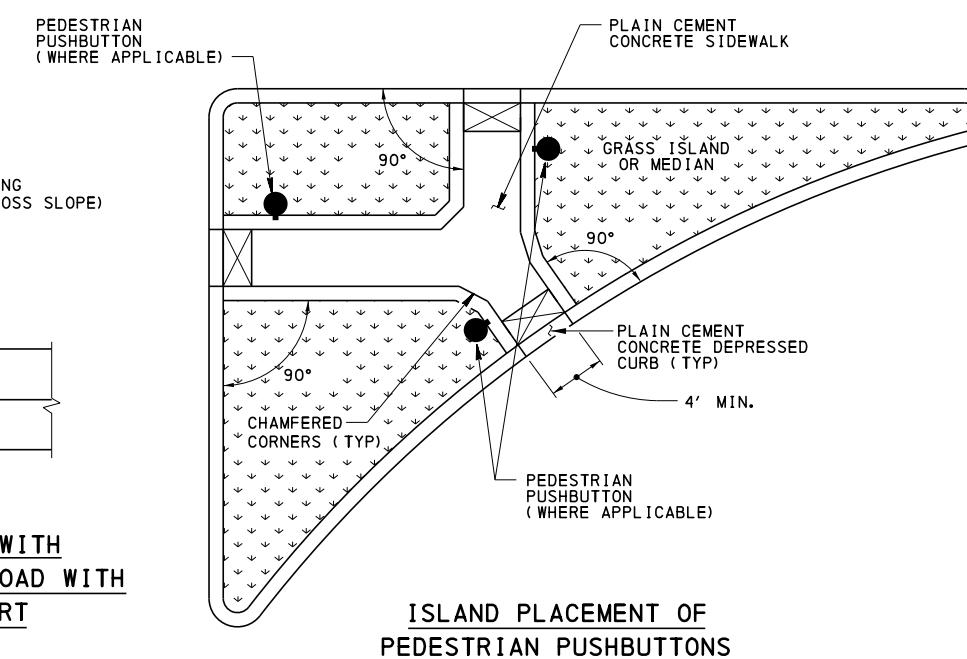
PERPENDICULAR RAMPS WITH
SIDEWALK SET BACK FROM ROAD WITH
CONTINUOUS SIDEWALK BETWEEN RAMPS



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
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BUREAU OF MAINTENANCE AND OPERATIONS

