SIGNALS & LIGHTING STANDARD DRAWINGS 2025

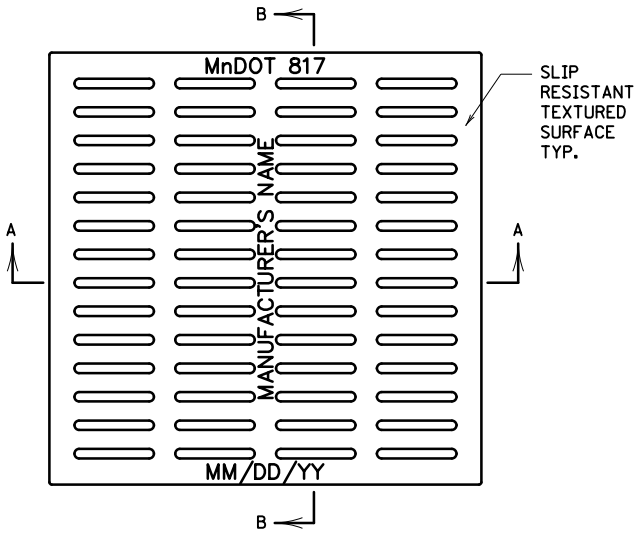
DEPARTMENT OF TRANSPORTATION

Standard Plates		
1	**Standard Plate 4155**	**ADA GRATE INLET CASTING**
2	**Standard Plate 7038**	**DETECTABLE WARNING SURFACE TRUNCATED DOMES**
3	**Standard Plate 7113**	**CONCRETE APPROACH NOSE DETAIL**
4	**Standard Plate 8106**	**EQUIPMENT PAD B**
5	**Standard Plate 8107**	**RLF EQUIPMENT PAD FOUNDATION LAYOUT**
6	**Standard Plate 8110**	**TRAFFIC SIGNAL BRACKETING (POLE MOUNTED)**
7	**Standard Plate 8111**	**TRAFFIC SIGNAL BRACKETING (PEDESTAL MOUNTED)**
8	**Standard Plate 8112**	**PEDESTAL FOUNDATION**
9	**Standard Plate 8117**	**PRECAST CONCRETE HANDHOLE WITH VEHICLE LOAD**
10	**Standard Plate 8118**	**SERVICE EQUIPMENT & POLE TRAFFIC CONTROL SIGNALS**
9	**Standard Plate 8124**	**POLE AND MAST ARM TYPE TS FOR MAST ARMS 15' TO 55'**
10	**Standard Plate 8125**	**POLE AND MAST ARM TYPE TS FOR MAST ARMS 60' TO 80'**
11	**Standard Plate 8127**	**LIGHT FOUNDATION – DESIGN E**
12	**Standard Plate 8128**	**LIGHT FOUNDATION – DESIGN H**
13	**Standard Plate 8129**	**SHIM AND WASHER TRAFFIC CONTROL SIGNALS AND ROADWAY LIGHTING**
14	**Standard Plate 8135**	**ANCHOR ROD ASSEMBLY FOR LIGHT TOWER FOUNDATION**
15	**Standard Plate 8308**	**REINFORCED CONCRETE MEDIAN BARRIER TYPE F (NON-GLARE SCREEN TYPE) LIGHT FOUNDATION - MONOLITHIC BARRIER PLACEMENT**
16	**Standard Plate 8309**	**REINFORCED CONCRETE MEDIAN BARRIER TYPE F & GLARE SCREEN LIGHT FOUNDATION - MONOLITHIC BARRIER PLACEMENT**
17	**Standard Plate 8332**	**ANCHOR ROD ASSEMBLY FOR LIGHT FOUNDATION-BARRIER**
18	**Detail B950**	**ANCHOR ROD ASSEMBLY FOR LIGHT POLES**

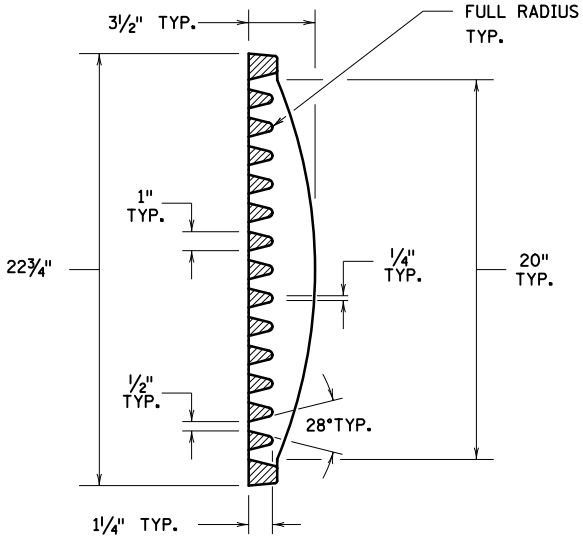
Standard Plans			
19	Standard Plan	5-297.250	PEDESTRIAN CURB RAMP DETAILS
20	Standard Plan	5-297.730	SIGN MOUNTING SYSTEMS FOR ROUND SUPPORTS
21	Standard Plan	5-297.731	SIGN MOUNTING DETAILS FOR SIGNAL MAST ARMS
22	Standard Plan	5-297.840	LIGHT TOWER PILE FOUNDATION DESIGN
23	Standard Plan	5-297.841	LIGHT TOWER MAT FOUNDATION DESIGN
24	Standard Plan	5-297.843	LIGHT FOUNDATION CONCRETE SURROUND DETAILS
25	Standard Plan	5-297.844 1 of 6	LIGHT FOUNDATION - DESIGN P CAST-IN-PLACE DRILLED SHAFT P-15 15' POLE OR LESS P-25 25' POLE OR LESS
26	Standard Plan	5-297.844 2 of 6	LIGHT FOUNDATION - DESIGN P CAST-IN-PLACE DRILLED SHAFT P-15 15' POLE OR LESS P-25 25' POLE OR LESS
27	Standard Plan	5-297.844 3 of 6	LIGHT FOUNDATION - DESIGN P 25' POLE OR LESS SPREAD FOOTING
28	Standard Plan	5-297.844 4 of 6	LIGHT FOUNDATION - DESIGN P CAST-IN-PLACE DRILLED SHAFT IN ROCK P-25R 25' POLE OR LESS
29	Standard Plan	5-297.844 5 of 6	LIGHT FOUNDATION - DESIGN P ANCHORED SPREAD FOOTING ON ROCK P-25A 25' POLE OR LESS
30	Standard Plan	5-297.844 6 of 6	HIGH-TOP LIGHT FOUNDATION - DESIGN P CAST-IN-PLACE DRILLED SHAFT P-15P 15' POLE OR LESS P-25P 25' POLE OR LESS
31	Standard Plan	5-297.845 1 of 6	LIGHT FOUNDATION - DESIGN E CAST-IN-PLACE DRILLED SHAFT E-15 15' POLE OR LESS E-40 40' POLE OR LESS
32	Standard Plan	5-297.845 2 of 6	LIGHT FOUNDATION - DESIGN E PRECAST DRILLED SHAFT E-15 15' POLE OR LESS E-40 40' POLE OR LESS
33	Standard Plan	5-297.845 3 of 6	LIGHT FOUNDATION - DESIGN E SPREAD FOOTING 40' POLE OR LESS

Standard Plans			
34	Standard Plan	5-297.845 4 of 6	LIGHT FOUNDATION - DESIGN E CAST-IN-PLACE DRILLED SHAFT IN ROCK E-40R 40' POLE OR LESS
35	Standard Plan	5-297.845 5 of 6	LIGHT FOUNDATION - DESIGN E ANCHORED SPREAD FOOTING ON ROCK E-40A 40' POLE OR LESS
36	Standard Plan	5-297.845 6 of 6	HIGH-TOP LIGHT FOUNDATION - DESIGN E CAST-IN-PLACE DRILLED SHAFT E-15P 15' POLE OR LESS E-40P 40' POLE OR LESS
37	Standard Plan	5-297.846 1 of 8	LIGHT FOUNDATION - DESIGN H CAST-IN-PLACE DRILLED SHAFT 50' POLE OR LESS
38	Standard Plan	5-297.846 2 of 8	LIGHT FOUNDATION - DESIGN H PRECAST DRILLED SHAFT 50' POLE OR LESS
39	Standard Plan	5-297.846 3 of 8	LIGHT FOUNDATION - DESIGN H SPREAD FOOTING 50' POLE OR LESS
40	Standard Plan	5-297.846 4 of 8	LIGHT FOUNDATION - DESIGN H CAST-IN-PLACE DRILLED SHAFT 50' POLE OR LESS - TWIN ARM LUMINAIRE FROM 1.5 TO 3.0 SQUARE FEET
41	Standard Plan	5-297.846 5 of 8	LIGHT FOUNDATION - DESIGN H PRECAST DRILLED SHAFT 50' POLE OR LESS - TWIN ARM LUMINAIRE FROM 1.5 TO 3.0 SQUARE FEET
42	Standard Plan	5-297.846 6 of 8	LIGHT FOUNDATION - DESIGN H SPREAD FOOTING 50' POLE OR LESS - TWIN ARM LUMINAIRE FROM 1.5 TO 3.0 SQUARE FEET
43	Standard Plan	5-297.846 7 of 8	LIGHT FOUNDATION - DESIGN H CAST-IN-PLACE DRILLED SHAFT IN ROCK TYPE H-50R - 50' POLE OR LESS
44	Standard Plan	5-297.846 8 of 8	LIGHT FOUNDATION - DESIGN H ANCHORED SPREAD FOOTING ON ROCK TYPE H-50A - 50' POLE OR LESS
45	Standard Plan	5-297.861 1 of 5	POLE FOUNDATION TYPE TS SPREAD FOOTING FOR 15' TO 55' MAST ARMS
46	Standard Plan	5-297.861 2 of 5	POLE FOUNDATION TYPE TS DRILLED SHAFT FOUNDATIONS FOR 15' TO 55' MAST ARMS

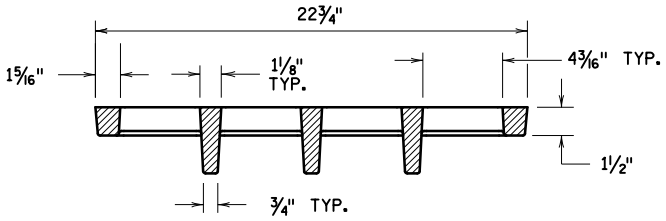
Standard Plans			
47	**Standard Plan**	**5-297.861 3 of 5**	**POLE FOUNDATION TYPE TS SPREAD FOOTING FOR 60' TO 80' MAST ARMS**
48	**Standard Plan**	**5-297.861 4 of 5**	**POLE FOUNDATION TYPE TS DRILLED SHAFT FOUNDATIONS FOR 60' TO 80' MAST ARMS**
46	**Standard Plan**	**5-297.861 5 of 5**	**POLE FOUNDATION TYPE TS ANCHOR RODS AND CONDUIT DETAILS**
47	**Standard Plan**	**5-297.869**	**350 ATCC AND SSB CABINET EQUIPMENT PAD CAST IN PLACE**
48	**Standard Plan**	**5-297.870**	**352 ATCC AND SSB CABINET EQUIPMENT PAD CAST IN PLACE**
49	**Standard Plan**	**5-297.873**	**SAWCUT LOOP DETECTORS**
50	**Standard Plan**	**5-297.874**	**PREFORMED RIGID PVC CONDUIT LOOP DETECTORS**
51	**Standard Plan**	**5-297.885**	**ACCESSIBLE PEDESTRIAN SIGNAL (APS) PUSHBUTTON STATION AND LOCATION**



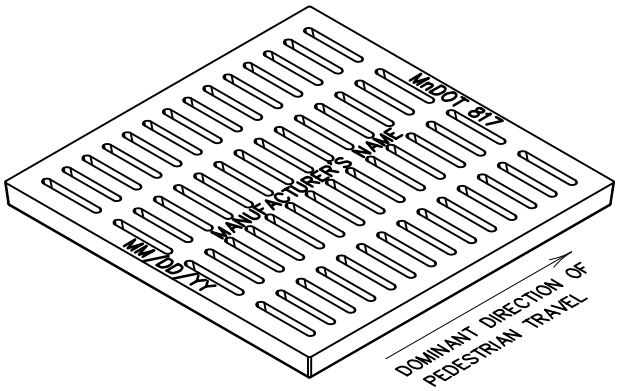
TOP VIEW



SECTION B-B



SECTION A-A



ISOMETRIC TOP VIEW

NOTES:

THIS GRATE MEETS ADA REQUIREMENTS.

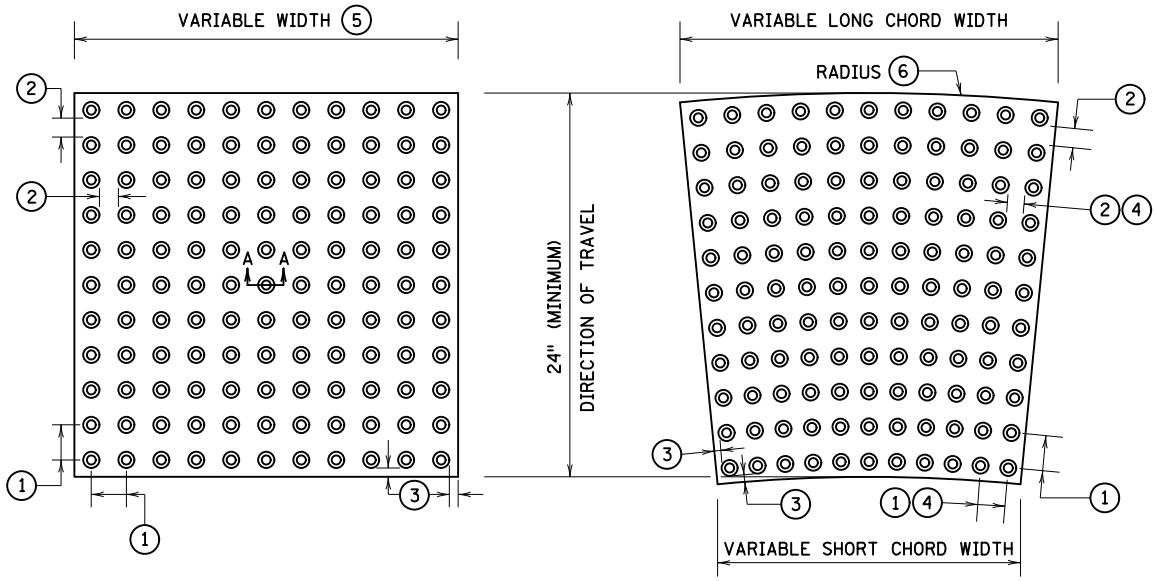
THIS GRATE USED WITH FRAME CASTING NO. 805.

CAST GRAY IRON, AASHTO M105/ASTM A48, CLASS 35B.

PRODUCT MARKING PER AASHTO M 105. CASTING SHALL INCLUDE; MANUFACTURER, CASTING DATE, MnDOT DESIGNATION, AND CASTING NUMBER. MARKING TEXT SHALL BE 3/4" IN HEIGHT AND DEPRESSED 1/8".

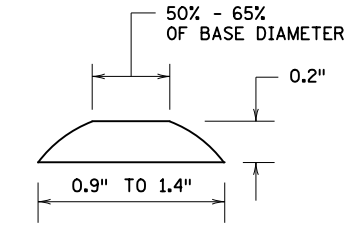
GRATE CASTING NO. 817

APPROVED SEPTEMBER 19, 2018 STATE DESIGN ENGINEER	STATE OF MINNESOTA DEPARTMENT OF TRANSPORTATION ADA GRATE INLET CASTING	SPECIFICATION REFERENCE 2506	STANDARD PLATE NO. 4155A



RECTANGULAR PLATES

RADIAL PLATES



SECTION A-A
TRUNCATED DOME

TYPICAL RADIAL TRUNCATED DOME PLATES			
RADIUS (FEET) (7)	LONG CHORD WIDTH (INCHES)	SQUARE FEET PER PLATE	PLATES REQUIRED FOR 90 DEGREE TURN
10	23 1/2	3.53	8
15	18 13/16	2.93	15
15	23 1/2	3.67	12
20	18 13/16	3.00	20
20	18 7/8	2.98	20
25	20 1/2	3.28	23
25	23 9/16	3.77	20
30	22 5/8	3.65	25
35	22	3.56	30

NOTES:

DETECTABLE WARNING SURFACES SHALL FOLLOW THE PUBLIC RIGHTS-OF-WAY ACCESSIBILITY GUIDELINES (PROWAG).

DETECTABLE WARNINGS CONSIST OF TRUNCATED DOMES ALIGNED IN A SQUARE OR RADIAL GRID PATTERN.

DETECTABLE WARNINGS ARE REQUIRED:
- -WHERE RAMPS, LANDINGS, OR BLENDED TRANSITIONS PROVIDE A FLUSH PEDESTRIAN CONNECTION TO THE ROADWAY.
- -WHERE PEDESTRIAN ACCESS ROUTES CROSS COMMERCIAL DRIVEWAYS THAT ARE PROVIDED WITH TRAFFIC CONTROL DEVICES OR OTHERWISE PERMITTED TO OPERATE LIKE A PUBLIC ROADWAY.
- -AT PEDESTRIAN RAILWAY CROSSINGS.
- -ON RAIL PLATFORMS WHERE BOARDING EDGES ARE NOT PROTECTED.

DETECTABLE WARNINGS SHALL EXTEND:
- -A MINIMUM OF 24" IN THE DIRECTION OF TRAVEL.
- -THE FULL WIDTH OF THE RAMP, LANDING, OR BLENDED TRANSITION, WITHIN 3" OF FULL WIDTH ON EITHER END.
- -THE FULL LENGTH OF THE PUBLIC USE AREA OF A RAIL PLATFORM.

DETECTABLE WARNING SURFACES SHALL CONTRAST VISUALLY WITH ADJACENT GUTTER, ROADWAY, OR WALKWAY, EITHER LIGHT-ON-DARK OR DARK-ON-LIGHT. CONTRAST MAY BE PROVIDED ON THE FULL RAMP SURFACE, EXCLUDING THE FLARED SIDES.

FOR MNDOT PROJECTS, SEE MNDOT'S APPROVED/QUALIFIED PRODUCT LISTS.

ALL TRUNCATED DOME SYSTEMS SHALL BE PLACED IN STRICT ACCORDANCE WITH THE RECOMMENDATIONS OF THE MANUFACTURER.

(1) CENTER-TO-CENTER DOME SPACING: 1.6" MINIMUM, 2.4" MAXIMUM.

(2) BASE-TO-BASE DOME SPACING: 0.65" MINIMUM.

(3) DOME BASE TO PLATE EDGE SPACING: 0.35" MINIMUM, 0.75" MAXIMUM.

(4) SPACING VARIES ON RADIAL PLATES.

(5) TYPICAL WIDTHS AVAILABLE: 12", 18", 24", 30", 36". CHECK WITH MANUFACTURERS FOR AVAILABLE WIDTHS.

(6) ON RADIAL PLATE, RADIUS DEFINED AT BACK OF CURB.

(7) TYPICAL RADII. CHECK WITH MANUFACTURERS FOR AVAILABLE RADII.

APPROVED AUGUST 23, 2010

STATE DESIGN ENGINEER

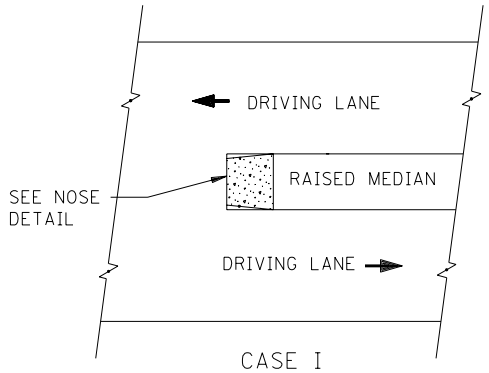
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

DETECTABLE WARNING SURFACE
TRUNCATED DOMES

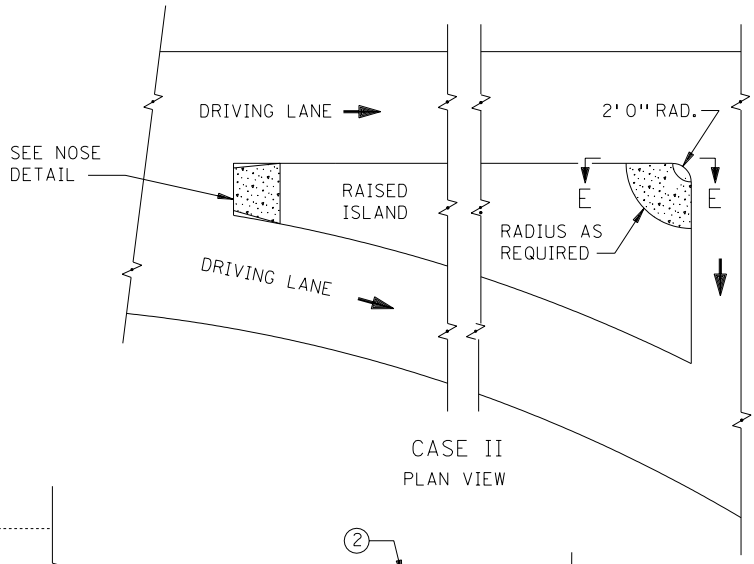
SPECIFICATION REFERENCE
2531
2563

REVISED
01-09-2020 M.J.E.

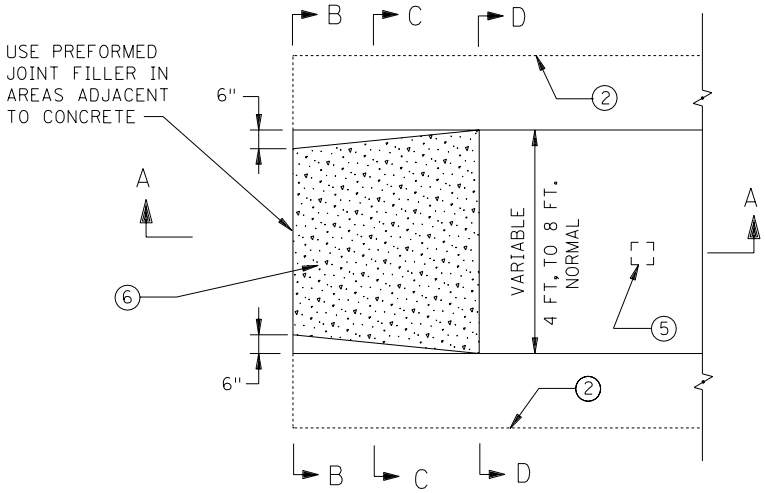
STANDARD PLATE NO.
7038A



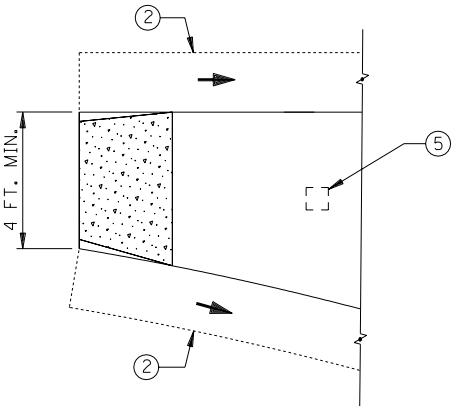
CASE I
PLAN VIEW



CASE II
PLAN VIEW

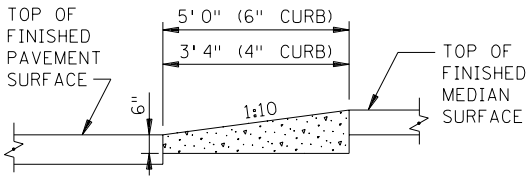


CASE I
NOSE DETAIL

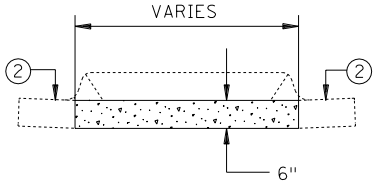


CASE II
NOSE DETAIL
SEE CASE I FOR DIMENSIONS

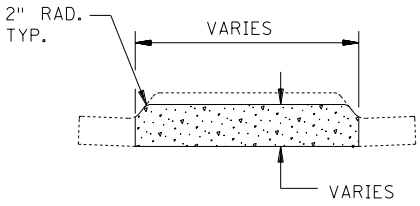
PLAN VIEWS



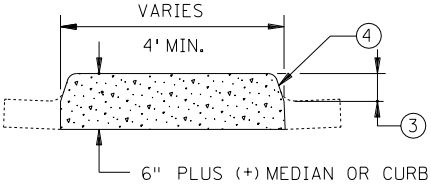
SECTION A-A



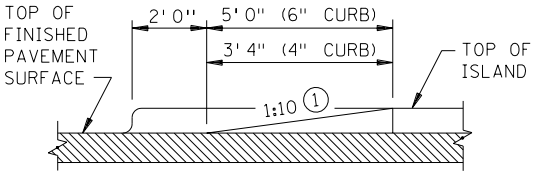
SECTION B-B



SECTION C-C



SECTION D-D



SECTION E-E

NOTES:

1. TYPICAL SLOPE ALONG GUTTER LINE EACH DIRECTION.
2. GUTTER, IF REQUIRED.
3. VARIABLE MEDIAN OR CURB HEIGHT.
4. SHAPE SAME AS MEDIAN OR CURB.
5. PROVIDE ONE 6" X 6" OPENING IN MEDIAN FOR SIGNING IF REQUIRED.
6. PAID FOR AS CONCRETE WALK, INCLUDES GUTTER, IF REQUIRED.

APPROVED June 24, 1993

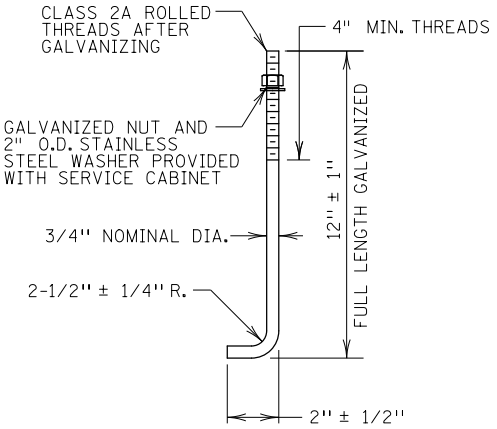
R. M. Hill

STATE DESIGN ENGINEER

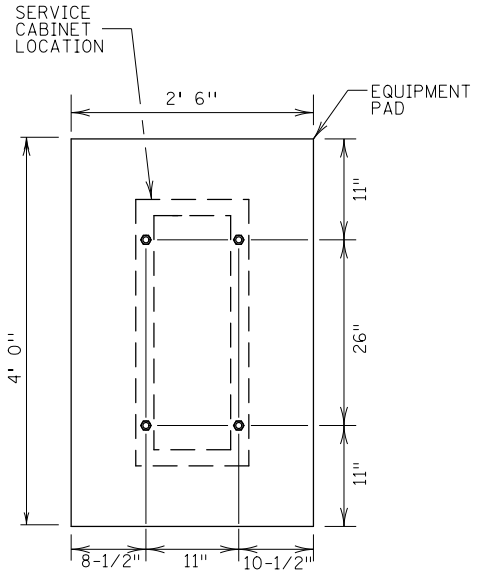
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

CONCRETE APPROACH NOSE DETAIL

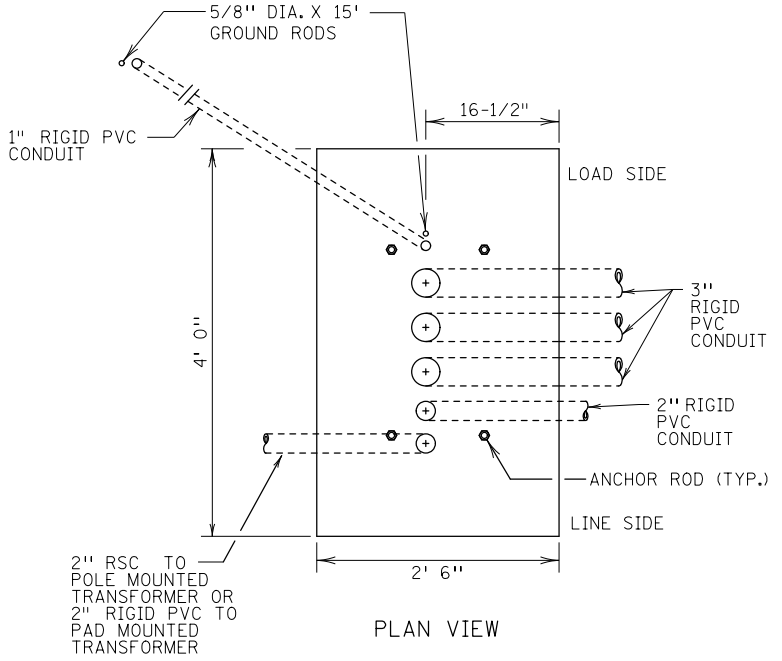
SPECIFICATION REFERENCE	STANDARD PLATE NO.
2531	7113A
REVISION DATE 5-28-2003	



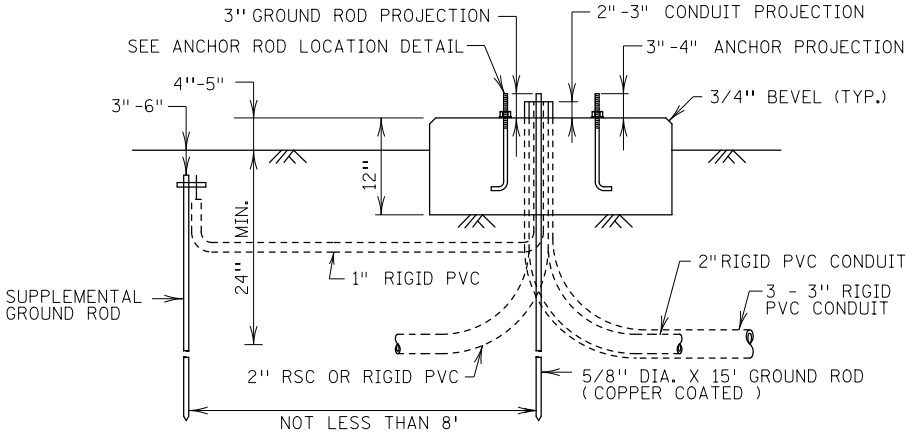
ANCHOR ROD DETAIL
(SPEC. 3385 TYPE A)



ANCHOR ROD LOCATION DETAIL



PLAN VIEW



SIDE VIEW

CAST-IN-PLACE EQUIPMENT PAD B

NOTES:

CONTRACTOR SHALL HAVE THE OPTION OF PRECAST OR CAST-IN-PLACE EQUIPMENT PAD.

CONCRETE SHALL BE MIX 3F52.

TOP OF PAD SHALL HAVE A BRUSH TOP FINISH.

PLACE THREE (3) 3 IN. RIGID PVC CONDUIT WITH 90° ELBOWS ON THE LOAD SIDE OF THE EQUIPMENT PAD.

PLACE ONE (1) 2 IN. RIGID PVC CONDUIT WITH 90°ELBOW ON THE LOAD SIDE OF THE EQUIPMENT PAD FOR FUTURE USE ONLY. USE PVC CONDUIT CAPS OR PLUGS TO SEAL THE OPEN ENDS OF THE CONDUIT

END BELL FITTINGS ON CONDUIT ENDS SHALL BE INCLUDED PER SPEC. 2565.3D.

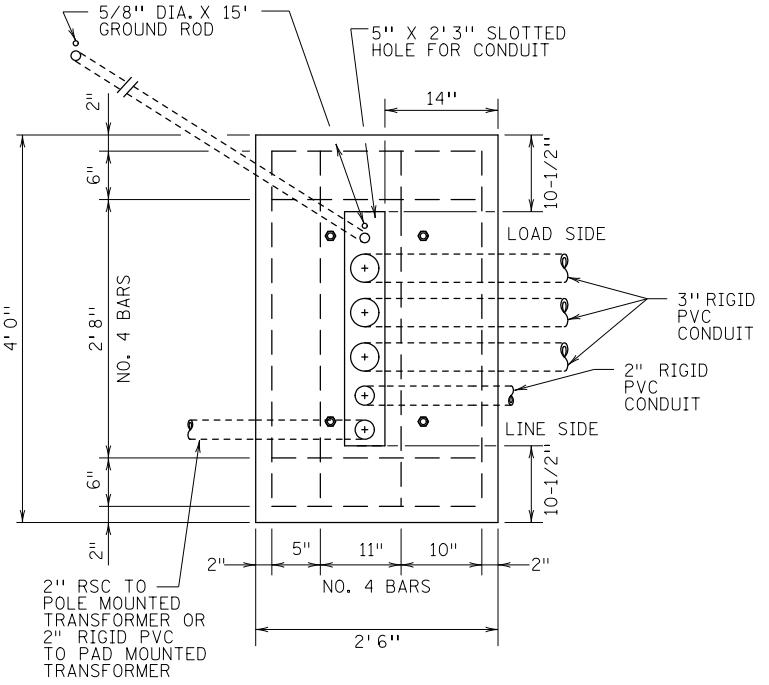
PLACE FOUR (4) GALVANIZED "L" SHAPED CONCRETE EMBEDDED TYPE ANCHOR RODS AS SHOWN IN THE ANCHOR ROD DETAIL, PLACE ANCHOR RODS AS SHOWN ON THE ANCHOR ROD LOCATION DETAIL. USE A RIGID STEEL TEMPLATE TO HOLD ANCHOR RODS IN PLACE UNTIL CONCRETE HAS CURED.

PLACE A 5/8" DIA. X 15' GROUND ROD ELECTRODE IN THE LOAD SIDE OF THE EQUIPMENT PAD AND PROJECT 3" +/- 1/4". PLACE A SUPPLEMENTAL 5/8" DIA. X 15' GROUND ROD ELECTRODE OUTSIDE OF THE EQUIPMENT PAD WITH THE TOP OF THE ELECTRODE BURIED 3" TO 6" BELOW THE GROUND LINE (7" TO 8" IF LOCATED UNDER BITUMINOUS OR CONCRETE SURFACES) AND NOT LESS THEN 8' FROM THE GROUND ROD ELECTRODE IN THE PAD.

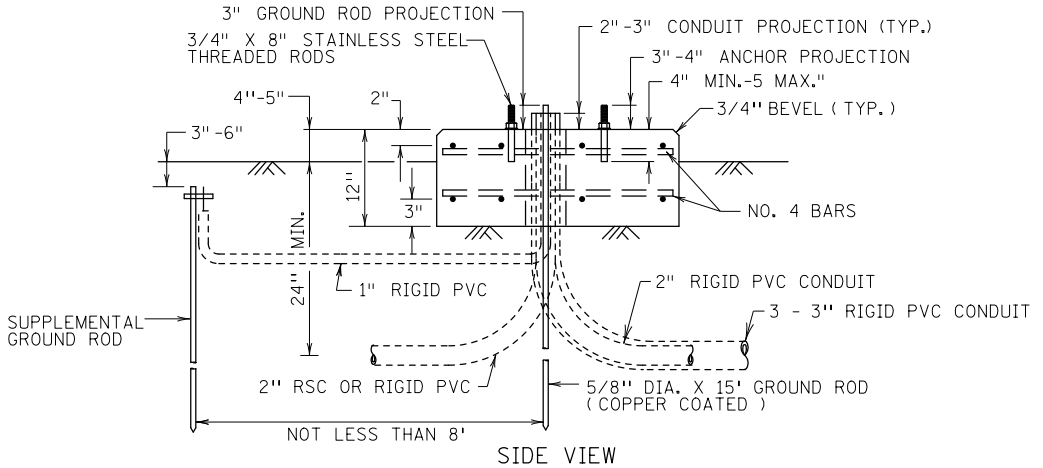
APPLY DE-OX COMPOUND TO THE GROUNDING CONNECTIONS AFTER FINAL ASSEMBLY.

APPLY ANTI -SEIZE COMPOUND THAT MEETS MIL-PRF-907E SPEC. WITH A BRUSH TO ALL ANCHOR ROD THREADS.

APPROVED JULY 15, 2015 STATE DESIGN ENGINEER	STATE OF MINNESOTA DEPARTMENT OF TRANSPORTATION EQUIPMENT PAD B	SPECIFICATION REFERENCE 2461, 2545 2550, 2565	STANDARD PLATE NO. 8106D 1 OF 3



PLAN VIEW



SIDE VIEW

PRECAST EQUIPMENT PAD B

NOTES:

CONTRACTOR SHALL HAVE THE OPTION OF PRECAST OR CAST-IN-PLACE EQUIPMENT PAD.

CONCRETE SHALL BE MIX 3F52.

TOP OF PAD SHALL HAVE A BRUSH TOP FINISH.

SEE ANCHOR ROD LOCATION DETAIL ON SHEET 1 OF 3 FOR BOLT LOCATION.

PLACE THREE (3) 3 IN. RIGID PVC CONDUIT WITH 90° ELBOWS ON THE LOAD SIDE OF THE EQUIPMENT PAD.

PLACE ONE (1) 2 IN. RIGID PVC CONDUIT WITH 90°ELBOW ON THE LOAD SIDE OF THE EQUIPMENT PAD FOR FUTURE USE ONLY. USE PVC CONDUIT CAPS OR PLUGS TO SEAL THE OPEN ENDS OF THE CONDUIT

END BELL FITTINGS ON CONDUIT ENDS SHALL BE INCLUDED PER SPEC. 2565.3D.

FILL AREA AROUND RIGID PVC CONDUIT AND GROUND ROD AS APPROVED BY THE ENGINEER.

PLACE A 5/8" DIA. X 15' GROUND ROD ELECTRODE IN THE LOAD SIDE OF THE EQUIPMENT PAD AND PROJECT 3" +/- 1/4". PLACE A SUPPLEMENTAL 5/8" DIA. X 15' GROUND ROD ELECTRODE OUTSIDE OF THE EQUIPMENT PAD WITH THE TOP OF THE ELECTRODE BURIED 3" TO 6" BELOW THE GROUND LINE (7" TO 8" IF UNDER BITUMINOUS OR CONCRETE SURFACES) AND NOT LESS THAN 8' FROM THE GROUND ROD ELECTRODE IN THE PAD

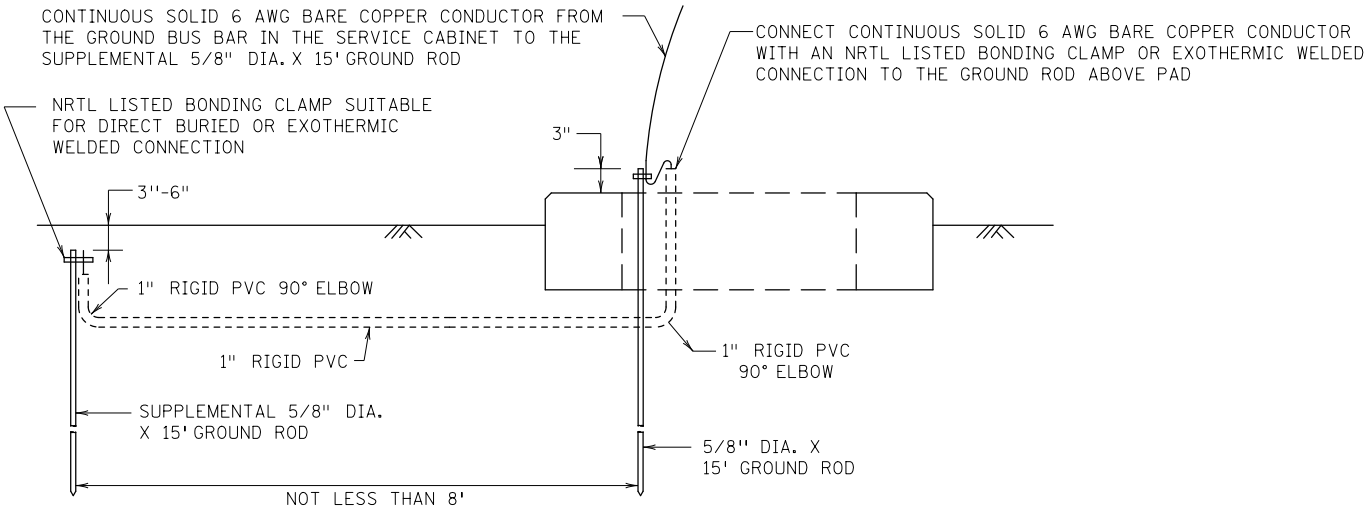
APPLY DE-OX COMPOUND TO THE GROUNDING CONNECTIONS AFTER FINAL ASSEMBLY.

REINFORCEMENT SHALL BE NO. 4. BAR. EACH PAD SHALL CONTAIN: EIGHT (8) 3'-8" LENGTH BARS AND EIGHT (8) 2'-2" LENGTH BARS AS SHOWN.

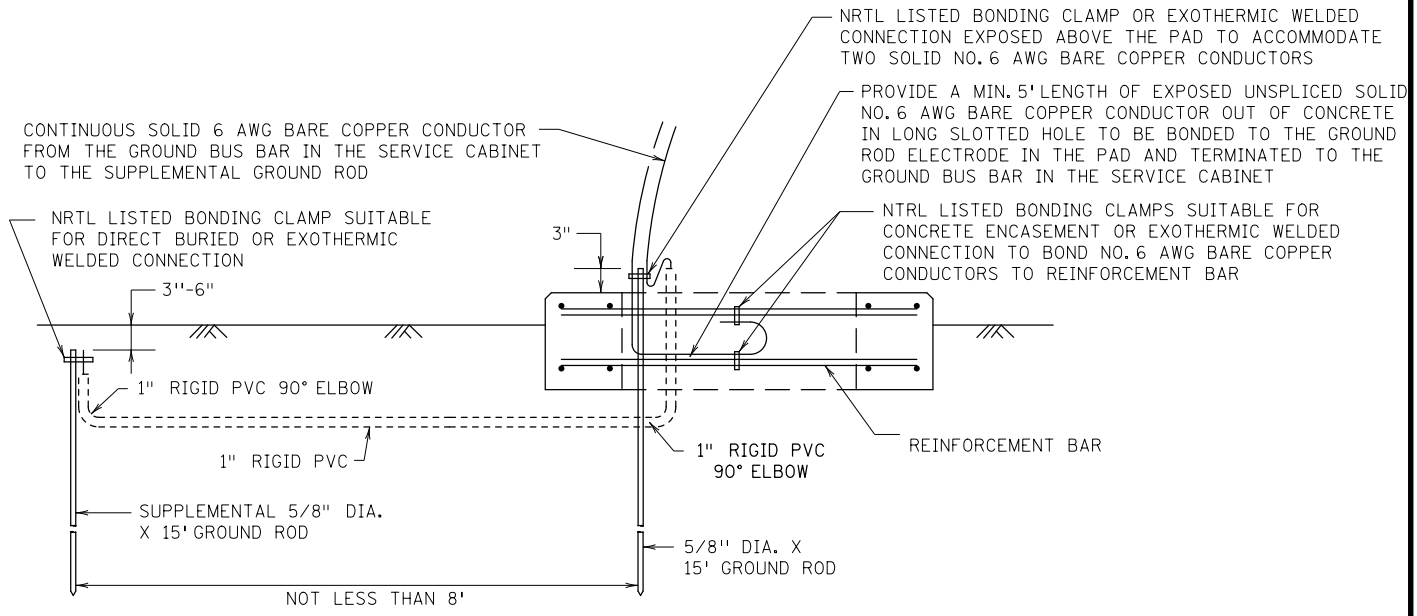
ANCHOR RODS SHALL BE CHAMFERED AND SHALL BE IN ACCORDANCE WITH 3385.2D. RODS SHALL BE ANCHORED USING AN EPOXY ADHESIVE INTO 7/8" DIA. DRILLED HOLE 4" - 5" IN DEPTH PER MANUFACTURE'S INSTRUCTIONS. MECHANICAL ANCHOR BOLTS OR CONCRETE WEDGE ANCHORS SHALL NOT BE USED. USE AN APPROVED EPOXY ADHESIVE FOR APS PUSH BUTTON BASE ADHESIVE ANCHOR SYSTEMS FROM MnDOT's APPROVED/QUALIFIED PRODUCTS LIST. PLACE ANCHORS AS SHOWN ON THE ANCHOR ROD LOCATION DETAIL. USE NUT AND WASHER PROVIDED WITH THE SERVICE CABINET.

APPLY ANTI-SEIZE COMPOUND THAT MEETS MIL-PRF-907E SPEC. WITH A BRUSH TO ALL ANCHOR ROD THREADS.

APPROVED JULY 15, 2015 STATE DESIGN ENGINEER	STATE OF MINNESOTA DEPARTMENT OF TRANSPORTATION EQUIPMENT PAD B	SPECIFICATION REFERENCE 2461, 2545 2550, 2565	STANDARD PLATE NO. 8106D 2 OF 3



GROUNDING ELECTRODE SYSTEM
FOR CAST-IN-PLACE PAD

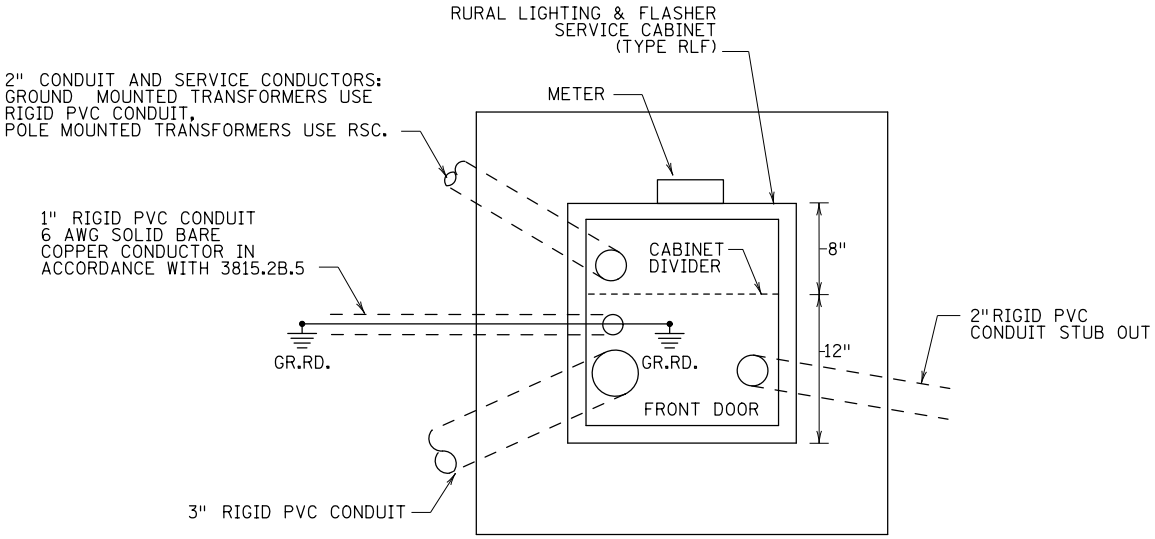


GROUNDING ELECTRODE SYSTEM
FOR PRECAST PAD

NOTES:

APPLY DE-OX COMPOUND TO THE GROUNDING CONNECTIONS AFTER FINAL ASSEMBLY.

APPROVED JULY 15, 2015 STATE DESIGN ENGINEER	STATE OF MINNESOTA DEPARTMENT OF TRANSPORTATION EQUIPMENT PAD B	SPECIFICATION REFERENCE 2461, 2545 2550, 2565	STANDARD PLATE NO. 8106D 3 OF 3



PLAN VIEW

NOTES:

1/2" RADIUS ON ALL FORMED EDGES OF PAD.

COVER THE TOP OF THE CONDUITS AFTER PLACEMENT UNTIL THE CONDUCTORS ARE PLACED.

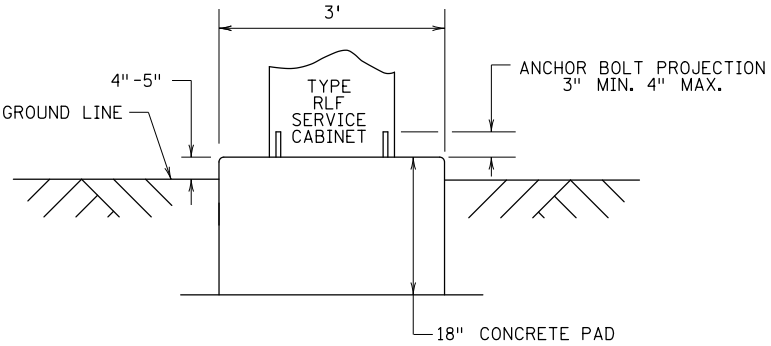
LOCATE CONDUITS INSIDE THE CABINET AWAY FROM SUPPORTING MEMBERS AND DIVIDERS OF THE CABINET.

PROVIDE TWO 15 FOOT LONG GROUND ROD ELECTRODES. PLACE A GROUNDING ELECTRODE SYSTEM IN ACCORDANCE WITH SPEC 2545.3F.3, SEE DETAIL (GROUNDING ELECTRODE SYSTEM FOR CAST-IN-PLACE PAD) ON SHEET 3 OF STANDARD PLATE 8106.

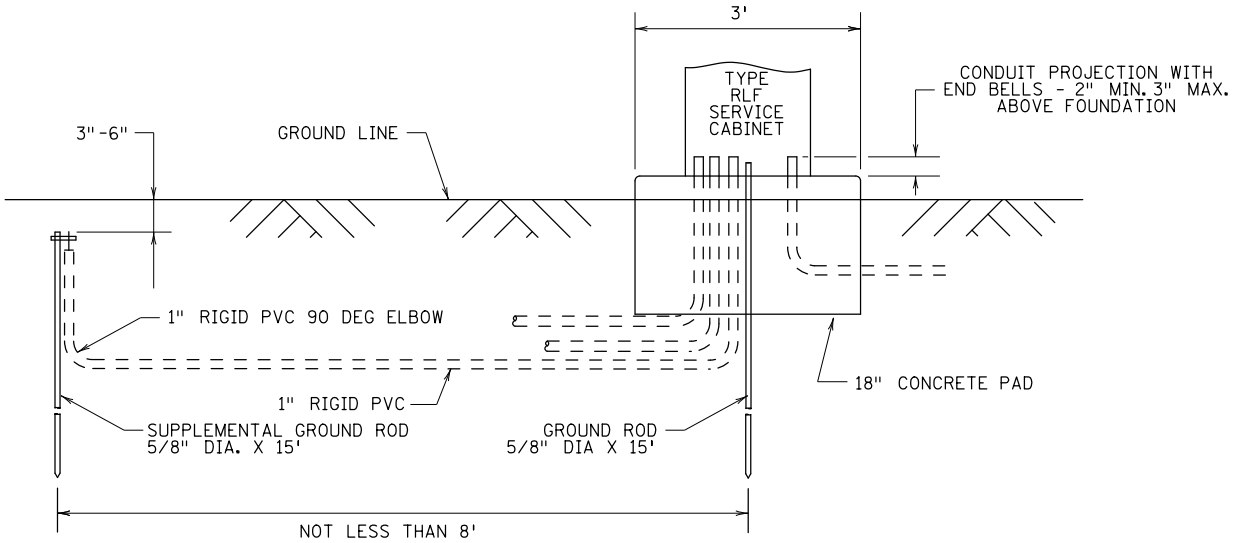
USE CONCRETE MIX 3F52.

USE GALVANIZED ANCHOR RODS, NUTS, AND WASHERS SUPPLIED WITH THE CABINET.

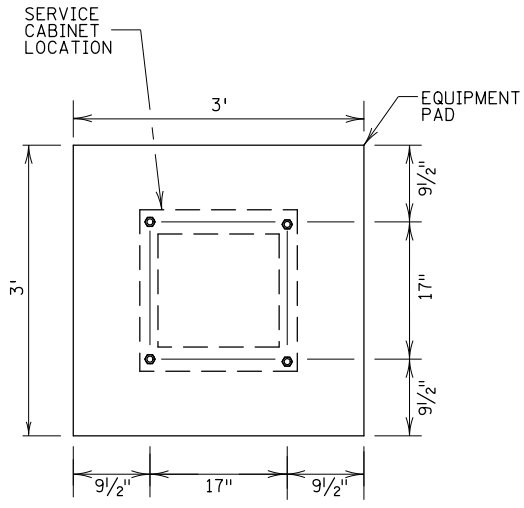
APPROVED DECEMBER 16, 2016 STATE DESIGN ENGINEER	STATE OF MINNESOTA DEPARTMENT OF TRANSPORTATION RLF EQUIPMENT PAD FOUNDATION LAYOUT (CAST-IN-PLACE)	SPECIFICATION REFERENCE 2461 2545 3850	STANDARD PLATE NO. 8107A 1 OF 3



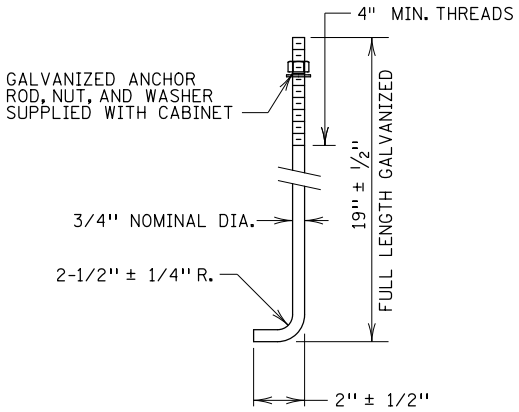
SIDE VIEW



FRONT VIEW



ANCHOR ROD
LOCATION DETAIL

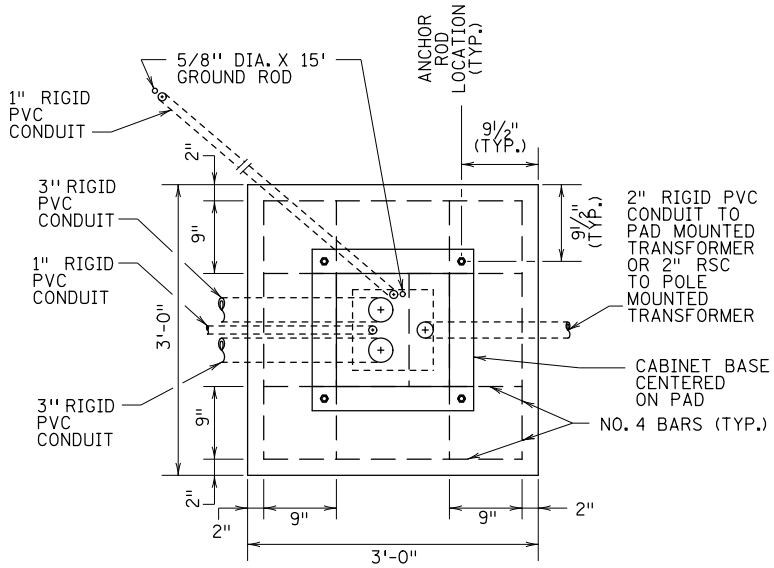


ANCHOR ROD DETAIL

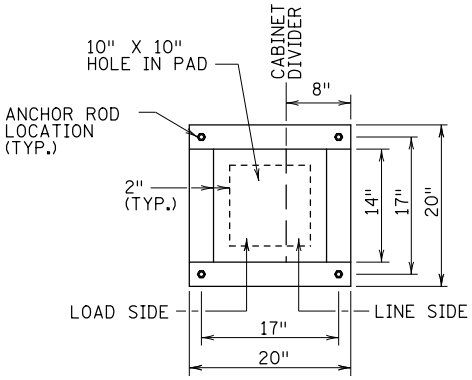
(SPEC. 3385 TYPE A OR TYPE B
AND GALVANIZED PER SPEC 3392)

SEE NOTES ON SHEET 1 OF 3.

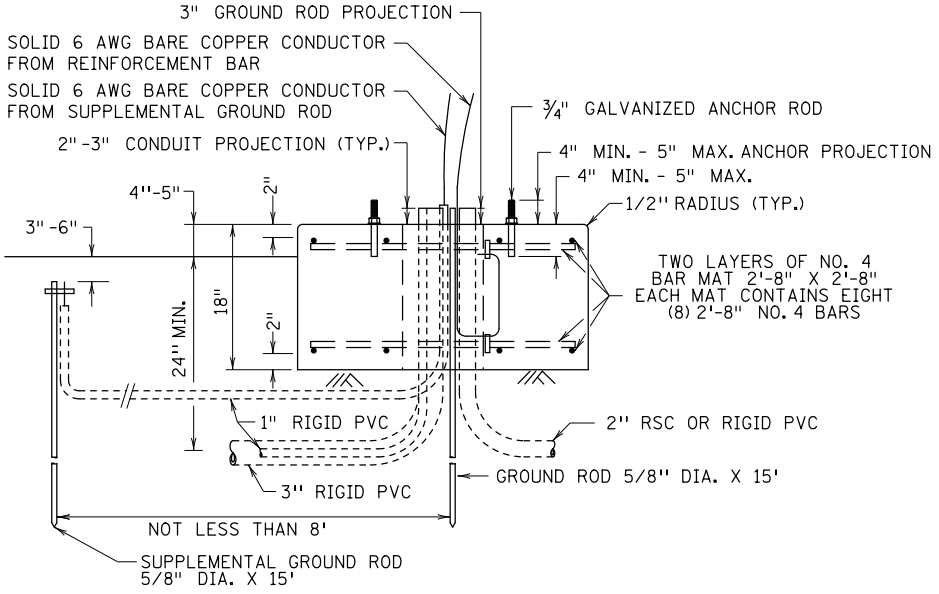
APPROVED DECEMBER 16, 2016 STATE DESIGN ENGINEER	STATE OF MINNESOTA DEPARTMENT OF TRANSPORTATION **RLF EQUIPMENT PAD FOUNDATION LAYOUT** (CAST-IN-PLACE)	SPECIFICATION REFERENCE 2451 2545 3850	STANDARD PLATE NO. 8107A 2 OF 3



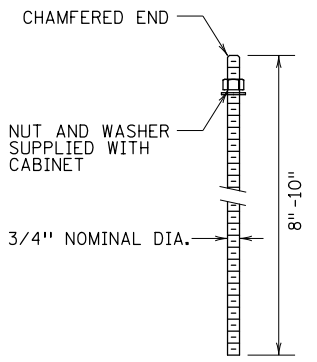
PLAN VIEW



CABINET BASE



SIDE VIEW



ANCHOR ROD DETAIL

(SPEC. 3385 TYPE A OR TYPE B AND GALVANIZED PER SPEC 3392)

NOTES:

FILL 10" X 10" HOLE IN PAD WITH A MATERIAL APPROVED BY THE ENGINEER AFTER THE CONDUITS AND GROUND ROD HAVE BEEN PLACED.

USE CONCRETE MIX 3Y82.

1/2" RADIUS ON ALL EDGES OF PAD.

CAP THE TOP OF THE CONDUITS AFTER PLACEMENT UNTIL THE CONDUCTORS ARE PLACED.

LOCATE CONDUITS INSIDE THE CABINET AWAY FROM SUPPORTING MEMBERS AND DIVIDERS OF THE CABINET.

PROVIDE TWO 15' LONG GROUND ROD ELECTRODES. PLACE A GROUNDING ELECTRODE SYSTEM IN ACCORDANCE WITH SPEC 2545.3F.3. SEE DETAIL (GROUNDING ELECTRODE SYSTEM FOR PRECAST PAD) ON SHEET 3 OF STANDARD PLATE 8106.

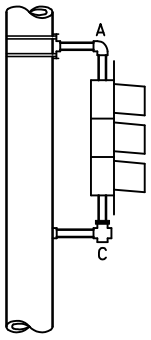
CENTER CABINET ON PAD.

PROVIDE 3/4" GALVANIZED ANCHOR RODS. INSERT ANCHOR RODS IN 7/8" DIA. DRILLED HOLES 4" TO 5" DEEP WITH AN APPROVED EPOXY ADHESIVE FOUND ON MnDOT'S APPROVED/QUALIFIED PRODUCTS LIST (ACCESSIBLE PEDESTRIAN SIGNAL (APS) PUSH BUTTON BASE ADHESIVE ANCHORING). USE GALVANIZED NUTS AND WASHERS SUPPLIED WITH CABINET FOR ANCHOR RODS.

DO NOT USE MECHANICAL OR CONCRETE WEDGE ANCHORS. DO NOT WET CAST ANCHORS.

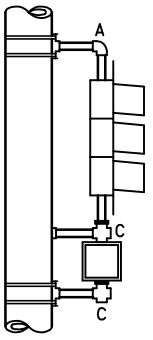
APPROVED DECEMBER 16, 2016 STATE DESIGN ENGINEER	STATE OF MINNESOTA DEPARTMENT OF TRANSPORTATION **RLF EQUIPMENT PAD FOUNDATION LAYOUT** (PRECAST)	SPECIFICATION REFERENCE 2451 2462 2545 2550 2565 3301 3850	STANDARD PLATE NO. 8107A 3 OF 3

TYPE 10A



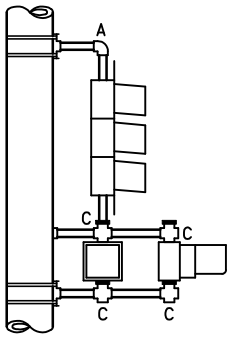
ONE WAY SIGNAL

TYPE 10B



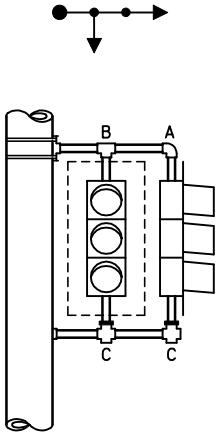
ONE WAY SIGNAL
1-SET PEDESTRIAN
INDICATIONS

TYPE 10C



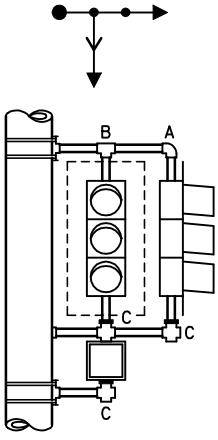
ONE WAY SIGNAL
2-SETS PEDESTRIAN
INDICATIONS

TYPE 20A



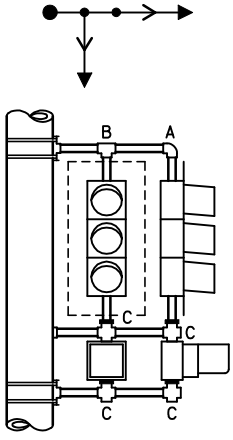
TWO WAY SIGNAL

TYPE 20B



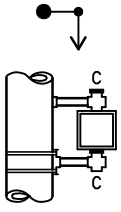
TWO WAY SIGNAL
1-SET PEDESTRIAN
INDICATIONS

TYPE 20C



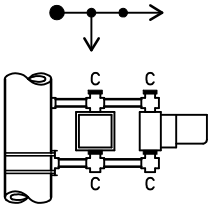
TWO WAY SIGNAL
2-SETS PEDESTRIAN
INDICATIONS

TYPE 30A

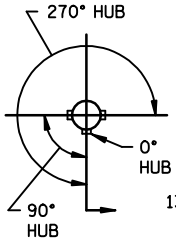


1-SET
PEDESTRIAN
INDICATIONS

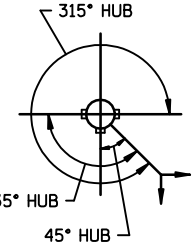
TYPE 30B



2-SETS
PEDESTRIAN
INDICATIONS



TYPE A
MAST ARM
POLE



TYPE B
MAST ARM
POLE

HUB LOCATIONS
FOR MAST ARM POLES

●	TRAFFIC SIGNAL MAST ARM POLE
→	SIGNAL FACE
→	PEDESTRIAN INDICATIONS
| ⊢	1-1/2" HALF COUPLING WELDED IN POLE
	POLE MOUNTING BRACKET
●↓→	PLANS SYMBOL (TYPICAL)
—●	ELBOW OR TEE (TOP VIEW OF BRACKETING)
=	1-1/2" IRON PIPE SIGNAL BRACKET
A	90° ELBOW THREADED INSIDE BOTH ENDS
B	TEE THREADED INSIDE ALL ENDS
C	CROSS - THREADED INSIDE ALL ENDS, ONE END SERRATED

NOTES:

1. POLE MOUNTING OF SIGNAL FACES AND/OR PEDESTRIAN INDICATIONS WILL BE INDICATED IN THE PLANS OR SPECIAL PROVISIONS ACCORDING TO TYPE. THE NOTATION "TYPE 10B-POLE MOUNTED _____ °" INDICATES A ONE-WAY VEHICLE SIGNAL FACE AND 1-SET PEDESTRIAN INDICATIONS POLE MOUNTED AT THE ANGLE SPECIFIED AND UTILIZING THE PIPE FITTINGS AND BRACKETING SHOWN IN THIS PLATE.
2. ALL MOUNTINGS SHOWN ARE TYPICAL, SUBJECT TO MINOR REVISIONS.
3. NUMBER OF SIGNAL INDICATIONS PER SIGNAL FACE SHALL BE AS REQUIRED IN THE PLANS OR SPECIAL PROVISIONS.
4. LENGTH OF SIGNAL BRACKETS SHALL BE SUFFICIENT TO ROTATE SIGNAL FACES FOR PROPER AIMING, WITHOUT CUTTING OR REMOVING BACKGROUND SHIELDS. PEDESTRIAN INDICATIONS SHALL BE ADJUSTABLE 360 DEGREES.
5. POLE MOUNTING BRACKETS SHALL BE 1-1/2" DIA. HORIZONTAL THREADED HUBS ATTACHED TO POLE BY MIN. 3/4" WIDE STAINLESS STEEL STRAPS.
6. BOTTOMS OF LOWER VEHICLE SIGNAL INDICATIONS OF A TWO-WAY SIGNAL SHALL BE AT THE SAME ELEVATION.
7. BACKGROUND SHIELDS SHALL BE PROVIDED ON ALL SIGNAL FACES.
8. PIPE FITTINGS (ELBOWS, TEES AND CROSSES) SHALL BE MALLEABLE IRON OR ANODIZED ALUMINUM. UNUSED OPENINGS SHALL BE PLUGGED WITH APPROPRIATE TYPE ORNAMENTAL THREADED PIPE CAPS. THE SERRATED END OF A PIPE FITTING SHALL BE 72 TOOTH, 5 DEG. RING MATCHING THE RING OF THE SIGNAL INDICATION.
9. WHEN MALLEABLE IRON IS UTILIZED, ALL SIGNAL BRACKETS, PIPE FITTINGS AND CAPS, AND POLE MOUNTING BRACKETS SHALL BE PAINTED WITH AN APPROVED METAL PRIMER PER SPEC 3520, AND TWO (2) COATS OF APPROVED PAINT PER SPEC. 3532 OR WHEN ALUMINUM IS UTILIZED, IT MUST BE ANODIZED ALUMINUM.
10. MUST PROVIDE ALL APPROPRIATE LOCK NUTS, NIPPLES, GASKETS, ETC., NECESSARY TO SECURELY FASTEN SIGNAL AND PEDESTRIAN INDICATIONS.
11. WHEN MOUNTING SIGNAL FACES AND/OR PEDESTRIAN INDICATIONS ON STREET LIGHT POLES, SIGN TRUSS POLES, SPECIAL MAST ARM POLES OR WOOD POLES, THE SAME BASIC BRACKETING SHOWN ON THIS PLATE SHALL APPLY.
12. BRUSH-ON ANTI-SEIZE COMPOUND MUST BE USED ON EACH THREADED FITTING DURING ASSEMBLY.

APPROVED MAY 22, 2009

STATE DESIGN ENGINEER

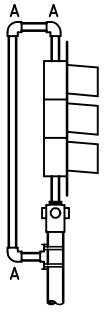
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

TRAFFIC SIGNAL BRACKETING
(POLE MOUNTED)

SPECIFICATION REFERENCE: 2565

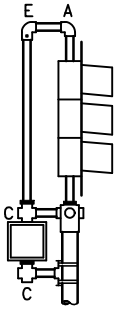
STANDARD PLATE NO.: 8110E

TYPE 1A

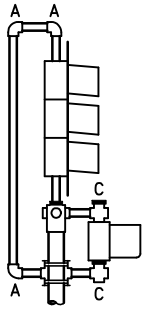


10 FT. SIGNAL PEDESTAL
ONE WAY SIGNAL

TYPE 1B

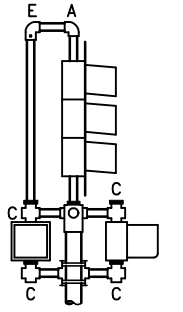


TYPE 1C

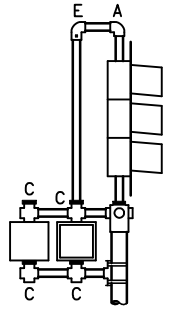


10 FT. SIGNAL PEDESTAL
ONE WAY SIGNAL
1 - PEDESTRIAN SIGNAL FACE

TYPE 1D

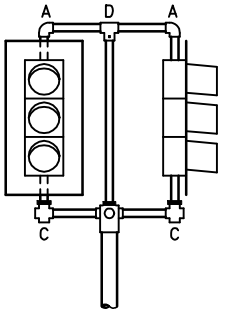


TYPE 1E



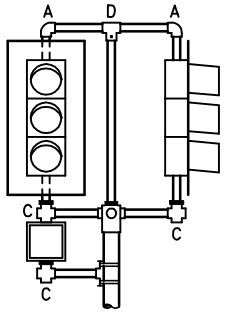
10 FT. SIGNAL PEDESTAL
ONE WAY SIGNAL
2 - PEDESTRIAN SIGNAL FACES

TYPE 2A



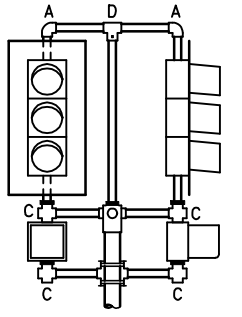
10 FT. SIGNAL PEDESTAL
TWO WAY SIGNAL

TYPE 2B

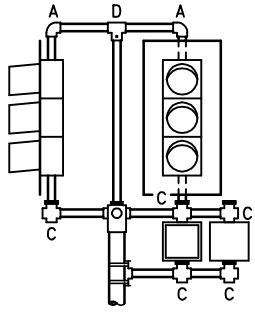


10 FT. SIGNAL PEDESTAL
TWO WAY SIGNAL
1 - PEDESTRIAN SIGNAL FACE

TYPE 2C

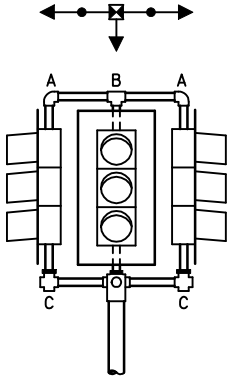


TYPE 2D



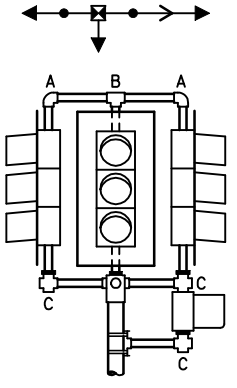
10 FT. SIGNAL PEDESTAL
TWO WAY SIGNAL
2 - PEDESTRIAN SIGNAL FACES

TYPE 3A



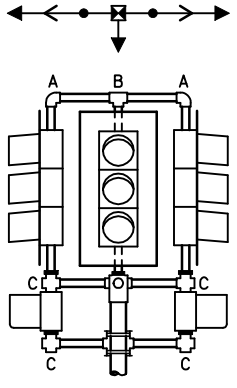
10 FT. SIGNAL PEDESTAL
THREE WAY SIGNAL

TYPE 3B



10 FT. SIGNAL PEDESTAL
THREE WAY SIGNAL
1 - PEDESTRIAN SIGNAL FACE

TYPE 3C



10 FT. SIGNAL PEDESTAL
THREE WAY SIGNAL
2 - PEDESTRIAN SIGNAL FACES

NOTES:

1. SEE SHEET 3 FOR LEGEND OF SYMBOLS, PEDESTAL SLIPFITTER COLLAR DETAIL AND NOTES.
2. SIGNAL PEDESTAL DIMENSIONS SHOWN ARE SHAFT LENGTHS.

APPROVED MAY 22, 2009

STATE DESIGN ENGINEER

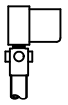
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

TRAFFIC SIGNAL BRACKETING
(PEDESTAL MOUNTED)

SPECIFICATION REFERENCE
2565

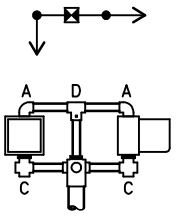
STANDARD PLATE NO.
8111E
1 OF 3

TYPE 4A



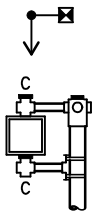
8 FT. SIGNAL PEDESTAL
1 - PEDESTRIAN
SIGNAL FACE

TYPE 4B



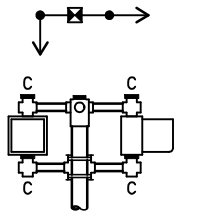
8 FT. SIGNAL PEDESTAL
2 - PEDESTRIAN
SIGNAL FACES

TYPE 4C



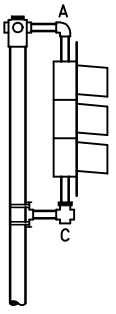
9 FT. SIGNAL PEDESTAL
1 - PEDESTRIAN
SIGNAL FACES

TYPE 4D



9 FT. SIGNAL PEDESTAL
2 - PEDESTRIAN
SIGNAL FACES

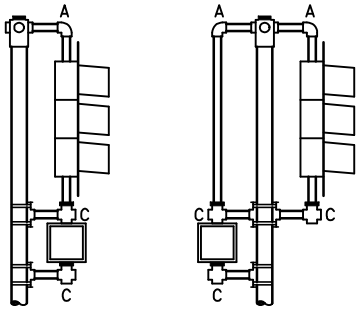
TYPE 5A



13 FT. SIGNAL PEDESTAL
ONE WAY SIGNAL

TYPE 5B

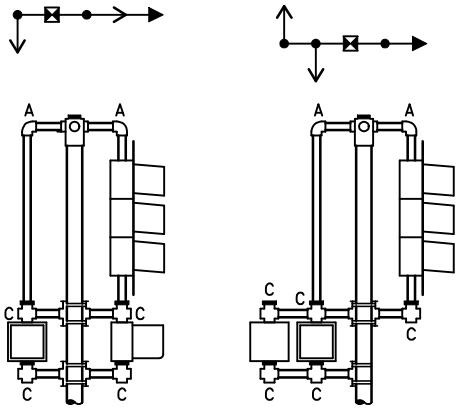
TYPE 5C



13 FT. SIGNAL PEDESTAL
ONE WAY SIGNAL
1 - PEDESTRIAN SIGNAL FACE

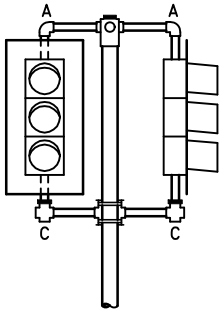
TYPE 5D

TYPE 5E



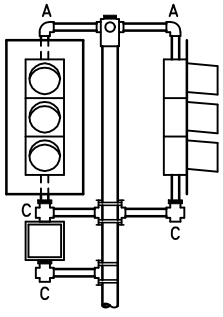
13 FT. SIGNAL PEDESTAL
ONE WAY SIGNAL
2 - PEDESTRIAN SIGNAL FACES

TYPE 6A



13 FT. SIGNAL PEDESTAL
TWO WAY SIGNAL

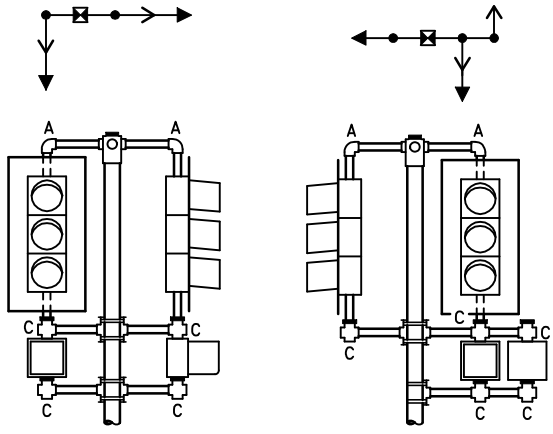
TYPE 6B



13 FT. SIGNAL PEDESTAL
TWO WAY SIGNAL
1 - PEDESTRIAN SIGNAL FACE

TYPE 6C

TYPE 6D



13 FT. SIGNAL PEDESTAL
TWO WAY SIGNAL
2 - PEDESTRIAN SIGNAL FACES

NOTES:

1. SEE SHEET 3 FOR LEGEND OF SYMBOLS, PEDESTAL SLIPFITTER COLLAR DETAIL AND NOTES.
2. SIGNAL PEDESTAL DIMENSIONS SHOWN ARE SHAFT LENGTHS.
3. SHAFT LENGTH FOR TYPE 5, 6 AND 7 (5 SECTION) INDICATIONS ARE 15'.

APPROVED MAY 22, 2009

STATE DESIGN ENGINEER

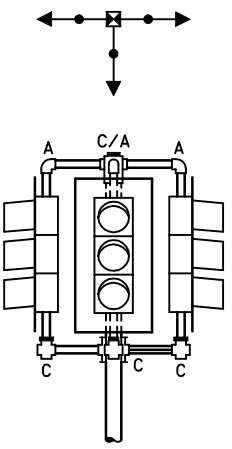
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

TRAFFIC SIGNAL BRACKETING
(PEDESTAL MOUNTED)

SPECIFICATION REFERENCE
2565

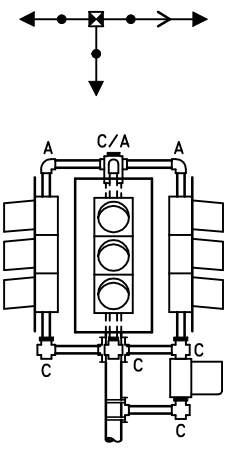
STANDARD PLATE NO.
8111E
2 OF 3

TYPE 7A



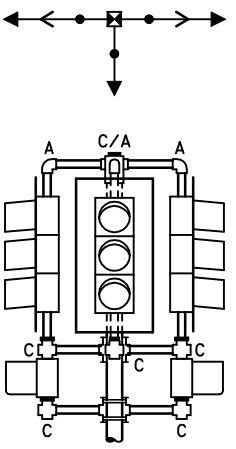
13 FT. SIGNAL PEDESTAL
THREE WAY SIGNAL

TYPE 7B

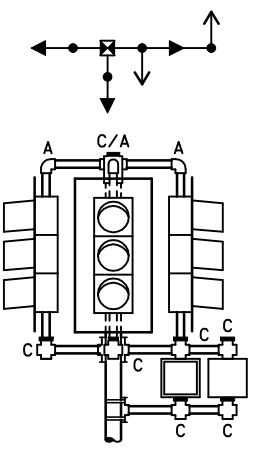


13 FT. SIGNAL PEDESTAL
THREE WAY SIGNAL
1 - PEDESTRIAN SIGNAL FACE

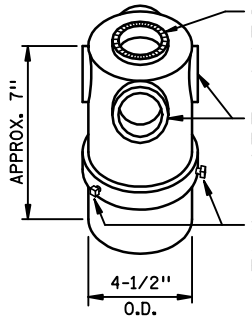
TYPE 7C



TYPE 7D



13 FT. SIGNAL PEDESTAL
THREE WAY SIGNAL
2 - PEDESTRIAN SIGNAL FACES



CENTER OPENING WITH SERRATED RING AND THREADED TO MATCH SIGNAL INDICATION - 72 TOOTH, 5 DEGREE RING.

FOUR 1-1/2" INSIDE THREADED HUBS SPACED 90° APART FOR SIGNAL BRACKETING (PLUGGED IF NOT USED).

SET SCREWS (MIN. 3) DRILLED AND TAPPED TO SECURE PEDESTAL SLIPFITTER COLLAR TO TOP OF PEDESTAL SHAFT.

PEDESTAL SLIPFITTER COLLAR

LEGEND OF SYMBOLS

	TRAFFIC SIGNAL PEDESTAL
	SIGNAL FACE
	PEDESTRIAN INDICATIONS
	PEDESTAL SLIPFITTER COLLAR
	POLE MOUNTING BRACKET
	PLANS SYMBOL (TYPICAL)
	ELBOW, TEE OR CROSS (TOP VIEW OF BRACKETING)
	1-1/2" IRON PIPE SIGNAL BRACKET
A	90° ELBOW THREADED INSIDE BOTH ENDS
B	TEE THREADED INSIDE ALL ENDS
C	CROSS - THREADED INSIDE ALL ENDS, ONE END SERRATED
D	TEE - THREADED INSIDE TWO ENDS - CENTER SLIP FIT (NO THREADS - SET SCREW)
E	90° ELBOW - THREADED INSIDE ONE END - OTHER END SLIP FIT (NO THREADS - SET SCREW)

NOTES:

1. PEDESTAL MOUNTING OF SIGNAL FACES AND/OR PEDESTRIAN INDICATIONS WILL BE INDICATED IN THE PLANS OR SPECIAL PROVISIONS ACCORDING TO TYPE. THE NOTATION "TYPE 1D" INDICATES A ONE-WAY VEHICLE SIGNAL FACE AND 2-SETS PEDESTRIAN INDICATIONS PEDESTAL MOUNTED AND UTILIZING THE PIPE FITTINGS AND BRACKETING SHOWN IN THIS PLATE.
2. ALL MOUNTINGS SHOWN ARE TYPICAL, SUBJECT TO MINOR REVISIONS.
3. NUMBER OF SIGNAL INDICATIONS PER SIGNAL FACE SHALL BE AS REQUIRED IN THE PLANS OR SPECIAL PROVISIONS.
4. BACKGROUND SHIELDS SHALL BE PROVIDED ON ALL SIGNAL FACES.
5. LENGTH OF SIGNAL BRACKETS SHALL BE SUFFICIENT TO ROTATE SIGNAL FACES FOR PROPER AIMING, WITHOUT CUTTING OR REMOVING BACKGROUND SHIELDS. PEDESTRIAN INDICATIONS SHALL BE ADJUSTABLE 360 DEGREES.
6. BOTTOMS OF BACKGROUND SHIELDS ON ONE-WAY SIGNAL FACES SHALL BE SIZED AND ATTACHED TO THE SATISFACTION OF THE ENGINEER.
7. POLE MOUNTING BRACKETS SHALL BE 1-1/2" HORIZONTAL THREADED HUBS ATTACHED TO THE PEDESTAL BY MINIMUM 3/4" WIDE STAINLESS STEEL STRAPS OR SHALL BE ORNAMENTAL TYPE POLE CLAMPS.
8. BOTTOMS OF LOWER VEHICLE SIGNAL INDICATIONS OF A TWO-WAY OR THREE-WAY SIGNAL SHALL BE AT THE SAME ELEVATION.
9. PIPE FITTINGS (ELBOWS, TEES AND CROSSES) AND PEDESTAL SLIP FITTER COLLARS SHALL BE MALLEABLE IRON OR ANODIZED ALUMINUM. UNUSED OPENINGS SHALL BE PLUGGED WITH APPROPRIATE TYPE ORNAMENTAL THREADED PIPE CAPS. THE SERRATED END OF A PIPE FITTING SHALL BE 72 TOOTH, 5 DEGREE RING MATCHING THE RING OF THE SIGNAL OR PEDESTRIAN INDICATION.
10. WHEN MALLEABLE IRON IS UTILIZED, ALL SIGNAL BRACKETS, PIPE FITTINGS AND CAPS, POLE MOUNTING BRACKETS, AND ORNAMENTAL TYPE POLE CLAMPS SHALL BE PAINTED WITH AN APPROVED METAL PRIMER PER SPEC 3520, AND TWO (2) COATS OF APPROVED PAINT PER SPEC 3532. WHEN ALUMINUM IS UTILIZED, IT MUST BE ANODIZED ALUMINUM.
11. MUST PROVIDE ALL APPROPRIATE LOCK NUTS, NIPPLES, GASKETS, ETC., NECESSARY TO SECURELY FASTEN SIGNAL AND PEDESTRIAN INDICATIONS.
12. BRUSH-ON ANTI-SEIZE COMPOUND MUST BE USED ON ALL THREADED FITTINGS DURING ASSEMBLY.
13. SIGNAL PEDESTAL DIMENSIONS SHOWN ARE SHAFT LENGTHS.
14. SHAFT LENGTH FOR TYPE 5, 6, AND 7 (5 SECTION) INDICATIONS ARE 15'.

APPROVED MAY 22, 2009

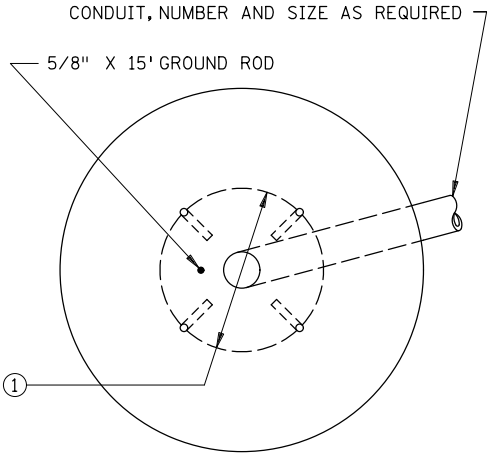
STATE DESIGN ENGINEER

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

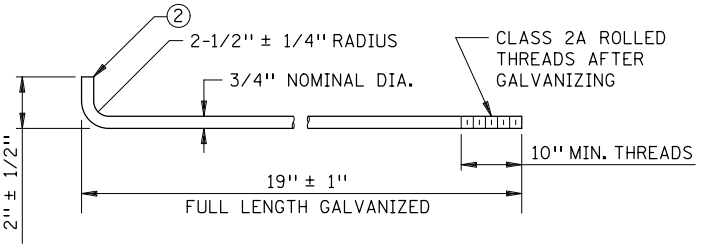
TRAFFIC SIGNAL BRACKETING
(PEDESTAL MOUNTED)

SPECIFICATION REFERENCE
2565

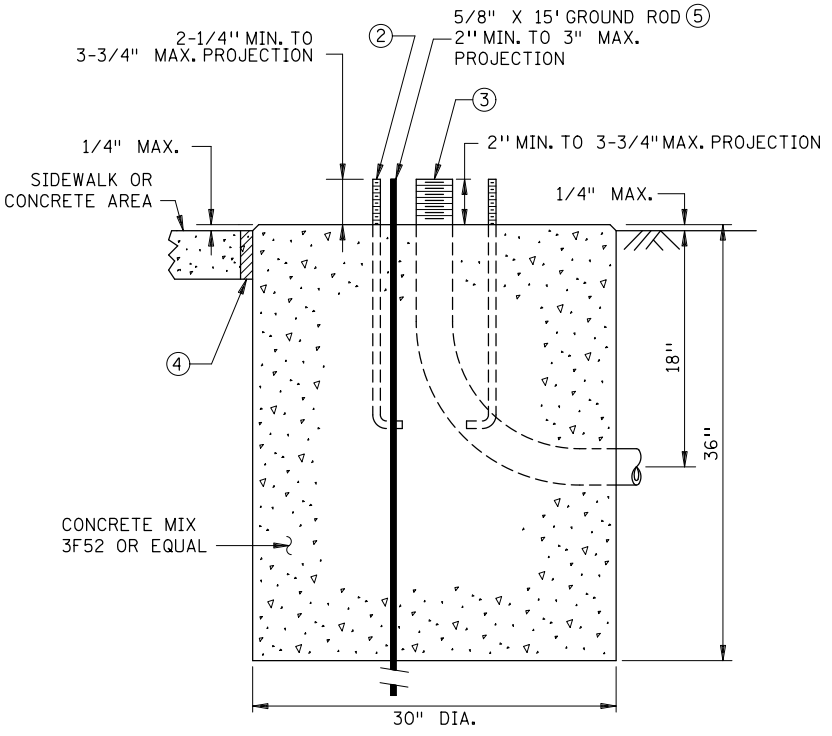
STANDARD PLATE NO.
8111E
3 OF 3



TOP VIEW



ANCHOR ROD DETAIL
(SPEC. 3385 TYPE A)



SIDE SECTION

NOTES:

SIZE OF FOUNDATION MAY BE CHANGED IN THE PLANS OR SPECIAL PROVISIONS, OR IN THE FIELD AS DIRECTED BY THE ENGINEER.

A FIBER FORMING TUBE MAY BE USED IN ACCORDANCE WTIH 2565.3F.

THE UPPER PART OF THE FOUNDATION SHALL BE BEVELED OR CHAMFERED IN A NEAT MANNER AS DIRECTED BY THE ENGINEER IN THE FIELD.

THE OPEN END OF ALL CONDUIT INTO THE FOUNDATION SHALL BE CAPPED UNTIL CABLES ARE PLACED.

ALL BACKFILLING AROUND THE FOUNDATION MUST BE IN ACCORDANCE WITH 2451.

ALL EXCAVATIONS MUST BE PROPERLY COMPACTED IN ACCORDANCE WITH 2451.

ANTI-SEIZE COMPOUND THAT MEETS MIL-PRF-907E SPEC. SHALL BE APPLIED WITH A BRUSH TO ALL THREADS.

END BELL FITTINGS ON CONDUIT ENDS SHALL BE INCLUDED PER SPEC. 2565.3D.

(1) 4 ANCHOR RODS EQUALLY SPACED ON 12-3/4" BOLT CIRCLE POSITIONED SUCH THAT THE PEDESTAL BASE ACCESS DOOR IS CONVENIENTLY LOCATED ON THE SIDE AWAY FROM TRAFFIC (IF POSSIBLE).

(2) FOUR (4) 3/4" DIA. ANCHOR RODS, NUTS AND WASHERS PER SPEC. 3385 (TYPE A), OR APPROVED PEDESTAL MANUFACTURERS' EQUAL. THE WASHERS SHALL BE PER SPEC. 3832.2C3, EXCEPT THAT THE DIMENSIONS OF THE WASHERS SHALL BE ONE OF OPTIONS SHOWN ON STANDARD PLATE 8129.

(3) RIGID STEEL CONDUIT PER SPEC. 3801 OR RIGID PVC CONDUIT PER SPEC. 3803. SIZE AND NUMBER AS REQUIRED IN PLANS OR SPECIAL PROVISIONS.

(4) PREFORMED JOINT FILLER BETWEEN FOUNDATION AND SIDEWALK OR CONCRETE AREA

(5) WHEN IN CONTACT WITH ROCK, GROUND RODS SHOULD BE PLACED AS SPECIFIED IN CURRENT NATIONAL ELECTRICAL CODE (NEC)

PLANS SYMBOL	
TRAFFIC SIGNAL PEDESTAL	⧓

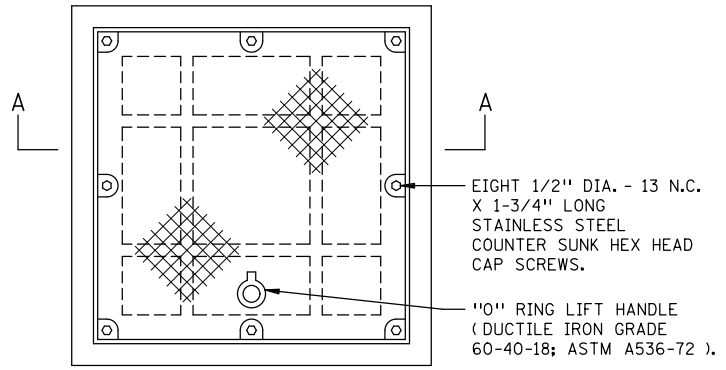
APPROVED JULY 15, 2015

STATE DESIGN ENGINEER

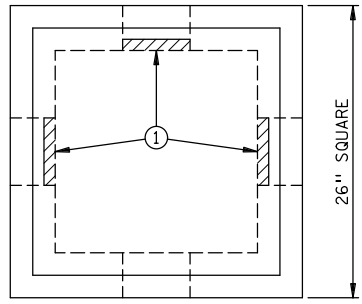
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

PEDESTAL FOUNDATION
(TRAFFIC CONTROL SIGNALS)

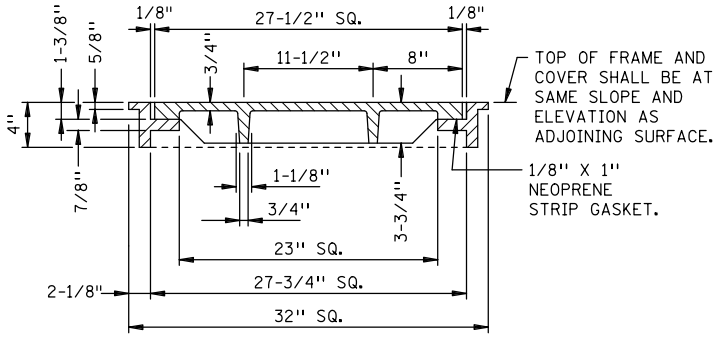
SPECIFICATION REFERENCE	STANDARD PLATE NO.
2461 2565	8112I



PLAN



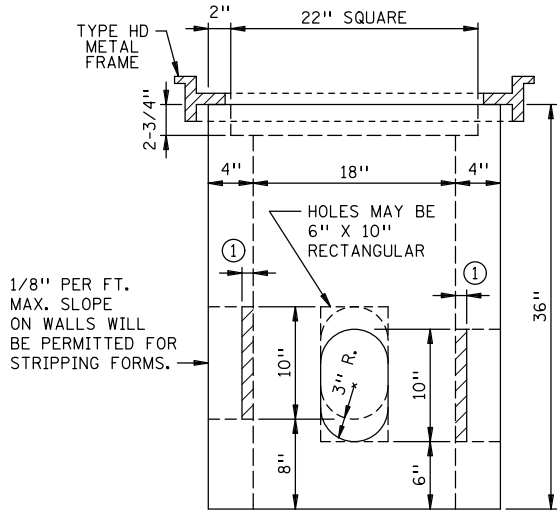
TOP VIEW



SECTION A-A

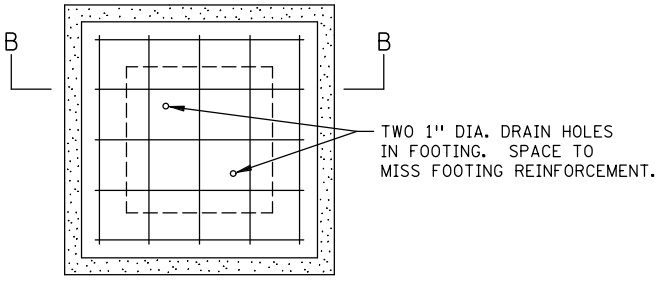
TYPE HD - METAL FRAME AND COVER

SPEC. 3321

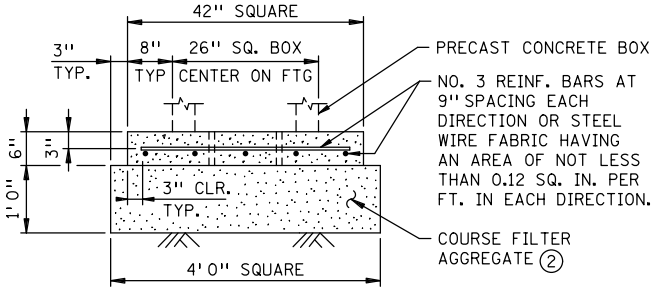


ELEVATION

PRECAST CONCRETE BOX



PLAN



SECTION B-B

"HD" CONCRETE FOOTING

NOTES:

TYPE HD METAL FRAMES AND COVERS SHALL BE COATED WITH MANUFACTURER'S SHOP COAT OF ASPHALT PAINT.

AFTER HANDHOLE AND CONDUIT INSTALLATION, ALL INSIDE HANDHOLE SIDE WALLS SHALL BE MADE WATER TIGHT BY PATCHING WITH CONCRETE TO THE SATISFACTION OF THE ENGINEER.

FOOTING MAY BE PRECAST OR CAST-IN-PLACE.

METAL FRAME AND COVER SHALL BE INDEPENDENTLY GROUNDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (NEC) 314.30.

EXCAVATIONS AND BACKFILLING SHALL BE IN ACCORDANCE WITH 2451.

F&I HANDHOLE IN ACCORDANCE WITH 2565.3E.

F&I CONDUITS IN ACCORDANCE WITH 2565.3D.

F&I END BELL FITTINGS ON RIGID PVC CONDUIT IN ACCORDANCE WITH 2565.3D.

EMBOSS "MnDOT SIGNALS" ON THE COVER FOR TRAFFIC SIGNAL CONTROL PROJECTS.

EMBOSS "MnDOT LIGHTING" ON THE COVER FOR ROADWAY LIGHTING PROJECTS.

EMBOSS "MnDOT TMS" ON THE COVER FOR ITS PROJECTS.

(1) 1" ± 1/4" CONCRETE ON INSIDE WALL OF ACCESS HOLES TO BE KNOCKED OUT AS NEEDED. A 3/4" HOLE IS PERMITTED IN KNOCKOUT WALLS FOR INSTALLATION.

(2) PLACE 4' X 4' X 1' COARSE FILTER AGGREGATE, SPEC. 3149 UNDER FOOTING.

APPROVED JUNE 2, 2014

STATE DESIGN ENGINEER

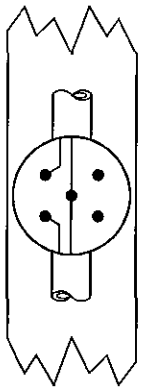
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

PRECAST CONCRETE HANDHOLE
WITH VEHICLE LOAD

SPECIFICATION REFERENCE
3622

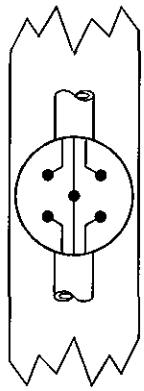
STANDARD PLATE NO.
8117G

SERVICE FOR SIGNAL ONLY. METER WIRED FOR 120 VOLT OPERATION. (120 VOLTS SERVICE)

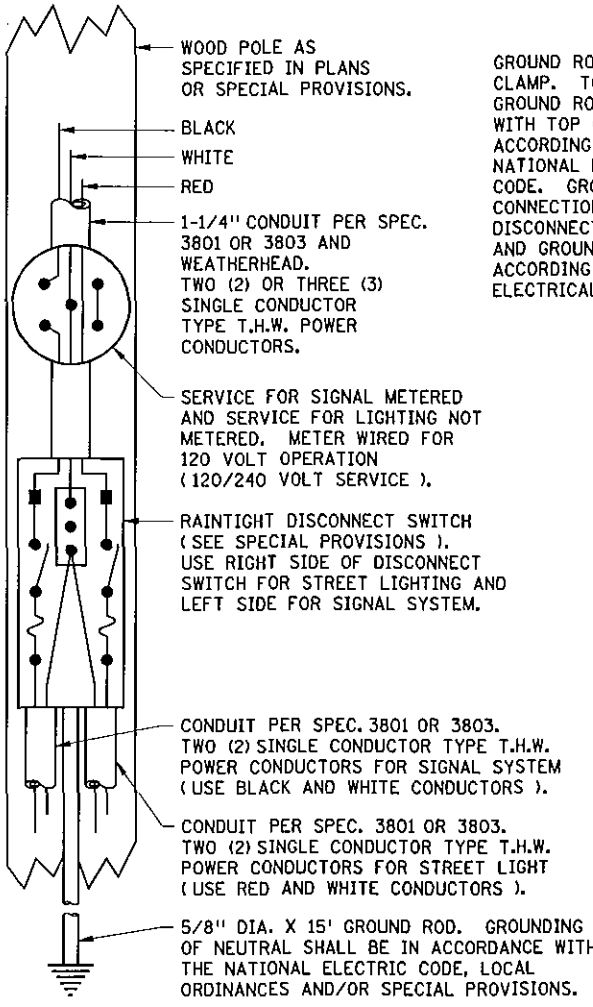


SIGNAL

SERVICE FOR SIGNAL AND LIGHTING METERED. (120/240 VOLTS SERVICE)

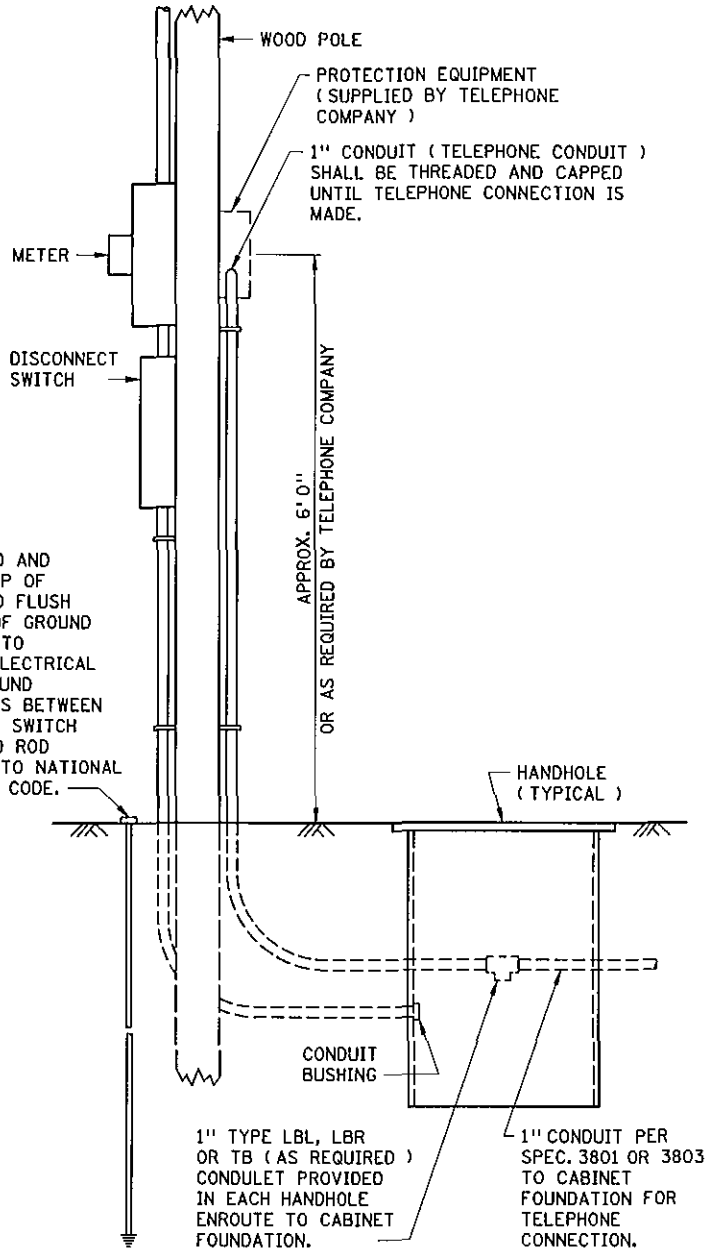


SIGNAL AND LIGHTING



METER AND DISCONNECT SWITCH

WIRING DIAGRAMS



ELEVATION

APPROVED MAY 1, 2008 STATE DESIGN ENGINEER	STATE OF MINNESOTA DEPARTMENT OF TRANSPORTATION SERVICE EQUIPMENT & POLE TRAFFIC CONTROL SIGNALS	SPECIFICATION REFERENCE 2545 2565	STANDARD PLATE NO. 8118D

APPROVED 02-27-2024
STATE DESIGN ENGINEER

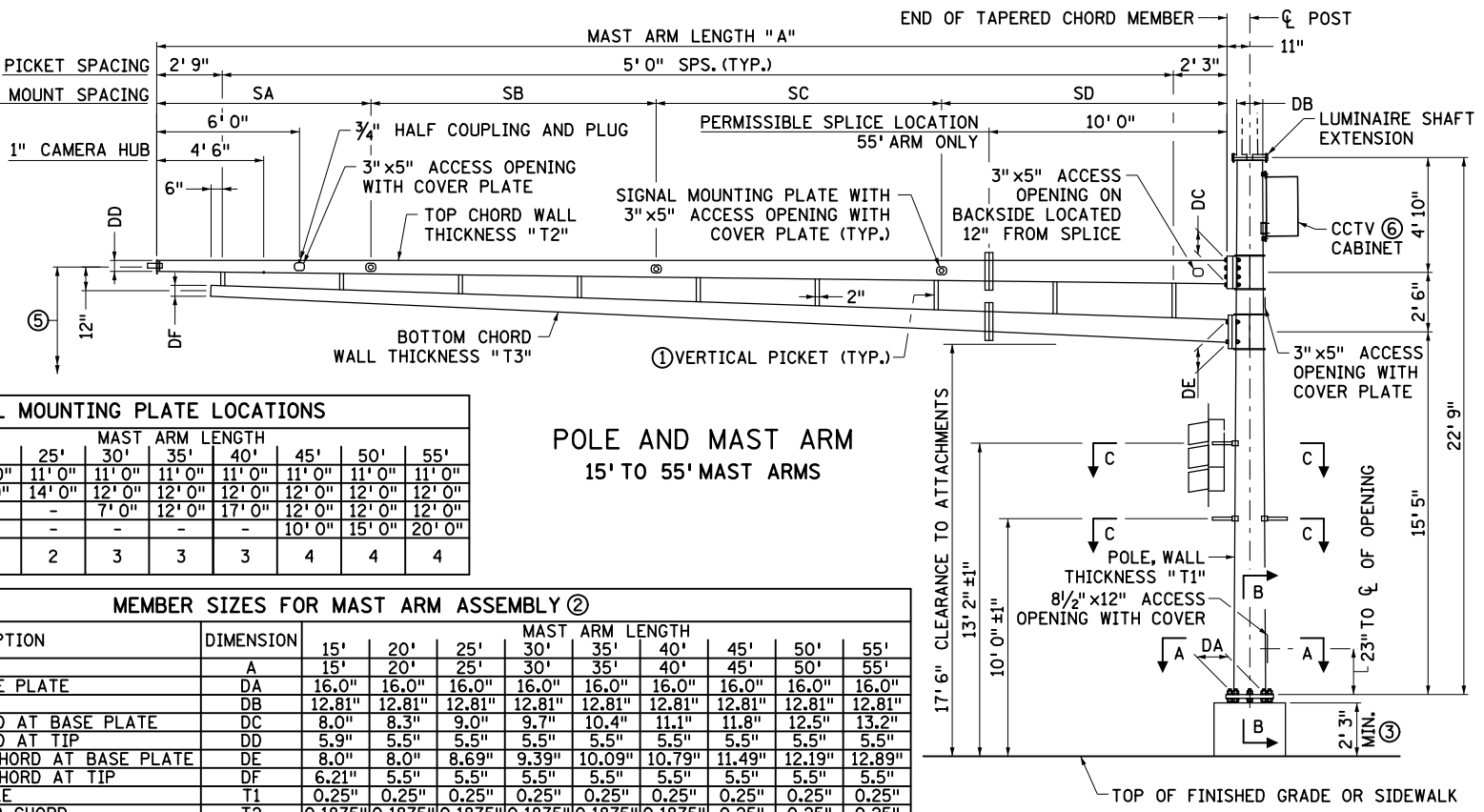
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

POLE AND MAST ARM TYPE TS

MAST ARM ASSEMBLY
FOR MAST ARM LENGTHS 15' TO 55'

SPECIFICATION REFERENCE
2565

STANDARD PLATE NO.
8124A



POLE AND MAST ARM
15' TO 55' MAST ARMS

SIGNAL MOUNTING PLATE LOCATIONS

DIMENSION	MAST ARM LENGTH 15'	20'	25'	30'	35'	40'	45'	50'	55'
SA	15' 0"	11' 0"	11' 0"	11' 0"	11' 0"	11' 0"	11' 0"	11' 0"	11' 0"
SB	-	9' 0"	14' 0"	12' 0"	12' 0"	12' 0"	12' 0"	12' 0"	12' 0"
SC	-	-	-	7' 0"	12' 0"	17' 0"	12' 0"	12' 0"	12' 0"
SD	-	-	-	-	-	-	10' 0"	15' 0"	20' 0"
④ NO. OF PLATES	1	2	2	3	3	3	4	4	4

MEMBER SIZES FOR MAST ARM ASSEMBLY ②

DESCRIPTION	DIMENSION	MAST ARM LENGTH 15'	20'	25'	30'	35'	40'	45'	50'	55'
MAST ARM LENGTH	A	15'	20'	25'	30'	35'	40'	45'	50'	55'
POLE DIAMETER AT BASE PLATE	DA	16.0"	16.0"	16.0"	16.0"	16.0"	16.0"	16.0"	16.0"	16.0"
POLE DIAMETER AT CAP	DB	12.81"	12.81"	12.81"	12.81"	12.81"	12.81"	12.81"	12.81"	12.81"
DIAMETER OF TOP CHORD AT BASE PLATE	DC	8.0"	8.3"	9.0"	9.7"	10.4"	11.1"	11.8"	12.5"	13.2"
DIAMETER OF TOP CHORD AT TIP	DD	5.9"	5.5"	5.5"	5.5"	5.5"	5.5"	5.5"	5.5"	5.5"
DIAMETER OF BOTTOM CHORD AT BASE PLATE	DE	8.0"	8.0"	8.69"	9.39"	10.09"	10.79"	11.49"	12.19"	12.89"
DIAMETER OF BOTTOM CHORD AT TIP	DF	6.21"	5.5"	5.5"	5.5"	5.5"	5.5"	5.5"	5.5"	5.5"
WALL THICKNESS OF POLE	T1	0.25"	0.25"	0.25"	0.25"	0.25"	0.25"	0.25"	0.25"	0.25"
WALL THICKNESS OF TOP CHORD	T2	0.1875"	0.1875"	0.1875"	0.1875"	0.1875"	0.1875"	0.25"	0.25"	0.25"
WALL THICKNESS OF BOTTOM CHORD	T3	0.1875"	0.1875"	0.1875"	0.1875"	0.1875"	0.1875"	0.25"	0.25"	0.25"

NOTES:

① USE 2" WIDE BY ⅝" THICK BAR FOR VERTICAL PICKETS AND PLACE AT THE SPACING SHOWN.

② DIAMETER DIMENSIONS PROVIDED ARE THE OUTSIDE DIAMETER.

③ INCREASE FOUNDATION PROJECTION AS REQUIRED TO PROVIDE A VERTICAL CLEARANCE FROM THE BOTTOM OF ALL SIGNS AND SIGNAL HEADS (INCLUDING BACKGROUND SHIELDS) TO THE PAVEMENT OF NOT LESS THAN 17.50' NOR MORE THAN 19.00'.

④ INCLUDES END MAST ARM SIGNAL MOUNT.

⑤ 21' 1" MOUNTING HEIGHT AFTER DEFLECTION DUE TO SELF WEIGHT AND DEAD LOAD FROM SIGNS AND SIGNALS.

⑥ PROVIDE BRACKETING AND HARDWARE FOR CCTV CABINET ON POLES SHOWN ON THE PLANS. CCTV CABINET BY OTHERS.

FURNISH AND INSTALL HIGH-STRENGTH, LOW-ALLOY, COLUMBIUM-VANADIUM STRUCTURAL STEEL IN ACCORDANCE WITH SPEC. 3310. 50,000 PSI MINIMUM YIELD.

LEVEL THE POLE AND BASE PLATE BY ADJUSTING THE LEVELING NUTS.

TAPER POLE MEMBER AND MAST ARM CHORD MEMBERS AT A RATE OF 0.14 INCHES/FOOT.

FURNISH AND INSTALL HIGH STRENGTH STRUCTURAL STEEL BOLTS, NUTS, WASHERS, AND TENSION INDICATORS IN ACCORDANCE WITH SPEC. 3391 AND 2404 FOR THE STRUCTURAL BOLTING OF MAST ARM SPLICES, MAST ARM TO POLE CONNECTIONS, AND LUMINAIRE AND CAMERA SHAFT EXTENSIONS TO POLES. PLACE DIRECT TENSION INDICATORS (DTI) UNDER THE STRUCTURAL BOLT HEADS WITH THE BUMPS TOUCHING THE UNDERSIDE OF THE BOLT HEAD. TIGHTEN THE CONNECTIONS BY TURNING THE STRUCTURAL HEAVY HEX NUTS. DO NOT ROTATE THE BOLT HEADS. USE AN INSPECTION PROCEDURE FOR DTI IN ACCORDANCE WITH SPEC. 2402.