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MISCELLANEOUS
TYPICAL PEDESTRIAN PUSHBUTTON
LOCATIONS

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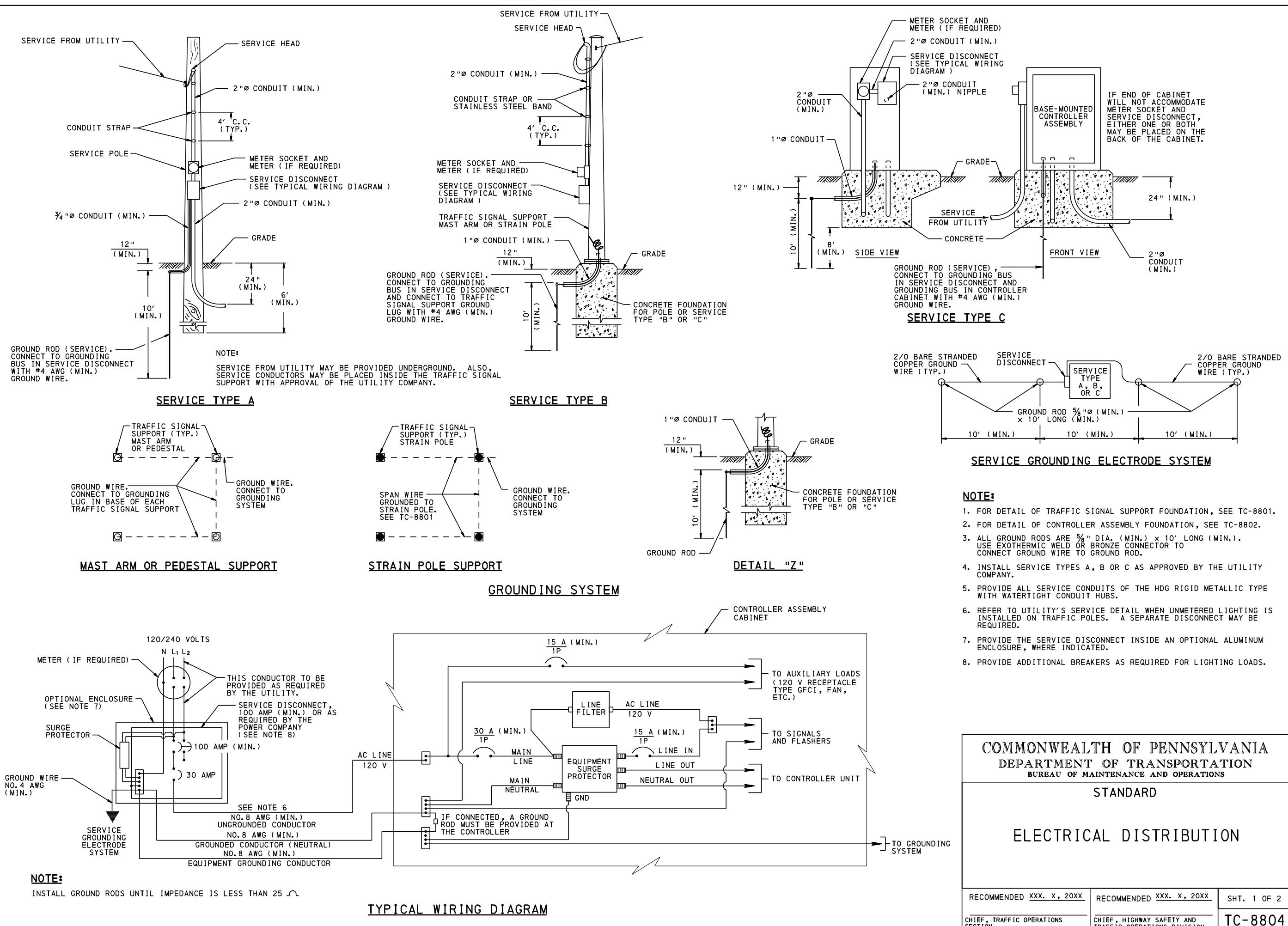
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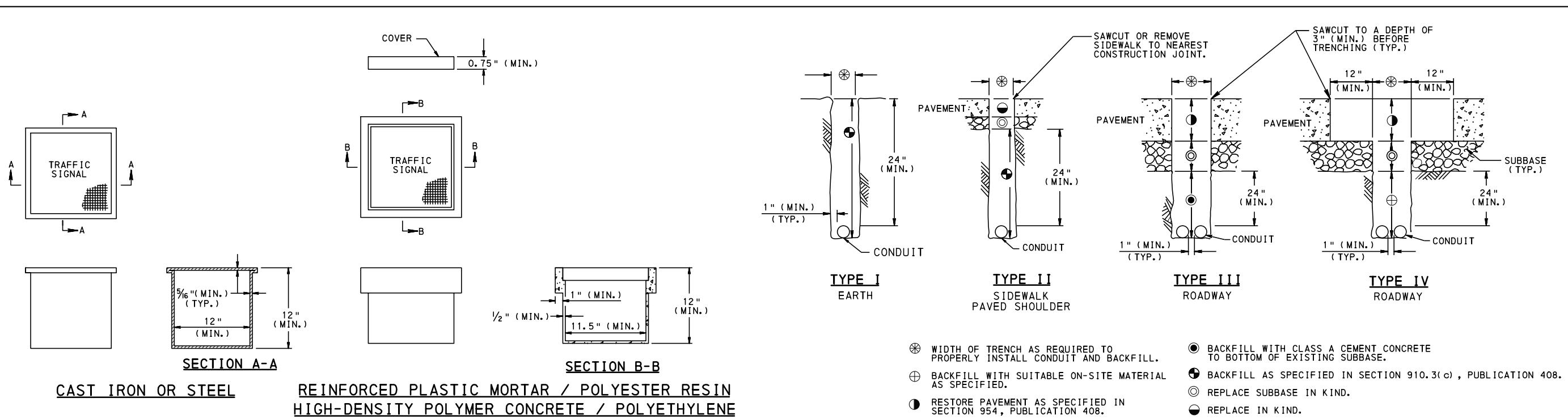
SHT. 4 OF 4

CHIEF, TRAFFIC OPERATIONS
SECTION

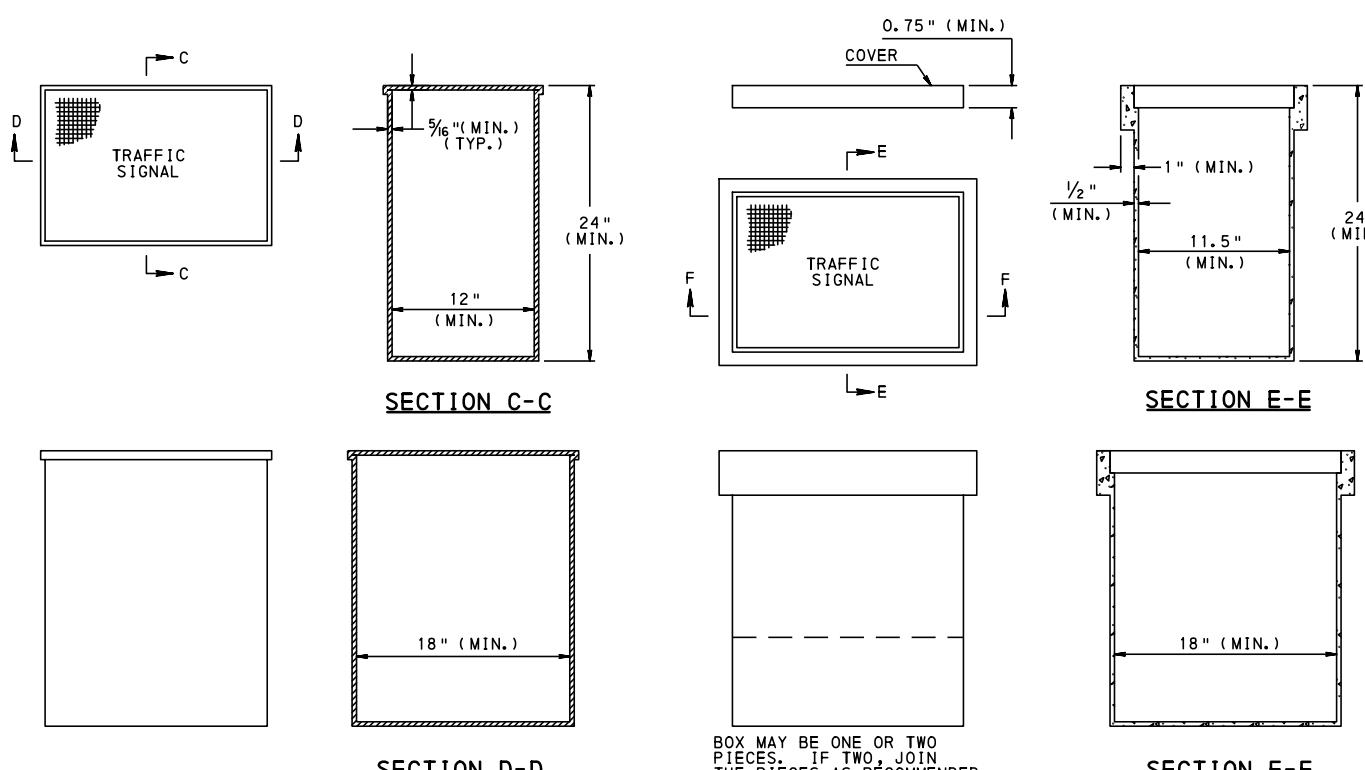
CHIEF, HIGHWAY SAFETY AND
TRAFFIC OPERATIONS DIVISION

TC-8803

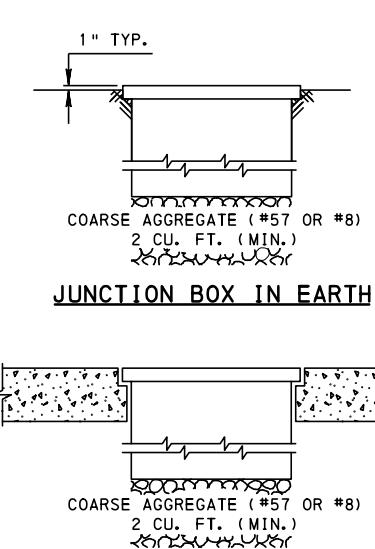




JUNCTION BOX, TYPE JB-26



JUNCTION BOX, TYPE JB-27



TYPICAL JUNCTION BOX INSTALLATION

NOTES:

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

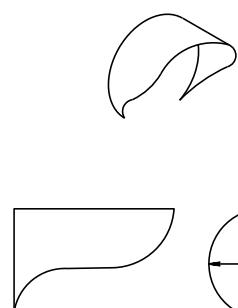
COMMONWEALTH OF PENNSYLVANIA
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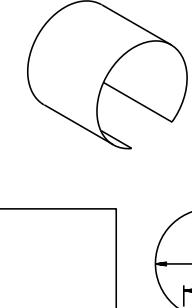
ELECTRICAL DISTRIBUTION

RECOMMENDED XXX. X, 20XX	RECOMMENDED XXX. X, 20XX	SHT. 2 OF 2
CHIEF, TRAFFIC OPERATIONS SECTION	CHIEF, HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION	TC-8804

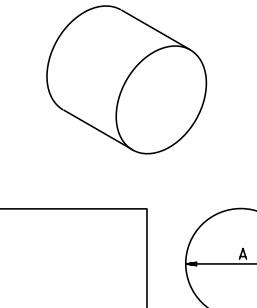
THE VISOR SHALL BE A MINIMUM OF 9.5" FOR A 12" SIGNAL LENS AND 7" FOR AN 8" SIGNAL LENS WITH A DOWNWARD TILT OF 3.5 DEGREES.