GALVANIZE HARDWARE IN ACCORDANCE WITH SPEC. 3392. GALVANIZE STEEL COMPONENTS IN ACCORDANCE WITH SPEC. 3394 AFTER FABRICATION. PROVIDE VENT AND DRAIN HOLES FOR THE HOT-DIP GALVANIZING PROCESS.

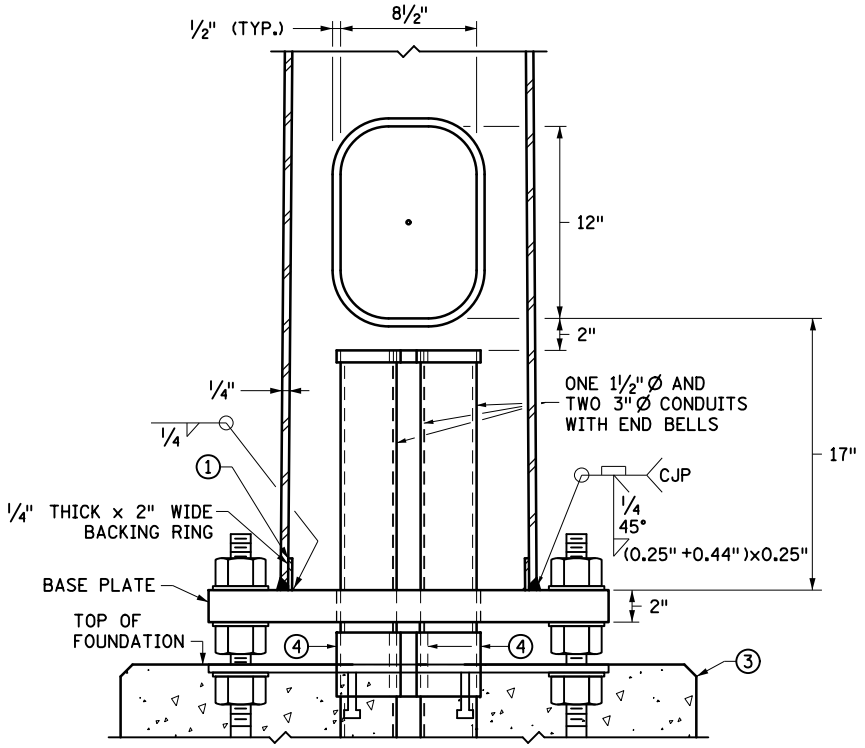
WELD IN ACCORDANCE WITH THE AMERICAN WELDING SOCIETY STRUCTURAL WELDING CODE (STEEL) ANSI/AWS D1.1 (CURRENT EDITION).

FABRICATE ROUND TAPERED POLE AND MAST ARM ELEMENTS BY LONGITUDINAL SEAM WELDING WITH 60% PENETRATION EXCEPT WITHIN 6" OF FULL-PENETRATION CIRCUMFERENTIAL GROOVE WELDS. FULL-PENETRATION GROOVE WELDS ARE REQUIRED WITHIN THIS 6" REGION.

PERFORM A WIND LOAD ANALYSIS FOR COMPONENTS MOUNTED TO THE MAST ARM.

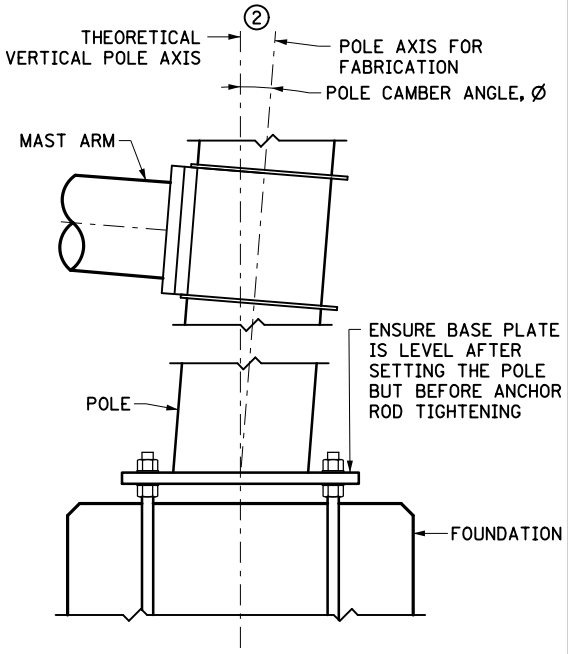
FOR SECTION A-A AND SECTION B-B, SEE SHEET 2 OF 12. FOR SECTION C-C, SEE SHEET 8 OF 12.

POLE TYPE	MAST ARM LENGTH	POLE CAMBER ANGLE Ø
TS15, TS20, TS25	15' 0" TO 25' 0"	0°00'00.0"
TS30, TS35, TS40	30' 0" TO 40' 0"	0°00'00.0"
TS45, TS50, TS55	45' 0" TO 55' 0"	0°30'00.0"



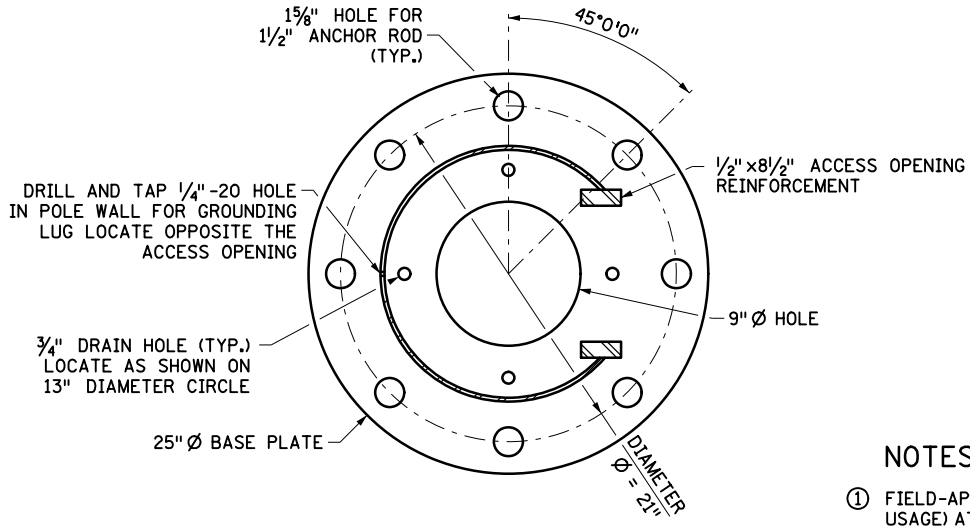
SECTION B-B

FOUNDATION REINFORCEMENT NOT SHOWN FOR CLARITY



POLE ALIGNMENT

NOT TO SCALE



SECTION A-A

CONDUITS NOT SHOWN FOR CLARITY

NOTES:

① FIELD-APPLIED 100% SILICONE CAULK (EXTERIOR USAGE) AT TOP OF BACKING RING ALONG ENTIRE CIRCUMFERENCE.

② POLE ROTATION IS ABOUT A HORIZONTAL AXIS ORIENTED PERPENDICULAR TO MAST ARM AXIS. SENSE OF ROTATION IS SUCH THAT TIP OF MAST ARM WILL BE RAISED.

③ SEE STANDARD PLAN 5-297.861 FOR PVC CONDUIT AND COUPLING INSTALLATION REQUIREMENTS.

④ PVC COUPLING.

APPROVED 02-27-2024

STATE DESIGN ENGINEER

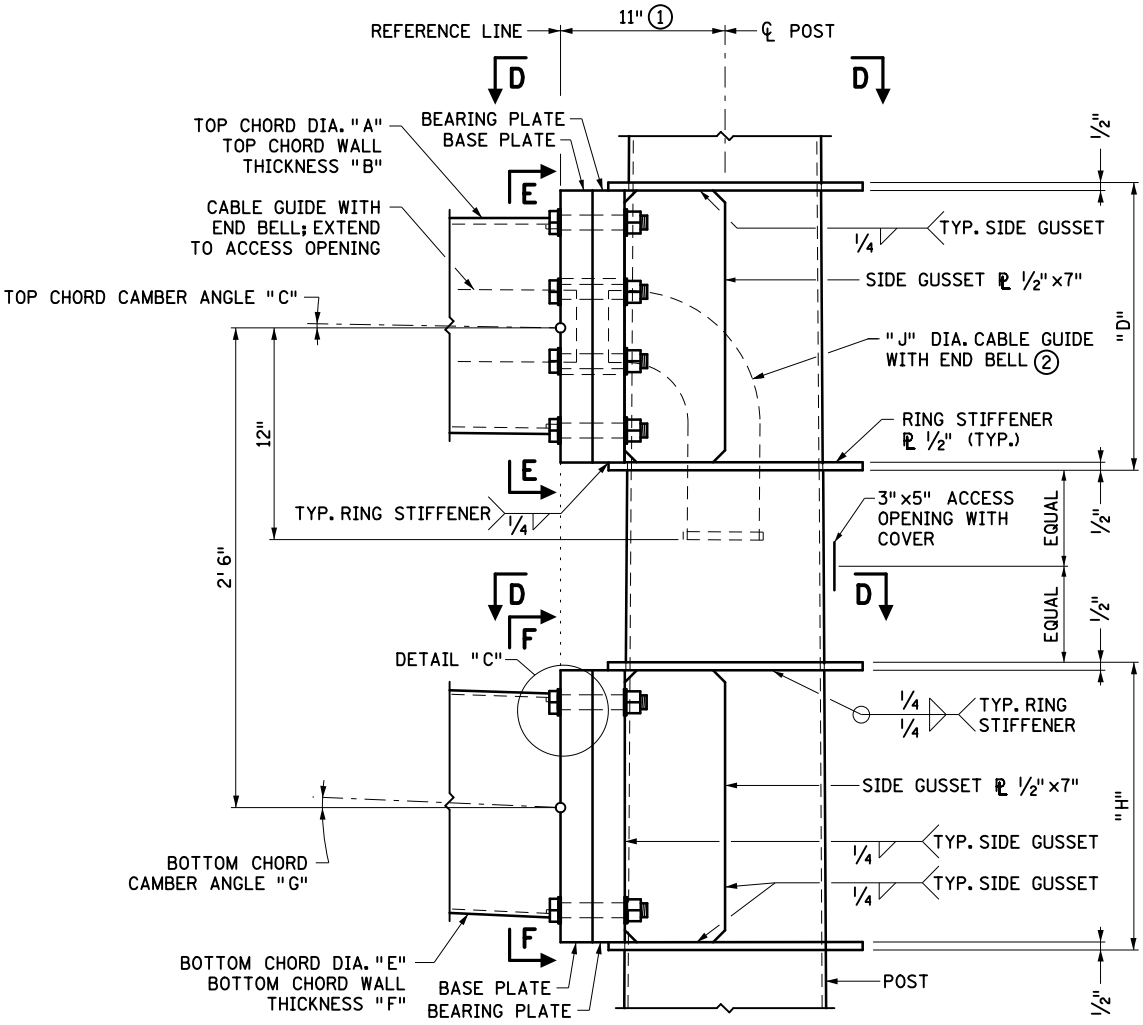
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

POLE AND MAST ARM TYPE TS

POLE DETAILS
FOR MAST ARM LENGTHS 15' TO 55'

SPECIFICATION REFERENCE 2565

STANDARD PLATE NO. 8124A



POLE/MAST ARM CONNECTION DETAIL

BOLT CONFIGURATION VARIES BY MAST ARM LENGTH
SEE SHEETS 4 AND 5 OF 12 FOR DETAILS

MAST ARM CONNECTION DIMENSIONS

DESCRIPTION	DIMENSION	MAST ARM LENGTH								
		15'	20'	25'	30'	35'	40'	45'	50'	55'
CHORD DIAMETER AT BASE PLATE	A	8.0"	8.3"	9.0"	9.7"	10.4"	11.1"	11.8"	12.5"	13.2"
CHORD WALL THICKNESS AT BASE PLATE	B	0.1875"	0.1875"	0.1875"	0.1875"	0.1875"	0.1875"	0.25"	0.25"	0.25"
CHORD CAMBER ANGLE	C	0°15'00.0"	0°15'00.0"	0°15'00.0"	0°30'00.0"	0°30'00.0"	0°30'00.0"	1°15'00.0"	1°15'00.0"	1°15'00.0"
RING STIFFENER SPACING - TOP	D	14"	14"	14"	20"	20"	20"	20"	20"	20"
CHORD DIAMETER AT BASE PLATE	E	8.0"	8.0"	8.69"	9.39"	10.09"	10.79"	11.49"	12.19"	12.89"
CHORD WALL THICKNESS AT BASE PLATE	F	0.1875"	0.1875"	0.1875"	0.1875"	0.1875"	0.1875"	0.25"	0.25"	0.25"
CHORD CAMBER ANGLE	G	4°00'00.0"	4°00'00.0"	4°00'00.0"	2°45'00.0"	2°45'00.0"	2°45'00.0"	2°45'00.0"	2°45'00.0"	2°45'00.0"
RING STIFFENER SPACING - BOTTOM	H	14"	14"	14"	14"	14"	14"	17"	17"	17"
DIAMETER OF CABLE GUIDE	J	3"	3"	3"	4"	4"	4"	4"	4"	4"

NOTES:

EACH MAST ARM CONNECTION CONSISTS OF THE FOLLOWING:
TWO HORIZONTAL RING STIFFENER PLATES, 0.50" THICK
TWO VERTICAL SIDE GUSSET PLATES, 0.50" THICK
ONE BEARING PLATE, 2" THICK

MAST ARM CHORD MEMBERS ARE WELDED TO A 2" THICK CHORD BASE PLATE, WHICH IS BOLTED TO THE BEARING PLATE BY A SPECIFIED NUMBER OF BOLTS.

FOR SECTION D-D AND DETAIL C, SEE SHEET 6 OF 12. FOR SECTION E-E (BEARING AND BASE PLATE DETAILS), SEE SHEET 4 OF 12. FOR SECTION F-F (BEARING AND BASE PLATE DETAILS), SEE SHEET 5 OF 12.

(1) DISTANCE TO MAST ARM REFERENCE LINE. THE REFERENCE LINE IS LOCATED ON THE PLANE OF WHERE THE RESPECTIVE MAST ARM CHORD MEMBER MEETS THE BASE PLATE.

(2) "J" DIAMETER SCHEDULE 40 STEEL PIPE CABLE GUIDE, BEND INTO A 90° CONFIGURATION. PROJECT CABLE GUIDE 6" BEYOND TOP CHORD BEARING PLATE. SEE SHEET 4 OF 12 FOR CONNECTION DETAIL TO BEARING PLATE. BREAK EDGES OF GUIDE.

APPROVED 02-27-2024
STATE DESIGN ENGINEER

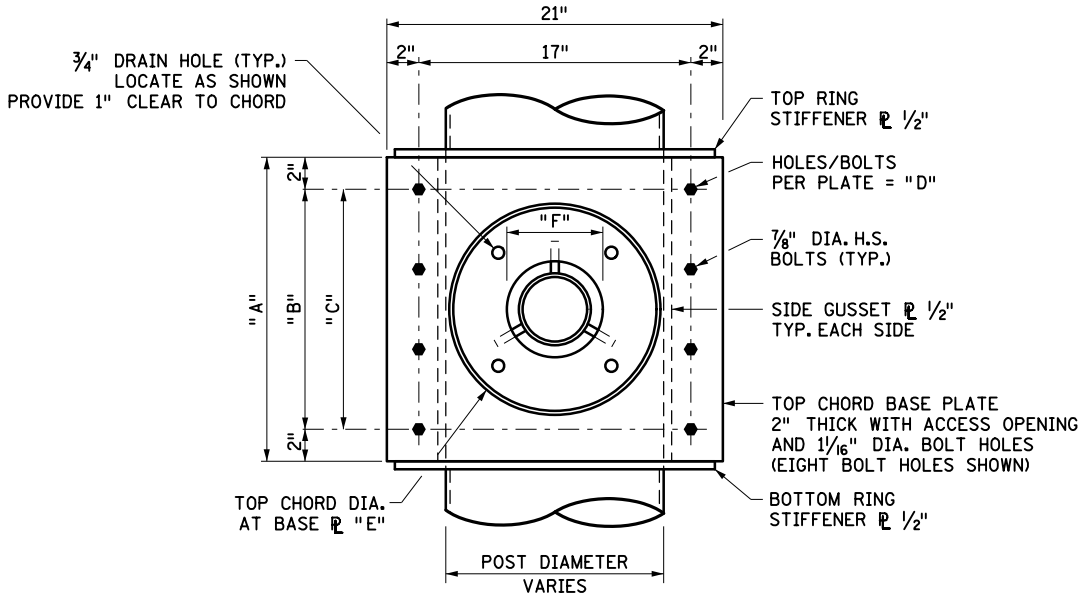
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

POLE AND MAST ARM TYPE TS

MAST ARM CONNECTION DETAILS
FOR MAST ARM LENGTHS 15' TO 55'

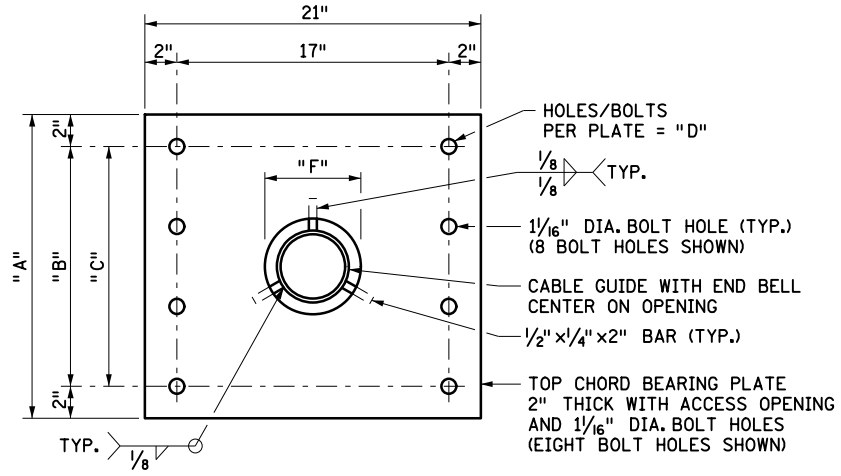
SPECIFICATION REFERENCE
2565

STANDARD PLATE NO.
8124A
3 OF 12



SECTION E-E - BASE PLATE

55' MAST ARM SHOWN; 15' TO 50' SIMILAR



TOP CHORD BEARING PLATE DETAILS

55' MAST ARM SHOWN; 15' TO 50' SIMILAR

MAST ARM CONNECTIONS DIMENSIONS

DESCRIPTION	DIMENSION	MAST ARM LENGTH								
		15'	20'	25'	30'	35'	40'	45'	50'	55'
CONNECTION/BEARING PLATE HEIGHT	A	13"	13"	13"	19"	19"	19"	19"	19"	19"
TOTAL HOLE SPACING VERTICAL	B	9"	9"	9"	15"	15"	15"	15"	15"	15"
HOLE SPACING	C	2 SPS. @ 4½"	2 SPS. @ 4½"	2 SPS. @ 4½"	3 SPS. @ 5"	3 SPS. @ 5"	3 SPS. @ 5"	3 SPS. @ 5"	3 SPS. @ 5"	3 SPS. @ 5"
HOLES PER PLATE	D	6	6	6	8	8	8	8	8	8
TOP CHORD O.D. AT BASE PLATE	E	8.0"	8.3"	9.0"	9.7"	10.4"	11.1"	11.8"	12.5"	13.2"
ACCESS OPENING	F	4.5"	4.5"	4.5"	6"	6"	6"	6"	6"	6"

APPROVED 02-27-2024

STATE DESIGN ENGINEER

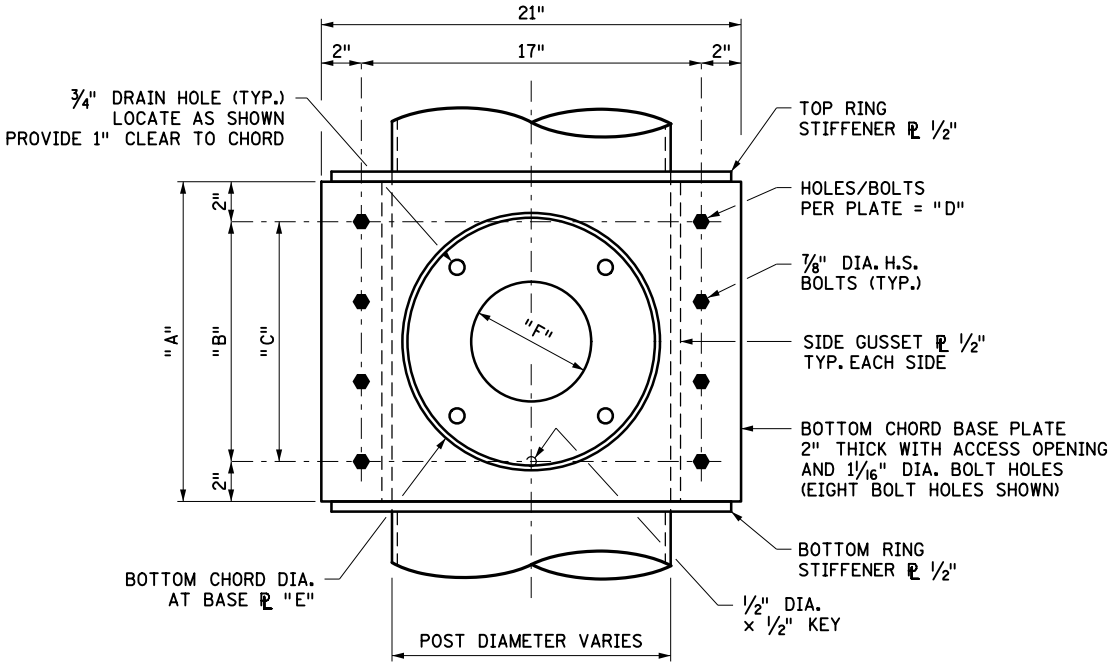
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

POLE AND MAST ARM TYPE TS

TOP CHORD CONNECTION DETAILS
FOR MAST ARM LENGTHS 15' TO 55'

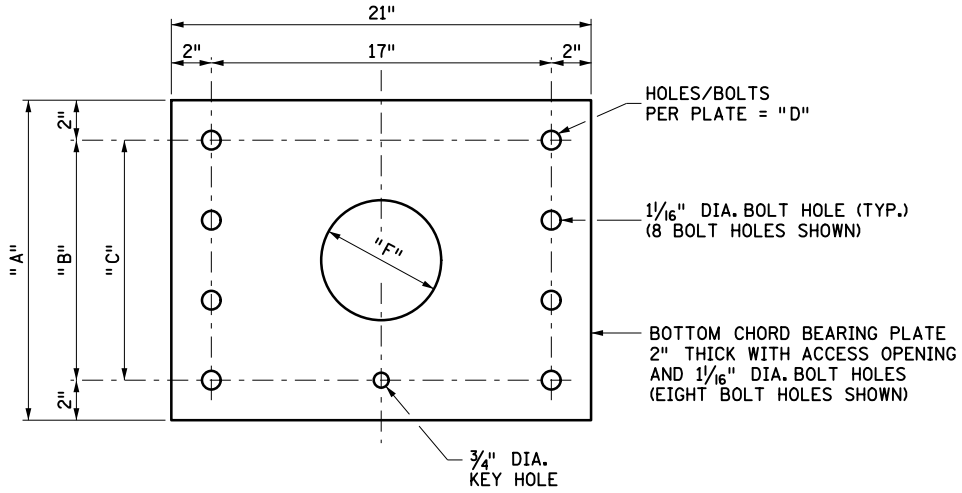
SPECIFICATION REFERENCE
2565

STANDARD PLATE NO.
8124A



SECTION F-F - BASE PLATE

55' MAST ARM SHOWN; 15' TO 50' SIMILAR



BOTTOM CHORD BEARING PLATE DETAILS

55' MAST ARM SHOWN; 15' TO 50' SIMILAR

MAST ARM CONNECTIONS DIMENSIONS

DESCRIPTION	DIMENSION	MAST ARM LENGTH 15'	20'	25'	30'	35'	40'	45'	50'	55'
CONNECTION/BEARING PLATE HEIGHT	A	13"	13"	13"	13"	13"	13"	16"	16"	16"
TOTAL HOLE SPACING VERTICAL	B	9"	9"	9"	9"	9"	9"	12"	12"	12"
HOLE SPACING	C	2 SPS. @ 4½"	2 SPS. @ 4½"	2 SPS. @ 4½"	2 SPS. @ 4½"	2 SPS. @ 4½"	2 SPS. @ 4½"	3 SPS. @ 4"	3 SPS. @ 4"	3 SPS. @ 4"
HOLES PER PLATE	D	6	6	6	6	6	6	8	8	8
BOTTOM CHORD O.D. AT BASE PLATE	E	8.0"	8.0"	8.69"	9.39"	10.09"	10.79"	11.49"	12.19"	12.89"
ACCESS OPENING	F	4.5"	4.5"	4.5"	4.5"	4.5"	4.5"	6"	6"	6"

APPROVED 02-27-2024

STATE DESIGN ENGINEER

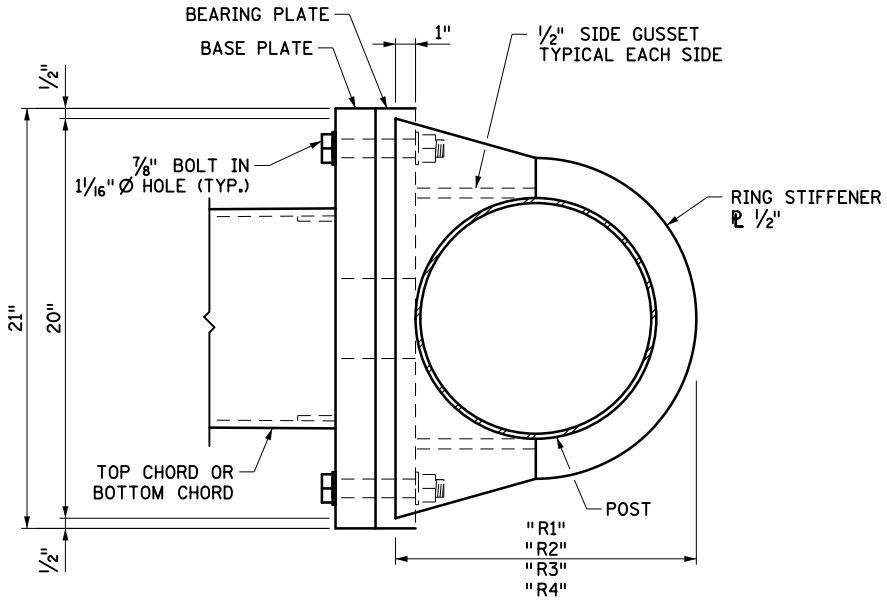
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

POLE AND MAST ARM TYPE TS

BOTTOM CHORD CONNECTION DETAILS
FOR MAST ARM LENGTHS 15' TO 55'

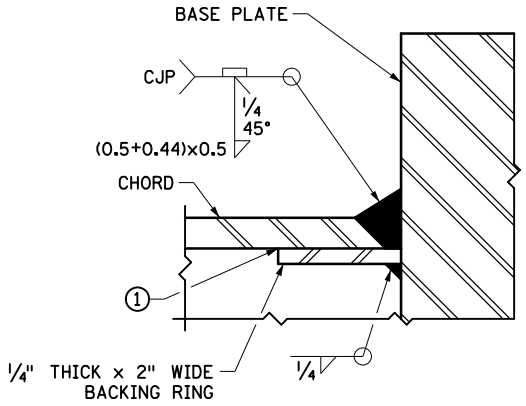
SPECIFICATION REFERENCE
2565

STANDARD PLATE NO.
8124A



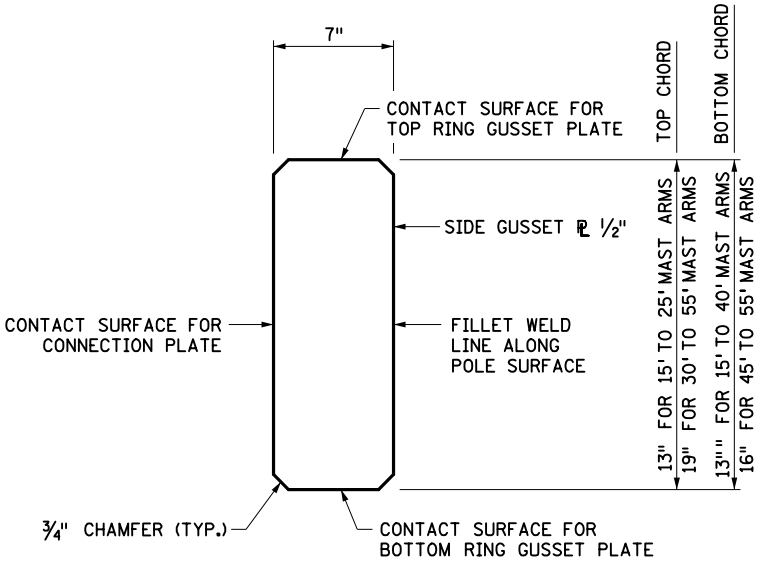
SECTION D-D

CABLE GUIDE NOT SHOWN FOR CLARITY

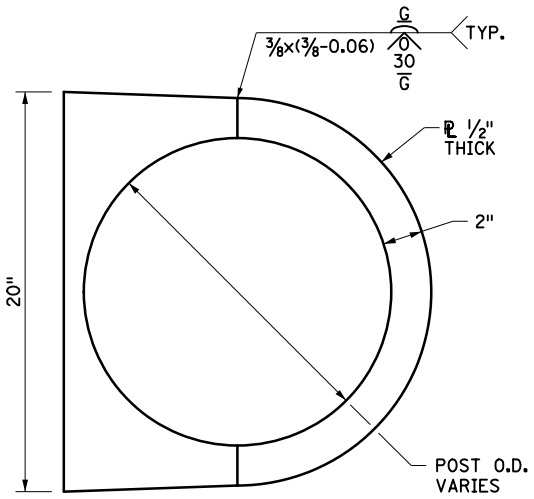


DETAIL C

BASE PLATE WELD DETAIL



SIDE GUSSET PLATE



RING STIFFENER

MAST ARM CONNECTION		
DESCRIPTION	DIMENSION	MAST ARM LENGTH 15' TO 55'
TOP CHORD - TOP RING STIFFENER PLATE	R1	16½"
TOP CHORD - BOTTOM RING STIFFENER PLATE	R2	16⅝"
BOTTOM CHORD - TOP RING STIFFENER PLATE	R3	16⅞"
BOTTOM CHORD - BOTTOM RING STIFFENER PLATE	R4	17"

NOTES:

(1) FIELD-APPLY 100% SILICONE CAULK (EXTERIOR USAGE) AT TOP OF BACKING RING ALONG ENTIRE INTERIOR CIRCUMFERENCE OF ARM.

APPROVED 02-27-2024

STATE DESIGN ENGINEER

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

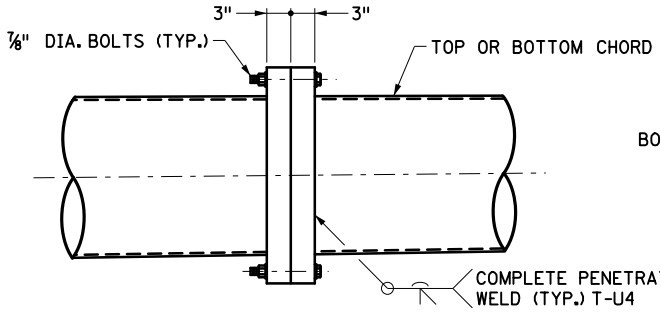
POLE AND MAST ARM TYPE TS

STIFFENER PLATE/GUSSET PLATE CONNECTION DETAILS
FOR MAST ARM LENGTHS 15' TO 55'

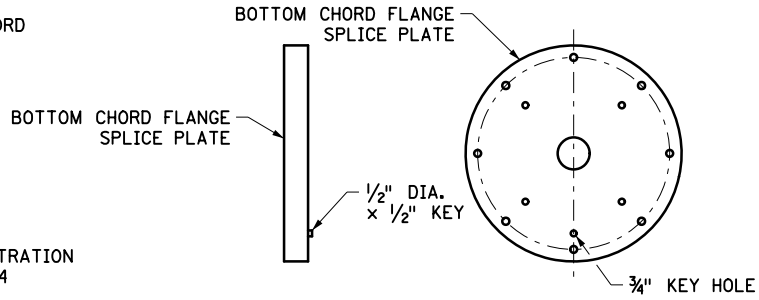
SPECIFICATION REFERENCE
2565

STANDARD PLATE NO.
8124A

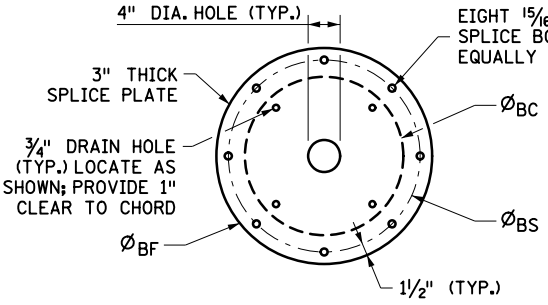
FLANGE SPLICE PLATE							
		TOP CHORD			BOTTOM CHORD		
POLE TYPE	MAST ARM LENGTH	FLANGE SPLICE PLATE DIAMETER Ø TF	BOLT CIRCLE DIAMETER Ø TS	CHORD DIAMETER @ SPLICE Ø TC	FLANGE SPLICE PLATE DIAMETER Ø BF	BOLT CIRCLE DIAMETER Ø BS	CHORD DIAMETER @ SPLICE Ø BC
TS55	55' 0"	19"	16"	11.8"	19"	16"	11.5"



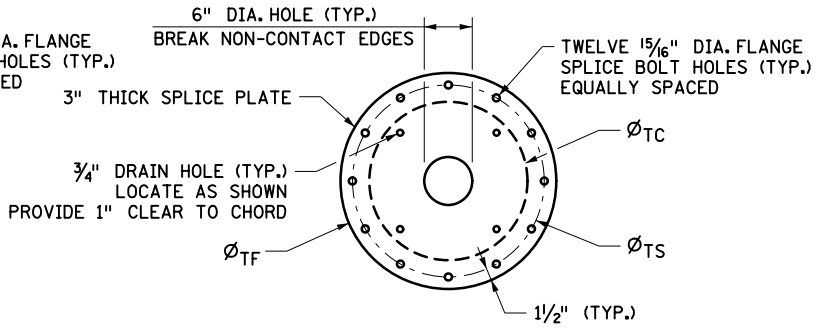
FLANGE SPLICE



SPLICE KEY

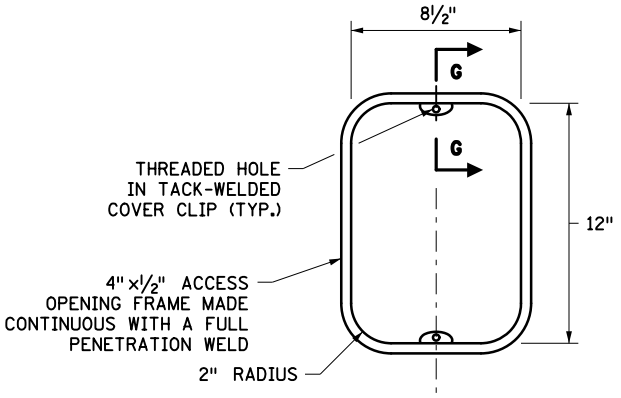


BOTTOM CHORD FLANGE SPLICE PLATE

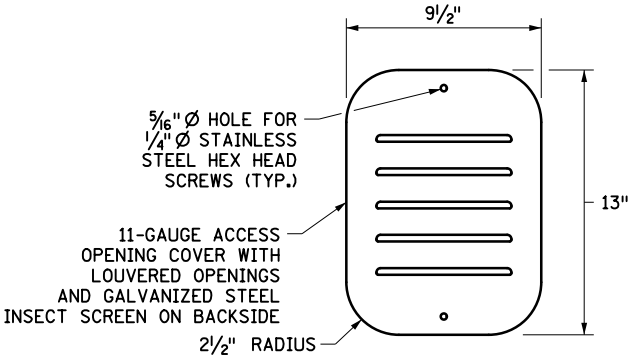


TOP CHORD FLANGE SPLICE PLATE

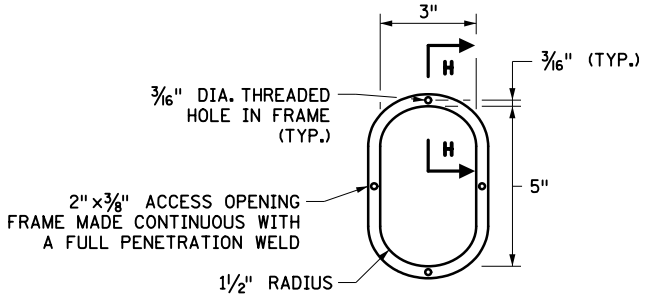
APPROVED 02-27-2024 STATE DESIGN ENGINEER	STATE OF MINNESOTA DEPARTMENT OF TRANSPORTATION POLE AND MAST ARM TYPE TS FLANGE SPLICE DETAILS FOR MAST ARM LENGTHS 15' TO 55'	SPECIFICATION REFERENCE 2565	STANDARD PLATE NO. 8124A 7 OF 12



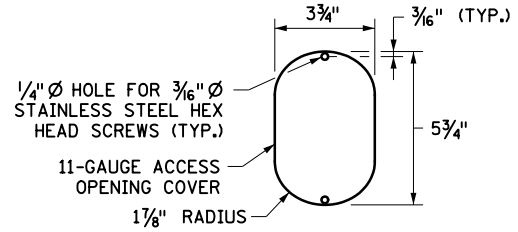
8.5" x 12" ACCESS OPENING FRAME



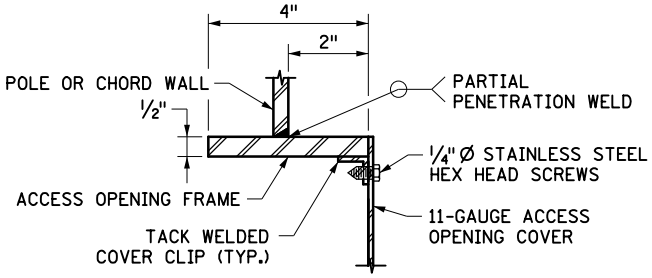
8.5" x 12" ACCESS OPENING COVER



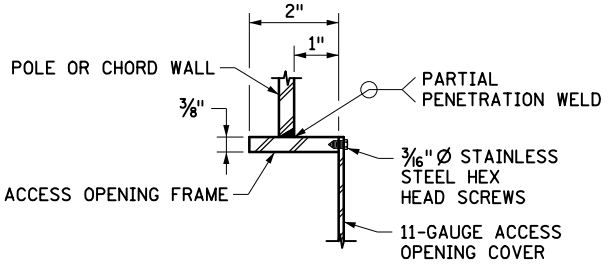
3" x 5" ACCESS OPENING FRAME



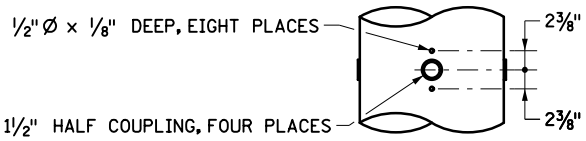
3" x 5" ACCESS OPENING COVER



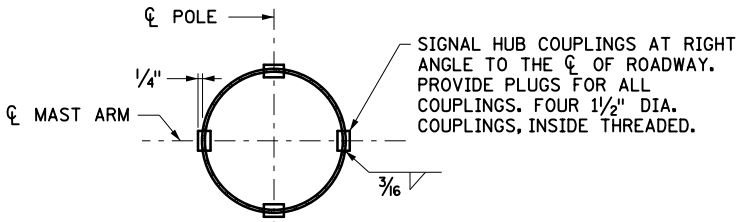
SECTION G-G



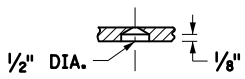
SECTION H-H



SIGNAL HUB DETAIL



SECTION C-C

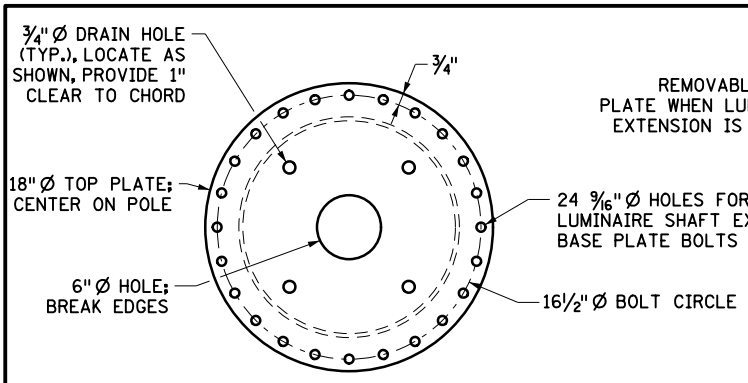


COUNTERSINK DETAIL

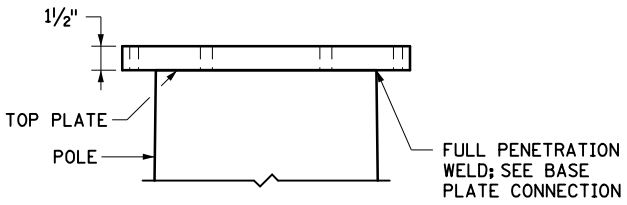
NOTES:

PLACE FASTENERS TO A SNUG-TIGHT CONDITION.

APPROVED 02-27-2024 STATE DESIGN ENGINEER	STATE OF MINNESOTA DEPARTMENT OF TRANSPORTATION **POLE AND MAST ARM TYPE TS** ACCESS OPENING AND ATTACHMENT DETAILS FOR MAST ARM LENGTHS 15' TO 55'	SPECIFICATION REFERENCE 2565	STANDARD PLATE NO. 8124A 8 OF 12

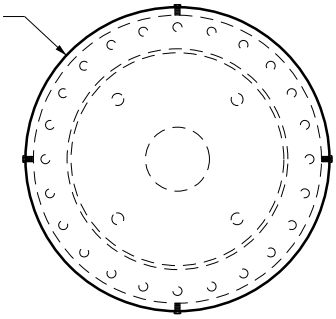


TOP VIEW

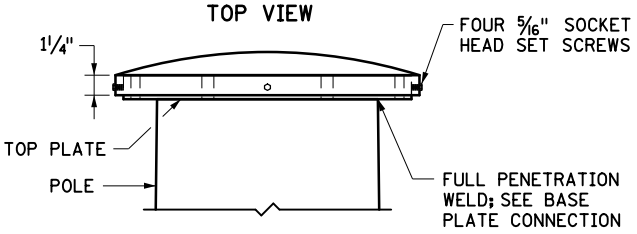


SIDE VIEW

POLE TOP WITH LUMINAIRE SHAFT EXTENSION
SHAFT EXTENSION NOT SHOWN FOR CLARITY



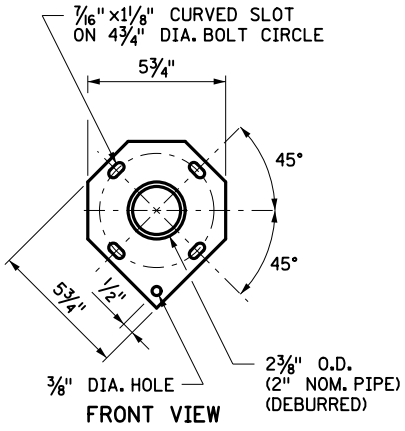
TOP VIEW



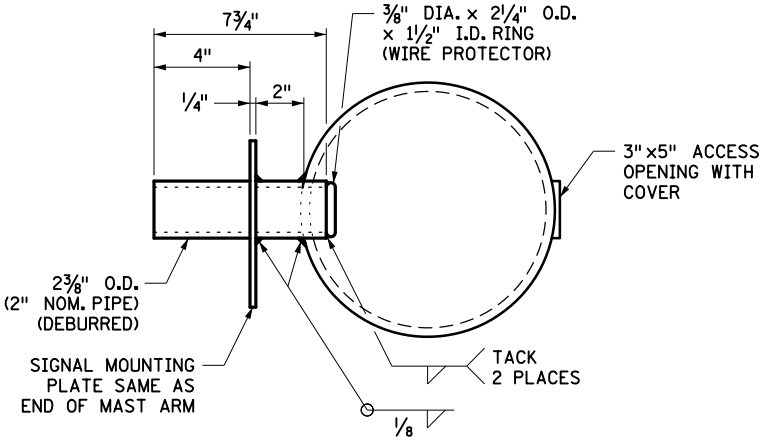
SIDE VIEW

POLE TOP WITHOUT LUMINAIRE SHAFT EXTENSION

POLE CAP DETAIL

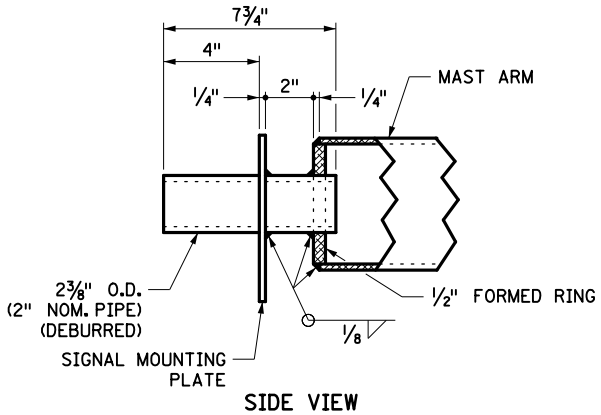


FRONT VIEW



SIGNAL MOUNTING DETAIL

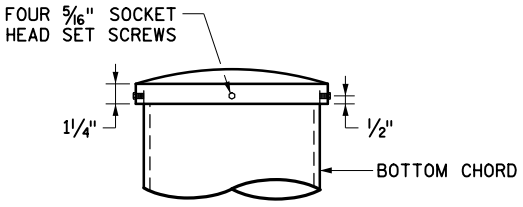
MID MAST ARM



SIDE VIEW

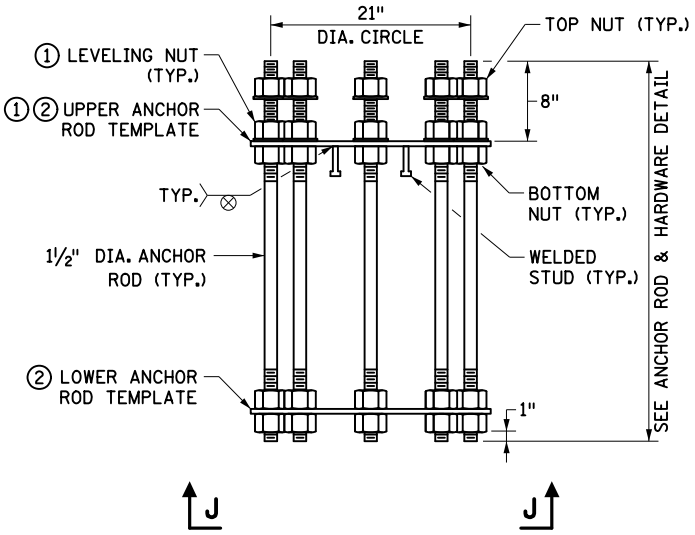
SIGNAL MOUNTING DETAIL

END OF MAST ARM

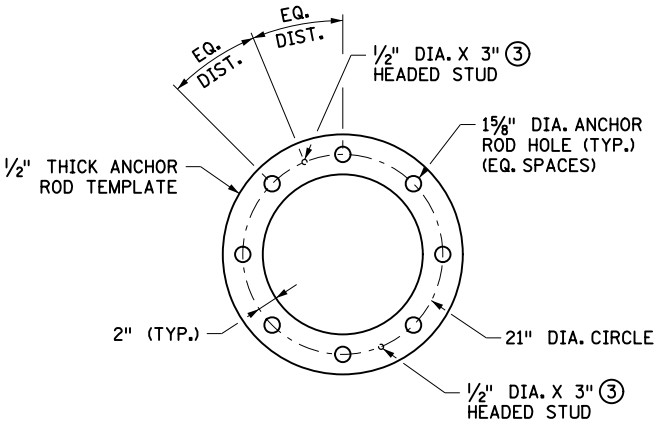


REMOVABLE CHORD CAP DETAIL

APPROVED 02-27-2024 STATE DESIGN ENGINEER	STATE OF MINNESOTA DEPARTMENT OF TRANSPORTATION **POLE AND MAST ARM TYPE TS** MISCELLANEOUS DETAILS FOR MAST ARM LENGTHS 15' TO 55'	SPECIFICATION REFERENCE 2565	STANDARD PLATE NO. 8124A 9 OF 12

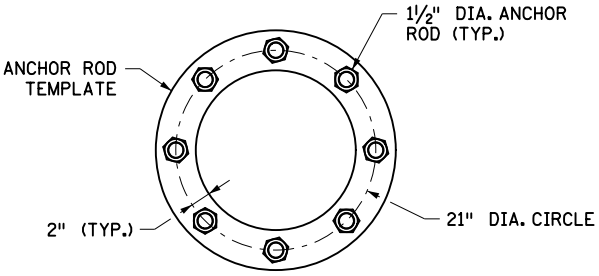


ANCHOR ROD ASSEMBLY DETAIL

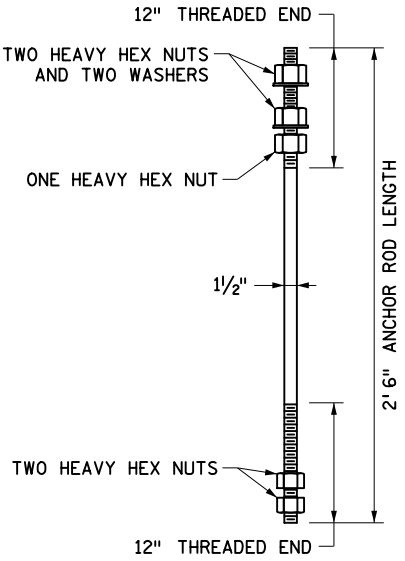


ANCHOR ROD TEMPLATE

TWO PER ASSEMBLY (ONE UPPER AND ONE LOWER)



VIEW J-J



ANCHOR ROD AND HARDWARE

EIGHT REQUIRED PER ASSEMBLY

NOTES:

① USE THE LEVELING NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE CONCRETE OPERATIONS. LEAVE THE NUTS SECURE AGAINST THE TEMPLATE UNTIL POLE INSTALLATION. USE THE REQUIRED HARDWARE FOR DOUBLE-NUT ANCHOR ROD CONNECTIONS IN ACCORDANCE WITH SPEC. 2545.3.

② TIGHTEN ANCHOR ROD TEMPLATE NUTS USING A 12"-LONG WRENCH.

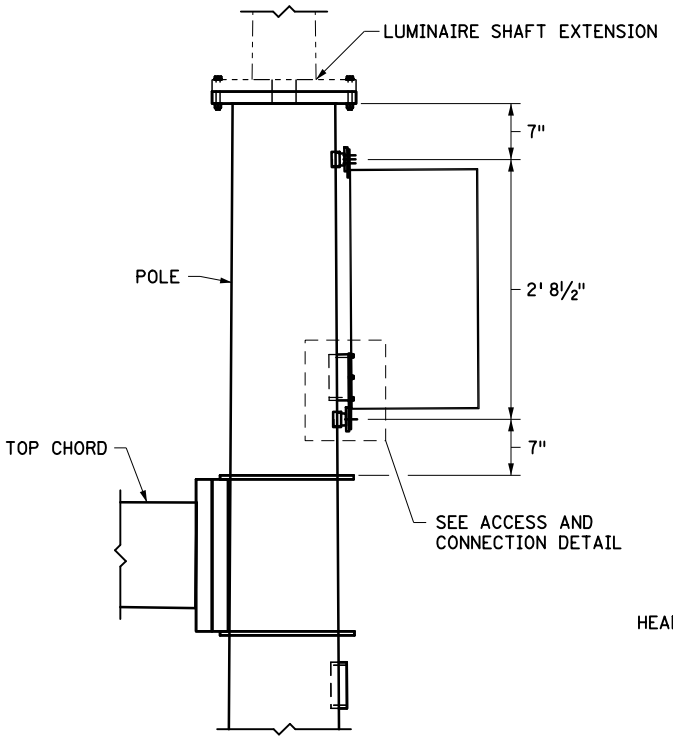
③ FURNISH AND INSTALL HEADED STUDS IN ACCORDANCE WITH SPEC. 3391.2 "STUD WELDED FASTENERS" ON THE UPPER TEMPLATE AT THE LOCATIONS SHOWN.

GALVANIZE HEAVY HEX NUTS AND WASHERS IN ACCORDANCE WITH SPEC. 3392.

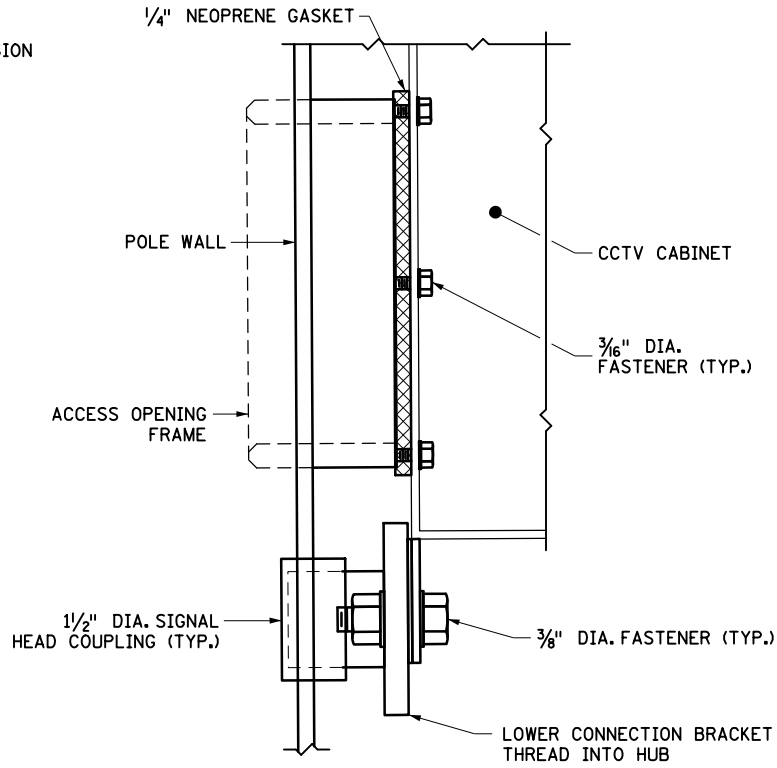
GALVANIZE UPPER AND LOWER ANCHOR ROD TEMPLATES IN ACCORDANCE WITH SPEC. 3394.

FURNISH AND INSTALL TYPE B ANCHOR RODS IN ACCORDANCE WITH SPEC. 3385.

APPROVED 02-27-2024 STATE DESIGN ENGINEER	STATE OF MINNESOTA DEPARTMENT OF TRANSPORTATION **POLE AND MAST ARM TYPE TS** ANCHOR ROD ASSEMBLY DETAILS FOR MAST ARM LENGTHS 15' TO 55'	SPECIFICATION REFERENCE 2565	STANDARD PLATE NO. 8124A 10 OF 12

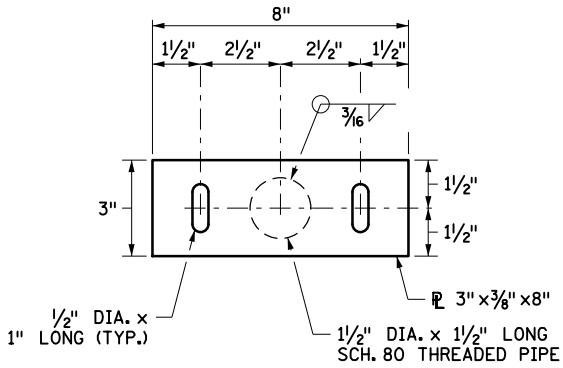


CCTV CABINET DETAIL



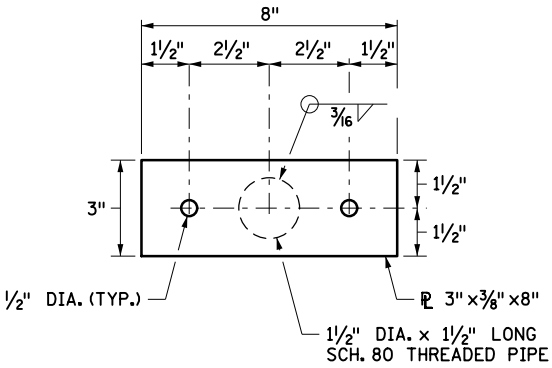
ACCESS AND CONNECTION DETAIL

LOWER CONNECTION SHOWN; UPPER SIMILAR



UPPER CONNECTION BRACKET

ONE REQUIRED PER POLE



LOWER CONNECTION BRACKET

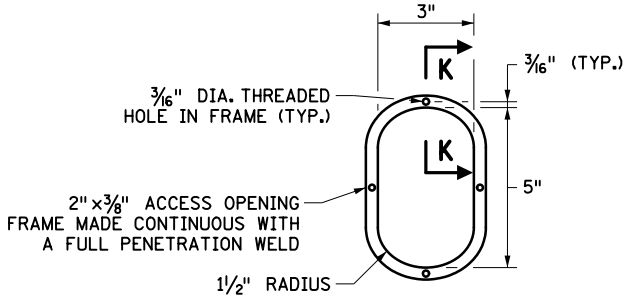
ONE REQUIRED PER POLE

NOTES:

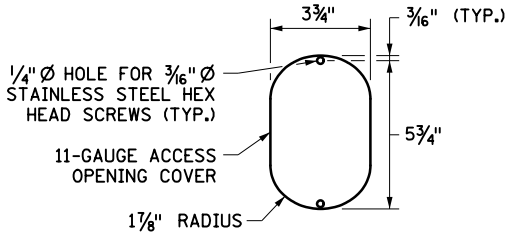
PROVIDE DETAILS ON THIS SHEET IF POLE IS TO RECEIVE A CCTV CABINET.

FURNISH AND INSTALL COMMON STRUCTURAL STEEL BOLTS, NUTS, AND WASHERS IN ACCORDANCE WITH SPEC. 3391 FOR THE CCTV CABINET TO POLE BRACKETING CONNECTIONS.

APPROVED 02-27-2024 STATE DESIGN ENGINEER	STATE OF MINNESOTA DEPARTMENT OF TRANSPORTATION **POLE AND MAST ARM TYPE TS** CCTV CONNECTION DETAILS (1 OF 2) FOR MAST ARM LENGTHS 15' TO 55'	SPECIFICATION REFERENCE 2565	STANDARD PLATE NO. 8124A 11 OF 12

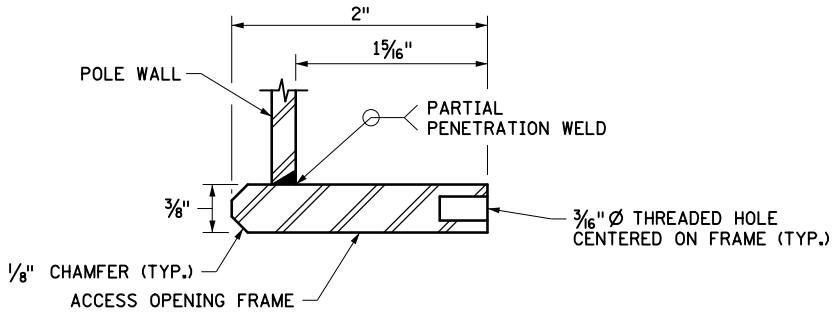


3" x 5" ACCESS OPENING FRAME



3" x 5" ACCESS OPENING COVER PLATE

PROVIDE COVER PLATE WHEN CCTV CABINET IS NOT REQUIRED



SECTION K-K

APPROVED 02-27-2024 STATE DESIGN ENGINEER	STATE OF MINNESOTA DEPARTMENT OF TRANSPORTATION **POLE AND MAST ARM TYPE TS** CCTV CONNECTION DETAILS (2 OF 2) FOR MAST ARM LENGTHS 15' TO 55'	SPECIFICATION REFERENCE 2565	STANDARD PLATE NO. **8124A** 12 OF 12

APPROVED 02-27-2024
STATE DESIGN ENGINEER

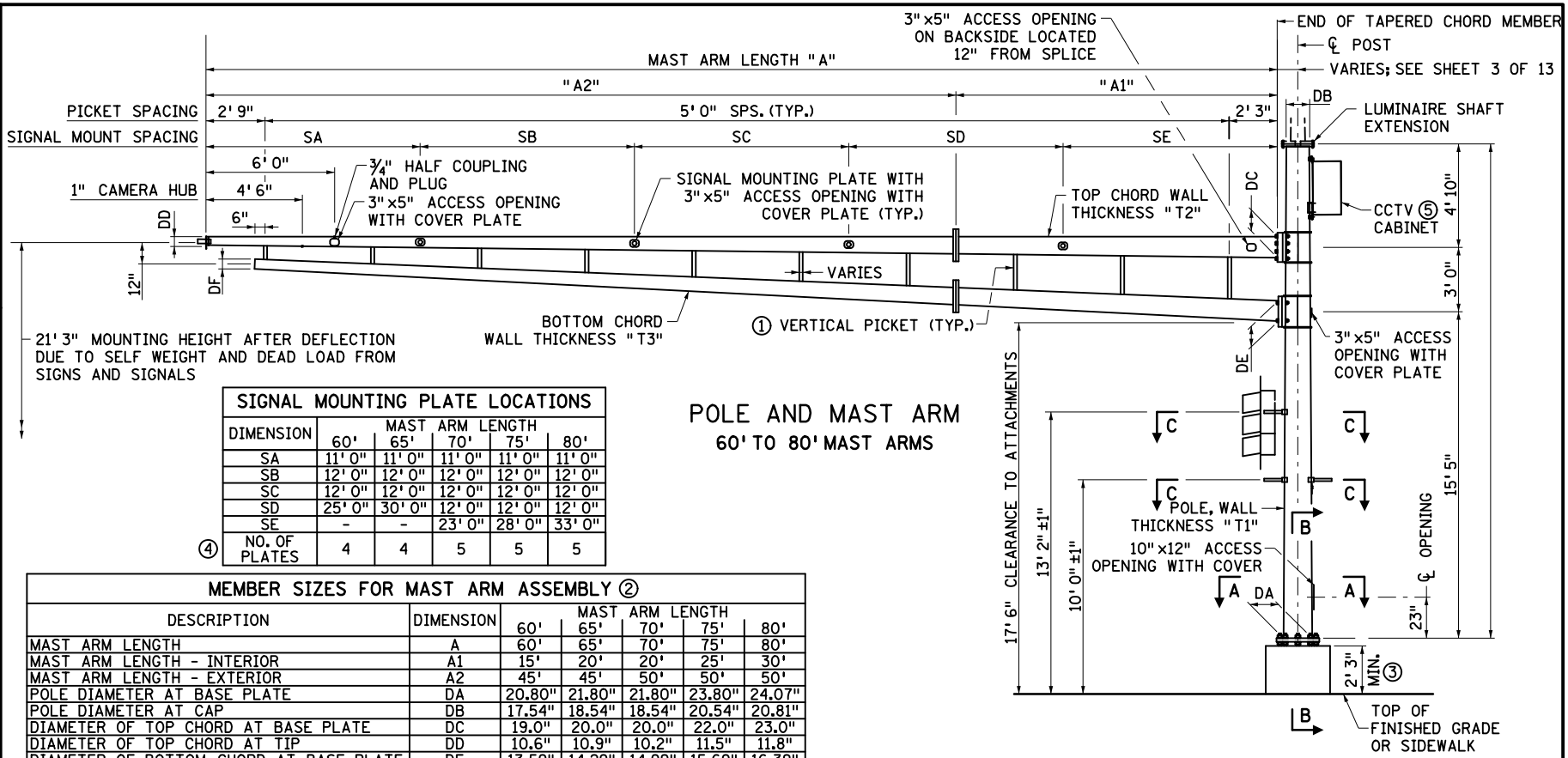
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

POLE AND MAST ARM TYPE TS

MAST ARM ASSEMBLY
FOR MAST ARM LENGTHS 60' TO 80'

SPECIFICATION REFERENCE
2565

STANDARD PLATE NO.
8125A
1 OF 13



POLE AND MAST ARM
60' TO 80' MAST ARMS

SIGNAL MOUNTING PLATE LOCATIONS					
DIMENSION	MAST ARM LENGTH 60'	65'	70'	75'	80'
SA	11' 0"	11' 0"	11' 0"	11' 0"	11' 0"
SB	12' 0"	12' 0"	12' 0"	12' 0"	12' 0"
SC	12' 0"	12' 0"	12' 0"	12' 0"	12' 0"
SD	25' 0"	30' 0"	12' 0"	12' 0"	12' 0"
SE	-	-	23' 0"	28' 0"	33' 0"
④ NO. OF PLATES	4	4	5	5	5

MEMBER SIZES FOR MAST ARM ASSEMBLY ②						
DESCRIPTION	DIMENSION	MAST ARM LENGTH 60'	65'	70'	75'	80'
MAST ARM LENGTH	A	60'	65'	70'	75'	80'
MAST ARM LENGTH - INTERIOR	A1	15'	20'	20'	25'	30'
MAST ARM LENGTH - EXTERIOR	A2	45'	45'	50'	50'	50'
POLE DIAMETER AT BASE PLATE	DA	20.80"	21.80"	21.80"	23.80"	24.07"
POLE DIAMETER AT CAP	DB	17.54"	18.54"	18.54"	20.54"	20.81"
DIAMETER OF TOP CHORD AT BASE PLATE	DC	19.0"	20.0"	20.0"	22.0"	23.0"
DIAMETER OF TOP CHORD AT TIP	DD	10.6"	10.9"	10.2"	11.5"	11.8"
DIAMETER OF BOTTOM CHORD AT BASE PLATE	DE	13.59"	14.29"	14.99"	15.69"	16.39"
DIAMETER OF BOTTOM CHORD AT TIP	DF	5.5"	5.5"	5.5"	5.5"	5.5"
WALL THICKNESS OF POLE	T1	0.25"	0.3125"	0.3125"	0.3125"	0.3125"
WALL THICKNESS OF TOP CHORD	T2	0.25"	0.3125"	0.3125"	0.375"	0.375"
WALL THICKNESS OF BOTTOM CHORD	T3	0.25"	0.25"	0.3125"	0.3125"	0.3125"

NOTES:

① SEE SHEET 8 OF 13 FOR VERTICAL PICKETS DIMENSIONS. PLACE AT THE SPACING SHOWN.

② DIAMETER DIMENSIONS PROVIDED ARE THE OUTSIDE DIAMETER.

③ INCREASE FOUNDATION PROJECTION AS REQUIRED TO PROVIDE A VERTICAL CLEARANCE FROM THE BOTTOM OF ALL SIGNS AND SIGNAL HEADS (INCLUDING BACKGROUND SHIELDS) TO THE PAVEMENT OF NOT LESS THAN 17.50' NOR MORE THAN 19.00'.

④ INCLUDES END MAST ARM SIGNAL MOUNT.

⑤ PROVIDE BRACKETING AND HARDWARE FOR CCTV CABINET ON POLES SHOWN ON THE PLANS. CCTV CABINET BY OTHERS.

FURNISH AND INSTALL HIGH-STRENGTH, LOW-ALLOY, COLUMBIUM-VANADIUM STRUCTURAL STEEL IN ACCORDANCE WITH SPEC. 3310. 50,000 PSI MINIMUM YIELD.

GALVANIZE HARDWARE IN ACCORDANCE WITH SPEC. 3392. GALVANIZE STEEL COMPONENTS IN ACCORDANCE WITH SPEC. 3394 AFTER FABRICATION. PROVIDE VENT AND DRAIN HOLES FOR THE HOT-DIP GALVANIZING PROCESS.

FURNISH AND INSTALL HIGH STRENGTH STRUCTURAL STEEL BOLTS, NUTS, WASHERS, AND TENSION INDICATORS IN ACCORDANCE WITH SPEC. 3391 AND 2404 FOR THE STRUCTURAL BOLTING OF MAST ARM SPLICES, MAST ARM TO POLE CONNECTIONS, AND LUMINAIRE AND CAMERA SHAFT EXTENSIONS TO POLES. PLACE DIRECT TENSION INDICATORS (DTI) UNDER THE STRUCTURAL BOLT HEADS WITH THE BUMPS TOUCHING THE UNDERSIDE OF THE BOLT HEAD. TIGHTEN THE CONNECTIONS BY TURNING THE STRUCTURAL HEAVY HEX NUTS. DO NOT ROTATE THE BOLT HEADS. USE AN INSPECTION PROCEDURE FOR DTI IN ACCORDANCE WITH SPEC. 2402.

WELD IN ACCORDANCE WITH THE AMERICAN WELDING SOCIETY STRUCTURAL WELDING CODE (STEEL) ANSI/AWS D1.1 (CURRENT EDITION).

FABRICATE ROUND TAPERED POLE AND MAST ARM ELEMENTS BY LONGITUDINAL SEAM WELDING WITH 60% PENETRATION EXCEPT WITHIN 6" OF FULL-PENETRATION CIRCUMFERENTIAL GROOVE WELDS. FULL-PENETRATION GROOVE WELDS ARE REQUIRED WITHIN THIS 6" REGION.

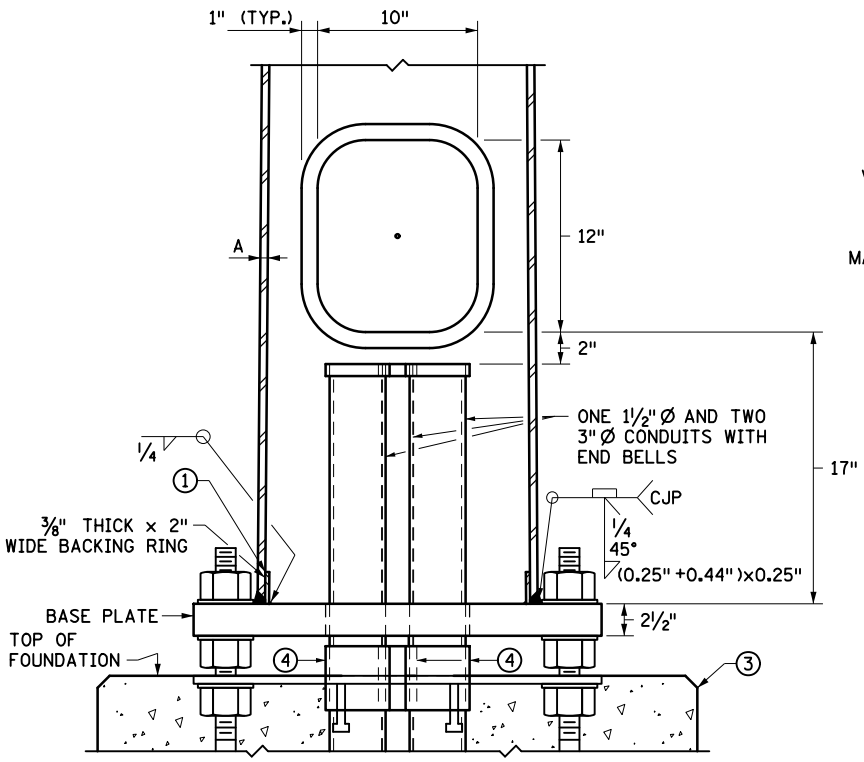
PERFORM A WIND LOAD ANALYSIS FOR COMPONENTS MOUNTED TO THE MAST ARM.

LEVEL THE POLE AND BASE PLATE BY ADJUSTING THE LEVELING NUTS.

TAPER POLE MEMBER AND MAST ARM CHORD MEMBERS AT A RATE OF 0.14 INCHES/FOOT.

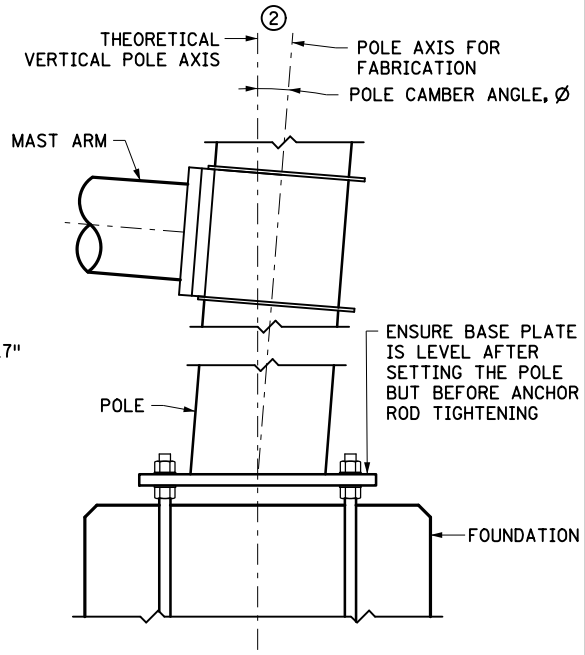
FOR SECTION A-A AND SECTION B-B, SEE SHEET 2 OF 13. FOR SECTION C-C, SEE SHEET 9 OF 13.

POLE TYPE	MAST ARM LENGTH	POLE CAMBER ANGLE Ø
TS60, TS65, TS70 TS75, TS80	60' 0" TO 80' 0"	0°30'00.0"



SECTION B-B

FOUNDATION REINFORCEMENT NOT SHOWN FOR CLARITY

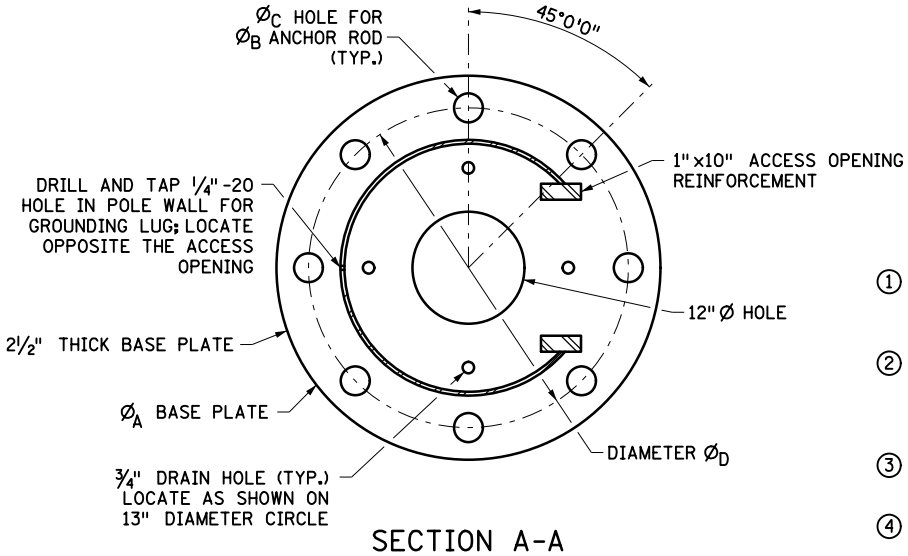


SCHEMATIC OF POLE ALIGNMENT

NOT TO SCALE

POLE TYPE	POLE WALL THICKNESS A
TS60	0.25"
TS65	0.3125"
TS70	0.3125"
TS75	0.3125"
TS80	0.3125"

POLE TYPE	BASE PLATE DIAMETER $Ø_A$	ANCHOR ROD DIAMETER $Ø_B$	DIAMETER OF ANCHOR ROD HOLE $Ø_C$	ANCHOR ROD PLACEMENT DIAMETER $Ø_D$
TS60	37"	1½"	1⅝"	29"
TS65	37"	1¾"	1⅞"	29"
TS70	39"	2"	2⅛"	31"
TS75	41"	2"	2⅛"	33"
TS80	41"	2¼"	2⅜"	33"



SECTION A-A

NOTES:

1. FIELD-APPLIED 100% SILICONE CAULK (EXTERIOR USAGE) AT TOP OF BACKING RING ALONG ENTIRE CIRCUMFERENCE.
2. POLE ROTATION IS ABOUT A HORIZONTAL AXIS ORIENTED PERPENDICULAR TO MAST ARM AXIS. SENSE OF ROTATION IS SUCH THAT TIP OF MAST ARM WILL BE RAISED.
3. SEE STANDARD PLAN 5-297.861 FOR PVC CONDUIT AND COUPLING INSTALLATION REQUIREMENTS.
4. PVC COUPLING.

APPROVED 02-27-2024

STATE DESIGN ENGINEER

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

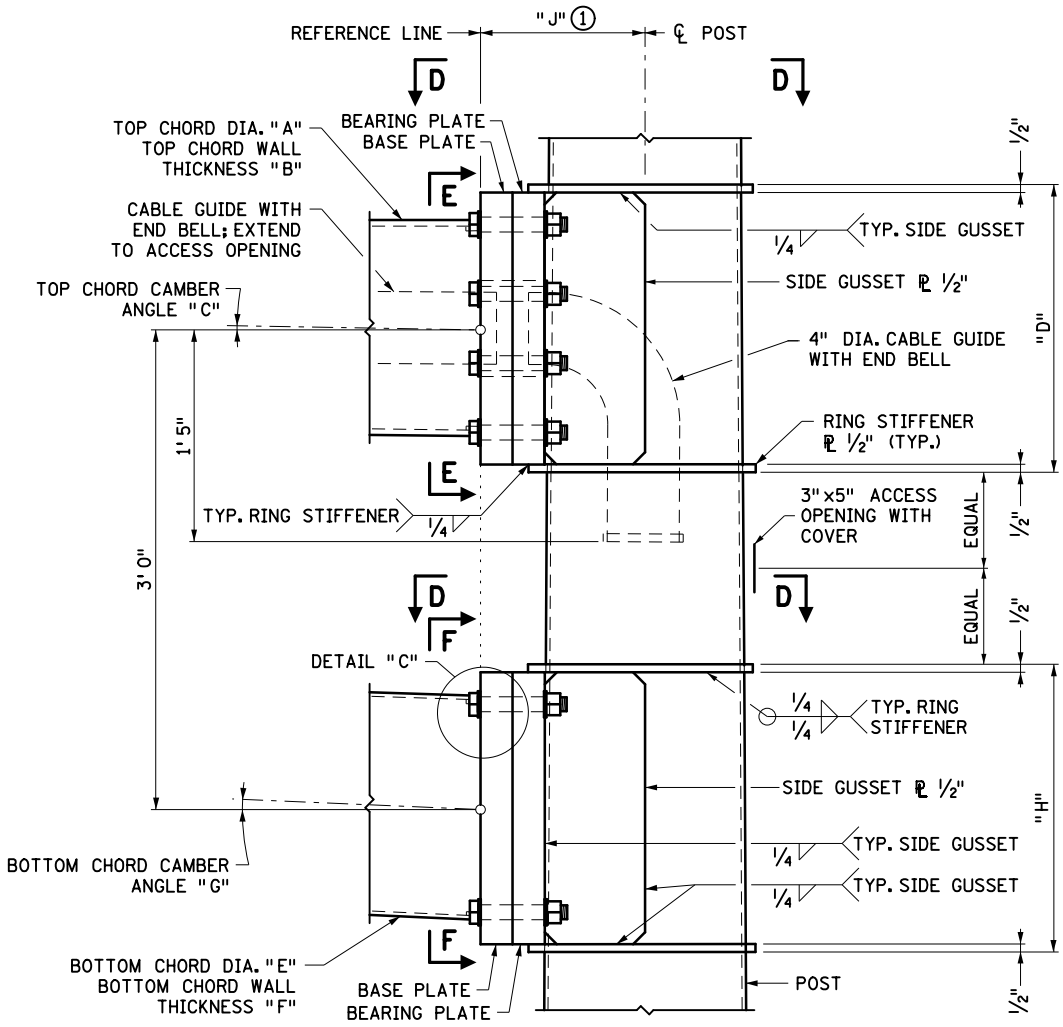
POLE AND MAST ARM TYPE TS

POLE DETAILS
FOR MAST ARM LENGTHS 60' TO 80'

SPECIFICATION REFERENCE 2565

REVISED 06-10-2024 K.Y.

STANDARD PLATE NO. 8125A



SCHEMATIC POST/BEAM CONNECTION DETAIL

BOLT CONFIGURATION VARIES BY MAST ARM LENGTH
SEE SHEETS 4 AND 5 OF 13 FOR DETAILS

MAST ARM CONNECTIONS DIMENSIONS

DESCRIPTION	DIMENSION	MAST ARM LENGTH				
		60'	65'	70'	75'	80'
TOP CHORD DIAMETER AT BASE PLATE	A	19.0"	20.0"	20.0"	22.0"	23.0"
TOP CHORD WALL THICKNESS AT BASE PLATE	B	0.25"	0.3125"	0.3125"	0.375"	0.375"
TOP CHORD CAMBER ANGLE	C	1°00'00.0"	1°00'00.0"	1°15'00.0"	1°15'00.0"	1°30'00.0"
RING STIFFENER SPACING - TOP	D	25"	27"	27"	29"	35"
BOTTOM CHORD DIAMETER AT BASE PLATE	E	13.52"	14.22"	14.92"	15.62"	16.32"
BOTTOM CHORD WALL THICKNESS AT BASE PLATE	F	0.25"	0.25"	0.3125"	0.3125"	0.3125"
BOTTOM CHORD CAMBER ANGLE	G	3°00'00.0"	2°45'00.0"	2°45'00.0"	2°45'00.0"	3°00'00.0"
RING STIFFENER SPACING - BOTTOM	H	20"	20"	20"	23"	25"
DISTANCE FROM ℄ POST TO REFERENCE LINE	J	13.375"	13.875"	13.875"	14.875"	15"

NOTES:

EACH MAST ARM CONNECTION CONSISTS OF THE FOLLOWING:
TWO HORIZONTAL RING STIFFENER PLATES, 0.50" THICK
TWO VERTICAL SIDE GUSSET PLATES, 0.50" THICK
ONE BEARING PLATE, 2" THICK

MAST ARM CHORD MEMBERS ARE WELDED TO A 2" THICK CHORD BASE PLATE, WHICH IS BOLTED TO THE BEARING PLATE BY A SPECIFIED NUMBER OF BOLTS.

FOR SECTION D-D AND DETAIL C, SEE SHEET 6 OF 13. FOR SECTION E-E (BEARING AND BASE PLATE DETAILS), SEE SHEET 4 OF 13. FOR SECTION F-F (BEARING AND BASE PLATE DETAILS), SEE SHEET 5 OF 13.

(1) DISTANCE TO MAST ARM REFERENCE LINE. THE REFERENCE LINE IS LOCATED ON THE PLANE OF WHERE THE RESPECTIVE MAST ARM CHORD MEMBER MEETS THE BASE PLATE.

(2) 4" DIAMETER SCHEDULE 40 STEEL PIPE CABLE GUIDE, BEND INTO A 90° CONFIGURATION. PROJECT CABLE GUIDE 6" BEYOND TOP CHORD BEARING PLATE. SEE SHEET 4 OF 13 FOR CONNECTION DETAIL TO BEARING PLATE. BREAK EDGES OF GUIDE.

APPROVED 02-27-2024
STATE DESIGN ENGINEER

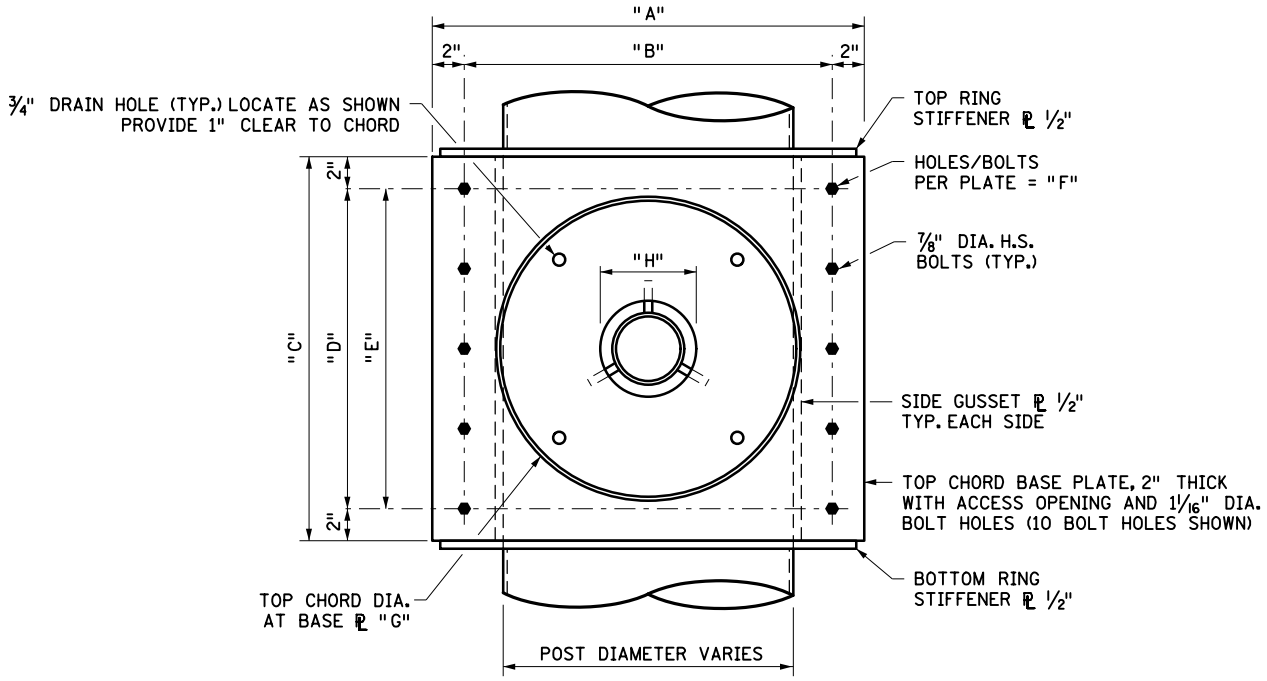
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

POLE AND MAST ARM TYPE TS

MAST ARM CONNECTION DETAILS
FOR MAST ARM LENGTHS 60' TO 80'

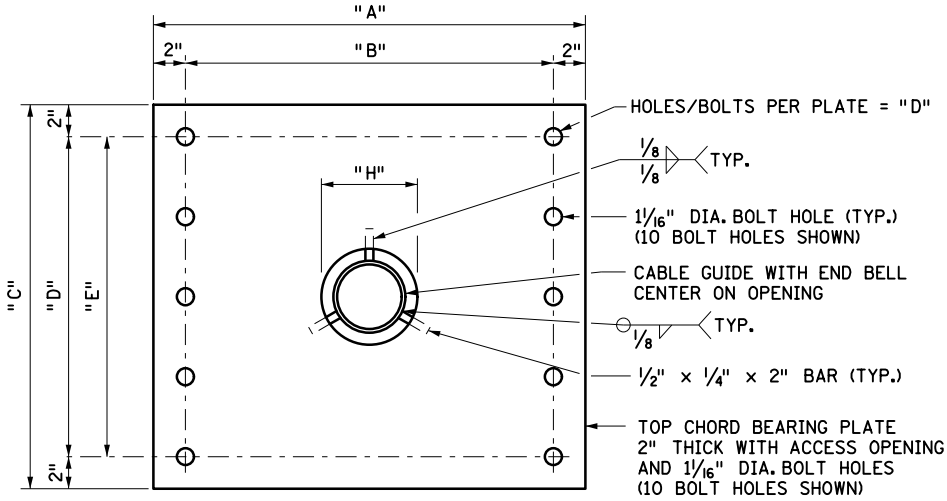
SPECIFICATION REFERENCE
2565

STANDARD PLATE NO.
8125A
3 OF 13



SECTION E-E - BASE PLATE

60' MAST ARM SHOWN; 65' TO 80' SIMILAR



TOP CHORD BEARING PLATE DETAILS

60' MAST ARM SHOWN; 65' TO 80' SIMILAR

MAST ARM CONNECTIONS DIMENSIONS

DESCRIPTION	DIMENSION	MAST ARM LENGTH				
		60'	65'	70'	75'	80'
BASE/BEARING PLATE WIDTH	A	27"	28"	29"	31"	32"
TOTAL HOLE SPACING HORIZONTAL	B	23"	24"	25"	27"	28"
BASE/BEARING PLATE HEIGHT	C	24"	26"	26"	28"	34"
TOTAL HOLE SPACING VERTICAL	D	20"	22"	22"	24"	30"
HOLE SPACING	E	4 SPS. @ 5"	4 SPS. @ 5½"	4 SPS. @ 5½"	6 SPS. @ 4"	6 SPS. @ 5"
HOLES PER PLATE	F	10	10	10	14	14
TOP CHORD O.D. AT BASE PLATE	G	19.0"	20.0"	20.0"	22.0"	23.0"
ACCESS OPENING	H	6"	6"	6"	7"	7.5"

APPROVED 02-27-2024

STATE DESIGN ENGINEER

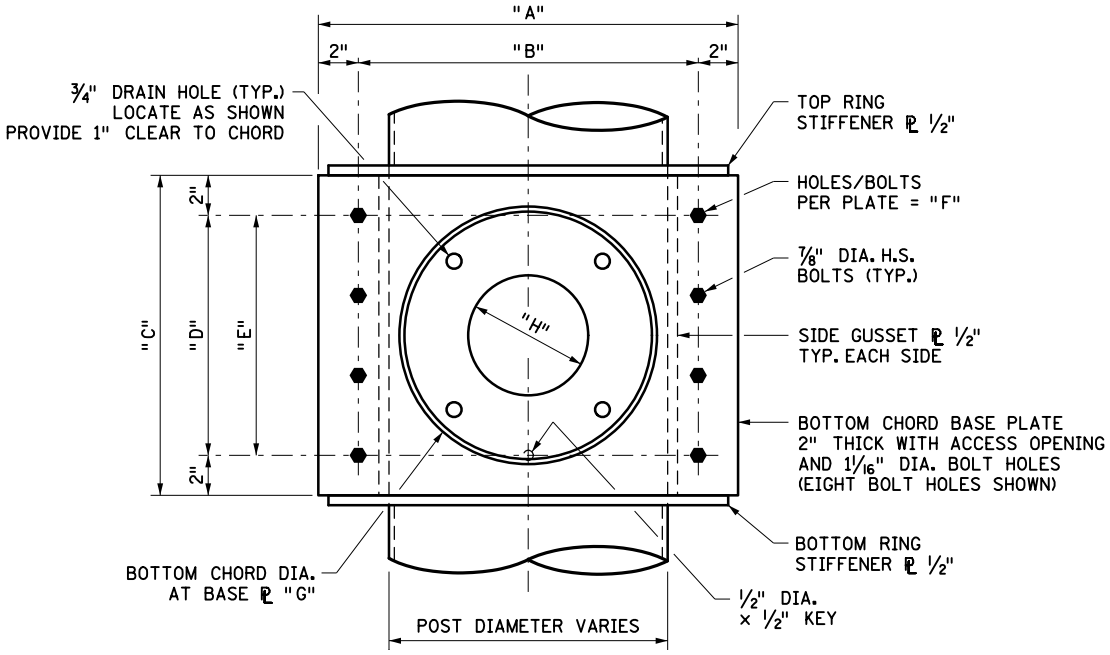
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

POLE AND MAST ARM TYPE TS

TOP CHORD CONNECTION DETAILS
FOR MAST ARM LENGTHS 60' TO 80'

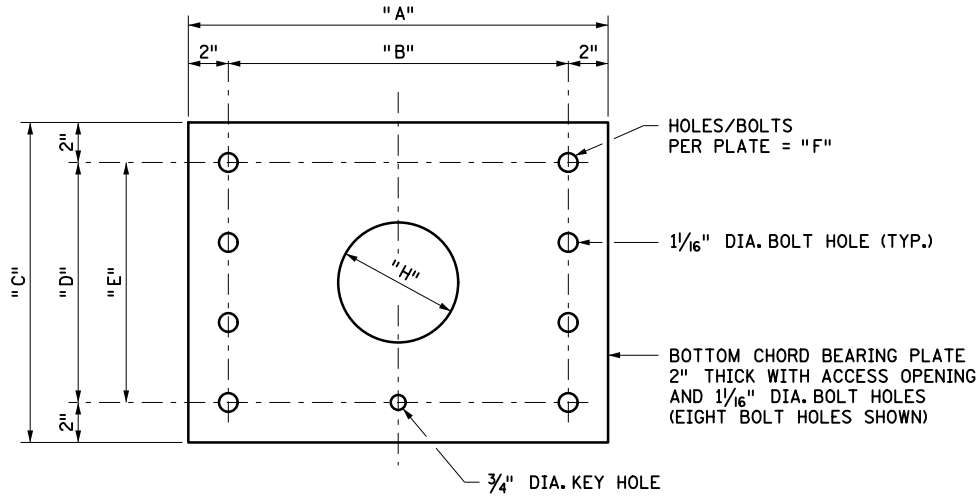
SPECIFICATION REFERENCE
2565

STANDARD PLATE NO.
8125A



SECTION F-F - BASE PLATE

60' MAST ARM SHOWN; 65' TO 80' SIMILAR



BOTTOM CHORD BEARING PLATE DETAILS

60' MAST ARM SHOWN; 65' TO 80' SIMILAR

MAST ARM CONNECTIONS DIMENSIONS						
DESCRIPTION	DIMENSION	MAST ARM LENGTH				
		60'	65'	70'	75'	80'
BASE/BEARING PLATE WIDTH	A	27"	28"	29"	31"	32"
TOTAL HOLE SPACING HORIZONTAL	B	23"	24"	25"	27"	28"
BASE/BEARING PLATE HEIGHT	C	19"	19"	19"	22"	24"
TOTAL HOLE SPACING VERTICAL	D	15"	15"	15"	18"	20"
HOLE SPACING	E	3 SPS. @ 5"	3 SPS. @ 5"	3 SPS. @ 5"	3 SPS. @ 6"	4 SPS. @ 5"
HOLES PER PLATE	F	8	8	8	8	10
BOTTOM CHORD O.D. AT BASE PLATE	G	19.0"	20.0"	20.0"	22.0"	23.0"
ACCESS OPENING	H	6"	6"	6"	6"	6"

APPROVED 02-27-2024

STATE DESIGN ENGINEER

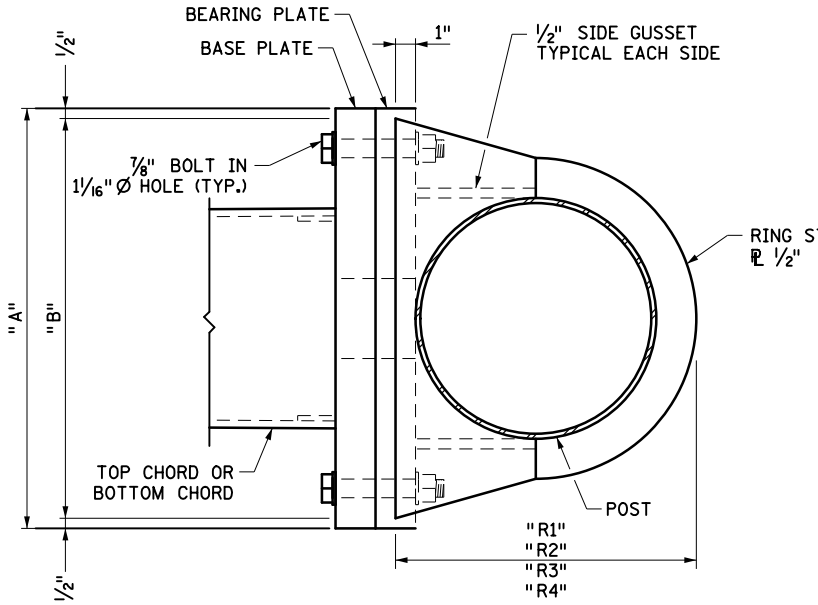
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

POLE AND MAST ARM TYPE TS

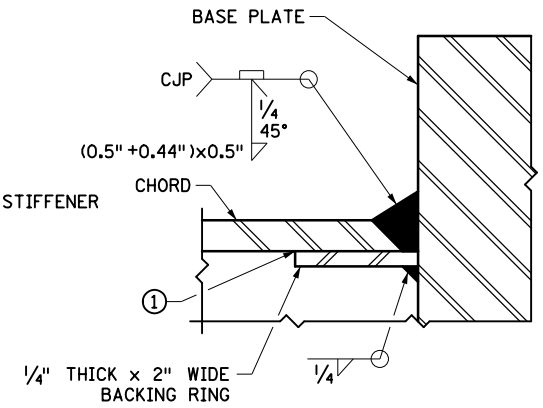
BOTTOM CHORD CONNECTION DETAILS
FOR MAST ARM LENGTHS 60' TO 80'

SPECIFICATION REFERENCE
2565

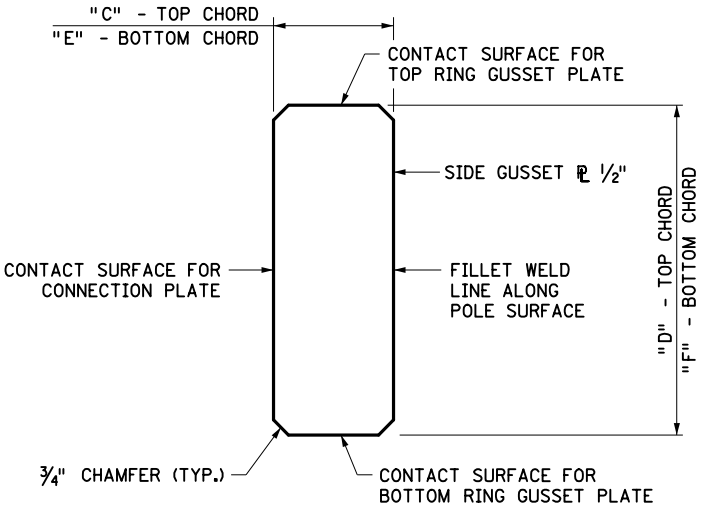
STANDARD PLATE NO.
8125A



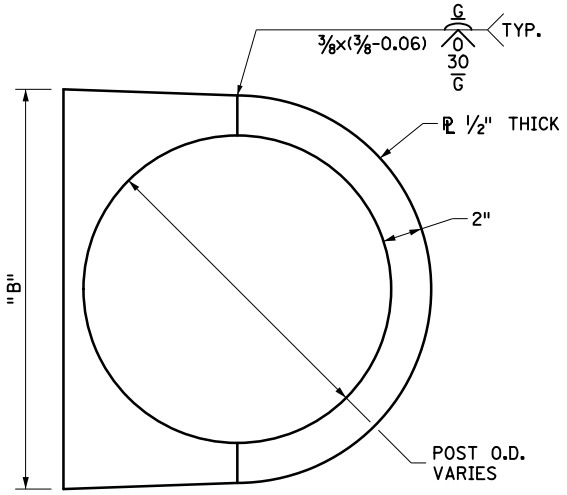
SECTION D-D
CABLE GUIDE NOT SHOWN FOR CLARITY



DETAIL C
BASE PLATE WELD DETAIL



SCHEMATIC OF SIDE GUSSET PLATE



RING STIFFENER

NOTES:

1. FIELD-APPLY 100% SILICONE CAULK (EXTERIOR USAGE) AT TOP OF BACKING RING ALONG ENTIRE INTERIOR CIRCUMFERENCE OF ARM.

MAST ARM CONNECTION

DESCRIPTION	DIMENSION	MAST ARM LENGTH 60'	65'	70'	75'	80'
TOP CHORD - TOP RING STIFFENER PLATE	R1	21⅛"	22⅛"	22⅛"	24"	24¼"
TOP CHORD - BOTTOM RING STIFFENER PLATE	R2	21⅜"	22⅜"	22⅜"	24⅜"	24¾"
BOTTOM CHORD - TOP RING STIFFENER PLATE	R3	21½"	22½"	22½"	24½"	24¾"
BOTTOM CHORD - BOTTOM RING STIFFENER PLATE	R4	21¾"	22¾"	22¾"	24¾"	25⅛"
BEARING/BASE PLATE WIDTH	A	27"	28"	29"	31"	32"
RING STIFFENER WIDTH AT BEARING PLATE	B	26"	27"	28"	30"	31"
TOP CHORD GUSSET PLATE WIDTH	C	9"	9½"	9½"	10½"	10¾"
TOP CHORD GUSSET PLATE HEIGHT	D	24"	26"	26"	28"	34"
BOTTOM CHORD GUSSET PLATE WIDTH	E	9¼"	9¾"	9¾"	10¾"	10⅞"
BOTTOM CHORD GUSSET PLATE HEIGHT	F	19"	19"	19"	22"	24"

APPROVED 02-27-2024
STATE DESIGN ENGINEER

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

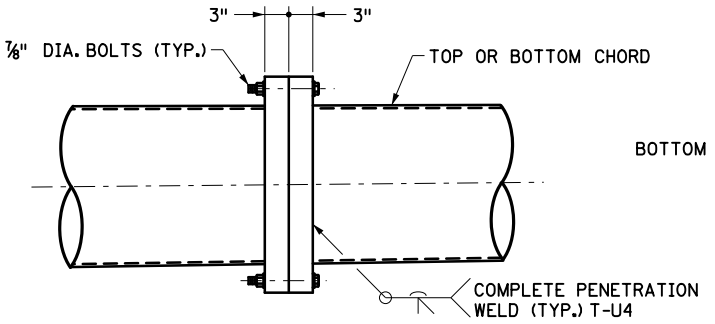
POLE AND MAST ARM TYPE TS

STIFFENER PLATE/GUSSET PLATE CONNECTION DETAILS
FOR MAST ARM LENGTHS 60' TO 80'

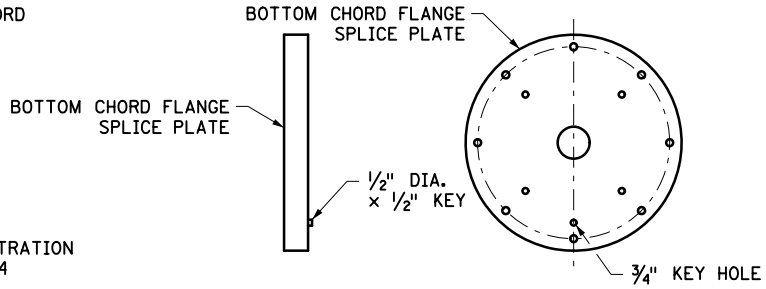
SPECIFICATION REFERENCE
2565

STANDARD PLATE NO.
8125A

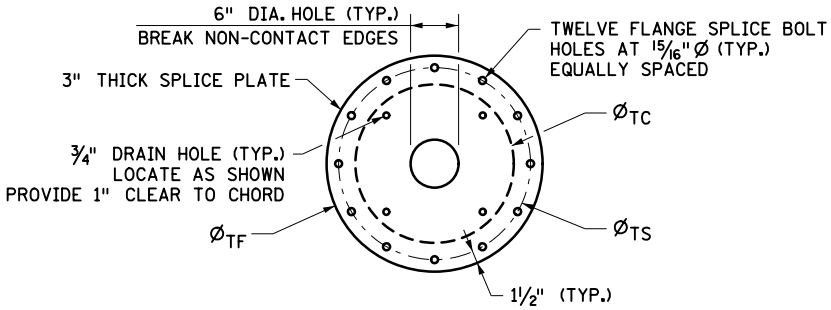
FLANGE SPLICE PLATE							
POLE TYPE	MAST ARM LENGTH	TOP CHORD			BOTTOM CHORD		
		FLANGE SPLICE PLATE DIAMETER Ø TF	BOLT CIRCLE DIAMETER Ø TS	CHORD DIAMETER @ SPLICE Ø TC	FLANGE SPLICE PLATE DIAMETER Ø BF	BOLT CIRCLE DIAMETER Ø BS	CHORD DIAMETER @ SPLICE Ø BC
TS60	60' 0"	24"	21"	16.9"	19"	16"	11.5"
TS65	65' 0"	24.5"	21.5"	17.2"	19"	16"	11.5"
TS70	70' 0"	24.5"	21.5"	17.2"	20"	17"	12.2"
TS75	75' 0"	26"	23"	18.5"	20"	17"	12.2"
TS80	80' 0"	26"	23"	18.8"	20"	17"	12.2"



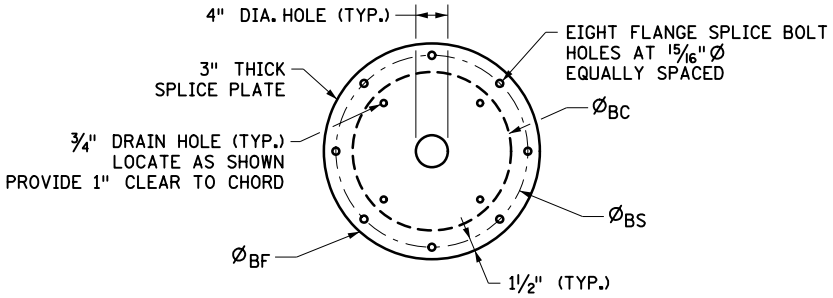
FLANGE SPLICE



SPLICE KEY

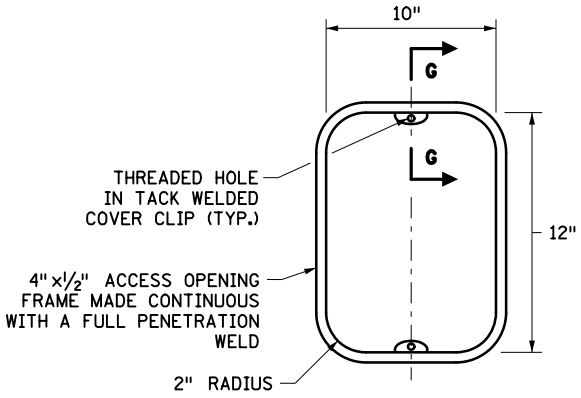


TOP CHORD FLANGE SPLICE PLATE

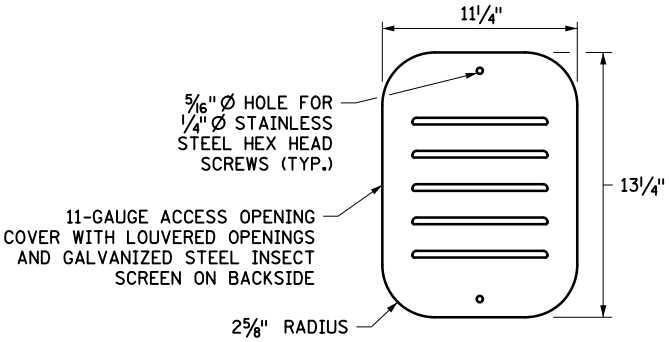


BOTTOM CHORD FLANGE SPLICE PLATE

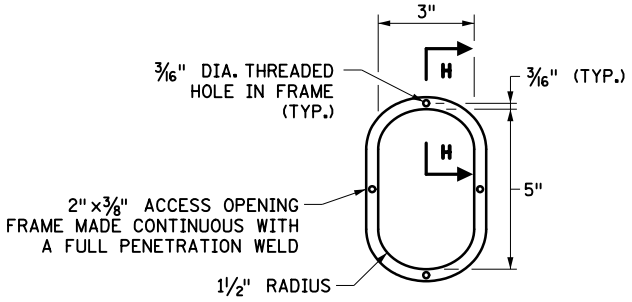
APPROVED 02-27-2024 STATE DESIGN ENGINEER	STATE OF MINNESOTA DEPARTMENT OF TRANSPORTATION **POLE AND MAST ARM TYPE TS** FLANGE SPLICE DETAILS FOR MAST ARM LENGTHS 60' TO 80'	SPECIFICATION REFERENCE 2565	STANDARD PLATE NO. 8125A 7 OF 13



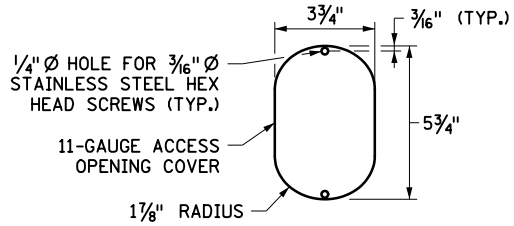
10" x 12" ACCESS OPENING FRAME



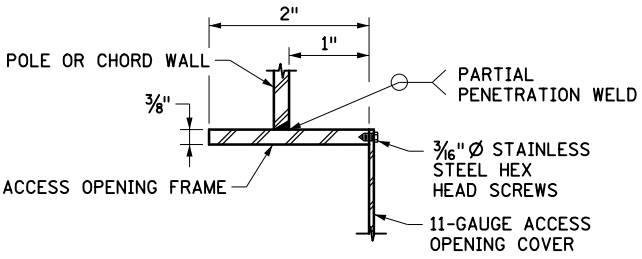
10" x 12" ACCESS OPENING COVER



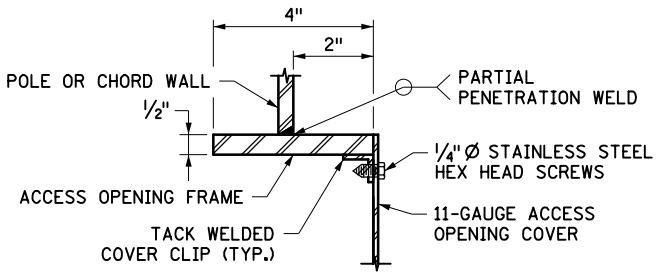
3" x 5" ACCESS OPENING FRAME



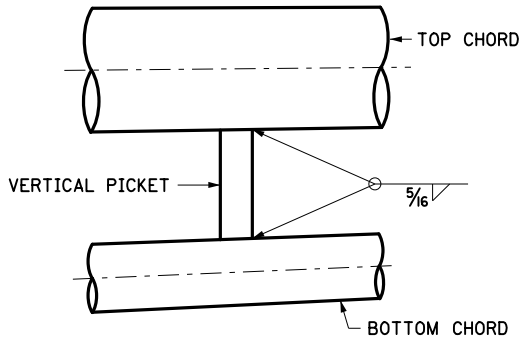
3" x 5" ACCESS OPENING COVER



SECTION H-H



SECTION G-G



VERTICAL PICKET

VERTICAL PICKET		
POLE TYPE	MAST ARM LENGTH	BAR DIMENSION
TS60	60' 0"	4" x 5/8"
TS65	65' 0"	4 1/2" x 5/8"
TS70	70' 0"	4 1/2" x 5/8"
TS75	75' 0"	5" x 5/8" (1)
TS80	80' 0"	5" x 5/8" (1)

NOTES:

INSTALL FASTENERS TO A SNUG-TIGHT CONDITION.

(1) 6" x 5/8" BARS REQUIRED AT THE TWO PICKET LOCATIONS NEAREST TO THE POLE.

APPROVED 02-27-2024

STATE DESIGN ENGINEER

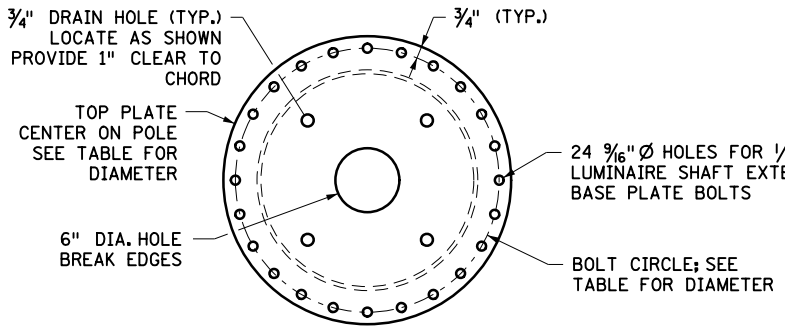
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

POLE AND MAST ARM TYPE TS

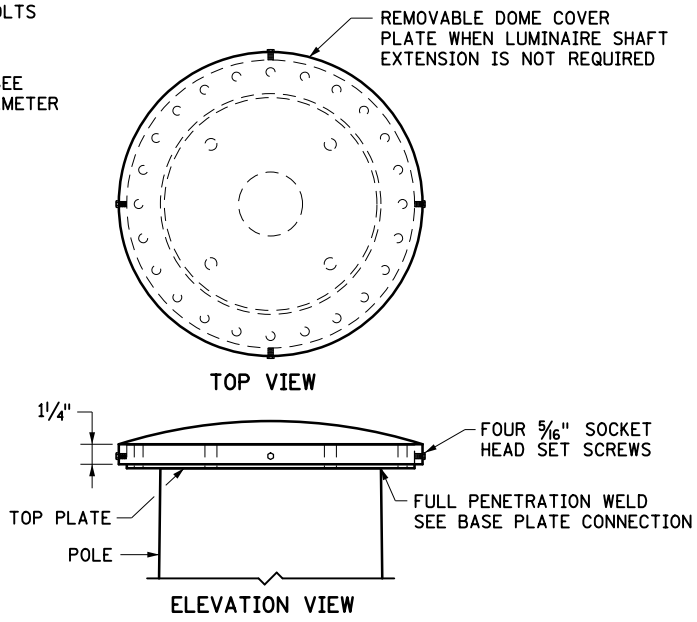
ACCESS OPENING AND ATTACHMENT DETAILS FOR MAST ARM LENGTHS 60' TO 80'

SPECIFICATION REFERENCE
2565

STANDARD PLATE NO.
8125A



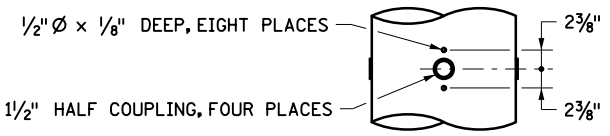
POLE TOP WITH LUMINAIRE SHAFT EXTENSION
SHAFT EXTENSION NOT SHOWN FOR CLARITY



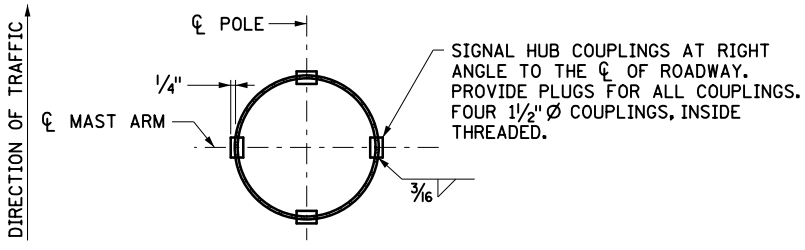
POLE TOP WITHOUT LUMINAIRE SHAFT EXTENSION

POLE CAP DETAIL

POLE CAP DIMENSIONS			
POLE TYPE	TOP PLATE DIAMETER	BOLT CIRCLE DIAMETER	COVER PLATE DIAMETER
TS60	22½"	21"	22½"
TS65	24"	22½"	24"
TS70	24"	22½"	24"
TS75	26"	24½"	26"
TS80	26½"	25"	26½"

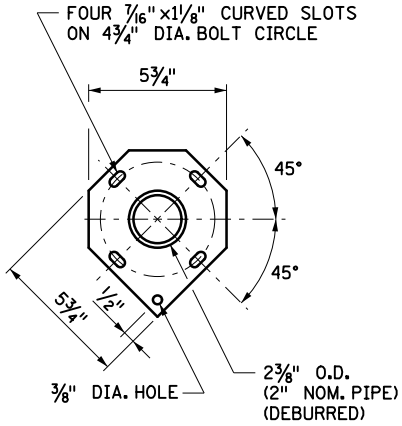


SIGNAL HUB DETAIL

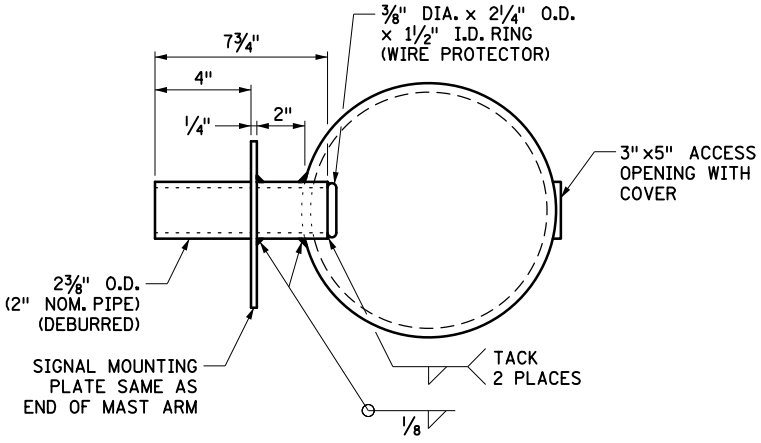


SECTION C-C

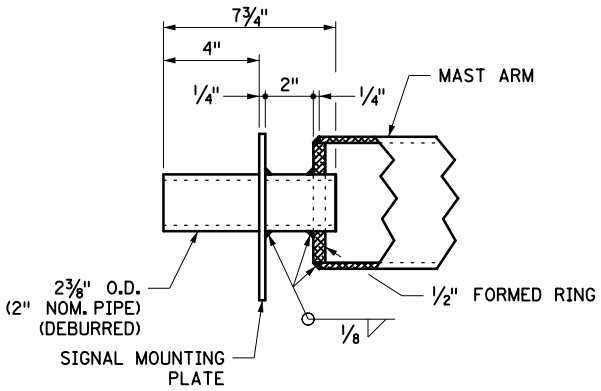
APPROVED 02-27-2024 STATE DESIGN ENGINEER	STATE OF MINNESOTA DEPARTMENT OF TRANSPORTATION **POLE AND MAST ARM TYPE TS** MISCELLANEOUS DETAILS FOR MAST ARM LENGTHS 60' TO 80'	SPECIFICATION REFERENCE 2565	STANDARD PLATE NO. 8125A 9 OF 13



FRONT VIEW

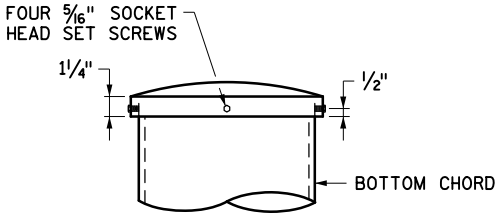


SIGNAL MOUNTING DETAIL
MID MAST ARM



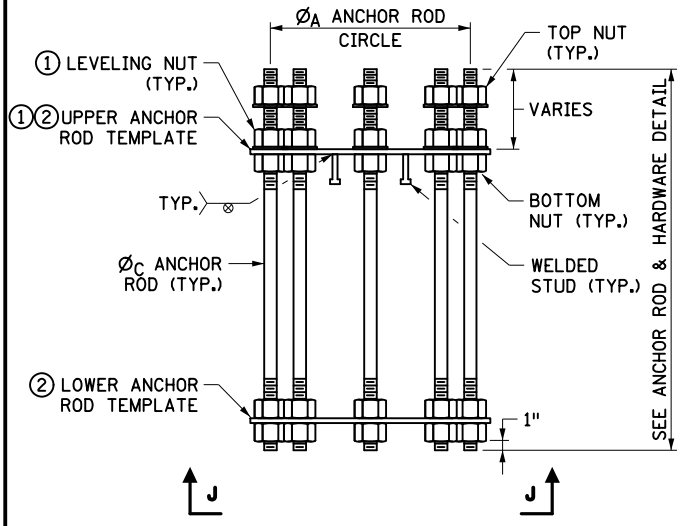
SIDE VIEW

SIGNAL MOUNTING DETAIL
END OF MAST ARM

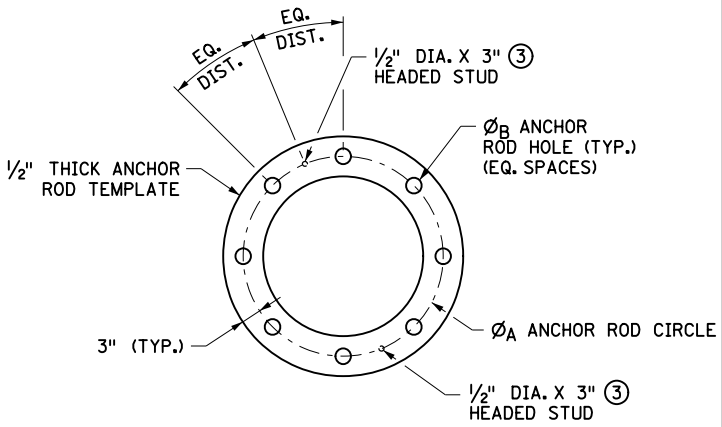


REMOVABLE CHORD CAP DETAIL

APPROVED 02-27-2024 STATE DESIGN ENGINEER	STATE OF MINNESOTA DEPARTMENT OF TRANSPORTATION **POLE AND MAST ARM TYPE TS** MISCELLANEOUS DETAILS FOR MAST ARM LENGTHS 60' TO 80'	SPECIFICATION REFERENCE 2565	STANDARD PLATE NO. 8125A 10 OF 13

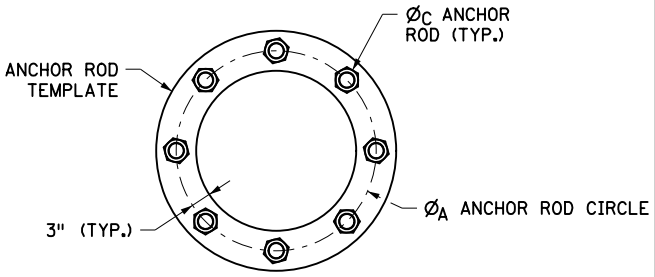


ANCHOR ROD ASSEMBLY DETAIL

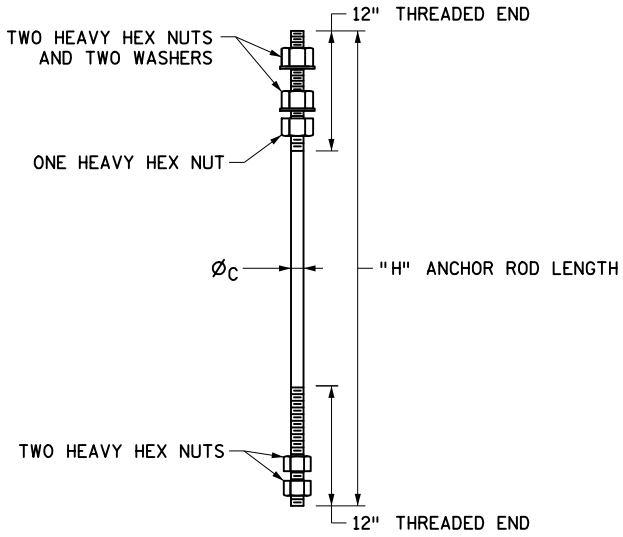


ANCHOR ROD TEMPLATE

TWO PER ASSEMBLY, ONE UPPER AND ONE LOWER



VIEW J-J



ANCHOR ROD AND HARDWARE

EIGHT REQUIRED PER ASSEMBLY

POLE TYPE	ANCHOR ROD CIRCLE	ANCHOR ROD HOLE	ANCHOR ROD DIA.	ANCHOR ROD TOTAL LENGTH
	$\varnothing_A$	$\varnothing_B$	$\varnothing_C$	H
TS60	29"	1⅝"	1½"	42"
TS65	29"	1⅞"	1¾"	47"
TS70	31"	2⅛"	2"	52"
TS75	33"	2⅛"	2"	52"
TS80	33"	2⅜"	2¼"	59"

NOTES:

① USE THE LEVELING NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE CONCRETE OPERATIONS. LEAVE THE NUTS SECURE AGAINST THE TEMPLATE UNTIL POLE INSTALLATION. USE THE REQUIRED HARDWARE FOR DOUBLE-NUT ANCHOR ROD CONNECTIONS IN ACCORDANCE WITH SPEC 2545.3.

② TIGHTEN ANCHOR ROD TEMPLATE NUTS USING A 12"-LONG WRENCH.

③ FURNISH AND INSTALL HEADED STUDS IN ACCORDANCE WITH 3391.2 "STUD WELDED FASTENERS" ON THE UPPER TEMPLATE AT THE LOCATIONS SHOWN.

GALVANIZE HEAVY HEX NUTS AND WASHERS IN ACCORDANCE WITH SPEC. 3392.

GALVANIZE UPPER AND LOWER ANCHOR ANCHOR ROD TEMPLATES IN ACCORDANCE WITH SPEC. 3394.

FURNISH AND INSTALL TYPE B ANCHOR RODS IN ACCORDANCE WITH SPEC. 3385.

APPROVED 02-27-2024

STATE DESIGN ENGINEER

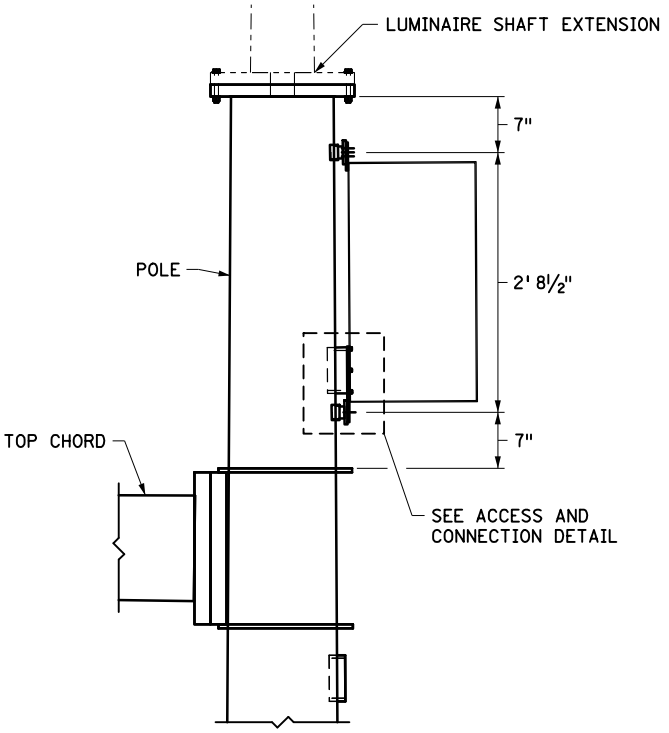
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

POLE AND MAST ARM TYPE TS

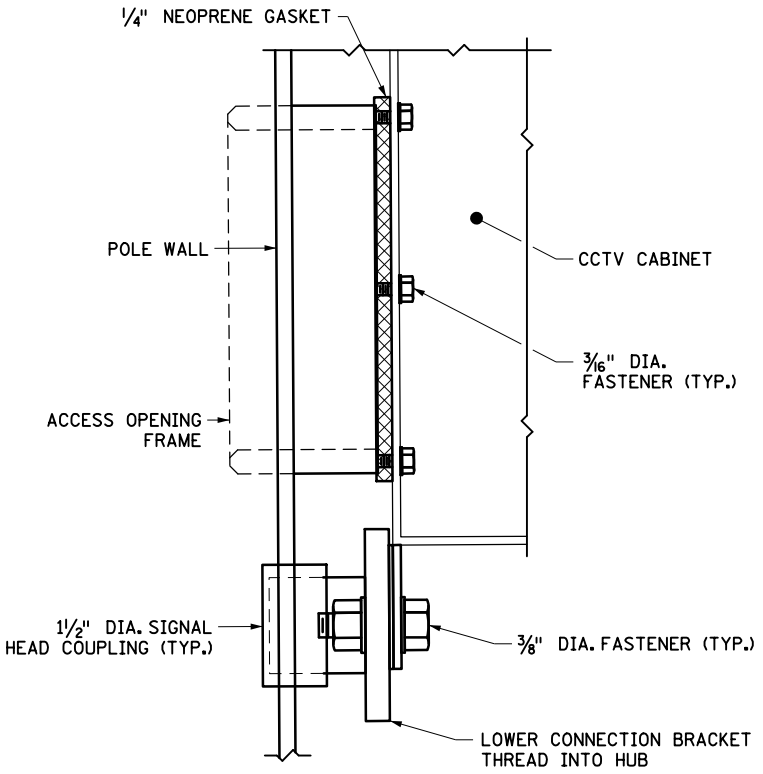
ANCHOR ROD ASSEMBLY DETAILS
FOR MAST ARM LENGTHS 60' TO 80'

SPECIFICATION REFERENCE
2565

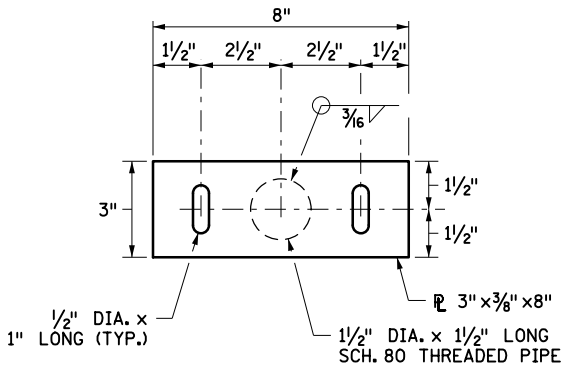
STANDARD PLATE NO.
8125A



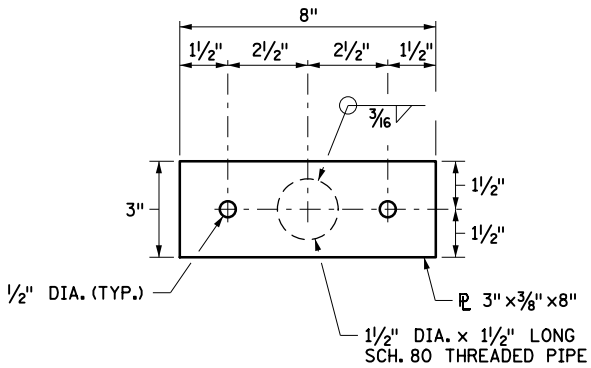
CCTV CABINET DETAIL



ACCESS AND CONNECTION DETAIL
LOWER CONNECTION SHOWN; UPPER SIMILAR



UPPER CONNECTION BRACKET
ONE REQUIRED PER POLE



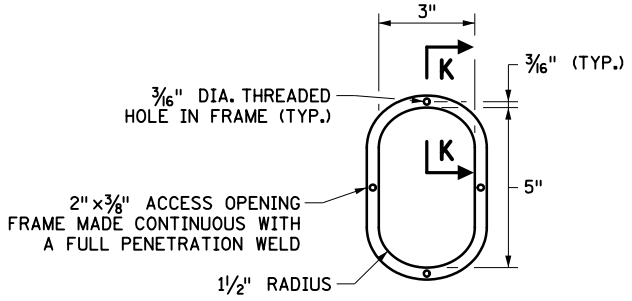
LOWER CONNECTION BRACKET
ONE REQUIRED PER POLE

NOTES:

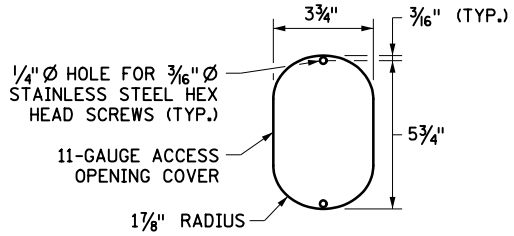
PROVIDE DETAILS ON THIS SHEET IF POLE IS TO RECEIVE A CCTV CABINET.

FURNISH AND INSTALL COMMON STRUCTURAL STEEL BOLTS, NUTS, AND WASHERS IN ACCORDANCE WITH SPEC. 3391 FOR THE CCTV CABINET TO POLE BRACKETING CONNECTIONS.

APPROVED 02-27-2024 STATE DESIGN ENGINEER	STATE OF MINNESOTA DEPARTMENT OF TRANSPORTATION **POLE AND MAST ARM TYPE TS** CCTV CONNECTION DETAILS (1 OF 2) FOR MAST ARM LENGTHS 60' TO 80'	SPECIFICATION REFERENCE 2565	STANDARD PLATE NO. 8125A 12 OF 13

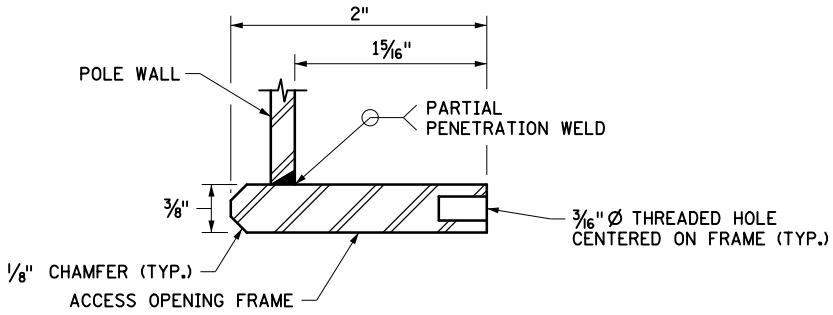


3"x5" ACCESS OPENING FRAME



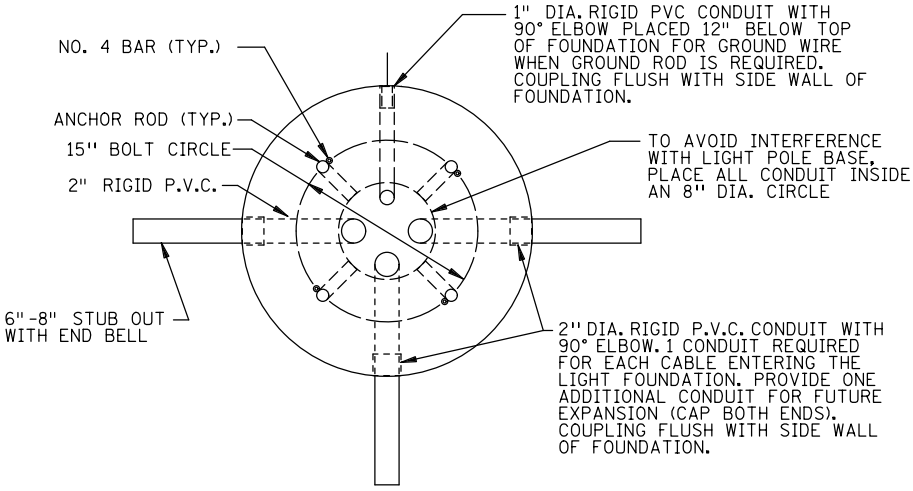
3"x5" ACCESS OPENING COVER PLATE

PROVIDE COVER PLATE WHEN CCTV
CABINET IS NOT REQUIRED

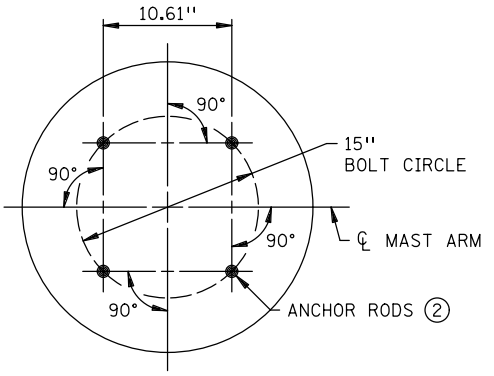


SECTION K-K

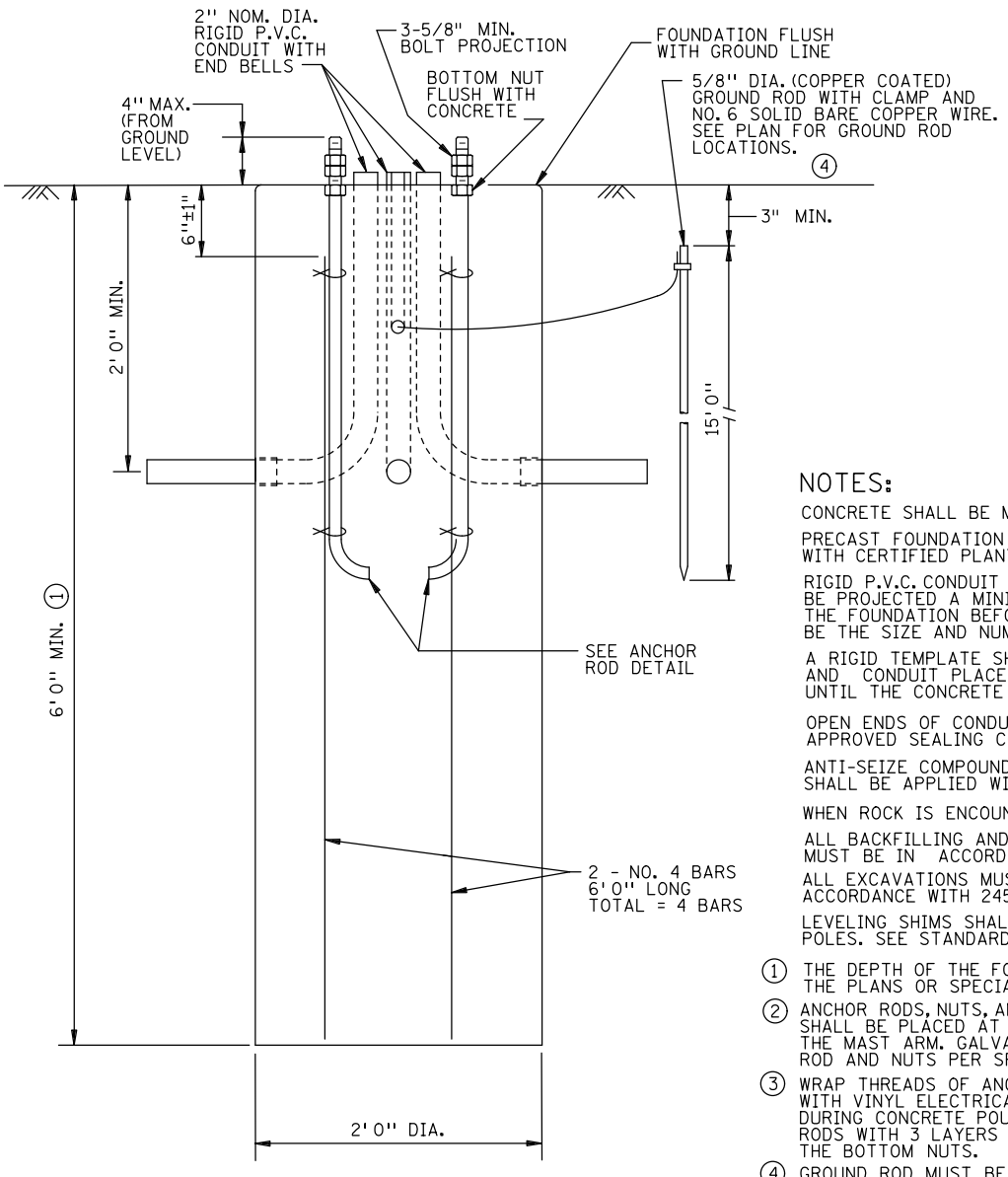
APPROVED 02-27-2024 STATE DESIGN ENGINEER	STATE OF MINNESOTA DEPARTMENT OF TRANSPORTATION **POLE AND MAST ARM TYPE TS** CCTV CONNECTION DETAILS (2 OF 2) FOR MAST ARM LENGTHS 60' TO 80'	SPECIFICATION REFERENCE 2565	STANDARD PLATE NO. 8125A 13 OF 13



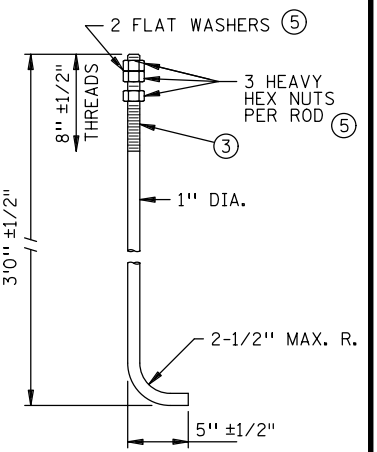
PLAN



ANCHOR ROD PLACEMENT



ELEVATION
PRECAST FOUNDATION



ANCHOR ROD DETAIL
4 REQUIRED (2)

NOTES:

CONCRETE SHALL BE MIX NO. 3G52.

PRECAST FOUNDATION FACILITY MUST BE IN COMPLIANCE WITH CERTIFIED PLANT REQUIREMENT OF SPEC. 3238.

RIGID P.V.C. CONDUIT PER SPEC. 3803 WITH END BELLS SHALL BE PROJECTED A MINIMUM 1/4" TO MAXIMUM 1" ABOVE THE FOUNDATION BEFORE MORTAR IS PLACED AND SHALL BE THE SIZE AND NUMBER SHOWN IN THE PLAN.

A RIGID TEMPLATE SHALL BE PROVIDED FOR ANCHOR ROD AND CONDUIT PLACEMENT AND SHALL BE LEFT IN PLACE UNTIL THE CONCRETE HAS SET.

OPEN ENDS OF CONDUITS SHALL BE SEALED WITH AN APPROVED SEALING COMPOUND.

ANTI-SEIZE COMPOUND THAT MEETS MIL-PRF-907E SPEC. SHALL BE APPLIED WITH A BRUSH TO ALL THREADS.

WHEN ROCK IS ENCOUNTERED, SEE PLAN DETAILS.

ALL BACKFILLING AND EXCAVATION AROUND FOUNDATION MUST BE IN ACCORDANCE WITH 2451 AND 2545.3.

ALL EXCAVATIONS MUST BE PROPERLY COMPACTED IN ACCORDANCE WITH 2451.

LEVELING SHIMS SHALL BE USED WHEN PLACING ALUMINUM POLES. SEE STANDARD PLATE 8129.

(1) THE DEPTH OF THE FOUNDATION MAY VARY IN THE PLANS OR SPECIAL PROVISIONS.

(2) ANCHOR RODS, NUTS, AND WASHERS PER SPEC. 3385, TYPE B, SHALL BE PLACED AT RIGHT ANGLES TO THE DIRECTION OF THE MAST ARM. GALVANIZE THE TOP 1 FT. OF THE ANCHOR ROD AND NUTS PER SPEC. 3392.

(3) WRAP THREADS OF ANCHOR RODS ABOVE THE BOTTOM NUT WITH VINYL ELECTRICAL TAPE TO AVOID CONTAMINATION DURING CONCRETE POURING. WRAP THREADS OF ANCHOR RODS WITH 3 LAYERS OF VINYL ELECTRICAL TAPE 2" BELOW THE BOTTOM NUTS.

(4) GROUND ROD MUST BE ADDED 3" TO 6" DEEP BELOW GROUND LINE AND WITHIN 1' OF FOUNDATION.

(5) USE 1 HOLDDOWN WASHER AND 2 HEAVY HEX NUTS PER ROD FOR ALUMINUM POLE INSTALLATION.

APPROVED JULY 15, 2015

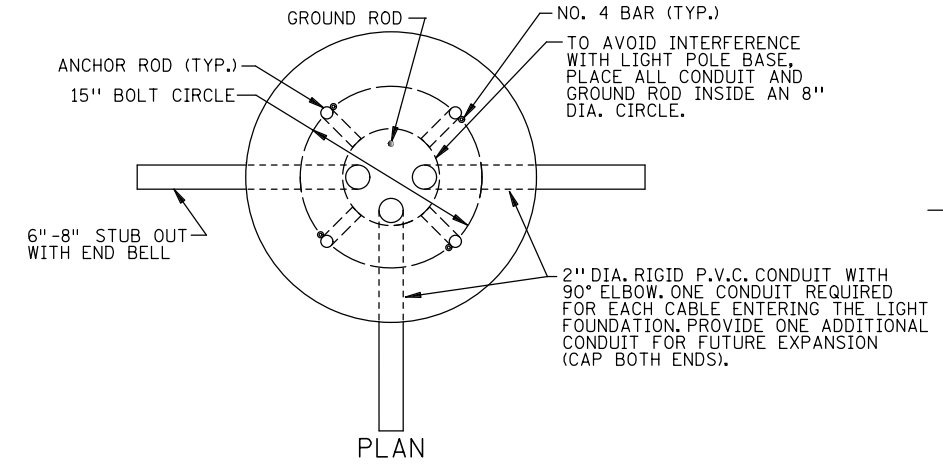
STATE DESIGN ENGINEER

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

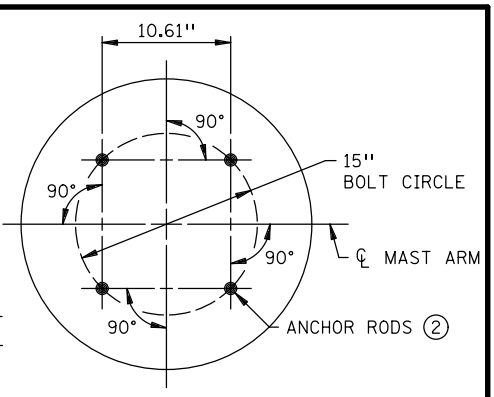
LIGHT FOUNDATION - DESIGN E PRECAST

40 FT. POLE OR LESS

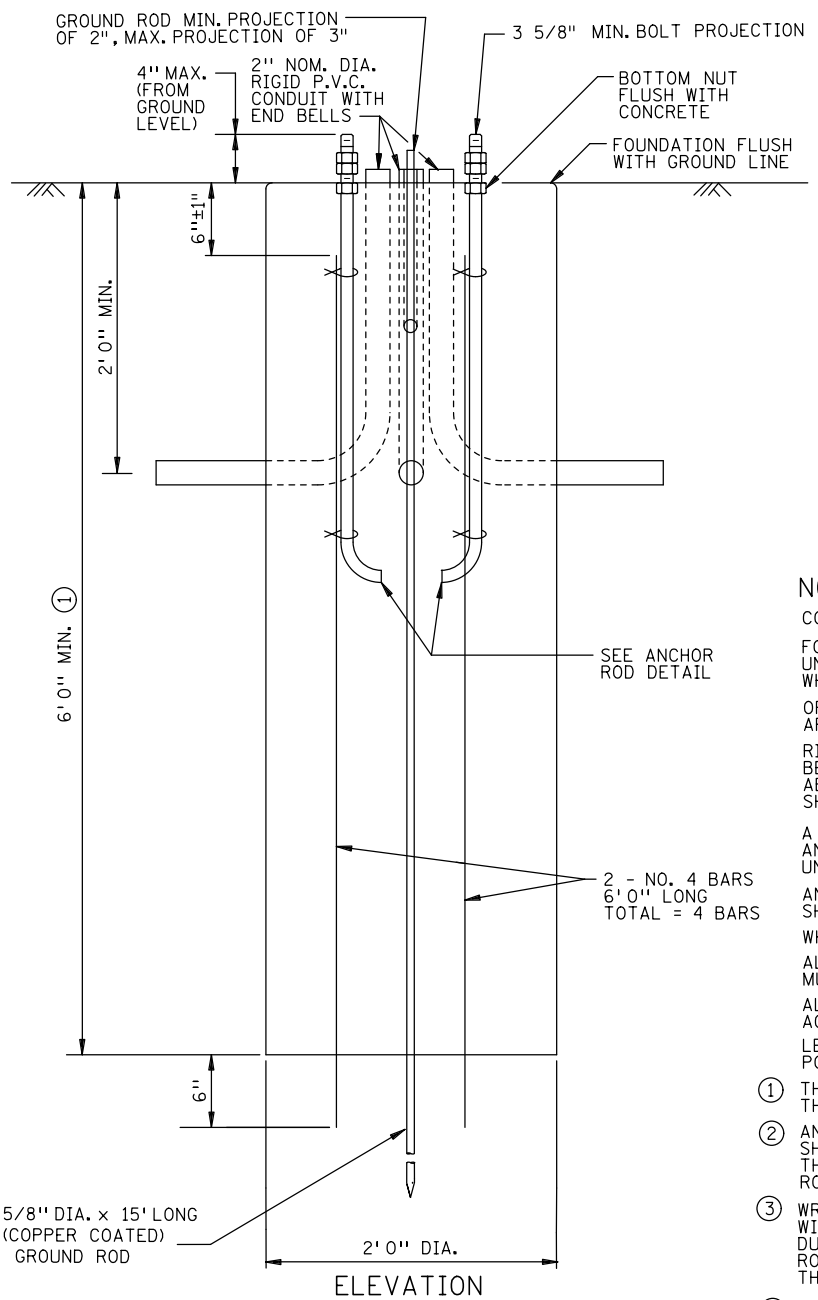
SPECIFICATION REFERENCE	STANDARD PLATE NO.
2545	8127E



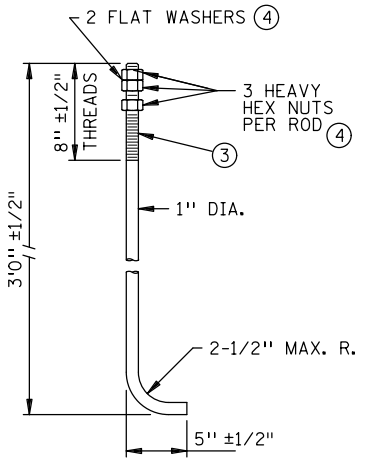
PLAN



ANCHOR ROD PLACEMENT



ELEVATION
CAST-IN-PLACE FOUNDATION



ANCHOR ROD DETAIL
4 REQUIRED (2)

NOTES:

CONCRETE SHALL BE MIX NO. 3G52.

FOUNDATIONS MAY BE CONSTRUCTED IN AUGERED HOLES UNLESS THE NATURAL SOILS WILL NOT STAND OPEN, IN WHICH CASE FORMING WILL BE REQUIRED.

OPEN ENDS OF CONDUITS SHALL BE SEALED WITH AN APPROVED SEALING COMPOUND.

RIGID P.V.C. CONDUIT PER SPEC. 3803 WITH END BELLS SHALL BE PROJECTED A MINIMUM 1/4" TO MAXIMUM 1" ABOVE THE FOUNDATION BEFORE MORTAR IS PLACED AND SHALL BE THE SIZE AND NUMBER SHOWN IN THE PLAN.

A RIGID TEMPLATE SHALL BE PROVIDED FOR ANCHOR ROD AND CONDUIT PLACEMENT AND SHALL BE LEFT IN PLACE UNTIL THE CONCRETE HAS SET.

ANTI-SEIZE COMPOUND THAT MEETS MIL-PRF-907E SPEC. SHALL BE APPLIED WITH A BRUSH TO ALL THREADS.

WHEN ROCK IS ENCOUNTERED, SEE PLAN DETAILS.

ALL BACKFILLING AND EXCAVATION AROUND FOUNDATION MUST BE IN ACCORDANCE WITH 2451 AND 2545.3.

ALL EXCAVATIONS MUST BE PROPERLY COMPACTED IN ACCORDANCE WITH 2451.

LEVELING SHIMS SHALL BE USED WHEN PLACING ALUMINUM POLES. SEE STANDARD PLATE 8129.

(1) THE DEPTH OF THE FOUNDATION MAY VARY IN THE PLANS OR SPECIAL PROVISIONS.

(2) ANCHOR RODS, NUTS, AND WASHERS PER SPEC. 3385, TYPE B, SHALL BE PLACED AT RIGHT ANGLES TO THE DIRECTION OF THE MAST ARM. GALVANIZE THE TOP 1 FT. OF THE ANCHOR ROD AND NUTS PER SPEC. 3392.

(3) WRAP THREADS OF ANCHOR RODS ABOVE THE BOTTOM NUT WITH VINYL ELECTRICAL TAPE TO AVOID CONTAMINATION DURING CONCRETE POURING. WRAP THREADS OF ANCHOR RODS WITH 3 LAYERS OF VINYL ELECTRICAL TAPE 2" BELOW THE BOTTOM NUTS.

(4) USE 1 HOLDDOWN WASHER AND 2 HEAVY HEX NUTS PER ROD FOR ALUMINUM POLE INSTALLATION.

APPROVED JULY 15, 2015

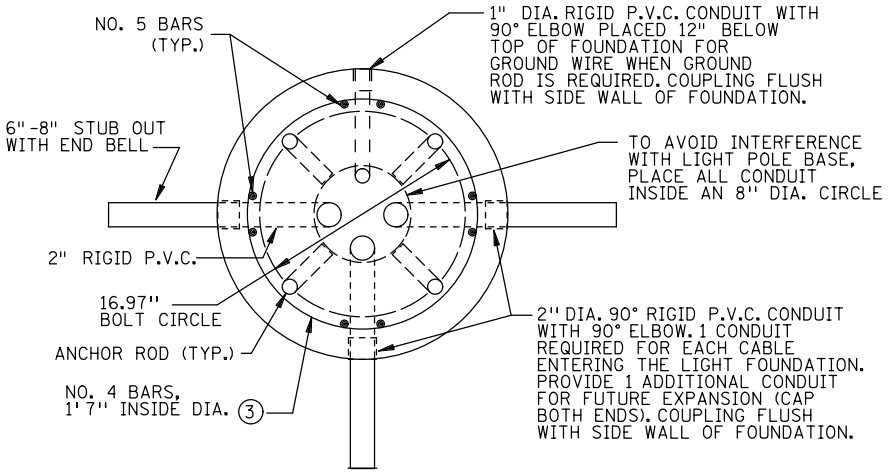
STATE DESIGN ENGINEER

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

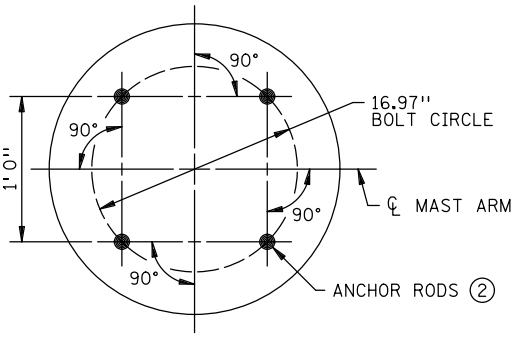
LIGHT FOUNDATION - DESIGN E CAST IN-PLACE

40 FT. POLE OR LESS

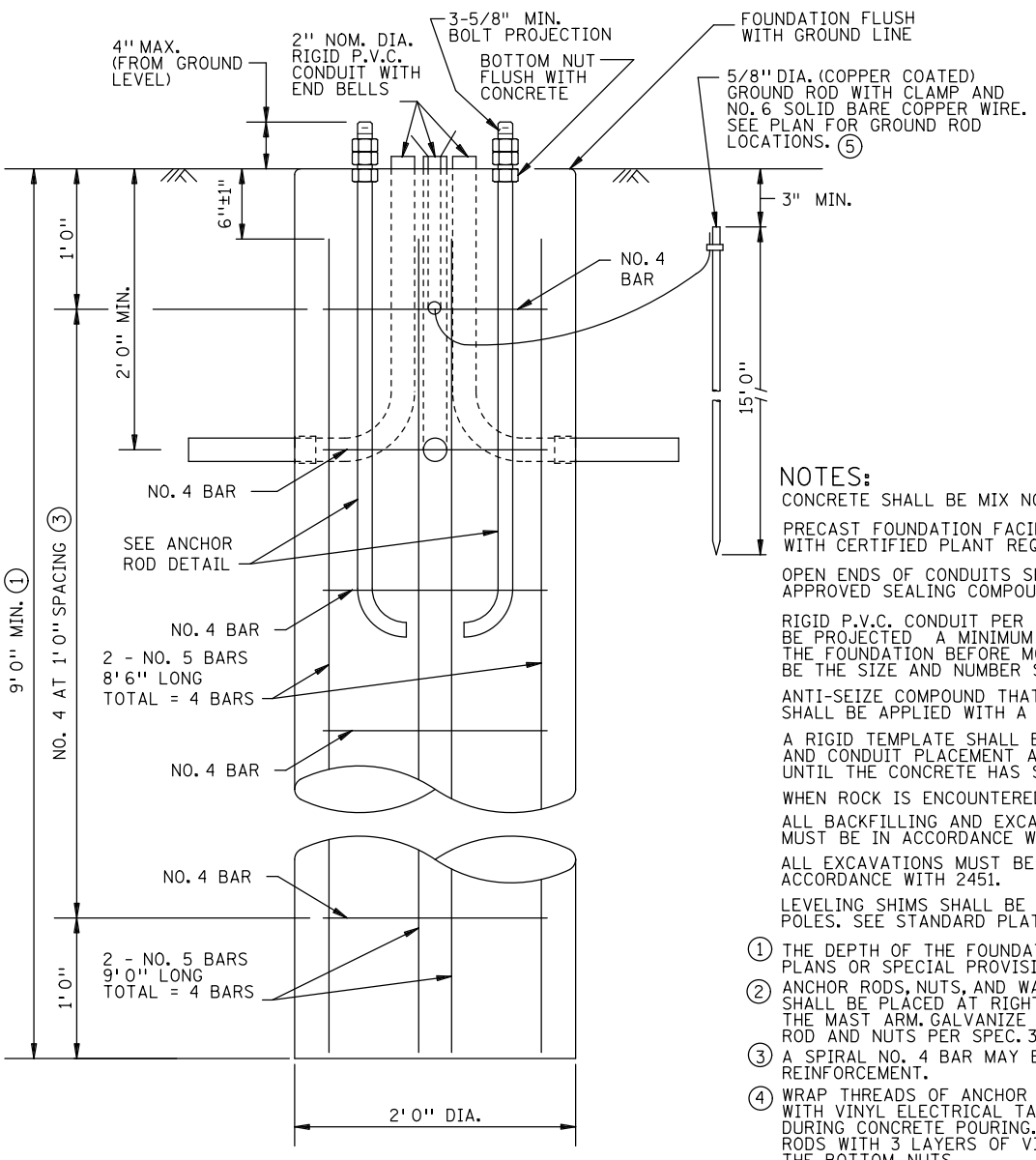
SPECIFICATION REFERENCE	STANDARD PLATE NO.
2545	8127E
	2 OF 2



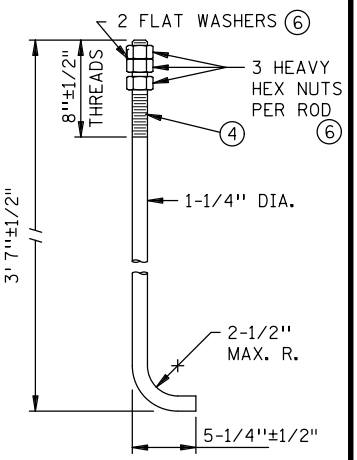
PLAN



ANCHOR ROD PLACEMENT



ELEVATION
PRECAST FOUNDATION



ANCHOR ROD DETAIL
4 REQUIRED ②

NOTES:

CONCRETE SHALL BE MIX NO. 3G52.

PRECAST FOUNDATION FACILITY MUST BE IN COMPLIANCE WITH CERTIFIED PLANT REQUIREMENT OF SPEC. 3238.

OPEN ENDS OF CONDUITS SHALL BE SEALED WITH AN APPROVED SEALING COMPOUND.

RIGID P.V.C. CONDUIT PER SPEC. 3803 WITH END BELLS SHALL BE PROJECTED A MINIMUM OF 1/4" TO MAXIMUM 1" ABOVE THE FOUNDATION BEFORE MORTAR IS PLACED AND SHALL BE THE SIZE AND NUMBER SHOWN IN THE PLAN.

ANTI-SEIZE COMPOUND THAT MEETS MIL-PRF-907E SPEC. SHALL BE APPLIED WITH A BRUSH TO ALL THREADS.

A RIGID TEMPLATE SHALL BE PROVIDED FOR ANCHOR ROD AND CONDUIT PLACEMENT AND SHALL BE LEFT IN PLACE UNTIL THE CONCRETE HAS SET.

WHEN ROCK IS ENCOUNTERED, SEE PLAN DETAILS.

ALL BACKFILLING AND EXCAVATION AROUND THE FOUNDATION MUST BE IN ACCORDANCE WITH 2451 AND 2545.3.

ALL EXCAVATIONS MUST BE PROPERLY COMPACTED IN ACCORDANCE WITH 2451.

LEVELING SHIMS SHALL BE USED WHEN PLACING ALUMINUM POLES. SEE STANDARD PLATE 8129.

① THE DEPTH OF THE FOUNDATION MAY VARY IN THE PLANS OR SPECIAL PROVISIONS.

② ANCHOR RODS, NUTS, AND WASHERS PER SPEC. 3385. TYPE B, SHALL BE PLACED AT RIGHT ANGLES TO THE DIRECTION OF THE MAST ARM. GALVANIZE THE TOP 1 FT. OF THE ANCHOR ROD AND NUTS PER SPEC. 3392.

③ A SPIRAL NO. 4 BAR MAY BE USED AS AN ALTERNATE REINFORCEMENT.

④ WRAP THREADS OF ANCHOR RODS ABOVE THE BOTTOM NUT WITH VINYL ELECTRICAL TAPE TO AVOID CONTAMINATION DURING CONCRETE POURING. WRAP THREADS OF ANCHOR RODS WITH 3 LAYERS OF VINYL ELECTRICAL TAPE 2" BELOW THE BOTTOM NUTS.

⑤ GROUND ROD MUST BE ADDED 3" TO 6" DEEP BELOW GROUND LINE AND WITHIN 1' OF FOUNDATION.

⑥ USE 1 HOLDDOWN WASHER AND 2 HEAVY HEX NUTS PER ROD FOR ALUMINUM POLE INSTALLATION.

APPROVED JULY 15, 2015

STATE DESIGN ENGINEER

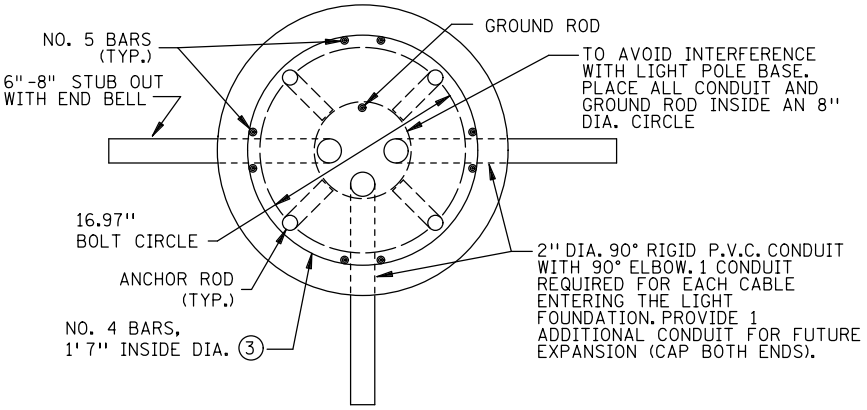
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

LIGHT FOUNDATION - DESIGN H PRECAST

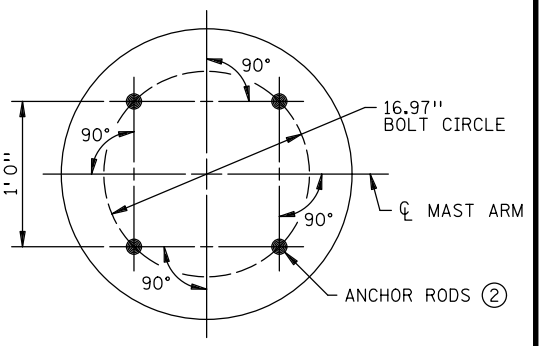
49 FT. POLE

SPECIFICATION REFERENCE
2545

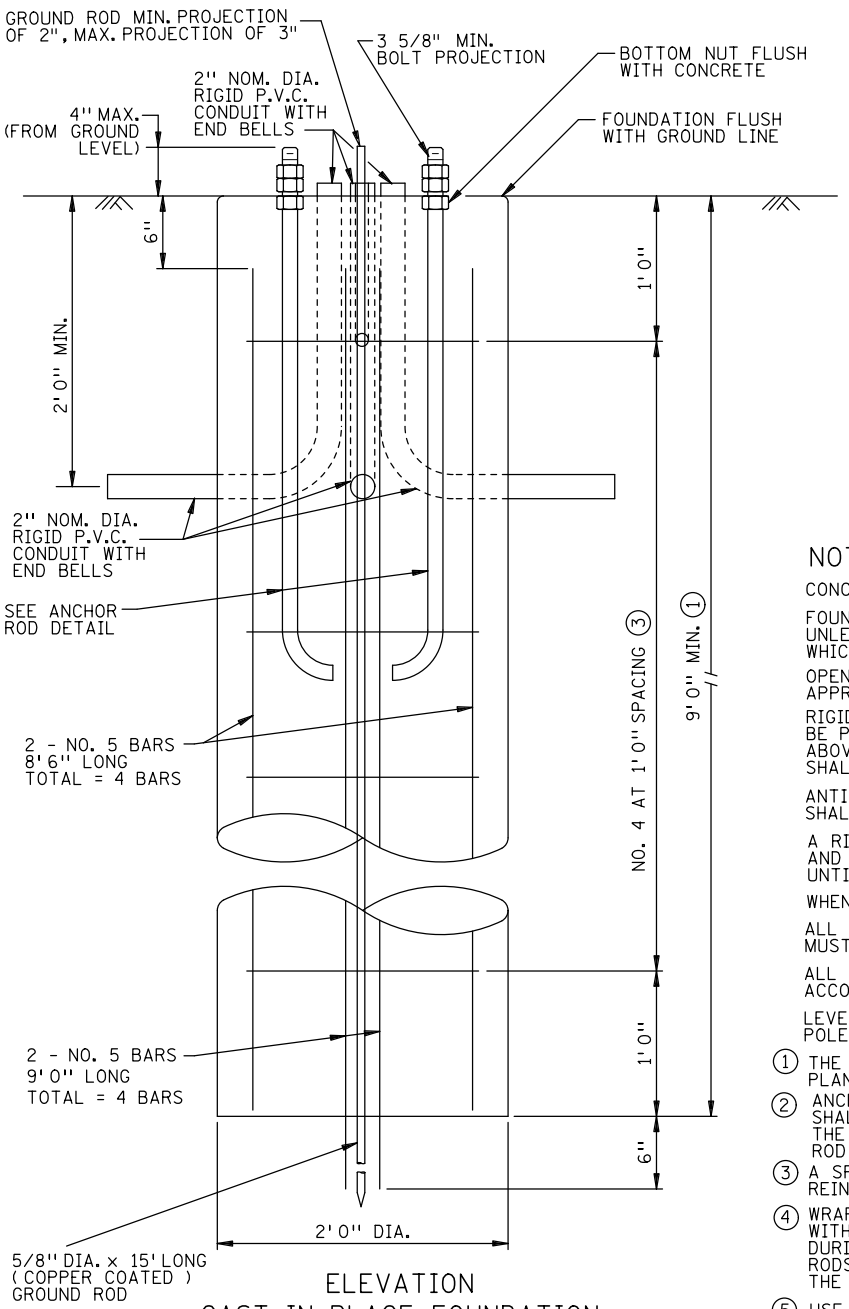
STANDARD PLATE NO.
8128E



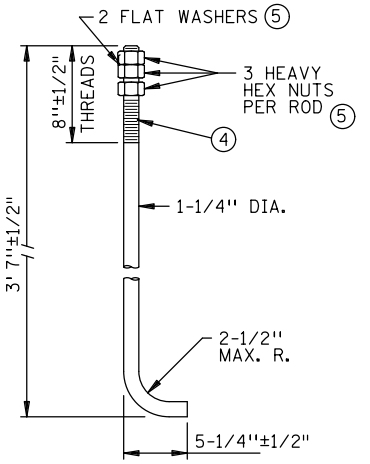
PLAN



ANCHOR ROD PLACEMENT



ELEVATION
CAST-IN-PLACE FOUNDATION



ANCHOR ROD DETAILS
4 REQUIRED (2)

NOTES:

CONCRETE SHALL BE MIX NO. 3G52.

FOUNDATIONS MAY BE CONSTRUCTED IN AUGERED HOLES UNLESS THE NATURAL SOILS WILL NOT STAND OPEN, IN WHICH CASE FORMING WILL BE REQUIRED.

OPEN ENDS OF CONDUITS SHALL BE SEALED WITH AN APPROVED SEALING COMPOUND.

RIGID P.V.C. CONDUIT PER SPEC. 3803 WITH END BELLS SHALL BE PROJECTED A MINIMUM 1/4" TO MAXIMUM 1" ABOVE THE FOUNDATION BEFORE MORTAR IS PLACED AND SHALL BE THE SIZE AND NUMBER SHOWN IN THE PLAN.

ANTI-SEIZE COMPOUND THAT MEETS MIL-PRF-907E SPEC. SHALL BE APPLIED WITH A BRUSH TO ALL THREADS.

A RIGID TEMPLATE SHALL BE PROVIDED FOR ANCHOR ROD AND CONDUIT PLACEMENT AND SHALL BE LEFT IN PLACE UNTIL THE CONCRETE HAS SET.

WHEN ROCK IS ENCOUNTERED, SEE PLAN DETAILS.

ALL BACKFILLING AND EXCAVATION AROUND FOUNDATION MUST BE IN ACCORDANCE WITH 2451 AND 2545.3.

ALL EXCAVATIONS MUST BE PROPERLY COMPACTED IN ACCORDANCE WITH 2451.

LEVELING SHIMS SHALL BE USED WHEN PLACING ALUMINUM POLES. SEE STANDARD PLATE 8129.

(1) THE DEPTH OF THE FOUNDATION MAY BE CHANGED IN THE PLANS OR SPECIAL PROVISIONS.

(2) ANCHOR RODS, NUTS, AND WASHERS PER SPEC. 3385, TYPE B, SHALL BE PLACED AT RIGHT ANGLES TO THE DIRECTION OF THE MAST ARM. GALVANIZE THE TOP 1 FT. OF THE ANCHOR ROD AND NUTS PER SPEC. 3392.

(3) A SPIRAL NO. 4 BAR MAY BE USED AS AN ALTERNATE REINFORCEMENT.

(4) WRAP THREADS OF ANCHOR RODS ABOVE THE BOTTOM NUT WITH VINYL ELECTRICAL TAPE TO AVOID CONTAMINATION DURING CONCRETE POURING. WRAP THREADS OF ANCHOR RODS WITH 3 LAYERS OF VINYL ELECTRICAL TAPE 2" BELOW THE BOTTOM NUTS.

(5) USE 1 HOLDDOWN WASHER AND 2 HEAVY HEX NUTS PER ROD FOR ALUMINUM POLE INSTALLATION.

APPROVED JULY 15, 2015

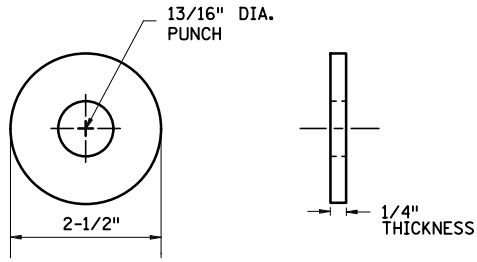
STATE DESIGN ENGINEER

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

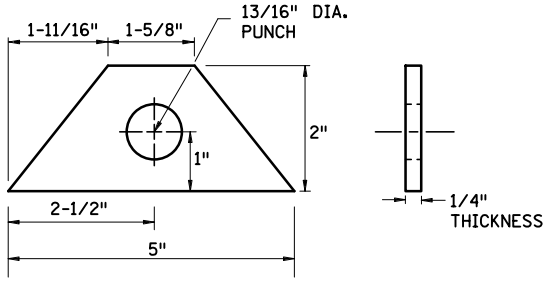
LIGHT FOUNDATION - DESIGN H
CAST IN-PLACE
49 FT. POLE

SPECIFICATION REFERENCE
2545

STANDARD PLATE NO.
8128E
2 OF 2

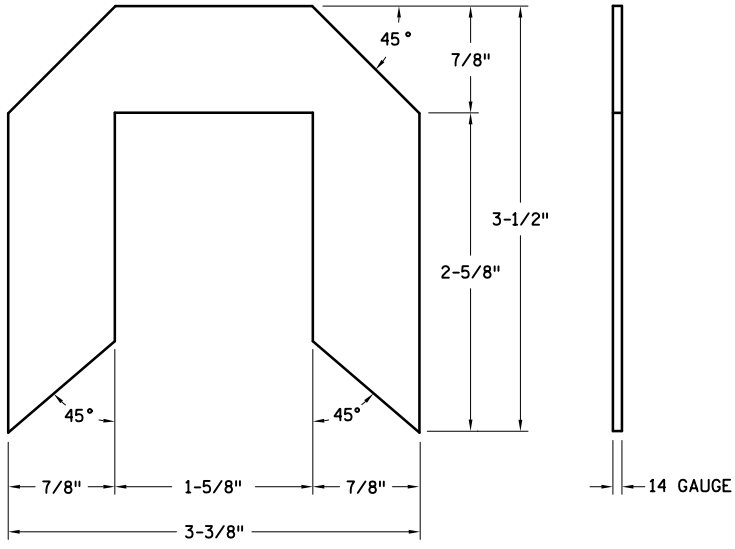


OPTION A



OPTION B

TRAFFIC SIGNAL PEDESTAL WASHERS ①



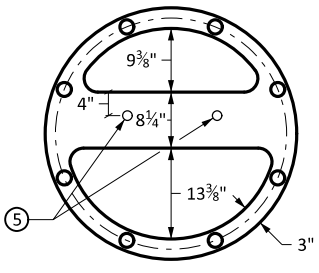
SIGNAL AND LIGHTING LEVELING SHIM ②

NOTES:

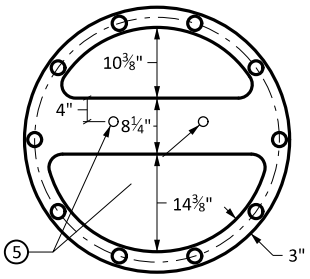
① WASHERS PER SPEC. 3832.2C3, EXCEPT THE DIMENSIONS MUST BE AS SHOWN.

② MATERIAL - GALVANIZED STEEL SHEET 36,000 PSI MIN. YIELD PER ASTM A924.
FINISH - PREPLATED GALVANIZED MATERIAL

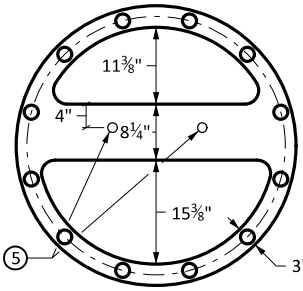
APPROVED DECEMBER 20, 2011 STATE DESIGN ENGINEER	STATE OF MINNESOTA DEPARTMENT OF TRANSPORTATION **SHIM AND WASHER** (TRAFFIC CONTROL SIGNALS AND ROADWAY LIGHTING)	SPECIFICATION REFERENCE 2545 2565	STANDARD PLATE NO. 8129A



T-100
8 BOLT, 34" BOLT CIRCLE

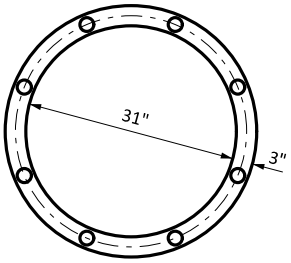


T-120
10 BOLT, 36" BOLT CIRCLE

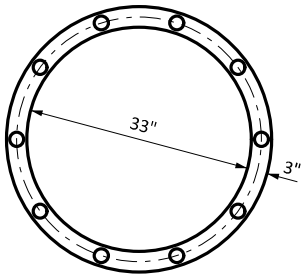


T-140
12 BOLT, 38" BOLT CIRCLE

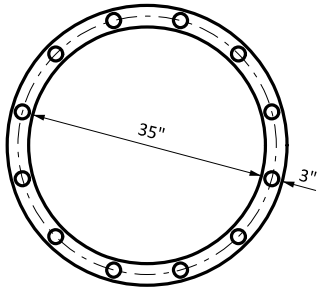
UPPER ANCHOR ROD TEMPLATE



T-100
8 BOLT, 34" BOLT CIRCLE

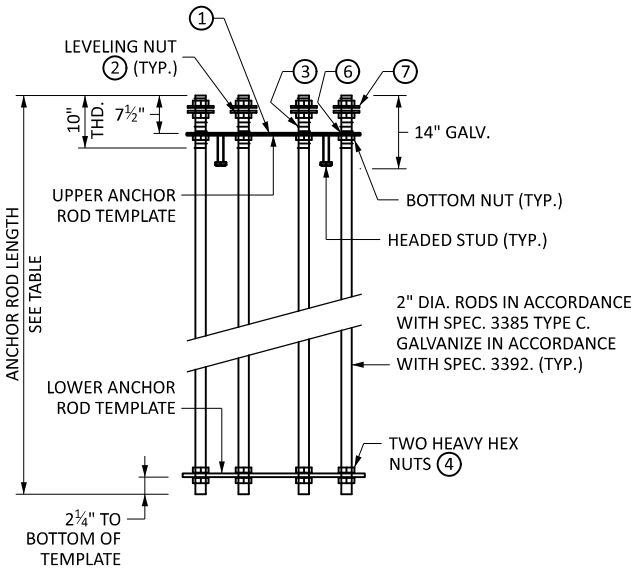


T-120
10 BOLT, 36" BOLT CIRCLE

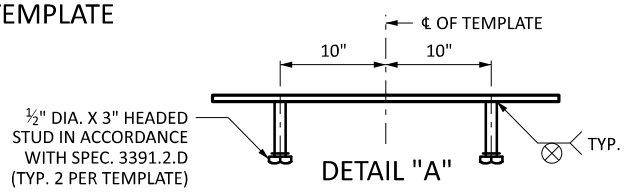


T-140
12 BOLT, 38" BOLT CIRCLE

LOWER ANCHOR ROD TEMPLATE



ANCHOR ROD ASSEMBLY
ELEVATION VIEW



DETAIL "A"
ELEVATION VIEW
UPPER ANCHOR ROD TEMPLATE
T-100 SHOWN, OTHERS SIMILAR

ANCHOR ROD FOR MAT OR PILE FOUNDATIONS SEE PLANS FOR TYPE	ANCHOR ROD LENGTH
MAT FOUNDATION FOR T-100	6' 4"
MAT FOUNDATION FOR T-120	6' 4"
MAT FOUNDATION FOR T-140	6' 10"
PILE FOUNDATION FOR T-100	6' 4"
PILE FOUNDATION FOR T-120	7' 4"
PILE FOUNDATION FOR T-140	7' 4"

NOTES:

FURNISH AND INSTALL ½" THICK ANCHOR ROD METAL TEMPLATES IN ACCORDANCE WITH SPEC. 3306 WITH 2 1/16" DIA. HOLES MATCHING THE ANCHOR ROD PATTERN OF THE TOWER BASE PLATE. GALVANIZE TEMPLATES IN ACCORDANCE WITH SPEC. 3394.

ANCHOR RODS DESIGNED FOR IMPORTANCE CATEGORY I FATIGUE DESIGN.

FOR EACH ANCHOR ROD, FURNISH AND INSTALL FIVE HEX NUTS IN ACCORDANCE WITH ASTM A194 GRADE 2H OR GRADE 7 WITH TWO HARDENED FLAT WASHERS IN ACCORDANCE WITH ASTM F436, ALL GALVANIZED IN ACCORDANCE WITH SPEC. 3392. USE AS FOLLOWS (PER ANCHOR ROD):
- TWO HEAVY HEX NUTS AND HARDENED FLAT WASHERS FOR THE DOUBLE NUT CONNECTION AT THE TOP OF THE ANCHOR ROD.
- ONE HEAVY HEX NUT ON THE UNDERSIDE OF THE UPPER ANCHOR ROD TEMPLATE (BOTTOM NUT).
- TWO HEAVY HEX NUTS TO SECURE THE LOWER ANCHOR ROD TEMPLATE.

(1) POSITION THE UPPER ANCHOR ROD TEMPLATE 7½" FROM THE TOP OF THE ANCHOR RODS AND EMBED THE TOP OF THE TEMPLATE FLUSH WITH THE TOP OF THE PEDESTAL CONCRETE.

(2) TEMPORARILY SECURE THE TOP OF THE UPPER TEMPLATE WITH THE LEVELING NUT BEFORE CONCRETE PLACEMENT. DO NOT LOOSEN LEVELING NUTS UNTIL AT LEAST 24 HOURS AFTER CONCRETE PLACEMENT.

(3) WRAP THREADED PORTION OF ANCHOR RODS PROJECTING ABOVE THE CONCRETE PEDESTAL WITH THREE LAYERS OF VINYL ELECTRICAL TAPE BEFORE PLACING CONCRETE TO AVOID THREAD CONTAMINATION (TYP.).

(4) TIGHTEN NUTS TO A "SNUG TIGHT" CONDITION IN ACCORDANCE WITH SPEC. 2402.3.F.

(5) HEADED STUD, SEE DETAIL "A".

(6) REMOVE SURFACE CONTAMINANTS AND SUPPLY SILICONE JOINT SEALER TO THE UPPER TEMPLATE AROUND THE ANCHOR RODS AND ANCHOR ROD HOLES, AND THE INNER AND OUTER EDGES WHERE THE PLATE MEETS THE CONCRETE. USE AN APPROVED SILICONE JOINT SEALER FOUND ON MnDOT'S APPROVED/QUALIFIED PRODUCTS LIST UNDER BRIDGE PRODUCTS.

(7) FURNISH AND INSTALL TWO HARDENED FLAT WASHERS FOR EACH ANCHOR ROD.

APPROVED: 11-15-2024

THOMAS STYRBICKI
STATE DESIGN ENGINEER

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

ANCHOR ROD ASSEMBLY FOR LIGHT TOWER FOUNDATION

SPECIFICATION REFERENCE
2402 3306 3385
3392 3394

STANDARD PLATE NO.
8135B

APPROVED APRIL 14, 2020

STATE DESIGN ENGINEER

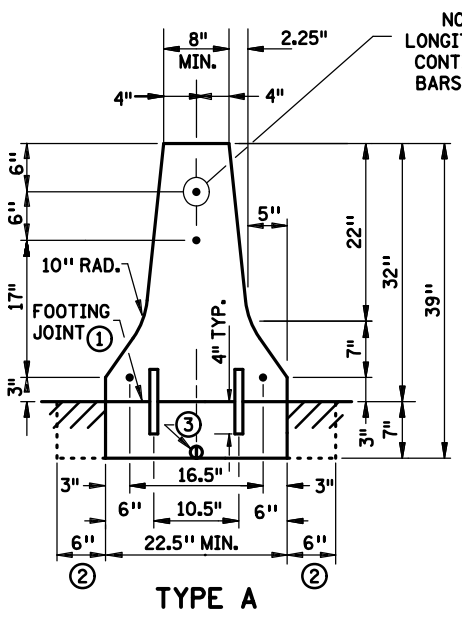
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

REINFORCED CONCRETE MEDIAN BARRIER TYPE F

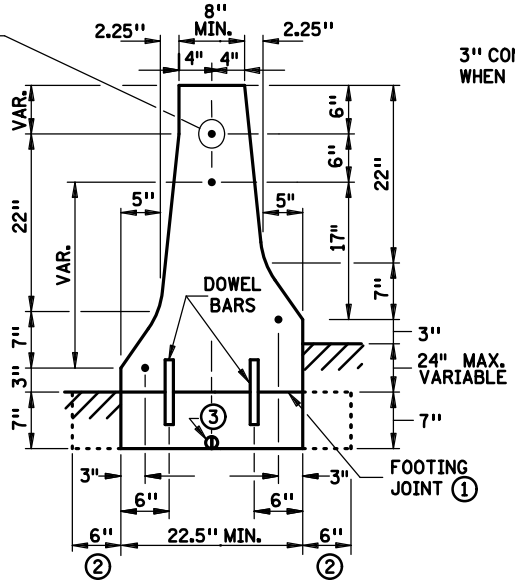
(NON-GLARE SCREEN TYPE)
DESIGN 8308

SPECIFICATION REFERENCE
2533

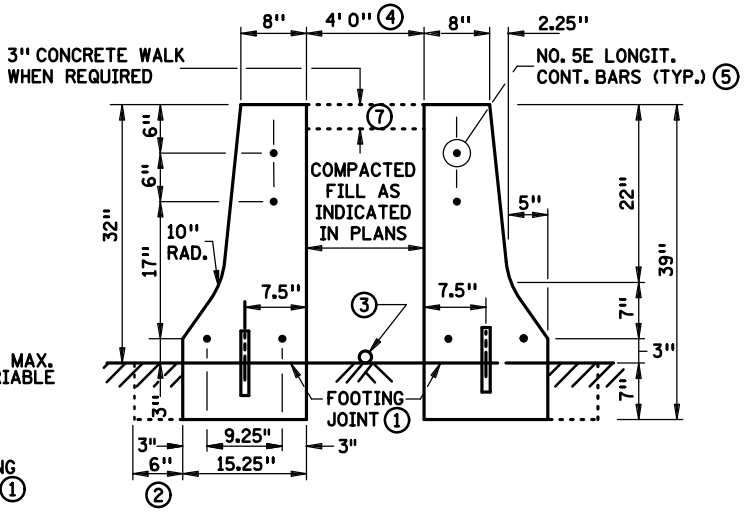
STANDARD PLATE NO.
8308C
1 OF 4



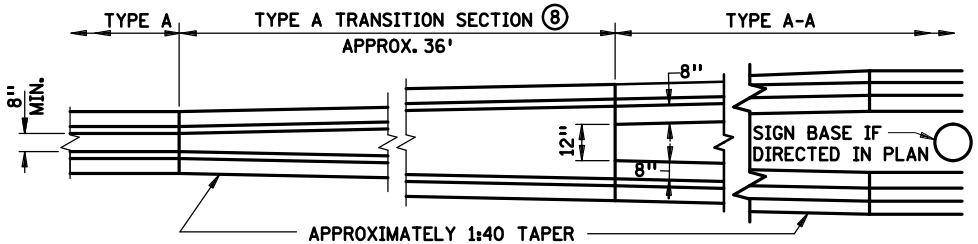
TYPE A



TYPE A STEP



TYPE A-A ⑥ TYPE A-A ⑥



TRANSITION FROM TYPE A TO TYPE A-A

CONTRACTION JOINT NOTES:

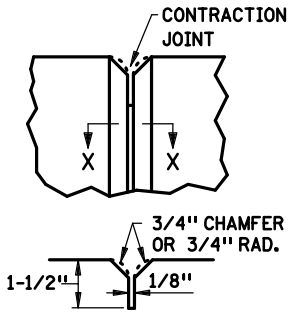
IF JOINT SPACING IS NOT INDICATED IN THE PLANS, THE BASIS OF JOINT SPACING IS AS FOLLOWS:

1) BITUMINOUS SECTION ADJACENT TO THE BARRIER, 15 FT. SPACING.

2) CONCRETE SECTION ADJACENT TO THE BARRIER:

   FIXED FORM OR SLIP FORMED BARRIER CONTRACTION JOINTS SHALL ALIGN WITH JOINTS IN CONCRETE SECTION, NOT TO EXCEED 15 FT.

3) REINFORCING TO BE CONTINUOUS THROUGH JOINT.



SECTION X-X
CONTRACTION JOINT

GENERAL NOTES:

0.148 CU. YDS. CONCRETE PER LIN. FT. TYPE A
0.114 CU. YDS. CONCRETE PER LIN. FT. TYPE A-A

CUBIC YARDS OF CONCRETE INCLUDES STANDARD FOOTING.

ALL BARS SHALL BE EPOXY COATED PER SPEC 3301.

FINISH ALL EDGES OF BARRIER WITH 1/2" VEE, EXCEPT WHERE OTHERWISE NOTED.

① IF FOOTING IS CONSTRUCTED SEPARATELY, A FOOTING JOINT WITH 1" DIA. DOWEL BARS 8" LONG AT 2' 0" CENTERS IS REQUIRED. DUMMY TRANSVERSE JOINTS (1-1/2" MIN. DEPTH) SHALL BE PLACED IN FOOTING AND BE ALIGNED WITH CONTRACTION JOINTS IN UPPER PORTION OF BARRIER. THE SURFACE OF THE FOOTING JOINT SHALL BE ROUGH.

② ADDITIONAL FOOTING WIDTH TO BE REQUIRED WHEN CONCRETE MEDIAN BARRIER IS ADJACENT TO BITUMINOUS PAVEMENT OR BITUMINOUS SHOULDER.

③ WHEN REQUIRED, PROVIDE A 1-1/2" NOMINAL DIAMETER PVC-TYPE I CONDUIT (SPEC. 3803) IN FIXED FORM OR SLIP FORM CONSTRUCTED BARRIER, OR 3" X 3" VOID IN PRECAST BARRIER FOR LIGHTING CONDUIT. LOCATE AS DIRECTED BY PLAN OR ENGINEER.

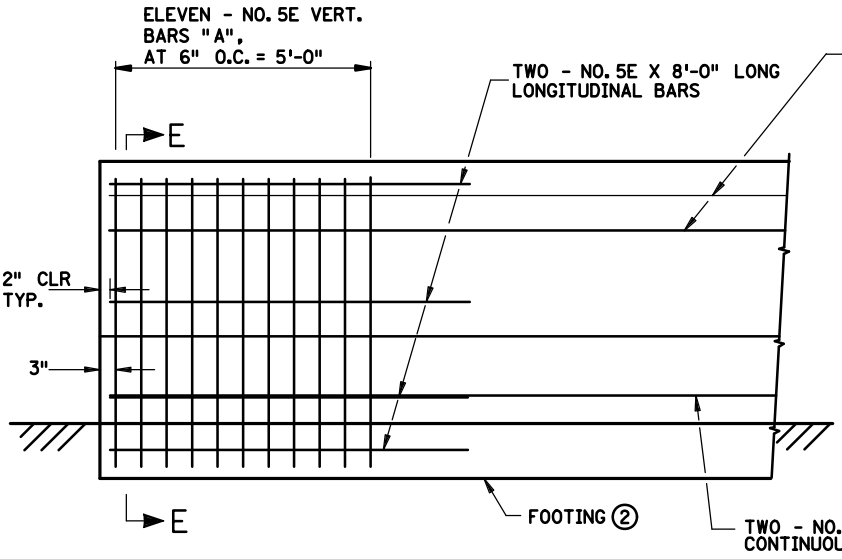
④ UNLESS OTHERWISE NOTED IN PLANS.

⑤ SEE SHEET 2 FOR BILL OF REINFORCEMENT AND CONSTRUCTION NOTES.

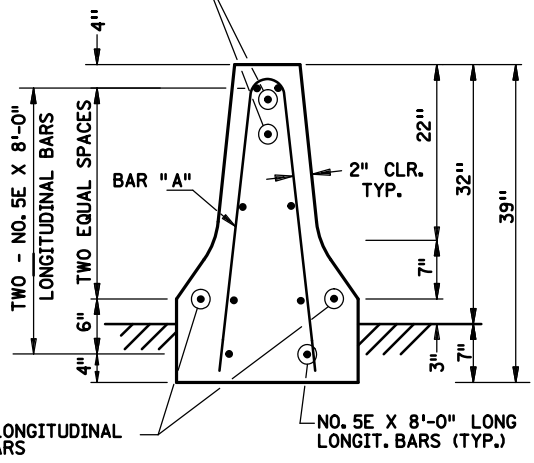
⑥ SHALL NOT USE ONE SIDE OF BARRIER TYPE A-A AS FREE-STANDING SYSTEM. MUST USE BOTH DETAILS AS SHOWN OR SINGLE BARRIER FULLY ABUTTED TO COMPACTED BACKFILL.

⑦ CONCRETE WALK BETWEEN TYPE A-A BARRIERS MAY BE SLOPED IF BARRIER TOPS ARE NOT THE SAME ELEVATION.

⑧ WHEN THE BARRIER IS PRECAST, THE TRANSITION SECTION MAY BE CAST IN THREE 12' LONG SECTIONS.

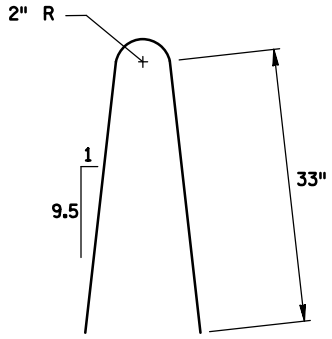


ELEVATION



SECTION E-E
TYPE A
(MONOLITHIC FOOTING SHOWN)

END ANCHORAGE DETAIL (1)



BAR "A" (NO. 5E)

NOTES:

(1) END ANCHORAGE MUST BE PLACED AT BOTH ENDS OF THE BARRIER AND AT ANY EXPANSION JOINT/OPEN JOINT. EXPANSION JOINTS SHALL BE PROVIDED IN THE BARRIERS TO MATCH EXPANSION JOINTS IN RIGID PAVEMENT, AT BRIDGE APPROACHES, OR AT OTHER STRUCTURES, WHERE UNCONTROLLED LONGITUDINAL MOVEMENT MAY BE OBJECTIONABLE.

(2) IF FOOTING IS CONSTRUCTED SEPARATELY, A FOOTING JOINT WITH NO. 8E DOWEL BARS 8" LONG AT 2'- 0" CENTERS IS REQUIRED. DUMMY TRANSVERSE JOINTS (1-1/2" MIN. DEPTH) SHALL BE PLACED IN FOOTING AND BE ALIGNED WITH CONTRACTION JOINTS IN UPPER PORTION OF BARRIER. THE SURFACE OF THE FOOTING JOINT SHALL BE ROUGH.

(3) ALL REBARS SHALL BE GRADE 60 STEEL AND SHALL BE EPOXY COATED, PER SPEC. 3301.

(4) MINIMUM LAP SPLICE IS 2'- 11" FOR ALL BARS.

BILL OF REINFORCEMENT (3)				
BAR SIZE	LENGTH PER BAR	NO. OF BAR	BAR SHAPE	BAR LOCATION
5E	---	---	STR	LONGITUDINAL (4)
5E	8'-0"	16*	STR	LONGIT. AT ENDS
5E	6'-0"	22*	BENT	VERT. AT ENDS

* NUMBERS PER TWO ENDS

GENERAL CONSTRUCTION NOTES:

A. CONSTRUCTION METHOD SHALL BE CONTRACTOR'S OPTION: CAST-IN-PLACE (FIXED FORM OR SLIP FORM) OR PRECAST.

B. PRECAST SECTIONS SHALL WEIGH A MINIMUM OF 650 LBS./FT. (TYPE A WITH STANDARD FOOTING). PROVISIONS SHALL BE MADE FOR THE INTERCONNECTION OF INDIVIDUAL SECTIONS PROVIDING LATERAL RESISTANCE EQUIVALENT TO THAT OF THE BARRIER SECTION ITSELF.

C. CONTRACTOR SHALL PROVIDE ALL NECESSARY SUPPORTS TO MAINTAIN LONGITUDINAL REBARS AT DIMENSIONS SHOWN ON THE PLAN DURING SLIP FORMING.

D. CONTRACTOR SHALL PROVIDE VERTICAL SUPPORTS WITH 2'- 0" MAXIMUM SPACING TO MAINTAIN LONGITUDINAL REBARS AT DIMENSIONS SHOWN ON THE PLAN DURING FIXED FORMING.

E. PAY QUANTITIES WILL NOT BE ADJUSTED AS A RESULT OF SELECTING ONE OF THE CONSTRUCTION METHODS.

APPROVED APRIL 14, 2020

STATE DESIGN ENGINEER

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

REINFORCED CONCRETE MEDIAN BARRIER TYPE F

(NON-GLARE SCREEN TYPE) DESIGN 8308
GENERAL CONSTRUCTION NOTES & END ANCHORAGE

SPECIFICATION REFERENCE
2533

STANDARD PLATE NO.
8308C
2 OF 4

APPROVED APRIL 14, 2020

STATE DESIGN ENGINEER

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

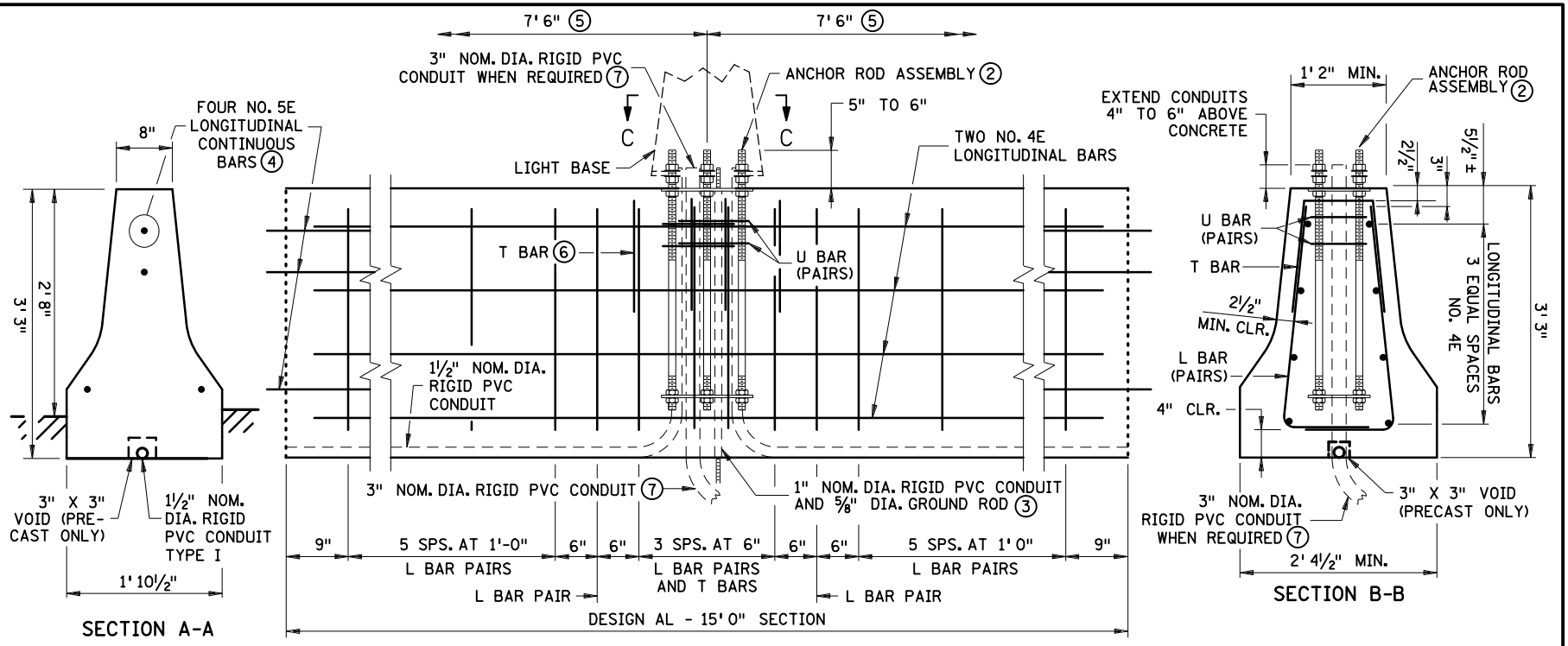
REINFORCED CONCRETE MEDIAN BARRIER TYPE F

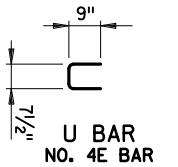
(NON-GLARE SCREEN TYPE)

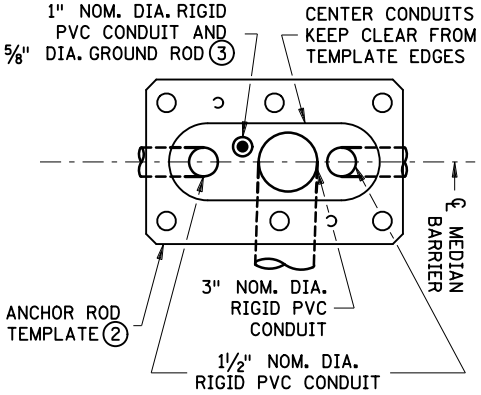
LIGHT FOUNDATION - MONOLITHIC BARRIER PLACEMENT

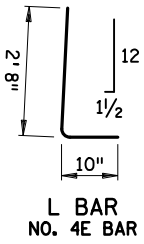
SPECIFICATION REFERENCE
2533
2545

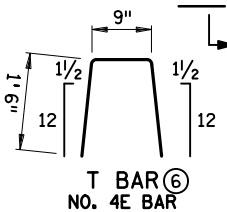
STANDARD PLATE NO.
8308C
3 OF 4

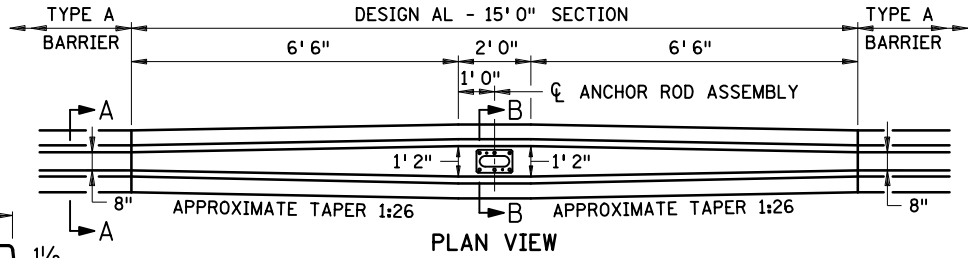












REINFORCEMENT REQUIREMENTS ①			
BAR TYPE	BAR SIZE	BAR LENGTH	NO. PER SECTION
LONGITUDINAL	4E	14' 6"	8
L	4E	3' 6"	36
U	4E	2' 2"	4
T ⑥	4E	3' 9"	4

① FURNISH & INSTALL EPOXY COATED REINF. BARS IN ACCORDANCE WITH 3301.

② REFER TO STANDARD PLATE 8332 FOR ANCHOR ROD ASSEMBLY AND TEMPLATE DETAILS.

③ FURNISH & INSTALL ⅝" DIA. X 15' 0" LONG GROUND ROD ELECTRODE IN 1" NOM. DIA. RIGID PVC CONDUIT (TOP OF CONDUIT FLUSH WITH TOP OF CONCRETE) OR DIRECTLY IN CONCRETE BARRIER. EXTEND THE GROUND ROD 3" - 4" ABOVE THE TOP OF CONCRETE.

④ EXTEND 5 NO. 5E LONGITUDINAL BARS 3' 4" MIN. INTO DESIGN AL SECTION.

⑤ DO NOT PLACE CONTRACTION OR OTHER BARRIER JOINTS WITHIN 7' 6" FROM THE CENTER OF THE ANCHOR ROD ASSEMBLY.

⑥ PAIR T BARS WITH L BARS AT LIGHT ANCHORAGE.

⑦ 3" CONDUIT USED WHEN CABLES ARE CROSSING UNDER THE ROADWAY.

APPROVED APRIL 14, 2020

STATE DESIGN ENGINEER

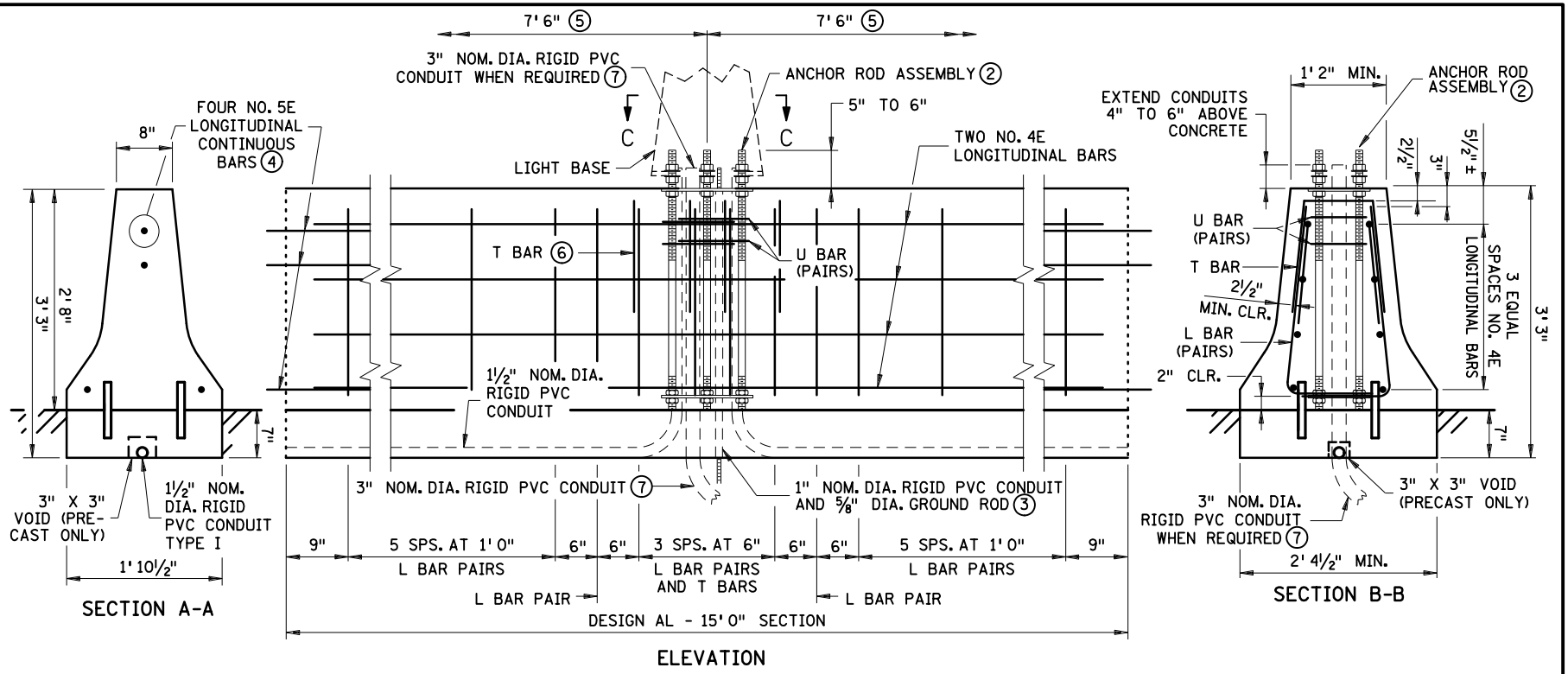
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

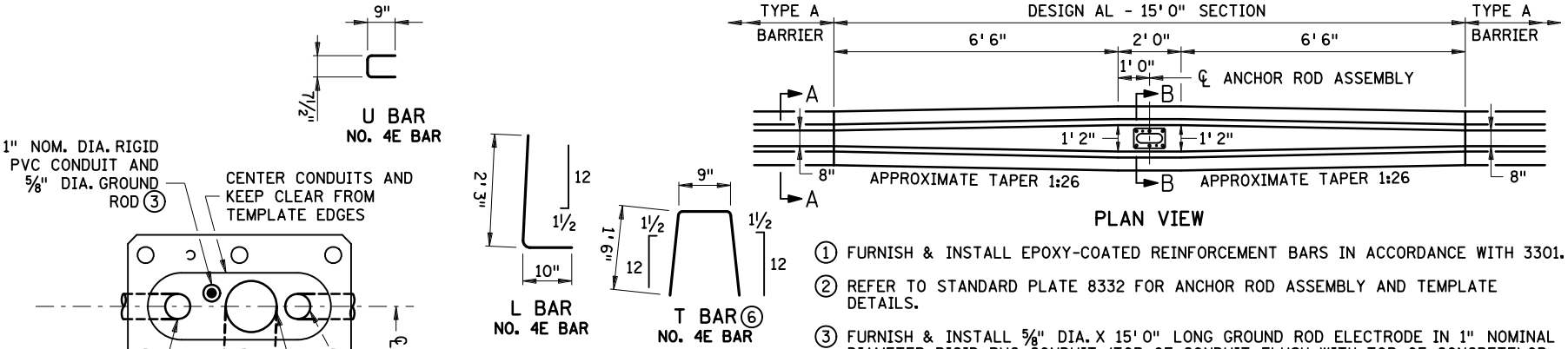
REINFORCED CONCRETE MEDIAN BARRIER TYPE F

(NON-GLARE SCREEN TYPE)
LIGHT FOUNDATION - BARRIER ON FOOTING

SPECIFICATION REFERENCE
2533
2545

STANDARD PLATE NO.
8308C
4 OF 4





REINFORCEMENT REQUIREMENTS ①			
BAR TYPE	BAR SIZE	BAR LENGTH	NO. PER SECTION
LONGITUDINAL	4E	14' 6"	8
L	4E	3' 1"	36
U	4E	2' 2"	4
T ⑥	4E	3' 9"	4

① FURNISH & INSTALL EPOXY-COATED REINFORCEMENT BARS IN ACCORDANCE WITH 3301.

② REFER TO STANDARD PLATE 8332 FOR ANCHOR ROD ASSEMBLY AND TEMPLATE DETAILS.

③ FURNISH & INSTALL ⅝" DIA. X 15' 0" LONG GROUND ROD ELECTRODE IN 1" NOMINAL DIAMETER RIGID PVC CONDUIT (TOP OF CONDUIT FLUSH WITH TOP OF CONCRETE) OR DIRECTLY IN CONCRETE BARRIER. EXTEND THE GROUND ROD 3"-4" ABOVE THE TOP OF CONCRETE.

④ EXTEND FIVE NO. 5E LONGITUDINAL BARS 3' 4" MINIMUM INTO DESIGN AL SECTION.

⑤ DO NOT PLACE CONTRACTION OR OTHER BARRIER JOINTS WITHIN 7' 6" OF THE CENTER OF THE ANCHOR ROD ASSEMBLY.

⑥ PAIR T BARS WITH L BARS AT LIGHT ANCHORAGE.

⑦ 3" CONDUIT USED WHEN CABLES ARE CROSSING UNDER THE ROADWAY.

APPROVED APRIL 14, 2020

STATE DESIGN ENGINEER

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

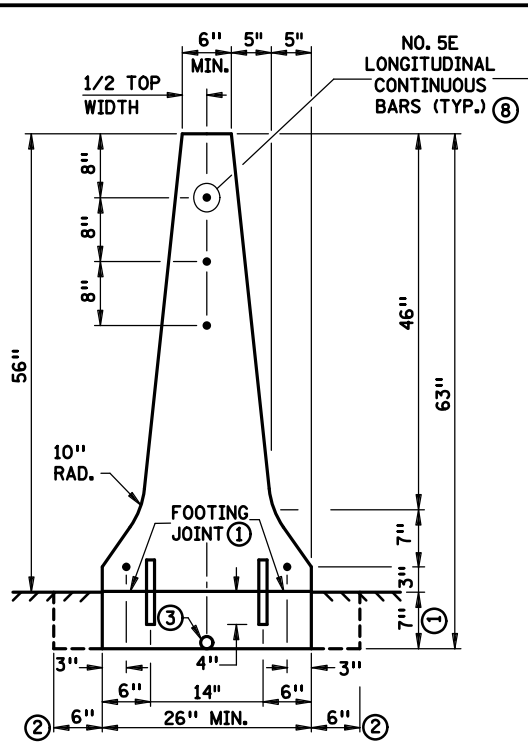
REINFORCED CONCRETE MEDIAN BARRIER TYPE F & GLARE SCREEN

DESIGN 8309

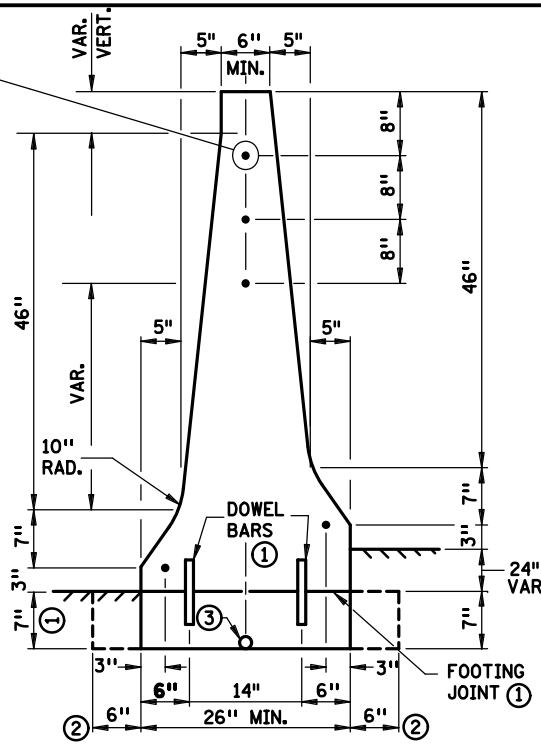
SPECIFICATION REFERENCE 2533

STANDARD PLATE NO. 8309C

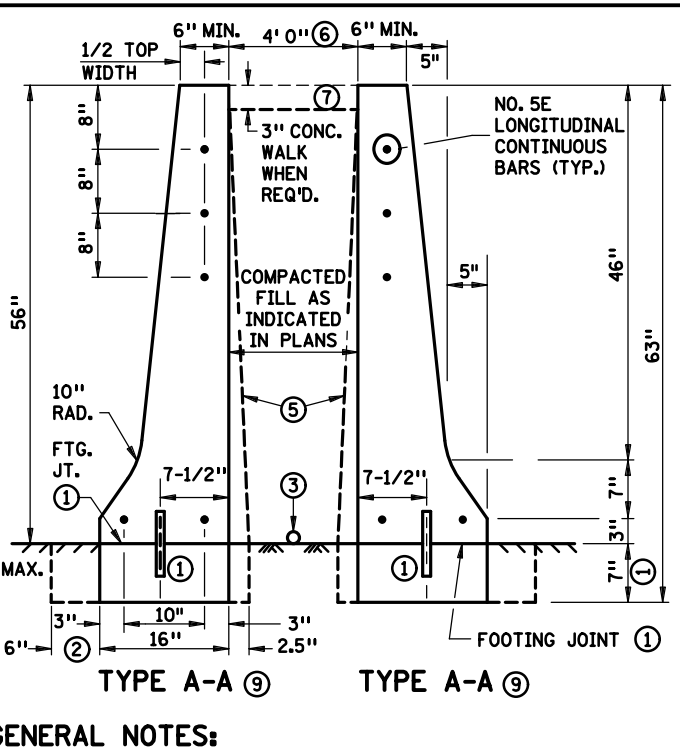
1 OF 4



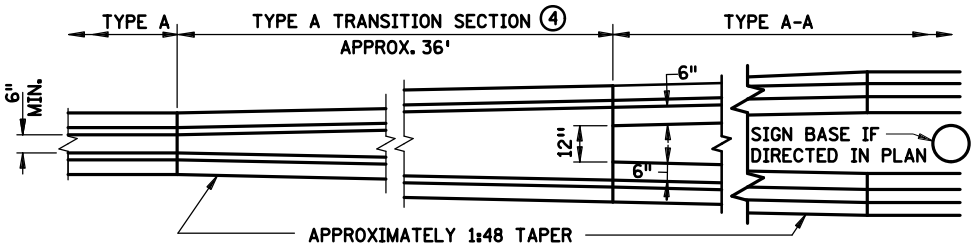
TYPE A



TYPE A STEP



TYPE A-A ⑨ TYPE A-A ⑨

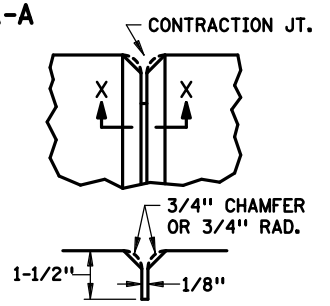


TRANSITION FROM TYPE A TO TYPE A-A

CONTRACTION JOINT NOTES:

IF JOINT SPACING IS NOT INDICATED IN THE PLANS, THE BASIS OF JOINT SPACING IS AS FOLLOWS:

1) BITUMINOUS SECTION ADJACENT TO THE BARRIER, 15 FT. SPACING.
2) CONCRETE SECTION ADJACENT TO THE BARRIER:
   FIXED FORM OR SLIP FORMED BARRIER CONTRACTION JOINTS SHALL ALIGN WITH JOINTS IN CONCRETE SECTION, NOT TO EXCEED 15 FT.
3) REINFORCING TO BE CONTINUOUS THROUGH JOINT.



SECTION X-X

CONTRACTION JOINT

GENERAL NOTES:

0.232 CU. YDS. CONCRETE PER LIN. FT. TYPE A
0.165 CU. YDS. CONCRETE PER LIN. FT. TYPE A-A

CUBIC YARDS OF CONCRETE INCLUDES STANDARD FOOTING.

ALL BARS SHALL BE EPOXY COATED PER SPEC. 3301.

FINISH ALL EDGES OF BARRIER WITH 1/2" VEE, EXCEPT WHERE OTHERWISE NOTED.

① IF FOOTING IS CONSTRUCTED SEPARATELY, A FOOTING JOINT WITH 1" DIA. DOWEL BARS 8" LONG AT 2' 0" CENTERS IS REQUIRED. DUMMY TRANSVERSE JOINTS (1-1/2" MIN. DEPTH) SHALL BE PLACED IN FOOTING AND BE ALIGNED WITH CONTRACTION JOINTS IN UPPER PORTION OF BARRIER. THE SURFACE OF THE FOOTING JOINT SHALL BE ROUGH.

② ADDITIONAL FOOTING WIDTH TO BE REQUIRED WHEN CONCRETE MEDIAN BARRIER IS ADJACENT TO BITUMINOUS PAVEMENT OR BITUMINOUS SHOULDER.

③ WHEN REQUIRED, PROVIDE A 1-1/2" NOMINAL DIAMETER PVC-TYPE I CONDUIT (SPEC. 3803) IN FIXED FORM OR SLIP FORM CONSTRUCTED BARRIER, OR 3" X 3" VOID IN PRECAST BARRIER FOR LIGHTING CONDUIT. LOCATE AS DIRECTED BY PLAN OR ENGINEER.

④ WHEN THE BARRIER IS PRECAST, THE TRANSITION SECTION MAY BE CAST IN THREE 12' LONG SECTIONS.

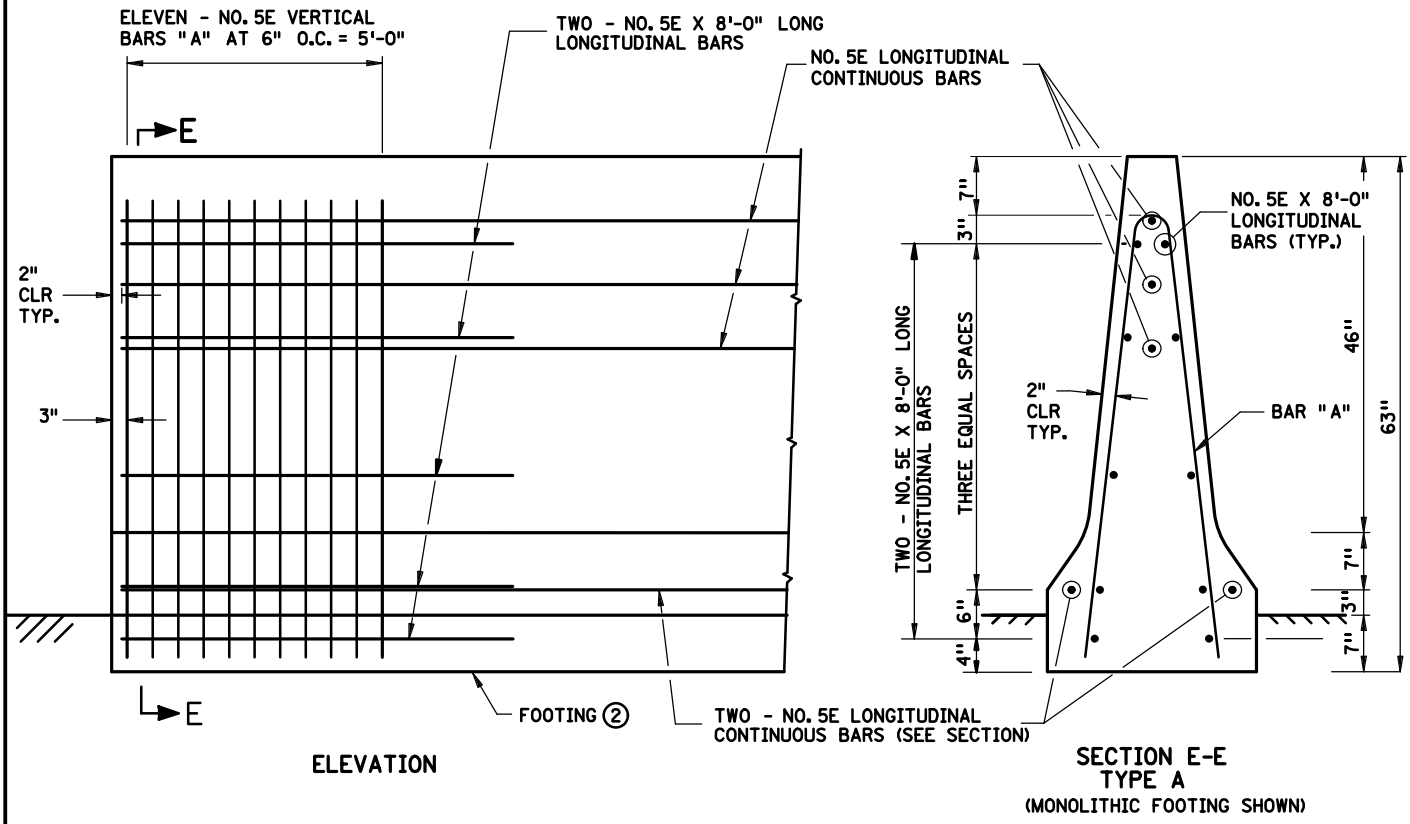
⑤ PERMISSIBLE IF SLIP FORMED.

⑥ UNLESS OTHERWISE NOTED IN PLANS.

⑦ CONCRETE WALK BETWEEN TYPE A-A BARRIERS MAY BE SLOPED IF BARRIER TOPS ARE NOT THE SAME ELEVATION.

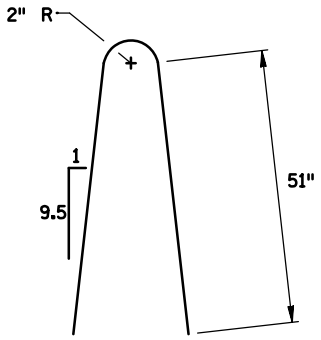
⑧ SEE SHEET 2 FOR BILL OF REINFORCEMENT AND CONSTRUCTION NOTES.

⑨ SHALL NOT USE ONE SIDE OF BARRIER TYPE A-A AS FREE-STANDING SYSTEM. MUST USE BOTH DETAILS AS SHOWN OR SINGLE BARRIER FULLY ABUTTED TO COMPACTED BACKFILL.



ELEVATION

SECTION E-E
TYPE A
(MONOLITHIC FOOTING SHOWN)



BAR "A" (NO. 5E)

END ANCHORAGE DETAIL (1)

NOTES:

(1) END ANCHORAGE MUST BE PLACED AT BOTH ENDS OF THE BARRIER AND AT ANY EXPANSION JOINT/OPEN JOINT. EXPANSION JOINTS SHALL BE PROVIDED IN THE BARRIERS TO MATCH EXPANSION JOINTS IN RIGID PAVEMENT, AT BRIDGE APPROACHES, OR AT OTHER STRUCTURES, WHERE UNCONTROLLED LONGITUDINAL MOVEMENT MAY BE OBJECTIONABLE.

(2) IF FOOTING IS CONSTRUCTED SEPARATELY, A FOOTING JOINT WITH NO. 8E DOWEL BARS 8" LONG AT 2' - 0" CENTERS IS REQUIRED. DUMMY TRANSVERSE JOINTS (1-1/2" MIN. DEPTH WALL BE PLACED IN FOOTING AND BE ALIGNED WITH CONSTRACTION JOINTS IN UPPER PORTION OF BARRIER. THE SURFACE OF THE FOOTING JOINT SHALL BE ROUGH.

(3) ALL REBARS SHALL BE GRADE 60 STEEL AND SHALL BE EPOXY COATED, PER SPEC. 3301.

(4) MINIMUM LAP SPLICE IS 2' - 11" FOR ALL BARS.