CUT-AWAY VISOR

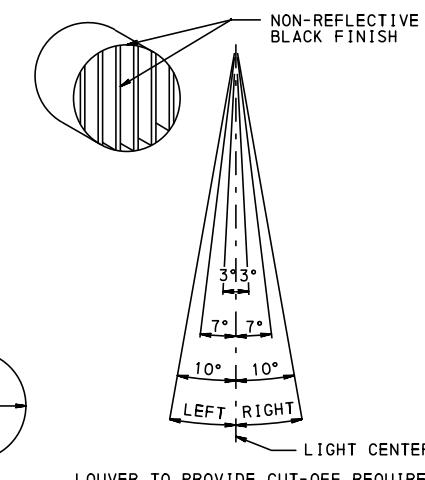


TUNNEL VISOR

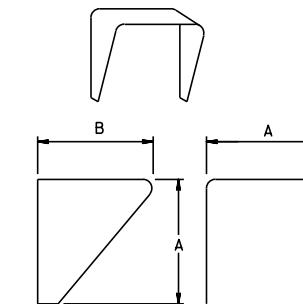


FULL-CIRCLE VISOR

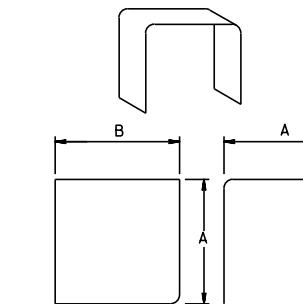
VISOR TYPES FOR VEHICULAR SIGNAL HEAD



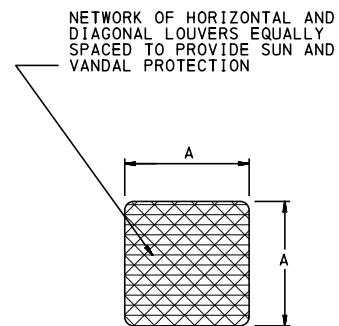
LOUVER FOR VEHICULAR SIGNAL HEAD
(DO NOT USE WITH CUT-AWAY VISOR)



CUT-AWAY VISOR



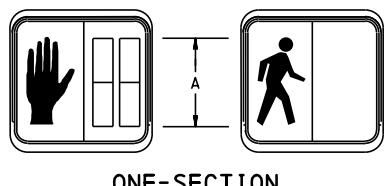
TUNNEL VISOR



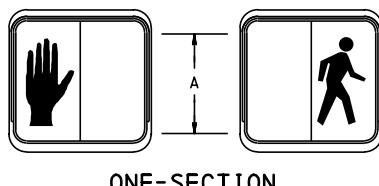
DIMENSION A AS REQUIRED.
DIMENSION B ≈ DIMENSION A

LOUVER VISOR
(FOR PEDESTRIAN SIGNAL HEAD ONLY)

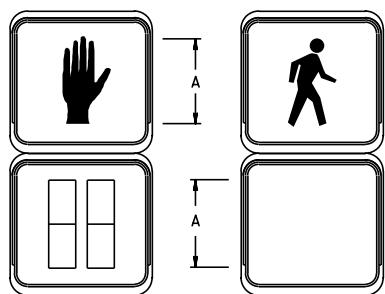
VISOR TYPES FOR PEDESTRIAN SIGNAL HEAD AND LANE-USE TRAFFIC CONTROL SIGNAL HEAD



ONE-SECTION



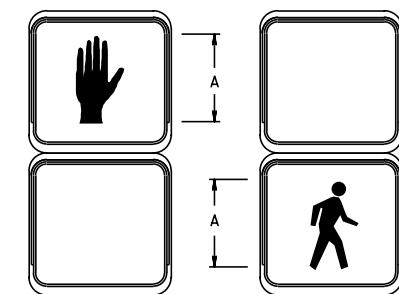
ONE-SECTION



TWO-SECTIONS

TYPE A

(COUNTDOWN) *



TWO-SECTIONS

TYPE B

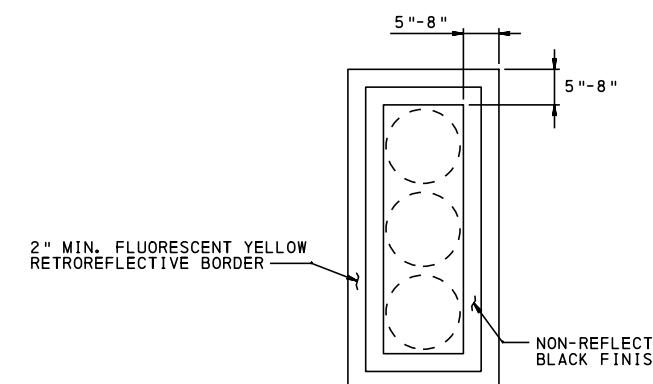
(SYMBOL) **

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.