BILL OF REINFORCEMENT (3)				
BAR SIZE	LENGTH PER BAR	NO. OF BAR	BAR SHAPE	BAR LOCATION
5E	---	---	STR	LONGITUDINAL (4)
5E	8'-0"	20*	STR	LONGIT. AT ENDS
5E	9'-0"	22*	BENT	VERT. AT ENDS

* NUMBERS PER TWO ENDS

GENERAL CONSTRUCTION NOTES:

A. CONSTRUCTION METHOD SHALL BE CONTRACTOR'S OPTION: CAST-IN-PLACE (FIXED FORM OR SLIP FORM) OR PRECAST.

B. PRECAST SECTIONS SHALL WEIGH A MINIMUM OF 940 LBS./FT. (TYPE A WITH STANDARD FOOTING). PROVISIONS SHALL BE MADE FOR THE INTERCONNECTION OF INDIVIDUAL SECTIONS PROVIDING LATERAL RESISTANCE EQUIVALENT TO THAT OF THE BARRIER SECTION ITSELF.

C. CONTRACTOR SHALL PROVIDE ALL NECESSARY SUPPORTS TO MAINTAIN LONGITUDINAL REBARS AT DIMENSIONS SHOWN ON THE PLAN DURING SLIP FORMING.

D. CONTRACTOR SHALL PROVIDE VERTICAL SUPPORTS WITH 2' - 0" MAX. SPACING TO MAINTAIN LONGITUDINAL REBARS AT DIMENSIONS SHOWN ON THE PLAN DURING FIXED FORMING.

E. PAY QUANTITIES WILL NOT BE ADJUSTED AS A RESULT OF SELECTING ONE OF THE CONSTRUCTION METHODS.

APPROVED APRIL 14, 2020

STATE DESIGN ENGINEER

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

REINFORCED CONCRETE MEDIAN BARRIER TYPE F & GLARE SCREEN

DESIGN 8309

GENERAL CONSTRUCTION NOTES & END ANCHORAGE

SPECIFICATION REFERENCE
2533

STANDARD PLATE NO.
8309C

APPROVED APRIL 14, 2020

STATE DESIGN ENGINEER

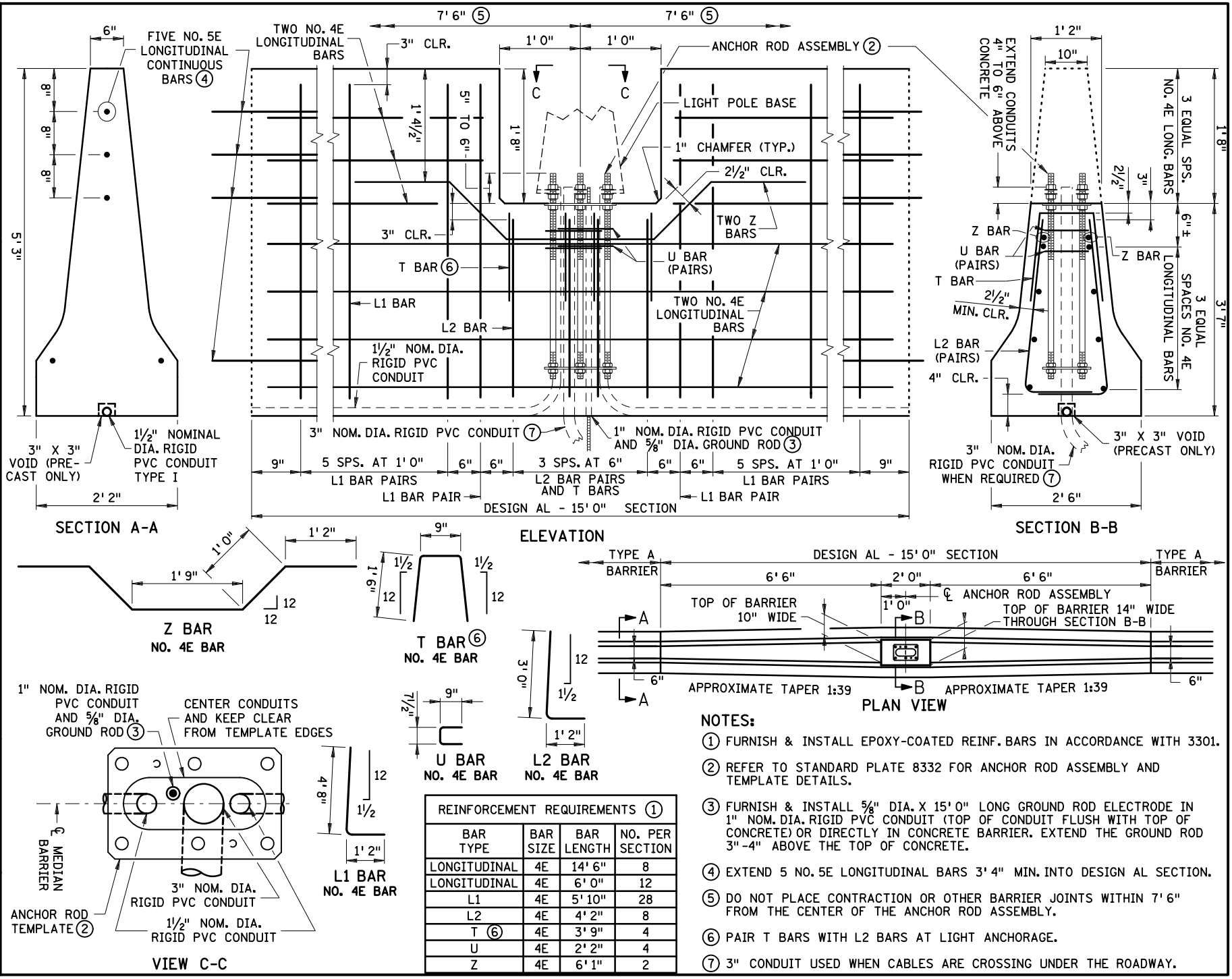
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

REINFORCED CONCRETE MEDIAN BARRIER TYPE F & GLARE SCREEN

LIGHT FOUNDATION - MONOLITHIC BARRIER PLACEMENT

SPECIFICATION REFERENCE
2533
2545

STANDARD PLATE NO.
8309C
3 OF 4



REINFORCEMENT REQUIREMENTS ①			
BAR TYPE	BAR SIZE	BAR LENGTH	NO. PER SECTION
LONGITUDINAL	4E	14' 6"	8
LONGITUDINAL	4E	6' 0"	12
L1	4E	5' 10"	28
L2	4E	4' 2"	8
T ⑥	4E	3' 9"	4
U	4E	2' 2"	4
Z	4E	6' 1"	2

APPROVED APRIL 14, 2020

STATE DESIGN ENGINEER

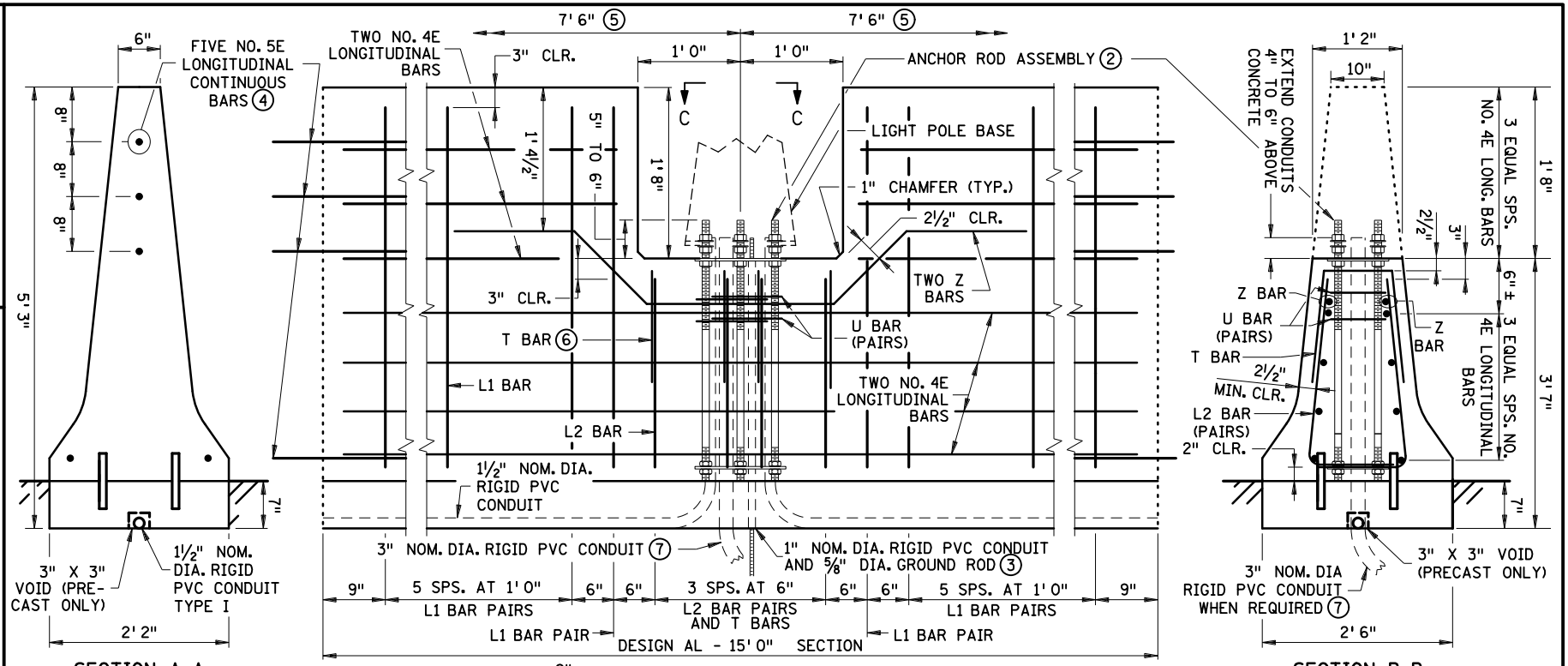
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

REINFORCED CONCRETE MEDIAN BARRIER TYPE F & GLARE SCREEN

LIGHT FOUNDATION - BARRIER ON FOOTING

SPECIFICATION REFERENCE
2533
2545

STANDARD PLATE NO.
8309C
4 OF 4



REINFORCEMENT REQUIREMENTS (1)			
BAR TYPE	BAR SIZE	BAR LENGTH	NO. PER SECTION
LONGITUDINAL	4E	14' 6"	8
LONGITUDINAL	4E	6' 0"	12
L1	4E	5' 3"	28
L2	4E	3' 9"	8
T (6)	4E	3' 9"	4
U	4E	2' 2"	4
Z	4E	6' 1"	2

NOTES:

(1) FURNISH & INSTALL EPOXY COATED REINF. BARS IN ACCORDANCE WITH 3301.

(2) REFER TO STANDARD PLATE 8332 FOR ANCHOR ROD ASSEMBLY AND TEMPLATE DETAILS.

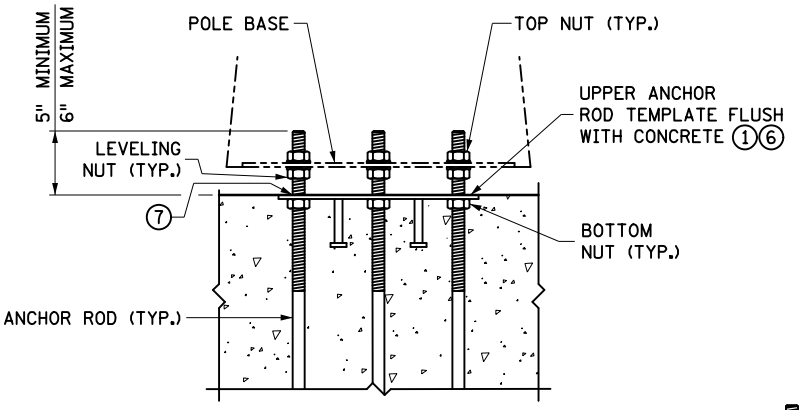
(3) FURNISH & INSTALL ⅝" DIA. X 15' 0" LONG GROUND ROD ELECTRODE IN 1" NOM. DIA. RIGID PVC CONDUIT (TOP OF CONDUIT FLUSH WITH TOP OF CONCRETE) OR DIRECTLY IN CONCRETE BARRIER. EXTEND THE GROUND ROD 3"-4" ABOVE THE TOP OF CONCRETE.

(4) EXTEND 5 NO. 5E LONGITUDINAL BARS 3' 4" MIN. INTO DESIGN AL SECTION.

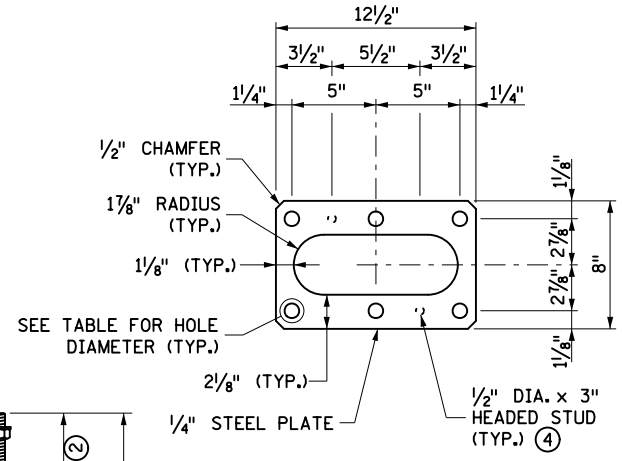
(5) DO NOT PLACE CONTRACTION OR OTHER BARRIER JOINTS WITHIN 7' 6" FROM THE CENTER OF THE ANCHOR ROD ASSEMBLY.

(6) PAIR T BARS WITH L2 BARS AT LIGHT ANCHORAGE.

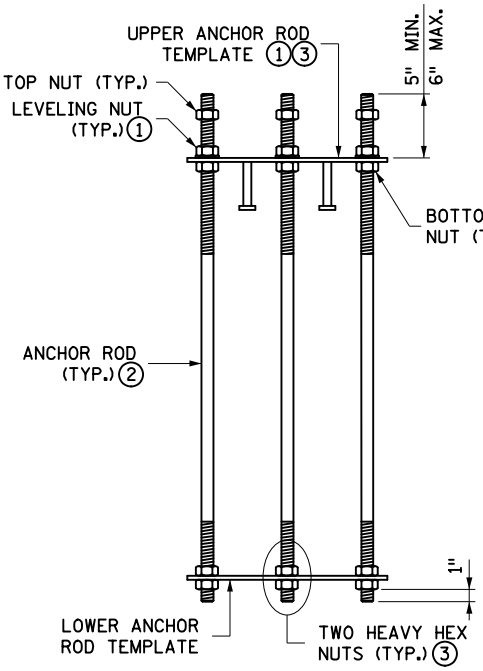
(7) 3" CONDUIT USED WHEN CABLES ARE CROSSING THE ROADWAY.



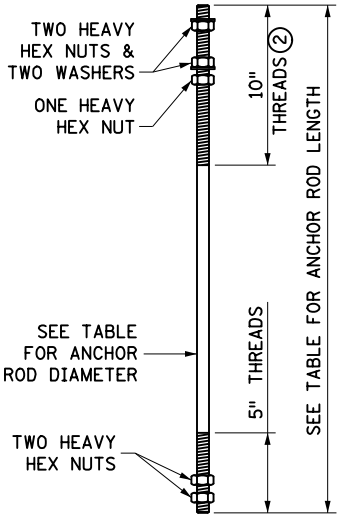
PARTIAL ELEVATION
SHOWING ANCHOR ROD ASSEMBLY AND HEX NUT POSITIONS AFTER POLE INSTALLATION



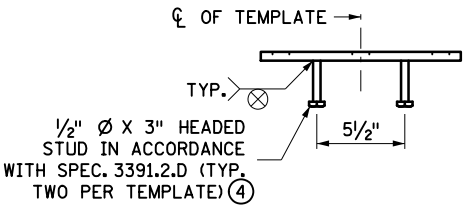
ANCHOR ROD TEMPLATE
TWO REQUIRED PER ASSEMBLY



ANCHOR ROD ASSEMBLY



ANCHOR ROD & HARDWARE
SIX REQUIRED PER ASSEMBLY



ELEVATION VIEW

UPPER ANCHOR ROD TEMPLATE

STANDARD BARRIER AND PARAPET TYPES (SEE PLANS FOR TYPE)	ANCHOR ROD LENGTH (5)
CONCRETE MEDIAN BARRIER SINGLE SLOPE	3' 5"
CONCRETE MEDIAN BARRIER TYPE F	3' 1"
CONCRETE MEDIAN BARRIER TYPE F W/GLARE SCREEN	3' 5"
RETAINING WALL CONCRETE PARAPET (TYPE P-1)	2' 9"
RETAINING WALL CONCRETE PARAPET (TYPE P-4)	3' 1"
RETAINING WALL CONCRETE BARRIER (TYPE F, TL-4)	3' 1"
RETAINING WALL CONCRETE BARRIER (TYPE S, TL-4)	3' 5"

ANCHOR ROD DETAILS		
TYPE	ANCHOR ROD DIAMETER	HOLE DIAMETER
49' LIGHT POLES WITH TWIN ARMS 10' OR LONGER	1¼"	1 5/16"
OTHERS	1"	1 1/16"

NOTES:

FURNISH AND INSTALL PLATES IN ACCORDANCE WITH SPEC. 3306, AND GALVANIZE IN ACCORDANCE WITH SPEC. 3394.

FURNISH AND INSTALL ANCHOR RODS IN ACCORDANCE WITH SPEC. 3385.2.B.

DO NOT TACK WELD.

SUBSTITUTE MATERIALS IN ACCORDANCE WITH SPEC. 1605.

FURNISH AND INSTALL HEAVY HEX NUTS AND FLAT WASHERS IN ACCORDANCE WITH SPEC. 3391.2.A.

(1) TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE WITH THE LEVELING NUTS BEFORE CONCRETE PLACEMENT. AFTER CONCRETE PLACEMENT, LEAVE LEVELING NUTS SECURED AGAINST THE TEMPLATE UNTIL THE CLEANING AND LUBRICATING OF THE ANCHOR ROD CONNECTIONS BEFORE POLE PLACEMENT IS INITIATED.

(2) PROTECT ANCHOR ROD THREADS AND LEVELING NUTS ABOVE THE UPPER ANCHOR ROD TEMPLATE FROM CONCRETE CONTAMINATION.

(3) USE A 12" LONG WRENCH TO SNUG TIGHTEN NUTS PULLING THE HANDLE WITH ONE ARM IN ONE SMOOTH MOTION.

(4) HEADED STUDS IN ACCORDANCE WITH SPEC. 3391.2.D. ON UPPER ANCHOR ROD TEMPLATE ONLY.

(5) FOR RETAINING WALL APPLICATIONS, PROJECT-SPECIFIC BARRIER OR PARAPET CONNECTION DETAILS ARE REQUIRED. PROVIDE 2" MINIMUM COVER FOR THE ANCHOR ROD ASSEMBLY AND VERIFY ANCHOR ROD LENGTH.

(6) LOCALLY ADJUST TOP-OF-BARRIER PROFILE AS REQUIRED TO PROVIDE A LEVEL ANCHOR ROD TEMPLATE PLACEMENT.

(7) REMOVE SURFACE CONTAMINANTS AND APPLY SILICONE JOINT SEALER TO THE UPPER TEMPLATE AROUND THE ANCHOR RODS AND ANCHOR ROD HOLES, AND THE INNER AND OUTER EDGES WHERE THE PLATE MEETS CONCRETE. USE AN APPROVED SILICONE JOINT SEALANT FOUND ON MnDOT'S APPROVED/QUALIFIED PRODUCTS LIST UNDER BRIDGE PRODUCTS.

APPROVED APRIL 14, 2020

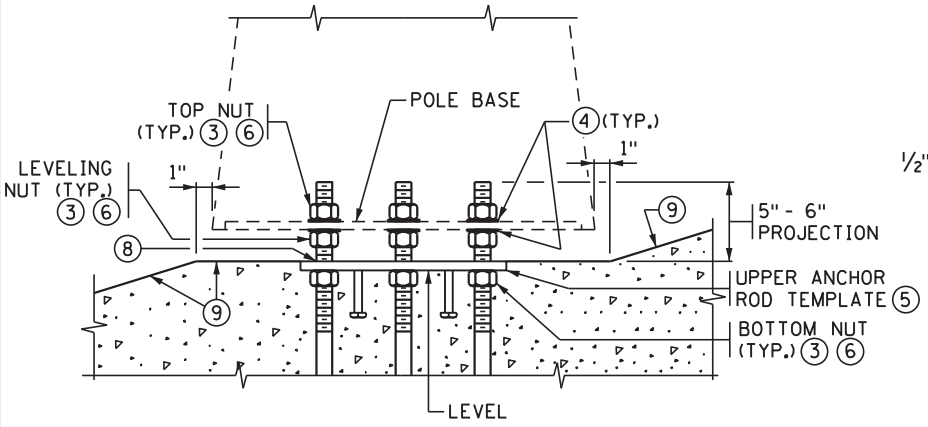
STATE DESIGN ENGINEER

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

ANCHOR ROD ASSEMBLY FOR LIGHT FOUNDATION-BARRIER

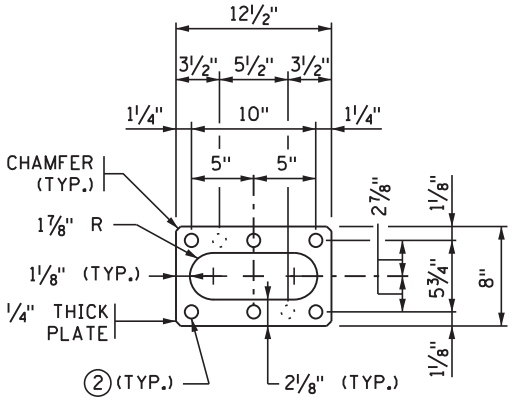
SPECIFICATION REFERENCE
2545
3306

STANDARD PLATE NO.
8332E

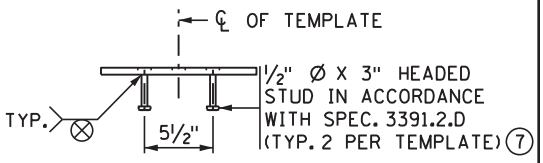


PARTIAL ELEVATION

(SHOWING ANCHOR ROD ASSEMBLY & HEX NUT POSITIONS AFTER POLE INSTALLATION)



PLAN VIEW



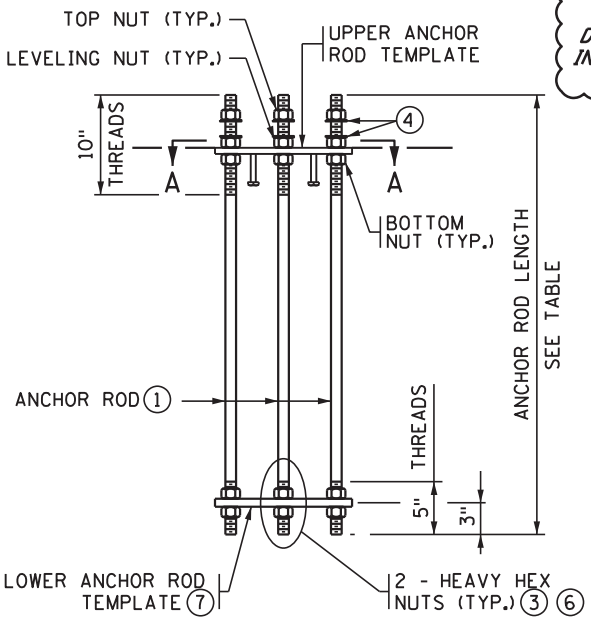
ELEVATION VIEW

SECTION A-A

ANCHOR ROD TEMPLATE

DESIGNER NOTE (REMOVE PRIOR TO PRINTING FINAL PLAN):

DESIGNER TO ENSURE REINFORCEMENT IN BARRIER OR PARAPET CAN DEVELOP YIELD STRENGTH OF ANCHOR RODS.



ANCHOR ROD ASSEMBLY

STANDARD BARRIER AND PARAPET TYPES (SEE PLANS FOR TYPE)	ANCHOR ROD LENGTH
36" TYPE "S" W/O CONCRETE WEARING COURSE *	3'-5"
36" TYPE "S" W/ CONCRETE WEARING COURSE *	3'-5"
42" TYPE "S" W/O CONCRETE WEARING COURSE *	3'-11"
42" TYPE "S" W/ CONCRETE WEARING COURSE *	3'-11"
54" TYPE "S" W/O CONCRETE WEARING COURSE *	4'-11"
54" TYPE "S" W/ CONCRETE WEARING COURSE *	4'-11"
32" TYPE "F" W/O CONCRETE WEARING COURSE	3'-1"
32" TYPE "F" W/CONCRETE WEARING COURSE	3'-3"
32" TYPE "F" MEDIAN W/O CONC. WEARING COURSE	3'-1"
32" TYPE "F" MEDIAN W/ CONC. WEARING COURSE	3'-3"
32" TYPE "F" ON RETAINING WALL	3'-1"
36" TYPE "S" ON RETAINING WALL	3'-5"
32" CONCRETE PARAPET (TYPE P4) W/O CONC. W. C.	3'-1"
32" CONCRETE PARAPET (TYPE P4) W/ CONC. W. C.	3'-1"

* USE SAME ANCHOR ROD LENGTH FOR TYPE "S" SPLIT OR SOLID MEDIAN BARRIERS.

NOTES:

INSTALL ANCHOR ROD ASSEMBLY PLUMB WITH UPPER ANCHOR ROD TEMPLATE LEVEL AND EMBEDDED IN CONCRETE AS SHOWN IN PARTIAL ELEVATION.

PROTECT ANCHOR ROD THREADS AND LEVELING NUTS ABOVE THE UPPER ANCHOR ROD TEMPLATE FROM CONCRETE CONTAMINATION.

GALVANIZE THREADED RODS, WASHERS, AND NUTS AFTER FABRICATION IN ACCORDANCE WITH SPEC. 3392.

FURNISH & INSTALL PLATES IN ACCORDANCE WITH SPEC. 3306, GALVANIZE IN ACCORDANCE WITH SPEC 3394.

TACK WELDING IS PROHIBITED.

SUBSTITUTE MATERIALS IN ACCORDANCE WITH SPEC. 1605.

① PROVIDE 1¼" NOMINAL DIA. ANCHOR RODS TYPE B, IN ACCORDANCE WITH SPEC. 3385.2.B FOR 49' LIGHT STANDARDS WITH TWIN ARMS 10' OR LONGER (6 REQUIRED). PROVIDE 1" NOMINAL DIA. ANCHOR RODS TYPE B, IN ACCORDANCE WITH SPEC. 3385.2.B FOR ALL OTHER INSTALLATIONS.

② 1 1/16" Ø HOLE FOR 1" NOMINAL DIA. ANCHOR ROD, 1 5/16" Ø HOLE FOR 1¼" NOMINAL DIA. ANCHOR ROD.

③ HEAVY HEX NUTS IN ACCORDANCE WITH SPEC. 3391.2.A (30 REQ'D PER ASSEMBLY)

④ FLAT WASHERS IN ACCORDANCE WITH SPEC 3391.2.A (12 REQ'D PER ASSEMBLY)

⑤ TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE WITH THE LEVELING NUTS BEFORE CONCRETE PLACEMENT. AFTER CONCRETE PLACEMENT, LEAVE LEVELING NUTS SECURED AGAINST TEMPLATE UNTIL CLEANING & LUBRICATING THE ANCHOR ROD CONNECTIONS, JUST PRIOR TO POLE INSTALLATION.

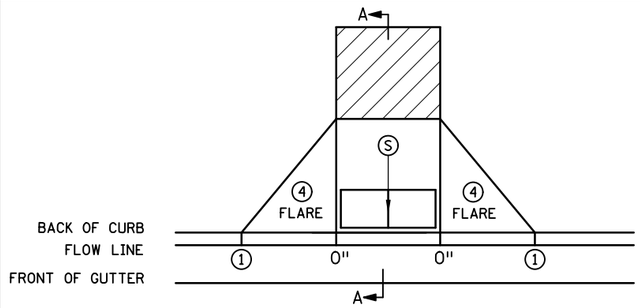
⑥ USE A 12" LONG WRENCH TO SNUG TIGHTEN NUTS PULLING THE HANDLE WITH ONE ARM IN ONE SMOOTH MOTION.

⑦ OMIT HEADED STUDS ON LOWER ANCHOR ROD TEMPLATE.

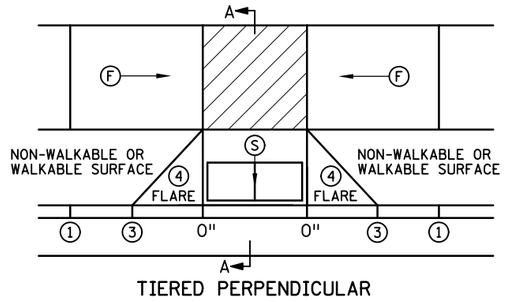
⑧ REMOVE SURFACE CONTAMINANTS AND APPLY SILICONE SEALANT TO THE UPPER TEMPLATE AROUND THE ANCHOR RODS AND ANCHOR ROD HOLES, AND THE INNER AND OUTER EDGES WHERE THE PLATE MEETS CONCRETE. USE AN APPROVED SILICONE JOINT SEALANT FOUND ON MNDOT'S APPROVED/QUALIFIED PRODUCTS LIST UNDER BRIDGE PRODUCTS.

⑨ CAST LEVEL CONCRETE SURFACE BENEATH LIGHT FIXTURE. SLOPE ADJACENT CONCRETE, AS SHOWN ON SLOPED OR SUPERELEVATED BRIDGES.

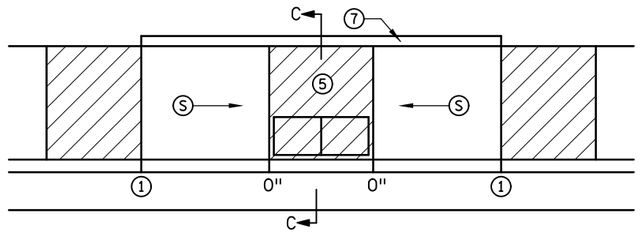
APPROVED: APRIL 09, 2020	STATE OF MINNESOTA DEPARTMENT OF TRANSPORTATION	REVISED	DETAIL NO.
Kevin Western STATE BRIDGE ENGINEER	ANCHOR ROD ASSEMBLY FOR LIGHT POLES		B950



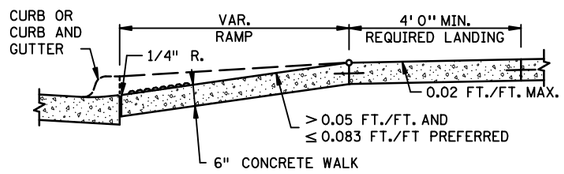
PERPENDICULAR



TIERED PERPENDICULAR

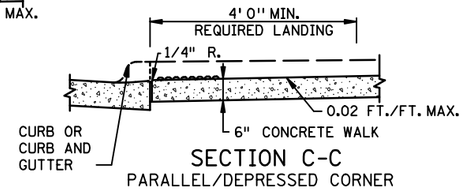


PARALLEL



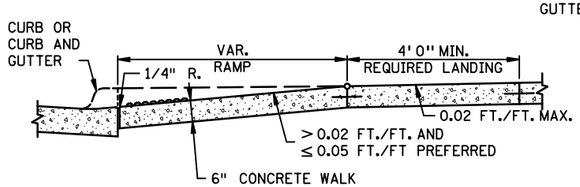
SECTION A-A

PERPENDICULAR/TIERED/DIAGONAL



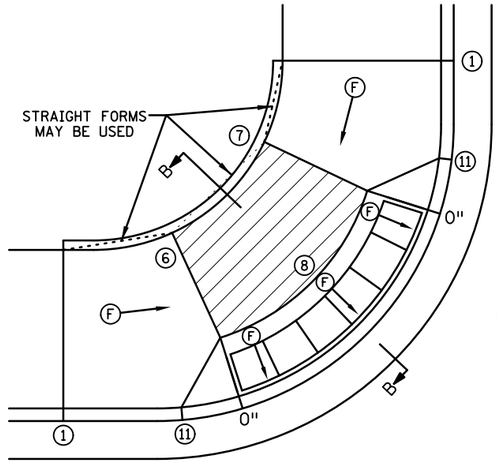
SECTION C-C

PARALLEL/DEPRESSED CORNER

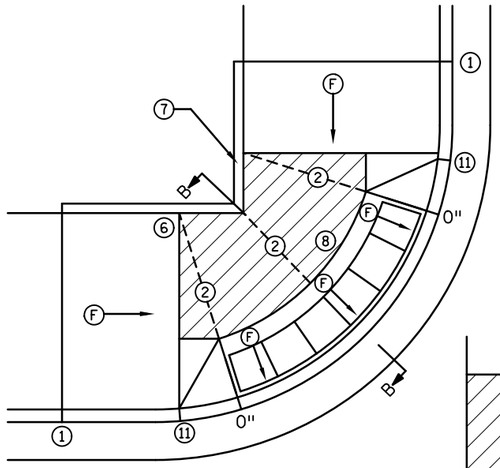


SECTION B-B

FAN

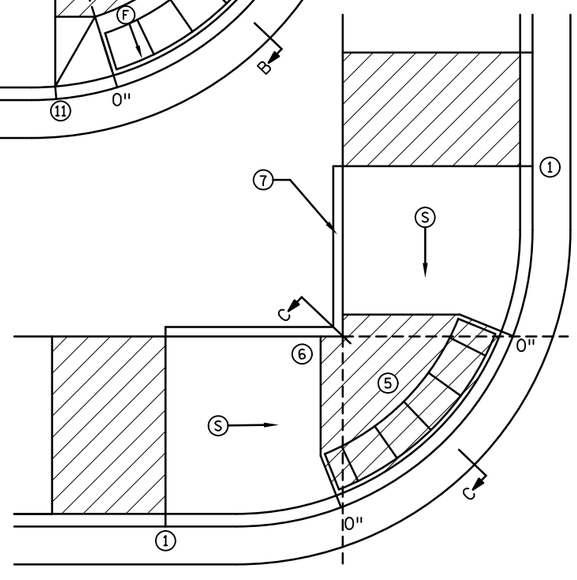


FAN ⑩

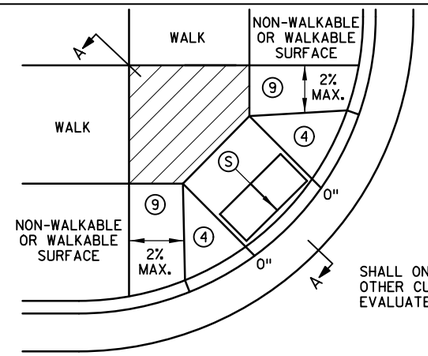


MODIFIED FAN ⑩

USED WHEN RIGHT-OF-WAY IS CONSTRAINED



DEPRESSED CORNER



DIAGONAL

SHALL ONLY BE USED AFTER ALL OTHER CURB RAMP TYPES HAVE BEEN EVALUATED AND DEEMED IMPRACTICAL

NOTES:

LANDINGS SHALL BE LOCATED ANYWHERE THE PEDESTRIAN ACCESS ROUTE (PAR) CHANGES DIRECTION, AT THE TOP OF RAMPS THAT HAVE RUNNING SLOPES GREATER THAN 5.0%, AND IF THE APPROACHING WALK IS INVERSE GRADE GREATER THAN 2%.

INITIAL CURB RAMP LANDINGS SHALL BE CONSTRUCTED WITHIN 15' FROM THE BACK OF CURB, WITH 6' FROM THE BACK OF CURB BEING THE PREFERRED DISTANCE, ONLY APPLICABLE WHEN THE INITIAL RAMP RUNNING SLOPE IS OVER 5.0%.

SECONDARY CURB RAMP LANDINGS ARE REQUIRED FOR EVERY 30" OF VERTICAL RISE WHEN THE LONGITUDINAL RUNNING SLOPE IS GREATER THAN 5.0%.

CONTRACTION JOINTS SHALL BE CONSTRUCTED ALONG ALL GRADE BREAKS WITHIN THE PAR. 1/4" DEEP VISUAL JOINTS SHALL BE USED AT THE TOPS OF CONCRETE FLARES ADJACENT TO WALKABLE SURFACES.

ALL GRADE BREAKS WITHIN THE PAR SHALL BE PERPENDICULAR TO THE PATH OF TRAVEL, THUS BOTH SIDES OF A SLOPED WALKING SURFACE MUST BE EQUAL LENGTH. (EXCEPT AS STATED IN ⑥ BELOW.

TO ENSURE RAMPS AND LANDINGS ARE PROPERLY CONSTRUCTED, ALL INITIAL LANDINGS AT A TOP OF A RAMPED SURFACE (RUNNING SLOPE GREATER THAN 2%) SHALL BE FORMED AND PLACED SEPARATELY IN AN INDEPENDENT CONCRETE POUR. FOLLOW SIDEWALK REINFORCEMENT DETAILS ON SHEET 6 OF 6 FOR ALL SEPARATELY POURED INITIAL LANDINGS.

WHEN SIDEWALK IS AT BACK OF CURB, TOP OF CURB SHALL MATCH PROPOSED ADJACENT WALK GRADE.

MAINTAIN POSITIVE BOULEVARD DRAINAGE TO TOP OF CURB.

ALL RAMP TYPES SHOULD HAVE A MINIMUM 3' LONG RAMP LENGTH.

4' MINIMUM WIDTH OF DETECTABLE WARNING IS REQUIRED FOR ALL RAMPS. DETECTABLE WARNINGS SHALL CONTINUOUSLY EXTEND FOR A MIN. OF 24" IN THE PATH OF TRAVEL. DETECTABLE WARNING TO COVER THE ENTIRE PAR WIDTH OF SHARED-USE PATHS AND THE ENTIRE PAR WIDTH OF THE WALK WITH THE EXCEPTION OF 3" MAXIMUM ON EACH OUTSIDE EDGE WHICH ENSURES THE DETECTABLE WARNINGS ARE ENCASED IN CONCRETE WHEN ADJACENT TO TURF. WHEN ADJACENT TO CONCRETE FLARES 0" - 3" OFFSET IS ALLOWED.

WHEN DESIGNING OR ORDERING RECTANGULAR DETECTABLE WARNING SURFACES SHOULD BE 6" LESS THAN THE INCOMING PAR. ARC LENGTH OF THE RADIAL DETECTABLE WARNINGS SHOULD NOT BE GREATER THAN 20 FEET.

RECTANGULAR DETECTABLE WARNINGS SHALL BE SETBACK 3" FROM THE BACK OF CURB. RADIAL DETECTABLE WARNINGS SHALL BE SETBACK 3" MINIMUM TO 6" MAXIMUM FROM THE BACK OF CURB.

① MATCH FULL HEIGHT CURB.

② 4' MINIMUM DEPTH LANDING REQUIRED ACROSS TOP OF RAMP.

③ 3" HIGH CURB WHEN USING A 3' LONG RAMP, 4" HIGH CURB WHEN USING A 4' LONG RAMP.

④ SEE SHEET 4 OF 6, TYPICAL SIDE TREATMENT OPTIONS, FOR DETAILS ON FLARES AND RETURNED CURBS.

⑤ DETECTABLE WARNINGS MAY BE PART OF THE 4' X 4' MIN. LANDING AREA IF IT IS NOT FEASIBLE TO CONSTRUCT THE LANDING OUTSIDE OF THE DETECTABLE WARNING AREA.

⑥ THE GRADE BREAK SHALL BE PERPENDICULAR TO THE BACK OF WALK. THIS WILL ENSURE THAT THE GRADE BREAK IS PERPENDICULAR TO THE DIRECTION OF TRAVEL. (TYPICAL FOR ALL)

⑦ WHEN ADJACENT TO GRASS, GRADING SHALL ALWAYS BE USED WHEN FEASIBLE. V CURB, IF USED, SHALL BE PLACED OUTSIDE THE SIDEWALK LIMITS WHEN RIGHT OF WAY ALLOWS. WHEN ADJACENT TO PARKING LOTS, CONCRETE OR BITUMINOUS TAPERS LESS THAN 5% RUNNING SLOPE SHOULD BE USED OVER V CURB TO REDUCE TRIPPING HAZARDS AND FACILITATE SNOW & ICE REMOVAL.

⑧ A 7' MIN TOP RADIUS GRADE BREAK IS REQUIRED TO BE CONSTRUCTIBLE.

⑨ PAVE FULL WALK WIDTH.

⑩ "S" SLOPES ON FANS SHALL ONLY BE USED WHEN ALL OTHER FEASIBLE OPTIONS HAVE BEEN EVALUATED AND DEEMED IMPRACTICAL.

⑪ INTERMEDIATE CURB HEIGHTS TAPER SHALL RISE AT 8-10% TO A MINIMUM 3" CURB HEIGHT. REDUCE INTERMEDIATE CURB HEIGHT TO 2+ INCHES IF NECESSARY TO MATCH ADJACENT BOULEVARD OR SIDEWALK GRADES.

LEGEND

THESE LONGITUDINAL SLOPE RANGES SHALL BE THE STARTING POINT. IF SITE CONDITIONS WARRANT, LONGITUDINAL SLOPES UP TO 8.3% OR FLATTER ARE ALLOWED.

Ⓢ INDICATES PEDESTRIAN RAMP - SLOPE SHALL BE BETWEEN 5.0% MINIMUM AND 8.3% MAXIMUM IN THE DIRECTION SHOWN AND THE CROSS SLOPE SHALL NOT EXCEED 2.0%.

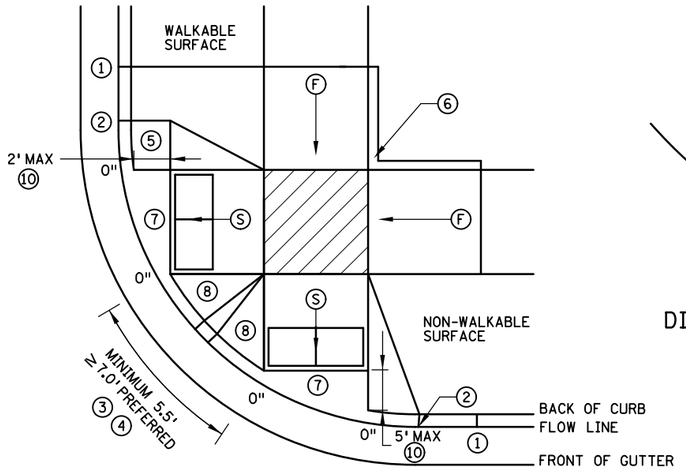
Ⓕ INDICATES PEDESTRIAN RAMP - SLOPE SHALL BE GREATER THAN 2.0% AND LESS THAN 5.0% IN THE DIRECTION SHOWN AND CROSS SLOPE SHALL NOT EXCEED 2.0%.

LANDING AREA - 4' X 4' MIN. (5' X 5' MIN. PREFERRED) DIMENSIONS AND MAX 2.0% SLOPE IN ALL DIRECTIONS. LANDING SHALL BE FULL WIDTH OF INCOMING PARS.

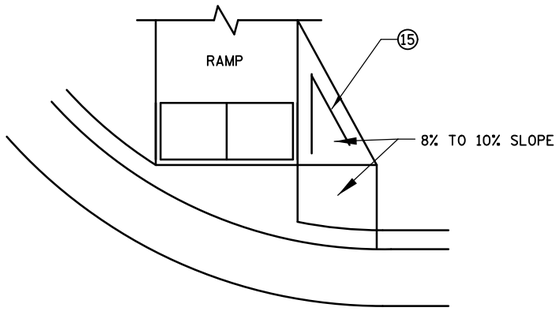
X" CURB HEIGHT

LEAD EXPERT OFFICE: JEFFREY PERKINS, OPERATIONS DIVISION		PEDESTRIAN CURB RAMP DETAILS	APPROVED: 11-04-2021 REVISED:	THOMAS STYRBICKI STATE DESIGN ENGINEER	STANDARD PLAN 5-297.250	1 OF 6

DEPARTMENT OF TRANSPORTATION	STANDARD PLAN	STATE PROJ. NO.	SHEET NO.	
		TRUNK HWY.	TOTAL SHEETS	

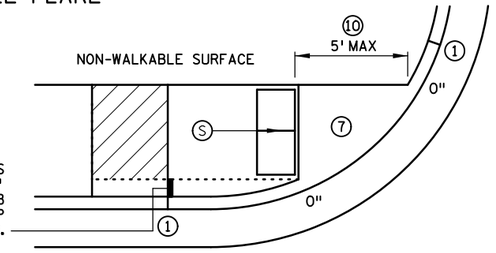


COMBINED DIRECTIONAL

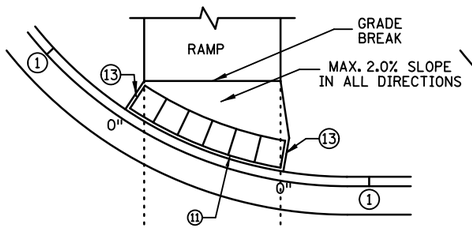


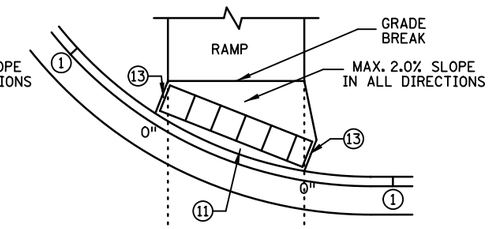
DIRECTIONAL RAMP WALKABLE FLARE

IF NON-CONCRETE BLVD. IS CONSTRUCTED AND IS LESS THAN 2' IN WIDTH AT TOP OF CURB TRANSITION, PAVE CONCRETE RAMP WIDTH TO ADJACENT BACK OF CURB.



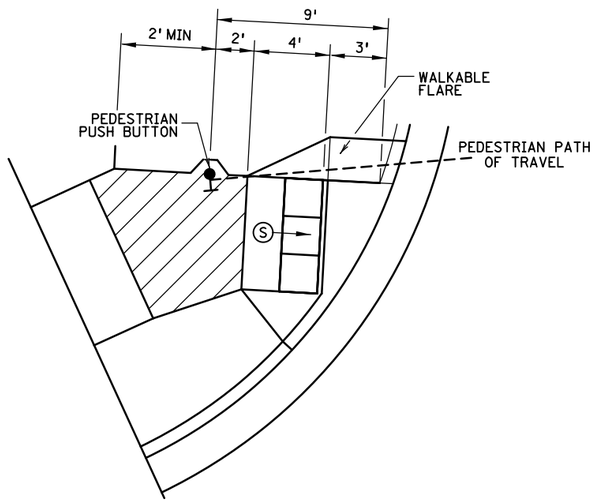
STANDARD ONE-WAY DIRECTIONAL ⑨





DETECTABLE WARNING PLACEMENT WHEN SETBACK CRITERIA IS EXCEEDED ⑫

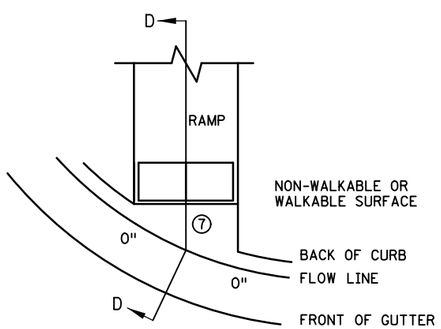
ONE-WAY DIRECTIONAL WITH DETECTABLE WARNING AT BACK OF CURB

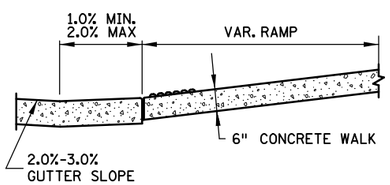


SEMI-DIRECTIONAL RAMP ③④⑨

3' DOME SETBACK, 4' LONG RAMP AND PUSH BUTTON 9' FROM THE BACK OF CURB

PRIMARILY USED FOR APS APPLICATIONS WHERE THE PAR DOES NOT CONTINUE PAST THE PUSH BUTTON (DEAD-END SIDEWALK)





SECTION D-D

CURB FOR DIRECTIONAL RAMPS ⑭

NOTES:

LANDINGS SHALL BE LOCATED ANYWHERE THE PEDESTRIAN ACCESS ROUTE (PAR) CHANGES DIRECTION, AT THE TOP OF RAMPS THAT HAVE RUNNING SLOPES GREATER THAN 5.0%, AND IF THE APPROACHING WALK IS INVERSE GRADE.

INITIAL CURB RAMP LANDINGS SHALL BE CONSTRUCTED WITHIN 15' FROM THE BACK OF CURB, WITH 6' FROM THE BACK OF CURB BEING THE PREFERRED DISTANCE, ONLY APPLICABLE WHEN THE INITIAL RAMP RUNNING SLOPE IS OVER 5.0%.

SECONDARY CURB RAMP LANDINGS ARE REQUIRED FOR EVERY 30" OF VERTICAL RISE WHEN THE LONGITUDINAL SLOPE IS GREATER THAN 5.0%.

CONTRACTION JOINTS SHALL BE CONSTRUCTED ALONG ALL GRADE BREAKS WITHIN THE PAR. 1/4" DEEP VISUAL JOINTS SHALL BE USED AT THE TOP GRADE BREAK OF CONCRETE FLARES ADJACENT TO WALKABLE SURFACES.

ALL GRADE BREAKS WITHIN THE PAR SHALL BE PERPENDICULAR TO THE PATH OF TRAVEL. THUS BOTH SIDES OF A SLOPED WALKING SURFACE MUST BE EQUAL LENGTH.

TO ENSURE INITIAL RAMPS AND INITIAL LANDINGS ARE PROPERLY CONSTRUCTED, LANDINGS SHALL BE CAST SEPARATELY. FOLLOW SIDEWALK REINFORCEMENT DETAILS ON SHEET 6 AND THE ADA SPECIAL PROVISION (PROSECUTION OF WORK).

TOP OF CURB SHALL MATCH PROPOSED ADJACENT WALK GRADE.

WHEN THE BOULEVARD IS 4' WIDE OR LESS, THE TOP OF CURB TAPER SHALL MATCH THE RAMP SLOPES TO REDUCE NEGATIVE BOULEVARD SLOPES FROM THE TOP BACK OF CURB TO THE PAR.

ALL RAMP TYPES SHOULD HAVE A MINIMUM 3' LONG RAMP LENGTH.

4' MINIMUM WIDTH OF DETECTABLE WARNING IS REQUIRED FOR ALL RAMPS. DETECTABLE WARNINGS SHALL CONTINUOUSLY EXTEND FOR A MIN. OF 24" IN THE PATH OF TRAVEL. DETECTABLE WARNING TO COVER THE ENTIRE PAR WIDTH OF SHARED-USE PATHS AND THE ENTIRE PAR WIDTH OF THE WALK WITH THE EXCEPTION OF 3" MAXIMUM ON EACH OUTSIDE EDGE WHICH ENSURES THE DETECTABLE WARNINGS ARE ENCASED IN CONCRETE WHEN ADJACENT TO TURF. WHEN ADJACENT TO CONCRETE FLARES 0" - 3" OFFSET IS ALLOWED.

WHEN DESIGNING OR ORDERING RECTANGULAR DETECTABLE WARNING SURFACES SHOULD BE 6" LESS THAN THE INCOMING PAR. ARC LENGTH OF THE RADIAL DETECTABLE WARNINGS SHOULD NOT BE GREATER THAN 20 FEET.

RADIAL DETECTABLE WARNINGS SHALL BE SETBACK 3" MINIMUM TO 6" MAXIMUM FROM THE BACK OF CURB. SEE NOTES ⑩ & ⑪ FOR INFORMATION REGARDING RECTANGULAR DETECTABLE WARNING PLACEMENT.

① MATCH FULL CURB HEIGHT.

② 3" HIGH CURB WHEN USING A 3' LONG RAMP
4" HIGH CURB WHEN USING A 4' LONG RAMP.

③ 3" MINIMUM CURB HEIGHT (5.5' MIN. DISTANCE REQUIRED BETWEEN DOMES)
4" PREFERRED (7' MIN. DISTANCE REQUIRED BETWEEN DOMES).

④ THE "BUMP" IN BETWEEN THE RAMPS SHOULD NOT BE IN THE PATH OF TRAVEL FOR COMBINED DIRECTIONAL RAMPS. IF THIS OCCURS MODIFY THE RAMP LOCATION OR SWITCH RAMP TO A FAN/DEPRESSED CORNER.

⑤ WHEN USING CONCRETE PAVED FLARES ON THE OUTSIDE OF DIRECTIONAL RAMPS, AND ADJACENT TO A WALKABLE SURFACE, DIRECTIONAL RAMP FLARES SHALL BE USED. SEE THE DETAIL ON THIS SHEET.

⑥ GRADING SHALL ALWAYS BE USED WHEN FEASIBLE. V CURB, IF USED, SHALL BE PLACED OUTSIDE THE SIDEWALK LIMITS WHEN RIGHT OF WAY ALLOWS. WHEN ADJACENT TO PARKING LOTS, CONCRETE OR BITUMINOUS TAPERS SHOULD BE USED OVER V CURB TO REDUCE TRIPPING HAZARDS AND FACILITATE SNOW & ICE REMOVAL.

⑦ MAX. 2.0% SLOPE IN ALL DIRECTIONS IN FRONT OF GRADE BREAK AND DRAIN TO FLOW LINE. SHALL BE CONSTRUCTED INTEGRAL WITH CURB AND GUTTER.

⑧ 8% TO 10% WALKABLE FLARE.

⑨ PLACE DOMES AT THE BACK OF CURB WHEN ALLOWABLE SETBACK CRITERIA IS EXCEEDED.

⑩ FRONT EDGE OF DETECTABLE WARNING SHALL BE SET BACK 2' MAXIMUM WHEN ADJACENT TO WALKABLE SURFACE, AND 5' MAXIMUM WHEN ADJACENT TO NON-WALKABLE SURFACE WITH ONE CORNER SET 3" FROM BACK OF CURB. A WALKABLE SURFACE IS DEFINED AS A PAVED SURFACE ADJACENT TO A CURB RAMP WITHOUT RAISED OBSTACLES THAT COULD MISTAKENLY BE TRAVERSED BY A USER WHO IS VISUALLY IMPAIRED.

⑪ RECTANGULAR DETECTABLE WARNINGS MAY BE SETBACK UP TO 9" FROM THE BACK OF CURB WITH CORNERS SET 3" FROM BACK OF CURB. IF 9" SETBACK IS EXCEEDED USE RADIAL DETECTABLE WARNINGS.

⑫ FOR DIRECTIONAL RAMPS WITH THE DETECTABLE WARNINGS PLACED AT THE BACK OF CURB, THE DETECTABLE WARNINGS SHALL COVER THE ENTIRE WIDTH OF THE WALK/PATH. THIS ENSURES A DETECTABLE EDGE AND HELPS ELIMINATE THE CURB TAPER OBSTRUCTING THE PATH OF PEDESTRIAN TRAVEL.

⑬ THE CONCRETE WALK SHALL BE FORMED AND CONSTRUCTED PERPENDICULAR TO THE BACK OF CURB. MAINTAIN 3" BETWEEN EDGE OF DOMES AND EDGE OF CONCRETE.

⑭ TO BE USED FOR ALL DIRECTIONAL RAMPS, EXCEPT WHERE DOMES ARE PLACED ALONG THE BACK OF CURB.

⑮ PLACE 2 NO. 4 BARS 4 INCHES FROM SIDE OF FORMS WITH A MINIMUM 2 INCHES OF CONCRETE COVER ALONG EACH SIDE OF FLARE (INCIDENTAL).

LEGEND

THESE LONGITUDINAL SLOPE RANGES SHALL BE THE STARTING POINT. IF SITE CONDITIONS WARRANT, LONGITUDINAL SLOPES UP TO 8.3% OR FLATTER ARE ALLOWED.

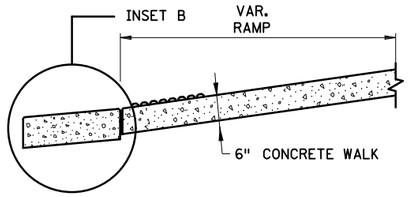
(S) INDICATES PEDESTRIAN RAMP - SLOPE SHALL BE BETWEEN 5.0% MINIMUM AND 8.3% MAXIMUM IN THE DIRECTION SHOWN AND THE CROSS SLOPE SHALL NOT EXCEED 2.0%.

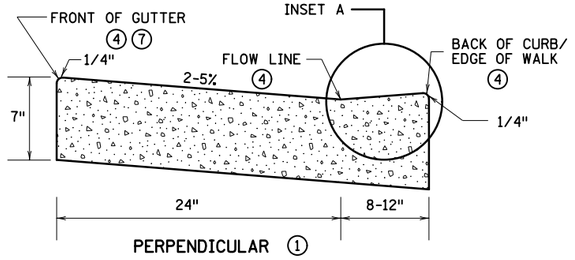
(F) INDICATES PEDESTRIAN RAMP - SLOPE SHALL BE GREATER THAN 2.0% AND LESS THAN 5.0% IN THE DIRECTION SHOWN AND CROSS SLOPE SHALL NOT EXCEED 2.0%.

LANDING AREA - 4' X 4' MIN. (5' X 5' MIN. PREFERRED) DIMENSIONS AND MAX 2.0% SLOPE IN ALL DIRECTIONS. LANDING SHALL BE FULL WIDTH OF INCOMING PARS.

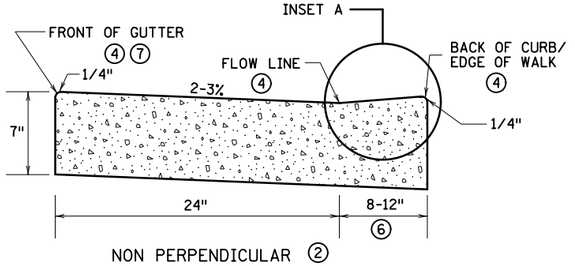
X" CURB HEIGHT

LEAD EXPERT OFFICE: JEFFREY PERKINS, OPERATIONS DIVISION		PEDESTRIAN CURB RAMP DETAILS	APPROVED: 11-04-2021 REVISED:	THOMAS STYRBICKI, STATE DESIGN ENGINEER	STANDARD PLAN 5-297.250	2 OF 6
	DEPARTMENT OF TRANSPORTATION	STANDARD PLAN	STATE PROJ. NO.		SHEET NO.	
			TRUNK HWY.		TOTAL SHEETS	

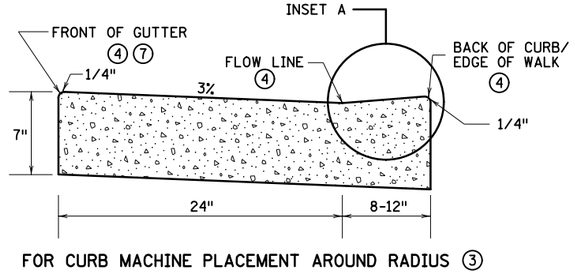




PERPENDICULAR ①

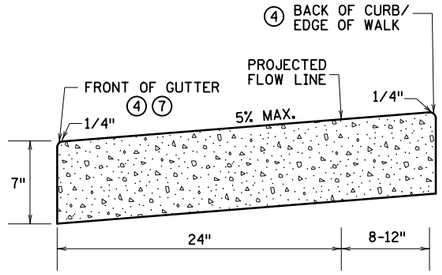


NON PERPENDICULAR ②

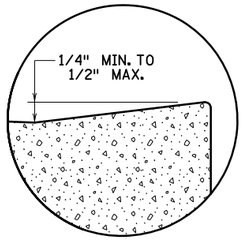


FOR CURB MACHINE PLACEMENT AROUND RADIUS ③
(REGARDLESS OF RAMP TYPE)

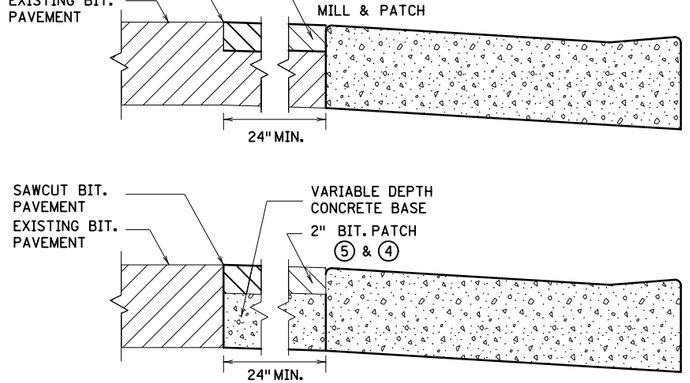
PEDESTRIAN ACCESS ROUTE CURB & GUTTER DETAIL



INSET B
OUTFLOW GUTTER ⑧



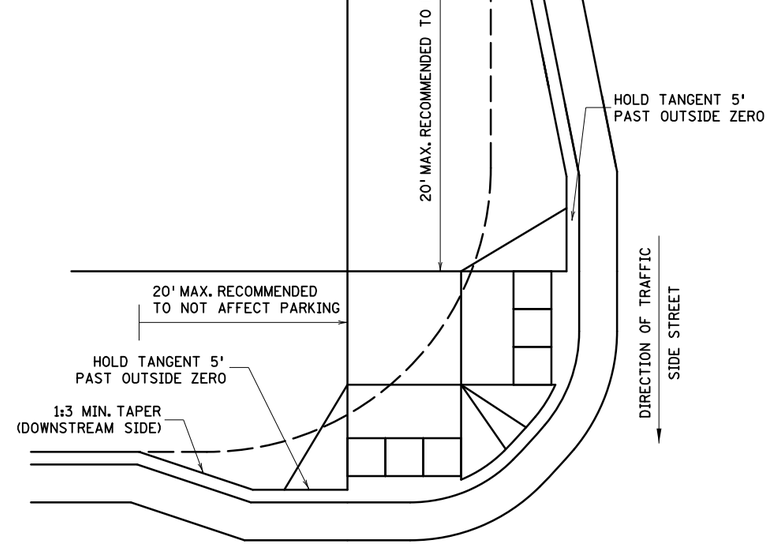
INSET A



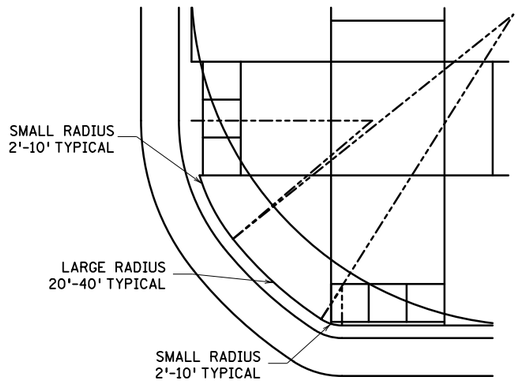
ONLY ALLOWED PER ENGINEER'S APPROVAL

PAVEMENT TREATMENT OPTIONS IN FRONT OF CURB & GUTTER

FOR USE ON CURB RAMP RETROFITS



ADA CURB EXTENSION WITH COMPOUND RADIUS (BUMP OUT) ⑪



COMBINED DIRECTIONAL ⑩
(COMPOUND RADIUS)

NOTES:

POSITIVE FLOW LINE DRAINAGE SHALL BE MAINTAINED THROUGH THE PEDESTRIAN ACCESS ROUTE (PAR) AT A 2% MAXIMUM.

NO PONDING SHALL BE PRESENT IN THE PAR.

ANY VERTICAL LIP THAT OCCURS AT THE FLOW LINE SHALL NOT BE GREATER THAN 1/4 INCH.

① FOR USE AT CURB CUTS WHERE THE PEDESTRIAN'S PATH OF TRAVEL IS ASSUMED PERPENDICULAR TO THE GUTTER FLOW LINE. RAMP TYPES INCLUDE: PERPENDICULAR, TIERED PERPENDICULAR, PARALLEL, AND DIAGONAL RAMPS.

② FOR USE AT CURB RAMPS WHERE THE PEDESTRIAN'S PATH OF TRAVEL IS ASSUMED NON PERPENDICULAR TO THE GUTTER FLOW LINE. RAMP TYPES INCLUDE: FANS & DEPRESSED CORNERS.

③ BEGIN GUTTER SLOPE TRANSITION 10' OUTSIDE OF ALL CURB RAMPS.

④ THERE SHALL BE NO VERTICAL DISCONTINUITIES GREATER THAN 1/4".

⑤ ELEVATION CHANGE TAKES PLACE FROM THE EXISTING TO NEW FRONT OF GUTTER. PATCH IS USED TO MATCH THE NEW GUTTER FACE INTO THE EXISTING ROADWAY.

⑥ VARIABLE WIDTH FOR DIRECTIONAL CURB APPLICATIONS. SEE SHEET 2 FOR DIRECTIONAL CURB SLOPE REQUIREMENTS.

⑦ TOP FRONT OF GUTTER SHALL BE CONSTRUCTED FLUSH WITH PROPOSED ADJACENT PAVEMENT ELEVATION. TOP 1.5" OF THE GUTTER FACE MUST BE A FORMED EDGE. PAR GUTTER SHALL NOT BE OVERLAID.

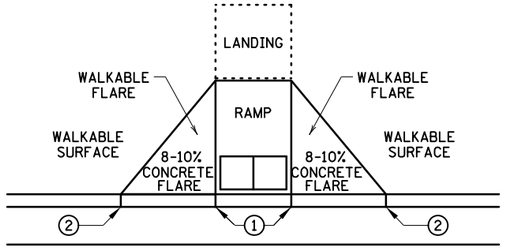
⑧ SHOULD BE USED AT VERTICALLY CONSTRAINED AREAS WHEN AT A DRAINAGE HIGH POINT OR SUPER ELEVATED ROADWAY SEGMENTS.

⑨ DRILL AND GROUT NO. 4 EPOXY-COATED 18" LONG TIE BARS AT 30" CENTER TO CENTER INTO EXISTING CONCRETE PAVEMENT 1' MINIMUM FROM ALL JOINTS.

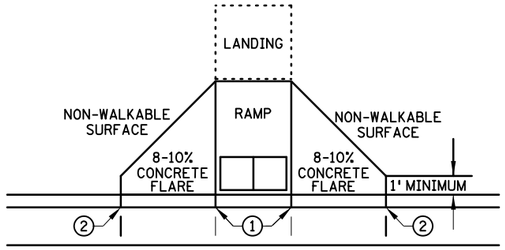
⑩ HELPS PROVIDE TWO SEPARATE RAMPS, REDUCES THE DOME SETBACK LENGTH AND MINIMIZES DIRECTIONAL CURB. THIS RADIUS DESIGN CLOSELY FOLLOWS THE TURNING VEHICLE PATH WHILE OPTIMIZING CURB RAMP LENGTH.

⑪ CURB EXTENSIONS SHOULD BE USED IN VERTICALLY CONSTRAINED AREAS, USUALLY IN DOWNTOWN ROADWAY SEGMENTS WHERE ON-STREET PARKING IS AVAILABLE. CURB EXTENSIONS SHOULD BE CONSIDERED FOR APS INTERSECTIONS WHERE SPACE IS LIMITED.
PUSH BUTTONS MUST MEET APS CRITERIA AS DESCRIBED IN THE PUSH BUTTON LOCATION DETAIL SHEET.

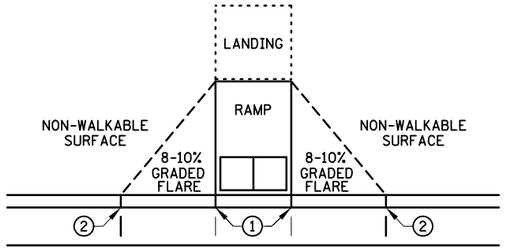
LEAD EXPERT OFFICE: JEFFREY PERKINS, OPERATIONS DIVISION		PEDESTRIAN CURB RAMP DETAILS	APPROVED: 11-04-2021 REVISED:	THOMAS STYRBICKI STATE DESIGN ENGINEER	STANDARD PLAN 5-297.250	3 OF 6
DEPARTMENT OF TRANSPORTATION		STANDARD PLAN		STATE PROJ. NO.	SHEET NO.	
				TRUNK HWY.	TOTAL SHEETS	



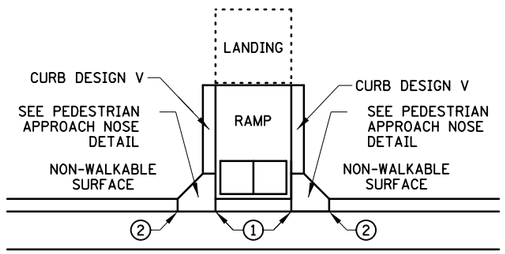
PAVED FLARES
ADJACENT TO WALKABLE SURFACE



PAVED FLARES
ADJACENT TO NON-WALKABLE SURFACE

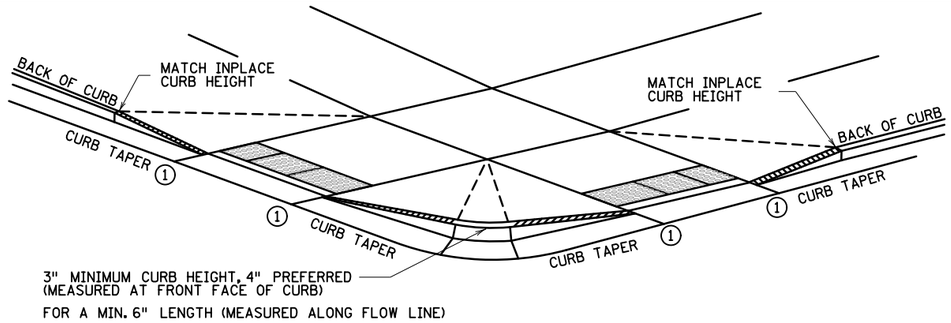


GRADED FLARES

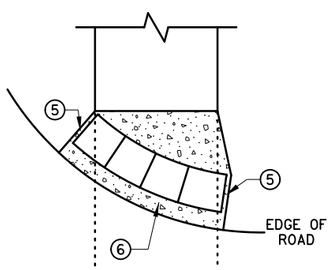


RETURNED CURB ④

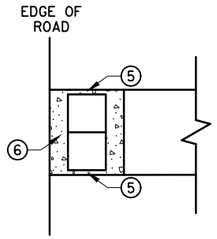
TYPICAL SIDE TREATMENT OPTIONS ③ ⑩



DETECTABLE EDGE WITH ⑦
CURB AND GUTTER

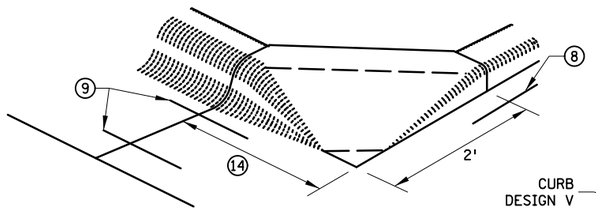


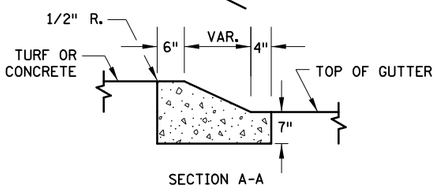
RADIAL DETECTABLE WARNING



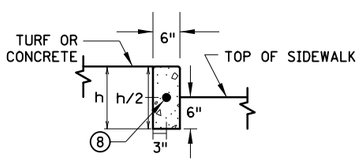
RECTANGULAR DETECTABLE WARNING

DETECTABLE EDGE WITHOUT CURB AND GUTTER

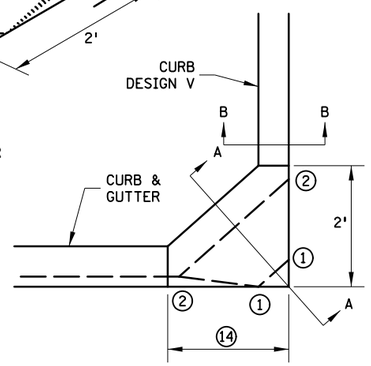




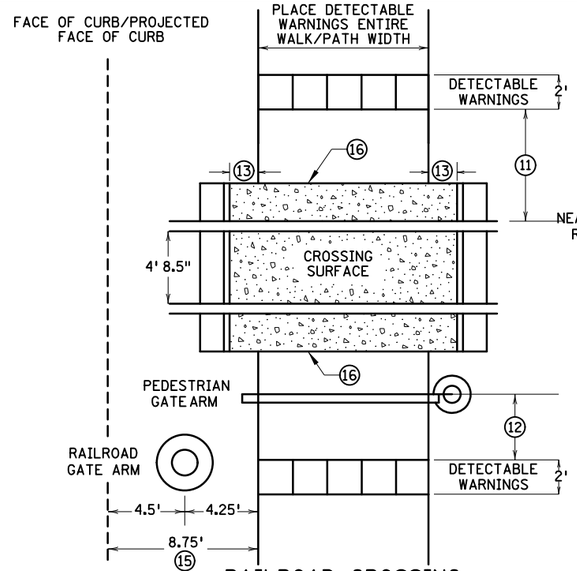
SECTION A-A



SECTION B-B



PEDESTRIAN APPROACH
NOSE DETAIL
(FOR RETURNED CURB
SIDE TREATMENT)



RAILROAD CROSSING
PLAN VIEW

NOTES:

INTERMEDIATE CURB HEIGHTS TAPER SHALL RISE AT 8-10% TO A MINIMUM 3 INCH CURB HEIGHT. INCREASE CURB TAPER LENGTH AT LESS THAN 8% OR REDUCE INTERMEDIATE CURB HEIGHT TO 2+ INCHES IF NECESSARY TO MATCH ADJACENT BOULEVARD OR SIDEWALK GRADES.

SEE STANDARD PLATE 7038 AND THIS SHEET FOR ADDITIONAL DETAILS ON DETECTABLE WARNING.

A WALKABLE SURFACE IS DEFINED AS A PAVED SURFACE ADJACENT TO A CURB RAMP WITHOUT RAISED OBSTACLES THAT COULD MISTAKENLY BE TRAVERSED BY A USER WHO IS VISUALLY IMPAIRED.

CONCRETE FLARE LENGTHS ADJACENT TO NON-WALKABLE SURFACES SHOULD BE LESS THAN 8' LONG MEASURED ALONG THE RAMPS FROM THE BACK OF CURB.

① 0" CURB HEIGHT. SEE INSET A ON SHEET 3 OF 6.

② FULL CURB HEIGHT.

③ SIDE TREATMENTS ARE APPLICABLE TO ALL RAMP TYPES AND SHOULD BE IMPLEMENTED AS NEEDED AS FIELD CONDITIONS DICTATE. THE ENGINEER SHALL DETERMINE THE RAMP SIDE TREATMENTS BASED ON MAINTENANCE OF BOTH ROADWAY AND SIDEWALK, ADJACENT PROPERTY CONSIDERATIONS, AND MITIGATING CONSTRUCTION IMPACTS.

④ TYPICALLY USED FOR MEDIANS AND ISLANDS.

⑤ WHEN NO CONCRETE FLARES ARE PROPOSED, THE CONCRETE WALK SHALL BE FORMED AND CONSTRUCTED PERPENDICULAR TO THE EDGE OF ROADWAY. MAINTAIN 3" MAX. BETWEEN EDGE OF DOMES AND EDGE OF CONCRETE.

⑥ IF NO CURB AND GUTTER IS PLACED IN RURAL SECTIONS, DETECTABLE WARNINGS SHALL BE PLACED 1' FROM THE EDGE OF BITUMINOUS ROADWAY AND/OR BITUMINOUS SHARED-USE PATH TO PROVIDE VISUAL CONTRAST.

⑦ ALL CONSTRUCTED CURBS MUST HAVE A CONTINUOUS DETECTABLE EDGE FOR THE VISUALLY IMPAIRED. THIS DETECTABLE EDGE REQUIRES DETECTABLE WARNINGS WHEREVER THERE IS ZERO-INCH HIGH CURB. CURB TAPERS ARE CONSIDERED A DETECTABLE EDGE WHEN THE TAPER STARTS WITHIN 3" OF THE EDGE OF THE DETECTABLE WARNINGS, AND UNIFORMLY RISES TO A 3-INCH MINIMUM CURB HEIGHT. ANY CURB NOT PART OF A CURB TAPER AND LESS THAN 3 INCHES IN HEIGHT IS NOT CONSIDERED A DETECTABLE EDGE AND THEREFORE IS NOT COMPLIANT WITH ACCESSIBILITY STANDARDS.

⑧ DRILL AND GROUT 1 - NO. 4 12" LONG REINFORCEMENT BAR (EPOXY COATED) WITH 3" MIN. COVER. REINFORCEMENT BARS ARE NOT NEEDED IF THE APPROACH NOSE IS POURED INTEGRAL WITH THE V CURB.

⑨ DRILL AND GROUT 2 - NO. 4 12" LONG REINFORCEMENT BARS (EPOXY COATED) WITH 3" MIN. COVER. REINFORCEMENT BARS ARE NOT NEEDED IF THE APPROACH NOSE IS POURED INTEGRAL WITH THE CURB AND GUTTER.

⑩ SIDE TREATMENT EXAMPLES SHOWN ARE WHEN THE INITIAL LANDING IS APPROXIMATELY LEVEL WITH THE FULL HEIGHT CURB (I.E. 6' LONG RAMP FOR 6" HIGH CURB). WHEN THE INITIAL LANDING IS MORE THAN 1" BELOW FULL HEIGHT CURB REFER TO SHEETS 1 & 2 TO MODIFY THE CURB HEIGHT TAPERS AND MAINTAIN POSITIVE BOULEVARD DRAINAGE. CONSTRUCT THESE TAPERS AT 0"-3" AT 8-10%, THEN LESS THAN 5% FROM 3" CURB TO FULL CURB HEIGHT.

⑪ NEAREST EDGE OF DETECTABLE WARNING SURFACES SHALL BE PLACED 12' MINIMUM TO 15' MAXIMUM FROM THE NEAREST RAIL. FOR SKEWED RAILWAYS IN NO INSTANCE SHALL THE DETECTABLE WARNING BE CLOSER THAN 12' MEASURED PERPENDICULAR TO THE NEAREST RAIL.

⑫ WHEN PEDESTRIAN GATES ARE PROVIDED, DETECTABLE WARNING SURFACES SHALL BE PLACED ON THE SIDE OF THE GATES OPPOSITE THE RAIL, 2' FROM THE APPROACHING SIDE OF THE GATE ARM. THIS CRITERIA GOVERNS OVER NOTE ⑪.

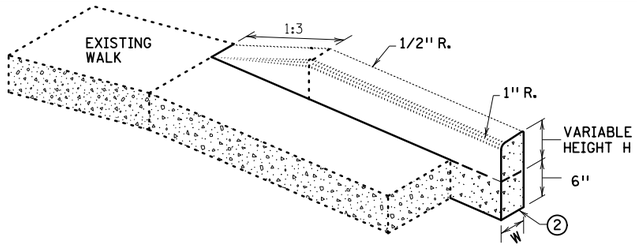
⑬ CROSSING SURFACE SHALL EXTEND 2' MINIMUM PAST THE OUTSIDE EDGE OF WALK OR SHARED-USE PATH.

⑭ 3' FOR MEDIANS AND SPLITTER ISLANDS. NOSE CAN BE REDUCED TO 2' ON FREE RIGHT ISLANDS.

⑮ SIDEWALK TO BE PLACED 8.75' MIN. FROM THE FACE OF CURB/PROJECTED FACE OF CURB. THIS ENSURES MIN. CLEARANCE BETWEEN THE SIDEWALK AND GATE ARM COUNTERWEIGHT SUPPORTS.

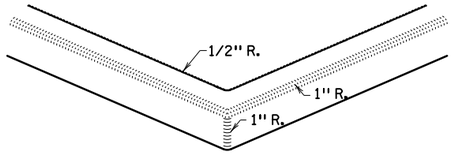
⑯ CONSTRUCT WITH EXPANSION MATERIAL PER MNDOT SPECIFICATION 3702 TYPES A-E. EXPANSION MATERIAL SHALL MATCH FULL HEIGHT OF ADJACENT CONCRETE.

LEAD EXPERT OFFICE: JEFFREY PERKINS, OPERATIONS DIVISION		PEDESTRIAN CURB RAMP DETAILS	APPROVED: 11-04-2021 REVISED:	THOMAS STYRBICKI, STATE DESIGN ENGINEER	STANDARD PLAN 5-297.250	4 OF 6
	DEPARTMENT OF TRANSPORTATION	STANDARD PLAN	STATE PROJ. NO.		SHEET NO.	
			TRUNK HWY.		TOTAL SHEETS	



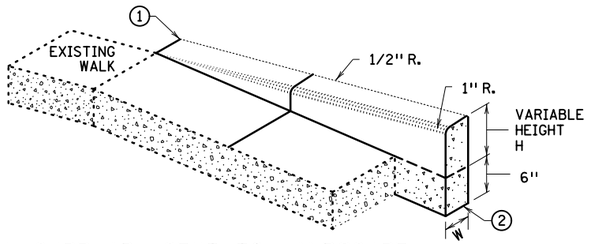
V CURB ADJACENT TO LANDSCAPE

CURB WITHIN SIDEWALK LIMITS



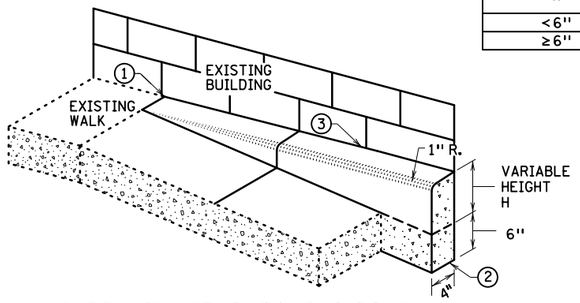
V CURB INTERSECTION

CONCRETE CURB DESIGN V	
CURB HEIGHT H	CURB WIDTH W
< 6"	4"
≥ 6"	6"

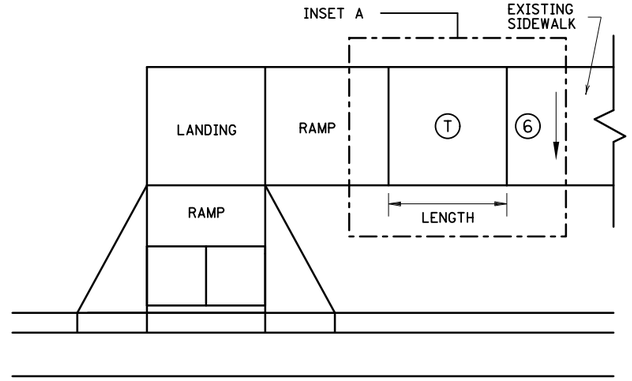


V CURB ADJACENT TO LANDSCAPE

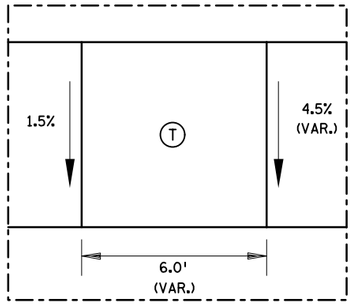
CURB OUTSIDE SIDEWALK LIMITS



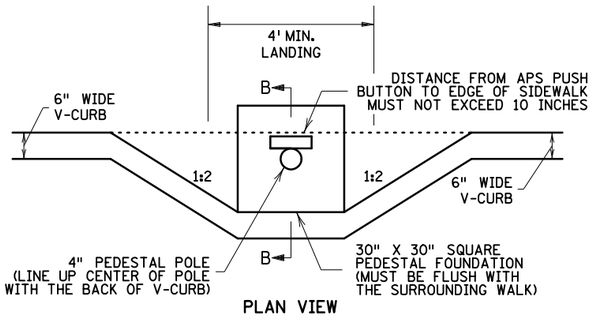
V CURB ADJACENT TO BUILDING OR BARRIER



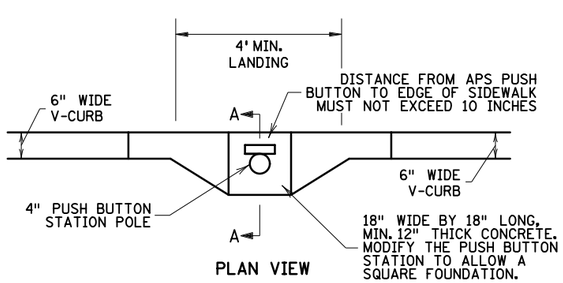
TRANSITION PANEL ④⑤



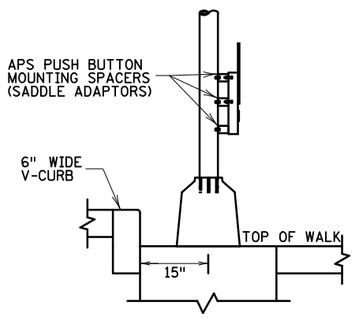
INSET A



PLAN VIEW

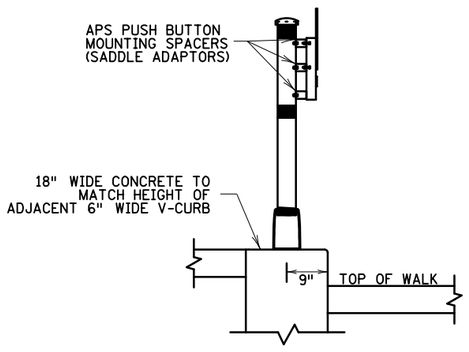


PLAN VIEW



SECTION B-B

SIGNAL PEDESTAL & PUSH BUTTON (V-CURB)



SECTION A-A

PUSH BUTTON STATION (V-CURB)

NOTES:

A WALKABLE FLARE IS AN 8-10% CONCRETE FLARE THAT IS REQUIRED WHEN THE FLARE IS ADJACENT TO A WALKABLE SURFACE, OR WHEN THE PEDESTRIAN PATH OF TRAVEL OF A PUSH BUTTON TRAVERSES THE FLARE.

ALL V CURB CONTRACTION JOINTS SHALL MATCH CONCRETE WALK JOINTS.

WHERE RIGHT-OF-WAY ALLOWS, USE OF V CURB SHOULD BE MINIMIZED. GRADING ADJACENT TURF OR SLOPING ADJACENT PAVEMENT IS PREFERRED.

V CURB SHALL BE PLACED OUTSIDE THE SIDEWALK LIMITS WHEN RIGHT OF WAY ALLOWS.

V CURB NEXT TO BUILDING SHALL BE A 4" WIDTH AND SHALL MATCH PREVIOUS TOP OF SIDEWALK ELEVATIONS.

① END TAPERS AT TRANSITION SECTION SHALL MATCH INPLACE SIDEWALK GRADES.

② ALL V CURB SHALL MATCH BOTTOM OF ADJACENT WALK.

③ CONSTRUCT USING APPROVED EXPANSION MATERIAL PER MNDOT TYPE A-E EXPANSION. LEAVE A MINIMUM ½" TOP GAP AND SEAL WITH MNDOT APPROVED SILICONE PER MNDOT SPEC 3722.

④ THE MAX. RATE OF CROSS SLOPE TRANSITIONING IS 1' LINEAR FOOT OF SIDEWALK PER HALF PERCENT CROSS SLOPE. WHEN PAR WIDTH IS GREATER THAN 6' OR THE RUNNING SLOPE IS GREATER THAN 5%, DOUBLE THE CALCULATED TRANSITION LENGTH.

⑤ TRANSITION PANELS ARE TO ONLY BE USED AFTER THE RAMP, OR IF NEEDED, LANDING ARE AT THE FULL CURB HEIGHT (TYPICAL SECTION).

⑥ EXISTING CROSS SLOPE GREATER THAN 2.0%.

LEGEND

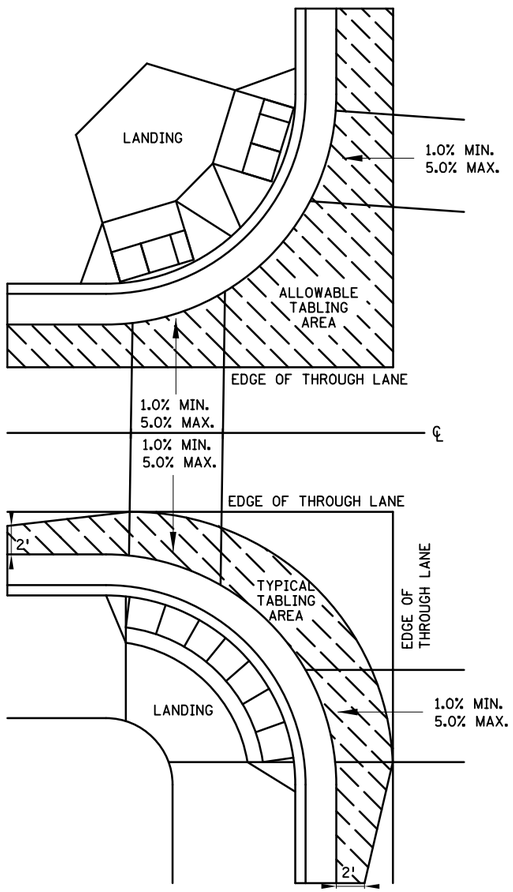
THESE LONGITUDINAL SLOPE RANGES SHALL BE THE STARTING POINT. IF SITE CONDITIONS WARRANT, LONGITUDINAL SLOPES UP TO 8.3% OR FLATTER ARE ALLOWED.

Ⓢ INDICATES PEDESTRIAN RAMP - SLOPE SHALL BE BETWEEN 5.0% MINIMUM AND 8.3% MAXIMUM IN THE DIRECTION SHOWN AND THE CROSS SLOPE SHALL NOT EXCEED 2.0%.

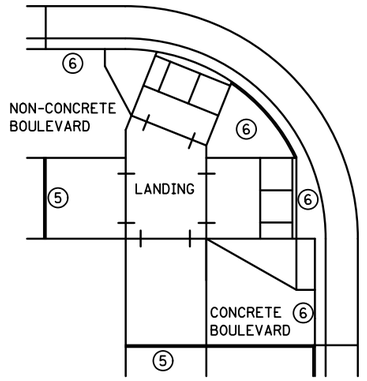
LANDING AREA - 4' X 4' MIN. (5' X 5' MIN. PREFERRED) DIMENSIONS AND MAX 2.0% SLOPE IN ALL DIRECTIONS. LANDING SHALL BE FULL WIDTH OF INCOMING PARS.

Ⓣ TRANSITION PANEL(S) - TO BE USED FOR TRANSITIONING THE CROSS-SLOPE OF A RAMP TO THE EXISTING WALK CROSS-SLOPE. RATE OF TRANSITION SHOULD BE 0.5% PER 1 LINEAR FOOT OF WALK. SEE THIS SHEET FOR ADDITIONAL INFORMATION.

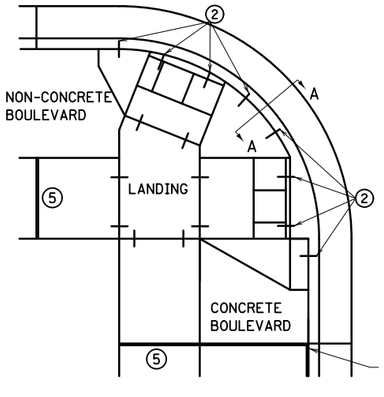
LEAD EXPERT OFFICE: JEFFREY PERKINS, OPERATIONS DIVISION		PEDESTRIAN CURB RAMP DETAILS	APPROVED: 11-04-2021 REVISED:	THOMAS STYRBICKI, STATE DESIGN ENGINEER	STANDARD PLAN 5-297.250	5 OF 6
DEPARTMENT OF TRANSPORTATION		STANDARD PLAN	STATE PROJ. NO.		SHEET NO.	
			TRUNK HWY.		TOTAL SHEETS	



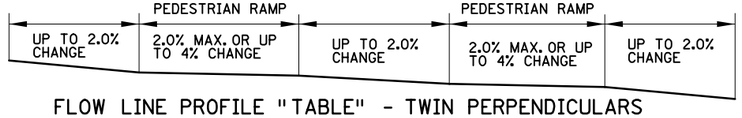
CURB LINE AND ROAD CROSSING ADJUSTMENTS



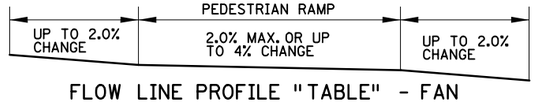
EXPANSION MATERIAL PLACEMENT
FOR CONCRETE ROADWAYS



CURB LINE REINFORCEMENT ④
PLACEMENT ON BITUMINOUS ROADWAYS



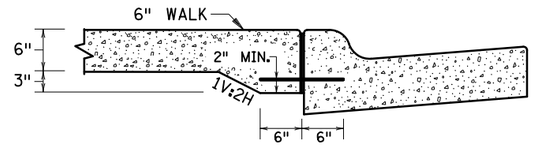
FLOW LINE PROFILE "TABLE" - TWIN PERPENDICULARS



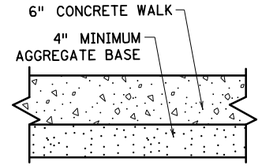
FLOW LINE PROFILE "TABLE" - FAN

FLOW LINE PROFILE RAISE - TWIN PERPENDICULARS

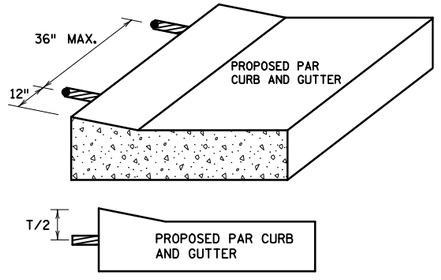
FLOW LINE PROFILE RAISE - FAN

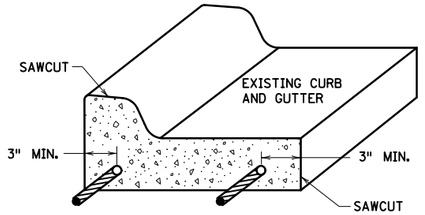


SECTION VIEW A-A
THICKENED SECTION
THROUGH CURB RAMP FLARES



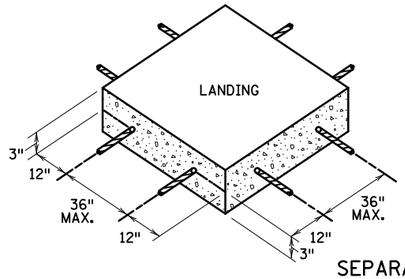
TYPICAL SIDEWALK SECTION
WITHIN INTERSECTION CORNER

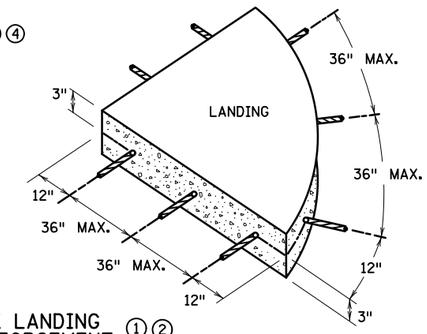




CURB AND GUTTER
REINFORCEMENT ③

CURB RAMP REINFORCEMENT DETAILS ②④





SEPARATE LANDING
POUR REINFORCEMENT ①②

GENERAL NOTES:

"TABLING" OF CROSSWALKS MEANS MAINTAINING LESS THAN 2% CROSS SLOPE WITHIN A CROSSWALK, IS REQUIRED WHEN A ROADWAY IS IN A STOP OR YIELD CONDITION AND THE PROJECT SCOPE ALLOWS.

RECONSTRUCTION PROJECTS: ON FULL PAVEMENT REPLACEMENT PROJECTS "TABLING" OF ENTIRE CROSSWALK SHALL OCCUR WHEN FEASIBLE.

MILL & OVERLAY PROJECTS: "TABLING" OF FLOW LINES, IN FRONT OF THE PEDESTRIAN RAMP, IS REQUIRED WHEN THE EXISTING FLOW LINE IS GREATER THAN 2%. WARPING OF THE BITUMINOUS PAVEMENT CAN NOT EXTEND INTO THE THROUGH LANE. TABLE THE FLOW LINE TO 2% OR AS MUCH AS POSSIBLE WHILE ADHERING TO THE FOLLOWING CRITERIA:

1) 1.0% MIN. CROSS-SLOPE OF THE ROAD
2) 5.0% MAX. CROSS-SLOPE OF THE ROAD
3) "TABLE" FLOW LINE UP TO 4% CHANGE FROM EXISTING SLOPE IN FRONT OF PEDESTRIAN RAMP
4) UP TO 2% CHANGE IN FLOW LINE FROM EXISTING SLOPE BEYOND THE PEDESTRIAN CURB RAMP

STAND-ALONE ADA RETROFITS: FOLLOW MILL & OVERLAY CRITERIA ABOVE HOWEVER ALL PAVEMENT WARPING IS DONE WITH BITUMINOUS PATCHING ON BITUMINOUS ROADWAYS AND FULL-DEPTH APRON REPLACEMENT ON CONCRETE ROADWAYS.

RAISING OF CURB LINES SHOULD OCCUR IN VERTICALLY CONSTRAINED AREAS. RAISE THE CURB LINES ENOUGH TO ALLOW COMPLIANT RAMPS OR AS MUCH AS POSSIBLE WHILE ADHERING TO THE FOLLOWING CRITERIA:

1) 1.0% MIN. AND 5.0% MAXIMUM CROSS-SLOPE OF THE ROAD
2) 1.0% MIN. FLOW LINE (ON EITHER SIDE OF PEDESTRIAN RAMP) TO MAINTAIN POSITIVE DRAINAGE
3) 5.0% RECOMMENDED MAX. FLOW LINE
4) LONGITUDINAL THROUGH LANE ROADWAY TAPERS SHOULD BE 1" VERTICAL PER 15' HORIZONTAL

NOTES:

① TO ENSURE RAMPS AND LANDINGS ARE PROPERLY CONSTRUCTED, ALL INITIAL LANDINGS AT A TOP OF A RAMPED SURFACE (RUNNING SLOPE GREATER THAN 2%) SHALL BE FORMED AND PLACED SEPARATELY IN AN INDEPENDENT CONCRETE POUR. FOLLOW SIDEWALK REINFORCEMENT DETAILS ON THIS SHEET FOR ALL SEPARATELY POURED INITIAL LANDINGS.

② DRILL AND GROUT NO. 4 12" LONG REINFORCEMENT BARS (EPOXY COATED) AT 36" MAXIMUM CENTER TO CENTER MINIMUM 12" SPACING FROM CONSTRUCTION JOINTS. BARS TO BE ADJUSTED TO MATCH RAMP GRADE. BARS TO BE PAID BY EACH.

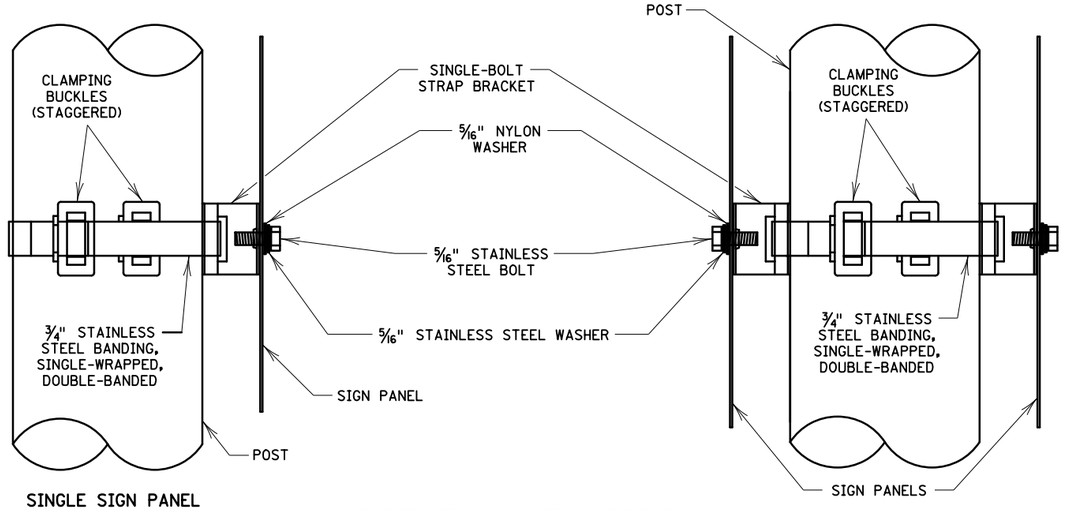
③ DRILL AND GROUT 2 - NO. 4 X 12" LONG (6" EMBEDDED) REINFORCEMENT BARS (EPOXY COATED). REINFORCEMENT REQUIRED FOR ALL CONSTRUCTION JOINTS. BARS TO BE PAID BY EACH.

④ THIS CURB LINE REINFORCEMENT DETAIL SHALL BE USED ON BITUMINOUS ROADWAYS. FOR CONCRETE ROADWAYS, SEE NOTE 6.

⑤ CONSTRUCT WITH EXPANSION MATERIAL PER MNDOT SPECIFICATION 3702 TYPES A-E. EXPANSION MATERIAL SHALL MATCH FULL HEIGHT OF ADJACENT CONCRETE.

⑥ USE AN APPROVED TYPE F (1/4 INCH THICK) SEPARATION MATERIAL. SEPARATION MATERIAL SHALL MATCH FULL HEIGHT DIMENSION OF ADJACENT CONCRETE.

LEAD EXPERT OFFICE: JEFFREY PERKINS, OPERATIONS DIVISION		PEDESTRIAN CURB RAMP DETAILS	APPROVED: 11-04-2021 REVISED:	THOMAS STYRBICKI STATE DESIGN ENGINEER	STANDARD PLAN 5-297.250	6 OF 6
DEPARTMENT OF TRANSPORTATION		STANDARD PLAN	STATE PROJ. NO.		SHEET NO.	
			TRUNK HWY.		TOTAL SHEETS	

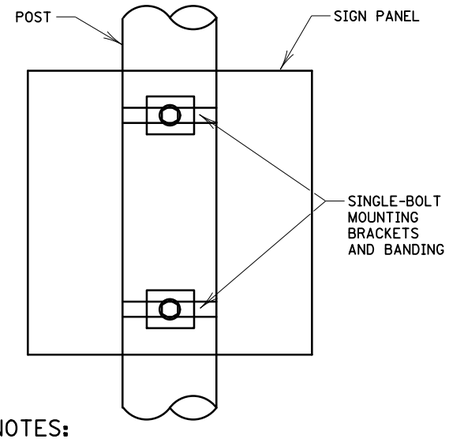


SINGLE SIGN PANEL

BACK TO BACK SIGN PANELS

NON-STIFFENER MOUNTING DETAILS

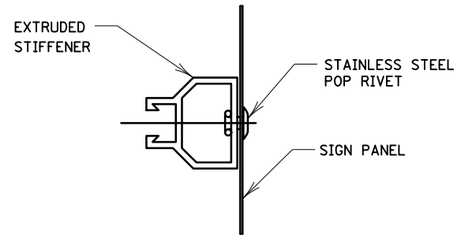
FOR SIGN PANELS UP TO 24" WIDE AND OVERHEAD SIGN IDENTIFICATION PLATES



NOTES:

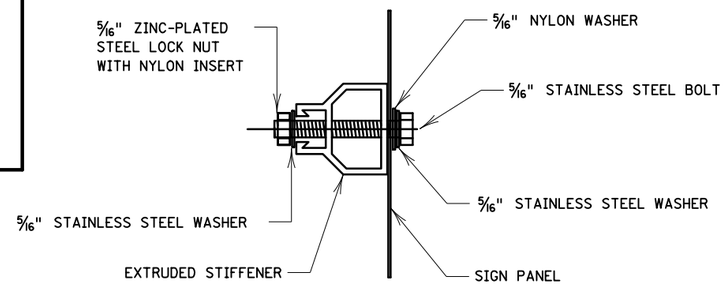
TENSION THE BANDING IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION REQUIREMENTS.

DO NOT MOUNT SIGNS ON BREAKAWAY TRAFFIC SIGNALS AND LUMINAIRE SUPPORTS.



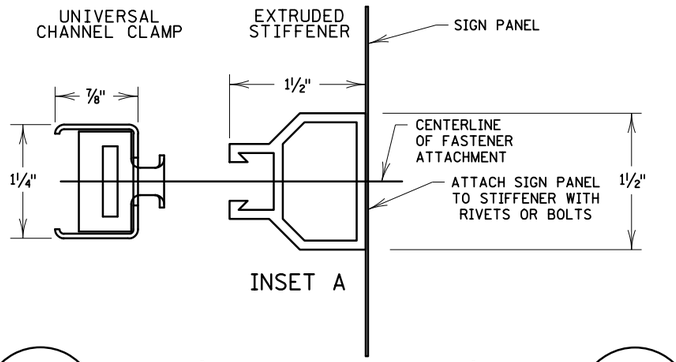
ATTACH 3/16" RIVETS AT 6" INTERVALS.
ATTACH END RIVETS 3" FROM SIGN EDGE.
USE 1/4" RIVETS FOR THE END RIVETS.

RIVET ATTACHMENT

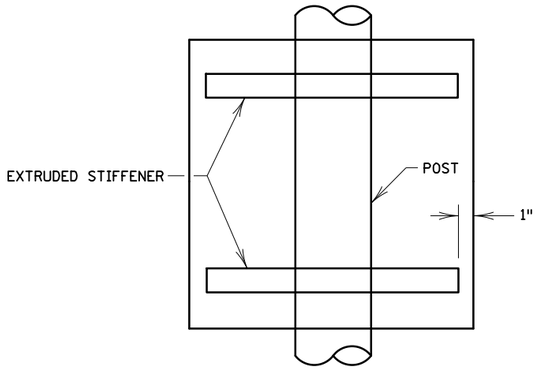


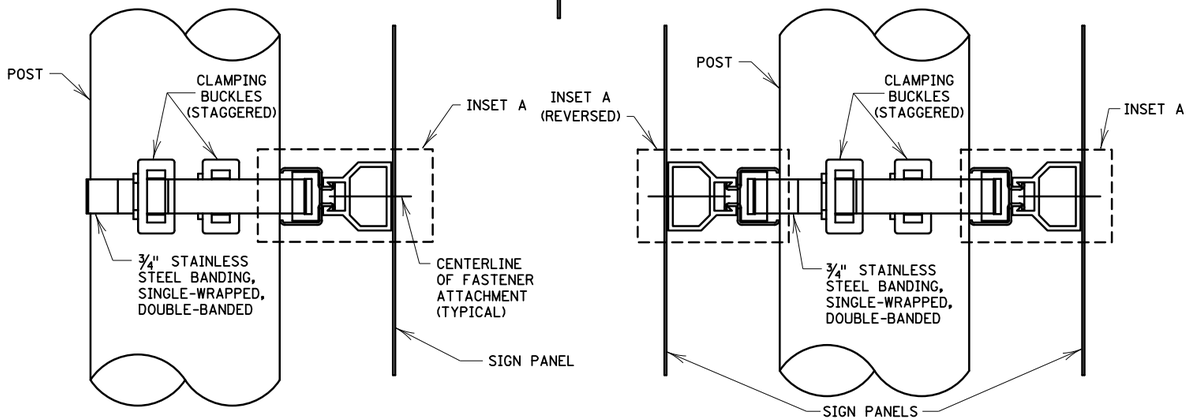
ATTACH AT STANDARD PUNCH CODE LOCATIONS

BOLT ATTACHMENT



INSET A





SINGLE SIGN PANEL

BACK-TO-BACK SIGN PANELS

STIFFENER MOUNTING DETAILS

FOR SIGN PANELS 30" WIDE AND LARGER

NUMBER OF EXTRUDED STIFFENERS REQUIRED

		PANEL WIDTH				
		2'	3'	4'	5'	6'
PANEL HEIGHT	2'	2	2	2	2	3
	3'	2	2	2	2	3
	4'	2	2	2	2	3
	5'	3	3	3	3	3
	6'	3	3	3	4	4
	7'	3	3	3	4	4

PROVIDE VERTICAL SPACING OF NO MORE THAN 36" BETWEEN STIFFENERS.

PROVIDE A VERTICAL DISTANCE OF NO MORE THAN 12" FROM PANEL EDGE TO STIFFENER.

NOTES:

SPACE STIFFENERS IN ACCORDANCE WITH THE PUNCH CODES SHOWN IN THE MnDOT STANDARD SIGNS AND MARKINGS MANUAL.

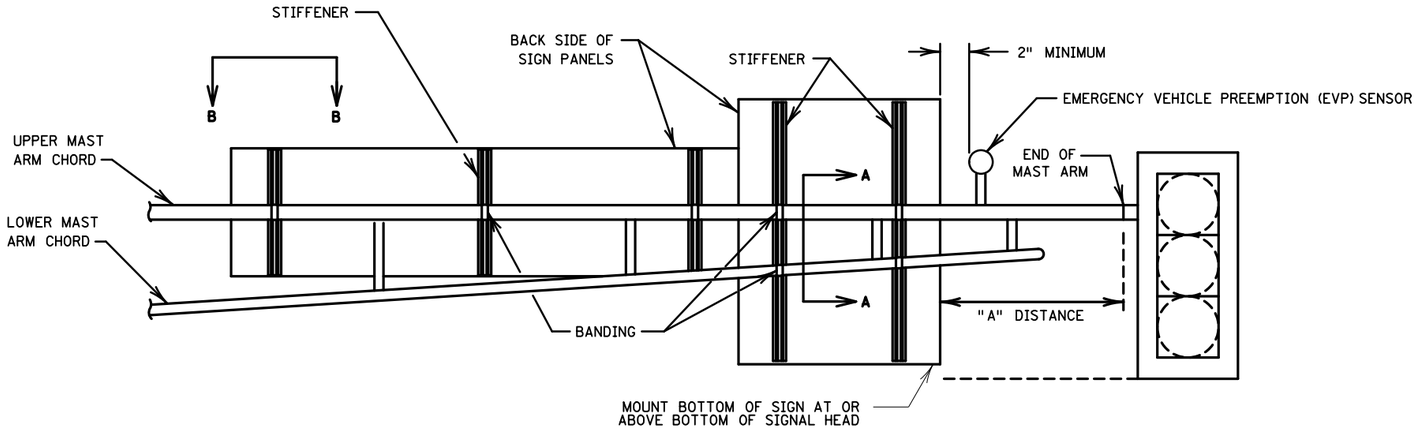
ATTACH STIFFENERS TO SIGN PANELS USING FASTENERS. PLACE STIFFENERS AT THE VERTICAL LOCATIONS OF THE MOUNTING HOLES FOR EACH SIGN.

FURNISH AND INSTALL HARDWARE COMPATIBLE WITH STIFFENER MOUNTING SYSTEMS.

FURNISH TWO TYPE 201 STAINLESS STEEL 3/4" WIDE BY 1/32" THICK STRAPS, EACH WITH CLAMPING BUCKLES AND INSTALL SEPARATELY WITH A SINGLE WRAP AROUND THE MAST ARM CHORD. PLACE THE SECOND BANDING STRAP OVER THE FIRST STRAP AND STAGGER THE CLAMPING BUCKLES SO THE BUCKLES ARE NOT DIRECTLY OVER ONE ANOTHER.

LEAD EXPERT OFFICE	BRIAN SORENSON STATE TRAFFIC ENGINEER OFFICE OF TRAFFIC ENGINEERING	SIGN MOUNTING SYSTEMS FOR ROUND SUPPORTS	APPROVED: 10-16-2019 REVISED:	Peter A Harff PETER A. HARFF STATE DESIGN ENGINEER	STANDARD PLAN 5-297.730	1 OF 1

DEPARTMENT OF TRANSPORTATION		STANDARD PLAN	STATE PROJ. NO.	SHEET NO.
			TRUNK HWY.	TOTAL SHEETS



MAST ARM SIGN MOUNTING

NUMBER OF EXTRUDED STIFFENERS REQUIRED*														
		PANEL WIDTH												
		2'	3'	4'	5'	6'	7'	8'	9'	10'	11'	12'	13'	14'
PANEL HEIGHT	2'	2	2	2	3	3	3	4	4	4	5	5	5	5
	3'	2	2	2	3	3	3	4	4	5	5	5	5	5
	4'	2	2	2	3	3	3	4	4	5	5	5	5	6
	5'	2	2	2	3	4	4	5	5	5	5	5	5	6
	6'			2	3	4	4	5	5	5	5	5	5	6
	7'				4	4	5	5	5	5	5	5	5	6

* WHERE SIGN PANEL DIMENSIONS FALL BETWEEN 1' INCREMENTS, USE NEXT HIGHER WIDTH AND/OR HEIGHT DIMENSION.