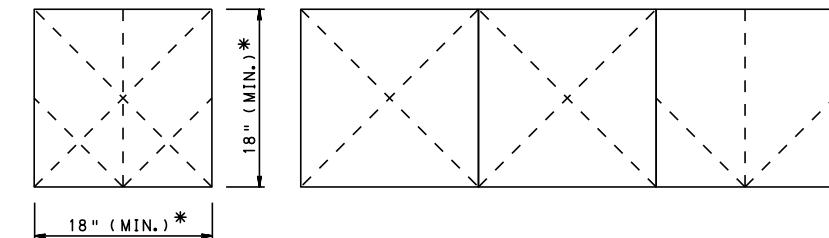
** FOR CROSSWALKS WHERE THE PEDESTRIAN ENTERS THE CROSSWALK MORE THAN 100' FROM THE PEDESTRIAN SIGNAL HEAD INDICATIONS, DIMENSION "A" SHOULD BE AT LEAST 9" HIGH.

PEDESTRIAN SIGNAL HEAD



BACKPLATE FOR VEHICULAR SIGNAL HEAD *

* BACKPLATE CONFORMING TO PUBLICATION 408 SECTION 955.2(B)3 SHALL BE ONE PIECE ALUMINUM



ONE-SECTION

TWO OR THREE SECTIONS

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

LANE-USE TRAFFIC CONTROL SIGNAL HEAD

NOTE:

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

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF MAINTENANCE AND OPERATIONS