NOTES:

FURNISH AND INSTALL AT LEAST ONE SPACER FOR EACH SIGN PANEL WHEN PANELS ARE ATTACHED TO THE LOWER MAST ARM CHORD.

AFFIX SIGNS TO UPPER AND LOWER MAST ARM CHORDS WHEN POSSIBLE.

POSITION BOTTOM OF SIGN PANEL AT LEAST 17' ABOVE ROADWAY.

MOUNT SIGN PANELS PLUMB AND SHIM WITH REQUIRED SPACERS AS SHOWN.

PROVIDE SPACING BETWEEN STIFFENERS OF NO MORE THAN 36".

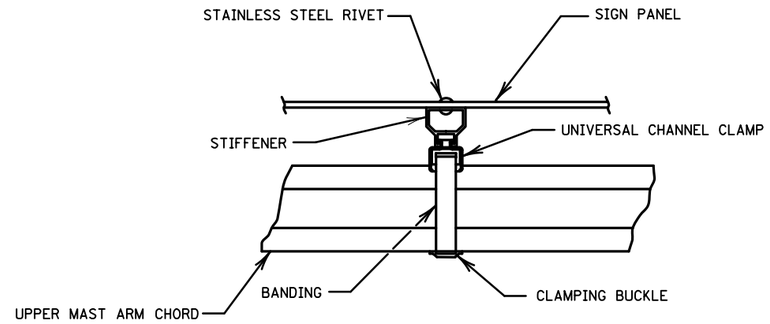
PROVIDE A HORIZONTAL DISTANCE OF NO MORE THAN 12" FROM PANEL EDGE TO STIFFENER.

PROVIDE A VERTICAL DISTANCE OF NO MORE THAN 1" FROM PANEL EDGE TO STIFFENER.

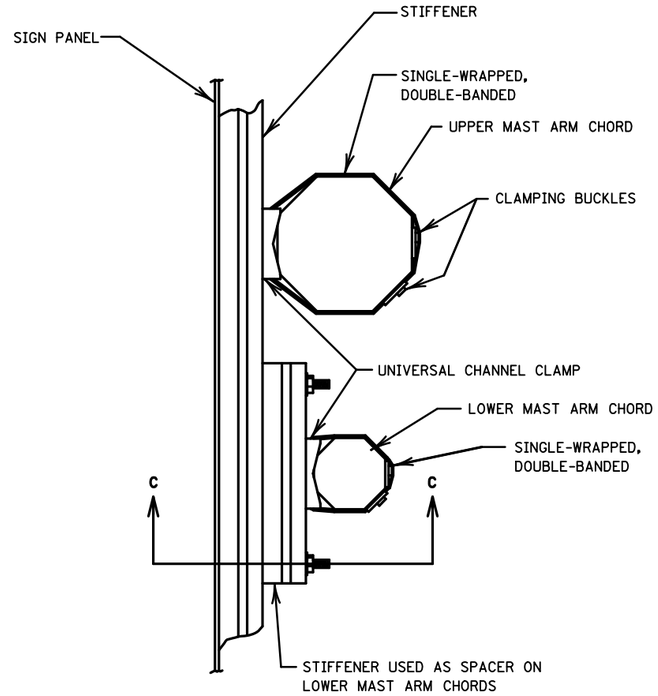
FURNISH AND INSTALL 1/4" STAINLESS STEEL RIVETS 3" FROM THE PANEL EDGE TO ATTACH THE STIFFENERS TO THE SIGN PANELS. FURNISH AND INSTALL 3/16" STAINLESS STEEL RIVETS AT 6" ON CENTER TO ATTACH THE REMAINDER OF THE STIFFENER TO THE SIGN PANEL.

FURNISH TWO TYPE 201 STAINLESS STEEL 3/4" WIDE BY 1/32" THICK STRAPS, EACH WITH CLAMPING BUCKLES AND INSTALL SEPARATELY WITH A SINGLE WRAP AROUND THE MAST ARM CHORD. PLACE THE SECOND BANDING STRAP OVER THE FIRST STRAP AND STAGGER THE CLAMPING BUCKLES SO THE BUCKLES ARE NOT DIRECTLY OVER ONE ANOTHER.

THE "A" DISTANCE IS SHOWN ON THE PLANS. IT IS THE DISTANCE FROM THE END OF THE MAST ARM TO THE EDGE OF EACH SIGN.

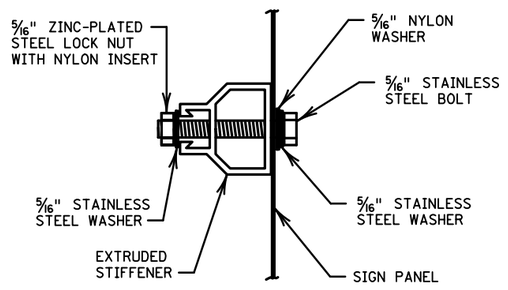


VIEW B-B



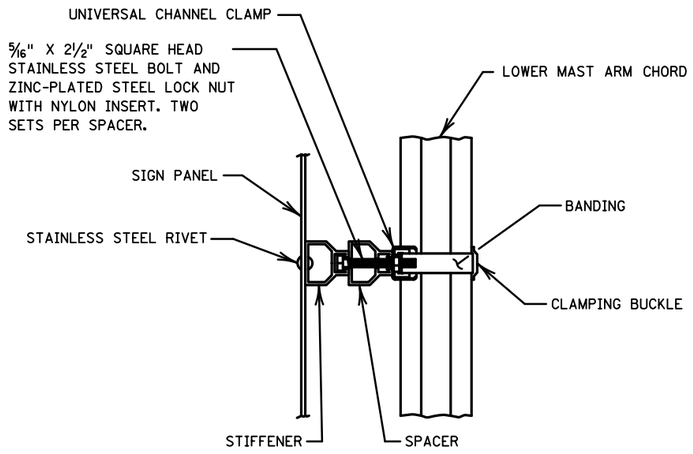
VIEW A-A ①

① SIGN PANELS TALLER THAN 36" MUST BE BANDED TO THE LOWER MAST ARM CHORD AT A MINIMUM OF ONE LOCATION. SIGN PANEL SHALL BE BANDED TO THE LOWER MAST ARM AT A LOCATION THAT WILL PROVIDE THE CLOSEST TO PLUMB ALIGNMENT FOR THE SIGN PANEL.



BOLT ATTACHMENT

ATTACH AT STANDARD PUNCH CODE LOCATIONS



VIEW C-C

LEAD EXPERT OFFICE	BRIAN SORENSON STATE TRAFFIC ENGINEER OFFICE OF TRAFFIC ENGINEERING		SIGN MOUNTING DETAILS FOR SIGNAL MAST ARMS	APPROVED: 10-16-2019 REVISED: 04-17-2020	Peter A Harff PETER A. HARFF STATE DESIGN ENGINEER	STANDARD PLAN 5-297.731	1 OF 1

	DEPARTMENT OF TRANSPORTATION		STANDARD PLAN	STATE PROJ. NO.	SHEET NO.
				TRUNK HWY.	TOTAL SHEETS

T-100 PILE TABLE

TOWER NO.	TYPE OF PILE ②	BOTTOM OF FOOTING ELEVATION	ESTIMATED LENGTH ①	REQUIRED MINIMUM PILE LENGTH	ACTUAL DRIVEN LENGTH OF EACH PILE ③
			FEET	FEET	FEET
					, ,
					, ,
					, ,
					, ,
					, ,
					, ,
					, ,
					, ,
					, ,
					, ,
					, ,
					, ,

T-120 PILE TABLE

TOWER NO.	TYPE OF PILE ②	BOTTOM OF FOOTING ELEVATION	ESTIMATED LENGTH ①	REQUIRED MINIMUM PILE LENGTH	ACTUAL DRIVEN LENGTH OF EACH PILE ③
			FEET	FEET	FEET
					, ,
					, ,
					, ,
					, ,
					, ,
					, ,
					, ,
					, ,
					, ,
					, ,
					, ,
					, ,

T-140 PILE TABLE

TOWER NO.	TYPE OF PILE ②	BOTTOM OF FOOTING ELEVATION	ESTIMATED LENGTH ①	REQUIRED MINIMUM PILE LENGTH	ACTUAL DRIVEN LENGTH OF EACH PILE ③
			FEET	FEET	FEET
					, ,
					, ,
					, ,
					, ,
					, ,
					, ,
					, ,
					, ,
					, ,
					, ,
					, ,
					, ,

PILE BEARING RESISTANCE TABLE

REQUIRED NOMINAL PILE BEARING RESISTANCE R_n - TONS/PILE ①

	CIP PILES ②		HP PILES ②	
FIELD CONTROL METHOD	Φ_{dyn}	$*R_n$	Φ_{dyn}	$*R_n$
MnDOT PILE FORMULA 2012 (MPF12) $R_n=20\sqrt{\frac{WxH}{1000}}\ x\log\left(\frac{10}{S}\right)$	0.50	200	0.60	167
PDA	0.65	155	0.65	155

∗ FACTORED DESIGN LOAD = 100 TONS
R_n = (FACTORED DESIGN LOAD) / Φ_{dyn}

NOTES:

PILE SPACING IS AT BOTTOM OF FOOTING. BATTERED PILES MARKED THUS ⊖►

FOR PILE SPLICE DETAILS, SEE DETAIL B201 FOR 12" DIA. C.I.P. OR DETAIL B202 FOR HP10X42. USE OF COMMERCIAL DRIVE-FIT PILE SPLICES IS PROHIBITED.

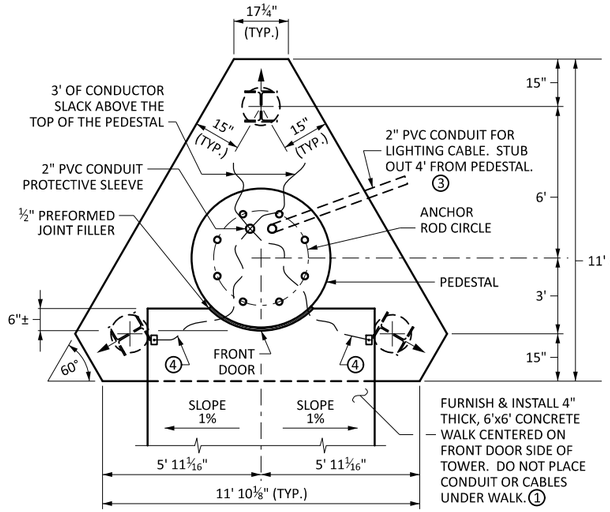
SEE NOTE ① BELOW FOR MINIMUM PILE LENGTH REQUIREMENTS.

① DRIVE EACH PILE IN ACCORDANCE WITH SPEC. 2452. DETERMINE PILE RESISTANCE IN ACCORDANCE WITH SPEC. 2452.3.E SUCH THAT THE REQUIRED NOMINAL PILE BEARING RESISTANCE SPECIFIED IN THE "PILE BEARING RESISTANCE TABLE" IS MET. DRIVE PILE AT LEAST THE MINIMUM LENGTH SHOWN IN THE PILE TABLES ON THIS SHEET TO MEET UPLIFT REQUIREMENTS. CONTACT THE BRIDGE STANDARDS ENGINEER IF SUBSTANTIAL REFUSAL IS OBTAINED PRIOR TO DRIVING TO THE REQUIRED MINIMUM LENGTH.

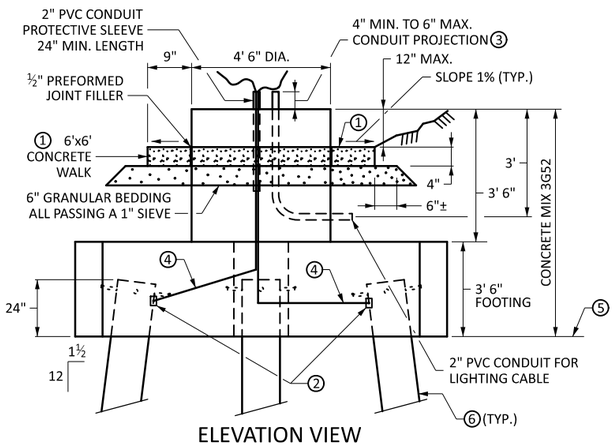
② USE THE PILE TYPE SPECIFIED IN THE PILE TABLES ON THIS SHEET. FOR H PILES USE HP 10X42. FOR CAST-IN-PLACE (C.I.P.) PILE USE 12" NOMINAL DIAMETER WITH ¼" MINIMUM WALL THICKNESS.

③ THE CONTRACTOR IS REQUIRED TO COMPLETE THE APPLICABLE PILE TABLES ON THIS SHEET AND, ON COMPLETION OF PILE DRIVING, PROVIDE TO THE PROJECT ENGINEER FOR SUBMITTAL TO BRIDGE OFFICE FOR INCLUSION IN ASSET MANAGEMENT DATABASE.

LEAD EXPERT OFFICE	EDWARD LUTGEN OFFICE DIRECTOR BRIDGE OFFICE	I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA. CERTIFIED BY: _____ (LICENSED PROFESSIONAL ENGINEER) _____ (DATE) PRINTED NAME: LIC. NO.	LIGHT TOWER PILE FOUNDATION DESIGN	APPROVED: 11-15-2024	THOMAS STYRBICKI STATE DESIGN ENGINEER	STANDARD PLAN 5-297.840	1 OF 4
DEPARTMENT OF TRANSPORTATION			STANDARD PLAN	STATE PROJ. NO.		SHEET NO.
				TRUNK HWY.		TOTAL SHEETS

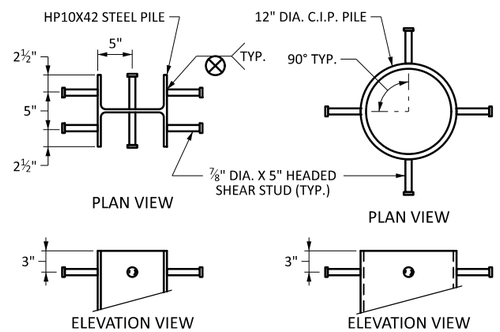


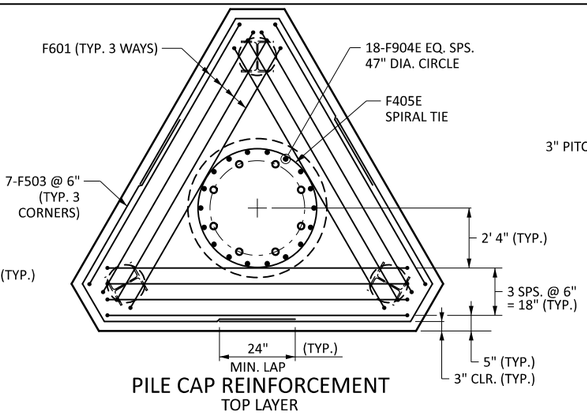
PLAN VIEW



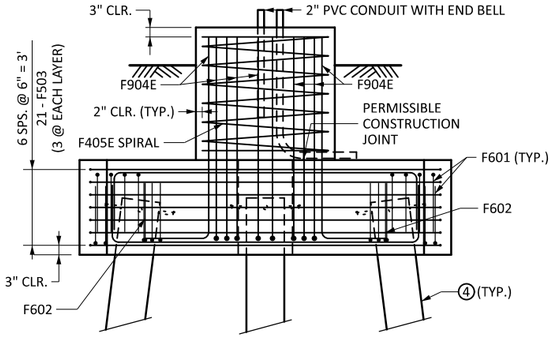
ELEVATION VIEW

PEDESTAL REINFORCEMENT NOT SHOWN. SEE REINFORCEMENT DETAILS.

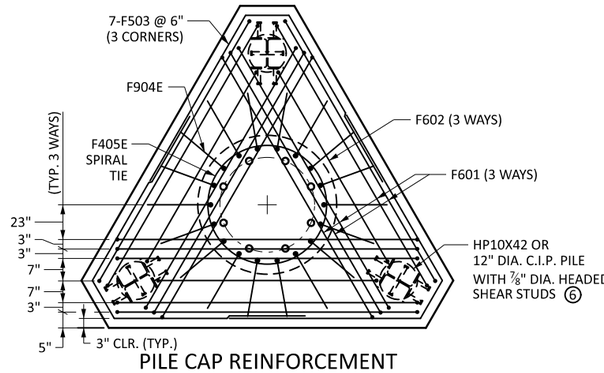




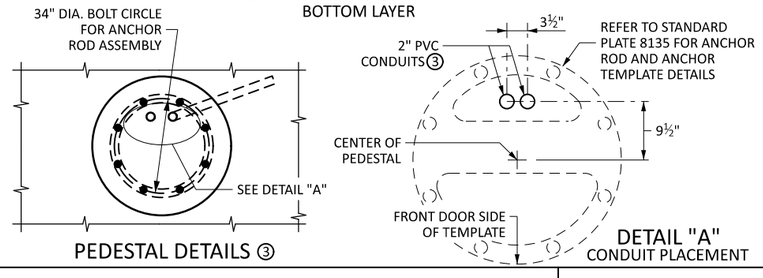
PILE CAP REINFORCEMENT
TOP LAYER

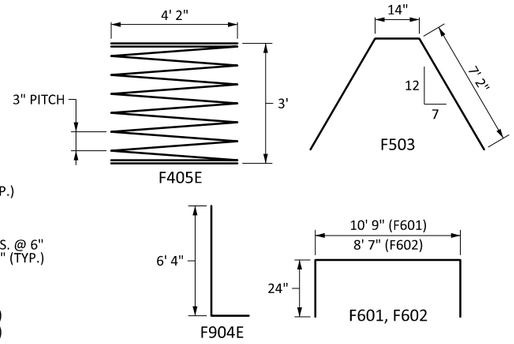


REINFORCEMENT DETAILS



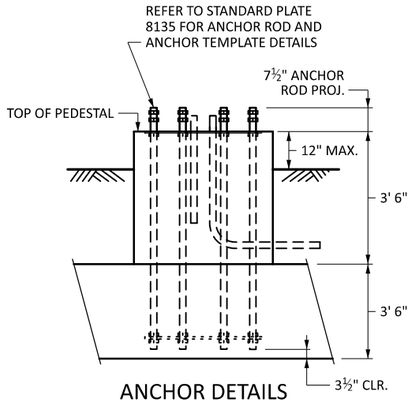
PILE CAP REINFORCEMENT
BOTTOM LAYER





BAR DETAILS

BILL OF REINFORCEMENT				
BAR	NO.	LENGTH	SHAPE	LOCATION
F601	27	14' 9"		FOOTING LONGITUDINAL
F602	3	12' 7"		FOOTING LONGITUDINAL
F503	21	14' 8"		FOOTING TIE
F904E	18	8' 0"		PEDESTAL DOWELS
F405E	1	SEE DETAIL		PEDESTAL SPIRAL



ANCHOR DETAILS

GEOTECHNICAL REQUIREMENTS:

REQUIRED SUBSURFACE INVESTIGATION: TAKE A MINIMUM OF ONE STANDARD PENETRATION TEST (SPT) FOUNDATION BORING OR ONE CONE PENETRATION TEST (CPT) SOUNDING AT EACH LIGHT TOWER LOCATION. ADVANCE THE BORING/SOUNDING WITHIN 30' OF THE PLANNED TOWER LOCATION AND FOLLOW THE REQUIREMENTS OF MnDOT'S GEOTECHNICAL INVESTIGATION SPECIFICATIONS. INVESTIGATE TO A MINIMUM DEPTH OF 45', OR TO TOP OF ROCK, BELOW THE PROPOSED FOOTING ELEVATION. WHERE ROCK IS ENCOUNTERED WITHIN 30' BELOW THE PROPOSED FOOTING, 10' OF ROCK CORING IS REQUIRED.

BASIS OF DESIGN:

THE DETAILS SHOWN ON THESE STANDARD PLANS ARE BASED ON THE AASHTO LRFD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS, FIRST EDITION, 2015, AND THE 2017 AND 2018 INTERIM REVISIONS.

STRENGTH LIMIT WIND LOADING OF 120 MPH, SERVICE LIMIT WIND LOADING OF 76 MPH.

THE MAXIMUM NUMBER OF LUMINAIRES ON THE TOP OF THE LIGHT TOWER IS SIX. THE MAXIMUM EFFECTIVE PROJECTED AREA (EPA) OF THE TOTAL LUMINAIRES AND RING ASSEMBLY AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 50 SQ. FT.

MATERIAL DESIGN PROPERTIES:

CONCRETE: f'c = 4.5 ksi ; MnDOT MIX 3G52
REINFORCEMENT Fy = 60 ksi

WELDED WIRE REINFORCEMENT IN ACCORDANCE WITH SPEC. 3303.

SPIRAL REINFORCEMENT IN ACCORDANCE WITH SPEC. 3305, OR DEFORMED GRADE 60 BILLET STEEL IN ACCORDANCE WITH SPEC. 3301.

FOR BARS OTHER THAN SPIRAL ROD STOCK, USE DEFORMED STEEL BARS IN ACCORDANCE WITH SPEC. 3301 GRADE 60 OR GREATER. EPOXY COAT BARS MARKED WITH THE SUFFIX "E" IN ACCORDANCE WITH SPEC. 3301.

CONSTRUCTION NOTES:

CONFIRM PEDESTAL AND FOOTING CONCRETE HAVE ATTAINED 4500 PSI COMPRESSIVE STRENGTH BEFORE PLACING TOWER.

PILE SPACING IS AT BOTTOM OF FOOTING. BATTERED PILES MARKED THUS ⊖►

FOR PILE SPLICE DETAILS, SEE DETAIL B201 FOR 12" DIA. C.I.P. OR DETAIL B202 FOR HP10X42. USE OF COMMERCIAL DRIVE-FIT PILE SPLICES IS PROHIBITED.

NOTES:

① USE WELDED WIRE REINFORCEMENT 6 X 6-W2.9 X W2.9 IN ACCORDANCE WITH SPEC. 3303. PLACE REINFORCEMENT AT SLAB MID-DEPTH. CONCRETE MIX NO. 3F52. FINISH GRADING THE SITE TO BLEND WITH EXISTING SLOPES AS APPROVED BY THE ENGINEER.

② OBTAIN THE ENGINEER'S APPROVAL OF THE EXOTHERMIC WELDED BONDING PILE CONNECTIONS BEFORE PLACEMENT OF PILE CAP REINFORCEMENT.

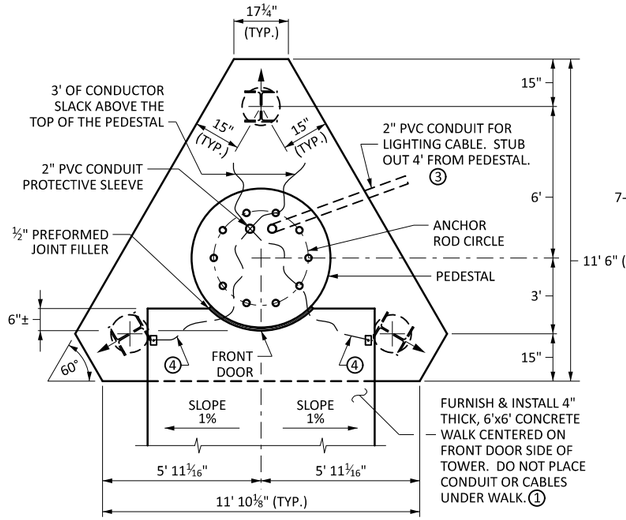
③ FURNISH AND INSTALL AN ADDITIONAL 2" PVC CONDUIT FOR FUTURE USE AT LOCATIONS SHOWN ON THE LIGHTING PLANS.

④ FURNISH AND INSTALL TWO UNSPLICED LENGTHS OF LIGHTNING PROTECTION CONDUCTORS MEETING THE FOLLOWING: BRAIDED BARE COPPER; AT LEAST 28 STRANDS OF 14 AWG WIRE; ½" DIA, ROPE LAY OF 115,000 CMIL; NET WEIGHT 375 LBS PER 1000'. BOND ONE END OF EACH CONDUCTOR TO THE PILING AS SHOWN USING EXOTHERMIC WELDED LIGHTING PROTECTION CONNECTIONS DESIGNED FOR PILING.

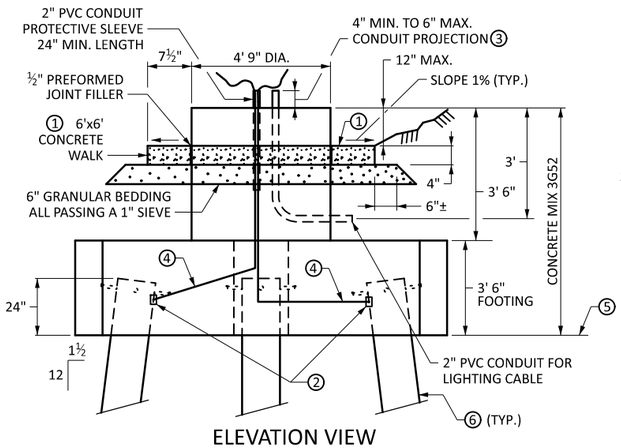
⑤ ENSURE BOTTOM OF PILE CAP IS AT LEAST 5' BELOW FINISHED GRADE. REFER TO "T-100 PILE TABLE" ON SHEET 1 OF 4 FOR FOOTING ELEVATION.

⑥ USE THE PILE TYPE SPECIFIED IN THE "T-100 PILE TABLE" ON SHEET 1 OF 4. FOR H PILES USE HP 10X42. FOR CAST-IN-PLACE (C.I.P.) PILE USE 12" NOMINAL DIAMETER WITH ¼" MINIMUM WALL THICKNESS.

LEAD EXPERT OFFICE	EDWARD LUTGEN OFFICE DIRECTOR BRIDGE OFFICE	T-100 LIGHT TOWER PILE FOUNDATION DESIGN	APPROVED: 11-15-2024	THOMAS STYRBICKI STATE DESIGN ENGINEER	STANDARD PLAN 5-297.840	2 OF 4
DEPARTMENT OF TRANSPORTATION		STANDARD PLAN	STATE PROJ. NO.		SHEET NO.	
			TRUNK HWY.		TOTAL SHEETS	

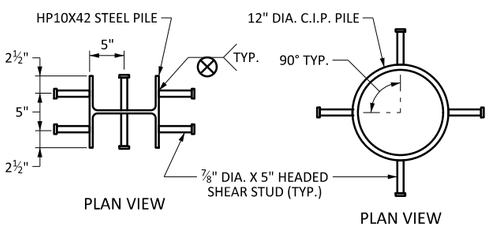


PLAN VIEW



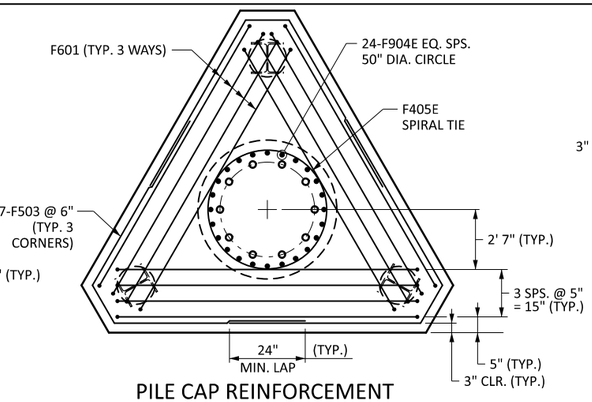
ELEVATION VIEW

PEDESTAL REINFORCEMENT NOT SHOWN. SEE REINFORCEMENT DETAILS.



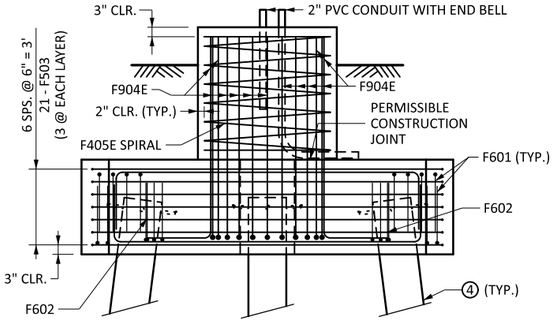
STEEL HP PILE DETAIL

STEEL 12" DIA. C.I.P. PILE

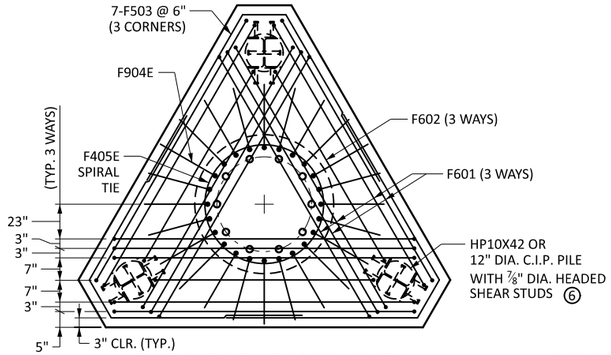


PILE CAP REINFORCEMENT

TOP LAYER

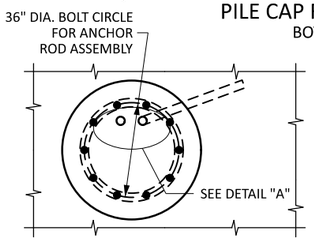


REINFORCEMENT DETAILS

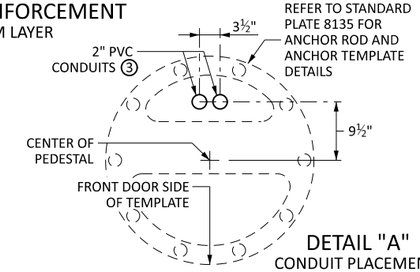


PILE CAP REINFORCEMENT

BOTTOM LAYER

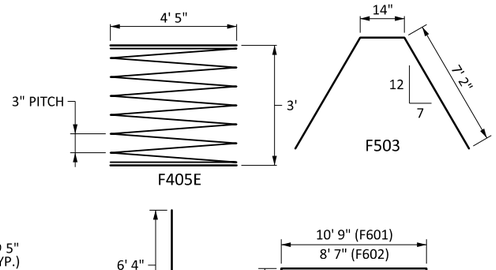


PEDESTAL DETAILS ③



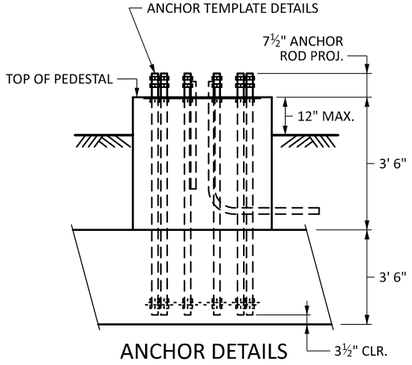
DETAIL "A"

CONDUIT PLACEMENT



BAR DETAILS

BILL OF REINFORCEMENT				
BAR	NO.	LENGTH	SHAPE	LOCATION
F601	27	14' 9"		FOOTING LONGITUDINAL
F602	3	12' 7"		FOOTING LONGITUDINAL
F503	21	14' 8"		FOOTING TIE
F904E	24	8' 0"		PEDESTAL DOWELS
F405E	1	SEE DETAIL		PEDESTAL SPIRAL



ANCHOR DETAILS

GEOTECHNICAL REQUIREMENTS:

REQUIRED SUBSURFACE INVESTIGATION: TAKE A MINIMUM OF ONE STANDARD PENETRATION TEST (SPT) FOUNDATION BORING OR ONE CONE PENETRATION TEST (CPT) SOUNDING AT EACH LIGHT TOWER LOCATION. ADVANCE THE BORING/SOUNDING WITHIN 30 FT. OF THE PLANNED TOWER LOCATION AND FOLLOW THE REQUIREMENTS OF MnDOT'S GEOTECHNICAL INVESTIGATION SPECIFICATIONS. INVESTIGATE TO A MINIMUM DEPTH OF 45 FEET, OR TO TOP OF ROCK, BELOW THE PROPOSED FOOTING ELEVATION. WHERE ROCK IS ENCOUNTERED WITHIN 30 FEET BELOW THE PROPOSED FOOTING, 10 FEET OF ROCK CORING IS REQUIRED.

BASIS OF DESIGN:

THE DETAILS SHOWN ON THESE STANDARD PLANS ARE BASED ON THE AASHTO LRFD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS, FIRST EDITION, 2015, AND THE 2017 AND 2018 INTERIM REVISIONS.

STRENGTH LIMIT WIND LOADING OF 120 MPH, SERVICE LIMIT WIND LOADING OF 76 MPH

THE MAXIMUM NUMBER OF LUMINAIRES ON THE TOP OF THE LIGHT TOWER IS 6. THE MAXIMUM EFFECTIVE PROJECTED AREA (EPA) OF THE TOTAL LUMINAIRES AND RING ASSEMBLY AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 50 SQ. FT.

MATERIAL DESIGN PROPERTIES:

CONCRETE: f'c = 4.5 ksi ; MnDOT MIX 3G52
REINFORCEMENT Fy = 60 ksi

WELDED WIRE REINFORCEMENT IN ACCORDANCE WITH SPEC. 3303.

SPIRAL REINFORCEMENT IN ACCORDANCE WITH SPEC. 3305, OR DEFORMED GRADE 60 BILLET STEEL IN ACCORDANCE WITH SPEC. 3301.

FOR BARS OTHER THAN SPIRAL ROD STOCK, USE DEFORMED STEEL BARS IN ACCORDANCE WITH SPEC. 3301 GRADE 60 OR GREATER. EPOXY COAT BARS MARKED WITH THE SUFFIX "E" IN ACCORDANCE WITH SPEC. 3301.

CONSTRUCTION NOTES:

CONFIRM PEDESTAL AND FOOTING CONCRETE HAVE ATTAINED 4500 PSI COMPRESSIVE STRENGTH BEFORE PLACING TOWER.

PILE SPACING IS AT BOTTOM OF FOOTING. BATTERED PILES MARKED THUS ⊖→

FOR PILE SPLICE DETAILS, SEE DETAIL B201 FOR 12" DIA. C.I.P. OR DETAIL B202 FOR HP10X42. USE OF COMMERCIAL DRIVE-FIT PILE SPLICES IS PROHIBITED.

NOTES:

① USE WELDED WIRE REINFORCEMENT 6 X 6-W2.9 X W2.9 IN ACCORDANCE WITH SPEC. 3303. PLACE REINFORCEMENT AT SLAB MID-DEPTH. CONCRETE MIX NO. 3F52. FINISH GRADING THE SITE TO BLEND WITH EXISTING SLOPES AS APPROVED BY THE ENGINEER.

② OBTAIN THE ENGINEER'S APPROVAL OF THE EXOTHERMIC WELDED BONDING PILE CONNECTIONS BEFORE PLACEMENT OF PILE CAP REINFORCEMENT.

③ FURNISH AND INSTALL AN ADDITIONAL 2" PVC CONDUIT FOR FUTURE USE AT LOCATIONS SHOWN ON THE LIGHTING PLANS.

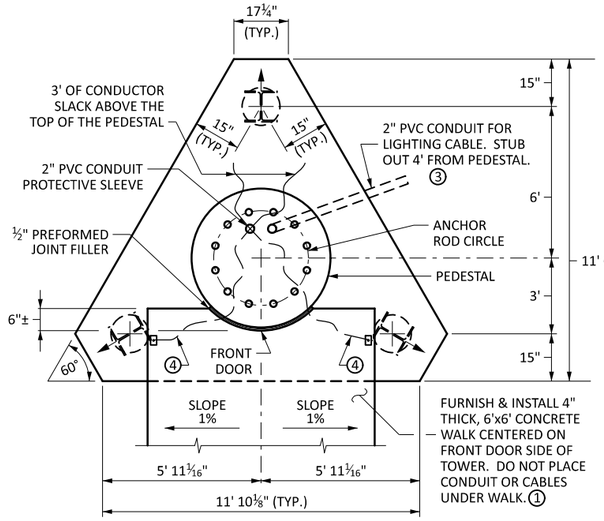
④ FURNISH AND INSTALL TWO UNSPLICED LENGTHS OF LIGHTNING PROTECTION CONDUCTORS MEETING THE FOLLOWING: BRAIDED BARE COPPER; AT LEAST 28 STRANDS OF 14 AWG WIRE; ½" DIA, ROPE LAY OF 115,000 CMIL; NET WEIGHT 375 LBS PER 1000'. BOND ONE END OF EACH CONDUCTOR TO THE PILING AS SHOWN USING EXOTHERMIC WELDED LIGHTING PROTECTION CONNECTIONS DESIGNED FOR PILING.

⑤ ENSURE BOTTOM OF PILE CAP IS AT LEAST 5' BELOW FINISHED GRADE. REFER TO "T-120 PILE TABLE" ON SHEET 1 OF 4 FOR FOOTING ELEVATION.

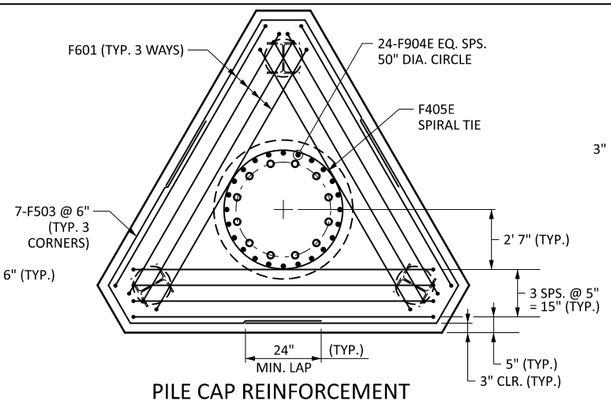
⑥ USE THE PILE TYPE SPECIFIED IN THE "T-120 PILE TABLE" ON SHEET 1 OF 4. FOR H PILES USE HP 10X42. FOR CAST-IN-PLACE (C.I.P.) PILE USE 12" NOMINAL DIAMETER WITH ¼" MINIMUM WALL THICKNESS.

LEAD EXPERT OFFICE	EDWARD LUTGEN OFFICE DIRECTOR BRIDGE OFFICE		T-120 LIGHT TOWER PILE FOUNDATION DESIGN	APPROVED: 11-15-2024	THOMAS STYRBICKI STATE DESIGN ENGINEER STANDARD PLAN 5-297.840	3 OF 4

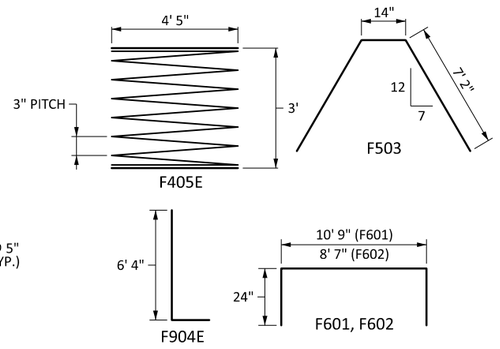
DEPARTMENT OF TRANSPORTATION			STANDARD PLAN	STATE PROJ. NO.	SHEET NO.
				TRUNK HWY.	TOTAL SHEETS



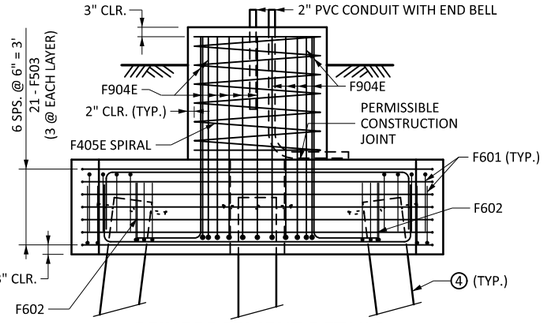
PLAN VIEW



PILE CAP REINFORCEMENT
TOP LAYER



BAR DETAILS



REINFORCEMENT DETAILS

BILL OF REINFORCEMENT				
BAR	NO.	LENGTH	SHAPE	LOCATION
F601	27	14' 9"		FOOTING LONGITUDINAL
F602	3	12' 7"		FOOTING LONGITUDINAL
F503	21	14' 8"		FOOTING TIE
F904E	24	8' 0"		PEDESTAL DOWELS
F405E	1	SEE DETAIL		PEDESTAL SPIRAL

GEOTECHNICAL REQUIREMENTS:

REQUIRED SUBSURFACE INVESTIGATION: TAKE A MINIMUM OF ONE STANDARD PENETRATION TEST (SPT) FOUNDATION BORING OR ONE CONE PENETRATION TEST (CPT) SOUNDING AT EACH LIGHT TOWER LOCATION. ADVANCE THE BORING/SOUNDING WITHIN 30 FT. OF THE PLANNED TOWER LOCATION AND FOLLOW THE REQUIREMENTS OF MnDOT'S GEOTECHNICAL INVESTIGATION SPECIFICATIONS. INVESTIGATE TO A MINIMUM DEPTH OF 45 FEET, OR TO TOP OF ROCK, BELOW THE PROPOSED FOOTING ELEVATION. WHERE ROCK IS ENCOUNTERED WITHIN 30 FEET BELOW THE PROPOSED FOOTING, 10 FEET OF ROCK CORING IS REQUIRED.

BASIS OF DESIGN:

THE DETAILS SHOWN ON THESE STANDARD PLANS ARE BASED ON THE AASHTO LRFD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS, FIRST EDITION, 2015, AND THE 2017 AND 2018 INTERIM REVISIONS.

STRENGTH LIMIT WIND LOADING OF 120 MPH, SERVICE LIMIT WIND LOADING OF 76 MPH

THE MAXIMUM NUMBER OF LUMINAIRES ON THE TOP OF THE LIGHT TOWER IS SIX. THE MAXIMUM EFFECTIVE PROJECTED AREA (EPA) OF THE TOTAL LUMINAIRES AND RING ASSEMBLY AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 50 SQ. FT.

MATERIAL DESIGN PROPERTIES:

CONCRETE: f'c = 4.5 ksi ; MnDOT MIX 3G52
REINFORCEMENT Fy = 60 ksi

WELDED WIRE REINFORCEMENT IN ACCORDANCE WITH SPEC. 3303.

SPIRAL REINFORCEMENT IN ACCORDANCE WITH SPEC. 3305, OR DEFORMED GRADE 60 BILLET STEEL IN ACCORDANCE WITH SPEC. 3301.

FOR BARS OTHER THAN SPIRAL ROD STOCK, USE DEFORMED STEEL BARS IN ACCORDANCE WITH SPEC. 3301 GRADE 60 OR GREATER. EPOXY COAT BARS MARKED WITH THE SUFFIX "E" IN ACCORDANCE WITH SPEC. 3301.

CONSTRUCTION NOTES:

CONFIRM PEDESTAL AND FOOTING CONCRETE HAVE ATTAINED 4500 PSI COMPRESSIVE STRENGTH BEFORE PLACING TOWER.

PILE SPACING IS AT BOTTOM OF FOOTING. BATTERED PILES MARKED THUS ⊖►

FOR PILE SPLICE DETAILS, SEE DETAIL B201 FOR 12" DIA. C.I.P. OR DETAIL B202 FOR HP10X42. USE OF COMMERCIAL DRIVE-FIT PILE SPLICES IS PROHIBITED.

NOTES:

① USE WELDED WIRE REINFORCEMENT 6 X 6-W2.9 X W2.9 IN ACCORDANCE WITH SPEC. 3303. PLACE REINFORCEMENT AT SLAB MID-DEPTH. CONCRETE MIX NO. 3F52. FINISH GRADING THE SITE TO BLEND WITH EXISTING SLOPES AS APPROVED BY THE ENGINEER.

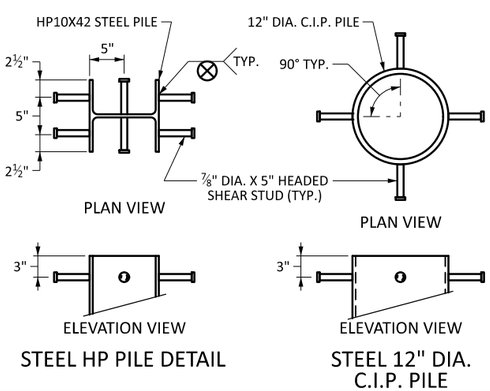
② OBTAIN THE ENGINEER'S APPROVAL OF THE EXOTHERMIC WELDED BONDING PILE CONNECTIONS BEFORE PLACEMENT OF PILE CAP REINFORCEMENT.

③ FURNISH AND INSTALL AN ADDITIONAL 2" PVC CONDUIT FOR FUTURE USE AT LOCATIONS SHOWN ON THE LIGHTING PLANS.

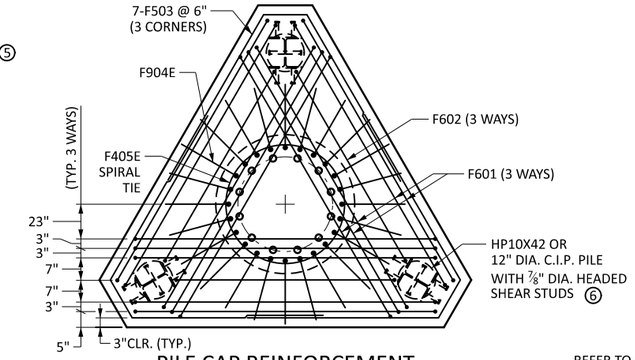
④ FURNISH AND INSTALL TWO UNSPLICED LENGTHS OF LIGHTNING PROTECTION CONDUCTORS MEETING THE FOLLOWING: BRAIDED BARE COPPER; AT LEAST 28 STRANDS OF 14 AWG WIRE; ½" DIA, ROPE LAY OF 115,000 CMIL; NET WEIGHT 375 LBS PER 1000'. BOND ONE END OF EACH CONDUCTOR TO THE PILING AS SHOWN USING EXOTHERMIC WELDED LIGHTING PROTECTION CONNECTIONS DESIGNED FOR PILING.

⑤ ENSURE BOTTOM OF PILE CAP IS AT LEAST 5' BELOW FINISHED GRADE. REFER TO "T-140 PILE TABLE" ON SHEET 1 OF 4 FOR FOOTING ELEVATION.

⑥ USE THE PILE TYPE SPECIFIED IN THE "T-140 PILE TABLE" ON SHEET 1 OF 4. FOR H PILES USE HP 10X42. FOR CAST-IN-PLACE (C.I.P.) PILE USE 12" NOMINAL DIAMETER WITH ¼" MINIMUM WALL THICKNESS.



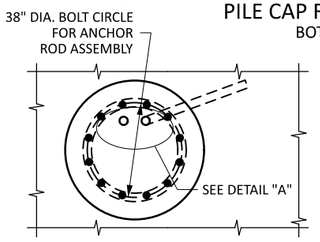
ELEVATION VIEW
PEDESTAL REINFORCEMENT NOT SHOWN. SEE REINFORCEMENT DETAILS.



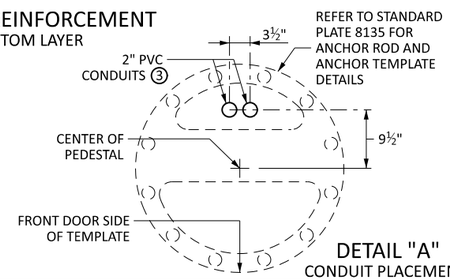
PILE CAP REINFORCEMENT
BOTTOM LAYER

STEEL HP PILE DETAIL

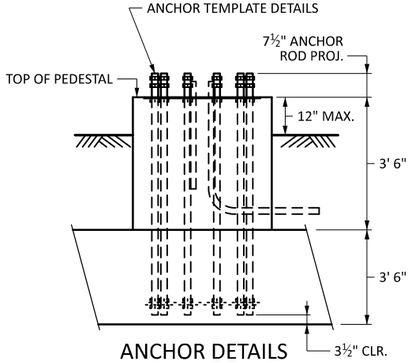
STEEL 12" DIA. C.I.P. PILE



PEDESTAL DETAILS ③



DETAIL "A"
CONDUIT PLACEMENT



ANCHOR DETAILS

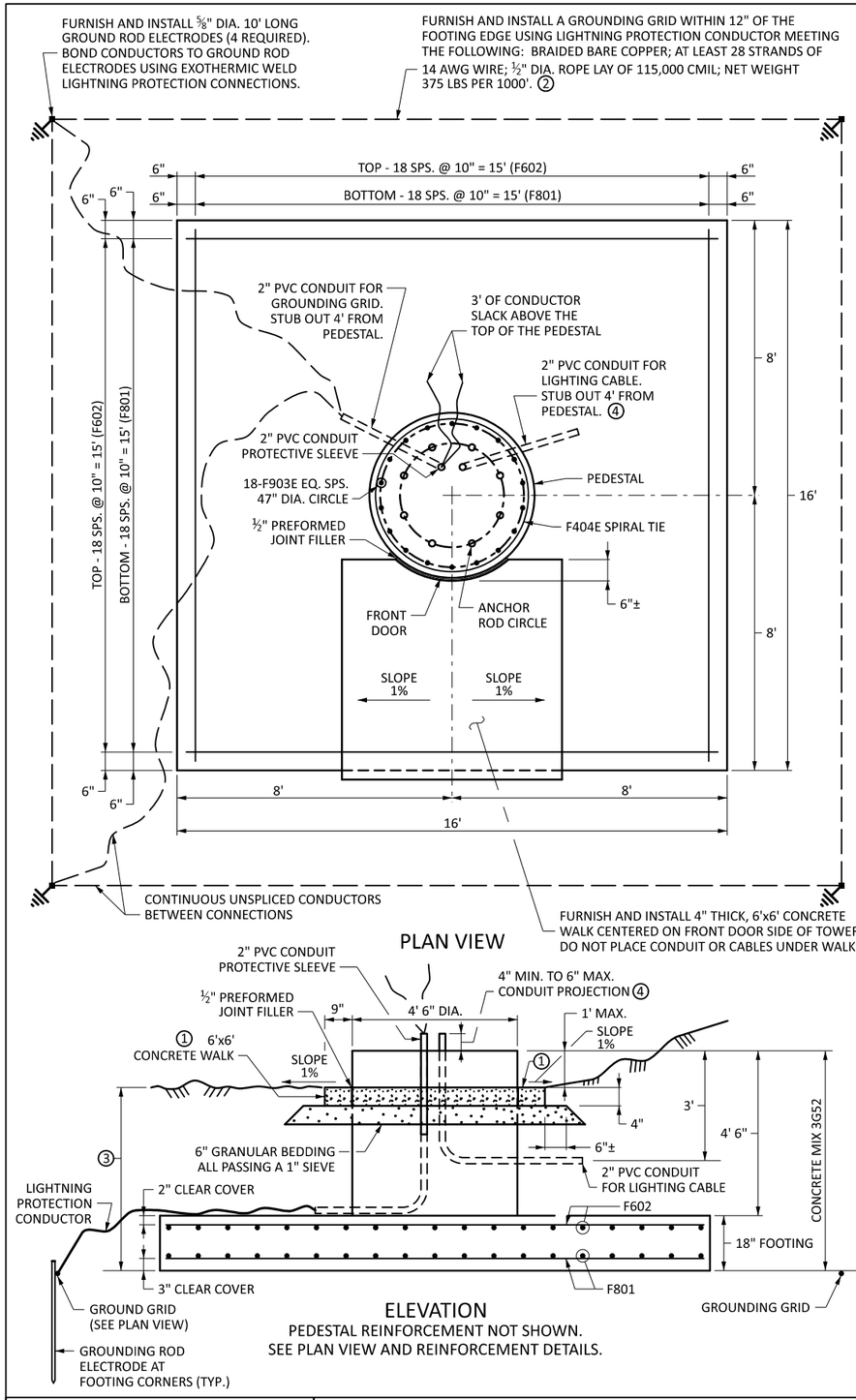
LEAD EXPERT OFFICE	EDWARD LUTGEN OFFICE DIRECTOR BRIDGE OFFICE		T-140 LIGHT TOWER PILE FOUNDATION DESIGN	APPROVED: 11-15-2024	THOMAS STYRBICKI STATE DESIGN ENGINEER STANDARD PLAN 5-297.840	4 OF 4
DEPARTMENT OF TRANSPORTATION			STANDARD PLAN	STATE PROJ. NO.	SHEET NO.	
				TRUNK HWY.	TOTAL SHEETS	

T-100 FOOTING TABLE				
TOWER NO.	BOTTOM OF FOOTING ELEVATION	SUBCUT DEPTH	BOTTOM OF SUBCUT ELEVATION	BACKFILL MATERIAL (SPEC.)

T-120 FOOTING TABLE				
TOWER NO.	BOTTOM OF FOOTING ELEVATION	SUBCUT DEPTH	BOTTOM OF SUBCUT ELEVATION	BACKFILL MATERIAL (SPEC.)

T-140 FOOTING TABLE				
TOWER NO.	BOTTOM OF FOOTING ELEVATION	SUBCUT DEPTH	BOTTOM OF SUBCUT ELEVATION	BACKFILL MATERIAL (SPEC.)

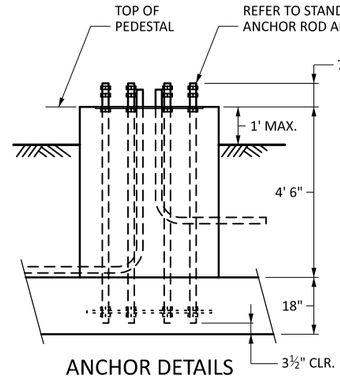
LEAD EXPERT OFFICE	EDWARD LUTGEN OFFICE DIRECTOR BRIDGE OFFICE	I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA. CERTIFIED BY: _____ LICENSED PROFESSIONAL ENGINEER _____ DATE PRINTED NAME: LIC. NO.	LIGHT TOWER MAT FOUNDATION DESIGN	APPROVED: 11-15-2024	THOMAS STYRBICKI STATE DESIGN ENGINEER
STANDARD PLAN 5-297.841	1 OF 4				
DEPARTMENT OF TRANSPORTATION			STANDARD PLAN	STATE PROJ. NO.	SHEET NO.
				TRUNK HWY.	TOTAL SHEETS



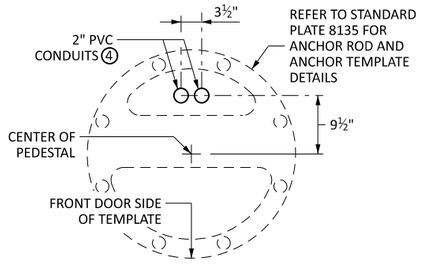
PLAN VIEW

ELEVATION

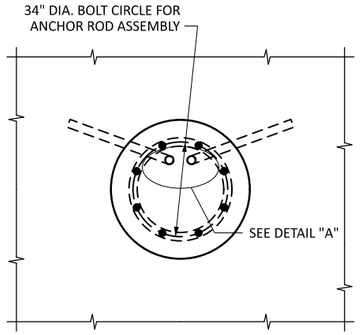
PEDESTAL REINFORCEMENT NOT SHOWN.
SEE PLAN VIEW AND REINFORCEMENT DETAILS.



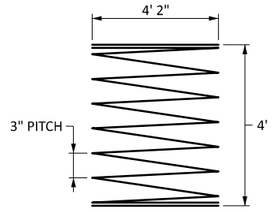
ANCHOR DETAILS



DETAIL "A"
CONDUIT PLACEMENT



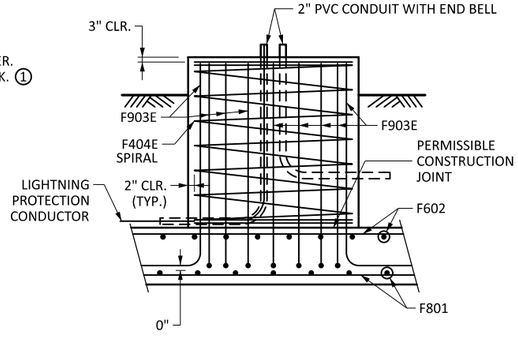
PEDESTAL DETAILS ④



F404E

F903E

BAR DETAILS



REINFORCEMENT DETAILS

BILL OF REINFORCEMENT

BAR	NO.	LENGTH	SHAPE	LOCATION
F801	38	15' 6"		FOOTING
F602	38	15' 6"		FOOTING
F903E	18	7' 0"		PEDESTAL DOWELS
F404E	1	SEE DETAIL		PEDESTAL SPIRAL

GEOTECHNICAL REQUIREMENTS:

REQUIRED SUBSURFACE INVESTIGATION: TAKE A MINIMUM OF ONE STANDARD PENETRATION TEST (SPT) FOUNDATION BORING OR ONE CONE PENETRATION TEST (CPT) SOUNDING AT EACH LIGHT TOWER LOCATION. ADVANCE THE BORING/SOUNDING WITHIN 30' OF THE PLANNED TOWER LOCATION AND FOLLOW THE REQUIREMENTS OF MnDOT'S GEOTECHNICAL INVESTIGATION SPECIFICATIONS. INVESTIGATE TO A MINIMUM DEPTH OF 45', OR TO TOP OF ROCK, BELOW THE PROPOSED FOOTING ELEVATION. WHERE ROCK IS ENCOUNTERED WITHIN 30' BELOW THE PROPOSED FOOTING, 10' OF ROCK CORING IS REQUIRED.

BASIS OF DESIGN:

THE DETAILS SHOWN ON THESE STANDARD PLANS ARE BASED ON THE AASHTO LRFD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS, FIRST EDITION, 2015, AND THE 2017 AND 2018 INTERIM REVISIONS.

STRENGTH LIMIT WIND LOADING OF 120 MPH, SERVICE LIMIT WIND LOADING OF 76 MPH.

THE MAXIMUM NUMBER OF LUMINAIRES ON THE TOP OF THE LIGHT TOWER IS SIX. THE MAXIMUM EFFECTIVE PROJECTED AREA (EPA) OF THE TOTAL LUMINAIRES AND RING ASSEMBLY AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 50 SQ. FT.

THE FACTORED BEARING RESISTANCE OF SOIL USED IN DESIGN IS 4 KSF.

THE WATER TABLE IS ASSUMED TO BE BELOW THE BOTTOM OF SUBCUT OR FOOTING ELEVATION.

LOAD CASE	EFFECTIVE WIDTH B' (FT)	EFFECTIVE SOIL PRESSURE (KSF)
SERVICE	11.20	1.40
EXTREME EVENT	11.64	1.43

MATERIAL DESIGN PROPERTIES:

CONCRETE: f'c = 4.5 ksi ; MnDOT MIX 3G52
REINFORCEMENT: Fy = 60 ksi

WELDED WIRE REINFORCEMENT IN ACCORDANCE WITH SPEC. 3303.

SPIRAL REINFORCEMENT IN ACCORDANCE WITH SPEC. 3305, OR DEFORMED GRADE 60 BILLET STEEL IN ACCORDANCE WITH SPEC. 3301.

FOR BARS OTHER THAN SPIRAL ROD STOCK, USE DEFORMED STEEL BARS IN ACCORDANCE WITH SPEC. 3301 GRADE 60 OR GREATER. EPOXY COAT BARS WITH THE SUFFIX "E" IN ACCORDANCE WITH SPEC. 3301.

DESIGNS ARE BASED ON A SOIL PROFILE WHICH MEETS OR EXCEEDS THE FOLLOWING MINIMUM SOIL PARAMETERS:

SANDY SOILS
EFFECTIVE UNIT WEIGHT = 52.5 PCF
FRICTION ANGLE = 30°

CLAY SOILS
EFFECTIVE UNIT WEIGHT = 57.5 PCF
COHESION = 1000 PSF
FRICTION ANGLE = 0°

CONSTRUCTION NOTES:

AFTER EXCAVATING THE FOUNDATION SITE AND PERFORMING ANY REQUIRED SUBCUTS, (SEE "T-100 FOOTING TABLE" ON SHEET 1 OF 4) EVALUATE AND INSPECT THE SITE CONDITIONS TO ENSURE THAT BEARING SOILS ARE UNIFORM AND CONSISTENT WITH DESIGN ASSUMPTIONS. CONTACT THE MnDOT FOUNDATIONS UNIT IF SITE CONDITIONS DIFFER. AFTER THE FOUNDATION SITE IS REVIEWED AND APPROVED, PROCEED WITH SUBCUT BACKFILLING AND FOOTING CONSTRUCTION.

CONFIRM PEDESTAL AND FOOTING CONCRETE HAVE ATTAINED 4500 PSI COMPRESSIVE STRENGTH BEFORE PLACING TOWER.

NOTES:

① USE WELDED WIRE REINFORCEMENT 6 X 6-W2.9 X W2.9 IN ACCORDANCE WITH SPEC. 3303. PLACE REINFORCEMENT AT SLAB MID-DEPTH. CONCRETE MIX NO. 3F52. FINISH GRADING THE SITE TO BLEND WITH EXISTING SLOPES AS APPROVED BY THE ENGINEER.

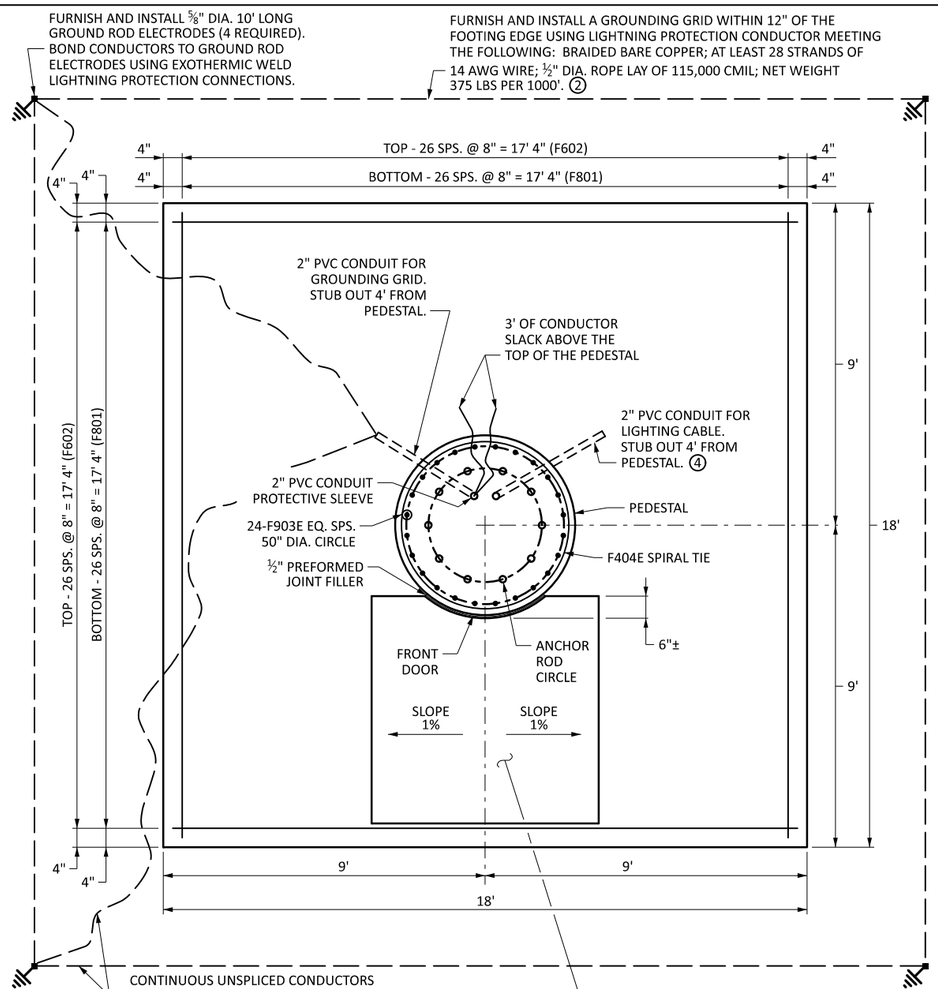
② OBTAIN THE ENGINEER'S APPROVAL OF THE COMPLETED GROUNDING GRID BEFORE BACKFILLING AROUND THE FOOTING.

③ ENSURE BOTTOM OF FOOTING IS AT LEAST 5' BELOW FINISHED GRADE. REFER TO "T-100 FOOTING TABLE" ON SHEET 1 OF 4 FOR FOOTING ELEVATIONS.

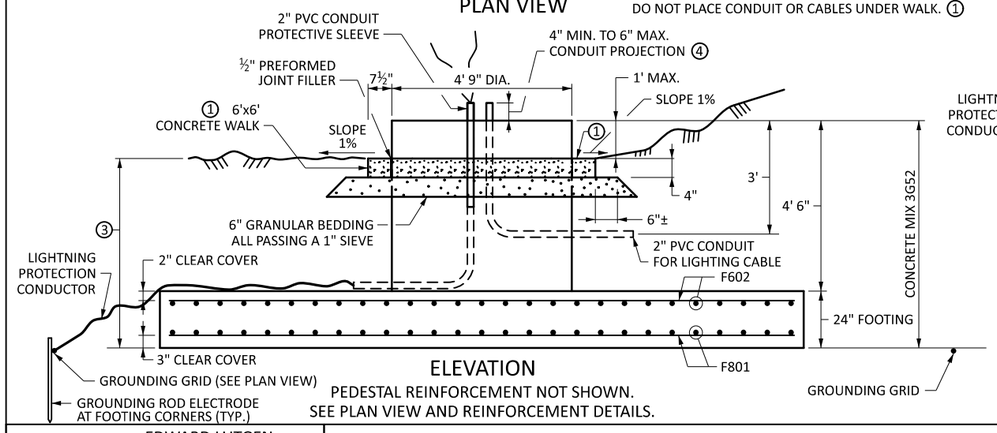
④ FURNISH AND INSTALL AN ADDITIONAL 2" CONDUIT FOR FUTURE USE AT LOCATIONS SHOWN ON THE LIGHTING PLANS.

LEAD EXPERT OFFICE	EDWARD LUTGEN OFFICE DIRECTOR BRIDGE OFFICE		T-100 LIGHT TOWER MAT FOUNDATION DESIGN	APPROVED: 11-15-2024	THOMAS STYRBICKI STATE DESIGN ENGINEER	STANDARD PLAN 5-297.841	2 OF 4

DEPARTMENT OF TRANSPORTATION			STANDARD PLAN	STATE PROJ. NO.	SHEET NO.
				TRUNK HWY.	TOTAL SHEETS

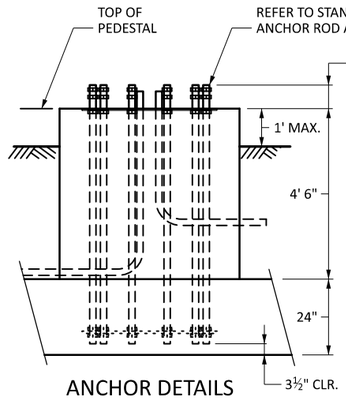


PLAN VIEW

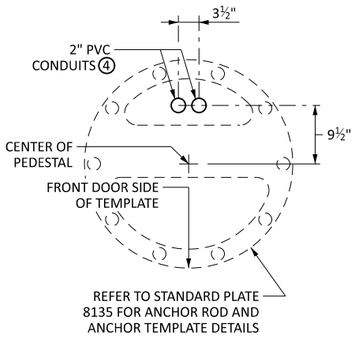


ELEVATION

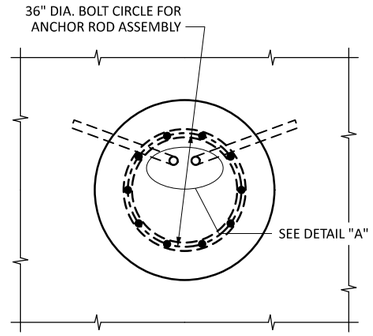
PEDESTAL REINFORCEMENT NOT SHOWN.
SEE PLAN VIEW AND REINFORCEMENT DETAILS.



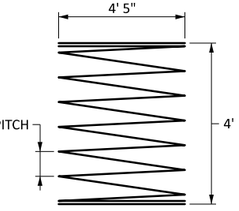
ANCHOR DETAILS



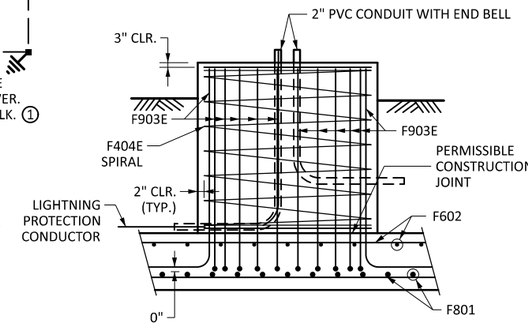
DETAIL "A"
CONDUIT PLACEMENT



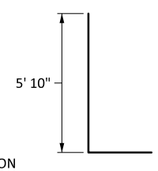
PEDESTAL DETAILS ④



F404E



REINFORCEMENT DETAILS



BAR DETAILS

BILL OF REINFORCEMENT

BAR	NO.	LENGTH	SHAPE	LOCATION
F801	54	17' 6"		FOOTING
F602	54	17' 6"		FOOTING
F903E	24	7' 6"		PEDESTAL DOWELS
F404E	1	SEE DETAIL		PEDESTAL SPIRAL

GEOTECHNICAL REQUIREMENTS:

REQUIRED SUBSURFACE INVESTIGATION: TAKE A MINIMUM OF ONE STANDARD PENETRATION TEST (SPT) FOUNDATION BORING OR ONE CONE PENETRATION TEST (CPT) SOUNDING AT EACH LIGHT TOWER LOCATION. ADVANCE THE BORING/SOUNDING WITHIN 30' OF THE PLANNED TOWER LOCATION AND FOLLOW THE REQUIREMENTS OF MnDOT'S GEOTECHNICAL INVESTIGATION SPECIFICATIONS. INVESTIGATE TO A MINIMUM DEPTH OF 45', OR TO TOP OF ROCK, BELOW THE PROPOSED FOOTING ELEVATION. WHERE ROCK IS ENCOUNTERED WITHIN 30' BELOW THE PROPOSED FOOTING, 10' OF ROCK CORING IS REQUIRED.

BASIS OF DESIGN:

THE DETAILS SHOWN ON THESE STANDARD PLANS ARE BASED ON THE AASHTO LRFD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS, FIRST EDITION, 2015 AND THE 2017 AND 2018 INTERIM REVISIONS.

STRENGTH LIMIT WIND LOADING OF 120 MPH, SERVICE LIMIT WIND LOADING OF 76 MPH.

THE MAXIMUM NUMBER OF LUMINAIRES ON THE TOP OF THE LIGHT TOWER IS SIX. THE MAXIMUM EFFECTIVE PROJECTED AREA (EPA) OF THE TOTAL LUMINAIRES AND RING ASSEMBLY AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 50 SQ. FT.

THE FACTORED BEARING RESISTANCE OF SOIL USED IN DESIGN IS 4 KSF.

THE WATER TABLE IS ASSUMED TO BE BELOW THE BOTTOM OF SUBCUT OR FOOTING ELEVATION.

LOAD CASE	EFFECTIVE WIDTH B' (FT)	EFFECTIVE SOIL PRESSURE (KSF)
SERVICE	12.80	1.51
EXTREME EVENT	13.14	1.54

MATERIAL DESIGN PROPERTIES:

CONCRETE: f'c = 4.5 ksi ; MnDOT MIX 3G52
REINFORCEMENT: Fy = 60 ksi

WELDED WIRE REINFORCEMENT IN ACCORDANCE WITH SPEC. 3303.

SPIRAL REINFORCEMENT IN ACCORDANCE WITH SPEC. 3305, OR DEFORMED GRADE 60 BILLET STEEL IN ACCORDANCE WITH SPEC. 3301.

FOR BARS OTHER THAN SPIRAL ROD STOCK, USE DEFORMED STEEL BARS IN ACCORDANCE WITH SPEC. 3301 GRADE 60 OR GREATER. EPOXY COAT BARS WITH THE SUFFIX "E" IN ACCORDANCE WITH SPEC. 3301.

DESIGNS ARE BASED ON A SOIL PROFILE WHICH MEETS OR EXCEEDS THE FOLLOWING MINIMUM SOIL PARAMETERS:

SANDY SOILS
EFFECTIVE UNIT WEIGHT = 52.5 PCF
FRICTION ANGLE = 30°

CLAY SOILS
EFFECTIVE UNIT WEIGHT = 57.5 PCF
COHESION = 1000 PSF
FRICTION ANGLE = 0°

CONSTRUCTION NOTES:

AFTER EXCAVATING THE FOUNDATION SITE AND PERFORMING ANY REQUIRED SUBCUTS (SEE "T-120 FOOTING TABLE" ON SHEET 1 OF 4), EVALUATE AND INSPECT THE SITE CONDITIONS TO ENSURE THAT BEARING SOILS ARE UNIFORM AND CONSISTENT WITH DESIGN ASSUMPTIONS. CONTACT THE MnDOT FOUNDATIONS UNIT IF SITE CONDITIONS DIFFER. AFTER THE FOUNDATION SITE IS REVIEWED AND APPROVED, PROCEED WITH SUBCUT BACKFILLING AND FOOTING CONSTRUCTION.

CONFIRM PEDESTAL AND FOOTING CONCRETE HAVE ATTAINED 4500 PSI COMPRESSIVE STRENGTH BEFORE PLACING TOWER.

NOTES:

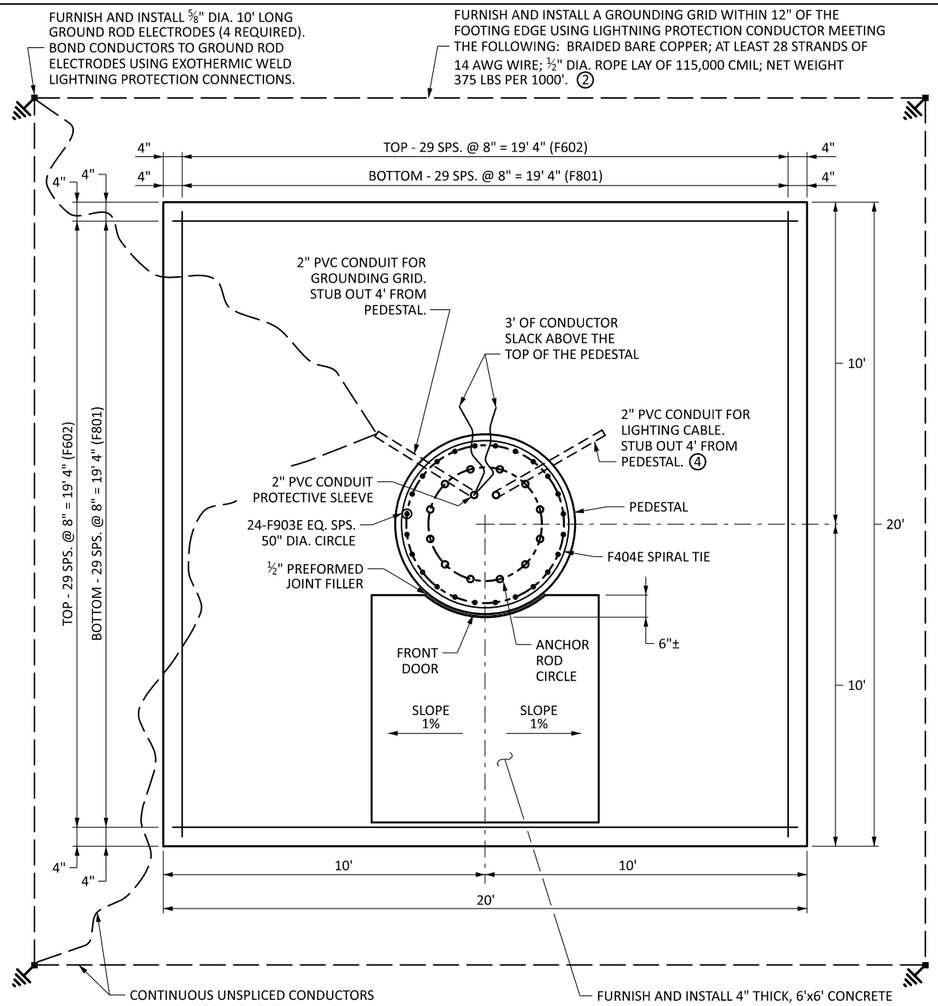
① USE WELDED WIRE REINFORCEMENT 6 X 6-W2.9 X W2.9 IN ACCORDANCE WITH SPEC. 3303. PLACE REINFORCEMENT AT SLAB MID-DEPTH. CONCRETE MIX NO. 3F52. FINISH GRADING THE SITE TO BLEND WITH EXISTING SLOPES AS APPROVED BY THE ENGINEER.

② OBTAIN THE ENGINEER'S APPROVAL OF THE COMPLETED GROUNDING GRID BEFORE BACKFILLING AROUND THE FOOTING.

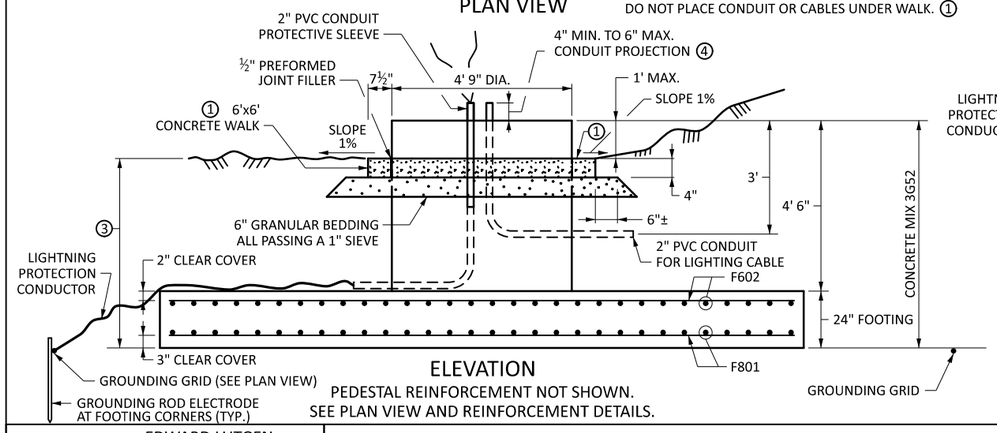
③ ENSURE BOTTOM OF FOOTING IS AT LEAST 5' BELOW FINISHED GRADE. REFER TO "T-120 FOOTING TABLE" ON SHEET 1 OF 4 FOR FOOTING ELEVATIONS.

④ FURNISH AND INSTALL AN ADDITIONAL 2" CONDUIT FOR FUTURE USE AT LOCATIONS SHOWN ON THE LIGHTING PLANS.

LEAD EXPERT OFFICE	EDWARD LUTGEN OFFICE DIRECTOR BRIDGE OFFICE		T-120 LIGHT TOWER MAT FOUNDATION DESIGN	APPROVED: 11-15-2024	THOMAS STYRBICKI STATE DESIGN ENGINEER STANDARD PLAN 5-297.841	3 OF 4
DEPARTMENT OF TRANSPORTATION			STANDARD PLAN	STATE PROJ. NO.	SHEET NO.	
				TRUNK HWY.	TOTAL SHEETS	

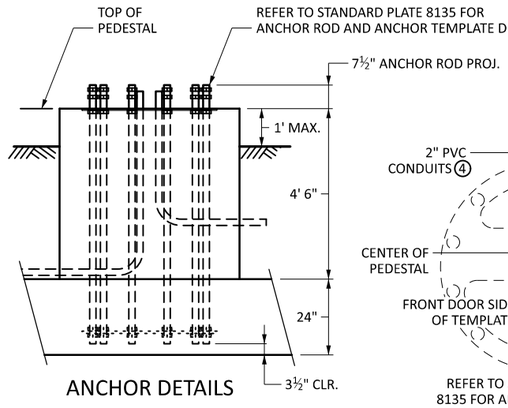


PLAN VIEW

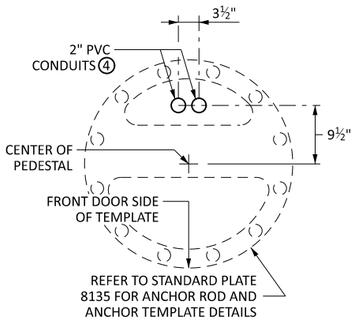


ELEVATION

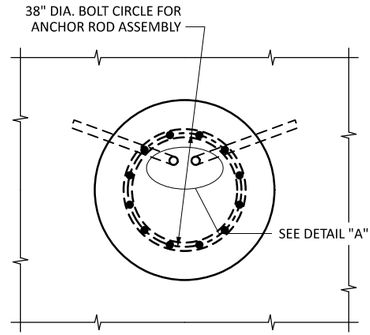
PEDESTAL REINFORCEMENT NOT SHOWN.
SEE PLAN VIEW AND REINFORCEMENT DETAILS.



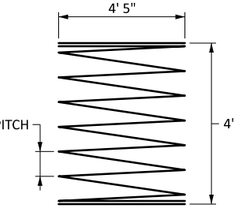
ANCHOR DETAILS



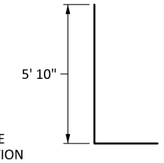
DETAIL "A"
CONDUIT PLACEMENT



PEDESTAL DETAILS ④

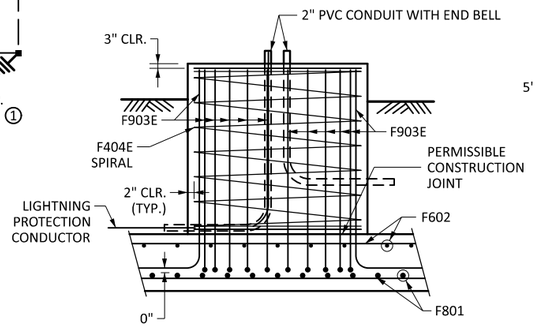


F404E



F903E

BAR DETAILS



REINFORCEMENT DETAILS

BILL OF REINFORCEMENT

BAR	NO.	LENGTH	SHAPE	LOCATION
F801	60	19' 6"		FOOTING
F602	60	19' 6"		FOOTING
F903E	24	7' 6"		PEDESTAL DOWELS
F404E	1	SEE DETAIL		PEDESTAL SPIRAL

GEOTECHNICAL REQUIREMENTS:

REQUIRED SUBSURFACE INVESTIGATION: TAKE A MINIMUM OF ONE STANDARD PENETRATION TEST (SPT) FOUNDATION BORING OR ONE CONE PENETRATION TEST (CPT) SOUNDING AT EACH LIGHT TOWER LOCATION. ADVANCE THE BORING/SOUNDING WITHIN 30' OF THE PLANNED TOWER LOCATION AND FOLLOW THE REQUIREMENTS OF MnDOT'S GEOTECHNICAL INVESTIGATION SPECIFICATIONS. INVESTIGATE TO A MINIMUM DEPTH OF 45', OR TO TOP OF ROCK, BELOW THE PROPOSED FOOTING ELEVATION. WHERE ROCK IS ENCOUNTERED WITHIN 30' BELOW THE PROPOSED FOOTING, 10' OF ROCK CORING IS REQUIRED.

BASIS OF DESIGN:

THE DETAILS SHOWN ON THESE STANDARD PLANS ARE BASED ON THE AASHTO LRFD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS, FIRST EDITION, 2015 AND THE 2017 AND 2018 INTERIM REVISIONS.

STRENGTH LIMIT WIND LOADING OF 120 MPH, SERVICE LIMIT WIND LOADING OF 76 MPH.

THE MAXIMUM NUMBER OF LUMINAIRES ON THE TOP OF THE LIGHT TOWER IS SIX. THE MAXIMUM EFFECTIVE PROJECTED AREA (EPA) OF THE TOTAL LUMINAIRES AND RING ASSEMBLY AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 50 SQ. FT.

THE FACTORED BEARING RESISTANCE OF SOIL USED IN DESIGN IS 4 KSF.

THE WATER TABLE IS ASSUMED TO BE BELOW THE BOTTOM OF SUBCUT OR FOOTING ELEVATION.

LOAD CASE	EFFECTIVE WIDTH B' (FT)	EFFECTIVE SOIL PRESSURE (KSF)
SERVICE	13.96	1.57
EXTREME EVENT	14.50	1.60

MATERIAL DESIGN PROPERTIES:

CONCRETE: f'c = 4.5 ksi ; MnDOT MIX 3G52
REINFORCEMENT: Fy = 60 ksi

WELDED WIRE REINFORCEMENT IN ACCORDANCE WITH SPEC. 3303.

SPIRAL REINFORCEMENT IN ACCORDANCE WITH SPEC. 3305, OR DEFORMED GRADE 60 BILLET STEEL IN ACCORDANCE WITH SPEC. 3301.

FOR BARS OTHER THAN SPIRAL ROD STOCK, USE DEFORMED STEEL BARS IN ACCORDANCE WITH SPEC. 3301 GRADE 60 OR GREATER. EPOXY COAT BARS WITH THE SUFFIX "E" IN ACCORDANCE WITH SPEC. 3301.

DESIGNS ARE BASED ON A SOIL PROFILE WHICH MEETS OR EXCEEDS THE FOLLOWING MINIMUM SOIL PARAMETERS:

SANDY SOILS
EFFECTIVE UNIT WEIGHT = 52.5 PCF
FRICTION ANGLE = 30°

CLAY SOILS
EFFECTIVE UNIT WEIGHT = 57.5 PCF
COHESION = 1000 PSF
FRICTION ANGLE = 0°

CONSTRUCTION NOTES:

AFTER EXCAVATING THE FOUNDATION SITE AND PERFORMING ANY REQUIRED SUBCUTS (SEE "T-140 FOOTING TABLE" ON SHEET 1 OF 4), EVALUATE AND INSPECT THE SITE CONDITIONS TO ENSURE THAT BEARING SOILS ARE UNIFORM AND CONSISTENT WITH DESIGN ASSUMPTIONS. CONTACT THE MnDOT FOUNDATIONS UNIT IF SITE CONDITIONS DIFFER. AFTER THE FOUNDATION SITE IS REVIEWED AND APPROVED, PROCEED WITH SUBCUT BACKFILLING AND FOOTING CONSTRUCTION.

CONFIRM PEDESTAL AND FOOTING CONCRETE HAVE ATTAINED 4500 PSI COMPRESSIVE STRENGTH BEFORE PLACING TOWER.

NOTES:

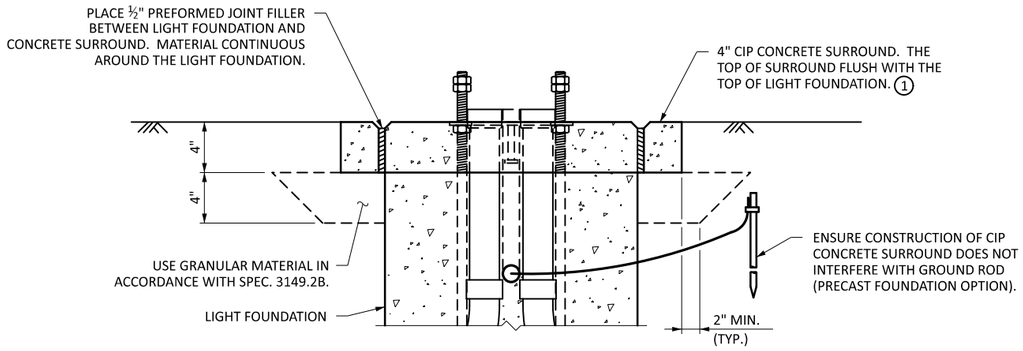
① USE WELDED WIRE REINFORCEMENT 6 X 6-W2.9 X W2.9 IN ACCORDANCE WITH SPEC. 3303. PLACE REINFORCEMENT AT SLAB MID-DEPTH. CONCRETE MIX NO. 3F52. FINISH GRADING THE SITE TO BLEND WITH EXISTING SLOPES AS APPROVED BY THE ENGINEER.

② OBTAIN THE ENGINEER'S APPROVAL OF THE COMPLETED GROUNDING GRID BEFORE BACKFILLING AROUND THE FOOTING.

③ ENSURE BOTTOM OF FOOTING IS AT LEAST 5' BELOW FINISHED GRADE. REFER TO "T-140 FOOTING TABLE" ON SHEET 1 OF 4 FOR FOOTING ELEVATIONS.

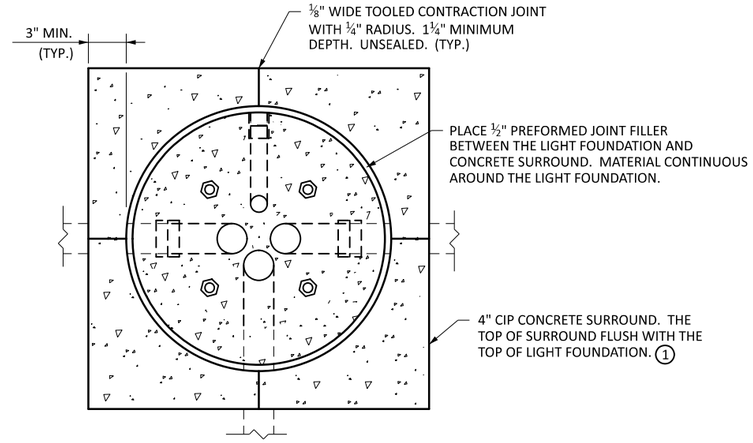
④ FURNISH AND INSTALL AN ADDITIONAL 2" CONDUIT FOR FUTURE USE AT LOCATIONS SHOWN ON THE LIGHTING PLANS.

LEAD EXPERT OFFICE	EDWARD LUTGEN OFFICE DIRECTOR BRIDGE OFFICE		T-140 LIGHT TOWER MAT FOUNDATION DESIGN	APPROVED: 11-15-2024	THOMAS STYRBICKI STATE DESIGN ENGINEER	STANDARD PLAN 5-297.841	4 OF 4
DEPARTMENT OF TRANSPORTATION			STANDARD PLAN	STATE PROJ. NO.		SHEET NO.	
				TRUNK HWY.		TOTAL SHEETS	



VERTICAL SECTION

PRECAST FOUNDATION OPTION SHOWN. CIP FOUNDATION SIMILAR.
FOUNDATION REINFORCEMENT AND ANCHOR ROD TEMPLATES NOT SHOWN FOR CLARITY.



PLAN

PRECAST FOUNDATION OPTION SHOWN. CIP FOUNDATION SIMILAR.
FOUNDATION REINFORCEMENT AND ANCHOR ROD TEMPLATES NOT SHOWN FOR CLARITY.

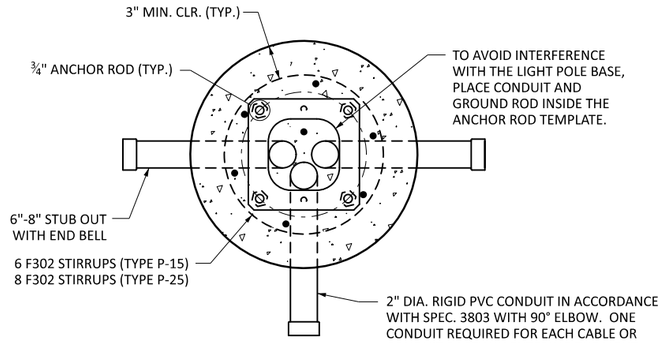
NOTES:

FURNISH AND INSTALL CONCRETE SURROUND AT SPECIFIED LOCATIONS SHOWN ON THE PLAN.

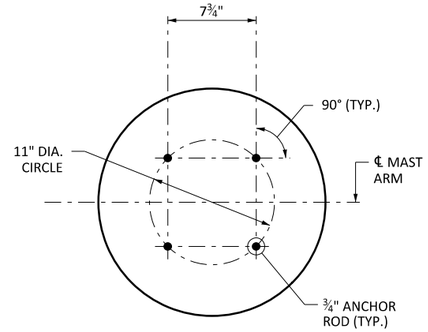
USE CONCRETE MIX NO. 3F52.

(1) ENSURE SURROUND IS FLUSH WITH TOP OF FOUNDATION EXCEPT WHEN USING HIGH-TOP FOUNDATIONS.

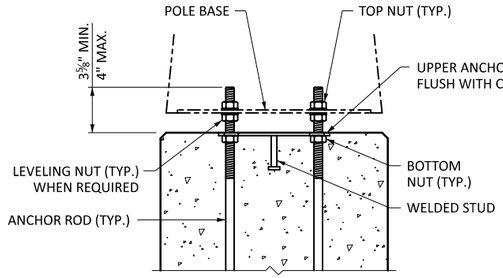
LEAD EXPERT OFFICE: BRIAN SORENSON, STATE TRAFFIC ENGINEER, OFFICE OF TRAFFIC ENGINEERING		LIGHT FOUNDATION CONCRETE SURROUND DETAILS	NOT APPROVED	STATE DESIGN ENGINEER	STANDARD PLAN 5-297.843	1 OF 1
DEPARTMENT OF TRANSPORTATION		STANDARD PLAN		STATE PROJ. NO.	SHEET NO.	
				TRUNK HWY.	TOTAL SHEETS	



PLAN

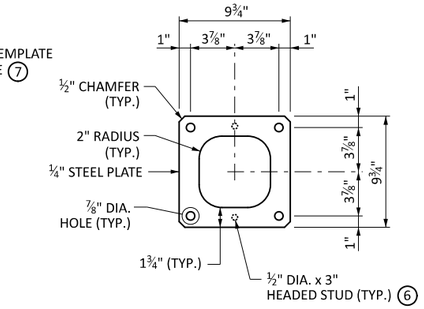


ANCHOR ROD PLACEMENT



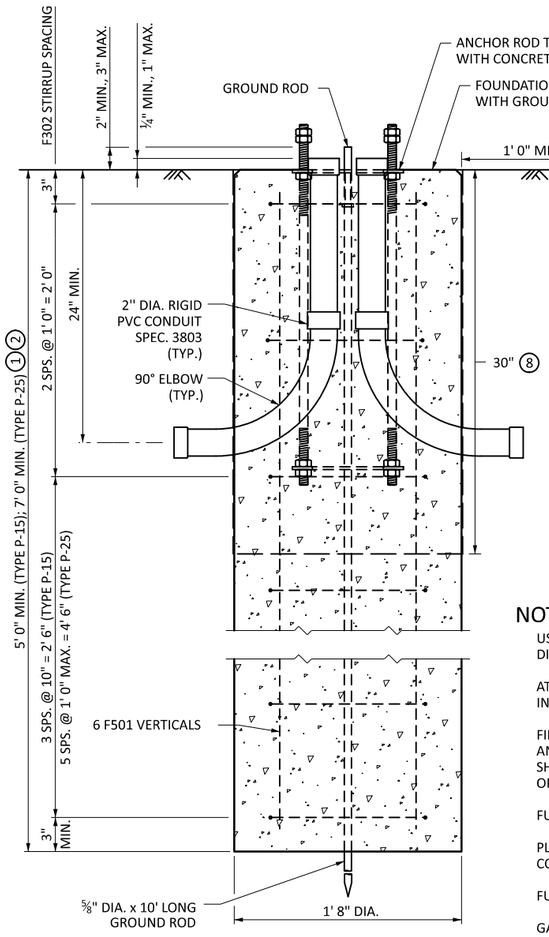
PARTIAL ELEVATION

SHOWING ANCHOR ROD ASSEMBLY & HEX NUT POSITIONS AFTER POLE INSTALLATION



ANCHOR ROD TEMPLATE

TWO REQUIRED PER ASSEMBLY



VERTICAL SECTION

BASIS OF DESIGN:

THE DETAILS SHOWN ON THIS STANDARD PLAN ARE BASED ON THE AASHTO "LRFD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS," FIRST EDITION, 2015, AND THE 2017, 2018, 2019, AND 2020 INTERIM REVISIONS.

STRENGTH LIMIT WIND LOADING OF 120 MPH, SERVICE LIMIT WIND LOADING OF 76 MPH.

TYPE P-15 FOUNDATION - THE DESIGN CONFIGURATION IS 15 FEET TALL WITH 3-FOOT TWIN ARMS. THE SHAPE OF THE LIGHT POLE SHAFT MAY BE ROUND, OCTAGONAL (8-SIDED), OR HEXADECAGONAL (16-SIDED). ALTERNATE POLE SHAPES REQUIRE A SPECIAL FOUNDATION DESIGN. THE MAXIMUM PROJECTED AREA (EPA) OF A SINGLE LUMINAIRE AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 2.0 SQUARE FEET.

TYPE P-25 FOUNDATION - THE DESIGN CONFIGURATION IS 25 FEET TALL WITH 9-FOOT TWIN ARMS. THE SHAPE OF THE LIGHT POLE SHAFT MAY BE ROUND, OCTAGONAL (8-SIDED), OR HEXADECAGONAL (16-SIDED). ALTERNATE POLE SHAPES REQUIRE A SPECIAL FOUNDATION DESIGN. THE MAXIMUM PROJECTED AREA (EPA) OF A SINGLE LUMINAIRE AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 1.50 SQUARE FEET.

GEOTECHNICAL PARAMETERS:

THE FOUNDATION DIMENSIONS SHOWN ON THIS SHEET ARE DESIGNED WITH THE FOLLOWING ASSUMED SOIL PROPERTIES:

COHESIVE SOILS:

MIN. SHEAR STRENGTH:	C = 1.0 ksf
UNIT WEIGHT OF SOIL:	γ = 125±10 pcf

GRANULAR SOILS:

MIN. ANGLE OF FRICTION:	Ø = 30°
UNIT WEIGHT OF SOIL:	γ = 125 pcf
MAX. COEFFICIENT OF FRICTION:	μ = 0.70

A SPECIAL FOUNDATION DESIGN IS REQUIRED WHEN THE SPECIFIED VALUES, CONDITIONS, OR BOTH LISTED ABOVE ARE NOT MET.

NOTES:

USE GRADE 60 REINFORCMENT BARS IN ACCORDANCE WITH ASTM A706 AND STEEL DIE STAMPED "W" ON THE SURFACE.

ATTACH REINFORCING BARS BY TYING, WELDING, OR BOTH. WELD REBAR TOGETHER IN ACCORDANCE WITH ANSI/AWS D1.4.

FIRMLY SUPPORT AND SECURELY TIE REINFORCING BARS, CONDUITS, GROUND ROD, AND ANCHOR ROD ASSEMBLY IN PROPER POSITION INTO THE FORM AND DRILLED SHAFT. OBTAIN ENGINEER'S APPROVAL BEFORE STARTING CONCRETE PLACEMENT OPERATIONS.

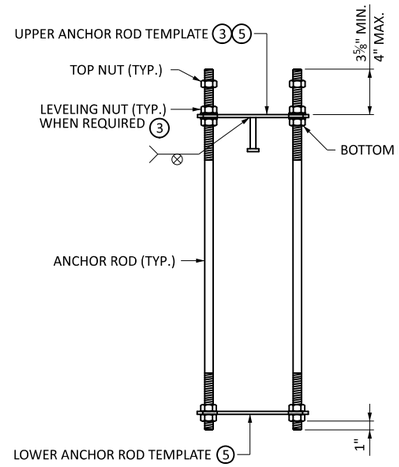
FURNISH AND INSTALL 3G52 CONCRETE MIX IN ACCORDANCE WITH SPEC. 2461.

PLACE PREFORMED JOINT FILLER BETWEEN FOUNDATION AND SIDEWALK OR CONCRETE AREAS.

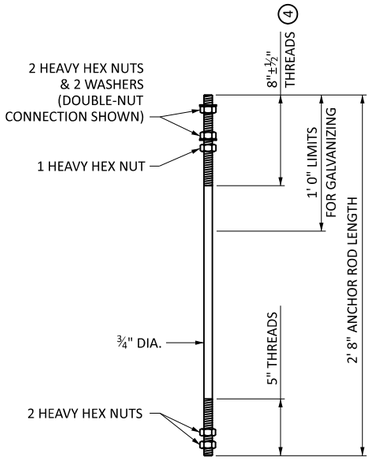
FURNISH AND INSTALL TYPE B ANCHOR RODS IN ACCORDANCE WITH SPEC. 3385.

GALVANIZE ANCHOR ROD ASSEMBLY TEMPLATES IN ACCORDANCE WITH SPEC. 3394.

(1) SEE THE PLAN AND SPECIAL PROVISIONS FOR MODIFIED FOUNDATION DEPTH.



ANCHOR ROD ASSEMBLY



ANCHOR ROD & HARDWARE

FOUR REQUIRED PER ASSEMBLY

(2) IF THE FOUNDATION IS PLACED ON A SLOPE STEEPER THAN 1V:3H, INCREASE THE MINIMUM FOUNDATION DEPTH BY 12 INCHES. ADDITIONAL REINFORCEMENT IS NOT REQUIRED. SLOPES STEEPER THAN 1V:2H REQUIRE A SPECIAL DESIGN.

(3) FOR SINGLE-NUT ANCHOR ROD CONNECTIONS, USE THE TOP NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. FOR DOUBLE-NUT ANCHOR ROD CONNECTIONS, USE THE LEVELING NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. LEAVE THE NUTS SECURED AGAINST THE TEMPLATE UNTIL POLE INSTALLATION. USE THE REQUIRED HARDWARE FOR ANCHOR ROD CONNECTION IN ACCORDANCE WITH 2545.3H.1.a AND 2545.3H.1.b.

(4) PROTECT ANCHOR ROD THREADS AND LEVELING NUTS ABOVE THE UPPER ANCHOR ROD TEMPLATE FROM CONCRETE CONTAMINATION.

(5) TIGHTEN ANCHOR ROD TEMPLATE NUTS USING A 12-INCH-LONG WRENCH.

(6) FURNISH AND INSTALL HEADED STUDS IN ACCORDANCE WITH 3391.2D "STUD WELDED FASTENERS" ON THE UPPER TEMPLATE AT THE LOCATIONS SHOWN.

(7) REMOVE SURFACE CONTAMINANTS AND APPLY SILICONE SEALANT TO THE UPPER TEMPLATE AROUND THE ANCHOR RODS AND ANCHOR ROD HOLES, AND THE INNER AND OUTER EDGES WHERE THE PLATE MEETS CONCRETE. USE AN APPROVED SILICONE JOINT SEALANT FOUND ON MnDOT'S APL UNDER BRIDGE PRODUCTS.

(8) FURNISH AND INSTALL A MAXIMUM 30" LONG CONCRETE FORMING TUBE TO FORM THE UPPER PORTION OF THE FOUNDATION. DO NOT USE A FULL-LENGTH FORMING TUBE.

BILL OF REINFORCEMENT - TYPE P-15

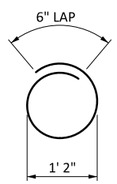
BAR	QTY.	LENGTH	SHAPE	LOCATION
F501	6	4' 6"	——	SHAFT VERTICALS
F302	6	4' 3"	TIES	SHAFT TIES

BILL OF REINFORCEMENT - TYPE P-25

BAR	QTY.	LENGTH	SHAPE	LOCATION
F501	6	6' 6"	——	SHAFT VERTICALS
F302	8	4' 3"	TIES	SHAFT TIES

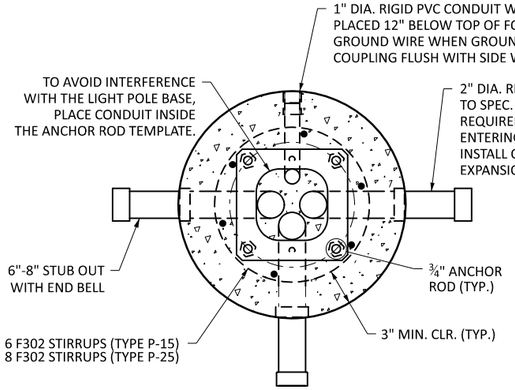
BAR BENDING DIAGRAM

BENT BAR DIMENSIONS GIVEN ARE OUT-TO-OUT. DETERMINE ACTUAL BAR LENGTHS BASED ON THE DETAIL DIMENSIONS SHOWN IN THE BAR BENDING DIAGRAM.

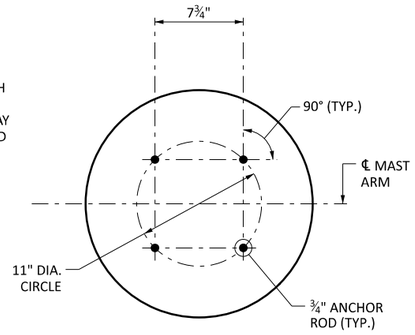


F302

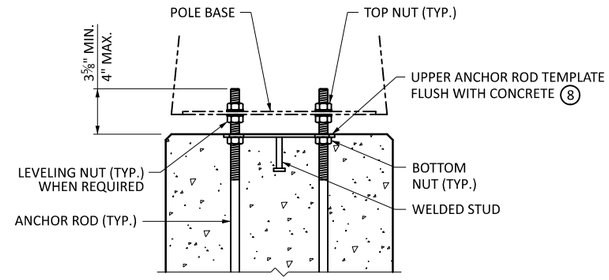
LEAD EXPERT OFFICE	BRIAN SORENSON STATE TRAFFIC ENGINEER OFFICE OF TRAFFIC ENGINEERING		LIGHT FOUNDATION - DESIGN P CAST-IN-PLACE DRILLED SHAFT P-15 15' POLE OR LESS P-25 25' POLE OR LESS	NOT APPROVED STATE DESIGN ENGINEER	STANDARD PLAN 5-297.844	1 OF 6
DEPARTMENT OF TRANSPORTATION			STANDARD PLAN	STATE PROJ. NO. TRUNK HWY.	SHEET NO. TOTAL SHEETS	



PLAN

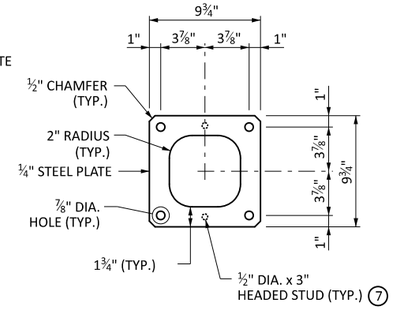


ANCHOR ROD PLACEMENT



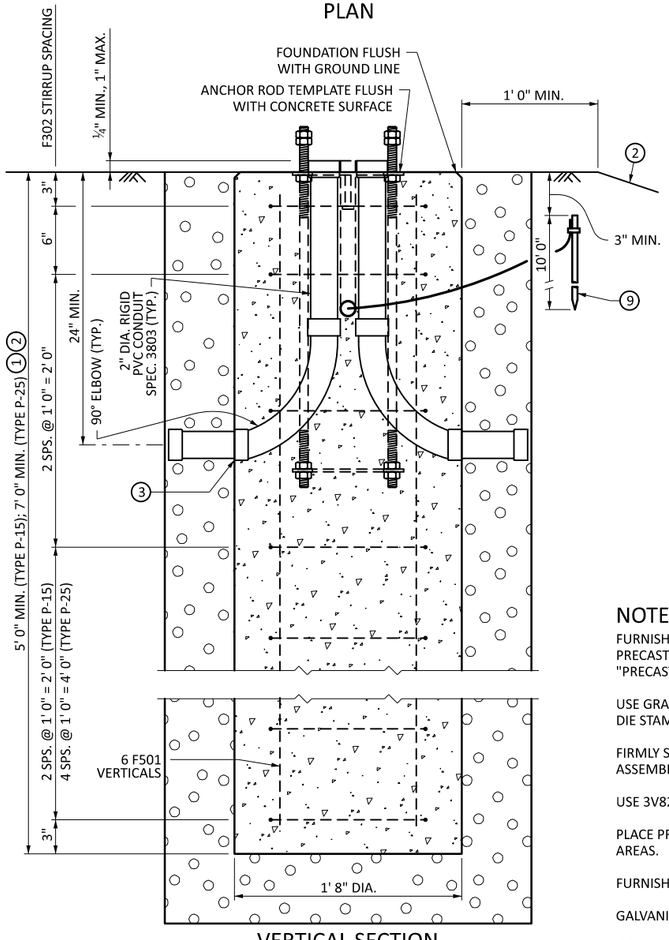
PARTIAL ELEVATION

SHOWING ANCHOR ROD ASSEMBLY & HEX NUT POSITIONS AFTER POLE INSTALLATION



ANCHOR ROD TEMPLATE

TWO REQUIRED PER ASSEMBLY



VERTICAL SECTION

EXCAVATE AND BACKFILL IN ACCORDANCE WITH SPEC. 2545.3.

BASIS OF DESIGN:

THE DETAILS SHOWN ON THIS STANDARD PLAN ARE BASED ON THE AASHTO "LRFD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS," FIRST EDITION, 2015, AND THE 2017, 2018, 2019, AND 2020 INTERIM REVISIONS.

STRENGTH LIMIT WIND LOADING OF 120 MPH, SERVICE LIMIT WIND LOADING OF 76 MPH.

TYPE P-15 FOUNDATION - THE DESIGN CONFIGURATION IS 15 FEET TALL WITH 3-FOOT TWIN ARMS. THE SHAPE OF THE LIGHT POLE SHAFT MAY BE ROUND, OCTAGONAL (8-SIDED), OR HEXADECAGONAL (16-SIDED). ALTERNATE POLE SHAPES REQUIRE A SPECIAL FOUNDATION DESIGN. THE MAXIMUM PROJECTED AREA (EPA) OF A SINGLE LUMINAIRE AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 2.0 SQUARE FEET.

TYPE P-25 FOUNDATION - THE DESIGN CONFIGURATION IS 25 FEET TALL WITH 9-FOOT TWIN ARMS. THE SHAPE OF THE LIGHT POLE SHAFT MAY BE ROUND, OCTAGONAL (8-SIDED), OR HEXDECAGONAL (16-SIDED). ALTERNATE POLE SHAPES REQUIRE A SPECIAL FOUNDATION DESIGN. THE MAXIMUM PROJECTED AREA (EPA) OF A SINGLE LUMINAIRE AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 1.50 SQUARE FEET.

GEOTECHNICAL PARAMETERS:

THE FOUNDATION DIMENSIONS SHOWN ON THIS SHEET ARE DESIGNED WITH THE FOLLOWING ASSUMED SOIL PROPERTIES:

COHESIVE SOILS:

MIN. SHEAR STRENGTH:	C = 1.0 ksf
UNIT WEIGHT OF SOIL:	γ = 125±10 pcf

GRANULAR SOILS:

MIN. ANGLE OF FRICTION:	Ø = 30°
UNIT WEIGHT OF SOIL:	γ = 125 pcf
MAX. COEFFICIENT OF FRICTION:	μ = 0.70

A SPECIAL FOUNDATION DESIGN IS REQUIRED WHEN THE SPECIFIED VALUES, CONDITIONS, OR BOTH LISTED ABOVE ARE NOT MET.

NOTES:

FURNISH AND INSTALL PRECAST CONCRETE LIGHT FOUNDATIONS MANUFACTURED IN A PRECAST CONCRETE MANUFACTURING PLANT IN ACCORDANCE WITH SPEC. 3238 "PRECAST CONCRETE BOX CULVERTS."

USE GRADE 60 REINFORCMENT BARS IN ACCORDANCE WITH ASTM A706 AND STEEL DIE STAMPED "W" ON THE SURFACE.

FIRMLY SUPPORT AND SECURELY TIE REINFORCING BARS, CONDUITS, AND ANCHOR ROD ASSEMBLY IN PROPER POSITION INTO THE FORM.

USE 3V82 CONCRETE MIX.

PLACE PREFORMED JOINT FILLER BETWEEN FOUNDATION AND SIDEWALK OR CONCRETE AREAS.

FURNISH AND INSTALL TYPE B ANCHOR RODS IN ACCORDANCE WITH SPEC. 3385.

GALVANIZE ANCHOR ROD ASSEMBLY TEMPLATES IN ACCORDANCE WITH SPEC. 3394.

(1) SEE THE PLAN AND SPECIAL PROVISIONS FOR MODIFIED FOUNDATION DEPTH.

(2) IF THE FOUNDATION IS PLACED ON A SLOPE STEEPER THAN 1V:3H, INCREASE THE MINIMUM FOUNDATION DEPTH BY 12 INCHES. ADDITIONAL REINFORCEMENT IS NOT REQUIRED. SLOPES STEEPER THAN 1V:2H REQUIRE A SPECIAL DESIGN.