STANDARD

SIGNAL HEADS

RECOMMENDED XXX. X, 20XX

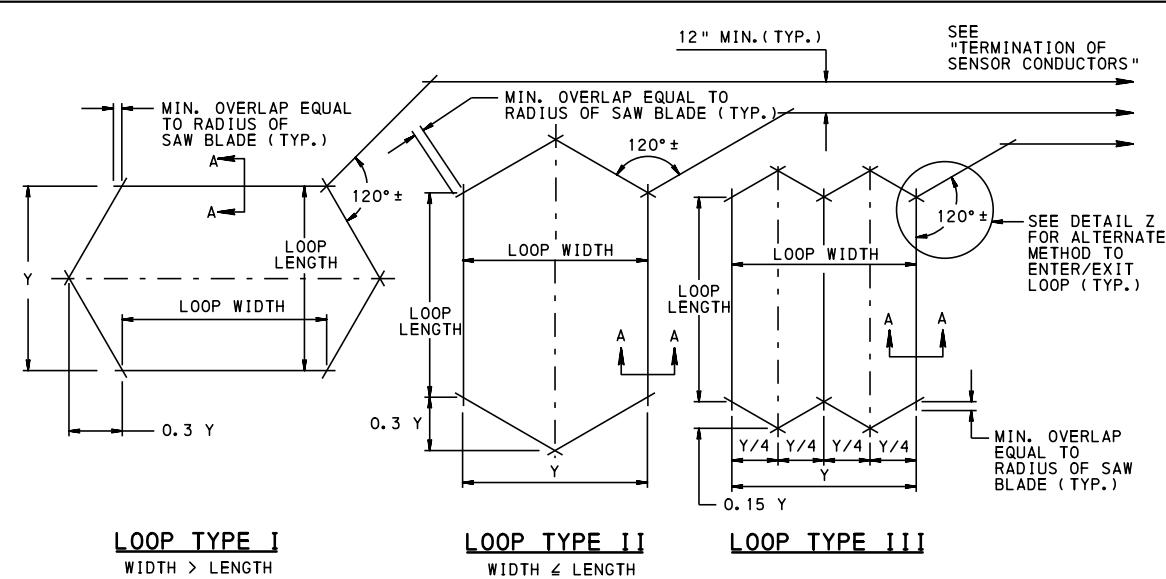
CHIEF, TRAFFIC OPERATIONS SECTION

RECOMMENDED XXX. X, 20XX

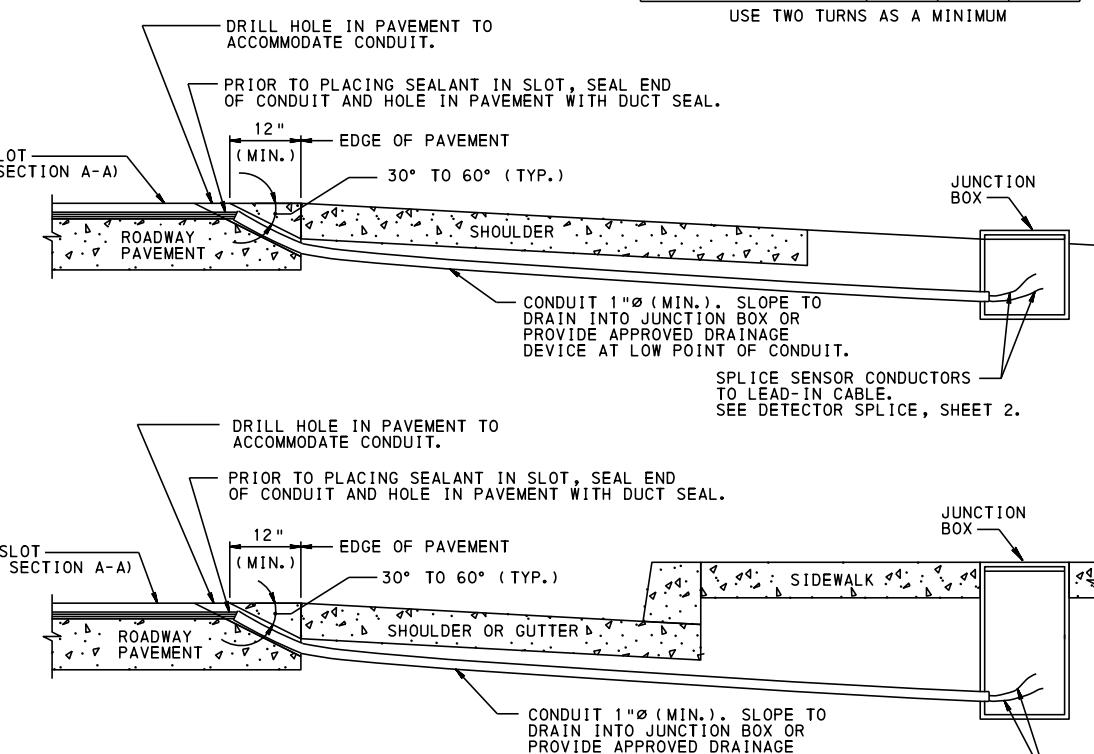
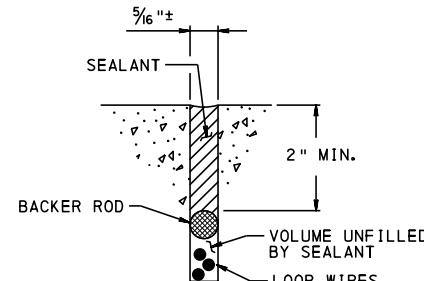
CHIEF, HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION

SHT. 1 OF 1

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TYPICAL SENSOR INSTALLATION - LOOP DETECTOR

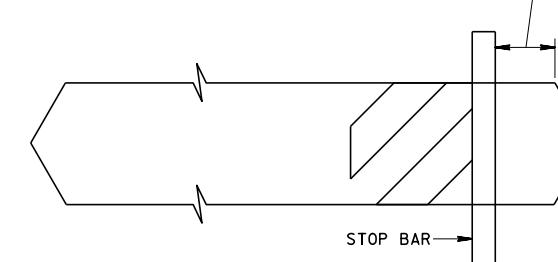
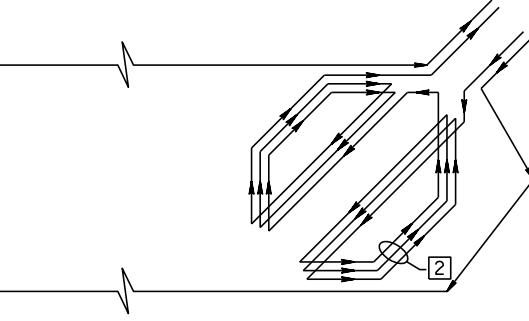
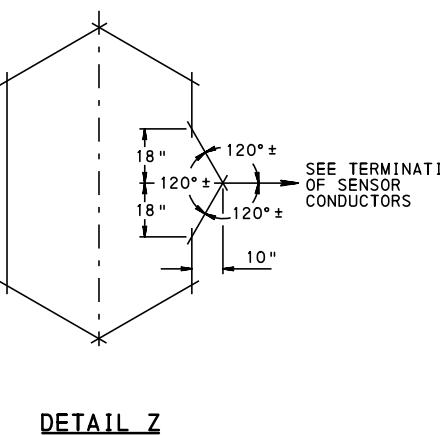


TERMINATION OF SENSOR CONDUCTORS

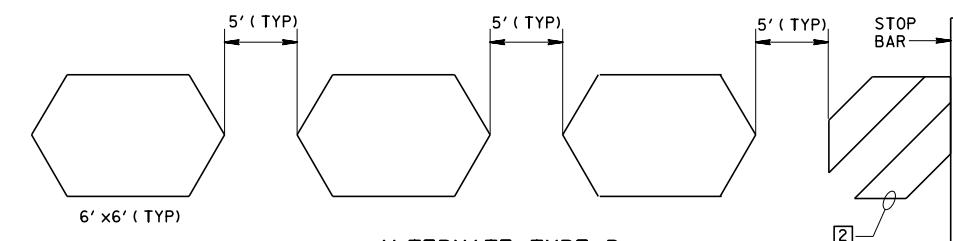
THIS TABLE (FOR INFORMATION ONLY) APPROXIMATES THE RESULTANT INDUCTANCE OF A LOOP BASED ON SIZE OF THE LOOP AND NUMBER OF SENSOR TURNS.