(3) CUT AND SPLICE ELBOW AS REQUIRED TO ACCOMMODATE FORM.

(4) FOR SINGLE-NUT ANCHOR ROD CONNECTIONS, USE THE TOP NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. FOR DOUBLE-NUT ANCHOR ROD CONNECTIONS, USE THE LEVELING NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. LEAVE THE NUTS SECURED AGAINST THE TEMPLATE UNTIL POLE INSTALLATION. USE THE REQUIRED HARDWARE FOR ANCHOR ROD CONNECTION IN ACCORDANCE WITH 2545.3H.1.a AND 2545.3H.1.b.

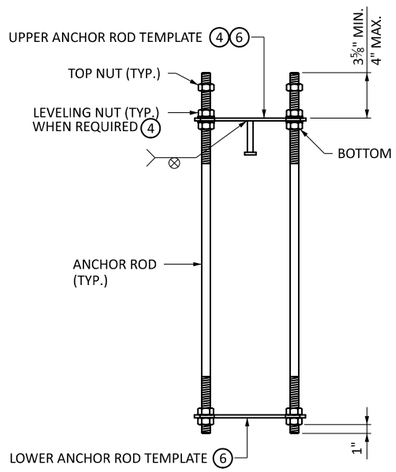
(5) PROTECT ANCHOR ROD THREADS AND LEVELING NUTS ABOVE THE UPPER ANCHOR ROD TEMPLATE FROM CONCRETE CONTAMINATION.

(6) TIGHTEN ANCHOR ROD TEMPLATE NUTS USING A 12-INCH-LONG WRENCH.

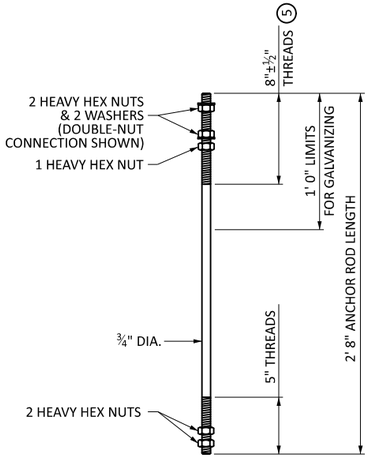
(7) FURNISH AND INSTALL HEADED STUDS IN ACCORDANCE WITH 3391.2D "STUD WELDED FASTENERS" ON THE UPPER TEMPLATE AT THE LOCATIONS SHOWN.

(8) REMOVE SURFACE CONTAMINANTS AND APPLY SILICONE SEALANT TO THE UPPER TEMPLATE AROUND THE ANCHOR RODS AND ANCHOR ROD HOLES, AND THE INNER AND OUTER EDGES WHERE THE PLATE MEETS CONCRETE. USE AN APPROVED SILICONE JOINT SEALANT FOUND ON MnDOT'S APL UNDER BRIDGE PRODUCTS.

(9) ⅝" DIA. GROUND ROD WITH CLAMP AND 6 AWG SOLID BARE COPPER WIRE. SEE PLAN FOR GROUND ROD LOCATIONS.



ANCHOR ROD ASSEMBLY



ANCHOR ROD & HARDWARE

FOUR REQUIRED PER ASSEMBLY

BILL OF REINFORCEMENT - TYPE P-15

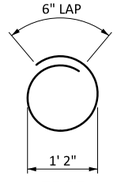
BAR	QTY.	LENGTH	SHAPE	LOCATION
F501	6	4' 6"	——	SHAFT VERTICALS
F302	6	4' 3"	TIES	SHAFT TIES

BILL OF REINFORCEMENT - TYPE P-25

BAR	QTY.	LENGTH	SHAPE	LOCATION
F501	6	6' 6"	——	SHAFT VERTICALS
F302	8	4' 3"	TIES	SHAFT TIES

BAR BENDING DIAGRAM

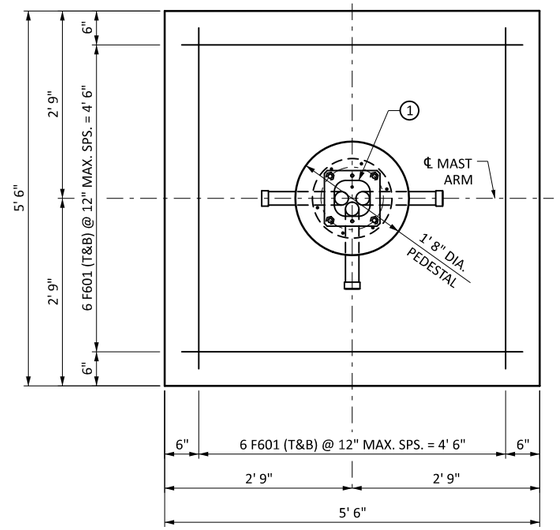
BENT BAR DIMENSIONS GIVEN ARE OUT-TO-OUT. DETERMINE ACTUAL BAR LENGTHS BASED ON THE DETAIL DIMENSIONS SHOWN IN THE BAR BENDING DIAGRAM.



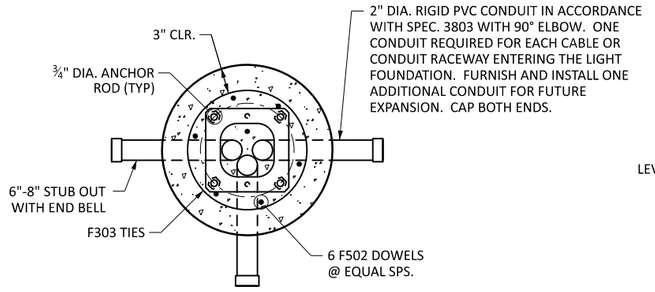
F302

LEAD EXPERT OFFICE	BRIAN SORENSON STATE TRAFFIC ENGINEER OFFICE OF TRAFFIC ENGINEERING	LIGHT FOUNDATION - DESIGN P PRECAST DRILLED SHAFT P-15 15' POLE OR LESS P-25 25' POLE OR LESS	NOT APPROVED	STATE DESIGN ENGINEER	STANDARD PLAN 5-297.844	2 OF 6

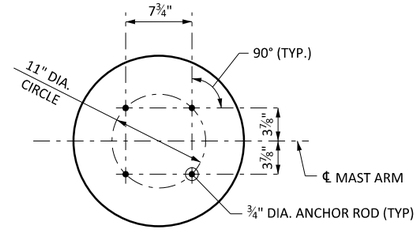
DEPARTMENT OF TRANSPORTATION		STANDARD PLAN	STATE PROJ. NO.	SHEET NO.
			TRUNK HWY.	TOTAL SHEETS



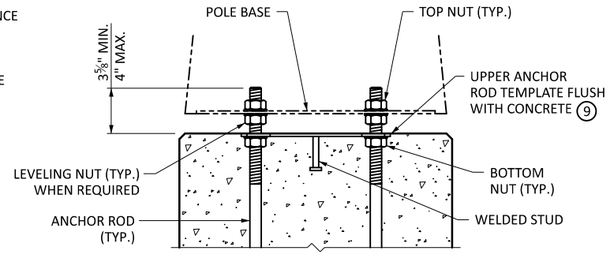
SPREAD FOOTING PLAN



PEDESTAL PLAN

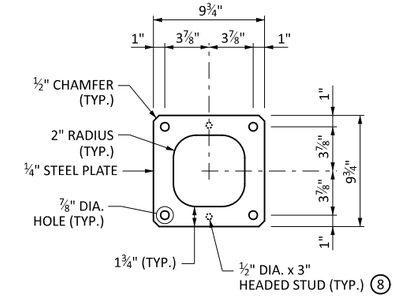


ANCHOR ROD PLACEMENT



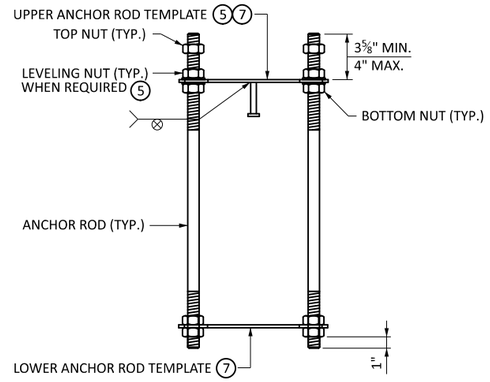
PARTIAL ELEVATION

SHOWING ANCHOR ROD ASSEMBLY & HEX NUT POSITIONS AFTER POLE INSTALLATION

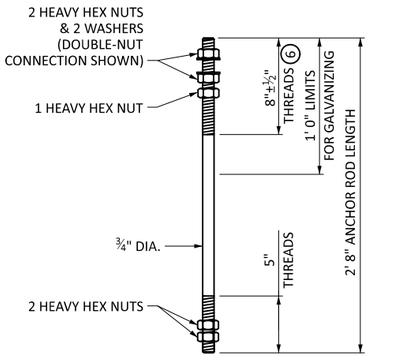


ANCHOR ROD TEMPLATE

TWO REQUIRED PER ASSEMBLY

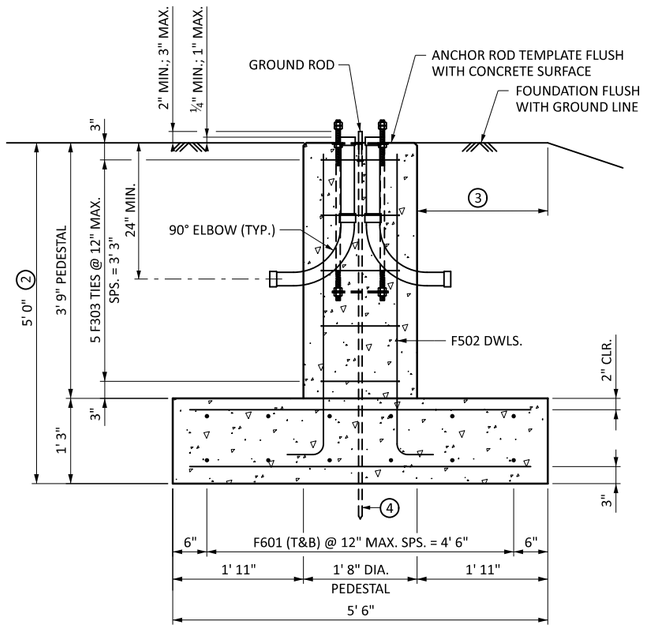


ANCHOR ROD ASSEMBLY



ANCHOR ROD & HARDWARE

FOUR REQUIRED PER ASSEMBLY



SPREAD FOOTING ELEVATION

BASIS OF DESIGN:

THE DETAILS SHOWN ON THIS STANDARD PLAN ARE BASED ON THE AASHTO "LRFD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS," FIRST EDITION, 2015, AND THE 2017, 2018, 2019, AND 2020 INTERIM REVISIONS.

STRENGTH LIMIT WIND LOADING OF 120 MPH, SERVICE LIMIT WIND LOADING OF 76 MPH.

THE FACTORED BEARING RESISTANCE OF SOIL USED IN DESIGN IS 4 KSF.

THE DESIGN CONFIGURATION IS 25 FEET TALL WITH 9-FOOT TWIN ARMS. THE SHAPE OF THE LIGHT POLE SHAFT MAY BE ROUND, OCTAGONAL (8-SIDED), OR HEXADECAGONAL (16-SIDED). ALTERNATE POLE SHAPES REQUIRE A SPECIAL FOUNDATION DESIGN.

THE MAXIMUM PROJECTED AREA (EPA) OF A SINGLE LUMINAIRE AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 1.50 SQUARE FEET.

GEOTECHNICAL PARAMETERS:

THE WATER TABLE IS ASSUMED BELOW THE BOTTOM OF FOOTING ELEVATION.

THE FOUNDATION DIMENSIONS SHOWN ON THIS SHEET ARE DESIGNED WITH THE FOLLOWING ASSUMED SOIL PROPERTIES:

SANDY SOILS	CLAY SOILS
UNIT WEIGHT = 125 PCF	UNIT WEIGHT = 125±10 PCF
FRICTION ANGLE = 30°	COHESION = 1000 PSF
	FRICTION ANGLE = 0°

A SPECIAL FOUNDATION DESIGN IS REQUIRED WHEN THE SPECIFIED VALUES, CONDITIONS, OR BOTH LISTED ABOVE ARE NOT MET.

LOAD CASE	EFFECTIVE WIDTH B' (FT)	EFFECTIVE SOIL PRESSURE (KSF)
SERVICE	4.64	0.95
STRENGTH	3.26	1.72

NOTES:

REINFORCEMENT BARS IN ACCORDANCE WITH SPEC. 3301 GRADE 60 OR GREATER. USE DEFORMED STEEL BARS.

FURNISH AND INSTALL 3G52 CONCRETE MIX IN ACCORDANCE WITH SPEC. 2461.

FURNISH AND INSTALL TYPE B ANCHOR RODS IN ACCORDANCE WITH SPEC. 3385.

GALVANIZE ANCHOR ROD ASSEMBLY TEMPLATES IN ACCORDANCE WITH SPEC. 3394.

(T&B) DENOTES TOP AND BOTTOM.

FIRMLY SUPPORT AND SECURELY TIE REINFORCING BARS, CONDUITS, GROUND ROD, AND ANCHOR ROD ASSEMBLY IN PROPER POSITION IN THE FORMS. OBTAIN ENGINEER'S APPROVAL BEFORE STARTING CONCRETE PLACEMENT OPERATIONS.

PLACE PREFORMED JOINT FILLER BETWEEN FOUNDATION AND SIDEWALK OR CONCRETE AREAS.

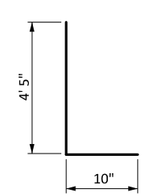
1. TO AVOID INTERFERENCE WITH THE LIGHT POLE BASE, PLACE CONDUIT AND GROUND ROD INSIDE THE ANCHOR ROD TEMPLATE.
2. PLACE THE BOTTOM OF FOOTING 5 FEET BELOW THE PROPOSED GROUNDLINE.
3. ENSURE GROUND IS LEVEL OVER THE PLAN DIMENSIONS OF THE FOOTING.
4. ⅝" DIAMETER x 10-FOOT-LONG GROUND ROD.
5. FOR SINGLE-NUT ANCHOR ROD CONNECTIONS, USE THE TOP NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. FOR DOUBLE-NUT ANCHOR ROD CONNECTIONS, USE THE LEVELING NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. LEAVE THE NUTS SECURED AGAINST THE TEMPLATE UNTIL POLE INSTALLATION. USE THE REQUIRED HARDWARE FOR ANCHOR ROD CONNECTION IN ACCORDANCE WITH 2545.3H.1.a AND 2545.3H.1.b.
6. PROTECT ANCHOR ROD THREADS AND LEVELING NUTS ABOVE THE UPPER ANCHOR ROD TEMPLATE FROM CONCRETE CONTAMINATION.
7. TIGHTEN ANCHOR ROD TEMPLATE NUTS USING A 12-INCH-LONG WRENCH.
8. FURNISH AND INSTALL HEADED STUDS IN ACCORDANCE WITH 3391.2D "STUD WELDED FASTENERS" ON THE UPPER TEMPLATE AT THE LOCATIONS SHOWN.
9. REMOVE SURFACE CONTAMINANTS AND APPLY SILICONE SEALANT TO THE UPPER TEMPLATE AROUND THE ANCHOR RODS AND ANCHOR ROD HOLES, AND THE INNER AND OUTER EDGES WHERE THE PLATE MEETS CONCRETE. USE AN APPROVED SILICONE JOINT SEALANT FOUND ON MnDOT'S APL UNDER BRIDGE PRODUCTS.

BILL OF REINFORCEMENT

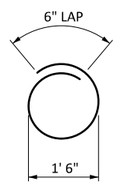
BAR	QTY.	LENGTH	SHAPE	LOCATION
F601	24	5' 0"	———	FOOTING REINFORCEMENT
F502	6	5' 3"	⌊——	FOOTING DOWELS
F303	5	4' 2"	TIES	PEDESTAL TIES

BAR BENDING DIAGRAMS

BENT BAR DIMENSIONS GIVEN ARE OUT-TO-OUT. DETERMINE ACTUAL BAR LENGTHS BASED ON THE DETAIL DIMENSIONS SHOWN IN THE BAR BENDING DIAGRAMS.

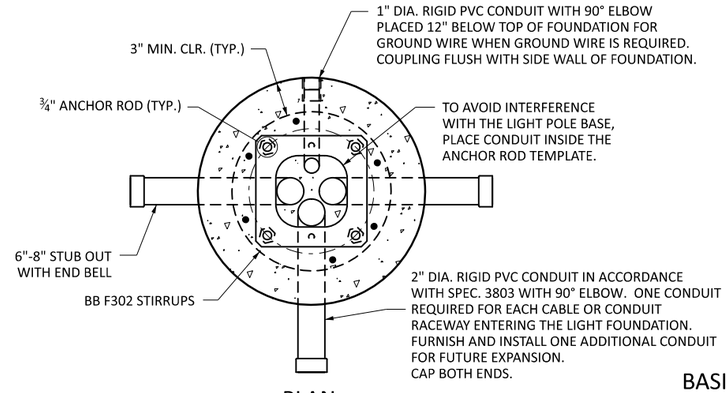


F502

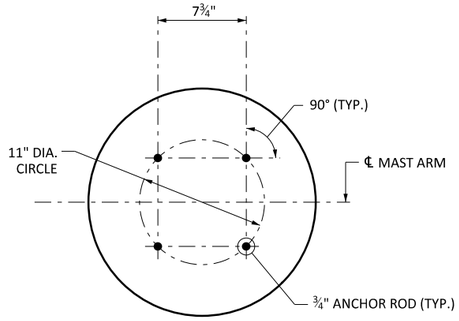


F303

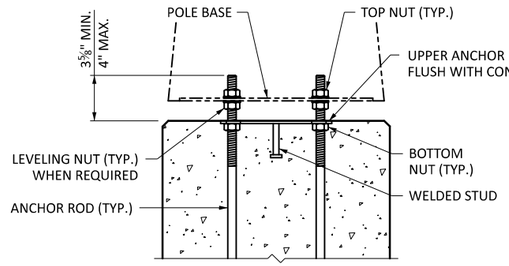
LEAD EXPERT OFFICE	BRIAN SORENSON STATE TRAFFIC ENGINEER OFFICE OF TRAFFIC ENGINEERING		LIGHT FOUNDATION - DESIGN P SPREAD FOOTING 25' POLE OR LESS	NOT APPROVED	STATE DESIGN ENGINEER	STANDARD PLAN 5-297.844	3 OF 6
DEPARTMENT OF TRANSPORTATION			STANDARD PLAN	STATE PROJ. NO.		SHEET NO.	
				TRUNK HWY.		TOTAL SHEETS	



PLAN

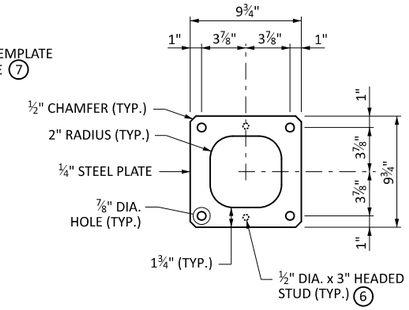


ANCHOR ROD PLACEMENT



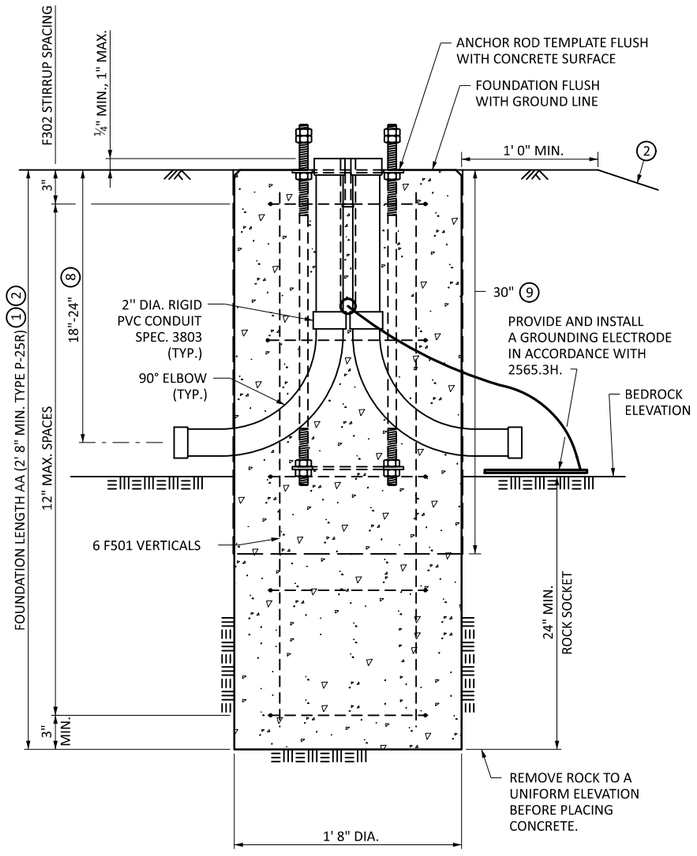
PARTIAL ELEVATION

SHOWING ANCHOR ROD ASSEMBLY & HEX NUT POSITIONS AFTER POLE INSTALLATION



ANCHOR ROD TEMPLATE

TWO REQUIRED PER ASSEMBLY



VERTICAL SECTION

BASIS OF DESIGN:

THE DETAILS SHOWN ON THIS STANDARD PLAN ARE BASED ON THE AASHTO "LRFD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS," FIRST EDITION, 2015, AND THE 2017, 2018, 2019, AND 2020 INTERIM REVISIONS.

STRENGTH LIMIT WIND LOADING OF 120 MPH, SERVICE LIMIT WIND LOADING OF 76 MPH.

TYPE P-25R FOUNDATION - THE DESIGN CONFIGURATION IS 25 FEET TALL WITH 9-FOOT TWIN ARMS. THE SHAPE OF THE LIGHT POLE SHAFT MAY BE ROUND, OCTAGONAL (8-SIDED), OR HEXADECAGONAL (16-SIDED). ALTERNATE POLE SHAPES REQUIRE A SPECIAL FOUNDATION DESIGN. THE MAXIMUM PROJECTED AREA (EPA) OF A SINGLE LUMINAIRE AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 1.50 SQUARE FEET.

GEOTECHNICAL PARAMETERS:

THE FOUNDATION DIMENSIONS SHOWN ON THIS SHEET ARE DESIGNED WITH THE FOLLOWING ASSUMED SOIL PROPERTIES:

COHESIVE SOILS:

MIN. SHEAR STRENGTH:	C = 1.0 ksf
UNIT WEIGHT OF SOIL:	γ = 125±10 pcf

GRANULAR SOILS:

MIN. ANGLE OF FRICTION:	Ø = 30°
UNIT WEIGHT OF SOIL:	γ = 125 pcf
MAX. COEFFICIENT OF FRICTION:	μ = 0.70

BEDROCK:

MIN. UNIAXIAL COMPRESSIVE STRENGTH:	700 psi
MIN. ROCK QUALITY DESIGNATION (RQD):	50%
MIN. JOINT CONDITION RATING ($JCOND_{89}$):	20

A SPECIAL FOUNDATION DESIGN IS REQUIRED WHEN THE SPECIFIED VALUES, CONDITIONS, OR BOTH LISTED ABOVE ARE NOT MET.

NOTES:

USE GRADE 60 REINFORCMENT BARS IN ACCORDANCE WITH ASTM A706 AND STEEL DIE STAMPED "W" ON THE SURFACE.

ATTACH REINFORCING BARS BY TYING, WELDING, OR BOTH. WELD REBAR TOGETHER IN ACCORDANCE WITH ANSI/AWS D1.4.

FIRMLY SUPPORT AND SECURELY TIE REINFORCING BARS, CONDUITS, AND ANCHOR ROD ASSEMBLY IN PROPER POSITION INTO THE FORM AND DRILLED SHAFT. OBTAIN ENGINEER'S APPROVAL BEFORE STARTING CONCRETE PLACEMENT OPERATIONS.

FURNISH AND INSTALL 3G52 CONCRETE MIX IN ACCORDANCE WITH SPEC. 2461.

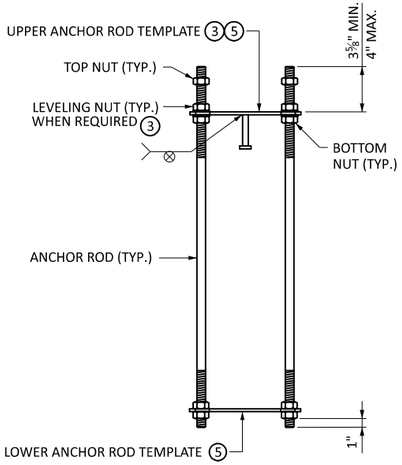
PLACE PREFORMED JOINT FILLER BETWEEN FOUNDATION AND SIDEWALK OR CONCRETE AREAS.

FURNISH AND INSTALL TYPE B ANCHOR RODS IN ACCORDANCE WITH SPEC. 3385.

GALVANIZE ANCHOR ROD ASSEMBLY TEMPLATES IN ACCORDANCE WITH SPEC. 3394.

(1) SEE THE PLAN AND SPECIAL PROVISIONS FOR MODIFIED FOUNDATION DEPTH.

(2) IF THE FOUNDATION IS PLACED ON A SLOPE STEEPER THAN 1V:3H, INCREASE THE MINIMUM FOUNDATION DEPTH BY 12 INCHES. ADDITIONAL REINFORCEMENT IS NOT REQUIRED. SLOPES STEEPER THAN 1V:2H REQUIRE A SPECIAL DESIGN.



ANCHOR ROD ASSEMBLY

(3) FOR SINGLE-NUT ANCHOR ROD CONNECTIONS, USE THE TOP NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. FOR DOUBLE-NUT ANCHOR ROD CONNECTIONS, USE THE LEVELING NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. LEAVE THE NUTS SECURED AGAINST THE TEMPLATE UNTIL POLE INSTALLATION. USE THE REQUIRED HARDWARE FOR ANCHOR ROD CONNECTION IN ACCORDANCE WITH 2545.3H.1.a AND 2545.3H.1.b.

(4) PROTECT ANCHOR ROD THREADS AND LEVELING NUTS ABOVE THE UPPER ANCHOR ROD TEMPLATE FROM CONCRETE CONTAMINATION.

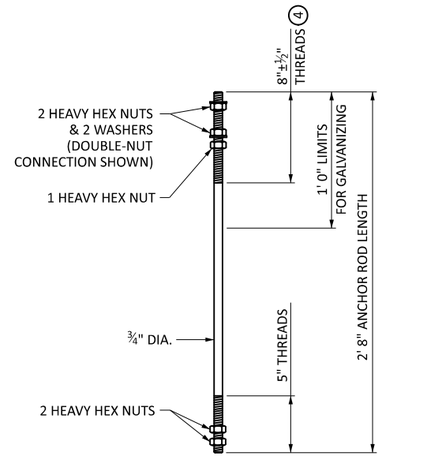
(5) TIGHTEN ANCHOR ROD TEMPLATE NUTS USING A 12-INCH-LONG WRENCH.

(6) FURNISH AND INSTALL HEADED STUDS IN ACCORDANCE WITH 3391.2D "STUD WELDED FASTENERS" ON THE UPPER TEMPLATE AT THE LOCATIONS SHOWN.

(7) REMOVE SURFACE CONTAMINANTS AND APPLY SILICONE SEALANT TO THE UPPER TEMPLATE AROUND THE ANCHOR RODS AND ANCHOR ROD HOLES, AND THE INNER AND OUTER EDGES WHERE THE PLATE MEETS CONCRETE. USE AN APPROVED SILICONE JOINT SEALANT FOUND ON MnDOT'S APL UNDER BRIDGE PRODUCTS.

(8) THE MINIMUM CONDUIT EMBEDMENT IS 18 INCHES BELOW FINISHED GRADE. SEE SPECIAL PROVISIONS IF SHALLOW BEDROCK IS ENCOUNTERED AND A REDUCED EMBEDMENT DEPTH IS REQUIRED.

(9) FURNISH AND INSTALL A MAXIMUM 30" LONG CONCRETE FORMING TUBE TO FORM THE UPPER PORTION OF THE FOUNDATION. DO NOT USE A FULL-LENGTH FORMING TUBE.



ANCHOR ROD & HARDWARE

FOUR REQUIRED PER ASSEMBLY

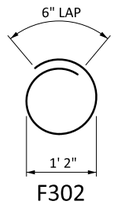
BILL OF REINFORCEMENT - TYPE P-25R

BAR	QTY.	LENGTH	SHAPE	LOCATION
F501	6	AA - 6"	——	SHAFT VERTICALS
F302	BB	4' 3"	TIES	SHAFT TIES

TO DETERMINE THE NUMBER OF F302 STIRRUPS REQUIRED, SUBTRACT 6 INCHES FROM THE OVERALL LENGTH OF FOUNDATION, AA, MEASURED IN FEET. ROUND THE VALUE TO THE NEXT HIGHEST INTEGER, IN FEET, AND ADD 1 FOOT. THE RESULTING VALUE, WITH UNITS REMOVED, REPRESENTS THE REQUIRED QUANTITY.

BAR BENDING DIAGRAM

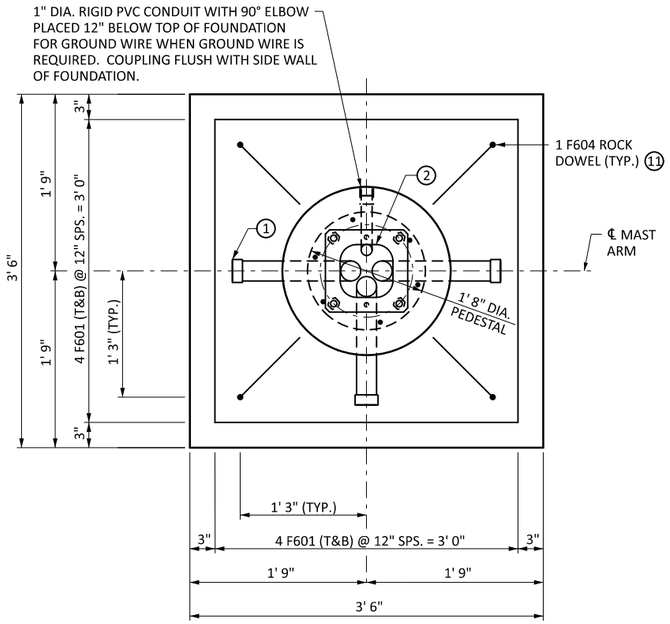
BENT BAR DIMENSIONS GIVEN ARE OUT-TO-OUT. DETERMINE ACTUAL BAR LENGTHS BASED ON THE DETAIL DIMENSIONS SHOWN IN THE BAR BENDING DIAGRAM.



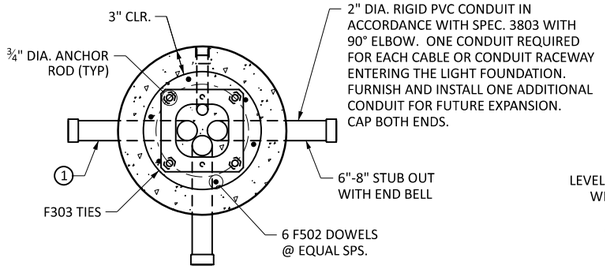
F302

LEAD EXPERT OFFICE	BRIAN SORENSON STATE TRAFFIC ENGINEER OFFICE OF TRAFFIC ENGINEERING		LIGHT FOUNDATION - DESIGN P CAST-IN-PLACE DRILLED SHAFT IN ROCK P-25R 25' POLE OR LESS	NOT APPROVED STATE DESIGN ENGINEER	STANDARD PLAN 5-297.844	4 OF 6

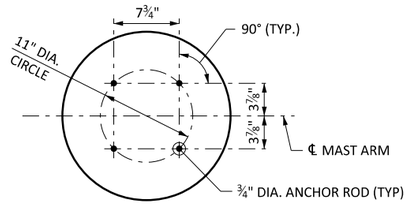
DEPARTMENT OF TRANSPORTATION			STANDARD PLAN	STATE PROJ. NO.	SHEET NO.
				TRUNK HWY.	TOTAL SHEETS



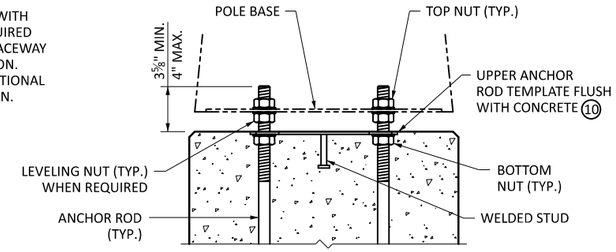
ANCHORED SPREAD FOOTING PLAN



PEDESTAL PLAN

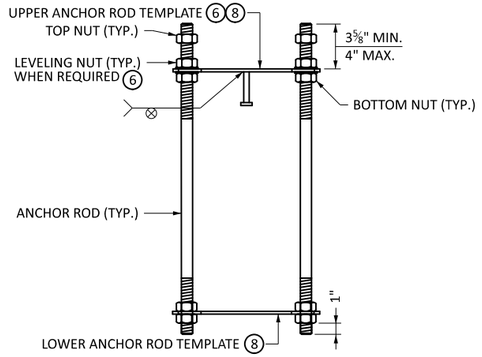


ANCHOR ROD PLACEMENT

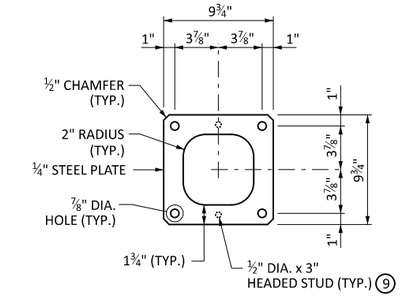


PARTIAL ELEVATION

SHOWING ANCHOR ROD ASSEMBLY & HEX NUT POSITIONS AFTER POLE INSTALLATION

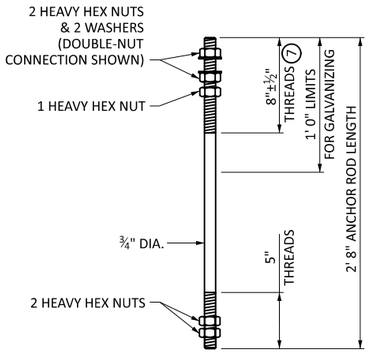


ANCHOR ROD ASSEMBLY



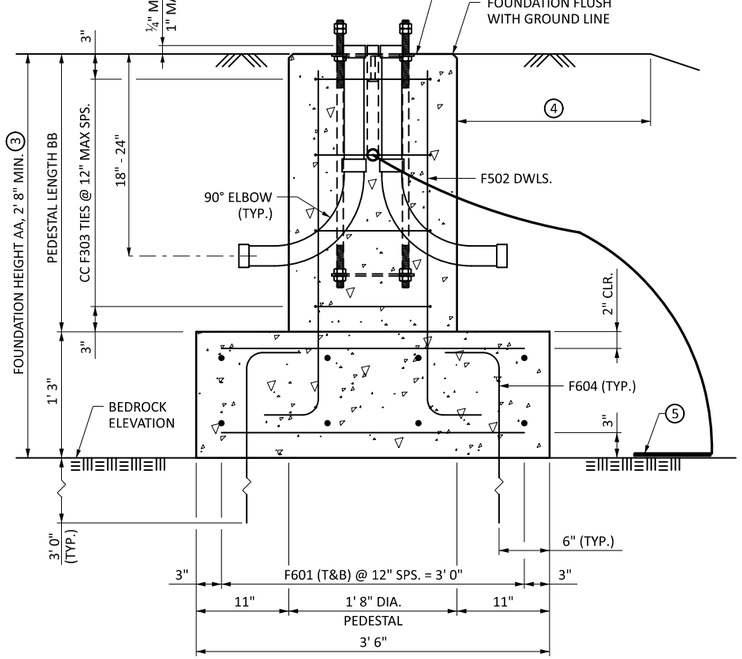
ANCHOR ROD TEMPLATE

TWO REQUIRED PER ASSEMBLY



ANCHOR ROD & HARDWARE

FOUR REQUIRED PER ASSEMBLY



ANCHORED SPREAD FOOTING ELEVATION

BASIS OF DESIGN:

THE DETAILS SHOWN ON THIS STANDARD PLAN ARE BASED ON THE AASHTO "LRFD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS," FIRST EDITION, 2015, AND THE 2017, 2018, 2019, AND 2020 INTERIM REVISIONS.

STRENGTH LIMIT WIND LOADING OF 120 MPH, SERVICE LIMIT WIND LOADING OF 76 MPH.

THE FACTORED BEARING RESISTANCE OF ROCK USED IN DESIGN IS 10 KSF.

THE DESIGN CONFIGURATION IS 25 FEET TALL WITH 9-FOOT TWIN ARMS. THE SHAPE OF THE LIGHT POLE SHAFT MAY BE ROUND, OCTAGONAL (8-SIDED), OR HEXADECAGONAL (16-SIDED). ALTERNATE POLE SHAPES REQUIRE A SPECIAL FOUNDATION DESIGN.

THE MAXIMUM PROJECTED AREA (EPA) OF A SINGLE LUMINIARE AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 1.50 SQUARE FEET.

GEOTECHNICAL PARAMETERS:

THE WATER TABLE IS ASSUMED BELOW THE BOTTOM OF FOOTING ELEVATION.

THE FOUNDATION DIMENSIONS SHOWN ON THIS SHEET ARE DESIGNED WITH THE FOLLOWING ASSUMED SOIL PROPERTIES:

SANDY SOILS
UNIT WEIGHT = 125 PCF
FRICTION ANGLE = 30°

CLAY SOILS
UNIT WEIGHT = 125±10 PCF
COHESION = 1000 PSF
FRICTION ANGLE = 0°

BEDROCK:
UNIAXIAL COMPRESSIVE STRENGTH: 700 psi
ROCK QUALITY DESIGNATION (RQD): 50%
JOINT CONDITION RATING ($JCOND_{89}$): 20

A SPECIAL FOUNDATION DESIGN IS REQUIRED WHEN THE SPECIFIED VALUES, CONDITIONS, OR BOTH LISTED ABOVE ARE NOT MET.

NOTES:

REINFORCEMENT BARS IN ACCORDANCE WITH SPEC. 3301 GRADE 60 OR GREATER. USE DEFORMED STEEL BARS.

FURNISH AND INSTALL 3G52 CONCRETE MIX IN ACCORDANCE WITH SPEC. 2461.

FURNISH AND INSTALL TYPE B ANCHOR RODS IN ACCORDANCE WITH SPEC. 3385.

GALVANIZE ANCHOR ROD ASSEMBLY TEMPLATES IN ACCORDANCE WITH SPEC. 3394.

(T&B) DENOTES TOP AND BOTTOM.

FIRMLY SUPPORT AND SECURELY TIE REINFORCING BARS, CONDUITS, AND ANCHOR ROD ASSEMBLY IN PROPER POSITION IN THE FORMS. OBTAIN ENGINEER'S APPROVAL BEFORE STARTING CONCRETE PLACEMENT OPERATIONS.

PLACE PREFORMED JOINT FILLER BETWEEN FOUNDATION AND SIDEWALK OR CONCRETE AREAS.

(1) EXTEND CONDUITS THROUGH FOOTING WHEN NECESSARY TO MAINTAIN 18-INCH TO 24-INCH EMBEDMENT.

(2) TO AVOID INTERFERENCE WITH THE LIGHT POLE BASE, PLACE CONDUIT INSIDE THE ANCHOR ROD TEMPLATE.

(3) ENSURE BOTTOM OF FOOTING IS SUPPORTED ON COMPETENT BEDROCK.

(4) ENSURE GROUND IS LEVEL OVER THE PLAN DIMENSIONS OF THE FOOTING.

(5) PROVIDE AND INSTALL A GROUNDING ELECTRODE IN ACCORDANCE WITH 2565.3H.

(6) FOR SINGLE-NUT ANCHOR ROD CONNECTIONS, USE THE TOP NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. FOR DOUBLE-NUT ANCHOR ROD CONNECTIONS, USE THE LEVELING NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. LEAVE THE NUTS SECURED AGAINST THE TEMPLATE UNTIL POLE INSTALLATION. USE THE REQUIRED HARDWARE FOR ANCHOR ROD CONNECTION IN ACCORDANCE WITH 2545.3H.1.a AND 2545.3H.1.b.

(7) PROTECT ANCHOR ROD THREADS AND LEVELING NUTS ABOVE THE UPPER ANCHOR ROD TEMPLATE FROM CONCRETE CONTAMINATION.

(8) TIGHTEN ANCHOR ROD TEMPLATE NUTS USING A 12-INCH-LONG WRENCH.

(9) FURNISH AND INSTALL HEADED STUDS IN ACCORDANCE WITH 3391.2D "STUD WELDED FASTENERS" ON THE UPPER TEMPLATE AT THE LOCATIONS SHOWN.

(10) REMOVE SURFACE CONTAMINANTS AND APPLY SILICONE SEALANT TO THE UPPER TEMPLATE AROUND THE ANCHOR RODS AND ANCHOR ROD HOLES, AND THE INNER AND OUTER EDGES WHERE THE PLATE MEETS CONCRETE. USE AN APPROVED SILICONE JOINT SEALANT FOUND ON MnDOT'S APL UNDER BRIDGE PRODUCTS.

(11) PLACE ROCK DOWEL IN 3-INCH-DIAMETER HOLE AND ANCHOR USING AN APPROVED NON-SHRINK GROUT FOUND ON MnDOT'S APL UNDER CONCRETE PRODUCTS.

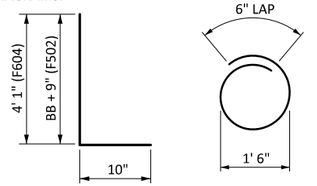
BILL OF REINFORCEMENT

BAR	QTY.	LENGTH	SHAPE	LOCATION
F601	16	3' 0"		FOOTING REINFORCEMENT
F502	6	BB + 1' 7"		FOOTING DOWELS
F303	CC	4' 2"	TIES	PEDESTAL TIES
F604	4	4' 11"		ROCK DOWELS

TO DETERMINE THE NUMBER OF F403 TIES REQUIRED, SUBTRACT 6 INCHES FROM THE OVERALL LENGTH OF PEDESTAL, BB, MEASURED IN FEET. ROUND THE VALUE TO THE NEXT HIGHEST INTEGER, IN FEET, AND ADD 1 FOOT. THE RESULTING VALUE, WITH UNITS REMOVED, REPRESENTS THE REQUIRED QUANTITY.

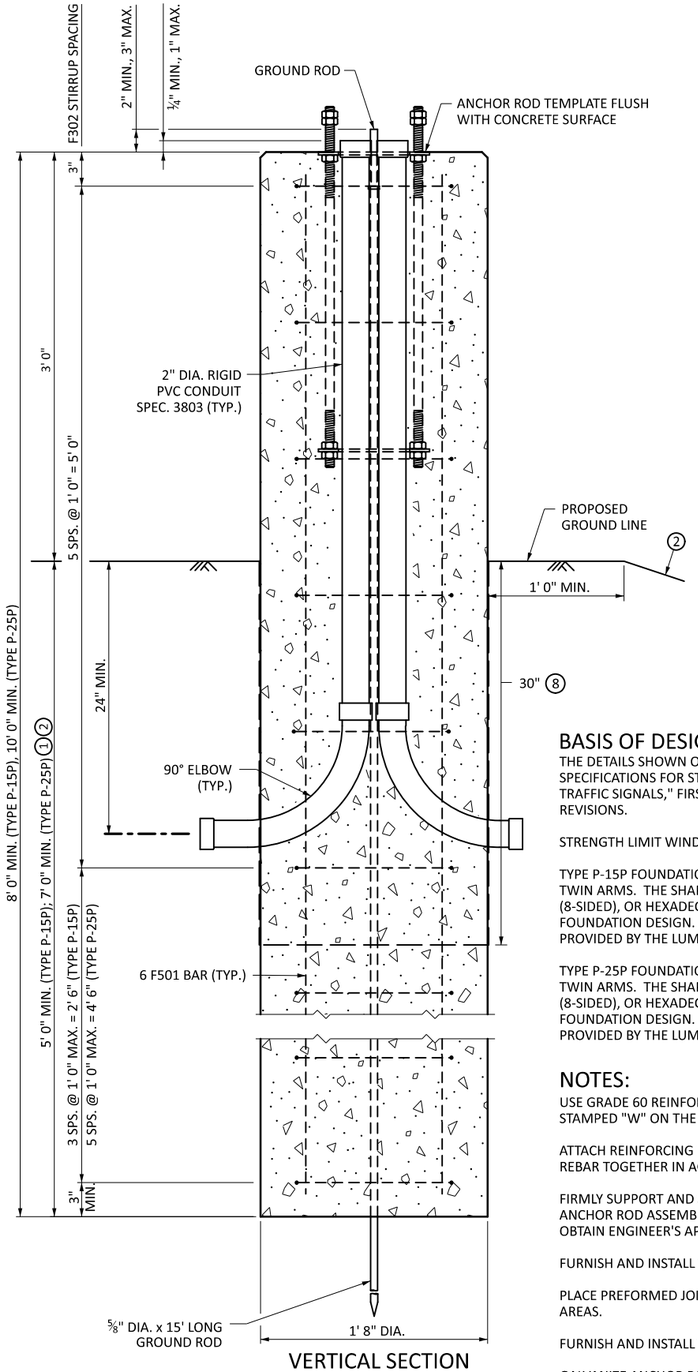
BAR BENDING DIAGRAMS

BENT BAR DIMENSIONS GIVEN ARE OUT-TO-OUT. DETERMINE ACTUAL BAR LENGTHS BASED ON THE DETAIL DIMENSIONS SHOWN IN THE BAR BENDING DIAGRAMS.

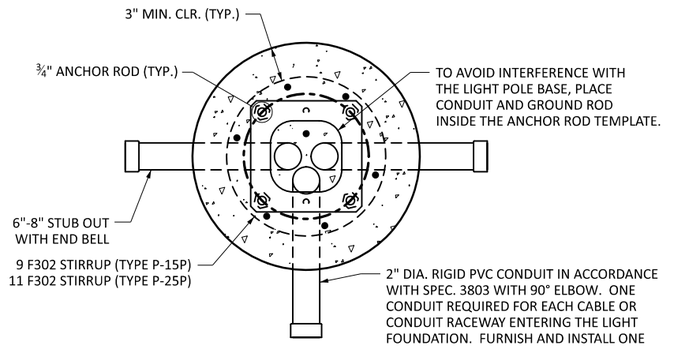


F502 & F604 F303

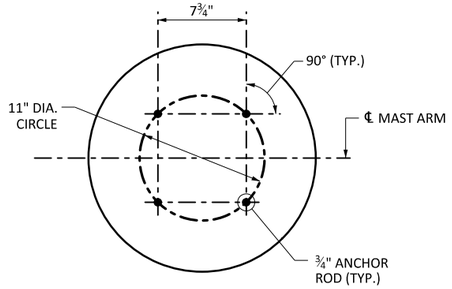
LEAD EXPERT OFFICE	BRIAN SORENSON STATE TRAFFIC ENGINEER OFFICE OF TRAFFIC ENGINEERING		LIGHT FOUNDATION - DESIGN P ANCHORED SPREAD FOOTING ON ROCK P-25A 25' POLE OR LESS	NOT APPROVED STATE DESIGN ENGINEER	STANDARD PLAN 5-297.844	5 OF 6
DEPARTMENT OF TRANSPORTATION			STANDARD PLAN	STATE PROJ. NO.	SHEET NO.	
				TRUNK HWY.	TOTAL SHEETS	



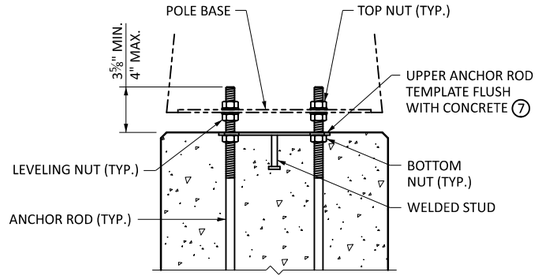
VERTICAL SECTION



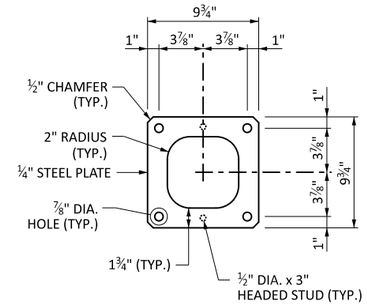
PLAN



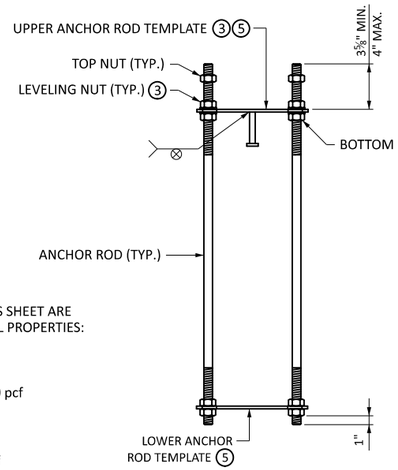
ANCHOR ROD PLACEMENT



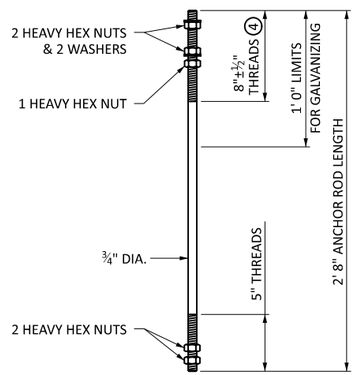
PARTIAL ELEVATION
SHOWING ANCHOR ROD ASSEMBLY & HEX NUT POSITIONS AFTER POLE INSTALLATION



ANCHOR ROD TEMPLATE
TWO REQUIRED PER ASSEMBLY



ANCHOR ROD ASSEMBLY



ANCHOR ROD & HARDWARE
FOUR REQUIRED PER ASSEMBLY

BASIS OF DESIGN:

THE DETAILS SHOWN ON THIS STANDARD PLAN ARE BASED ON THE AASHTO "LRFD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS," FIRST EDITION, 2015, AND THE 2017, 2018, 2019, AND 2020 INTERIM REVISIONS.

STRENGTH LIMIT WIND LOADING OF 120 MPH, SERVICE LIMIT WIND LOADING OF 76 MPH.

TYPE P-15P FOUNDATION - THE DESIGN CONFIGURATION IS 15 FEET TALL WITH 3-FOOT TWIN ARMS. THE SHAPE OF THE LIGHT POLE SHAFT MAY BE ROUND, OCTAGONAL (8-SIDED), OR HEXADECAGONAL (16-SIDED). ALTERNATE POLE SHAPES REQUIRE A SPECIAL FOUNDATION DESIGN. THE MAXIMUM PROJECTED AREA (EPA) OF A SINGLE LUMINAIRE AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 2.0 SQUARE FEET.

TYPE P-25P FOUNDATION - THE DESIGN CONFIGURATION IS 25 FEET TALL WITH 9-FOOT TWIN ARMS. THE SHAPE OF THE LIGHT POLE SHAFT MAY BE ROUND, OCTAGONAL (8-SIDED), OR HEXADECAGONAL (16-SIDED). ALTERNATE POLE SHAPES REQUIRE A SPECIAL FOUNDATION DESIGN. THE MAXIMUM PROJECTED AREA (EPA) OF A SINGLE LUMINAIRE AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 1.50 SQUARE FEET.

NOTES:

USE GRADE 60 REINFORCMENT BARS IN ACCORDANCE WITH ASTM A706 AND STEEL DIE STAMPED "W" ON THE SURFACE.

ATTACH REINFORCING BARS BY TYING, WELDING, OR A COMBINATION THEREOF. WELD REBAR TOGETHER IN ACCORDANCE WITH ANSI/AWS D1.4.

FIRMLY SUPPORT AND SECURELY TIE REINFORCING BARS, CONDUITS, GROUND ROD, AND ANCHOR ROD ASSEMBLY IN PROPER POSITION INTO THE FORM AND DRILLED SHAFT. OBTAIN ENGINEER'S APPROVAL BEFORE STARTING CONCRETE PLACEMENT OPERATIONS.

FURNISH AND INSTALL 3G52 CONCRETE MIX IN ACCORDANCE WITH SPEC. 2461.

PLACE PREFORMED JOINT FILLER BETWEEN FOUNDATION AND SIDEWALK OR CONCRETE AREAS.

FURNISH AND INSTALL TYPE B ANCHOR RODS IN ACCORDANCE WITH SPEC. 3385.

GALVANIZE ANCHOR ROD ASSEMBLY TEMPLATES IN ACCORDANCE WITH SPEC. 3394.

GEOTECHNICAL PARAMETERS:

THE FOUNDATION DIMENSIONS SHOWN ON THIS SHEET ARE DESIGNED WITH THE FOLLOWING ASSUMED SOIL PROPERTIES:

COHESIVE SOILS:

MIN. SHEAR STRENGTH:	C = 1.0 ksf
UNIT WEIGHT OF SOIL:	γ = 125±10 pcf

GRANULAR SOILS:

MIN. ANGLE OF FRICTION:	Ø = 30°
UNIT WEIGHT OF SOIL:	γ = 125 pcf
MAX. COEFFICIENT OF FRICTION:	μ = 0.70

A SPECIAL FOUNDATION DESIGN IS REQUIRED WHEN THE SPECIFIED VALUES, CONDITIONS, OR BOTH LISTED ABOVE ARE NOT MET.

1. SEE THE PLAN AND SPECIAL PROVISIONS FOR MODIFIED FOUNDATION DEPTH.
2. IF THE FOUNDATION IS PLACED ON A SLOPE STEEPER THAN 1V:3H, INCREASE THE MINIMUM FOUNDATION DEPTH BY 12 INCHES. ADDITIONAL REINFORCEMENT IS NOT REQUIRED. SLOPES STEEPER THAN 1V:2H REQUIRE A SPECIAL DESIGN.
3. USE THE LEVELING NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. LEAVE THE NUTS SECURED AGAINST THE TEMPLATE UNTIL POLE INSTALLATION. USE THE REQUIRED HARDWARE FOR ANCHOR ROD CONNECTION IN ACCORDANCE WITH 2545.3H.1.a AND 2545.3H.1.b.
4. PROTECT ANCHOR ROD THREADS AND LEVELING NUTS ABOVE THE UPPER ANCHOR ROD TEMPLATE FROM CONCRETE CONTAMINATION.
5. TIGHTEN ANCHOR ROD TEMPLATE NUTS USING A 12-INCH-LONG WRENCH.
6. FURNISH AND INSTALL HEADED STUDS IN ACCORDANCE WITH 3391.2.D "STUD WELDED FASTENERS" ON THE UPPER TEMPLATE AT THE LOCATIONS SHOWN.
7. REMOVE SURFACE CONTAMINANTS AND APPLY SILICONE SEALANT TO THE UPPER TEMPLATE AROUND THE ANCHOR RODS AND ANCHOR ROD HOLES, AND THE INNER AND OUTER EDGES WHERE THE PLATE MEETS CONCRETE. USE AN APPROVED SILICONE JOINT SEALANT FOUND ON MnDOT'S APL UNDER BRIDGE PRODUCTS.
8. FURNISH AND INSTALL A CONCRETE FORMING TUBE TO FORM THE UPPER PORTION OF THE FOUNDATION AND A MAXIMUM 30" BELOW FINISHED GRADE. REMOVE THE PORTION OF THE FORMING TUBE ABOVE THE FINISHED GRADE AFTER PLACING THE POLE.

BILL OF REINFORCEMENT - TYPE P-15P

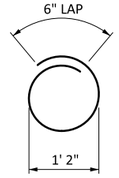
BAR	QTY.	LENGTH	SHAPE	LOCATION
F501	6	7' 8"	——	SHAFT VERTICALS
F302	9	4' 3"	TIES	SHAFT TIES

BILL OF REINFORCEMENT - TYPE P-25P

BAR	QTY.	LENGTH	SHAPE	LOCATION
F501	6	9' 8"	——	SHAFT VERTICALS
F302	11	4' 3"	TIES	SHAFT TIES

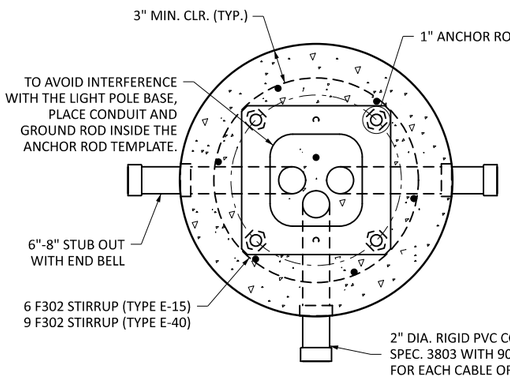
BAR BENDING DIAGRAM

BENT BAR DIMENSIONS GIVEN ARE OUT-TO-OUT. DETERMINE ACTUAL BAR LENGTHS BASED ON THE DETAIL DIMENSIONS SHOWN IN THE BAR BENDING DIAGRAM.

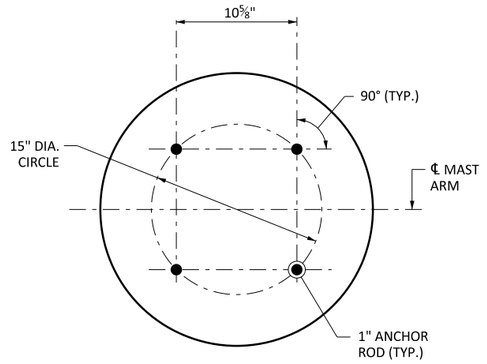


F302

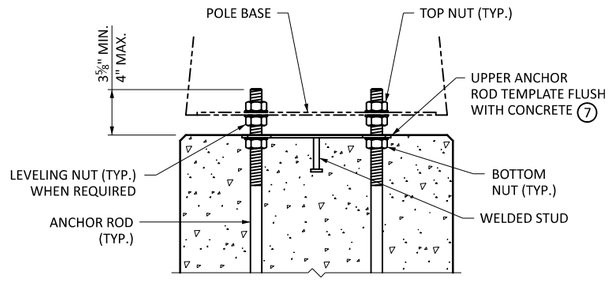
LEAD EXPERT OFFICE	BRIAN SORENSON STATE TRAFFIC ENGINEER OFFICE OF TRAFFIC ENGINEERING		HIGH-TOP LIGHT FOUNDATION - DESIGN P CAST-IN-PLACE DRILLED SHAFT P-15P 15' POLE OR LESS P-25P 25' POLE OR LESS	NOT APPROVED STATE DESIGN ENGINEER	STANDARD PLAN 5-297.844	6 OF 6
DEPARTMENT OF TRANSPORTATION			STANDARD PLAN	STATE PROJ. NO. TRUNK HWY.	SHEET NO. TOTAL SHEETS	



PLAN

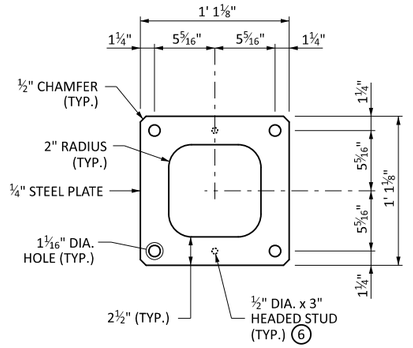


ANCHOR ROD PLACEMENT



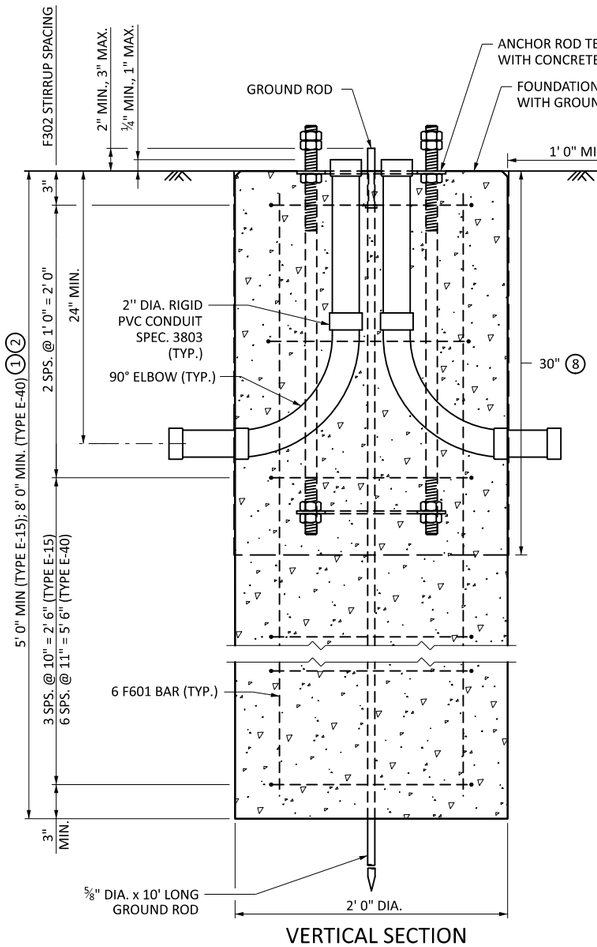
PARTIAL ELEVATION

SHOWING ANCHOR ROD ASSEMBLY & HEX NUT POSITIONS AFTER POLE INSTALLATION



ANCHOR ROD TEMPLATE

TWO REQUIRED PER ASSEMBLY



VERTICAL SECTION

BASIS OF DESIGN:

THE DETAILS SHOWN ON THIS STANDARD PLAN ARE BASED ON THE AASHTO "LRFD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS," FIRST EDITION, 2015, AND THE 2017, 2018, 2019, AND 2020 INTERIM REVISIONS.

STRENGTH LIMIT WIND LOADING OF 120 MPH, SERVICE LIMIT WIND LOADING OF 76 MPH.

TYPE E-15 FOUNDATION - THE DESIGN CONFIGURATION IS 15 FEET TALL WITH 3-FOOT TWIN ARMS. THE SHAPE OF THE LIGHT POLE SHAFT MAY BE ROUND, OCTAGONAL (8-SIDED), OR HEXADECAGONAL (16-SIDED). ALTERNATE POLE SHAPES REQUIRE A SPECIAL FOUNDATION DESIGN. THE MAXIMUM PROJECTED AREA (EPA) OF A SINGLE LUMINAIRE AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 3.50 SQUARE FEET.

TYPE E-40 FOUNDATION - THE DESIGN CONFIGURATION IS 40 FEET TALL WITH 12-FOOT TWIN ARMS. THE SHAPE OF THE LIGHT POLE SHAFT MAY BE ROUND OR HEXADECAGONAL (16-SIDED). ALTERNATE POLE SHAPES REQUIRE A SPECIAL FOUNDATION DESIGN. THE MAXIMUM PROJECTED AREA (EPA) OF A SINGLE LUMINAIRE AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 1.50 SQUARE FEET.

GEOTECHNICAL PARAMETERS:

THE FOUNDATION DIMENSIONS SHOWN ON THIS SHEET ARE DESIGNED WITH THE FOLLOWING ASSUMED SOIL PROPERTIES:

COHESIVE SOILS:

MIN. SHEAR STRENGTH:	C = 1.0 ksf
UNIT WEIGHT OF SOIL:	γ = 125±10 pcf

GRANULAR SOILS:

MIN. ANGLE OF FRICTION:	Ø = 30°
UNIT WEIGHT OF SOIL:	γ = 125 pcf
MAX. COEFFICIENT OF FRICTION:	μ = 0.70

A SPECIAL FOUNDATION DESIGN IS REQUIRED WHEN THE SPECIFIED VALUES, CONDITIONS, OR BOTH LISTED ABOVE ARE NOT MET.

NOTES:

USE GRADE 60 WELDABLE REINFORCING BARS IN ACCORDANCE WITH ASTM A706 AND STEEL DIE STAMPED "W" ON THE SURFACE.

ATTACH REINFORCING BARS BY TYING, WELDING, OR BOTH. WELD REBAR TOGETHER IN ACCORDANCE WITH ANSI/AWS D1.4.

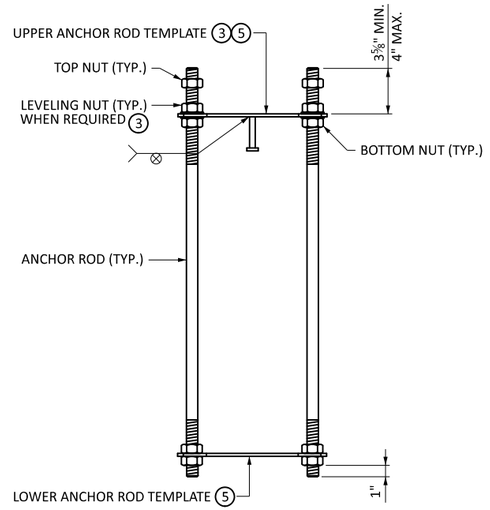
FIRMLY SUPPORT AND SECURELY TIE REINFORCING BARS, CONDUITS, GROUND ROD, AND ANCHOR ROD ASSEMBLY IN PROPER POSITION INTO THE FORM AND DRILLED SHAFT. OBTAIN ENGINEER'S APPROVAL BEFORE STARTING CONCRETE PLACEMENT OPERATIONS.

FURNISH AND INSTALL 3G52 CONCRETE MIX IN ACCORDANCE WITH SPEC. 2461.

PLACE PREFORMED JOINT FILLER BETWEEN FOUNDATION AND SIDEWALK OR CONCRETE AREAS.

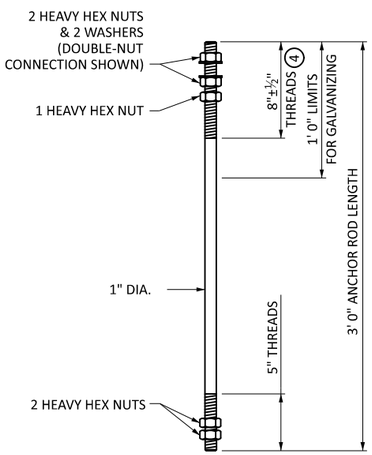
FURNISH AND INSTALL TYPE B ANCHOR RODS IN ACCORDANCE WITH SPEC. 3385.

GALVANIZE ANCHOR ROD ASSEMBLY TEMPLATES IN ACCORDANCE WITH SPEC. 3394.



ANCHOR ROD ASSEMBLY

1. SEE THE PLAN AND SPECIAL PROVISIONS FOR MODIFIED FOUNDATION DEPTH.
2. IF THE FOUNDATION IS PLACED ON A SLOPE STEEPER THAN 1V:3H, INCREASE THE MINIMUM FOUNDATION DEPTH BY 12 INCHES. ADDITIONAL REINFORCEMENT IS NOT REQUIRED. SLOPES STEEPER THAN 1V:2H REQUIRE A SPECIAL DESIGN.
3. FOR SINGLE-NUT ANCHOR ROD CONNECTIONS, USE THE TOP NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. FOR DOUBLE-NUT ANCHOR ROD CONNECTIONS, USE THE LEVELING NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. LEAVE THE NUTS SECURED AGAINST THE TEMPLATE UNTIL POLE INSTALLATION. USE THE REQUIRED HARDWARE FOR ANCHOR ROD CONNECTION IN ACCORDANCE WITH 2545.3H.1.a AND 2545.3H.1.b.
4. PROTECT ANCHOR ROD THREADS AND LEVELING NUTS ABOVE THE UPPER ANCHOR ROD TEMPLATE FROM CONCRETE CONTAMINATION.
5. TIGHTEN ANCHOR ROD TEMPLATE NUTS USING A 12-INCH-LONG WRENCH.
6. FURNISH AND INSTALL HEADED STUDS IN ACCORDANCE WITH 3391.2D "STUD WELDED FASTENERS" ON THE UPPER TEMPLATE AT THE LOCATIONS SHOWN.
7. REMOVE SURFACE CONTAMINANTS AND APPLY SILICONE SEALANT TO THE UPPER TEMPLATE AROUND THE ANCHOR RODS AND ANCHOR ROD HOLES, AND THE INNER AND OUTER EDGES WHERE THE PLATE MEETS CONCRETE. USE AN APPROVED SILICONE JOINT SEALANT FOUND ON MnDOT'S APL UNDER BRIDGE PRODUCTS.
8. FURNISH AND INSTALL A MAXIMUM 30" LONG CONCRETE FORMING TUBE TO FORM THE UPPER PORTION OF THE FOUNDATION. DO NOT USE A FULL-LENGTH FORMING TUBE.



ANCHOR ROD & HARDWARE

FOUR REQUIRED PER ASSEMBLY

BILL OF REINFORCEMENT - TYPE E-15

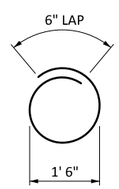
BAR	QTY.	LENGTH	SHAPE	LOCATION
F601	6	4' 6"	——	SHAFT VERTICALS
F302	6	5' 3"	TIES	SHAFT TIES

BILL OF REINFORCEMENT - TYPE E-40

BAR	QTY.	LENGTH	SHAPE	LOCATION
F601	6	7' 6"	——	SHAFT VERTICALS
F302	9	5' 3"	TIES	SHAFT TIES

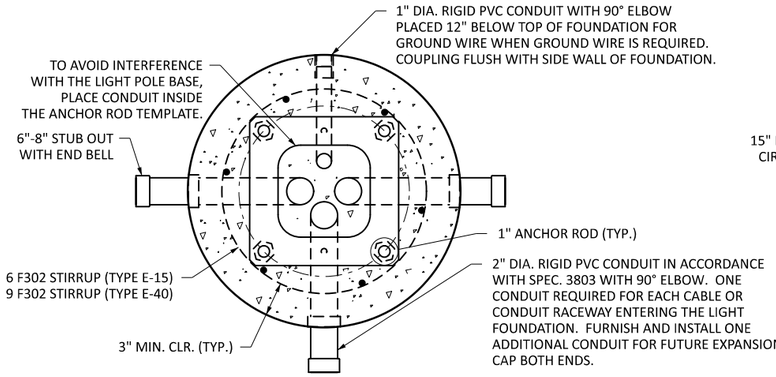
BAR BENDING DIAGRAM

BENT BAR DIMENSIONS GIVEN ARE OUT-TO-OUT. DETERMINE ACTUAL BAR LENGTHS BASED ON THE DETAIL DIMENSIONS SHOWN IN THE BAR BENDING DIAGRAM.

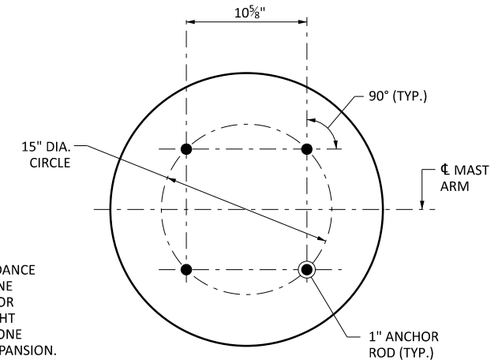


F302

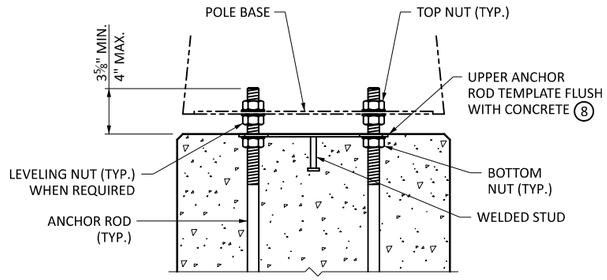
LEAD EXPERT OFFICE	BRIAN SORENSON STATE TRAFFIC ENGINEER OFFICE OF TRAFFIC ENGINEERING		LIGHT FOUNDATION - DESIGN E CAST-IN-PLACE DRILLED SHAFT E-15 15' POLE OR LESS E-40 40' POLE OR LESS	NOT APPROVED STATE DESIGN ENGINEER	STANDARD PLAN 5-297.845	1 OF 6
DEPARTMENT OF TRANSPORTATION			STANDARD PLAN	STATE PROJ. NO.	SHEET NO.	
				TRUNK HWY.	TOTAL SHEETS	



PLAN

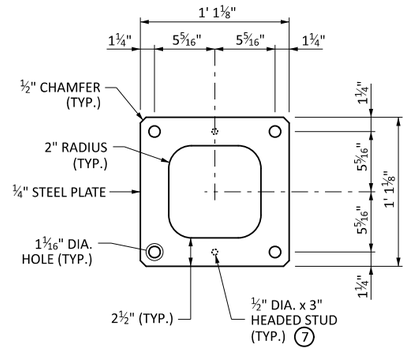


ANCHOR ROD PLACEMENT



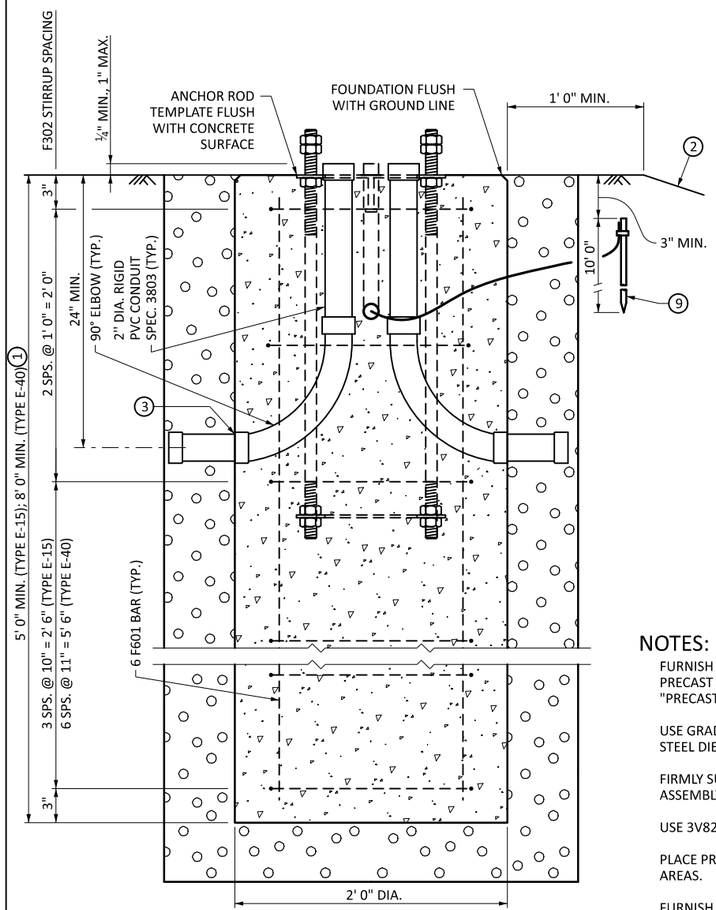
PARTIAL ELEVATION

SHOWING ANCHOR ROD ASSEMBLY & HEX NUT POSITIONS AFTER POLE INSTALLATION



ANCHOR ROD TEMPLATE

TWO REQUIRED PER ASSEMBLY



VERTICAL SECTION

EXCAVATE AND BACKFILL IN ACCORDANCE WITH SPEC. 2545.3.

BASIS OF DESIGN:

THE DETAILS SHOWN ON THIS STANDARD PLAN ARE BASED ON THE AASHTO "LRFD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS," FIRST EDITION, 2015, AND THE 2017, 2018, 2019, AND 2020 INTERIM REVISIONS.

STRENGTH LIMIT WIND LOADING OF 120 MPH, SERVICE LIMIT WIND LOADING OF 76 MPH.

TYPE E-15 FOUNDATION - THE DESIGN CONFIGURATION IS 15 FEET TALL WITH 3-FOOT TWIN ARMS. THE SHAPE OF THE LIGHT POLE SHAFT MAY BE ROUND, OCTAGONAL (8-SIDED), OR HEXADECAGONAL (16-SIDED). ALTERNATE POLE SHAPES REQUIRE A SPECIAL FOUNDATION DESIGN. THE MAXIMUM PROJECTED AREA (EPA) OF A SINGLE LUMINAIRE AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 3.50 SQUARE FEET.

TYPE E-40 FOUNDATION - THE DESIGN CONFIGURATION IS 40 FEET TALL WITH 12-FOOT TWIN ARMS. THE SHAPE OF THE LIGHT POLE SHAFT MAY BE ROUND OR HEXADECAGONAL (16-SIDED). ALTERNATE POLE SHAPES REQUIRE A SPECIAL FOUNDATION DESIGN. THE MAXIMUM PROJECTED AREA (EPA) OF A SINGLE LUMINAIRE AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 1.50 SQUARE FEET.

GEOTECHNICAL PARAMETERS:

THE FOUNDATION DIMENSIONS SHOWN ON THIS SHEET ARE DESIGNED WITH THE FOLLOWING ASSUMED SOIL PROPERTIES:

COHESIVE SOILS:

MIN. SHEAR STRENGTH:	C = 1.0 ksf
UNIT WEIGHT OF SOIL:	γ = 125±10 pcf

GRANULAR SOILS:

MIN. ANGLE OF FRICTION:	Ø = 30°
UNIT WEIGHT OF SOIL:	γ = 125 pcf
MAX. COEFFICIENT OF FRICTION:	μ = 0.70

A SPECIAL FOUNDATION DESIGN IS REQUIRED WHEN THE SPECIFIED VALUES, CONDITIONS, OR BOTH LISTED ABOVE ARE NOT MET.

NOTES:

FURNISH AND INSTALL PRECAST CONCRETE LIGHT FOUNDATIONS MANUFACTURED IN A PRECAST CONCRETE MANUFACTURING PLANT IN ACCORDANCE WITH SPEC. 3238 "PRECAST CONCRETE BOX CULVERTS."

USE GRADE 60 WELDABLE REINFORCING BARS IN ACCORDANCE WITH ASTM A706 AND STEEL DIE STAMPED "W" ON THE SURFACE.

FIRMLY SUPPORT AND SECURELY TIE REINFORCING BARS, CONDUITS, AND ANCHOR ROD ASSEMBLY IN PROPER POSITION INTO THE FORM.

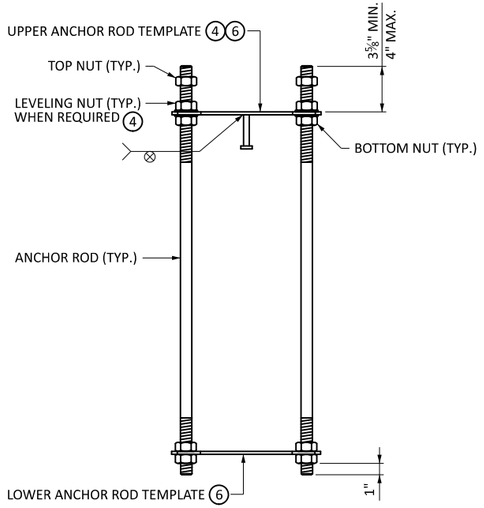
USE 3V82 CONCRETE MIX.

PLACE PREFORMED JOINT FILLER BETWEEN FOUNDATION AND SIDEWALK OR CONCRETE AREAS.

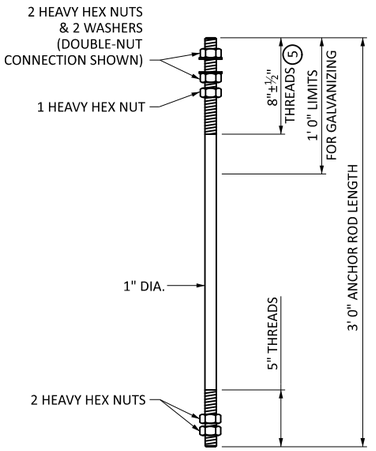
FURNISH AND INSTALL TYPE B ANCHOR RODS IN ACCORDANCE WITH SPEC. 3385.

GALVANIZE ANCHOR ROD ASSEMBLY TEMPLATES IN ACCORDANCE WITH SPEC. 3394.

(1) SEE THE PLAN AND SPECIAL PROVISIONS FOR MODIFIED FOUNDATION DEPTH.



ANCHOR ROD ASSEMBLY



ANCHOR ROD & HARDWARE

FOUR REQUIRED PER ASSEMBLY

(2) IF THE FOUNDATION IS PLACED ON A SLOPE STEEPER THAN 1V:3H, INCREASE THE MINIMUM FOUNDATION DEPTH BY 12 INCHES. ADDITIONAL REINFORCEMENT IS NOT REQUIRED. SLOPES STEEPER THAN 1V:2H REQUIRE A SPECIAL DESIGN.

(3) CUT AND SPLICE ELBOW AS REQUIRED TO ACCOMMODATE FORM.

(4) FOR SINGLE-NUT ANCHOR ROD CONNECTIONS, USE THE TOP NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. FOR DOUBLE-NUT ANCHOR ROD CONNECTIONS, USE THE LEVELING NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. LEAVE THE NUTS SECURED AGAINST THE TEMPLATE UNTIL POLE INSTALLATION. USE THE REQUIRED HARDWARE FOR ANCHOR ROD CONNECTION IN ACCORDANCE WITH 2545.3H.1.a AND 2545.3H.1.b.

(5) PROTECT ANCHOR ROD THREADS AND LEVELING NUTS ABOVE THE UPPER ANCHOR ROD TEMPLATE FROM CONCRETE CONTAMINATION.

(6) TIGHTEN ANCHOR ROD TEMPLATE NUTS USING A 12-INCH-LONG WRENCH.

(7) FURNISH AND INSTALL HEADED STUDS IN ACCORDANCE WITH 3391.2D "STUD WELDED FASTENERS" ON THE UPPER TEMPLATE AT THE LOCATIONS SHOWN.

(8) REMOVE SURFACE CONTAMINANTS AND APPLY SILICONE SEALANT TO THE UPPER TEMPLATE AROUND THE ANCHOR RODS AND ANCHOR ROD HOLES, AND THE INNER AND OUTER EDGES WHERE THE PLATE MEETS CONCRETE. USE AN APPROVED SILICONE JOINT SEALANT FOUND ON MnDOT'S APL UNDER BRIDGE PRODUCTS.

(9) ⅝" DIA. GROUND ROD WITH CLAMP AND 6 AWG SOLID BARE COPPER WIRE. SEE PLAN FOR GROUND ROD LOCATIONS.

BILL OF REINFORCEMENT - TYPE E-15

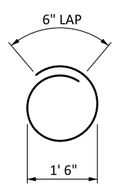
BAR	QTY.	LENGTH	SHAPE	LOCATION
F601	6	4' 6"	——	SHAFT VERTICALS
F302	6	5' 3"	TIES	SHAFT TIES

BILL OF REINFORCEMENT - TYPE E-40

BAR	QTY.	LENGTH	SHAPE	LOCATION
F601	6	7' 6"	——	SHAFT VERTICALS
F302	9	5' 3"	TIES	SHAFT TIES

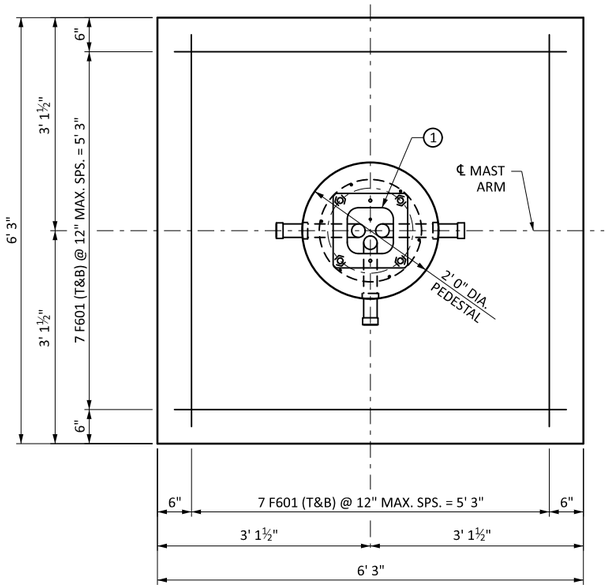
BAR BENDING DIAGRAM

BENT BAR DIMENSIONS GIVEN ARE OUT-TO-OUT. DETERMINE ACTUAL BAR LENGTHS BASED ON THE DETAIL DIMENSIONS SHOWN IN THE BAR BENDING DIAGRAM.

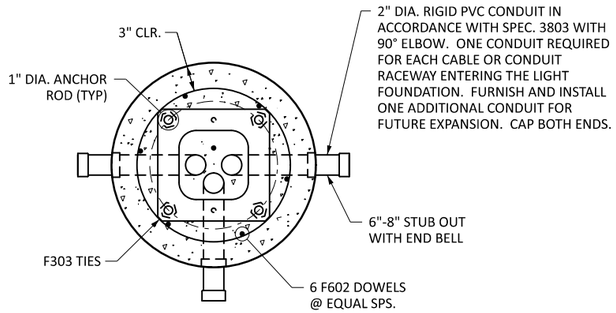


F302

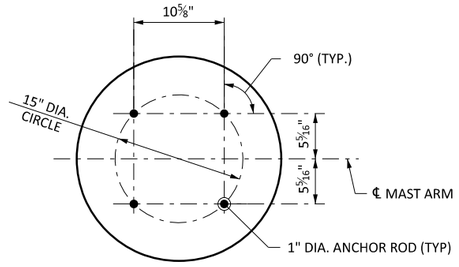
LEAD EXPERT OFFICE	BRIAN SORENSON STATE TRAFFIC ENGINEER OFFICE OF TRAFFIC ENGINEERING		LIGHT FOUNDATION - DESIGN E PRECAST DRILLED SHAFT E-15 15' POLE OR LESS E-40 40' POLE OR LESS	NOT APPROVED STATE DESIGN ENGINEER	STANDARD PLAN 5-297.845	2 OF 6
DEPARTMENT OF TRANSPORTATION			STANDARD PLAN	STATE PROJ. NO. TRUNK HWY.	SHEET NO. TOTAL SHEETS	



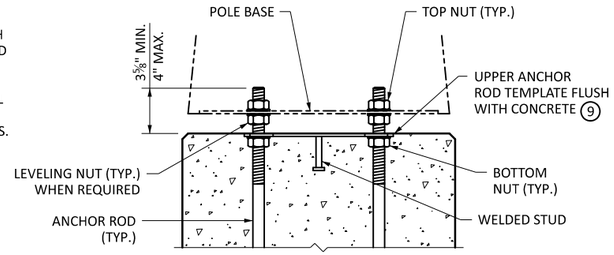
SPREAD FOOTING PLAN



PEDESTAL PLAN

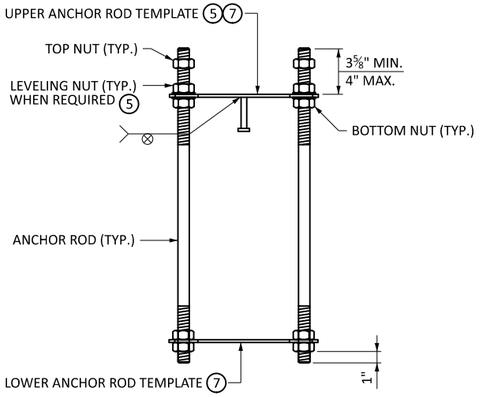


ANCHOR ROD PLACEMENT

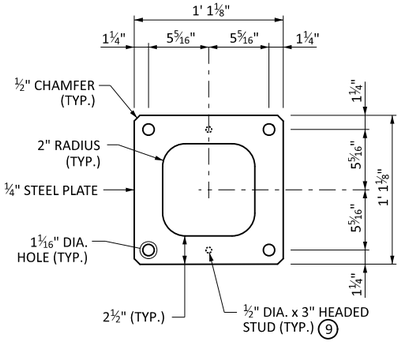


PARTIAL ELEVATION

SHOWING ANCHOR ROD ASSEMBLY & HEX NUT POSITIONS AFTER POLE INSTALLATION

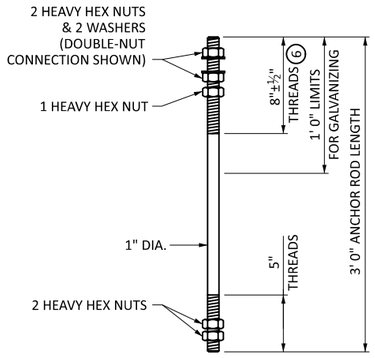


ANCHOR ROD ASSEMBLY



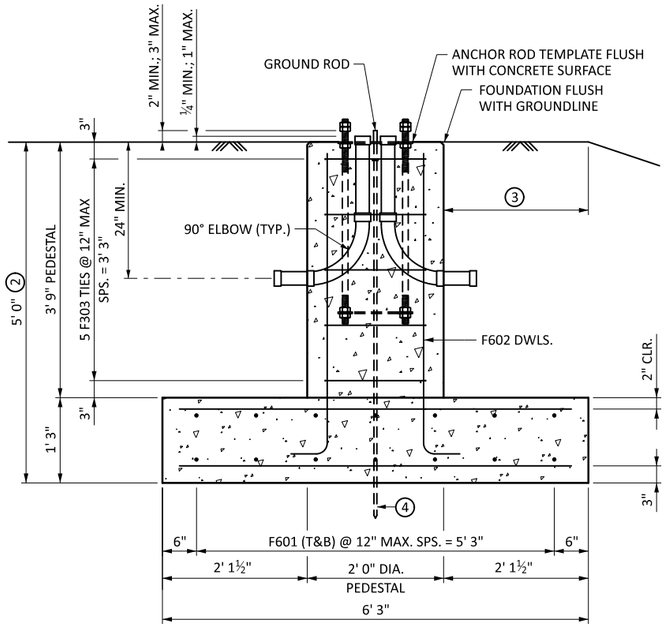
ANCHOR ROD TEMPLATE

TWO REQUIRED PER ASSEMBLY



ANCHOR ROD & HARDWARE

FOUR REQUIRED PER ASSEMBLY



SPREAD FOOTING ELEVATION

BASIS OF DESIGN:

THE DETAILS SHOWN ON THIS STANDARD PLAN ARE BASED ON THE AASHTO "LRFD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS," FIRST EDITION, 2015, AND THE 2017, 2018, 2019, AND 2020 INTERIM REVISIONS.

STRENGTH LIMIT WIND LOADING OF 120 MPH, SERVICE LIMIT WIND LOADING OF 76 MPH.

THE FACTORED BEARING RESISTANCE OF SOIL USED IN DESIGN IS 4 KSF.

THE DESIGN CONFIGURATION IS 40 FEET TALL WITH 12-FOOT TWIN ARMS. THE SHAPE OF THE LIGHT POLE SHAFT MAY BE ROUND OR HEXADECAGONAL (16-SIDED). ALTERNATE POLE SHAPES REQUIRE A SPECIAL FOUNDATION DESIGN.

THE MAXIMUM PROJECTED AREA (EPA) OF A SINGLE LUMINAIRE AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 1.50 SQUARE FEET.

NOTES:

REINFORCEMENT BARS IN ACCORDANCE WITH SPEC. 3301 GRADE 60 OR GREATER. USE DEFORMED STEEL BARS.

FURNISH AND INSTALL 3G52 CONCRETE MIX IN ACCORDANCE WITH SPEC. 2461.

FURNISH AND INSTALL TYPE B ANCHOR RODS IN ACCORDANCE WITH SPEC. 3385.

GALVANIZE ANCHOR ROD ASSEMBLY TEMPLATES IN ACCORDANCE WITH SPEC. 3394.

(T&B) DENOTES TOP AND BOTTOM.

FIRMLY SUPPORT AND SECURELY TIE REINFORCING BARS, CONDUITS, GROUND ROD, AND ANCHOR ROD ASSEMBLY IN PROPER POSITION IN THE FORMS. OBTAIN ENGINEER'S APPROVAL BEFORE STARTING CONCRETE PLACEMENT OPERATIONS.

PLACE PREFORMED JOINT FILLER BETWEEN FOUNDATION AND SIDEWALK OR CONCRETE AREAS.

1. TO AVOID INTERFERENCE WITH THE LIGHT POLE BASE, PLACE CONDUIT AND GROUND ROD INSIDE THE ANCHOR ROD TEMPLATE.
2. PLACE THE BOTTOM OF FOOTING 5 FEET BELOW THE PROPOSED GROUNDLINE.
3. ENSURE GROUND IS LEVEL OVER THE PLAN DIMENSIONS OF THE FOOTING.
4. ⅝" DIAMETER X 10-FOOT-LONG GROUND ROD.

GEOTECHNICAL PARAMETERS:

THE WATER TABLE IS ASSUMED BELOW THE BOTTOM OF FOOTING ELEVATION.

THE FOUNDATION DIMENSIONS SHOWN ON THIS SHEET ARE DESIGNED WITH THE FOLLOWING ASSUMED SOIL PROPERTIES:

SANDY SOILS
UNIT WEIGHT = 125 PCF
FRICTION ANGLE = 30°

CLAY SOILS
UNIT WEIGHT = 125±10 PCF
COHESION = 1000 PSF
FRICTION ANGLE = 0°

A SPECIAL FOUNDATION DESIGN IS REQUIRED WHEN THE SPECIFIED VALUES, CONDITIONS, OR BOTH LISTED ABOVE ARE NOT MET.

LOAD CASE	EFFECTIVE WIDTH B' (FT)	EFFECTIVE SOIL PRESSURE (KSF)
SERVICE	5.03	1.04
STRENGTH	3.26	2.24

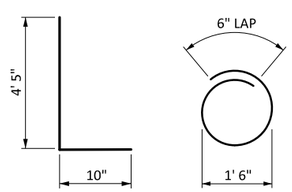
5. FOR SINGLE-NUT ANCHOR ROD CONNECTIONS, USE THE TOP NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. FOR DOUBLE-NUT ANCHOR ROD CONNECTIONS, USE THE LEVELING NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. LEAVE THE NUTS SECURED AGAINST THE TEMPLATE UNTIL POLE INSTALLATION. USE THE REQUIRED HARDWARE FOR ANCHOR ROD CONNECTION IN ACCORDANCE WITH 2545.3H.1.a AND 2545.3H.1.b.
6. PROTECT ANCHOR ROD THREADS AND LEVELING NUTS ABOVE THE UPPER ANCHOR ROD TEMPLATE FROM CONCRETE CONTAMINATION.
7. TIGHTEN ANCHOR ROD TEMPLATE NUTS USING A 12-INCH-LONG WRENCH.
8. FURNISH AND INSTALL HEADED STUDS IN ACCORDANCE WITH 3391.2D "STUD WELDED FASTENERS" ON THE UPPER TEMPLATE AT THE LOCATIONS SHOWN.
9. REMOVE SURFACE CONTAMINANTS AND APPLY SILICONE SEALANT TO THE UPPER TEMPLATE AROUND THE ANCHOR RODS AND ANCHOR ROD HOLES, AND THE INNER AND OUTER EDGES WHERE THE PLATE MEETS CONCRETE. USE AN APPROVED SILICONE JOINT SEALANT FOUND ON MnDOT'S APL UNDER BRIDGE PRODUCTS.

BILL OF REINFORCEMENT

BAR	QTY.	LENGTH	SHAPE	LOCATION
F601	28	5' 9"		FOOTING REINFORCEMENT
F602	6	5' 3"		FOOTING DOWELS
F303	5	5' 3"	TIES	PEDESTAL TIES

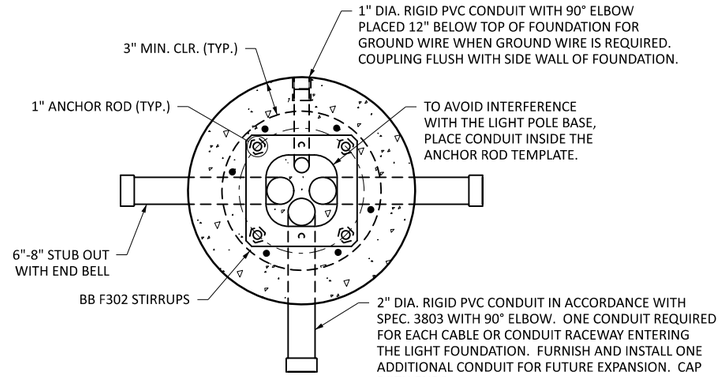
BAR BENDING DIAGRAMS

BENT BAR DIMENSIONS GIVEN ARE OUT-TO-OUT. DETERMINE ACTUAL BAR LENGTHS BASED ON THE DETAIL DIMENSIONS SHOWN IN THE BAR BENDING DIAGRAMS.

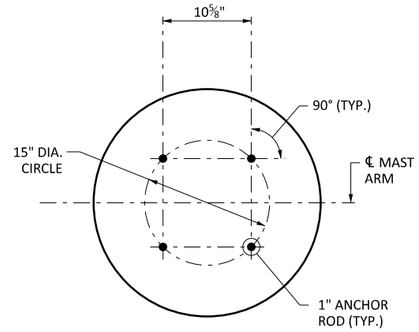


F602 F303

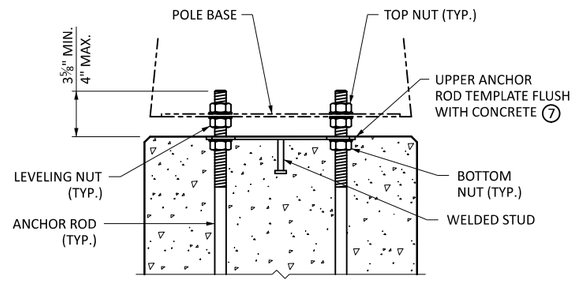
LEAD EXPERT OFFICE	BRIAN SORENSON STATE TRAFFIC ENGINEER OFFICE OF TRAFFIC ENGINEERING		LIGHT FOUNDATION - DESIGN E SPREAD FOOTING 40' POLE OR LESS	NOT APPROVED STATE DESIGN ENGINEER	STANDARD PLAN 5-297.845	3 OF 6
DEPARTMENT OF TRANSPORTATION			STANDARD PLAN	STATE PROJ. NO. TRUNK HWY.	SHEET NO. TOTAL SHEETS	



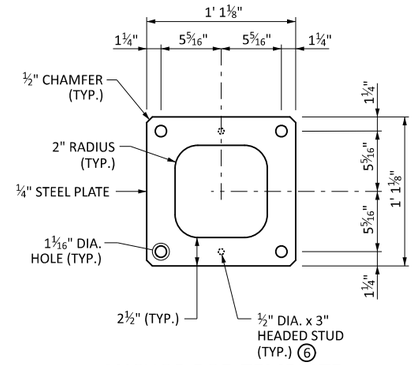
PLAN



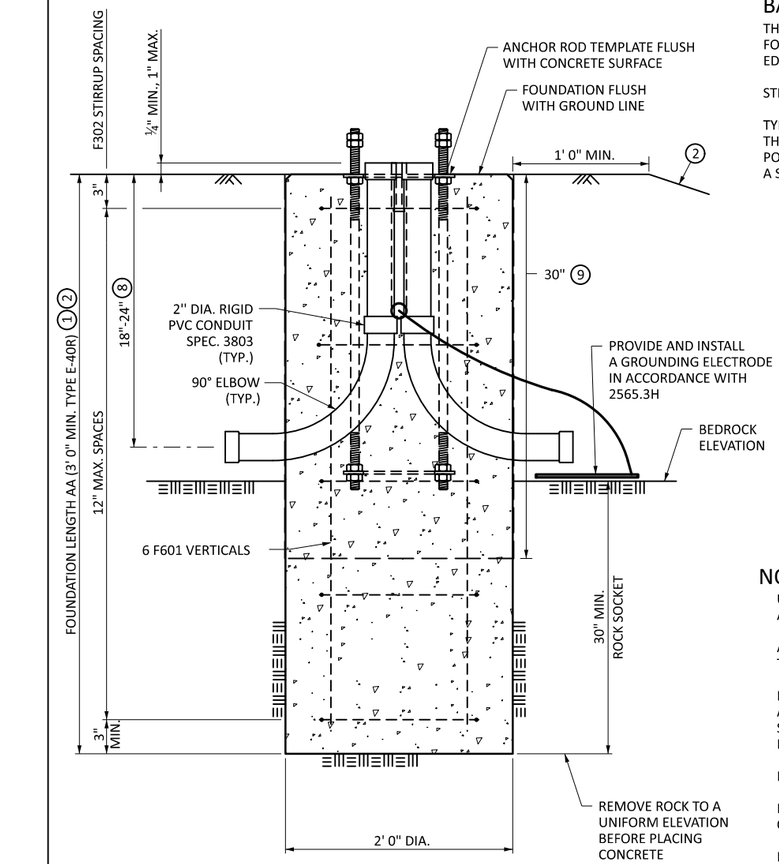
ANCHOR ROD PLACEMENT



PARTIAL ELEVATION
SHOWING ANCHOR ROD ASSEMBLY & HEX NUT POSITIONS AFTER POLE INSTALLATION



ANCHOR ROD TEMPLATE
TWO REQUIRED PER ASSEMBLY



VERTICAL SECTION

BASIS OF DESIGN:

THE DETAILS SHOWN ON THIS STANDARD PLAN ARE BASED ON THE AASHTO "LRFD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS," FIRST EDITION, 2015, AND THE 2017, 2018, 2019, AND 2020 INTERIM REVISIONS.

STRENGTH LIMIT WIND LOADING OF 120 MPH, SERVICE LIMIT WIND LOADING OF 76 MPH.

TYPE E-40R FOUNDATION - THE DESIGN CONFIGURATION IS 40 FEET TALL WITH 12-FOOT TWIN ARMS. THE SHAPE OF THE LIGHT POLE SHAFT MAY BE ROUND OR HEXADECAGONAL (16-SIDED). ALTERNATE POLE SHAPES REQUIRE A SPECIAL FOUNDATION DESIGN. THE MAXIMUM PROJECTED AREA (EPA) OF A SINGLE LUMINAIRE AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 1.50 SQUARE FEET.

GEOTECHNICAL PARAMETERS:

THE FOUNDATION DIMENSIONS SHOWN ON THIS SHEET ARE DESIGNED WITH THE FOLLOWING ASSUMED SOIL PROPERTIES:

COHESIVE SOILS:
- MIN. SHEAR STRENGTH: C = 1.0 ksf
- UNIT WEIGHT OF SOIL: γ = 125±10 pcf

GRANULAR SOILS:
- MIN. ANGLE OF FRICTION: Ø = 30°
- UNIT WEIGHT OF SOIL: γ = 125 pcf
- MAX. COEFFICIENT OF FRICTION: μ = 0.70

BEDROCK:
- MIN. UNIAXIAL COMPRESSIVE STRENGTH: 700 psi
- MIN. ROCK QUALITY DESIGNATION (RQD): 50%
- MIN. JOINT CONDITION RATING ($JCOND_{89}$): 20

A SPECIAL FOUNDATION DESIGN IS REQUIRED WHEN THE SPECIFIED VALUES, CONDITIONS, OR BOTH LISTED ABOVE ARE NOT MET.

NOTES:

USE GRADE 60 WELDABLE REINFORCING BARS IN ACCORDANCE WITH ASTM A706 AND STEEL DIE STAMPED "W" ON THE SURFACE.

ATTACH REINFORCING BARS BY TYING, WELDING, OR BOTH. WELD REBAR TOGETHER IN ACCORDANCE WITH ANSI/AWS D1.4.

FIRMLY SUPPORT AND SECURELY TIE REINFORCING BARS, CONDUITS, AND ANCHOR ROD ASSEMBLY IN PROPER POSITION INTO THE FORM AND DRILLED SHAFT. OBTAIN ENGINEER'S APPROVAL BEFORE STARTING CONCRETE PLACEMENT OPERATIONS.

FURNISH AND INSTALL 3G52 CONCRETE MIX IN ACCORDANCE WITH SPEC. 2461.

PLACE PREFORMED JOINT FILLER BETWEEN FOUNDATION AND SIDEWALK OR CONCRETE AREAS.

FURNISH AND INSTALL TYPE B ANCHOR RODS IN ACCORDANCE WITH SPEC. 3385.

GALVANIZE ANCHOR ROD ASSEMBLY TEMPLATES IN ACCORDANCE WITH SPEC. 3394.

(1) SEE THE PLAN AND SPECIAL PROVISIONS FOR MODIFIED FOUNDATION DEPTH.

(2) IF THE FOUNDATION IS PLACED ON A SLOPE STEEPER THAN 1V:3H, INCREASE THE MINIMUM FOUNDATION DEPTH BY 12 INCHES. ADDITIONAL REINFORCEMENT IS NOT REQUIRED. SLOPES STEEPER THAN 1V:2H REQUIRE A SPECIAL DESIGN.

ANCHOR ROD ASSEMBLY

ANCHOR ROD & HARDWARE
FOUR REQUIRED PER ASSEMBLY

(3) FOR SINGLE-NUT ANCHOR ROD CONNECTIONS, USE THE TOP NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. FOR DOUBLE-NUT ANCHOR ROD CONNECTIONS, USE THE LEVELING NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. LEAVE THE NUTS SECURED AGAINST THE TEMPLATE UNTIL POLE INSTALLATION. USE THE REQUIRED HARDWARE FOR ANCHOR ROD CONNECTION IN ACCORDANCE WITH 2545.3H.1.a AND 2545.3H.1.b.

(4) PROTECT ANCHOR ROD THREADS AND LEVELING NUTS ABOVE THE UPPER ANCHOR ROD TEMPLATE FROM CONCRETE CONTAMINATION.

(5) TIGHTEN ANCHOR ROD TEMPLATE NUTS USING A 12-INCH-LONG WRENCH.

(6) FURNISH AND INSTALL HEADED STUDS IN ACCORDANCE WITH 3391.2D "STUD WELDED FASTENERS" ON THE UPPER TEMPLATE AT THE LOCATIONS SHOWN.

(7) REMOVE SURFACE CONTAMINANTS AND APPLY SILICONE SEALANT TO THE UPPER TEMPLATE AROUND THE ANCHOR RODS AND ANCHOR ROD HOLES, AND THE INNER AND OUTER EDGES WHERE THE PLATE MEETS CONCRETE. USE AN APPROVED SILICONE JOINT SEALANT FOUND ON MnDOT'S APL UNDER BRIDGE PRODUCTS.

(8) THE MINIMUM CONDUIT EMBEDMENT IS 18 INCHES BELOW FINISHED GRADE. SEE SPECIAL PROVISIONS IF SHALLOW BEDROCK IS ENCOUNTERED AND A REDUCED EMBEDMENT DEPTH IS REQUIRED.

(9) FURNISH AND INSTALL A MAXIMUM 30" LONG CONCRETE FORMING TUBE TO FORM THE UPPER PORTION OF THE FOUNDATION. DO NOT USE A FULL-LENGTH FORMING TUBE.

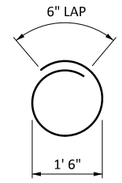
BILL OF REINFORCEMENT - TYPE E-40R

BAR	QTY.	LENGTH	SHAPE	LOCATION
F601	6	AA - 6"	——	SHAFT VERTICALS
F302	BB	5' 3"	TIES	SHAFT TIES

TO DETERMINE THE NUMBER OF F302 STIRRUPS REQUIRED, SUBTRACT 6 INCHES FROM THE OVERALL LENGTH OF FOUNDATION, AA, MEASURED IN FEET. ROUND THE VALUE TO THE NEXT HIGHEST INTEGER, IN FEET, AND ADD 1 FOOT. THE RESULTING VALUE, WITH UNITS REMOVED, REPRESENTS THE REQUIRED QUANTITY.

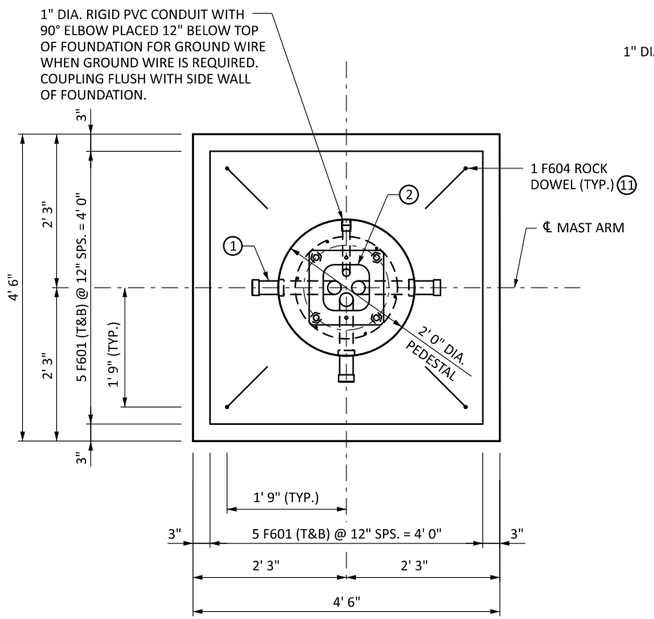
BAR BENDING DIAGRAM

BENT BAR DIMENSIONS GIVEN ARE OUT-TO-OUT. DETERMINE ACTUAL BAR LENGTHS BASED ON THE DETAIL DIMENSIONS SHOWN IN THE BAR BENDING DIAGRAM.

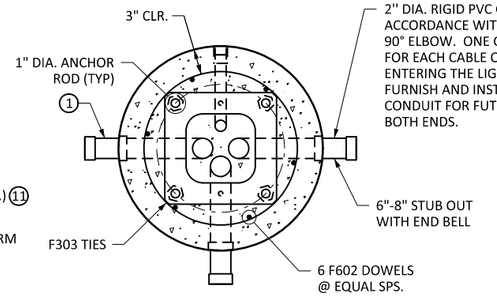


F302

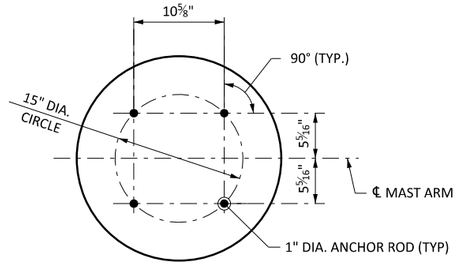
LEAD EXPERT OFFICE	BRIAN SORENSON STATE TRAFFIC ENGINEER OFFICE OF TRAFFIC ENGINEERING		LIGHT FOUNDATION - DESIGN E CAST-IN-PLACE DRILLED SHAFT IN ROCK E-40R 40' POLE OR LESS	NOT APPROVED STATE DESIGN ENGINEER	STANDARD PLAN 5-297.845	4 OF 6
DEPARTMENT OF TRANSPORTATION			STANDARD PLAN	STATE PROJ. NO. TRUNK HWY.	SHEET NO. TOTAL SHEETS	



ANCHORED SPREAD FOOTING PLAN



PEDESTAL PLAN



ANCHOR ROD PLACEMENT

BASIS OF DESIGN:

THE DETAILS SHOWN ON THIS STANDARD PLAN ARE BASED ON THE AASHTO "LRFD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS," FIRST EDITION, 2015, AND THE 2017, 2018, 2019, AND 2020 INTERIM REVISIONS.

STRENGTH LIMIT WIND LOADING OF 120 MPH, SERVICE LIMIT WIND LOADING OF 76 MPH.

THE FACTORED BEARING RESISTANCE OF ROCK USED IN DESIGN IS 10 KSF.

THE DESIGN CONFIGURATION IS 40 FEET TALL WITH 12-FOOT TWIN ARMS. THE SHAPE OF THE LIGHT POLE SHAFT MAY BE ROUND OR HEXADECAGONAL (16-SIDED). ALTERNATE POLE SHAPES REQUIRE A SPECIAL FOUNDATION DESIGN.

THE MAXIMUM PROJECTED AREA (EPA) OF A SINGLE LUMINAIRE AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 1.50 SQUARE FEET.

GEOTECHNICAL PARAMETERS:

THE WATER TABLE IS ASSUMED BELOW THE BOTTOM OF FOOTING ELEVATION.