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

USE TWO TURNS AS A MINIMUM



ALTERNATE TYPE A DETECTOR LAYOUT

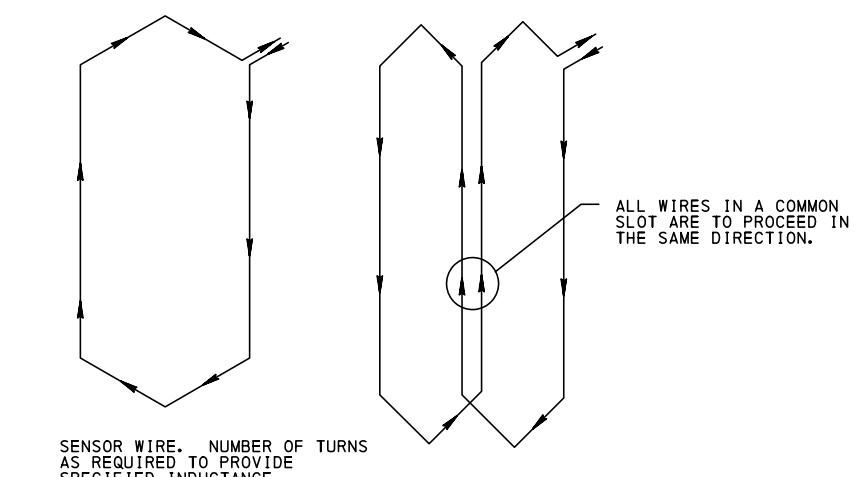


ALTERNATE DETECTOR NOTES:

- 1 ROUND CORNERS OF ACUTE SAWCUTS TO PREVENT DAMAGE TO CONDUCTORS.
- 2 INSTALL 3 TURNS WHEN ONLY ONE LOOP IS ON A SENSOR UNIT CHANNEL. INSTALL 5 TURNS WHEN ONE LOOP IS CONNECTED IN SERIES WITH 3 ADDITIONAL 6'x6' LOOPS ON A SENSOR UNIT CHANNEL.

ALTERNATE SENSOR INSTALLATION - LOOP DETECTOR

FOR ENHANCED BICYCLE AND MOTORCYCLE DETECTION



TYPICAL LAYOUT OF LOOP SENSOR

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF MAINTENANCE AND OPERATIONS