THE FOUNDATION DIMENSIONS SHOWN ON THIS SHEET ARE DESIGNED WITH THE FOLLOWING ASSUMED SOIL PROPERTIES:

SANDY SOILS	CLAY SOILS
UNIT WEIGHT = 125 PCF	UNIT WEIGHT = 125±10 PCF
FRICTION ANGLE = 30°	COHESION = 1000 PSF
	FRICTION ANGLE = 0°

BEDROCK:
UNIAXIAL COMPRESSIVE STRENGTH: 700 psi
ROCK QUALITY DESIGNATION (RQD): 50%
JOINT CONDITION RATING ($JCOND_{89}$): 20

A SPECIAL FOUNDATION DESIGN IS REQUIRED WHEN THE SPECIFIED VALUES, CONDITIONS, OR BOTH LISTED ABOVE ARE NOT MET.

NOTES:

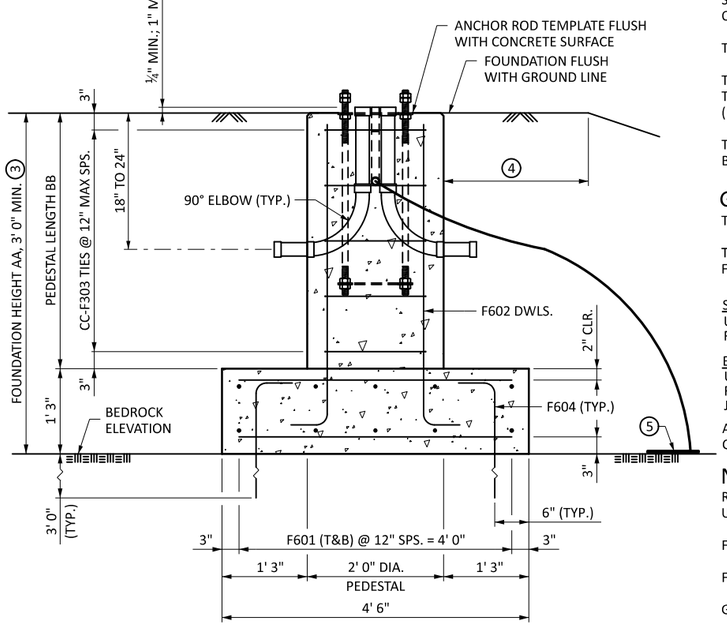
REINFORCEMENT BARS IN ACCORDANCE WITH SPEC. 3301 GRADE 60 OR GREATER. USE DEFORMED STEEL BARS.

FURNISH AND INSTALL 3G52 CONCRETE MIX IN ACCORDANCE WITH SPEC. 2461.

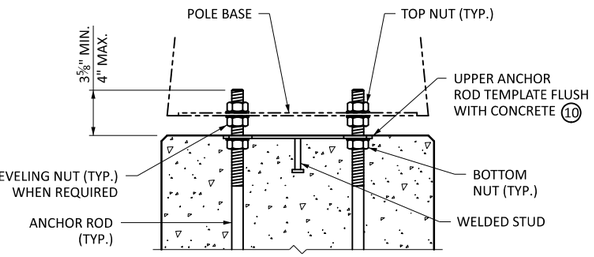
FURNISH AND INSTALL TYPE B ANCHOR RODS IN ACCORDANCE WITH SPEC. 3385.

GALVANIZE ANCHOR ROD ASSEMBLY TEMPLATES IN ACCORDANCE WITH SPEC. 3394.

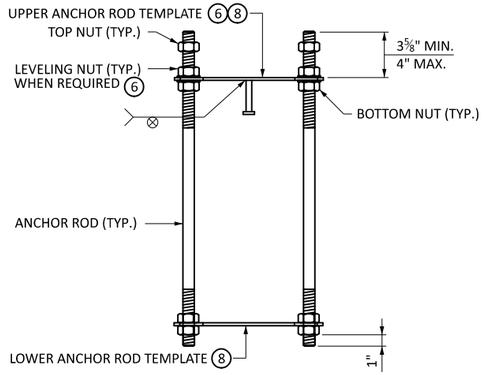
(T&B) DENOTES TOP AND BOTTOM.



ANCHORED SPREAD FOOTING ELEVATION



PARTIAL ELEVATION
SHOWING ANCHOR ROD ASSEMBLY & HEX NUT POSITIONS AFTER POLE INSTALLATION



ANCHOR ROD ASSEMBLY

FIRMLY SUPPORT AND SECURELY TIE REINFORCING BARS, CONDUITS, AND ANCHOR ROD ASSEMBLY IN PROPER POSITION IN THE FORMS. OBTAIN ENGINEER'S APPROVAL BEFORE STARTING CONCRETE PLACEMENT OPERATIONS.

PLACE PREFORMED JOINT FILLER BETWEEN FOUNDATION AND SIDEWALK OR CONCRETE AREAS.

(1) EXTEND CONDUITS THROUGH FOOTING WHEN NECESSARY TO MAINTAIN 18-INCH TO 24-INCH EMBEDMENT.

(2) TO AVOID INTERFERENCE WITH THE LIGHT POLE BASE, PLACE CONDUIT INSIDE THE ANCHOR ROD TEMPLATE.

(3) ENSURE BOTTOM OF FOOTING IS SUPPORTED ON COMPETENT BEDROCK.

(4) ENSURE GROUND IS LEVEL OVER THE PLAN DIMENSIONS OF THE FOOTING.

(5) PROVIDE AND INSTALL A GROUNDING ELECTRODE IN ACCORDANCE WITH 2565.3H.

(6) FOR SINGLE-NUT ANCHOR ROD CONNECTIONS, USE THE TOP NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. FOR DOUBLE-NUT ANCHOR ROD CONNECTIONS, USE THE LEVELING NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. LEAVE THE NUTS SECURED AGAINST THE TEMPLATE UNTIL POLE INSTALLATION. USE THE REQUIRED HARDWARE FOR ANCHOR ROD CONNECTION IN ACCORDANCE WITH 2545.3H.1.a AND 2545.3H.1.b.

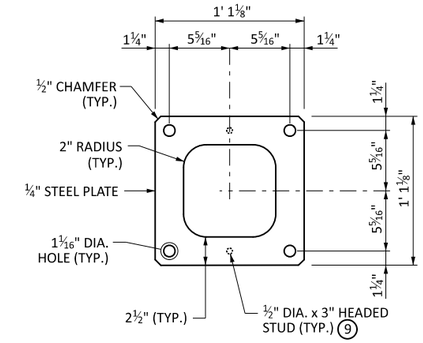
(7) PROTECT ANCHOR ROD THREADS AND LEVELING NUTS ABOVE THE UPPER ANCHOR ROD TEMPLATE FROM CONCRETE CONTAMINATION.

(8) TIGHTEN ANCHOR ROD TEMPLATE NUTS USING A 12-INCH-LONG WRENCH.

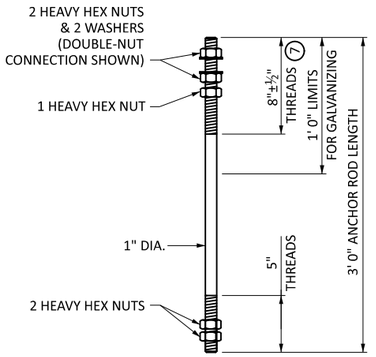
(9) FURNISH AND INSTALL HEADED STUDS IN ACCORDANCE WITH 3391.2D "STUD WELDED FASTENERS" ON THE UPPER TEMPLATE AT THE LOCATIONS SHOWN.

(10) REMOVE SURFACE CONTAMINANTS AND APPLY SILICONE SEALANT TO THE UPPER TEMPLATE AROUND THE ANCHOR RODS AND ANCHOR ROD HOLES, AND THE INNER AND OUTER EDGES WHERE THE PLATE MEETS CONCRETE. USE AN APPROVED SILICONE JOINT SEALANT FOUND ON MnDOT'S APL UNDER BRIDGE PRODUCTS.

(11) PLACE ROCK DOWEL IN 3-INCH DIAMETER HOLE AND ANCHOR USING AN APPROVED NON-SHRINK GROUT FOUND ON MnDOT'S APL UNDER CONCRETE PRODUCTS.



ANCHOR ROD TEMPLATE
TWO REQUIRED PER ASSEMBLY



ANCHOR ROD & HARDWARE
FOUR REQUIRED PER ASSEMBLY

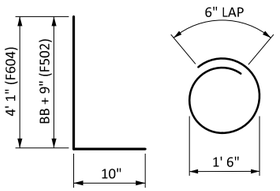
BILL OF REINFORCEMENT

BAR	QTY.	LENGTH	SHAPE	LOCATION
F601	20	4' 0"		FOOTING REINFORCEMENT
F602	6	BB+1' 7"		FOOTING DOWELS
F303	CC	5' 3"	TIES	PEDESTAL TIES
F604	4	4' 11"		ROCK DOWELS

TO DETERMINE THE NUMBER OF F303 TIES REQUIRED, SUBTRACT 6 INCHES FROM THE OVERALL LENGTH OF PEDESTAL, BB, MEASURED IN FEET. ROUND THE VALUE TO THE NEXT HIGHEST INTEGER, IN FEET, AND ADD 1 FOOT. THE RESULTING VALUE, WITH UNITS REMOVED, REPRESENTS THE REQUIRED QUANTITY.

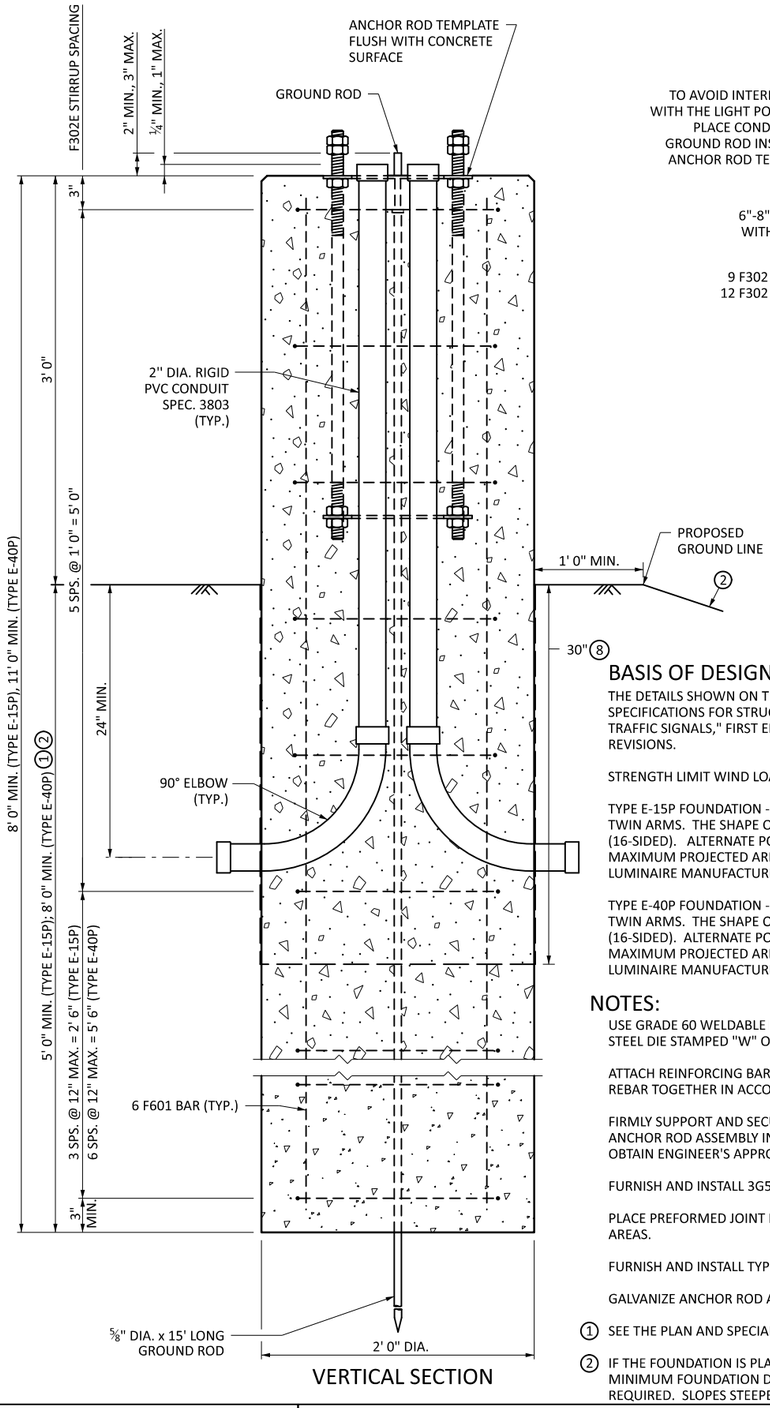
BAR BENDING DIAGRAMS

BENT BAR DIMENSIONS GIVEN ARE OUT-TO-OUT. DETERMINE ACTUAL BAR LENGTHS BASED ON THE DETAIL DIMENSIONS SHOWN IN THE BAR BENDING DIAGRAMS.

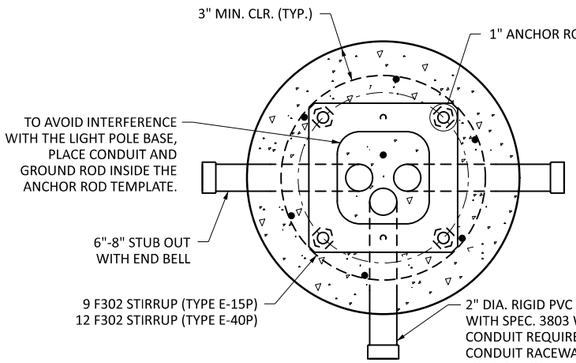


F602 & F604 F303

LEAD EXPERT OFFICE	BRIAN SORENSON STATE TRAFFIC ENGINEER OFFICE OF TRAFFIC ENGINEERING		LIGHT FOUNDATION - DESIGN E ANCHORED SPREAD FOOTING ON ROCK E-40A 40' POLE OR LESS	NOT APPROVED STATE DESIGN ENGINEER	STANDARD PLAN 5-297.845	5 OF 6
DEPARTMENT OF TRANSPORTATION			STANDARD PLAN	STATE PROJ. NO. TRUNK HWY.	SHEET NO. TOTAL SHEETS	



VERTICAL SECTION



PLAN

BASIS OF DESIGN:

THE DETAILS SHOWN ON THIS STANDARD PLAN ARE BASED ON THE AASHTO "LRFD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS," FIRST EDITION, 2015, AND THE 2017, 2018, 2019, AND 2020 INTERIM REVISIONS.

STRENGTH LIMIT WIND LOADING OF 120 MPH, SERVICE LIMIT WIND LOADING OF 76 MPH.

TYPE E-15P FOUNDATION - THE DESIGN CONFIGURATION IS 15 FEET TALL WITH 3-FOOT TWIN ARMS. THE SHAPE OF THE LIGHT POLE SHAFT MAY BE ROUND OR HEXADECAGONAL (16-SIDED). ALTERNATE POLE SHAPES REQUIRE A SPECIAL FOUNDATION DESIGN. THE MAXIMUM PROJECTED AREA (EPA) OF A SINGLE LUMINAIRE AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 3.50 SQUARE FEET.

TYPE E-40P FOUNDATION - THE DESIGN CONFIGURATION IS 40 FEET TALL WITH 12-FOOT TWIN ARMS. THE SHAPE OF THE LIGHT POLE SHAFT MAY BE ROUND OR HEXADECAGONAL (16-SIDED). ALTERNATE POLE SHAPES REQUIRE A SPECIAL FOUNDATION DESIGN. THE MAXIMUM PROJECTED AREA (EPA) OF A SINGLE LUMINAIRE AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 1.50 SQUARE FEET.

NOTES:

USE GRADE 60 WELDABLE REINFORCING BARS IN ACCORDANCE WITH ASTM A706 AND STEEL DIE STAMPED "W" ON THE SURFACE.

ATTACH REINFORCING BARS BY TYING, WELDING, OR COMBINATION THEREOF. WELD REBAR TOGETHER IN ACCORDANCE WITH ANSI/AWS D1.4.

FIRMLY SUPPORT AND SECURELY TIE REINFORCING BARS, CONDUITS, GROUND ROD, AND ANCHOR ROD ASSEMBLY IN PROPER POSITION INTO THE FORM AND DRILLED SHAFT. OBTAIN ENGINEER'S APPROVAL BEFORE STARTING CONCRETE PLACEMENT OPERATIONS.

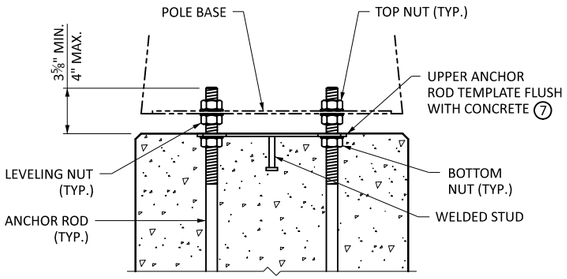
FURNISH AND INSTALL 3G52 CONCRETE MIX IN ACCORDANCE WITH SPEC. 2461.

PLACE PREFORMED JOINT FILLER BETWEEN FOUNDATION AND SIDEWALK OR CONCRETE AREAS.

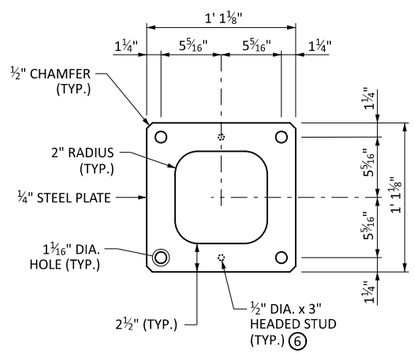
FURNISH AND INSTALL TYPE B ANCHOR RODS IN ACCORDANCE WITH SPEC. 3385.

GALVANIZE ANCHOR ROD ASSEMBLY TEMPLATES IN ACCORDANCE WITH SPEC. 3394.

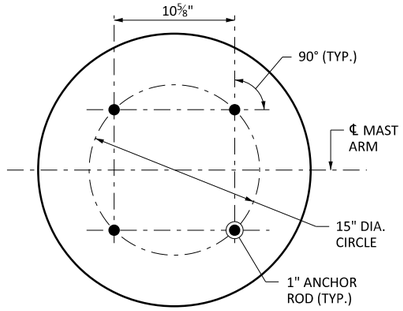
1. SEE THE PLAN AND SPECIAL PROVISIONS FOR MODIFIED FOUNDATION DEPTH.
2. IF THE FOUNDATION IS PLACED ON A SLOPE STEEPER THAN 1V:3H, INCREASE THE MINIMUM FOUNDATION DEPTH BY 12 INCHES. ADDITIONAL REINFORCEMENT IS NOT REQUIRED. SLOPES STEEPER THAN 1V:2H REQUIRE A SPECIAL DESIGN.



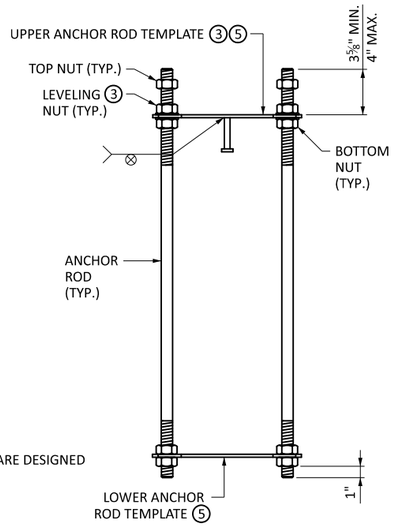
PARTIAL ELEVATION
SHOWING ANCHOR ROD ASSEMBLY & HEX NUT POSITIONS AFTER POLE INSTALLATION



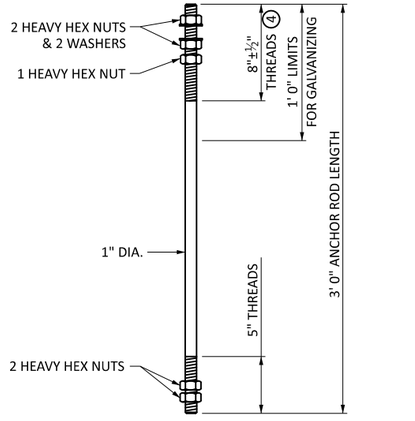
ANCHOR ROD TEMPLATE
TWO REQUIRED PER ASSEMBLY



ANCHOR ROD PLACEMENT



ANCHOR ROD ASSEMBLY



ANCHOR ROD & HARDWARE
FOUR REQUIRED PER ASSEMBLY

GEOTECHNICAL PARAMETERS:

THE FOUNDATION DIMENSIONS SHOWN ON THIS SHEET ARE DESIGNED WITH THE FOLLOWING ASSUMED SOIL PROPERTIES:

COHESIVE SOILS:

MIN. SHEAR STRENGTH:	C = 1.0 ksf
UNIT WEIGHT OF SOIL:	γ = 125±10 pcf

GRANULAR SOILS:

MIN. ANGLE OF FRICTION:	Ø = 30°
UNIT WEIGHT OF SOIL:	γ = 125 pcf
MAX. COEFFICIENT OF FRICTION:	μ = 0.70

A SPECIAL FOUNDATION DESIGN IS REQUIRED WHEN THE SPECIFIED VALUES, CONDITIONS, OR BOTH LISTED ABOVE ARE NOT MET.

3. USE THE LEVELING NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. LEAVE THE NUTS SECURED AGAINST THE TEMPLATE UNTIL POLE INSTALLATION. USE THE REQUIRED HARDWARE FOR ANCHOR ROD CONNECTION IN ACCORDANCE WITH 2545.3H.1.a AND 2545.3H.1.b.
4. PROTECT ANCHOR ROD THREADS AND LEVELING NUTS ABOVE THE UPPER ANCHOR ROD TEMPLATE FROM CONCRETE CONTAMINATION.
5. TIGHTEN ANCHOR ROD TEMPLATE NUTS USING A 12-INCH-LONG WRENCH.
6. FURNISH AND INSTALL HEADED STUDS IN ACCORDANCE WITH 3391.2.D "STUD WELDED FASTENERS" ON THE UPPER TEMPLATE AT THE LOCATIONS SHOWN.
7. REMOVE SURFACE CONTAMINANTS AND APPLY SILICONE SEALANT TO THE UPPER TEMPLATE AROUND THE ANCHOR RODS AND ANCHOR ROD HOLES, AND THE INNER AND OUTER EDGES WHERE THE PLATE MEETS CONCRETE. USE AN APPROVED SILICONE JOINT SEALANT FOUND ON MnDOT'S APL UNDER BRIDGE PRODUCTS.
8. FURNISH AND INSTALL A CONCRETE FORMING TUBE TO FORM THE UPPER PORTION OF THE FOUNDATION AND A MAXIMUM 30" BELOW FINISHED GRADE. REMOVE THE PORTION OF THE FORMING TUBE ABOVE THE FINISHED GRADE AFTER PLACING THE POLE.

BILL OF REINFORCEMENT - TYPE E-15P

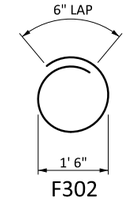
BAR	QTY.	LENGTH	SHAPE	LOCATION
F601	6	7' 8"	——	SHAFT VERTICALS
F302	9	5' 3"	TIES	SHAFT TIES

BILL OF REINFORCEMENT - TYPE E-40P

BAR	QTY.	LENGTH	SHAPE	LOCATION
F601	6	10' 8"	——	SHAFT VERTICALS
F302	12	5' 3"	TIES	SHAFT TIES

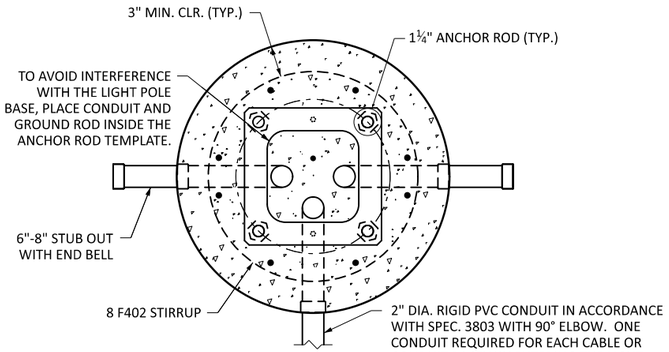
BAR BENDING DIAGRAM

BENT BAR DIMENSIONS GIVEN ARE OUT-TO-OUT. DETERMINE ACTUAL BAR LENGTHS BASED ON THE DETAIL DIMENSIONS SHOWN IN THE BAR BENDING DIAGRAM.

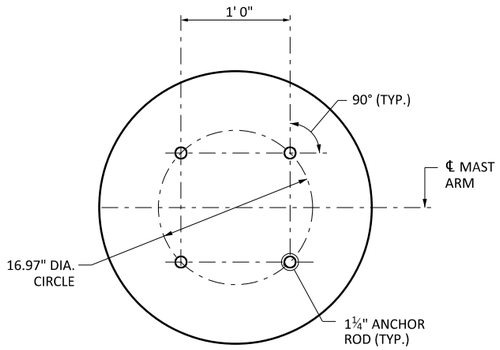


F302

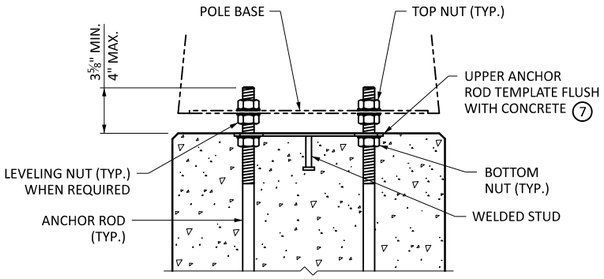
LEAD EXPERT OFFICE	BRIAN SORENSON STATE TRAFFIC ENGINEER OFFICE OF TRAFFIC ENGINEERING		HIGH-TOP LIGHT FOUNDATION - DESIGN E CAST-IN-PLACE DRILLED SHAFT E-15P 15' POLE OR LESS E-40P 40' POLE OR LESS	NOT APPROVED STATE DESIGN ENGINEER	STANDARD PLAN 5-297.845	6 OF 6
DEPARTMENT OF TRANSPORTATION			STANDARD PLAN	STATE PROJ. NO. TRUNK HWY.	SHEET NO. TOTAL SHEETS	



PLAN

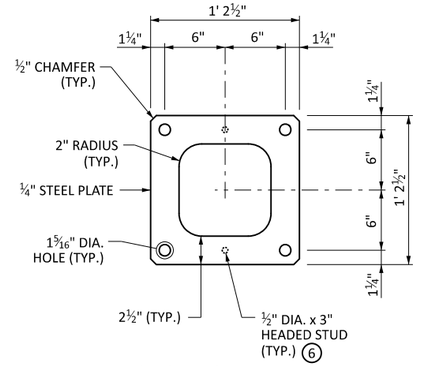


ANCHOR ROD PLACEMENT



PARTIAL ELEVATION

SHOWING ANCHOR ROD ASSEMBLY & HEX NUT POSITIONS AFTER POLE INSTALLATION



ANCHOR ROD TEMPLATE

2 REQUIRED PER ASSEMBLY

BASIS OF DESIGN:

THE DETAILS SHOWN ON THIS STANDARD PLAN ARE BASED ON THE AASHTO "LRFD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS," FIRST EDITION, 2015, AND THE 2017, 2018, 2019, AND 2020 INTERIM REVISIONS.

STRENGTH LIMIT WIND LOADING OF 120 MPH, SERVICE LIMIT WIND LOADING OF 76 MPH.

THE DESIGN CONFIGURATION IS 50 FEET TALL WITH A SINGLE OR TWIN 12-FOOT ARMS. THE SHAPE OF THE LIGHT POLE SHAFT MAY BE ROUND OR HEXADECAGONAL (16-SIDED). ALTERNATE POLE SHAPES REQUIRE A SPECIAL FOUNDATION DESIGN.

THE MAXIMUM PROJECTED AREA (EPA) OF A SINGLE LUMINAIRE ON A SINGLE ARM AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 3.00 SQUARE FEET.

THE MAXIMUM PROJECTED AREA (EPA) OF A SINGLE LUMINAIRE FOR TWIN ARMS AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 1.50 SQUARE FEET.

GEOTECHNICAL PARAMETERS:

THE FOUNDATION DIMENSIONS SHOWN ON THIS SHEET ARE DESIGNED WITH THE FOLLOWING ASSUMED SOIL PROPERTIES:

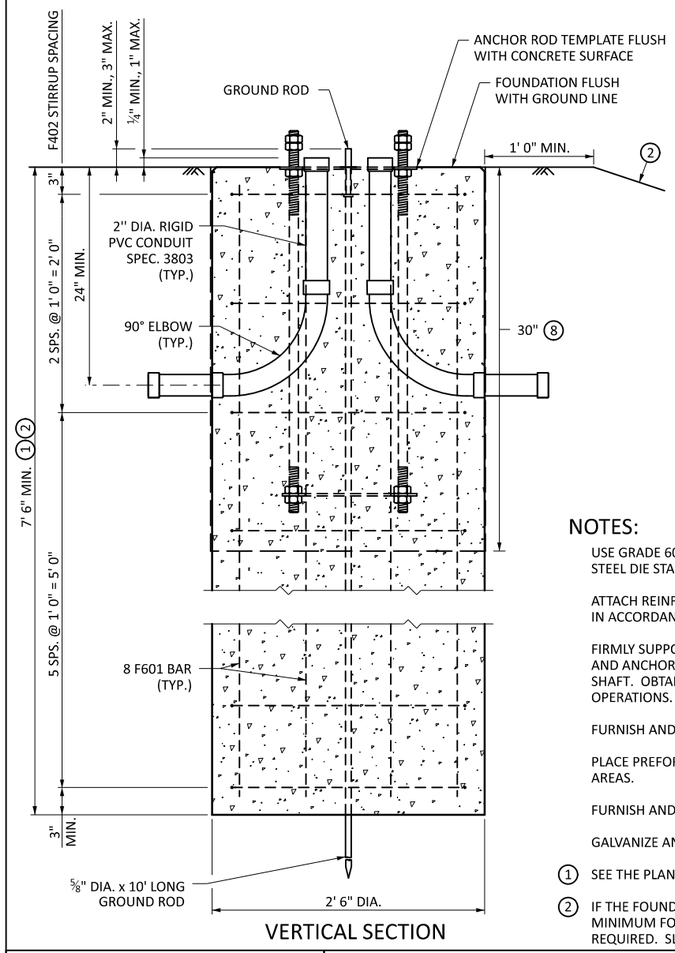
COHESIVE SOILS:

MIN. SHEAR STRENGTH:	C = 1.0 ksf
UNIT WEIGHT OF SOIL:	γ = 125±10 pcf

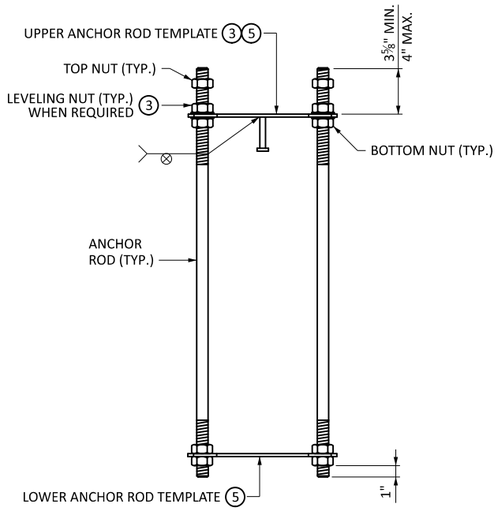
GRANULAR SOILS:

MIN. ANGLE OF FRICTION:	Ø = 30°
UNIT WEIGHT OF SOIL:	γ = 125 pcf
MAX. COEFFICIENT OF FRICTION:	μ = 0.70

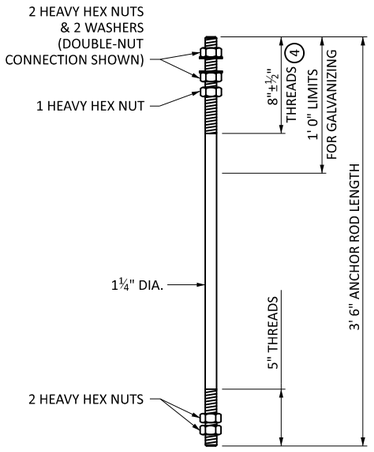
A SPECIAL FOUNDATION DESIGN IS REQUIRED WHEN THE SPECIFIED VALUES, CONDITIONS, OR BOTH LISTED ABOVE ARE NOT MET.



VERTICAL SECTION



ANCHOR ROD ASSEMBLY



ANCHOR ROD & HARDWARE

4 REQUIRED PER ASSEMBLY

NOTES:

USE GRADE 60 WELDABLE REINFORCING BARS IN ACCORDANCE WITH ASTM A706 AND STEEL DIE STAMPED "W" ON THE SURFACE.

ATTACH REINFORCING BARS BY TYING, WELDING, OR BOTH. WELD REBAR TOGETHER IN ACCORDANCE WITH ANSI/AWS D1.4.

FIRMLY SUPPORT AND SECURELY TIE REINFORCING BARS, CONDUITS, GROUND ROD, AND ANCHOR ROD ASSEMBLY IN PROPER POSITION INTO THE FORM AND DRILLED SHAFT. OBTAIN ENGINEER'S APPROVAL BEFORE STARTING CONCRETE PLACEMENT OPERATIONS.

FURNISH AND INSTALL 3G52 CONCRETE MIX IN ACCORDANCE WITH SPEC. 2461.

PLACE PREFORMED JOINT FILLER BETWEEN FOUNDATION AND SIDEWALK OR CONCRETE AREAS.

FURNISH AND INSTALL TYPE B ANCHOR RODS IN ACCORDANCE WITH SPEC. 3385.

GALVANIZE ANCHOR ROD ASSEMBLY TEMPLATES IN ACCORDANCE WITH SPEC. 3394.

(1) SEE THE PLAN AND SPECIAL PROVISIONS FOR MODIFIED FOUNDATION DEPTH.

(2) IF THE FOUNDATION IS PLACED ON A SLOPE STEEPER THAN 1V:3H, INCREASE THE MINIMUM FOUNDATION DEPTH BY 12 INCHES. ADDITIONAL REINFORCEMENT IS NOT REQUIRED. SLOPES STEEPER THAN 1V:2H REQUIRE A SPECIAL DESIGN.

(3) FOR SINGLE-NUT ANCHOR ROD CONNECTIONS, USE THE TOP NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. FOR DOUBLE-NUT ANCHOR ROD CONNECTIONS, USE THE LEVELING NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. LEAVE THE NUTS SECURED AGAINST THE TEMPLATE UNTIL POLE INSTALLATION. USE THE REQUIRED HARDWARE FOR ANCHOR ROD CONNECTION IN ACCORDANCE WITH 2545.3H.1.a AND 2545.3H.1.b.

(4) PROTECT ANCHOR ROD THREADS AND LEVELING NUTS ABOVE THE UPPER ANCHOR ROD TEMPLATE FROM CONCRETE CONTAMINATION.

(5) TIGHTEN ANCHOR ROD TEMPLATE NUTS USING A 12-INCH-LONG WRENCH.

(6) FURNISH AND INSTALL HEADED STUDS IN ACCORDANCE WITH 3391.2D "STUD WELDED FASTENERS" ON THE UPPER TEMPLATE AT THE LOCATIONS SHOWN.

(7) REMOVE SURFACE CONTAMINANTS AND APPLY SILICONE SEALANT TO THE UPPER TEMPLATE AROUND THE ANCHOR RODS AND ANCHOR ROD HOLES, AND THE INNER AND OUTER EDGES WHERE THE PLATE MEETS CONCRETE. USE AN APPROVED SILICONE JOINT SEALANT FOUND ON MnDOT'S APL UNDER BRIDGE PRODUCTS.

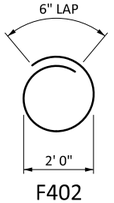
(8) FURNISH AND INSTALL A MAXIMUM 30" LONG CONCRETE FORMING TUBE TO FORM THE UPPER PORTION OF THE FOUNDATION. DO NOT USE A FULL-LENGTH FORMING TUBE.

BILL OF REINFORCEMENT

BAR	QTY.	LENGTH	SHAPE	LOCATION
F601	8	7' 0"		SHAFT VERTICALS
F402	8	8' 6"	TIES	SHAFT TIES

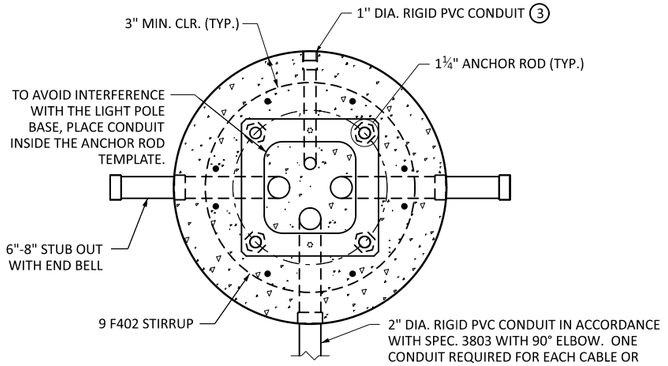
BAR BENDING DIAGRAM

BENT BAR DIMENSIONS GIVEN ARE OUT-TO-OUT. DETERMINE ACTUAL BAR LENGTHS BASED ON THE DETAIL DIMENSIONS SHOWN IN THE BAR BENDING DIAGRAM.

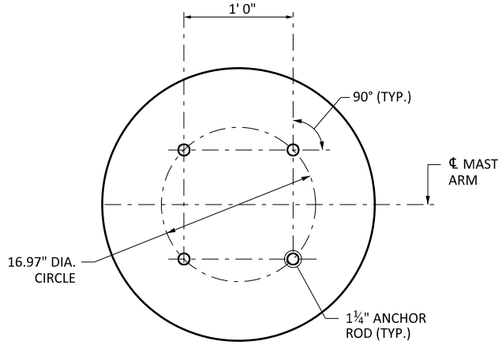


F402

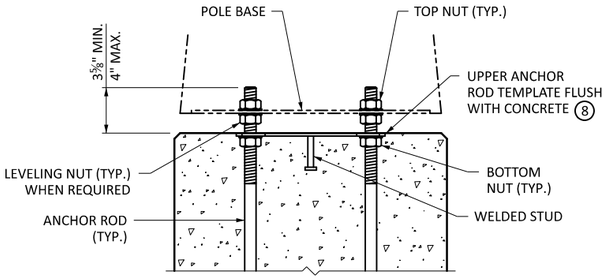
LEAD EXPERT OFFICE	BRIAN SORENSON STATE TRAFFIC ENGINEER OFFICE OF TRAFFIC ENGINEERING		LIGHT FOUNDATION - DESIGN H CAST-IN-PLACE DRILLED SHAFT 50' POLE OR LESS	NOT APPROVED STATE DESIGN ENGINEER	STANDARD PLAN 5-297.846	1 OF 8
DEPARTMENT OF TRANSPORTATION			STANDARD PLAN	STATE PROJ. NO.	SHEET NO.	
				TRUNK HWY.	TOTAL SHEETS	



PLAN

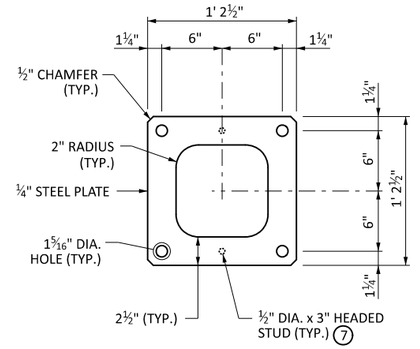


ANCHOR ROD PLACEMENT



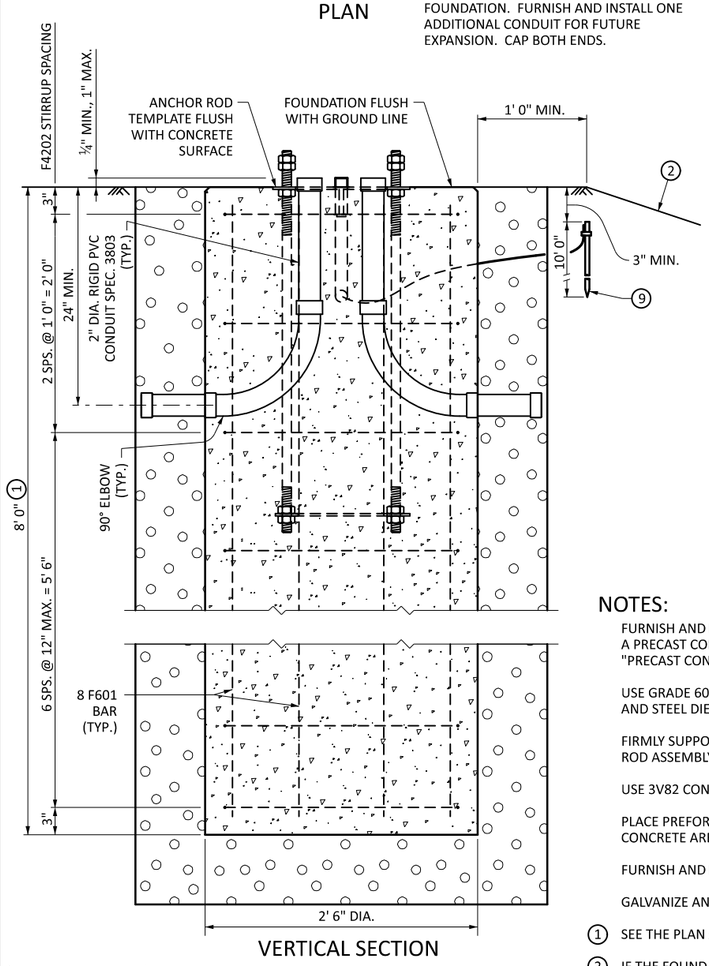
PARTIAL ELEVATION

SHOWING ANCHOR ROD ASSEMBLY & HEX NUT POSITIONS AFTER POLE INSTALLATION



ANCHOR ROD TEMPLATE

TWO REQUIRED PER ASSEMBLY



VERTICAL SECTION

EXCAVATE AND BACKFILL IN ACCORDANCE WITH SPEC. 2545.3.

BASIS OF DESIGN:

THE DETAILS SHOWN ON THIS STANDARD PLAN ARE BASED ON THE AASHTO "LRFD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS," FIRST EDITION, 2015, AND THE 2017, 2018, 2019, AND 2020 INTERIM REVISIONS.

STRENGTH LIMIT WIND LOADING OF 120 MPH, SERVICE LIMIT WIND LOADING OF 76 MPH.

THE DESIGN CONFIGURATION IS 50 FEET TALL WITH A SINGLE OR TWIN 12-FOOT ARMS. THE SHAPE OF THE LIGHT POLE SHAFT MAY BE ROUND OR HEXADECAGONAL (16-SIDED). ALTERNATE POLE SHAPES REQUIRE A SPECIAL FOUNDATION DESIGN.

THE MAXIMUM PROJECTED AREA (EPA) OF A SINGLE LUMINAIRE ON A SINGLE ARM AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 3.00 SQUARE FEET.

THE MAXIMUM PROJECTED AREA (EPA) OF A SINGLE LUMINAIRE ON TWIN ARMS AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 1.50 SQUARE FEET.

GEOTECHNICAL PARAMETERS:

THE FOUNDATION DIMENSIONS SHOWN ON THIS SHEET ARE DESIGNED WITH THE FOLLOWING ASSUMED SOIL PROPERTIES:

COHESIVE SOILS:

MIN. SHEAR STRENGTH:	C = 1.0 ksf
UNIT WEIGHT OF SOIL:	γ = 125±10 pcf

GRANULAR SOILS:

MIN. ANGLE OF FRICTION:	Ø = 30°
UNIT WEIGHT OF SOIL:	γ = 125 pcf
MAX. COEFFICIENT OF FRICTION:	μ = 0.70

A SPECIAL FOUNDATION DESIGN IS REQUIRED WHEN THE SPECIFIED VALUES, CONDITIONS, OR BOTH LISTED ABOVE ARE NOT MET.

NOTES:

FURNISH AND INSTALL PRECAST CONCRETE LIGHT FOUNDATIONS MANUFACTURED IN A PRECAST CONCRETE MANUFACTURING PLANT IN ACCORDANCE WITH SPEC. 3238 "PRECAST CONCRETE BOX CULVERTS."

USE GRADE 60 WELDABLE REINFORCING BARS IN ACCORDANCE WITH ASTM A706 AND STEEL DIE STAMPED "W" ON THE SURFACE.

FIRMLY SUPPORT AND SECURELY TIE REINFORCING BARS, CONDUITS, AND ANCHOR ROD ASSEMBLY IN PROPER POSITION INTO THE FORM.

USE 3V82 CONCRETE MIX.

PLACE PREFORMED JOINT FILLER BETWEEN FOUNDATION AND SIDEWALK OR CONCRETE AREAS.

FURNISH AND INSTALL TYPE B ANCHOR RODS IN ACCORDANCE WITH SPEC. 3385.

GALVANIZE ANCHOR ROD ASSEMBLY TEMPLATES IN ACCORDANCE WITH SPEC. 3394.

(1) SEE THE PLAN AND SPECIAL PROVISIONS FOR MODIFIED FOUNDATION DEPTH.

(2) IF THE FOUNDATION IS PLACED ON A SLOPE STEEPER THAN 1V:3H, INCREASE THE MINIMUM FOUNDATION DEPTH BY 12 INCHES. ADDITIONAL REINFORCEMENT IS NOT REQUIRED. SLOPES STEEPER THAN 1V:2H REQUIRE A SPECIAL DESIGN.

ANCHOR ROD ASSEMBLY

ANCHOR ROD & HARDWARE

FOUR REQUIRED PER ASSEMBLY

(3) 1" DIA. RIGID PVC CONDUIT WITH 90° ELBOW PLACED 12 INCHES BELOW TOP OF FOUNDATION FOR GROUND WIRE WHEN GROUND WIRE IS REQUIRED. COUPLING FLUSH WITH SIDE WALL OF FOUNDATION.

(4) FOR SINGLE-NUT ANCHOR ROD CONNECTIONS, USE THE TOP NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. FOR DOUBLE-NUT ANCHOR ROD CONNECTIONS, USE THE LEVELING NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. LEAVE THE NUTS SECURED AGAINST THE TEMPLATE UNTIL POLE INSTALLATION. USE THE REQUIRED HARDWARE FOR ANCHOR ROD CONNECTION IN ACCORDANCE WITH 2545.3H.1.a AND 2545.3H.1.b.

(5) PROTECT ANCHOR ROD THREADS AND LEVELING NUTS ABOVE THE UPPER ANCHOR ROD TEMPLATE FROM CONCRETE CONTAMINATION.

(6) TIGHTEN ANCHOR ROD TEMPLATE NUTS USING A 12-INCH-LONG WRENCH.

(7) FURNISH AND INSTALL HEADED STUDS IN ACCORDANCE WITH 3391.2D "STUD WELDED FASTENERS" ON THE UPPER TEMPLATE AT THE LOCATIONS SHOWN.

(8) REMOVE SURFACE CONTAMINANTS AND APPLY SILICONE SEALANT TO THE UPPER TEMPLATE AROUND THE ANCHOR RODS AND ANCHOR ROD HOLES, AND THE INNER AND OUTER EDGES WHERE THE PLATE MEETS CONCRETE. USE AN APPROVED SILICONE JOINT SEALANT FOUND ON MnDOT'S APL UNDER BRIDGE PRODUCTS.

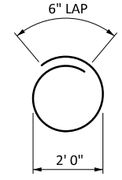
(9) ⅝" DIA. GROUND ROD WITH CLAMP AND 6 AWG SOLID BARE COPPER WIRE. SEE PLAN FOR GROUND ROD LOCATIONS.

BILL OF REINFORCEMENT

BAR	QTY.	LENGTH	SHAPE	LOCATION
F601	8	7' 6"	——	SHAFT VERTICALS
F402	9	8' 6"	TIES	SHAFT TIES

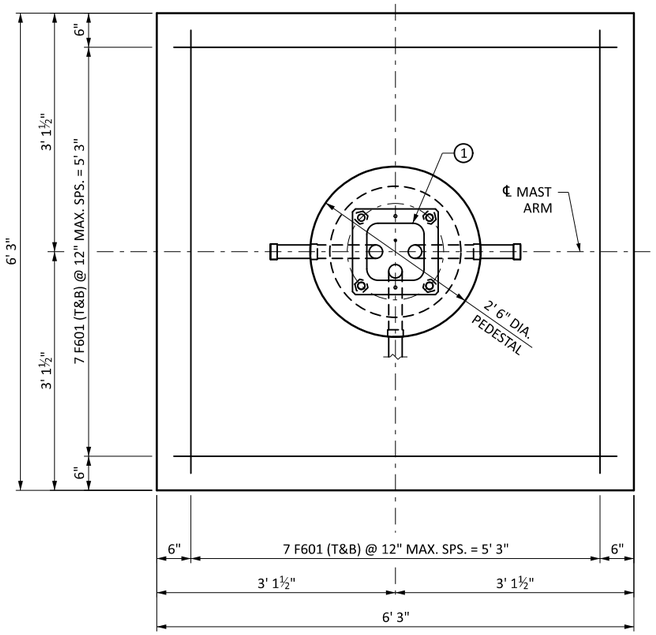
BAR BENDING DIAGRAM

BENT BAR DIMENSIONS GIVEN ARE OUT-TO-OUT. DETERMINE ACTUAL BAR LENGTHS BASED ON THE DETAIL DIMENSIONS SHOWN IN THE BAR BENDING DIAGRAM.

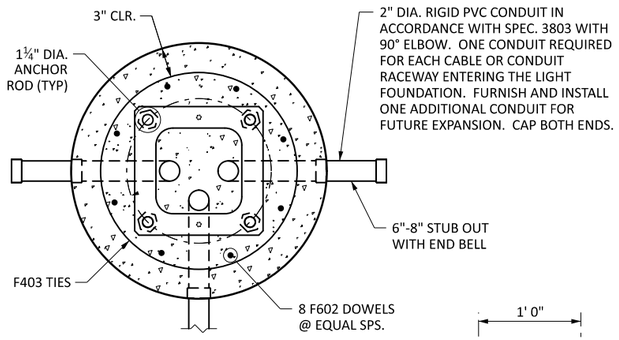


F402

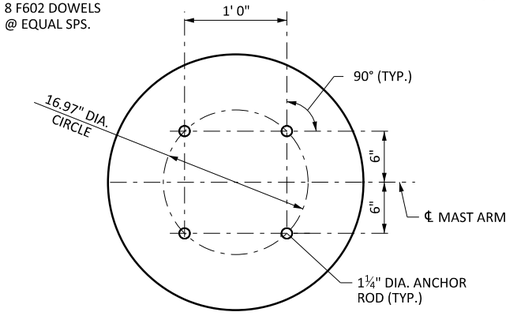
LEAD EXPERT OFFICE	BRIAN SORENSON STATE TRAFFIC ENGINEER OFFICE OF TRAFFIC ENGINEERING		LIGHT FOUNDATION - DESIGN H PRECAST DRILLED SHAFT 50' POLE OR LESS	NOT APPROVED STATE DESIGN ENGINEER	STANDARD PLAN 5-297.846	2 OF 8
DEPARTMENT OF TRANSPORTATION			STANDARD PLAN	STATE PROJ. NO. TRUNK HWY.	SHEET NO. TOTAL SHEETS	



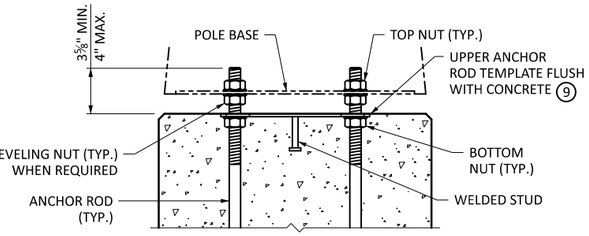
SPREAD FOOTING PLAN



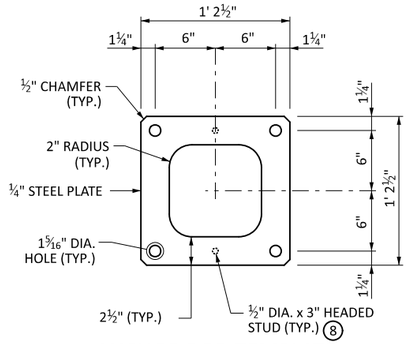
PEDESTAL PLAN



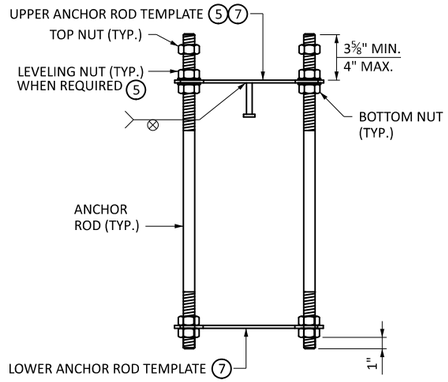
ANCHOR ROD PLACEMENT



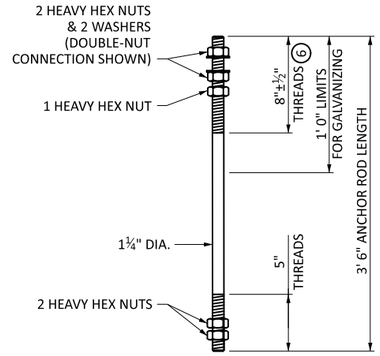
PARTIAL ELEVATION
SHOWING ANCHOR ROD ASSEMBLY & HEX NUT POSITIONS AFTER POLE INSTALLATION



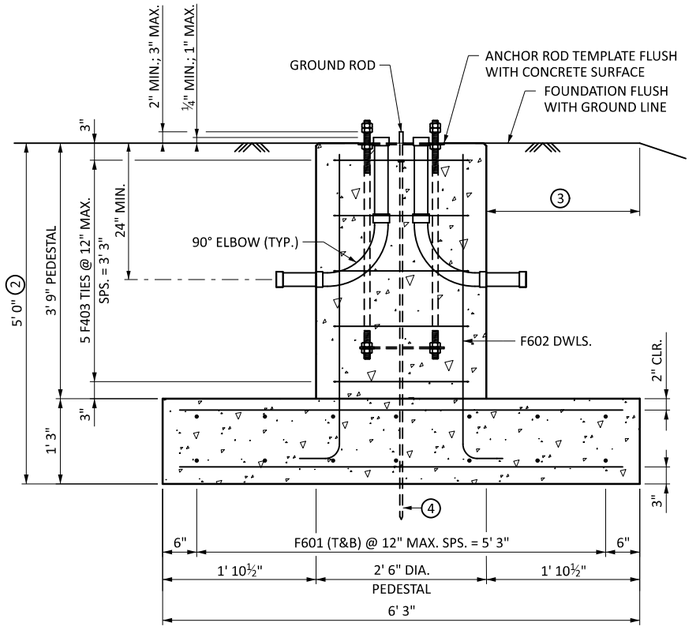
ANCHOR ROD TEMPLATE
TWO REQUIRED PER ASSEMBLY



ANCHOR ROD ASSEMBLY



ANCHOR ROD & HARDWARE
FOUR REQUIRED PER ASSEMBLY



SPREAD FOOTING ELEVATION

BASIS OF DESIGN:

THE DETAILS SHOWN ON THIS STANDARD PLAN ARE BASED ON THE AASHTO "LRFD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS," FIRST EDITION, 2015, AND THE 2017, 2018, 2019, AND 2020 INTERIM REVISIONS.

STRENGTH LIMIT WIND LOADING OF 120 MPH, SERVICE LIMIT WIND LOADING OF 76 MPH.

THE FACTORED BEARING RESISTANCE OF SOIL USED IN DESIGN IS 4 KSF.

THE DESIGN CONFIGURATION IS 50 FEET TALL WITH A SINGLE OR TWIN 12-FOOT ARMS. THE SHAPE OF THE LIGHT POLE SHAFT MAY BE ROUND OR HEXADECAGONAL (16-SIDED). ALTERNATE POLE SHAPES REQUIRE A SPECIAL FOUNDATION DESIGN.

THE MAXIMUM PROJECTED AREA (EPA) OF A SINGLE LUMINAIRE ON A SINGLE ARM AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 3.00 SQUARE FEET.

THE MAXIMUM PROJECTED AREA (EPA) OF A SINGLE LUMINAIRE FOR TWIN ARMS AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 1.50 SQUARE FEET.

GEOTECHNICAL PARAMETERS:

THE WATER TABLE IS ASSUMED BELOW THE BOTTOM OF FOOTING ELEVATION.

THE FOUNDATION DIMENSIONS SHOWN ON THIS SHEET ARE DESIGNED WITH THE FOLLOWING ASSUMED SOIL PROPERTIES:

SANDY SOILS	CLAY SOILS
UNIT WEIGHT = 125 PCF	UNIT WEIGHT = 125±10 PCF
FRICTION ANGLE = 30°	COHESION = 1000 PSF
	FRICTION ANGLE = 0°

A SPECIAL FOUNDATION DESIGN IS REQUIRED WHEN THE SPECIFIED VALUES, CONDITIONS, OR BOTH LISTED ABOVE ARE NOT MET.

LOAD CASE	EFFECTIVE WIDTH B' (FT)	EFFECTIVE SOIL PRESSURE (KSF)
SERVICE	5.00	1.06
STRENGTH	3.28	2.22

NOTES:

REINFORCEMENT BARS IN ACCORDANCE WITH SPEC. 3301 GRADE 60 OR GREATER. USE DEFORMED STEEL BARS.

FURNISH AND INSTALL 3G52 CONCRETE MIX IN ACCORDANCE WITH SPEC. 2461.

FURNISH AND INSTALL TYPE B ANCHOR RODS IN ACCORDANCE WITH SPEC. 3385.

GALVANIZE ANCHOR ROD ASSEMBLY TEMPLATES IN ACCORDANCE WITH SPEC. 3394.

(T&B) DENOTES TOP AND BOTTOM.

FIRMLY SUPPORT AND SECURELY TIE REINFORCING BARS, CONDUITS, GROUND ROD, AND ANCHOR ROD ASSEMBLY IN PROPER POSITION IN THE FORMS. OBTAIN ENGINEER'S APPROVAL BEFORE STARTING CONCRETE PLACEMENT OPERATIONS.

PLACE PREFORMED JOINT FILLER BETWEEN FOUNDATION AND SIDEWALK OR CONCRETE AREAS.

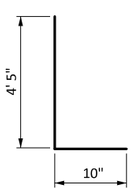
1. TO AVOID INTERFERENCE WITH THE LIGHT POLE BASE, PLACE CONDUIT AND GROUND ROD INSIDE THE ANCHOR ROD TEMPLATE.
2. PLACE THE BOTTOM OF FOOTING 5 FEET BELOW THE PROPOSED GROUNDLINE.
3. ENSURE GROUND IS LEVEL OVER THE PLAN DIMENSIONS OF THE FOOTING.
4. ⅝" DIAMETER x 10-FOOT-LONG GROUND ROD.
5. FOR SINGLE-NUT ANCHOR ROD CONNECTIONS, USE THE TOP NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. FOR DOUBLE-NUT ANCHOR ROD CONNECTIONS, USE THE LEVELING NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. LEAVE THE NUTS SECURED AGAINST THE TEMPLATE UNTIL POLE INSTALLATION. USE THE REQUIRED HARDWARE FOR ANCHOR ROD CONNECTION IN ACCORDANCE WITH 2545.3H.1.a AND 2545.3H.1.b.
6. PROTECT ANCHOR ROD THREADS AND LEVELING NUTS ABOVE THE UPPER ANCHOR ROD TEMPLATE FROM CONCRETE CONTAMINATION.
7. TIGHTEN ANCHOR ROD TEMPLATE NUTS USING A 12-INCH-LONG WRENCH.
8. FURNISH AND INSTALL HEADED STUDS IN ACCORDANCE WITH 3391.2D "STUD WELDED FASTENERS" ON THE UPPER TEMPLATE AT THE LOCATIONS SHOWN.
9. REMOVE SURFACE CONTAMINANTS AND APPLY SILICONE SEALANT TO THE UPPER TEMPLATE AROUND THE ANCHOR RODS AND ANCHOR ROD HOLES, AND THE INNER AND OUTER EDGES WHERE THE PLATE MEETS CONCRETE. USE AN APPROVED SILICONE JOINT SEALANT FOUND ON MnDOT'S APL UNDER BRIDGE PRODUCTS.

BILL OF REINFORCEMENT

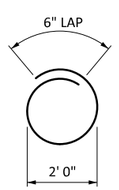
BAR	QTY.	LENGTH	SHAPE	LOCATION
F601	28	5' 9"		FOOTING REINFORCEMENT
F602	8	5' 3"		FOOTING DOWELS
F403	5	6' 10"	TIES	PEDESTAL TIES

BAR BENDING DIAGRAMS

BENT BAR DIMENSIONS GIVEN ARE OUT-TO-OUT. DETERMINE ACTUAL BAR LENGTHS BASED ON THE DETAIL DIMENSIONS SHOWN IN THE BAR BENDING DIAGRAMS.

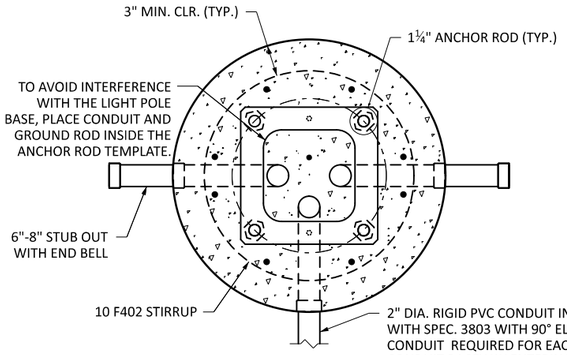


F602

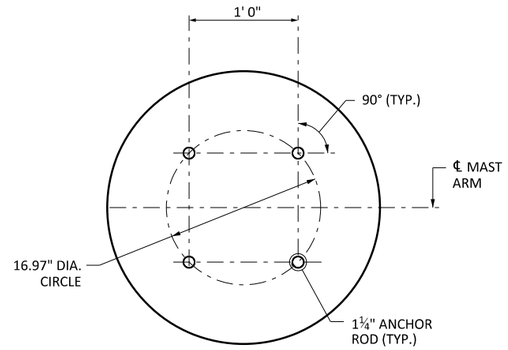


F403

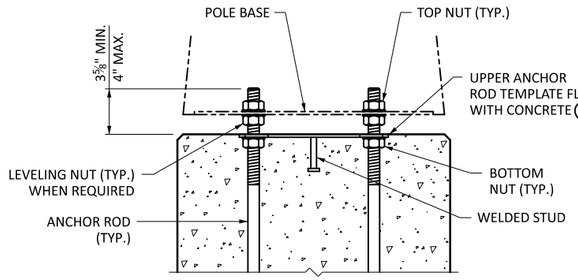
LEAD EXPERT OFFICE	BRIAN SORENSON STATE TRAFFIC ENGINEER OFFICE OF TRAFFIC ENGINEERING		LIGHT FOUNDATION - DESIGN H SPREAD FOOTING 50' POLE OR LESS	NOT APPROVED STATE DESIGN ENGINEER	STANDARD PLAN 5-297.846	3 OF 8
DEPARTMENT OF TRANSPORTATION			STANDARD PLAN	STATE PROJ. NO. TRUNK HWY.	SHEET NO. TOTAL SHEETS	



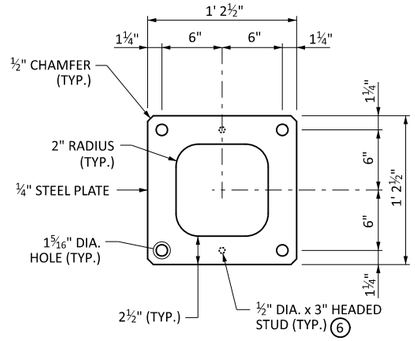
PLAN



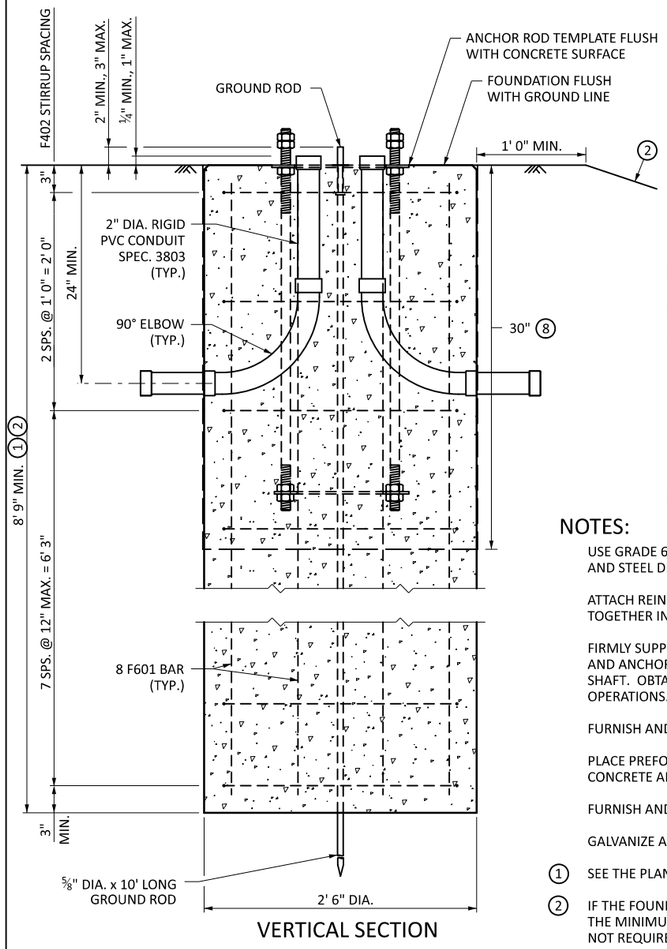
ANCHOR ROD PLACEMENT



PARTIAL ELEVATION
SHOWING ANCHOR ROD ASSEMBLY & HEX NUT POSITIONS AFTER POLE INSTALLATION



ANCHOR ROD TEMPLATE
TWO REQUIRED PER ASSEMBLY



VERTICAL SECTION

BASIS OF DESIGN:

THE DETAILS SHOWN ON THIS STANDARD PLAN ARE BASED ON THE AASHTO "LRFD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS," FIRST EDITION, 2015, AND THE 2017, 2018, 2019, AND 2020 INTERIM REVISIONS.

STRENGTH LIMIT WIND LOADING OF 120 MPH, SERVICE LIMIT WIND LOADING OF 76 MPH.

THE DESIGN CONFIGURATION IS 50 FEET TALL WITH 12-FOOT TWIN ARMS. THE SHAPE OF THE LIGHT POLE SHAFT MAY BE ROUND OR HEXADECAGONAL (16-SIDED). ALTERNATE POLE SHAPES REQUIRE A SPECIAL FOUNDATION DESIGN.

THE MAXIMUM PROJECTED AREA (EPA) OF A SINGLE LUMINAIRE AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 3.00 SQUARE FEET.

GEOTECHNICAL PARAMETERS:

THE FOUNDATION DIMENSIONS SHOWN ON THIS SHEET ARE DESIGNED WITH THE FOLLOWING ASSUMED SOIL PROPERTIES:

COHESIVE SOILS:

MIN. SHEAR STRENGTH:	C = 1.0 ksf
UNIT WEIGHT OF SOIL:	γ = 125±10 pcf

GRANULAR SOILS:

MIN. ANGLE OF FRICTION:	Ø = 30°
UNIT WEIGHT OF SOIL:	γ = 125 pcf
MAX. COEFFICIENT OF FRICTION:	μ = 0.70

A SPECIAL FOUNDATION DESIGN IS REQUIRED WHEN THE SPECIFIED VALUES, CONDITIONS, OR BOTH LISTED ABOVE ARE NOT MET.

NOTES:

USE GRADE 60 WELDABLE REINFORCING BARS IN ACCORDANCE WITH ASTM A706 AND STEEL DIE STAMPED "W" ON THE SURFACE.

ATTACH REINFORCING BARS BY TYING, WELDING, OR BOTH. WELD REBAR TOGETHER IN ACCORDANCE WITH ANSI/AWS D1.4.

FIRMLY SUPPORT AND SECURELY TIE REINFORCING BARS, CONDUITS, GROUND ROD, AND ANCHOR ROD ASSEMBLY IN PROPER POSITION INTO THE FORM AND DRILLED SHAFT. OBTAIN ENGINEER'S APPROVAL BEFORE STARTING CONCRETE PLACEMENT OPERATIONS.

FURNISH AND INSTALL 3G52 CONCRETE MIX IN ACCORDANCE WITH SPEC. 2461.

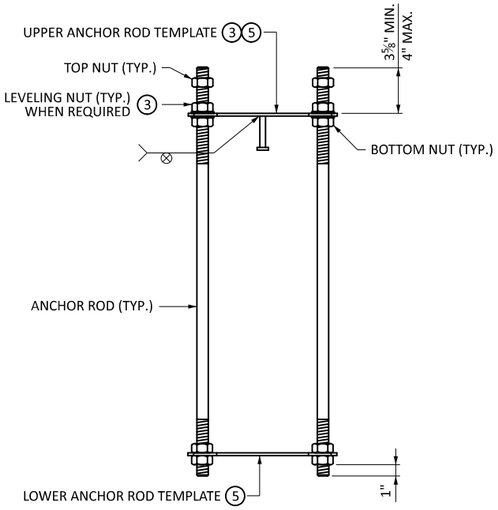
PLACE PREFORMED JOINT FILLER BETWEEN FOUNDATION AND SIDEWALK OR CONCRETE AREAS.

FURNISH AND INSTALL TYPE B ANCHOR RODS IN ACCORDANCE WITH SPEC. 3385.

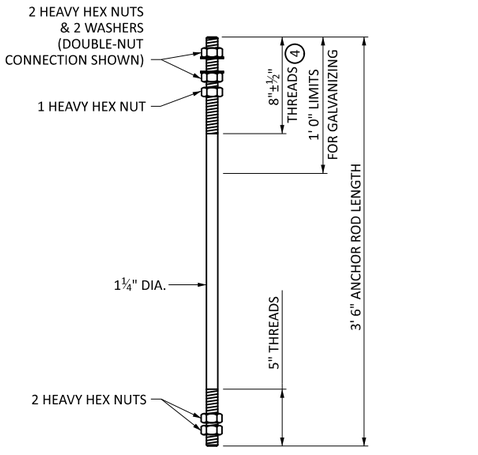
GALVANIZE ANCHOR ROD ASSEMBLY TEMPLATES IN ACCORDANCE WITH SPEC. 3394.

(1) SEE THE PLAN AND SPECIAL PROVISIONS FOR MODIFIED FOUNDATION DEPTH.

(2) IF THE FOUNDATION IS PLACED ON A SLOPE STEEPER THAN 1V:3H, INCREASE THE MINIMUM FOUNDATION DEPTH BY 12 INCHES. ADDITIONAL REINFORCEMENT IS NOT REQUIRED. SLOPES STEEPER THAN 1V:2H REQUIRE A SPECIAL DESIGN.



ANCHOR ROD ASSEMBLY



ANCHOR ROD & HARDWARE
FOUR REQUIRED PER ASSEMBLY

(3) FOR SINGLE-NUT ANCHOR ROD CONNECTIONS, USE THE TOP NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. FOR DOUBLE-NUT ANCHOR ROD CONNECTIONS, USE THE LEVELING NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. LEAVE THE NUTS SECURED AGAINST THE TEMPLATE UNTIL POLE INSTALLATION. USE THE REQUIRED HARDWARE FOR ANCHOR ROD CONNECTION IN ACCORDANCE WITH 2545.3H.1.a AND 2545.3H.1.b.

(4) PROTECT ANCHOR ROD THREADS AND LEVELING NUTS ABOVE THE UPPER ANCHOR ROD TEMPLATE FROM CONCRETE CONTAMINATION.

(5) TIGHTEN ANCHOR ROD TEMPLATE NUTS USING A 12-INCH-LONG WRENCH.

(6) FURNISH AND INSTALL HEADED STUDS IN ACCORDANCE WITH 3391.2D "STUD WELDED FASTENERS" ON THE UPPER TEMPLATE AT THE LOCATIONS SHOWN.

(7) REMOVE SURFACE CONTAMINANTS AND APPLY SILICONE SEALANT TO THE UPPER TEMPLATE AROUND THE ANCHOR RODS AND ANCHOR ROD HOLES, AND THE INNER AND OUTER EDGES WHERE THE PLATE MEETS CONCRETE. USE AN APPROVED SILICONE JOINT SEALANT FOUND ON MnDOT'S APL UNDER BRIDGE PRODUCTS.

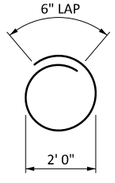
(8) FURNISH AND INSTALL A MAXIMUM 30" LONG CONCRETE FORMING TUBE TO FORM THE UPPER PORTION OF THE FOUNDATION. DO NOT USE A FULL-LENGTH FORMING TUBE.

BILL OF REINFORCEMENT

BAR	QTY.	LENGTH	SHAPE	LOCATION
F601	8	8' 3"	——	SHAFT VERTICALS
F402	10	8' 6"	TIES	SHAFT TIES

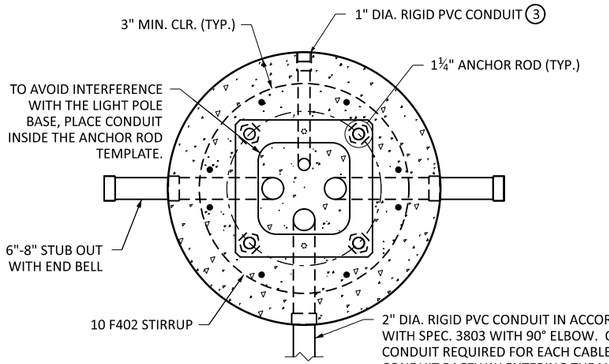
BAR BENDING DIAGRAM

BENT BAR DIMENSIONS GIVEN ARE OUT-TO-OUT. DETERMINE ACTUAL BAR LENGTHS BASED ON THE DETAIL DIMENSIONS SHOWN IN THE BAR BENDING DIAGRAM.

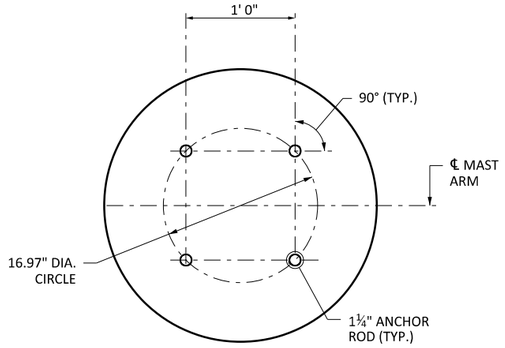


F402

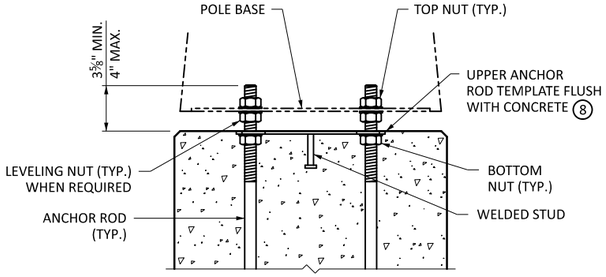
LEAD EXPERT OFFICE	BRIAN SORENSON STATE TRAFFIC ENGINEER OFFICE OF TRAFFIC ENGINEERING		LIGHT FOUNDATION - DESIGN H CAST-IN-PLACE DRILLED SHAFT 50' POLE OR LESS - TWIN ARM LUMINAIRE FROM 1.5 TO 3.0 SQUARE FEET	NOT APPROVED STATE DESIGN ENGINEER	STANDARD PLAN 5-297.846	4 OF 8
DEPARTMENT OF TRANSPORTATION			STANDARD PLAN	STATE PROJ. NO. TRUNK HWY.	SHEET NO. TOTAL SHEETS	



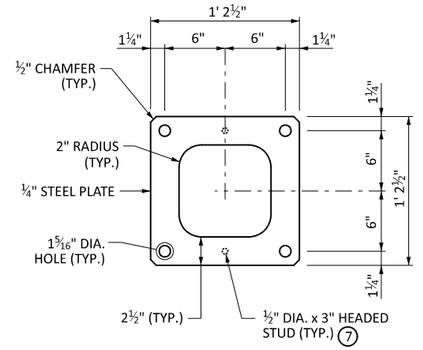
PLAN



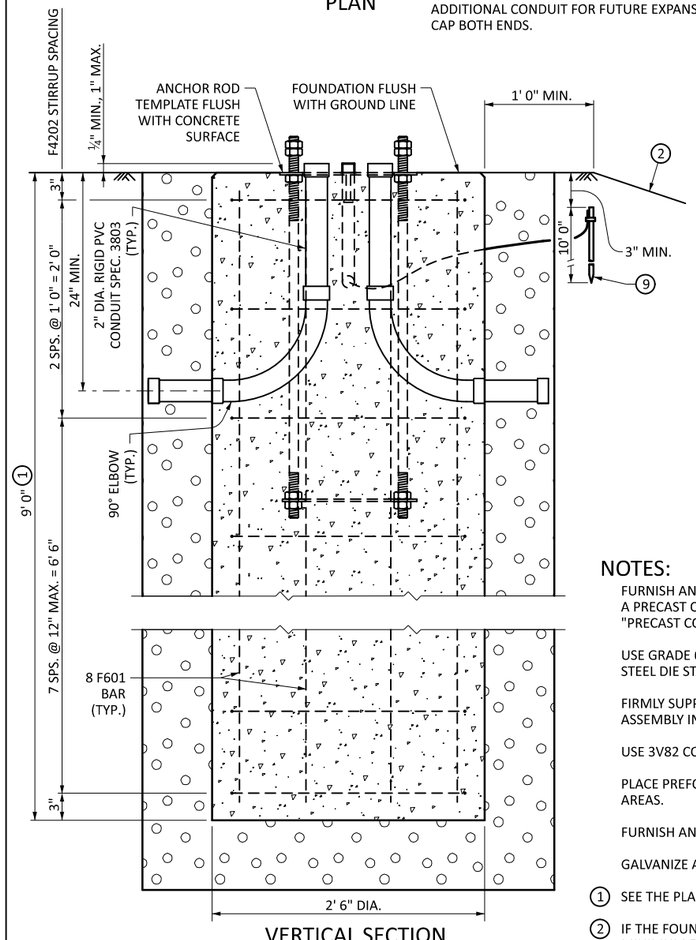
ANCHOR ROD PLACEMENT



PARTIAL ELEVATION
SHOWING ANCHOR ROD ASSEMBLY & HEX NUT POSITIONS AFTER POLE INSTALLATION



ANCHOR ROD TEMPLATE
TWO REQUIRED PER ASSEMBLY



VERTICAL SECTION

EXCAVATE AND BACKFILL IN ACCORDANCE WITH SPEC. 2545.3.

BASIS OF DESIGN:

THE DETAILS SHOWN ON THIS STANDARD PLAN ARE BASED ON THE AASHTO "LRFD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS," FIRST EDITION, 2015, AND THE 2017, 2018, 2019, AND 2020 INTERIM REVISIONS.

STRENGTH LIMIT WIND LOADING OF 120 MPH, SERVICE LIMIT WIND LOADING OF 76 MPH.

THE DESIGN CONFIGURATION IS 50 FEET TALL WITH 12-FOOT TWIN ARMS. THE SHAPE OF THE LIGHT POLE SHAFT MAY BE ROUND OR HEXADECAGONAL (16-SIDED). ALTERNATE POLE SHAPES REQUIRE A SPECIAL FOUNDATION DESIGN.

THE MAXIMUM PROJECTED AREA (EPA) OF A SINGLE LUMINAIRE AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 3.00 SQUARE FEET.

GEOTECHNICAL PARAMETERS:

THE FOUNDATION DIMENSIONS SHOWN ON THIS SHEET ARE DESIGNED WITH THE FOLLOWING ASSUMED SOIL PROPERTIES:

COHESIVE SOILS:

MIN. SHEAR STRENGTH:	C = 1.0 ksf
UNIT WEIGHT OF SOIL:	γ = 125±10 pcf

GRANULAR SOILS:

MIN. ANGLE OF FRICTION:	Ø = 30°
UNIT WEIGHT OF SOIL:	γ = 125 pcf
MAX. COEFFICIENT OF FRICTION:	μ = 0.70

A SPECIAL FOUNDATION DESIGN IS REQUIRED WHEN THE SPECIFIED VALUES, CONDITIONS, OR BOTH LISTED ABOVE ARE NOT MET.

NOTES:

FURNISH AND INSTALL PRECAST CONCRETE LIGHT FOUNDATIONS MANUFACTURED IN A PRECAST CONCRETE MANUFACTURING PLANT IN ACCORDANCE WITH SPEC. 3238 "PRECAST CONCRETE BOX CULVERTS."

USE GRADE 60 WELDABLE REINFORCING BARS IN ACCORDANCE WITH ASTM A706 AND STEEL DIE STAMPED "W" ON THE SURFACE.

FIRMLY SUPPORT AND SECURELY TIE REINFORCING BARS, CONDUITS, AND ANCHOR ROD ASSEMBLY IN PROPER POSITION INTO THE FORM.

USE 3V82 CONCRETE MIX.

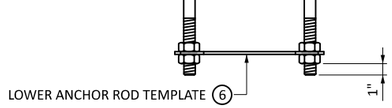
PLACE PREFORMED JOINT FILLER BETWEEN FOUNDATION AND SIDEWALK OR CONCRETE AREAS.

FURNISH AND INSTALL TYPE B ANCHOR RODS IN ACCORDANCE WITH SPEC. 3385.

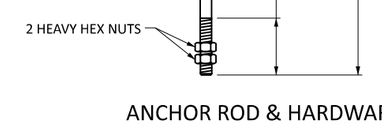
GALVANIZE ANCHOR ROD ASSEMBLY TEMPLATES IN ACCORDANCE WITH SPEC. 3394.

(1) SEE THE PLAN AND SPECIAL PROVISIONS FOR MODIFIED FOUNDATION DEPTH.

(2) IF THE FOUNDATION IS PLACED ON A SLOPE STEEPER THAN 1V:3H, INCREASE THE MINIMUM FOUNDATION DEPTH BY 12 INCHES. ADDITIONAL REINFORCEMENT IS NOT REQUIRED. SLOPES STEEPER THAN 1V:2H REQUIRE A SPECIAL DESIGN.



ANCHOR ROD ASSEMBLY



ANCHOR ROD & HARDWARE
FOUR REQUIRED PER ASSEMBLY

(3) 1" DIA. RIGID PVC CONDUIT WITH 90° ELBOW PLACED 12 INCHES BELOW TOP OF FOUNDATION FOR GROUND WIRE WHEN GROUND WIRE IS REQUIRED. COUPLING FLUSH WITH SIDE WALL OF FOUNDATION.

(4) FOR SINGLE-NUT ANCHOR ROD CONNECTIONS, USE THE TOP NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. FOR DOUBLE-NUT ANCHOR ROD CONNECTIONS, USE THE LEVELING NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. LEAVE THE NUTS SECURED AGAINST THE TEMPLATE UNTIL POLE INSTALLATION. USE THE REQUIRED HARDWARE FOR ANCHOR ROD CONNECTION IN ACCORDANCE WITH 2545.3H.1.a AND 2545.3H.1.b.

(5) PROTECT ANCHOR ROD THREADS AND LEVELING NUTS ABOVE THE UPPER ANCHOR ROD TEMPLATE FROM CONCRETE CONTAMINATION.

(6) TIGHTEN ANCHOR ROD TEMPLATE NUTS USING A 12-INCH-LONG WRENCH.

(7) FURNISH AND INSTALL HEADED STUDS IN ACCORDANCE WITH 3391.2D "STUD WELDED FASTENERS" ON THE UPPER TEMPLATE AT THE LOCATIONS SHOWN.

(8) REMOVE SURFACE CONTAMINANTS AND APPLY SILICONE SEALANT TO THE UPPER TEMPLATE AROUND THE ANCHOR RODS AND ANCHOR ROD HOLES, AND THE INNER AND OUTER EDGES WHERE THE PLATE MEETS CONCRETE. USE AN APPROVED SILICONE JOINT SEALANT FOUND ON MnDOT'S APL UNDER BRIDGE PRODUCTS.

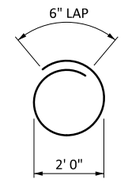
(9) ⅝" DIA. GROUND ROD WITH CLAMP AND 6 AWG SOLID BARE COPPER WIRE. SEE PLAN FOR GROUND ROD LOCATIONS.

BILL OF REINFORCEMENT

BAR	QTY.	LENGTH	SHAPE	LOCATION
F601	8	8' 6"	——	SHAFT VERTICALS
F402	10	8' 6"	TIES	SHAFT TIES

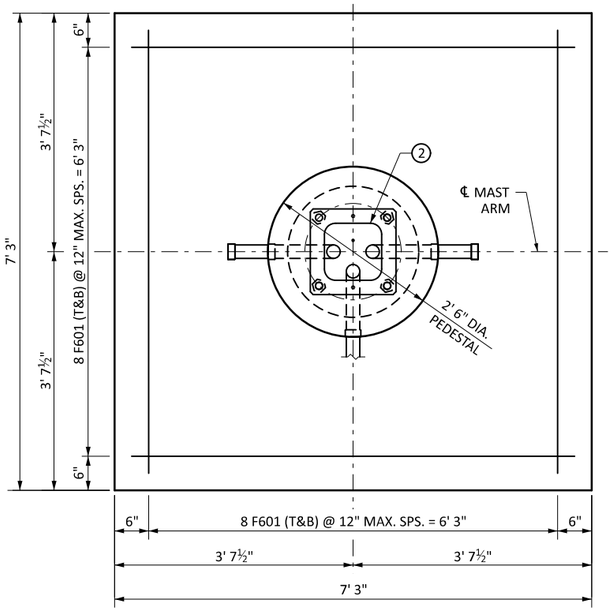
BAR BENDING DIAGRAM

BENT BAR DIMENSIONS GIVEN ARE OUT-TO-OUT. DETERMINE ACTUAL BAR LENGTHS BASED ON THE DETAIL DIMENSIONS SHOWN IN THE BAR BENDING DIAGRAM.

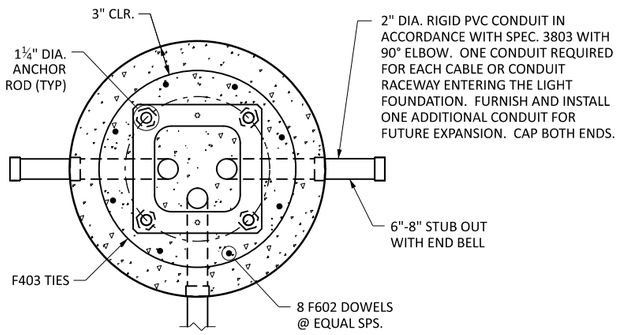


F402

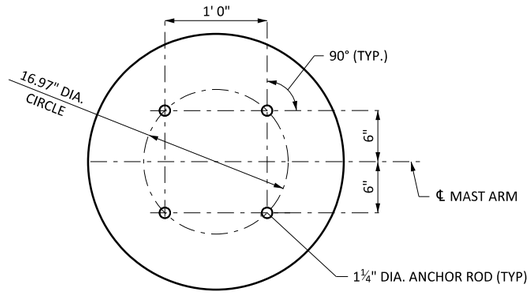
LEAD EXPERT OFFICE	BRIAN SORENSON STATE TRAFFIC ENGINEER OFFICE OF TRAFFIC ENGINEERING		LIGHT FOUNDATION - DESIGN H PRECAST DRILLED SHAFT 50' POLE OR LESS - TWIN ARM LUMINAIRE FROM 1.5 TO 3.0 SQUARE FEET	NOT APPROVED STATE DESIGN ENGINEER	STANDARD PLAN 5-297.846	5 OF 8
DEPARTMENT OF TRANSPORTATION			STANDARD PLAN	STATE PROJ. NO. TRUNK HWY.	SHEET NO. TOTAL SHEETS	



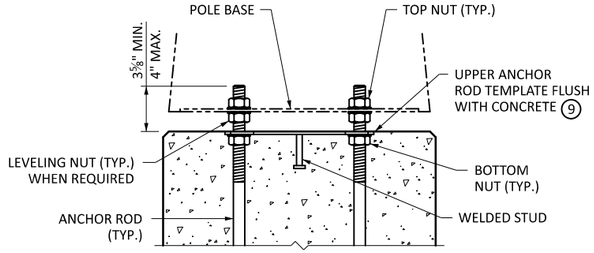
SPREAD FOOTING PLAN



PEDESTAL PLAN

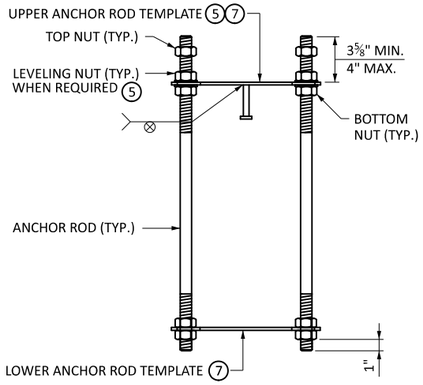


ANCHOR ROD PLACEMENT

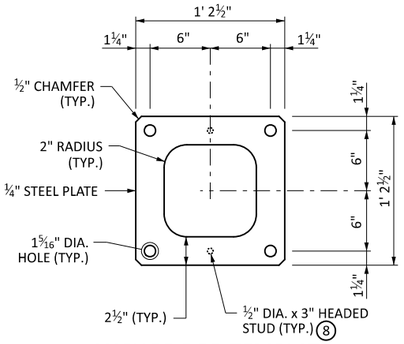


PARTIAL ELEVATION

SHOWING ANCHOR ROD ASSEMBLY & HEX NUT POSITIONS AFTER POLE INSTALLATION

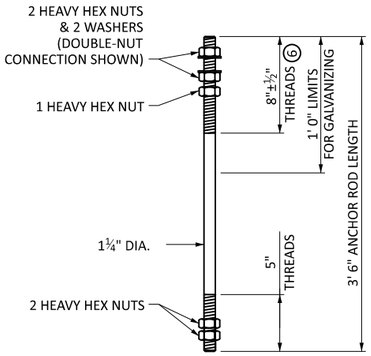


ANCHOR ROD ASSEMBLY



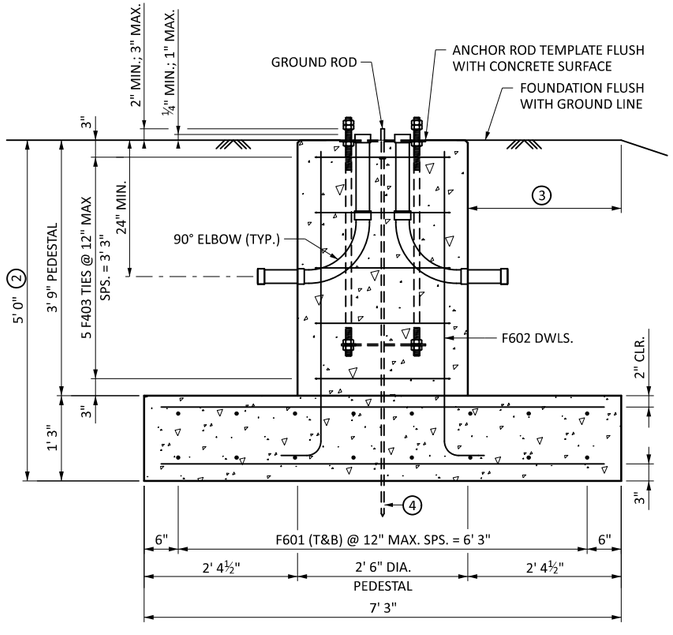
ANCHOR ROD TEMPLATE

TWO REQUIRED PER ASSEMBLY



ANCHOR ROD & HARDWARE

FOUR REQUIRED PER ASSEMBLY



SPREAD FOOTING ELEVATION

BASIS OF DESIGN:

THE DETAILS SHOWN ON THIS STANDARD PLAN ARE BASED ON THE AASHTO "LRFD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS," FIRST EDITION, 2015, AND THE 2017, 2018, 2019, AND 2020 INTERIM REVISIONS.

STRENGTH LIMIT WIND LOADING OF 120 MPH, SERVICE LIMIT WIND LOADING OF 76 MPH.

THE FACTORED BEARING RESISTANCE OF SOIL USED IN DESIGN IS 4 KSF.

THE DESIGN CONFIGURATION IS 50 FEET TALL WITH 12-FOOT TWIN ARMS. THE SHAPE OF THE LIGHT POLE SHAFT MAY BE ROUND OR HEXADECAGONAL (16-SIDED). ALTERNATE POLE SHAPES REQUIRE A SPECIAL FOUNDATION DESIGN.

THE MAXIMUM PROJECTED AREA (EPA) OF A SINGLE LUMINAIRE AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 3.00 SQUARE FEET.

GEOTECHNICAL PARAMETERS:

THE WATER TABLE IS ASSUMED BELOW THE BOTTOM OF FOOTING ELEVATION.

THE FOUNDATION DIMENSIONS SHOWN ON THIS SHEET ARE DESIGNED WITH THE FOLLOWING ASSUMED SOIL PROPERTIES:

SANDY SOILS	CLAY SOILS
UNIT WEIGHT = 125 PCF	UNIT WEIGHT = 125±10 PCF
FRICTION ANGLE = 30°	COHESION = 1000 PSF
	FRICTION ANGLE = 0°

A SPECIAL FOUNDATION DESIGN IS REQUIRED WHEN THE SPECIFIED VALUES, CONDITIONS, OR BOTH LISTED ABOVE ARE NOT MET.

LOAD CASE	EFFECTIVE WIDTH B' (FT)	EFFECTIVE SOIL PRESSURE (KSF)
SERVICE	5.88	1.02
STRENGTH	3.84	2.16

NOTES:

REINFORCEMENT BARS IN ACCORDANCE WITH SPEC. 3301 GRADE 60 OR GREATER. USE DEFORMED STEEL BARS.

FURNISH AND INSTALL 3G52 CONCRETE MIX IN ACCORDANCE WITH SPEC. 2461.

FURNISH AND INSTALL TYPE B ANCHOR RODS IN ACCORDANCE WITH SPEC. 3385.

GALVANIZE ANCHOR ROD ASSEMBLY TEMPLATES IN ACCORDANCE WITH SPEC. 3394.

(T&B) DENOTES TOP AND BOTTOM.

FIRMLY SUPPORT AND SECURELY TIE REINFORCING BARS, CONDUITS, GROUND ROD, AND ANCHOR ROD ASSEMBLY IN PROPER POSITION IN THE FORMS. OBTAIN ENGINEER'S APPROVAL BEFORE STARTING CONCRETE PLACEMENT OPERATIONS.

PLACE PREFORMED JOINT FILLER BETWEEN FOUNDATION AND SIDEWALK OR CONCRETE AREAS.

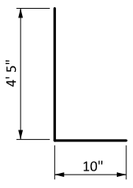
1. TO AVOID INTERFERENCE WITH THE LIGHT POLE BASE, PLACE CONDUIT AND GROUND ROD INSIDE THE ANCHOR ROD TEMPLATE.
2. PLACE THE BOTTOM OF FOOTING 5 FEET BELOW THE PROPOSED GROUNDLINE.
3. ENSURE GROUND IS LEVEL OVER THE PLAN DIMENSIONS OF THE FOOTING.
4. ⅝" DIAMETER x 10-FOOT-LONG GROUND ROD.
5. FOR SINGLE-NUT ANCHOR ROD CONNECTIONS, USE THE TOP NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. FOR DOUBLE-NUT ANCHOR ROD CONNECTIONS, USE THE LEVELING NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. LEAVE THE NUTS SECURED AGAINST THE TEMPLATE UNTIL POLE INSTALLATION. USE THE REQUIRED HARDWARE FOR ANCHOR ROD CONNECTION IN ACCORDANCE WITH 2545.3H.1.a AND 2545.3H.1.b.
6. PROTECT ANCHOR ROD THREADS AND LEVELING NUTS ABOVE THE UPPER ANCHOR ROD TEMPLATE FROM CONCRETE CONTAMINATION.
7. TIGHTEN ANCHOR ROD TEMPLATE NUTS USING A 12-INCH-LONG WRENCH.
8. FURNISH AND INSTALL HEADED STUDS IN ACCORDANCE WITH 3391.2D "STUD WELDED FASTENERS" ON THE UPPER TEMPLATE AT THE LOCATIONS SHOWN.
9. REMOVE SURFACE CONTAMINANTS AND APPLY SILICONE SEALANT TO THE UPPER TEMPLATE AROUND THE ANCHOR RODS AND ANCHOR ROD HOLES, AND THE INNER AND OUTER EDGES WHERE THE PLATE MEETS CONCRETE. USE AN APPROVED SILICONE JOINT SEALANT FOUND ON MnDOT'S APL UNDER BRIDGE PRODUCTS.

BILL OF REINFORCEMENT

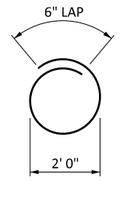
BAR	QTY.	LENGTH	SHAPE	LOCATION
F601	32	6' 9"		FOOTING REINFORCEMENT
F602	8	5' 3"		FOOTING DOWELS
F403	5	6' 10"	TIES	PEDESTAL TIES

BAR BENDING DIAGRAMS

BENT BAR DIMENSIONS GIVEN ARE OUT-TO-OUT. DETERMINE ACTUAL BAR LENGTHS BASED ON THE DETAIL DIMENSIONS SHOWN IN THE BAR BENDING DIAGRAMS.

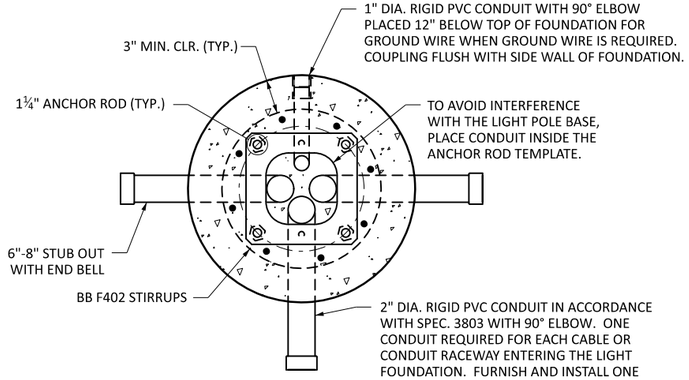


F602

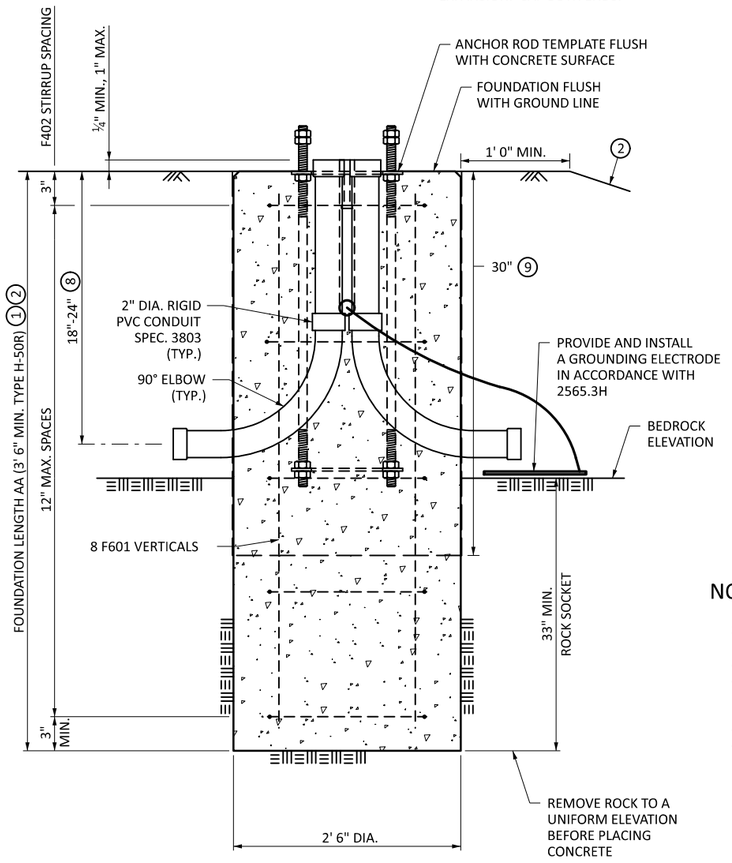


F403

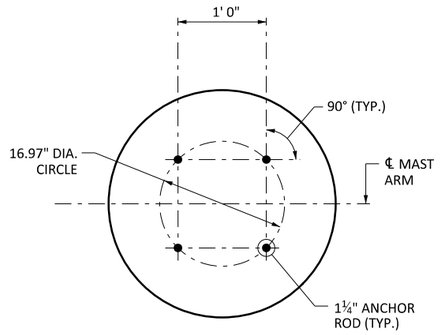
LEAD EXPERT OFFICE	BRIAN SORENSON STATE TRAFFIC ENGINEER OFFICE OF TRAFFIC ENGINEERING		LIGHT FOUNDATION - DESIGN H SPREAD FOOTING 50' POLE OR LESS - TWIN ARM LUMINAIRE FROM 1.5 TO 3.0 SQUARE FEET	NOT APPROVED STATE DESIGN ENGINEER	STANDARD PLAN 5-297.846	6 OF 8
DEPARTMENT OF TRANSPORTATION			STANDARD PLAN	STATE PROJ. NO. TRUNK HWY.	SHEET NO. TOTAL SHEETS	



PLAN



VERTICAL SECTION



ANCHOR ROD PLACEMENT

BASIS OF DESIGN:

THE DETAILS SHOWN ON THIS STANDARD PLAN ARE BASED ON THE AASHTO "LRFD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS," FIRST EDITION, 2015, AND THE 2017, 2018, 2019, AND 2020 INTERIM REVISIONS.

STRENGTH LIMIT WIND LOADING OF 120 MPH, SERVICE LIMIT WIND LOADING OF 76 MPH.

TYPE E-50R FOUNDATION - THE DESIGN CONFIGURATION IS 50 FEET TALL WITH 12-FOOT TWIN ARMS. THE SHAPE OF THE LIGHT POLE SHAFT MAY BE ROUND OR HEXADECAGONAL (16-SIDED). ALTERNATE POLE SHAPES REQUIRE A SPECIAL FOUNDATION DESIGN. THE MAXIMUM PROJECTED AREA (EPA) OF A SINGLE LUMINAIRE AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 1.50 SQUARE FEET.

GEOTECHNICAL PARAMETERS:

THE FOUNDATION DIMENSIONS SHOWN ON THIS SHEET ARE DESIGNED WITH THE FOLLOWING ASSUMED SOIL PROPERTIES:

COHESIVE SOILS:

MIN. SHEAR STRENGTH:	C = 1.0 ksf
UNIT WEIGHT OF SOIL:	γ = 125±10 pcf

GRANULAR SOILS:

MIN. ANGLE OF FRICTION:	Ø = 30°
UNIT WEIGHT OF SOIL:	γ = 125 pcf
MAX. COEFFICIENT OF FRICTION:	μ = 0.70

BEDROCK:

MIN. UNIAXIAL COMPRESSIVE STRENGTH:	700 psi
MIN. ROCK QUALITY DESIGNATION (RQD):	50%
MIN. JOINT CONDITION RATING ($JCOND_{89}$):	20

A SPECIAL FOUNDATION DESIGN IS REQUIRED WHEN THE SPECIFIED VALUES, CONDITIONS, OR BOTH LISTED ABOVE ARE NOT MET.

NOTES:

USE GRADE 60 WELDABLE REINFORCING BARS IN ACCORDANCE WITH ASTM A706 AND STEEL DIE STAMPED "W" ON THE SURFACE.

ATTACH REINFORCING BARS BY TYING, WELDING, OR BOTH. WELD REBAR TOGETHER IN ACCORDANCE WITH ANSI/AWS D1.4.

FIRMLY SUPPORT AND SECURELY TIE REINFORCING BARS, CONDUITS, AND ANCHOR ROD ASSEMBLY IN PROPER POSITION INTO THE FORM AND DRILLED SHAFT. OBTAIN ENGINEER'S APPROVAL BEFORE STARTING CONCRETE PLACEMENT OPERATIONS.

FURNISH AND INSTALL 3G52 CONCRETE MIX IN ACCORDANCE WITH SPEC. 2461.

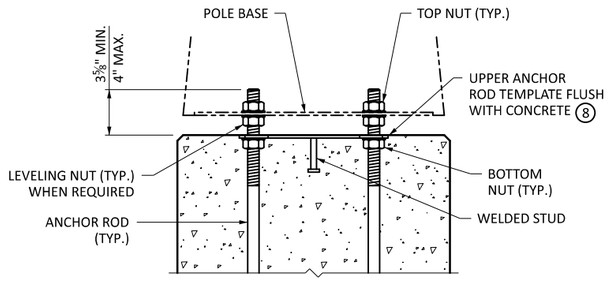
PLACE PREFORMED JOINT FILLER BETWEEN FOUNDATION AND SIDEWALK OR CONCRETE AREAS.

FURNISH AND INSTALL TYPE B ANCHOR RODS IN ACCORDANCE WITH SPEC. 3385.

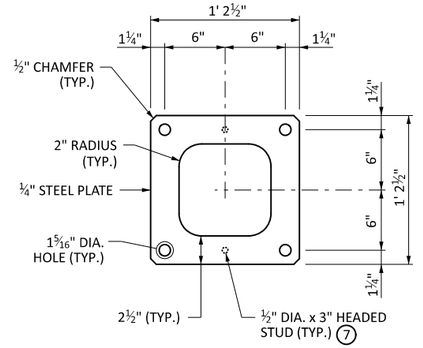
GALVANIZE ANCHOR ROD ASSEMBLY TEMPLATES IN ACCORDANCE WITH SPEC. 3394.

(1) SEE THE PLAN AND SPECIAL PROVISIONS FOR MODIFIED FOUNDATION DEPTH.

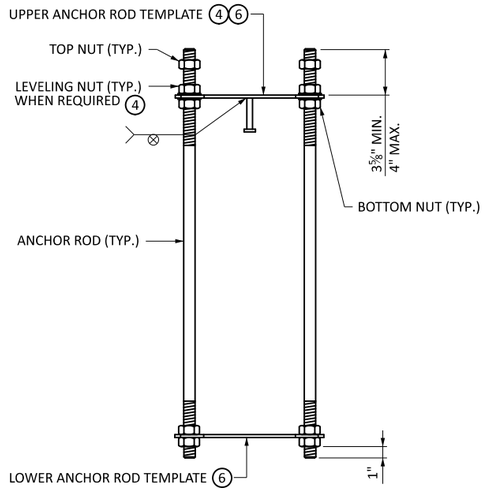
(2) IF THE FOUNDATION IS PLACED ON A SLOPE STEEPER THAN 1V:3H, INCREASE THE MINIMUM FOUNDATION DEPTH BY 12 INCHES. ADDITIONAL REINFORCEMENT IS NOT REQUIRED. SLOPES STEEPER THAN 1V:2H REQUIRE A SPECIAL DESIGN.



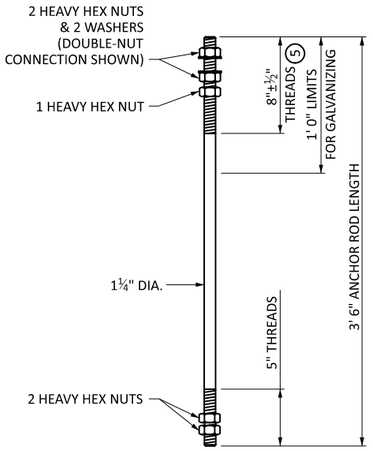
PARTIAL ELEVATION
SHOWING ANCHOR ROD ASSEMBLY & HEX NUT POSITIONS AFTER POLE INSTALLATION



ANCHOR ROD TEMPLATE
TWO REQUIRED PER ASSEMBLY



ANCHOR ROD ASSEMBLY



ANCHOR ROD & HARDWARE
FOUR REQUIRED PER ASSEMBLY

(3) FOR SINGLE-NUT ANCHOR ROD CONNECTIONS, USE THE TOP NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. FOR DOUBLE-NUT ANCHOR ROD CONNECTIONS, USE THE LEVELING NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. LEAVE THE NUTS SECURED AGAINST THE TEMPLATE UNTIL POLE INSTALLATION. USE THE REQUIRED HARDWARE FOR ANCHOR ROD CONNECTION IN ACCORDANCE WITH 2545.3H.1.a AND 2545.3H.1.b.

(4) PROTECT ANCHOR ROD THREADS AND LEVELING NUTS ABOVE THE UPPER ANCHOR ROD TEMPLATE FROM CONCRETE CONTAMINATION.

(5) TIGHTEN ANCHOR ROD TEMPLATE NUTS USING A 12-INCH-LONG WRENCH.

(6) FURNISH AND INSTALL HEADED STUDS IN ACCORDANCE WITH 3391.2D "STUD WELDED FASTENERS" ON THE UPPER TEMPLATE AT THE LOCATIONS SHOWN.

(7) REMOVE SURFACE CONTAMINANTS AND APPLY SILICONE SEALANT TO THE UPPER TEMPLATE AROUND THE ANCHOR RODS AND ANCHOR ROD HOLES, AND THE INNER AND OUTER EDGES WHERE THE PLATE MEETS CONCRETE. USE AN APPROVED SILICONE JOINT SEALANT FOUND ON MnDOT'S APL UNDER BRIDGE PRODUCTS.

(8) THE MINIMUM CONDUIT EMBEDMENT IS 18 INCHES BELOW FINISHED GRADE. SEE SPECIAL PROVISIONS IF SHALLOW BEDROCK IS ENCOUNTERED AND A REDUCED EMBEDMENT DEPTH IS REQUIRED.

(9) FURNISH AND INSTALL A MAXIMUM 30" LONG CONCRETE FORMING TUBE TO FORM THE UPPER PORTION OF THE FOUNDATION. DO NOT USE A FULL-LENGTH FORMING TUBE.

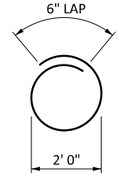
BILL OF REINFORCEMENT - TYPE H-50R

BAR	QTY.	LENGTH	SHAPE	LOCATION
F601	8	AA - 6"	——	SHAFT VERTICALS
F402	BB	6' 10"	TIES	SHAFT TIES

TO DETERMINE THE NUMBER OF F302 STIRRUPS REQUIRED, SUBTRACT 6 INCHES FROM THE OVERALL LENGTH OF FOUNDATION, AA, MEASURED IN FEET. ROUND THE VALUE TO THE NEXT HIGHEST INTEGER, IN FEET, AND ADD 1 FOOT. THE RESULTING VALUE, WITH UNITS REMOVED, REPRESENTS THE REQUIRED QUANTITY.

BAR BENDING DIAGRAM

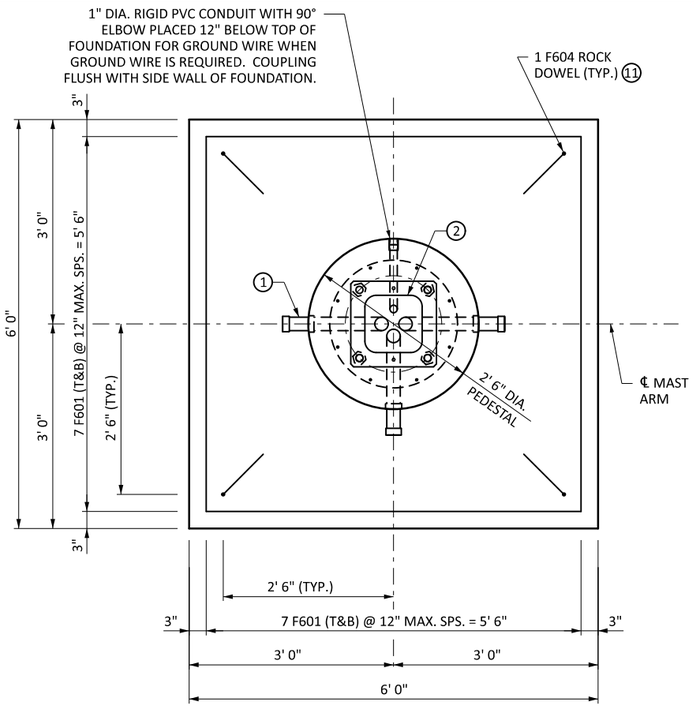
BENT BAR DIMENSIONS GIVEN ARE OUT-TO-OUT. DETERMINE ACTUAL BAR LENGTHS BASED ON THE DETAIL DIMENSIONS SHOWN IN THE BAR BENDING DIAGRAM.