STANDARD

DETECTORS

RECOMMENDED XXX. X, 20XX

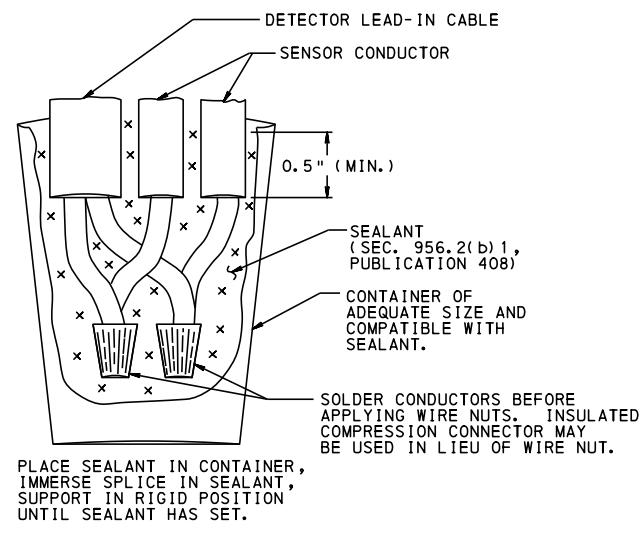
RECOMMENDED XXX. X, 20XX

SHT. 1 OF 2

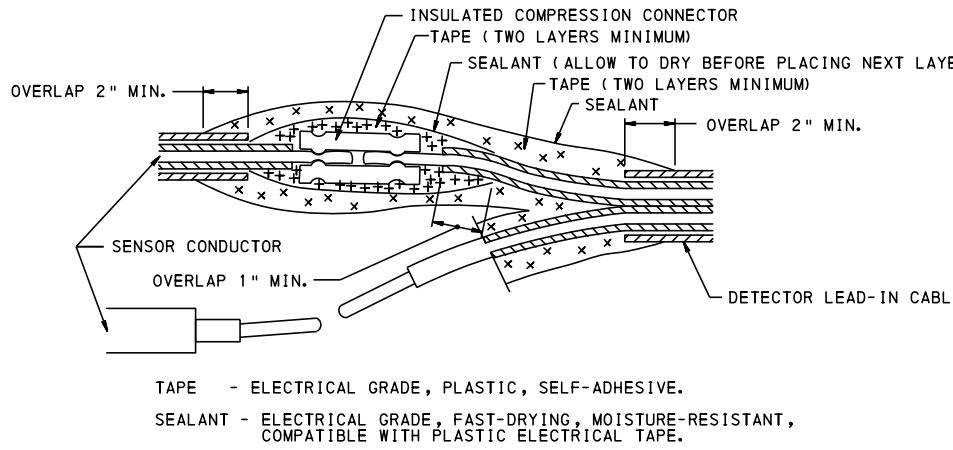
CHIEF, TRAFFIC OPERATIONS SECTION

CHIEF, HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION

TC-8806



ALTERNATE A

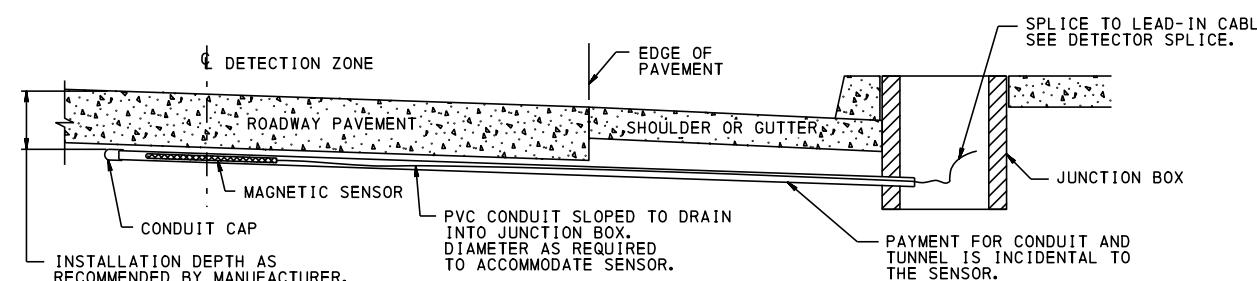
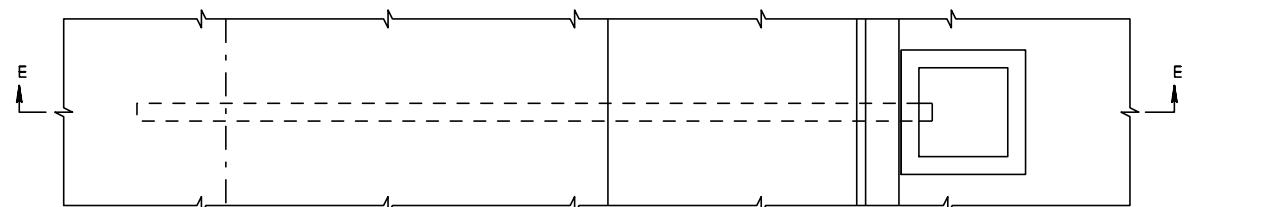


ALTERNATE B

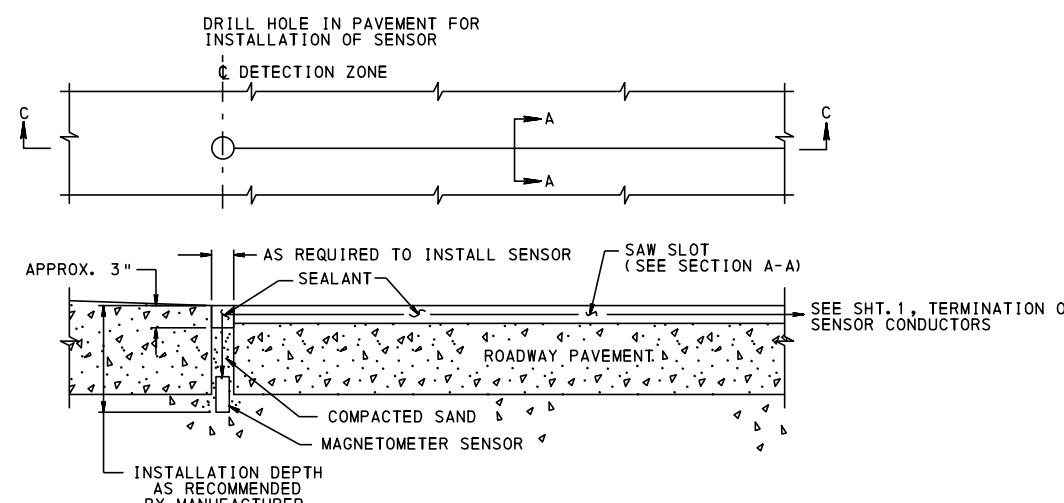
ALTERNATE C SPLICE WILL BE MADE ELECTRICALLY SECURE WITH INSULATED COMPRESSION CONNECTORS THEN COVERED WITH A SPLICING KIT THAT IS MOISTURE-PROOF, SPLICE ENCAPSULATING (INCLUDING CABLE JACKET), AND DESIGNED FOR INSULATING AND SPLICING ELECTRIC CABLE; OR A RE-ENTERABLE SPLICE KIT AS SPECIFIED IN SEC. 956.2(b) 4, PUBLICATION 408.

ALTERNATE C

DETECTOR SPLICE



SECTION E-E
TYPICAL SENSOR INSTALLATION - MAGNETIC DETECTOR



SECTION C-C

TYPICAL SENSOR INSTALLATION - MAGNETOMETER DETECTOR

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
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SHT. 2 OF 2

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