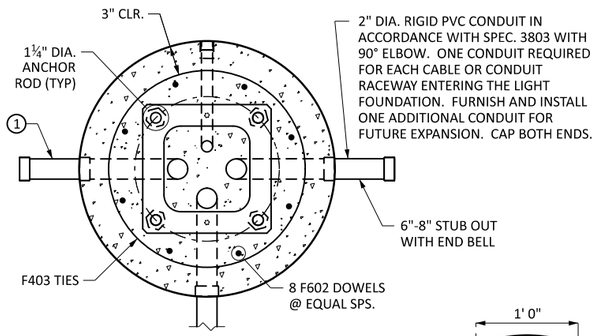
F402

LEAD EXPERT OFFICE	BRIAN SORENSON STATE TRAFFIC ENGINEER OFFICE OF TRAFFIC ENGINEERING		LIGHT FOUNDATION - DESIGN H CAST-IN-PLACE DRILLED SHAFT IN ROCK TYPE H-50R - 50' POLE OR LESS	NOT APPROVED STATE DESIGN ENGINEER	STANDARD PLAN 5-297.846	7 OF 8

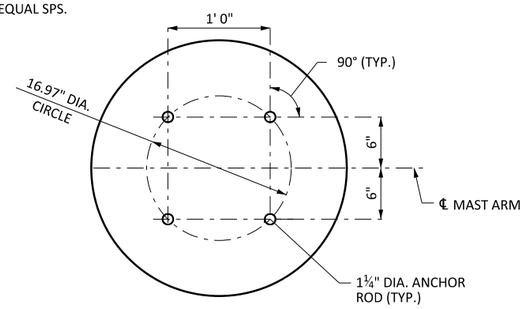
DEPARTMENT OF TRANSPORTATION			STANDARD PLAN	STATE PROJ. NO. TRUNK HWY.	SHEET NO. TOTAL SHEETS



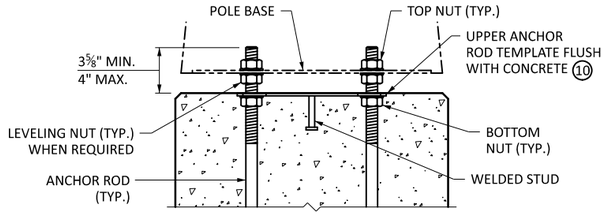
ANCHORED SPREAD FOOTING PLAN



PEDESTAL PLAN

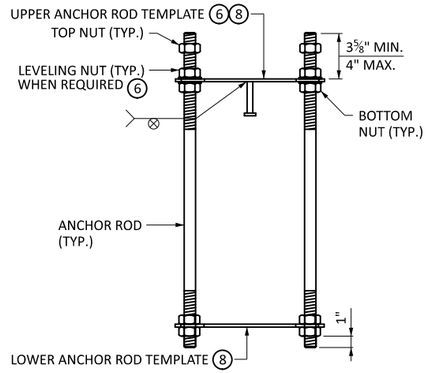


ANCHOR ROD PLACEMENT

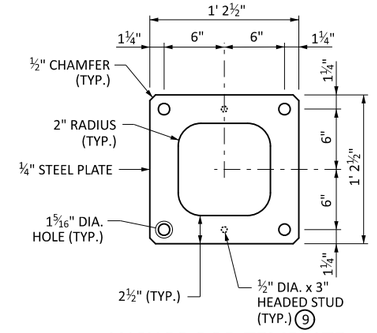


PARTIAL ELEVATION

SHOWING ANCHOR ROD ASSEMBLY & HEX NUT POSITIONS AFTER POLE INSTALLATION

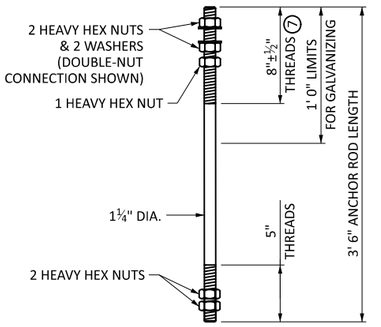


ANCHOR ROD ASSEMBLY



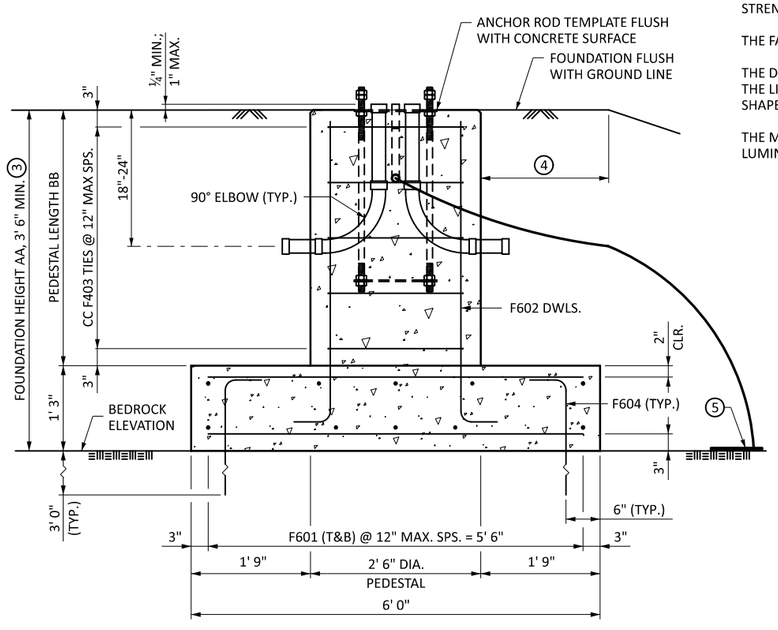
ANCHOR ROD TEMPLATE

TWO REQUIRED PER ASSEMBLY



ANCHOR ROD & HARDWARE

FOUR REQUIRED PER ASSEMBLY



ANCHORED SPREAD FOOTING ELEVATION

BASIS OF DESIGN:

THE DETAILS SHOWN ON THIS STANDARD PLAN ARE BASED ON THE AASHTO "LRFD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS," FIRST EDITION, 2015, AND THE 2017, 2018, 2019, AND 2020 INTERIM REVISIONS.

STRENGTH LIMIT WIND LOADING OF 120 MPH, SERVICE LIMIT WIND LOADING OF 76 MPH.

THE FACTORED BEARING RESISTANCE OF ROCK USED IN DESIGN IS 10 KSF.

THE DESIGN CONFIGURATION IS 50 FEET TALL WITH 12-FOOT TWIN ARMS. THE SHAPE OF THE LIGHT POLE SHAFT MAY BE ROUND OR HEXADECAGONAL (16-SIDED). ALTERNATE POLE SHAPES REQUIRE A SPECIAL FOUNDATION DESIGN.

THE MAXIMUM PROJECTED AREA (EPA) OF A SINGLE LUMINAIRE AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 1.50 SQUARE FEET.

GEOTECHNICAL PARAMETERS:

THE WATER TABLE IS ASSUMED BELOW THE BOTTOM OF FOOTING ELEVATION.

THE FOUNDATION DIMENSIONS SHOWN ON THIS SHEET ARE DESIGNED WITH THE FOLLOWING ASSUMED SOIL PROPERTIES:

SANDY SOILS
UNIT WEIGHT = 125 PCF
FRICTION ANGLE = 30°

CLAY SOILS
UNIT WEIGHT = 125±10 PCF
COHESION = 1000 PSF
FRICTION ANGLE = 0°

BEDROCK:
UNIAXIAL COMPRESSIVE STRENGTH: 700 psi
ROCK QUALITY DESIGNATION (RQD): 50%
JOINT CONDITION RATING ($JCOND_{89}$): 20

A SPECIAL FOUNDATION DESIGN IS REQUIRED WHEN THE SPECIFIED VALUES, CONDITIONS, OR BOTH LISTED ABOVE ARE NOT MET.

NOTES:

REINFORCEMENT BARS IN ACCORDANCE WITH SPEC. 3301 GRADE 60 OR GREATER. USE DEFORMED STEEL BARS.

FURNISH AND INSTALL 3G52 CONCRETE MIX IN ACCORDANCE WITH SPEC. 2461.

FURNISH AND INSTALL TYPE B ANCHOR RODS IN ACCORDANCE WITH SPEC. 3385.

GALVANIZE ANCHOR ROD ASSEMBLY TEMPLATES IN ACCORDANCE WITH SPEC. 3394.

(T&B) DENOTES TOP AND BOTTOM.

FIRMLY SUPPORT AND SECURELY TIE REINFORCING BARS, CONDUITS, AND ANCHOR ROD ASSEMBLY IN PROPER POSITION IN THE FORMS. OBTAINENGINEER'S APPROVAL BEFORE STARTING CONCRETE PLACEMENT OPERATIONS.

PLACE PREFORMED JOINT FILLER BETWEEN FOUNDATION AND SIDEWALK OR CONCRETE AREAS.

(1) EXTEND CONDUITS THROUGH FOOTING WHEN NECESSARY TO MAINTAIN 18-INCH TO 24-INCH EMBEDMENT.

(2) TO AVOID INTERFERENCE WITH THE LIGHT POLE BASE, PLACE CONDUIT INSIDE THE ANCHOR ROD TEMPLATE.

(3) ENSURE BOTTOM OF FOOTING IS SUPPORTED ON COMPETENT BEDROCK.

(4) ENSURE GROUND IS LEVEL OVER THE PLAN DIMENSIONS OF THE FOOTING.

(5) PROVIDE AND INSTALL A GROUNDING ELECTRODE IN ACCORDANCE WITH 2565.3H.

(6) FOR SINGLE-NUT ANCHOR ROD CONNECTIONS, USE THE TOP NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. FOR DOUBLE-NUT ANCHOR ROD CONNECTIONS, USE THE LEVELING NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE STARTING CONCRETE OPERATIONS. LEAVE THE NUTS SECURED AGAINST THE TEMPLATE UNTIL POLE INSTALLATION. USE THE REQUIRED HARDWARE FOR ANCHOR ROD CONNECTION IN ACCORDANCE WITH 2545.3H.1.a AND 2545.3H.1.b.

(7) PROTECT ANCHOR ROD THREADS AND LEVELING NUTS ABOVE THE UPPER ANCHOR ROD TEMPLATE FROM CONCRETE CONTAMINATION.

(8) TIGHTEN ANCHOR ROD TEMPLATE NUTS USING A 12-INCH-LONG WRENCH.

(9) FURNISH AND INSTALL HEADED STUDS IN ACCORDANCE WITH 3391.2D "STUD WELDED FASTENERS" ON THE UPPER TEMPLATE AT THE LOCATIONS SHOWN.

(10) REMOVE SURFACE CONTAMINANTS AND APPLY SILICONE SEALANT TO THE UPPER TEMPLATE AROUND THE ANCHOR RODS AND ANCHOR ROD HOLES, AND THE INNER AND OUTER EDGES WHERE THE PLATE MEETS CONCRETE. USE AN APPROVED SILICONE JOINT SEALANT FOUND ON MnDOT'S APL UNDER BRIDGE PRODUCTS.

(11) PLACE ROCK DOWEL IN 3-INCH-DIAMETER HOLE AND ANCHOR USING AN APPROVED NON-SHRINK GROUT FOUND ON MnDOT'S APL UNDER CONCRETE PRODUCTS.

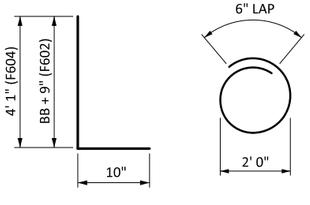
BILL OF REINFORCEMENT

BAR	QTY.	LENGTH	SHAPE	LOCATION
F601	28	5' 6"		FOOTING REINFORCEMENT
F602	6	BB+1' 7"		FOOTING DOWELS
F403	CC	6' 10"	TIES	PEDESTAL TIES
F604	4	4' 11"		ROCK DOWELS

TO DETERMINE THE NUMBER OF F403 TIES REQUIRED, SUBTRACT 6 INCHES FROM THE OVERALL LENGTH OF PEDESTAL, BB, MEASURED IN FEET. ROUND THE VALUE TO THE NEXT HIGHEST INTEGER, IN FEET, AND ADD 1 FOOT. THE RESULTING VALUE, WITH UNITS REMOVED, REPRESENTS THE REQUIRED QUANTITY.

BAR BENDING DIAGRAMS

BENT BAR DIMENSIONS GIVEN ARE OUT-TO-OUT. DETERMINE ACTUAL BAR LENGTHS BASED ON THE DETAIL DIMENSIONS SHOWN IN THE BAR BENDING DIAGRAMS.



F602 & F604 F403

LEAD EXPERT OFFICE	BRIAN SORENSON STATE TRAFFIC ENGINEER OFFICE OF TRAFFIC ENGINEERING		LIGHT FOUNDATION - DESIGN H ANCHORED SPREAD FOOTING ON ROCK TYPE H-50A - 50' POLE OR LESS	NOT APPROVED	STATE DESIGN ENGINEER	STANDARD PLAN 5-297.846	8 OF 8

DEPARTMENT OF TRANSPORTATION			STANDARD PLAN	STATE PROJ. NO.	SHEET NO.
				TRUNK HWY.	TOTAL SHEETS

SPREAD FOOTING FOUNDATION DATA

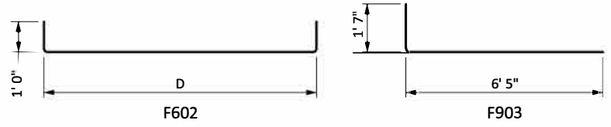
POLE TYPE	MAST ARM LENGTH	SPREAD FOOTING DIMENSIONS			
		A	B	C	D
TS15-TS25	15' 0", 20' 0" & 25' 0"	8' 0"	2' 6"	3' 0"	7' 6"
TS30-TS40	30' 0", 35' 0" & 40' 0"	9' 6"	3' 3"	3' 0"	9' 0"
TS45-TS55 STANDARD	45' 0", 50' 0" & 55' 0"	10' 3"	3' 1¼"	4' 0"	9' 9"
TS45-TS55 HEAVY	45' 0", 50' 0" & 55' 0"	11' 0"	3' 6"	4' 0"	10' 6"

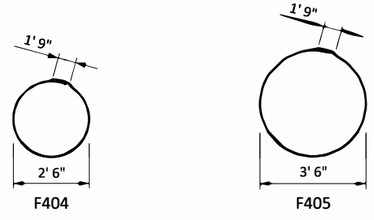
SPREAD FOOTING REINFORCEMENT

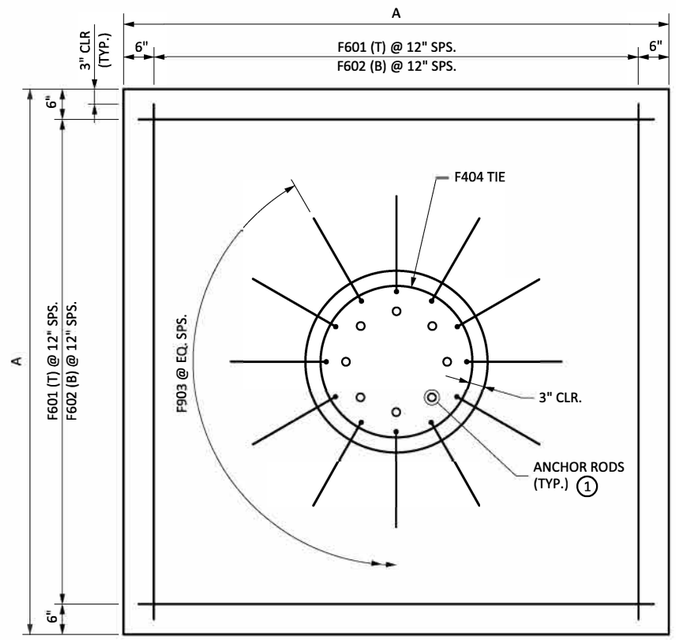
	BAR	MAST ARM LENGTH								SHAPE	LOCATION
		15' TO 25'		30' TO 40'		45' TO 55' STANDARD		45' TO 55' HEAVY			
		NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH		
	F601	16	7' 6"	20	9' 0"	22	9' 9"	22	10' 6"	———	FOOTING TOP
	F602	16	9' 6"	20	11' 0"	22	11' 9"	22	12' 6"	⌊——⌋	FOOTING BOTTOM
	F903	12	8' 0"	12	8' 0"	20	8' 0"	20	8' 0"	⌊——	PEDESTAL VERTICAL
(4)	F404	7	9' 8"	7	9' 8"	---	---	---	---	○	PEDESTAL TIE
(4)	F405	---	---	---	---	7	12' 9"	7	12' 9"	◯	PEDESTAL TIE

BAR BENDING DIAGRAMS

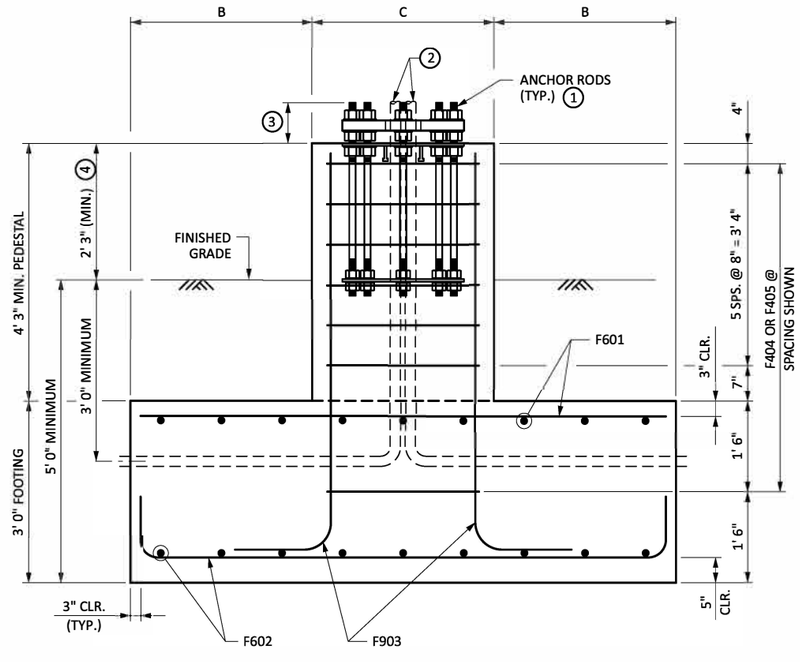
BENT BAR DIMENSIONS GIVEN ARE OUT-TO-OUT. DETERMINE ACTUAL BAR LENGTHS BASED ON THE DETAIL DIMENSIONS SHOWN IN THE BAR BENDING DIAGRAMS.







SPREAD FOOTING PLAN



SPREAD FOOTING ELEVATION

GEOTECHNICAL PARAMETERS:

CONTACT MnDOT FOUNDATIONS UNIT FOR DETERMINATION OF SUBSURFACE INVESTIGATION REQUIREMENTS.

THE FOUNDATION DIMENSIONS SHOWN ON THIS SHEET ARE DESIGNED ASSUMING THE WATER TABLE IS BELOW THE BOTTOM OF FOOTING ELEVATION OR LOWER AND THE IN-SITU SOIL PROPERTIES MEET OR EXCEED THE FOLLOWING MINIMUM VALUES:

SANDY SOILS
UNIT WEIGHT = 125 PCF
FRICTION ANGLE = 30°

CLAY SOILS
UNIT WEIGHT = 125±10 PCF
COHESION = 1000 PSF
FRICTION ANGLE = 0°

A SPECIAL FOUNDATION DESIGN IS REQUIRED WHEN THE SPECIFIED VALUES, CONDITIONS, OR BOTH LISTED ABOVE ARE NOT MET.

SPREAD FOOTINGS ARE DESIGNED BASED ON AN ALLOWABLE BEARING PRESSURE OF 2.50 KSF.

IF THE SOIL BEARING CAPACITY IS LESS THAN 2.50 KSF, OBTAIN APPROVAL FROM THE DISTRICT SOILS ENGINEER.

NOTES:

FURNISH AND INSTALL PREFORMED JOINT FILLER IN ACCORDANCE WITH SPEC. 3702 BETWEEN THE FOUNDATION AND SIDEWALK OR OTHER CONCRETE AREAS. THEN SEAL THE JOINT BETWEEN THE FOUNDATION AND SIDEWALK OR CONCRETE AREA WITH SILICONE SEALANT IN ACCORDANCE WITH SPEC 3722.

FURNISH AND INSTALL 3G52 CONCRETE MIX IN ACCORDANCE WITH SPEC. 2461. CURE CONCRETE IN ACCORDANCE WITH SPEC. 2401.

PROVIDE ¾" CHAMFER ON THE EXPOSED TOP EDGE OF THE FOUNDATION.

EXCAVATE, BACKFILL, AND COMPACT AROUND THE FOUNDATION IN ACCORDANCE WITH SPEC. 2451.

POSITION FOUNDATION CONDUITS INSIDE THE ANCHOR ROD ASSEMBLY. CAP ENDS UNTIL CABLES ARE INSTALLED.

ALLOW THE FOUNDATION TO CURE FOR AT LEAST 7 DAYS AFTER CONCRETE POURING OPERATIONS BEFORE INSTALLING POLES.

PROVIDE GRADE 60 DEFORMED BILLET REINFORCEMENT BARS IN ACCORDANCE WITH AASHTO M31 GRADE 60, SPEC. 2471, AND SPEC. 3301.

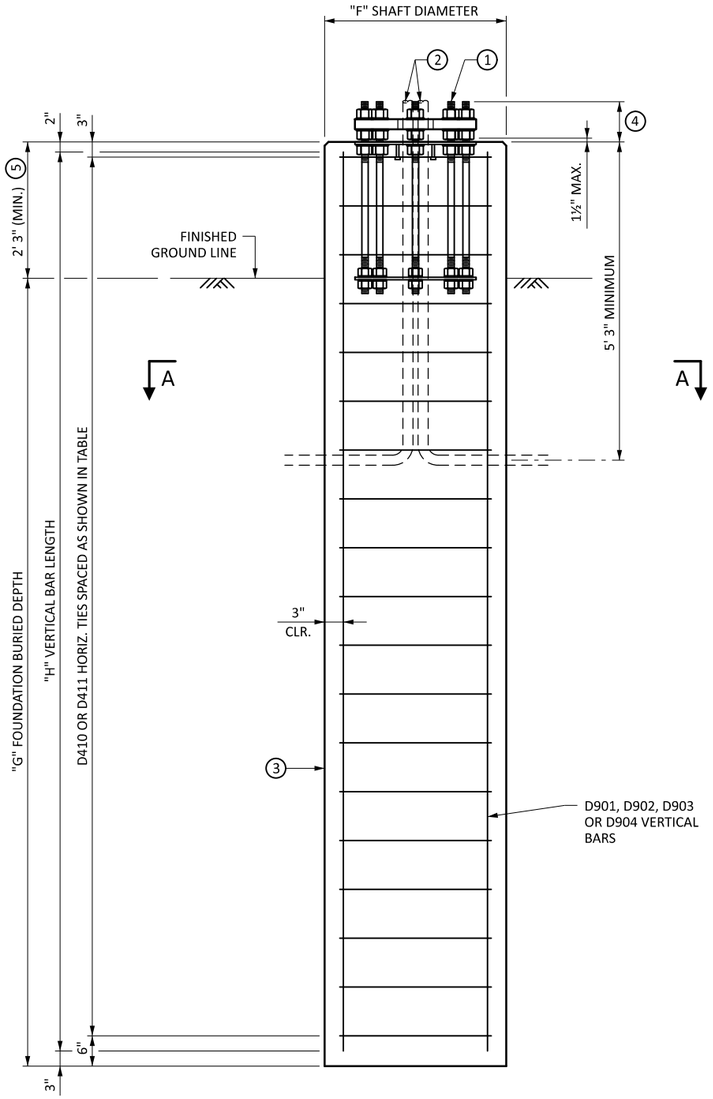
(1) SEE STANDARD PLATE 8124 FOR ANCHOR ROD ASSEMBLY DETAILS.

(2) SEE CONDUIT DETAIL ON SHEET 5 OF 5.

(3) SEE ANCHOR ROD PLACEMENT DETAIL ON SHEET 5 OF 5.

(4) INCREASE FOUNDATION PROJECTION AS REQUIRED TO PROVIDE A VERTICAL CLEARANCE FROM THE BOTTOM OF ALL SIGNS AND SIGNAL HEADS (INCLUDING BACKGROUND SHIELDS) TO THE PAVEMENT OF NOT LESS THAN 17.50' NOR MORE THAN 19.00'. INCREASE PEDESTAL LENGTH TO PROVIDE THE MINIMUM FOOTING BURIED DEPTH FOR FROST PROTECTION. INCREASE VERTICAL BAR LENGTH AND, IF NEEDED, ADD ADDITIONAL F404 OR F405 TO PROVIDE THE INDICATED COVER.

LEAD EXPERT OFFICE	EDWARD LUTGEN OFFICE DIRECTOR BRIDGE OFFICE		POLE FOUNDATION TYPE TS SPREAD FOOTING FOR 15' TO 55' MAST ARMS	APPROVED: 02-21-2024 REVISED:	THOMAS STYRBICKI STATE DESIGN ENGINEER	STANDARD PLAN 5-297.861	1 OF 5
	DEPARTMENT OF TRANSPORTATION		STANDARD PLAN	STATE PROJ. NO.		SHEET NO.	
				TRUNK HWY.		TOTAL SHEETS	

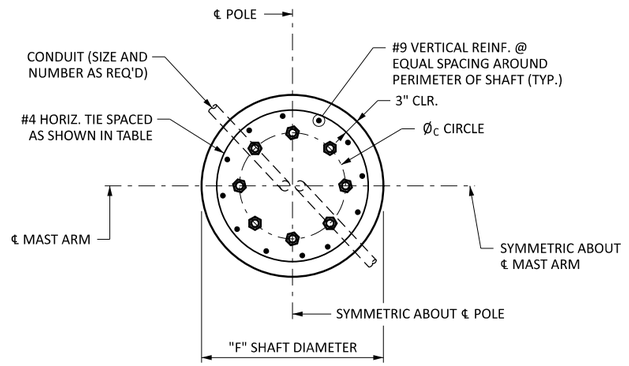


DRILLED SHAFT ELEVATION

FOUNDATION FOR 30' TO 40' MAST ARM SHOWN; OTHERS SIMILAR

DRILLED SHAFT FOUNDATION DATA					
DESCRIPTION	DIMENSION	MAST ARM LENGTH			
		15' TO 25'	30' TO 40'	45' TO 55' STANDARD	45' TO 55' HEAVY
SHAFT DIAMETER	F	3' 0"	3' 0"	4' 0"	4' 0"
FOUNDATION BURIED DEPTH	G	9' 0"	13' 0"	11' 0"	14' 0"
BOLT CIRCLE DIAMETER	$Ø_C$	1' 9"	1' 9"	1' 9"	1' 9"

DRILLED SHAFT REINFORCEMENT					
DESCRIPTION	DIMENSION	MAST ARM LENGTH			
		15' TO 25'	30' TO 40'	45' TO 55' STANDARD	45' TO 55' HEAVY
VERTICAL BAR MARK (#9)	-	D901	D902	D903	D904
VERTICAL BAR LENGTH	H	10' 10"	14' 10"	12' 10"	15' 10"
NUMBER OF VERTICAL BARS	-	12	12	20	20
HORIZONTAL TIE BAR MARK (#4)	-	D410	D410	D411	D411
NUMBER OF HORIZONTAL TIES	-	12	19	14	17
MAX. HORIZONTAL TIE SPACING	-	12"	10"	12"	12"
HORIZONTAL TIE LENGTH	-	9' 8"	9' 8"	12' 9"	12' 9"



SECTION A-A

GEOTECHNICAL PARAMETERS:

CONTACT MnDOT FOUNDATIONS UNIT FOR DETERMINATION OF SUBSURFACE INVESTIGATION REQUIREMENTS.

THE FOUNDATION DIMENSIONS SHOWN ON THIS SHEET ARE DESIGNED ASSUMING THE WATER TABLE IS 1.5' BELOW GRADE OR LOWER AND THE IN-SITU SOIL PROPERTIES MEET OR EXCEED THE FOLLOWING MINIMUM VALUES:

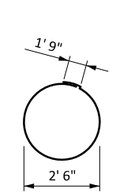
SANDY SOILS
UNIT WEIGHT = 125 PCF
FRICTION ANGLE = 30°

CLAY SOILS
UNIT WEIGHT = 125±10 PCF
COHESION = 1000 PSF
FRICTION ANGLE = 0°

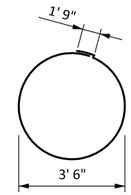
A SPECIAL FOUNDATION DESIGN IS REQUIRED WHEN THE SPECIFIED VALUES, CONDITIONS, OR BOTH LISTED ABOVE ARE NOT MET.

BAR BENDING DIAGRAMS

BENT BAR DIMENSIONS GIVEN ARE OUT-TO-OUT. DETERMINE ACTUAL BAR LENGTHS BASED ON THE DETAIL DIMENSIONS SHOWN IN THE BAR BENDING DIAGRAMS.



D410



D411

NOTES:

COLD CONCRETE CONSTRUCTION JOINTS ARE NOT PERMITTED.

GALVANIZE STEEL COMPONENTS IN ACCORDANCE WITH SPEC. 3394.

FURNISH AND INSTALL PREFORMED JOINT FILLER IN ACCORDANCE WITH SPEC. 3702 BETWEEN THE FOUNDATION AND SIDEWALK OR OTHER CONCRETE AREAS. THEN SEAL THE JOINT BETWEEN THE FOUNDATION AND SIDEWALK OR CONCRETE AREA WITH SILICONE SEALANT IN ACCORDANCE WITH SPEC 3722.

FURNISH AND INSTALL 3G52 CONCRETE MIX IN ACCORDANCE WITH SPEC. 2461. CURE CONCRETE IN ACCORDANCE WITH SPEC. 2401.

PROVIDE ¾" CHAMFER ON THE EXPOSED TOP EDGE OF THE FOUNDATION.

EXCAVATE, BACKFILL, AND COMPACT AROUND THE FOUNDATION IN ACCORDANCE WITH SPEC. 2451.

POSITION FOUNDATION CONDUITS INSIDE THE ANCHOR ROD ASSEMBLY. CAP ENDS UNTIL CABLES ARE INSTALLED.

ALLOW THE FOUNDATION TO CURE FOR AT LEAST 7 DAYS AFTER CONCRETE POURING OPERATIONS BEFORE INSTALLING POLES.

PROVIDE GRADE 60 DEFORMED BILLET REINFORCEMENT BARS IN ACCORDANCE WITH AASHTO M31 GRADE 60, SPEC. 2471, AND SPEC. 3301.

DRILLED SHAFT FOUNDATIONS ARE DESIGNED FOR THE CAST-IN-PLACE CONCRETE TO BE POURED DIRECTLY AGAINST THE SOILS SURROUNDING THE DRILLED SHAFT. CONCRETE FORMS ARE REQUIRED FOR THE 27" ABOVE THE FINISHED GROUNDLINE OR SIDEWALK AND PERMANENT CASING MAY BE USED FOR NO MORE THAN 25 PERCENT OF THE TOTAL FOUNDATION DEPTH BELOW FINISHED GRADE OR SIDEWALK. DO NOT USE PERMANENT CASING FOR MORE THAN 25 PERCENT OF THE ENTIRE DEPTH OF THE DRILLED SHAFT.

1. SEE STANDARD PLATE 8124 FOR ANCHOR ROD ASSEMBLY DETAILS.
2. SEE CONDUIT DETAIL ON SHEET 5 OF 5.
3. EXCAVATE TO NEAT LINES AND PLACE CONCRETE AGAINST UNDISTURBED SOIL.
4. SEE ANCHOR ROD PLACEMENT DETAIL ON SHEET 5 OF 5.
5. INCREASE FOUNDATION PROJECTION AS REQUIRED TO PROVIDE A VERTICAL CLEARANCE FROM THE BOTTOM OF ALL SIGNS AND SIGNAL HEADS (INCLUDING BACKGROUND SHIELDS) TO THE PAVEMENT OF NOT LESS THAN 17.50' NOR MORE THAN 19.00'. INCREASE OVERALL FOUNDATION LENGTH TO PROVIDE THE MINIMUM FOUNDATION BURIED DEPTH. INCREASE LONGITUDINAL BAR LENGTH TO PROVIDE THE INDICATED COVER.

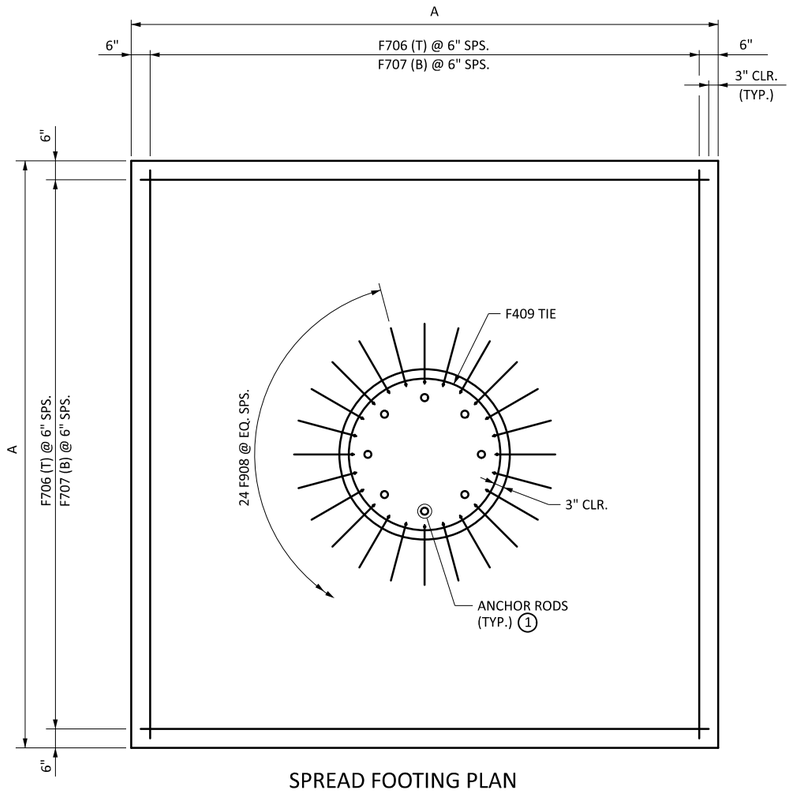
LEAD EXPERT OFFICE	EDWARD LUTGEN OFFICE DIRECTOR BRIDGE OFFICE		POLE FOUNDATION TYPE TS DRILLED SHAFT FOUNDATIONS FOR 15' TO 55' MAST ARMS	APPROVED: 02-21-2024 REVISED:	THOMAS STYRBICKI STATE DESIGN ENGINEER	STANDARD PLAN 5-297.861	2 OF 5
	DEPARTMENT OF TRANSPORTATION		STANDARD PLAN	STATE PROJ. NO.		SHEET NO.
				TRUNK HWY.		TOTAL SHEETS

SPREAD FOOTING FOUNDATION DATA

POLE TYPE	MAST ARM LENGTH	SPREAD FOOTING DIMENSIONS		
		A	B	C
TS60	60' 0"	12' 6"	4' 0"	12' 0"
TS65	65' 0"	13' 0"	4' 3"	12' 6"
TS70	70' 0"	14' 0"	4' 9"	13' 6"
TS75	75' 0"	15' 0"	5' 3"	14' 6"
TS80	80' 0"	15' 6"	5' 6"	15' 0"

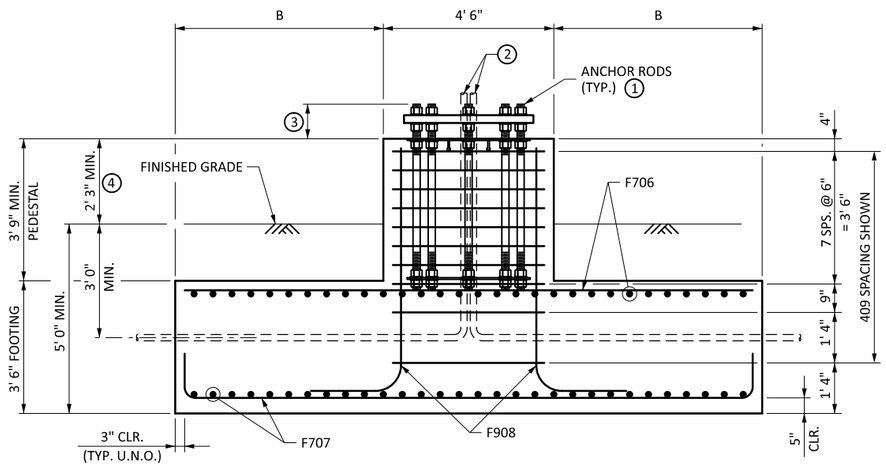
SPREAD FOOTING REINFORCEMENT

BAR	MAST ARM LENGTH										SHAPE	LOCATION
	60'		65'		70'		75'		80'			
	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH		
F706	48	12' 0"	50	12' 6"	54	13' 6"	58	14' 6"	60	15' 0"		FOOTING TOP
F707	48	14' 4"	50	14' 10"	54	15' 10"	58	16' 10"	60	17' 4"		FOOTING BOTTOM
F908	24	8' 1"	24	8' 1"	24	8' 1"	24	8' 1"	24	8' 1"		PEDESTAL VERTICAL
F409	10	14' 4"	10	14' 4"	10	14' 4"	10	14' 4"	10	14' 4"		PEDESTAL TIE



SPREAD FOOTING PLAN

80' MAST ARM FOUNDATION SHOWN; 60' TO 75' MAST ARM FOUNDATION SIMILAR



SPREAD FOOTING ELEVATION

GEOTECHNICAL PARAMETERS:

CONTACT MnDOT FOUNDATIONS UNIT FOR DETERMINATION OF SUBSURFACE INVESTIGATION REQUIREMENTS.

THE FOUNDATION DIMENSIONS SHOWN ON THIS SHEET ARE DESIGNED ASSUMING THE WATER TABLE IS BELOW THE BOTTOM OF FOOTING ELEVATION OR LOWER AND THE IN-SITU SOIL PROPERTIES MEET OR EXCEED THE FOLLOWING MINIMUM VALUES:

SANDY SOILS	CLAY SOILS
UNIT WEIGHT = 125 PCF	UNIT WEIGHT = 125±10 PCF
FRICTION ANGLE = 30°	COHESION = 1000 PSF
	FRICTION ANGLE = 0°

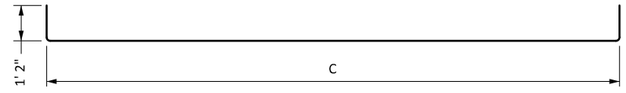
A SPECIAL FOUNDATION DESIGN IS REQUIRED WHEN THE SPECIFIED VALUES, CONDITIONS, OR BOTH LISTED ABOVE ARE NOT MET.

SPREAD FOOTINGS ARE DESIGNED BASED ON AN ALLOWABLE BEARING PRESSURE OF 2.50 KSF.

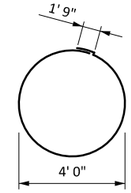
IF THE SOIL BEARING CAPACITY IS LESS THAN 2.50 KSF, OBTAIN APPROVAL FROM THE DISTRICT SOILS ENGINEER.

BAR BENDING DIAGRAMS

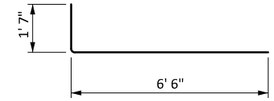
BENT BAR DIMENSIONS GIVEN ARE OUT-TO-OUT. DETERMINE ACTUAL BAR LENGTHS BASED ON THE DETAIL DIMENSIONS SHOWN IN THE BAR BENDING DIAGRAMS.



F707



F409



F908

NOTES:

FURNISH AND INSTALL PREFORMED JOINT FILLER IN ACCORDANCE WITH SPEC. 3702 BETWEEN THE FOUNDATION AND SIDEWALK OR OTHER CONCRETE AREAS. THEN SEAL THE JOINT BETWEEN THE FOUNDATION AND SIDEWALK OR CONCRETE AREA WITH SILICONE SEALANT IN ACCORDANCE WITH SPEC 3722.

FURNISH AND INSTALL 3G52 CONCRETE MIX IN ACCORDANCE WITH SPEC. 2461. CURE CONCRETE IN ACCORDANCE WITH SPEC. 2401.

PROVIDE ¾" CHAMFER ON THE EXPOSED TOP EDGE OF THE FOUNDATION.

EXCAVATE, BACKFILL, AND COMPACT AROUND THE FOUNDATION IN ACCORDANCE WITH SPEC. 2451.

POSITION FOUNDATION CONDUITS INSIDE THE ANCHOR ROD ASSEMBLY. CAP ENDS UNTIL CABLES ARE INSTALLED.

ALLOW THE FOUNDATION TO CURE FOR AT LEAST 7 DAYS AFTER CONCRETE POURING OPERATIONS BEFORE INSTALLING POLES.

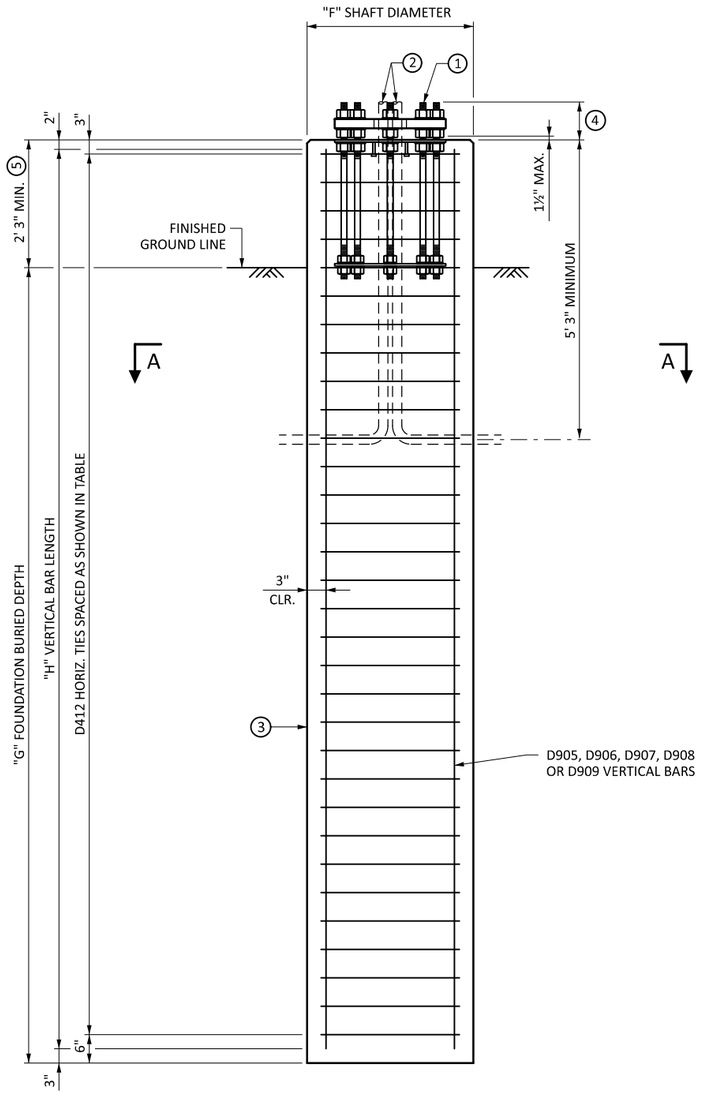
PROVIDE GRADE 60 DEFORMED BILLET REINFORCEMENT BARS IN ACCORDANCE WITH AASHTO M31 GRADE 60, SPEC. 2471, AND SPEC. 3301.

1. SEE STANDARD PLATE 8125 FOR ANCHOR ROD ASSEMBLY DETAILS.
2. SEE CONDUIT DETAIL ON SHEET 5 OF 5.
3. SEE ANCHOR ROD PLACEMENT DETAIL ON SHEET 5 OF 5.
4. INCREASE FOUNDATION PROJECTION AS REQUIRED TO PROVIDE A VERTICAL CLEARANCE FROM THE BOTTOM OF ALL SIGNS AND SIGNAL HEADS (INCLUDING BACKGROUND SHIELDS) TO THE PAVEMENT OF NOT LESS THAN 17.50 FEET NOR MORE THAN 19.00 FEET. INCREASE PEDESTAL LENGTH TO PROVIDE THE MINIMUM FOOTING BURIED DEPTH FOR FROST PROTECTION. INCREASE VERTICAL BAR LENGTH TO PROVIDE THE INDICATED COVER.

LEAD EXPERT OFFICE: EDWARD LUTGEN, OFFICE DIRECTOR BRIDGE OFFICE		POLE FOUNDATION TYPE TS SPREAD FOOTING FOR 60' TO 80' MAST ARMS	APPROVED: 02-21-2024 REVISED:	THOMAS STYRBICKI STATE DESIGN ENGINEER	STANDARD PLAN 5-297.861	3 OF 5
DEPARTMENT OF TRANSPORTATION		STANDARD PLAN	STATE PROJ. NO.		SHEET NO.	
			TRUNK HWY.		TOTAL SHEETS	

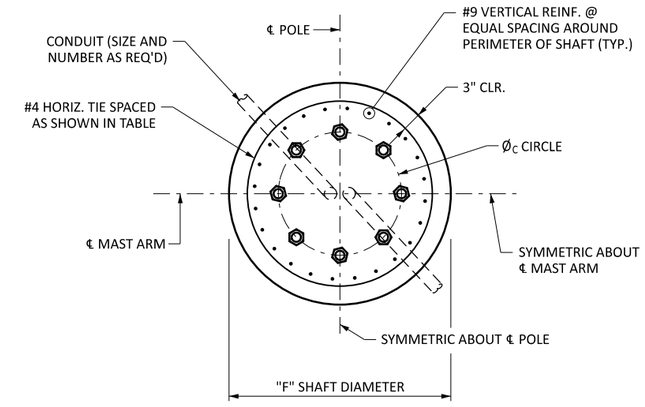
DRILLED SHAFT FOUNDATION DATA						
DESCRIPTION	DIMENSION	MAST ARM LENGTH				
		60'	65'	70'	75'	80'
SHAFT DIAMETER	F	4' 6"	4' 6"	4' 6"	4' 6"	4' 6"
FOUNDATION BURIED DEPTH	G	14' 0"	16' 6"	19' 6"	22' 0"	24' 6"
BOLT CIRCLE DIAMETER	$Ø_C$	2' 5"	2' 5"	2' 7"	2' 9"	2' 9"

DRILLED SHAFT REINFORCEMENT						
DESCRIPTION	DIMENSION	MAST ARM LENGTH				
		60'	65'	70'	75'	80'
VERTICAL BAR MARK (#9)	-	D905	D906	D907	D908	D909
VERTICAL BAR LENGTH	H	15' 10"	18' 4"	21' 4"	23' 10"	26' 4"
NUMBER OF VERTICAL BARS	-	24	24	24	24	24
HORIZONTAL TIE BAR MARK (#4)	-	D412	D412	D412	D412	D412
NUMBER OF HORIZONTAL TIES	-	32	37	43	48	53
MAX. HORIZONTAL TIE SPACING	-	6"	6"	6"	6"	6"
HORIZONTAL TIE LENGTH	-	14' 4"	14' 4"	14' 4"	14' 4"	14' 4"



DRILLED SHAFT ELEVATION

FOUNDATION FOR 60' MAST ARM SHOWN; OTHERS SIMILAR



SECTION A-A

GEOTECHNICAL PARAMETERS:

CONTACT MnDOT FOUNDATIONS UNIT FOR DETERMINATION OF SUBSURFACE INVESTIGATION REQUIREMENTS.

THE FOUNDATION DIMENSIONS SHOWN ON THIS SHEET ARE DESIGNED ASSUMING THE WATER TABLE IS 1.5' BELOW GRADE OR LOWER AND THE IN-SITU SOIL PROPERTIES MEET OR EXCEED THE FOLLOWING MINIMUM VALUES:

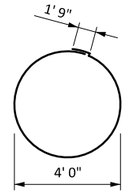
SANDY SOILS
UNIT WEIGHT = 125 PCF
FRICTION ANGLE = 30°

CLAY SOILS
UNIT WEIGHT = 125±10 PCF
COHESION = 1000 PSF
FRICTION ANGLE = 0°

A SPECIAL FOUNDATION DESIGN IS REQUIRED WHEN THE SPECIFIED VALUES, CONDITIONS, OR BOTH LISTED ABOVE ARE NOT MET.

BAR BENDING DIAGRAMS

BENT BAR DIMENSIONS GIVEN ARE OUT-TO-OUT. DETERMINE ACTUAL BAR LENGTHS BASED ON THE DETAIL DIMENSIONS SHOWN IN THE BAR BENDING DIAGRAMS.



D412

NOTES:

COLD CONCRETE CONSTRUCTION JOINTS ARE NOT PERMITTED FOR DRILLED SHAFTS.

GALVANIZE STEEL COMPONENTS IN ACCORDANCE WITH SPEC. 3394.

FURNISH AND INSTALL PREFORMED JOINT FILLER IN ACCORDANCE WITH SPEC. 3702 BETWEEN THE FOUNDATION AND SIDEWALK OR OTHER CONCRETE AREAS. THEN SEAL THE JOINT BETWEEN THE FOUNDATION AND SIDEWALK OR CONCRETE AREA WITH SILICONE SEALANT IN ACCORDANCE WITH SPEC 3722.

FURNISH AND INSTALL 3G52 CONCRETE MIX IN ACCORDANCE WITH SPEC. 2461. CURE CONCRETE IN ACCORDANCE WITH SPEC. 2401.

PROVIDE ¾" CHAMFER ON THE EXPOSED TOP EDGE OF THE FOUNDATION.

EXCAVATE, BACKFILL, AND COMPACT AROUND THE FOUNDATION IN ACCORDANCE WITH SPEC. 2451.

POSITION FOUNDATION CONDUITS INSIDE THE ANCHOR ROD ASSEMBLY. CAP ENDS UNTIL CABLES ARE INSTALLED.

ALLOW THE FOUNDATION TO CURE FOR AT LEAST 7 DAYS AFTER CONCRETE POURING OPERATIONS BEFORE INSTALLING POLES.

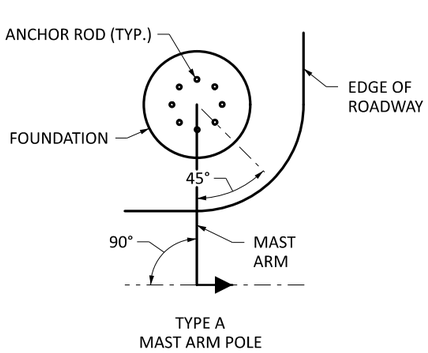
PROVIDE GRADE 60 DEFORMED BILLET REINFORCEMENT BARS IN ACCORDANCE WITH AASHTO M31 GRADE 60, SPEC. 2471, AND SPEC. 3301.

DRILLED SHAFT FOUNDATIONS ARE DESIGNED FOR THE CAST-IN-PLACE CONCRETE TO BE POURED DIRECTLY AGAINST THE SOILS SURROUNDING THE DRILLED SHAFT. CONCRETE FORMS ARE REQUIRED FOR THE 27" ABOVE THE FINISHED GROUNDLINE OR SIDEWALK AND PERMANENT CASING MAY BE USED FOR NO MORE THAN 25 PERCENT OF THE TOTAL FOUNDATION DEPTH BELOW FINISHED GRADE OR SIDEWALK. DO NOT USE PERMANENT CASING FOR MORE THAN 25 PERCENT OF THE ENTIRE DEPTH OF THE DRILLED SHAFT.

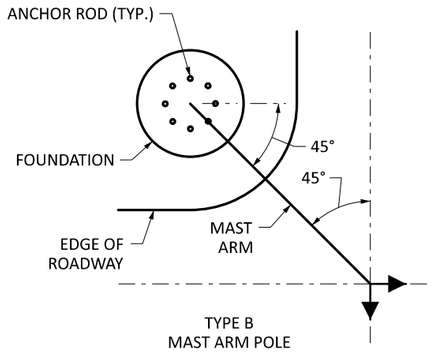
1. SEE STANDARD PLATE 8125 FOR ANCHOR ROD ASSEMBLY DETAILS.
2. SEE CONDUIT DETAIL ON SHEET 5 OF 5.
3. EXCAVATE TO NEAT LINES AND PLACE CONCRETE AGAINST UNDISTURBED SOIL.
4. SEE ANCHOR ROD PLACEMENT DETAIL ON SHEET 5 OF 5.
5. INCREASE FOUNDATION PROJECTION AS REQUIRED TO PROVIDE A VERTICAL CLEARANCE FROM THE BOTTOM OF ALL SIGNS AND SIGNAL HEADS (INCLUDING BACKGROUND SHIELDS) TO THE PAVEMENT OF NOT LESS THAN 17.50' NOR MORE THAN 19.00'. INCREASE OVERALL FOUNDATION LENGTH TO PROVIDE THE MINIMUM FOUNDATION BURIED DEPTH. INCREASE LONGITUDINAL BAR LENGTH TO PROVIDE THE INDICATED COVER.

PLOTTED/REVISED: 20-MAR-2024
PLOT NAME: s861_4_spn
PATH & FILENAME: OTS\DesignStandards\Development\StandardPlans_DEV\800_Series\Publishing\s861_4_spn.dgn

LEAD EXPERT OFFICE	EDWARD LUTGEN OFFICE DIRECTOR BRIDGE OFFICE	POLE FOUNDATION TYPE TS DRILLED SHAFT FOUNDATIONS FOR 60' TO 80' MAST ARMS	APPROVED: 02-21-2024 REVISED:	THOMAS STYRBICKI STATE DESIGN ENGINEER	STANDARD PLAN 5-297.861	4 OF 5
DEPARTMENT OF TRANSPORTATION		STANDARD PLAN	STATE PROJ. NO.		SHEET NO.	
			TRUNK HWY.		TOTAL SHEETS	



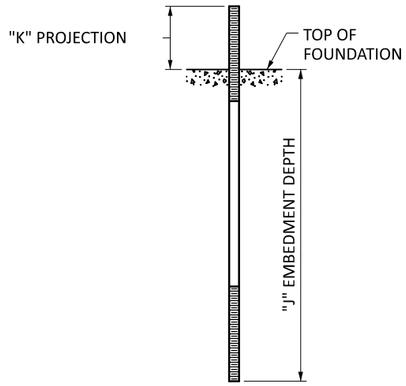
TYPE A
MAST ARM POLE



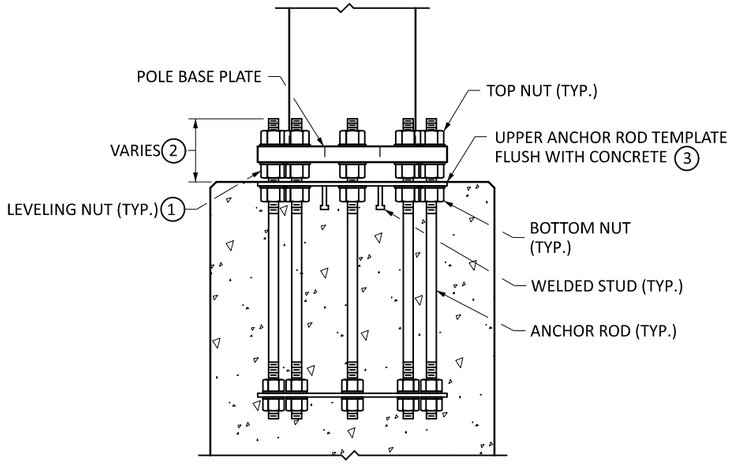
TYPE B
MAST ARM POLE

ANCHOR ROD PLACEMENT

POLE TYPE	ANCHOR ROD EMBEDMENT DEPTH	ANCHOR ROD PROJECTION
	J	K
TS15-TS55	22"	8"
TS60	34"	8"
TS65	38"	9"
TS70	42"	10"
TS75	42"	10"
TS80	48"	11"

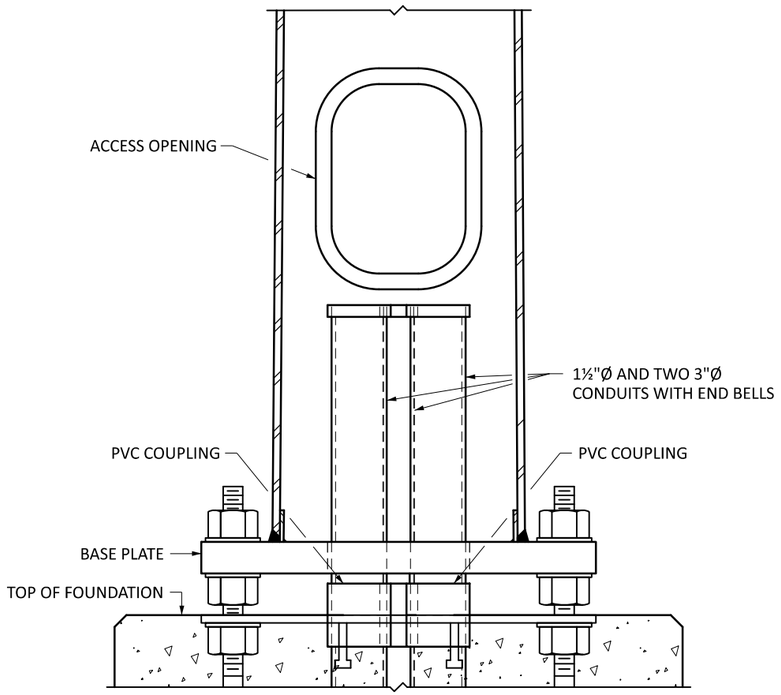


ANCHOR ROD PLACEMENT DETAIL



PARTIAL ELEVATION

SHOWING ANCHOR ROD ASSEMBLY AND HEX NUT POSITIONS AFTER POLE INSTALLATION



CONDUIT

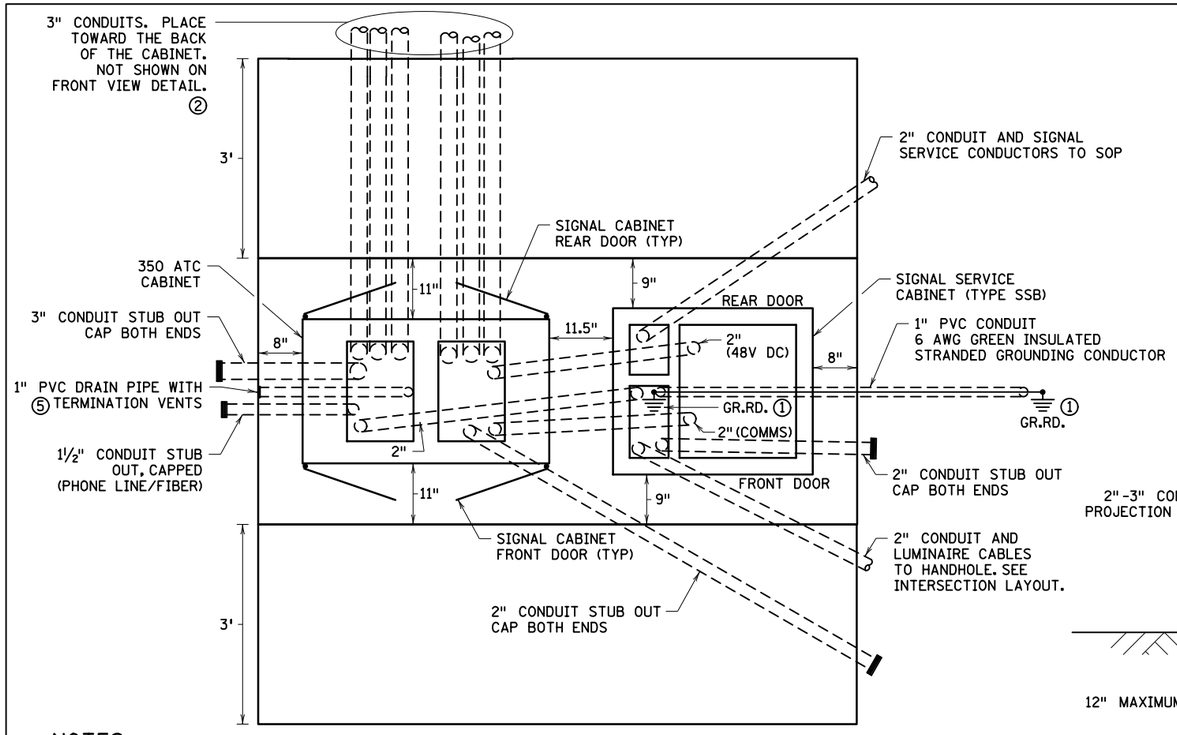
FOUNDATION REINFORCEMENT NOT SHOWN FOR CLARITY

NOTES:

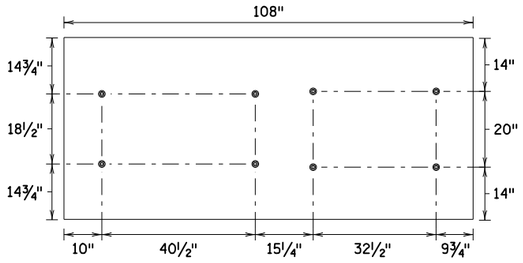
1. USE THE LEVELING NUTS TO TEMPORARILY SECURE THE UPPER ANCHOR ROD TEMPLATE BEFORE CONCRETE OPERATIONS. LEAVE THE NUTS SECURE AGAINST THE TEMPLATE UNTIL POLE INSTALLATION. USE THE REQUIRED HARDWARE FOR DOUBLE-NUT ANCHOR ROD CONNECTIONS IN ACCORDANCE WITH SPEC 2545.
2. PROTECT ANCHOR ROD THREADS AND LEVELING NUTS ABOVE THE ANCHOR ROD TEMPLATE FROM CONCRETE CONTAMINATION.
3. REMOVE SURFACE CONTAMINANTS AND APPLY SILICONE SEALANT TO THE UPPER TEMPLATE AROUND THE ANCHOR RODS, ANCHOR ROD HOLES, AND THE INNER AND OUTER EDGES WHERE THE PLATE MEETS CONCRETE. USE AN APPROVED SILICONE JOINT SEALANT FOUND ON MnDOT'S APL UNDER BRIDGE PRODUCTS.

LEAD EXPERT OFFICE	EDWARD LUTGEN OFFICE DIRECTOR BRIDGE OFFICE		POLE FOUNDATION TYPE TS ANCHOR RODS AND CONDUIT DETAILS	APPROVED: 02-21-2024 REVISED:	THOMAS STYRBICKI STATE DESIGN ENGINEER	STANDARD PLAN 5-297.861	5 OF 5

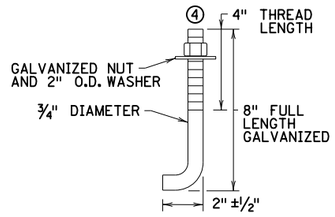
DEPARTMENT OF TRANSPORTATION		STANDARD PLAN	STATE PROJ. NO.	SHEET NO.
			TRUNK HWY.	TOTAL SHEETS



PLAN VIEW ②

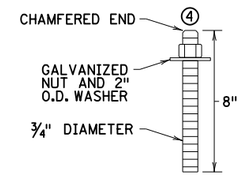


CONCRETE PAD ANCHOR ROD LOCATIONS



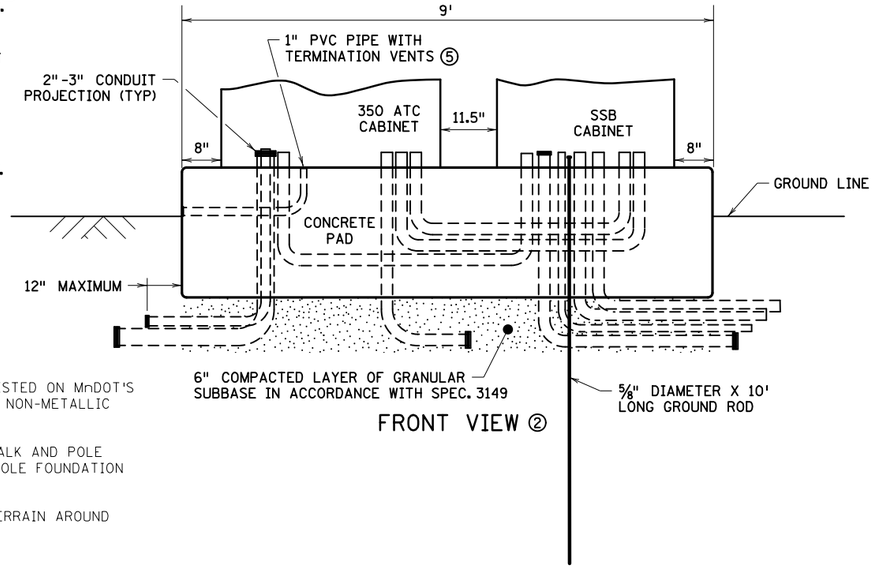
WET CAST ANCHOR ROD DETAIL

SPEC. 3385 TYPE A OR TYPE B

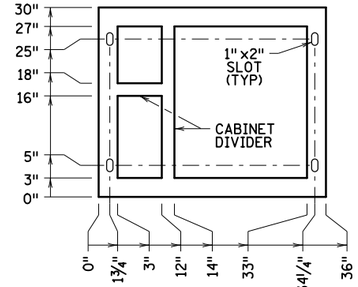


ADHESIVE ANCHORING SYSTEM ROD DETAIL

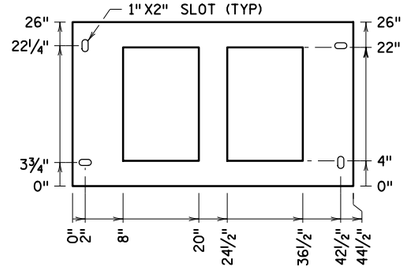
SPEC. 3385 TYPE A OR TYPE B



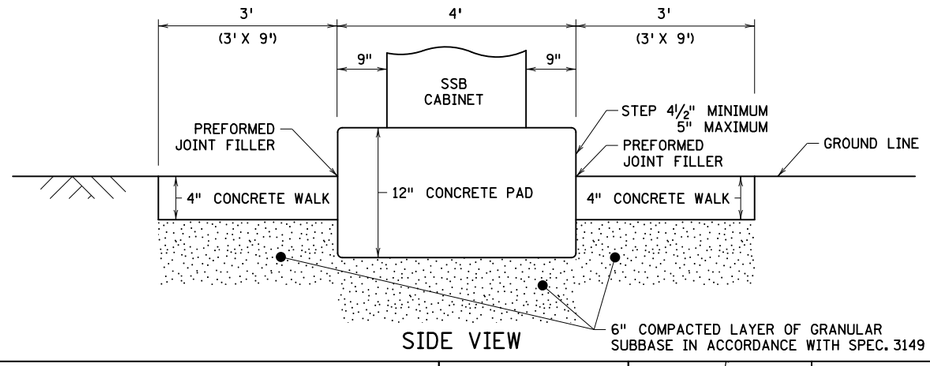
FRONT VIEW ②



SSB CABINET BASE TEMPLATE ③



350 ATC CABINET BASE TEMPLATE ③



SIDE VIEW

NOTES:

SEE INTERSECTION LAYOUT FOR CABLE INFORMATION.

FOR THE EQUIPMENT PAD, USE CONCRETE MIX 3G52 WITH APPROVED MACRO NON-METALLIC FIBERS FOR REINFORCEMENT. THESE ARE LISTED ON MnDOT'S APL UNDER CONCRETE "NONMETALLIC FIBERS (BRIDGE APPLICATIONS)." ADD FIBERS TO THE CONCRETE MIX IN ACCORDANCE WITH THE NON-METALLIC FIBERS MANUFACTURER'S INSTRUCTIONS AND CONTRACT DOCUMENTS.

FOR CONCRETE WALK, USE CONCRETE MIX 3G52. 3G52 CONCRETE MIX WITH NON-METALLIC FIBERS MAY BE USED FOR THE CONCRETE WALK AND POLE FOUNDATIONS. DO NOT USE NON-METALLIC FIBERS AS A SUBSTITUTE FOR THE REQUIRED REINFORCEMENT IN ACCORDANCE WITH THE POLE FOUNDATION STANDARD PLATES.

IF THE SITE CONDITIONS REQUIRE THE PAD TO BE PLACED ON A SLOPE, INCREASE THE THICKNESS OF THE PAD BY 6". SHAPE THE TERRAIN AROUND THE PAD FOR PROPER DRAINAGE.

3" MINIMUM CLEAR REQUIRED BETWEEN THE TOP AND BOTTOM SURFACES OF THE PAD AND THE OUTSIDE OF THE CONDUIT.

ENSURE THE CONDUITS FULLY ENCASED IN CONCRETE FROM ONE CABINET TO THE OTHER ARE PLACED AT THE CORRECT DEPTH AND LOCATION TO AVOID INTERFERENCE WITH THE INSTALLATION OF THE ANCHOR RODS.

① PLACE A GROUNDING ELECTRODE SYSTEM IN ACCORDANCE WITH THE GROUNDING ELECTRODE SYSTEM DETAIL ON STANDARD PLATE 8106 SHEET 3 EXCEPT FURNISH AND INSTALL 10' GROUND ROD ELECTRODES, 6 AWG GREEN INSULATED COPPER CONDUCTOR, AND EXOTHERMIC WELDED CONNECTIONS. IF A MnDOT TRAFFIC SIGNAL SYSTEM HAND HOLE IS LOCATED AT LEAST 6' APART AND NO MORE THAN 10' APART FROM THE GROUND ROD LOCATED IN THE EQUIPMENT PAD, THE SUPPLEMENTAL GROUND ROD MAY BE PLACED IN THAT HANDHOLE. USE A 12' GROUND ROD IN THE HAND HOLE INSTEAD OF A 10' GROUND ROD AND PULL A GREEN INSULATED 6 AWG CONDUCTOR IN THE CONDUIT GOING TO THAT HAND HOLE. IF THE REQUIRED TRAFFIC SIGNAL POLE HANDHOLE GROUND ROD IS LOCATED WITHIN THE SPECIFIED DISTANCE MENTIONED, BOND THE GREEN INSULATED 6 AWG CONDUCTOR TO THAT GROUND ROD.

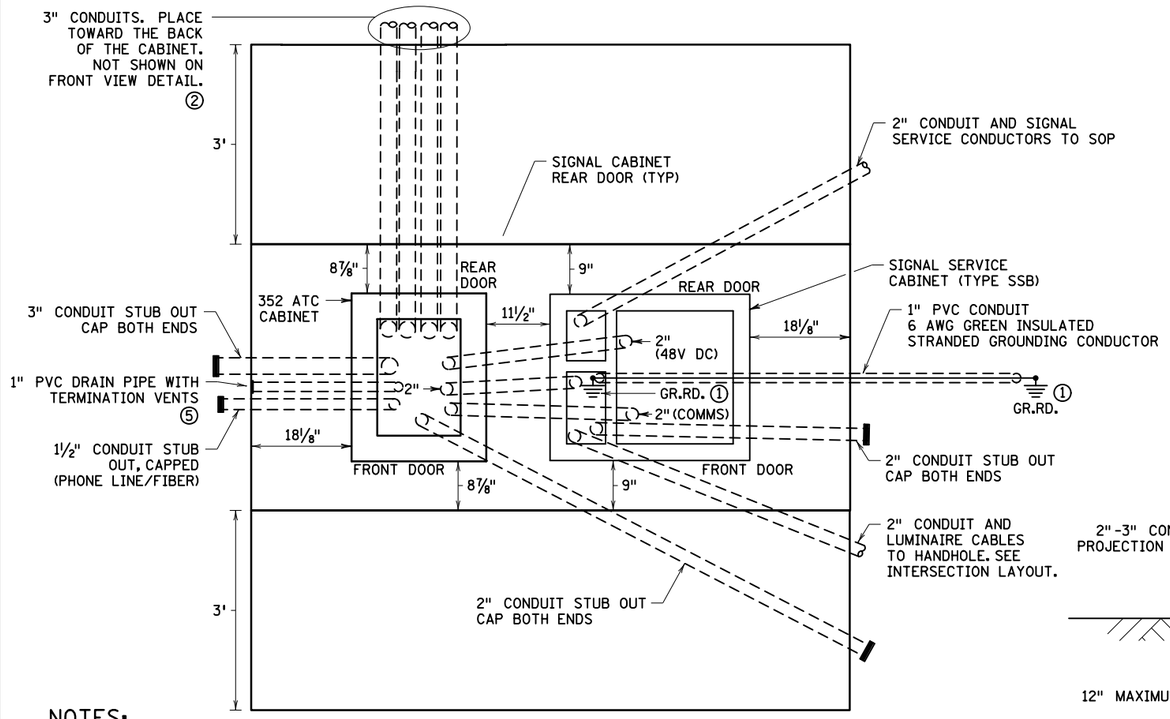
② CONDUIT SIZE, QUANTITY, AND DIRECTION MAY VARY. FURNISH AND INSTALL CONDUITS AS SPECIFIED ON THE INTERSECTION LAYOUT PLAN SHEET. ENSURE CONDUITS ARE NOT PLACED DIRECTLY UNDER ANCHOR ROD LOCATIONS.

③ USE TEMPLATES WITH THE DIMENSIONS SHOWN INCLUDING OPENINGS, DIVIDERS, AND ANCHOR ROD HOLES AS A GUIDE TO ENSURE PROPER PLACEMENT OF THE CABINETS, CONDUITS, AND ANCHOR RODS. 350 BASE OPENINGS FOR TEMPLATE ARE SMALLER THAN THE ACTUAL BASE OPENINGS.

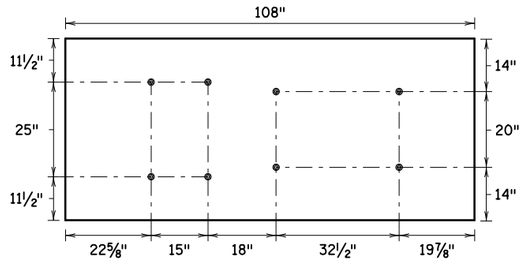
④ SET ANCHOR RODS IN THE CONCRETE PAD WITH A 2" TO 2¼" PROJECTION ABOVE THE PAD. FURNISH AND INSTALL ANCHOR RODS SHOWN ON THE ANCHOR ROD DETAIL IF WET-CASTING ANCHORS IN CONCRETE. FURNISH AND INSTALL ANCHOR RODS SHOWN ON THE ANCHOR ROD DETAIL IF USING AN ADHESIVE ANCHORING SYSTEM. WHEN USING THE ADHESIVE, FULLY INSERT THE ¾"Ø X 8" LONG ANCHOR RODS INTO 6" DEEP DRILLED HOLES IN THE PAD AT THE LOCATIONS SHOWN ON THE ANCHOR ROD LOCATION DETAIL. DRILL THE HOLES TO THE DIAMETER SIZE SHOWN IN THE ADHESIVE MANUFACTURER'S PRINTED INSTALLATION INSTRUCTIONS FOR ¾"Ø RODS. FOLLOW THE ADHESIVE MANUFACTURER'S PRINTED INSTALLATION INSTRUCTIONS INCLUDING CURE TIME AND GEL TIME BASED ON CONCRETE TEMPERATURE. USE AN APPROVED ADHESIVE ANCHORING SYSTEM LISTED ON MnDOT'S APL UNDER SIGNALS/PEDESTRIAN PUSHBUTTONS AND MOUNTING HARDWARE.

⑤ FURNISH AND INSTALL A DRAIN IN THE PAD USING 1" SCHEDULE 40 PVC PIPE. PLACE PVC TERMINATION VENT SCREEN DESIGNED FOR PVC PIPE AT EACH END OF THE PIPE. PROVIDE PVC TERMINATION VENTS WITH A STAINLESS STEEL SCREEN. ENSURE THE TERMINATION VENT SCREEN AND PIPE ARE FLUSH WITH THE TOP AND SIDE OF THE PAD AND PROTECT FROM CONCRETE INTRUSION BEFORE CONCRETE PLACEMENT OPERATIONS.

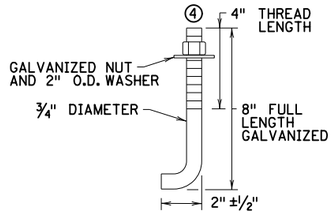
LEAD EXPERT OFFICE: BRIAN SORENSON, STATE TRAFFIC ENGINEER, OFFICE OF TRAFFIC ENGINEERING		350 ATCC AND SSB CABINET EQUIPMENT PAD CAST IN PLACE	APPROVED: 02-22-2022 REVISED:	THOMAS STYRBICKI, STATE DESIGN ENGINEER	STANDARD PLAN 5-297.869	1 OF 1
	DEPARTMENT OF TRANSPORTATION	STANDARD PLAN	STATE PROJ. NO.	SHEET NO.		
			TRUNK HWY.	TOTAL SHEETS		



PLAN VIEW ②

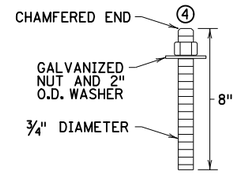


CONCRETE PAD ANCHOR ROD LOCATIONS



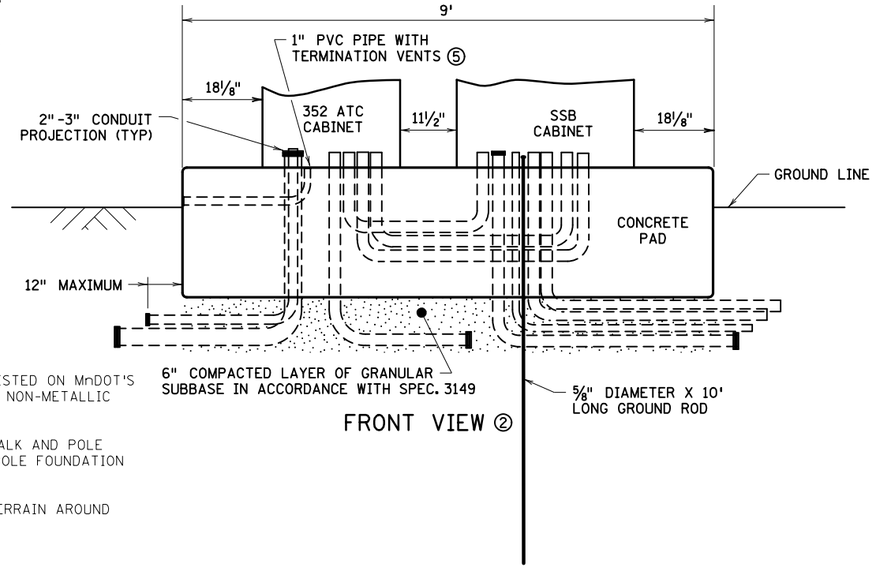
WET CAST ANCHOR ROD DETAIL

SPEC. 3385 TYPE A OR TYPE B

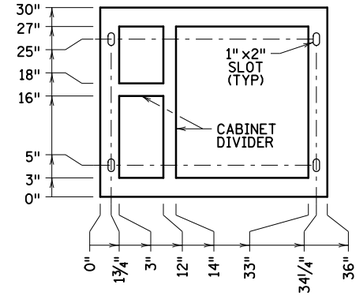


ADHESIVE ANCHORING SYSTEM ROD DETAIL

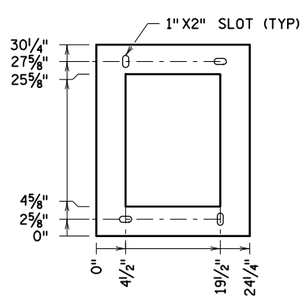
SPEC. 3385 TYPE A OR TYPE B



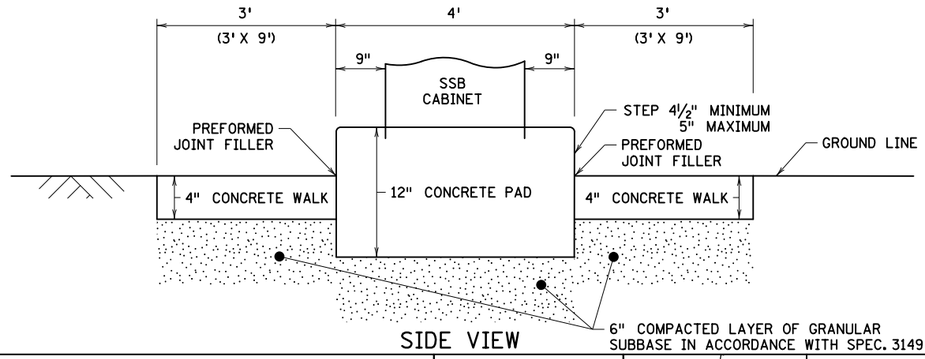
FRONT VIEW ②



SSB CABINET BASE TEMPLATE ③



352 ATC CABINET BASE TEMPLATE ③



SIDE VIEW

NOTES:

SEE INTERSECTION LAYOUT FOR CABLE INFORMATION.

FOR THE EQUIPMENT PAD, USE CONCRETE MIX 3G52 WITH APPROVED MACRO NON-METALLIC FIBERS FOR REINFORCEMENT. THESE ARE LISTED ON MnDOT'S APL UNDER CONCRETE "NONMETALLIC FIBERS (BRIDGE APPLICATIONS)." ADD FIBERS TO THE CONCRETE MIX IN ACCORDANCE WITH THE NON-METALLIC FIBERS MANUFACTURER'S INSTRUCTIONS AND CONTRACT DOCUMENTS.

FOR CONCRETE WALK, USE CONCRETE MIX 3G52. 3G52 CONCRETE MIX WITH NON-METALLIC FIBERS MAY BE USED FOR THE CONCRETE WALK AND POLE FOUNDATIONS. DO NOT USE NON-METALLIC FIBERS AS A SUBSTITUTE FOR THE REQUIRED REINFORCEMENT IN ACCORDANCE WITH THE POLE FOUNDATION STANDARD PLATES.

IF THE SITE CONDITIONS REQUIRE THE PAD TO BE PLACED ON A SLOPE, INCREASE THE THICKNESS OF THE PAD BY 6". SHAPE THE TERRAIN AROUND THE PAD FOR PROPER DRAINAGE.

3" MINIMUM CLEAR REQUIRED BETWEEN THE TOP AND BOTTOM SURFACES OF THE PAD AND THE OUTSIDE OF THE CONDUIT.

ENSURE THE CONDUITS FULLY ENCASED IN CONCRETE FROM ONE CABINET TO THE OTHER ARE PLACED AT THE CORRECT DEPTH AND LOCATION TO AVOID INTERFERENCE WITH THE INSTALLATION OF THE ANCHOR RODS.

① PLACE A GROUNDING ELECTRODE SYSTEM IN ACCORDANCE WITH THE GROUNDING ELECTRODE SYSTEM DETAIL ON STANDARD PLATE 8106 SHEET 3 EXCEPT FURNISH AND INSTALL 10' GROUND ROD ELECTRODES, 6 AWG GREEN INSULATED COPPER CONDUCTOR, AND EXOTHERMIC WELDED CONNECTIONS. IF A MnDOT TRAFFIC SIGNAL SYSTEM HAND HOLE IS LOCATED AT LEAST 6' APART AND NO MORE THAN 10' APART FROM THE GROUND ROD LOCATED IN THE EQUIPMENT PAD, THE SUPPLEMENTAL GROUND ROD MAY BE PLACED IN THAT HANDHOLE. USE A 12' GROUND ROD IN THE HAND HOLE INSTEAD OF A 10' GROUND ROD AND PULL A GREEN INSULATED 6 AWG CONDUCTOR IN THE CONDUIT GOING TO THAT HAND HOLE. IF THE REQUIRED TRAFFIC SIGNAL POLE HANDHOLE GROUND ROD IS LOCATED WITHIN THE SPECIFIED DISTANCE MENTIONED, BOND THE GREEN INSULATED 6 AWG CONDUCTOR TO THAT GROUND ROD.

② CONDUIT SIZE, QUANTITY, AND DIRECTION MAY VARY. FURNISH AND INSTALL CONDUITS AS SPECIFIED ON THE INTERSECTION LAYOUT PLAN SHEET. ENSURE CONDUITS ARE NOT PLACED DIRECTLY UNDER ANCHOR ROD LOCATIONS.

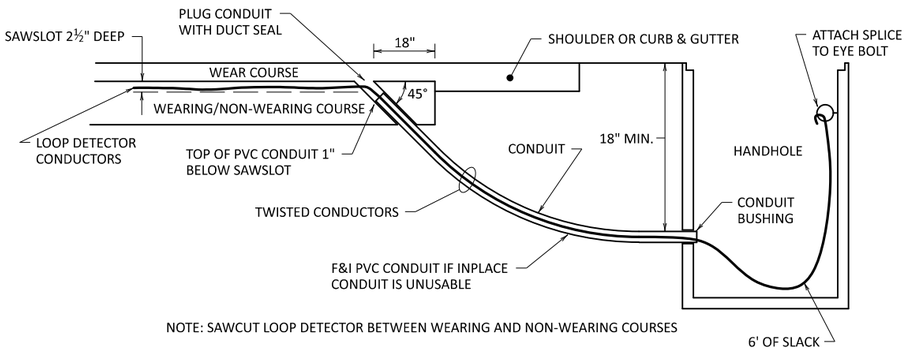
③ USE TEMPLATES WITH THE DIMENSIONS SHOWN INCLUDING OPENINGS, DIVIDERS, AND ANCHOR ROD HOLES AS A GUIDE TO ENSURE PROPER PLACEMENT OF THE CABINETS, CONDUITS, AND ANCHOR RODS. 350 BASE OPENINGS FOR TEMPLATE ARE SMALLER THAN THE ACTUAL BASE OPENINGS.

④ SET ANCHOR RODS IN THE CONCRETE PAD WITH A 2" TO 2¼" PROJECTION ABOVE THE PAD. FURNISH AND INSTALL ANCHOR RODS SHOWN ON THE ANCHOR ROD DETAIL IF WET-CASTING ANCHORS IN CONCRETE. FURNISH AND INSTALL ANCHOR RODS SHOWN ON THE ANCHOR ROD DETAIL IF USING AN ADHESIVE ANCHORING SYSTEM. WHEN USING THE ADHESIVE, FULLY INSERT THE ¾"Ø X 8" LONG ANCHOR RODS INTO 6" DEEP DRILLED HOLES IN THE PAD AT THE LOCATIONS SHOWN ON THE ANCHOR ROD LOCATION DETAIL. DRILL THE HOLES TO THE DIAMETER SIZE SHOWN IN THE ADHESIVE MANUFACTURER'S PRINTED INSTALLATION INSTRUCTIONS FOR ¾"Ø RODS. FOLLOW THE ADHESIVE MANUFACTURER'S PRINTED INSTALLATION INSTRUCTIONS INCLUDING CURE TIME AND GEL TIME BASED ON CONCRETE TEMPERATURE. USE AN APPROVED ADHESIVE ANCHORING SYSTEM LISTED ON MnDOT'S APL UNDER SIGNALS/PEDESTRIAN PUSHBUTTONS AND MOUNTING HARDWARE.

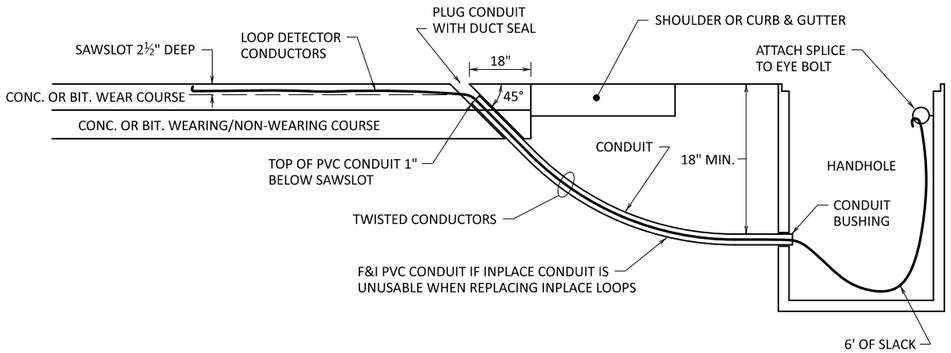
⑤ FURNISH AND INSTALL A DRAIN IN THE PAD USING 1" SCHEDULE 40 PVC PIPE. PLACE PVC TERMINATION VENT SCREEN DESIGNED FOR PVC PIPE AT EACH END OF THE PIPE. PROVIDE PVC TERMINATION VENTS WITH A STAINLESS STEEL SCREEN. ENSURE THE TERMINATION VENT SCREEN AND PIPE ARE FLUSH WITH THE TOP AND SIDE OF THE PAD AND PROTECT FROM CONCRETE INTRUSION BEFORE CONCRETE PLACEMENT OPERATIONS.

LEAD EXPERT OFFICE: BRIAN SORENSON, STATE TRAFFIC ENGINEER, OFFICE OF TRAFFIC ENGINEERING		352 ATCC AND SSB CABINET EQUIPMENT PAD CAST IN PLACE	APPROVED: 02-22-2022 REVISED:	THOMAS STYRBICKI, STATE DESIGN ENGINEER STANDARD PLAN 5-297.870	1 OF 1

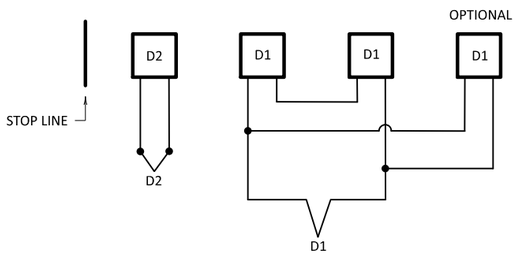
DEPARTMENT OF TRANSPORTATION		STANDARD PLAN	STATE PROJ. NO.	SHEET NO.
			TRUNK HWY.	TOTAL SHEETS



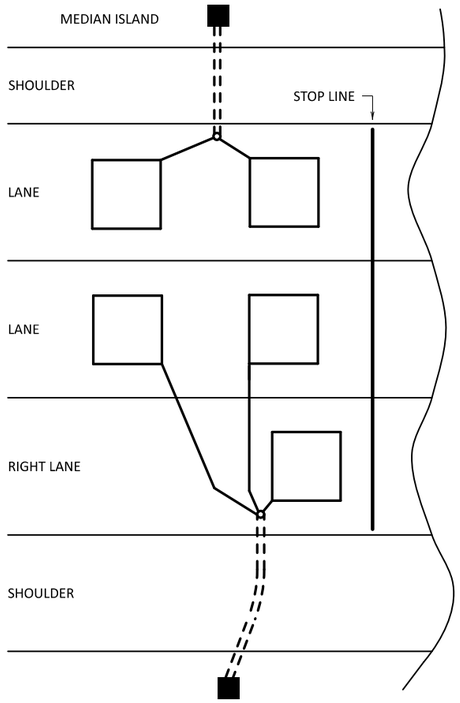
LOOP/HANDHOLE INSTALLATION FOR MILL & OVERLAY CONSTRUCTION



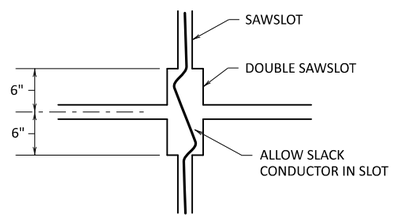
LOOP/HANDHOLE INSTALLATION FOR INPLACE ROADWAYS



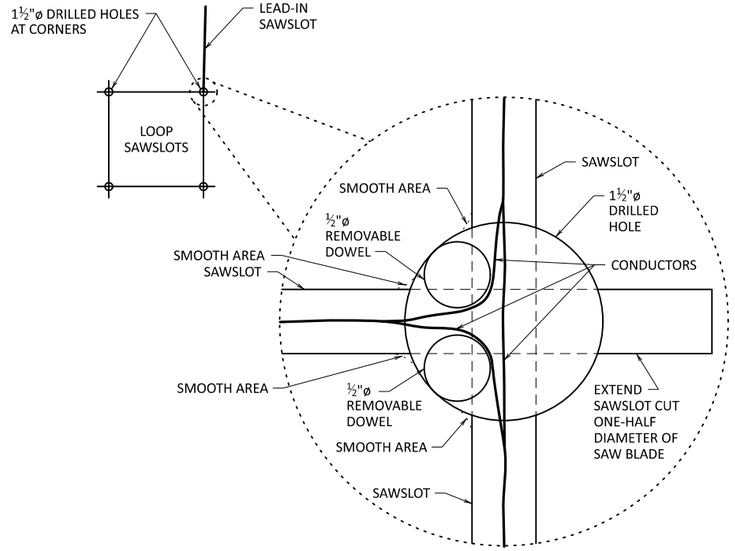
MULTIPLE LOOP SERIES HOOKUP



APPROACH DETECTORS



JOINT/CRACK INSTALLATION



DRILL SAWCUT CORNERS

NOTES:

FURNISH AND INSTALL LOOP DETECTORS IN ACCORDANCE WITH CONTRACT DOCUMENTS.

FOR ROADWAYS BEING RESURFACED, SAWCUT AND REPLACE SEALANT MATERIAL BEFORE THE BITUMINOUS WEARING COURSE IS PLACED UNLESS OTHERWISE APPROVED BY THE ENGINEER TO NOT PLACE THE LOOP DETECTORS UNTIL AFTER PAVEMENT MARKINGS AND LANE STRIPING HAVE BEEN ESTABLISHED.

SWEEP, WASH, AND BLOW CLEAR OF DIRT AND DEBRIS THE SURFACE AREA BEFORE SAWCUTTING.

MARK THE LOOP DETECTORS AND HOME RUN ON THE PAVEMENT.

MARK SAWCUTS AT A UNIFORM DEPTH BETWEEN 2¼" AND 2¾" AND ⅛" WIDER THAN THE OUTER DIAMETER OF THE TUBING.

AVOID CROSSING CONCRETE JOINTS AND CRACKS WHENEVER POSSIBLE. USE THE JOINT CRACK DETAIL SHOWN WHEN A JOINT OR CRACK CROSSING CANNOT BE AVOIDED.

SAWCUT LOOP CORNERS SQUARE AND WITH A 1½" DIAMETER DRILL BIT, DRILL EACH CORNER ½" DEEPER THAN THE SAW CUT. ENSURE THE INSIDE CORNERS HAVE BEEN ROUNDED TO PREVENT DAMAGE TO THE CABLE.

CLEAN AND FLUSH THE SAWSLOTS OF FOREIGN MATERIAL USING A COMBINATION OF COMPRESSED AIR AND WATER AND DRY THE SAWSLOTS WITH COMPRESSED AIR BEFORE PLACING THE LOOP DETECTOR CABLE.

APPLY A BEAD OF APPROVED LOOP DETECTOR SEALANT INTO THE SAWCUT SLOT AND WITHIN 6" OF WHERE THE CONDUITS RUN FROM THE END OF THE SAWCUT SLOT TO THE ADJACENT HANDHOLE BEFORE INSERTING THE LOOP DETECTOR CONDUCTORS.

ENSURE LOOP CONDUCTORS ARE CLEAN AND DRY BEFORE PLACING INTO THE SAWSLOT.

PUSH THE LOOP DETECTOR CONDUCTORS TO THE BOTTOM OF THE SAWSLOT USING A BLUNT INSTRUMENT TO PREVENT DAMAGE TO THE CONDUCTORS.

AFTER PLACING THE CONDUCTORS INTO THE SAWSLOT, PLACE ¾"x2" BACKER ROD IN 2' INTERVALS INTO THE SAWSLOT TO ENSURE CONDUCTORS STAY AT THE BOTTOM OF THE SAWSLOT.

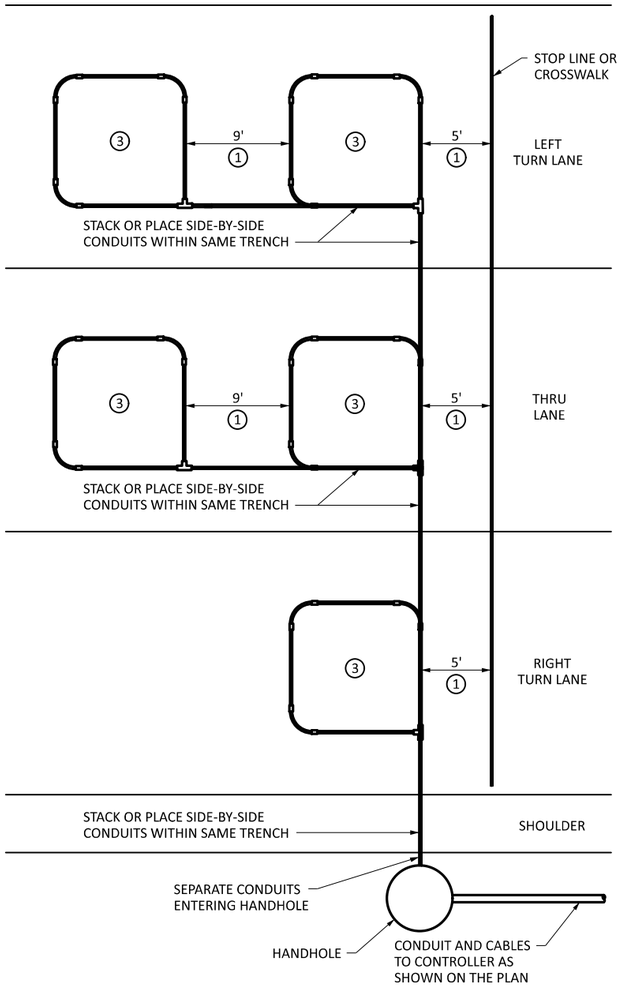
TWIST THE LOOP DETECTOR CONDUCTORS FROM THE DETECTOR TO THE HANDHOLE IN THREE TURNS PER FOOT. FROM THE END OF THE SAWSLOT TO THE ADJACENT HAND HOLE, FURNISH AND INSTALL A ¾" OR LARGER PVC CONDUIT IN ACCORDANCE WITH NEC CONDUIT FILL RATIO FOR THE NUMBER LOOP DETECTORS CONDUCTORS PLACED IN ONE CONDUIT. PLACE THE TWISTED CONDUCTORS INSIDE THE CONDUIT.

TO PREVENT LOOP DETECTOR SEALANT FROM ENTERING INTO THE CONDUIT, USE DUCT SEAL OR OBTAIN ENGINEERS APPROVAL TO USE ALTERNATE SEAL.

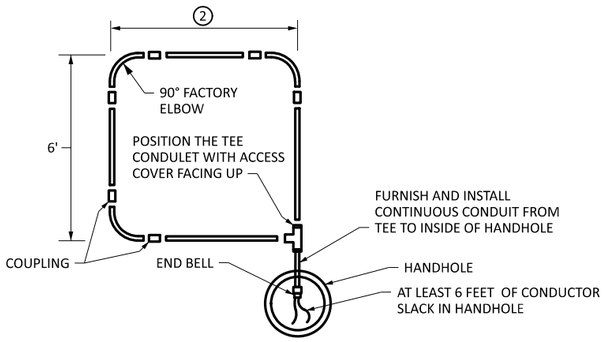
DO NOT PLACE LOOP LEADS ACROSS CONCRETE PAVEMENT TRANSVERSE JOINTS. MOVE THE LOOP TO THE NEXT PANEL AND PLACE A SEPARATE CONDUIT TO THE HAND HOLE IF LOOPS WILL NOT FIT IN ONE PANEL, AND MAINTAIN SEPARATIONS SHOWN.

SEE PLAN LAYOUT FOR ACTUAL DETECTOR SIZE AND PLACEMENT LOCATION.

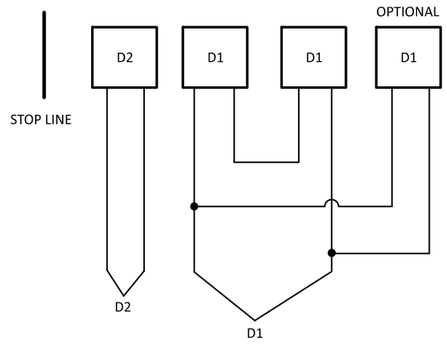
LEAD EXPERT OFFICE BRIAN SORENSON STATE TRAFFIC ENGINEER OFFICE OF TRAFFIC ENGINEERING		SAWCUT LOOP DETECTORS	APPROVED: 10-04-2024	THOMAS STYRBICKI STATE DESIGN ENGINEER	STANDARD PLAN 5-297.873	1 OF 1
DEPARTMENT OF TRANSPORTATION		STANDARD PLAN	STATE PROJ. NO.	SHEET NO.		
			TRUNK HWY.	TOTAL SHEETS		



RIGID PVC LOOP DETECTOR PLACEMENT DETAIL



PREFORMED RIGID PVC LOOP DETECTOR DETAIL



MULTIPLE LOOP SERIES HOOKUP DETAIL

NOTES:

FURNISH AND INSTALL ¾" CONDUIT AND FITTINGS.

ASSEMBLE THE PREFORMED RIGID PVC CONDUIT LOOP DETECTOR AS SHOWN IN THE DETAIL.

USE PRIMER AND PVC SOLVENT CEMENT MADE FOR JOINING RIGID PVC CONDUIT AND FITTINGS.

ATTACH A FERROUS METAL ITEM IN OR ADJACENT TO THE TEE CONDULET COVER OR AS APPROVED BY THE ENGINEER.

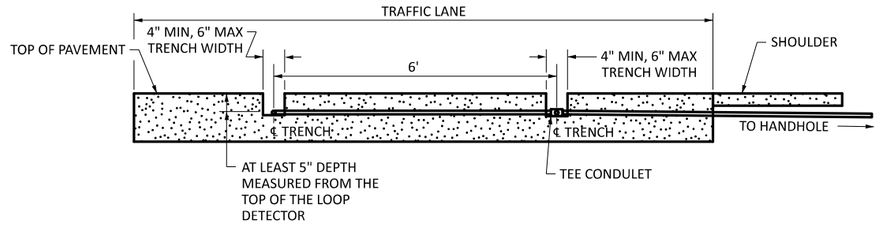
SLOPE CONDUITS FROM THE TEE CONDULETS TOWARDS THE HANDHOLE.

LOOP DETECTOR CONDUITS TO THE HANDHOLE MAY BE PLACED WITHIN THE SAME TRENCH.

(1) USE DIMENSION SHOWN ON THE PLAN.

(2) DIMENSION ACCORDING TO LOOP SIZE SHOWN ON THE PLAN.

(3) CENTER RIGID PVC LOOP DETECTOR IN THE LANE.



LOOP DETECTOR PLACEMENT IN EXISTING PAVEMENT

NOTES:

FURNISH AND INSTALL THE SAME LOOP DETECTOR USED TO TRACE OUT THE SPECIFIC LOCATION ON THE PAVEMENT TO ASSURE A PROPER FIT IN THE TRENCH.

MILL BEYOND THE LOOP DETECTOR PAVEMENT MARKINGS TO ACHIEVE FULL TRENCH DEPTH OF THE LOOP DETECTOR.

BEFORE APPLYING THE TACK COAT, REMOVE DEBRIS AND FOREIGN MATTER FROM THE TRENCH AND USE COMPRESSED AIR TO CLEAN AND DRY THE TRENCH.

APPLY A BITUMINOUS TACK COAT IN ACCORDANCE WITH SPEC. 2357 TO THE BOTTOM OF A CLEAN AND DRY TRENCH.

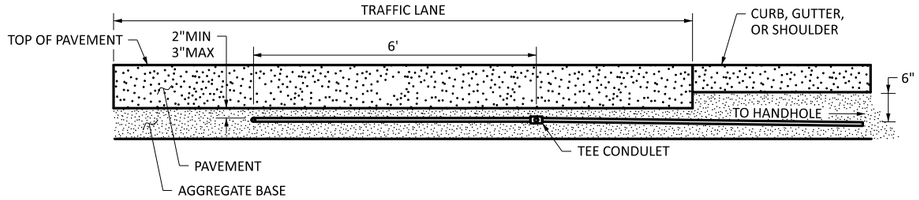
BACKFILL THE LOOP DETECTOR TRENCHES WITH A PLANT-MIXED ASPHALT IN ACCORDANCE WITH SPEC 2360, UNLESS OTHERWISE APPROVED BY THE ENGINEER TO USE AN ALTERNATE MIXTURE TYPE.

BACKFILL THE TRENCH WITH THE REQUIRED MIXED ASPHALT IN AT LEAST TWO COMPACTED LIFTS. BEFORE COMPACTING THE FIRST LIFT OF MIXED ASPHALT, ENSURE THERE IS AN ADEQUATE AMOUNT OF MIX ON THE SIDES AND ABOVE THE LOOP DETECTORS TO PREVENT DAMAGE DURING COMPACTION. USE "ORDINARY COMPACTION" METHOD IN ACCORDANCE WITH SPEC 2560.3D.2 FOR EACH LIFT. LEAVE ¼" TO ½" COMPACTED MIXED ASPHALT IN THE TRENCH ABOVE THE EXISTING PAVEMENT TO ALLOW FOR ADDITIONAL COMPACTION BY TRAFFIC.

FILL THE TRENCH WITH PACKAGED, DRY, NON-SHRINK, RAPID-HARDENING, CEMENT MATERIAL FOR CONCRETE REPAIRS LISTED ON MnDOT'S APL UNDER "CONCRETE PRODUCTS."

MILLING IS REQUIRED FOR RIGID PVC LOOP INSTALLATIONS. WHEN MILLING INTO EXISTING SURFACE THAT WILL BE OVERLAYED WITH BITUMINOUS, MILL THE TRENCH DEPTH NO LESS THAN THE HIGHEST LOOP DETECTOR IN THE TRENCH.

CONCRETE UNDER THE EXISTING BITUMINOUS SURFACE MAY BE ENCOUNTERED DURING MILLING OPERATIONS.



LOOP DETECTOR PLACEMENT IN NEW PAVEMENT

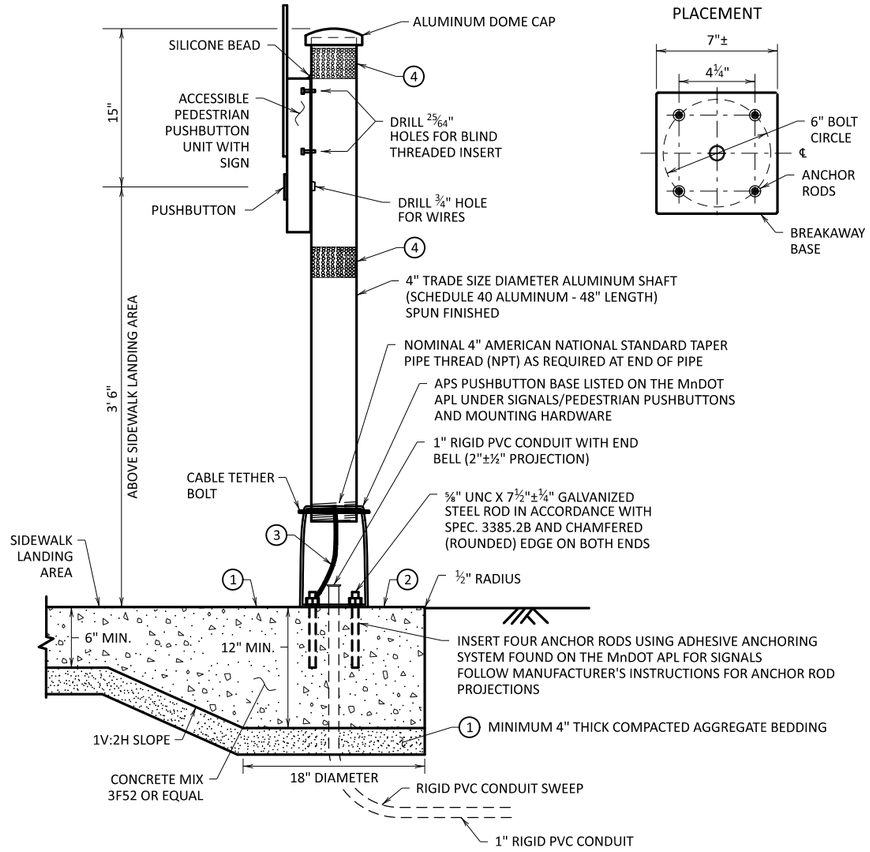
NOTES:

OBTAIN THE REQUIRED COMPACTION OF THE AGGREGATE BASE AFTER PLACEMENT OF LOOP DETECTOR AND LEAD-IN CONDUIT.

PLACE THE LOOP DETECTORS INTO THE AGGREGATE BASE 2" MINIMUM TO 3" MAXIMUM, MEASURED FROM THE TOP OF THE AGGREGATE BASE TO THE TOP OF THE LOOP DETECTOR AND LEAD-IN CONDUIT.

LEAD EXPERT OFFICE	BRIAN SORENSON STATE TRAFFIC ENGINEER OFFICE OF TRAFFIC ENGINEERING		PREFORMED RIGID PVC CONDUIT LOOP DETECTORS	APPROVED: 10-04-2024	THOMAS STYRBICKI STATE DESIGN ENGINEER	STANDARD PLAN 5-297.874	1 OF 1
DEPARTMENT OF TRANSPORTATION			STANDARD PLAN	STATE PROJ. NO.		SHEET NO.	
				TRUNK HWY.		TOTAL SHEETS	

APS PUSHBUTTON STATION



ANCHOR ROD PLACEMENT

NOTES:

MOUNT THE BUTTON SO THAT THE FACE IS PARALLEL WITH THE ASSOCIATED CROSSWALK. SCREW IN SHAFT TO A TIGHTENED POSITION BEFORE MOUNTING ACCESSIBLE PEDESTRIAN PUSHBUTTON UNIT TO THE SHAFT.

ORIENT THE BASE ACCESS OPENING DIRECTLY BELOW THE APS BUTTON.

PLUMB AND LEVEL APS PUSHBUTTON STATIONS, AND TIGHTEN ANCHOR RODS IN ACCORDANCE WITH CONTRACT DOCUMENTS.

FURNISH AND INSTALL BLIND THREADED INSERTS USING MANUFACTURER'S SPECIFIC INSERTION TOOL.

USE APS ¼"-20 STAINLESS STEEL MOUNTING BOLTS. APPLY BRUSH-ON ANTI-SEIZE COMPOUND TO BOLTS BEFORE ASSEMBLY.

APPLY A BEAD OF 100% SILICONE SEALANT ALONG THE TOP OF THE PUSHBUTTON UNIT WHERE IT CONTACTS THE 4" SHAFT.

(1) THE PUSHBUTTON STATION FOUNDATION IS MONOLITHIC (POURED AT ONE TIME) WITH THE SIDEWALK. PROVIDE A 1V:2H SLOPE GRADE WHERE THE 6" MINIMUM SIDEWALK DEPTH TRANSITIONS TO THE 12" MINIMUM FOUNDATION DEPTH. MAINTAIN THE COMPACTED AGGREGATE BEDDING AND THICKNESS USED FOR THE SIDEWALK THROUGHOUT THE SLOPE AND FOUNDATION GRADING. PROVIDE 1V:2H SLOPE GRADING 360 DEGREES FOR THE TRANSITION FROM THE SIDEWALK TO THE FOUNDATION WHEN THE FOUNDATION IS NOT LOCATED NEAR EDGE OF SIDEWALK AND IS SURROUNDED BY CONCRETE WALK.

(2) ENSURE CONCRETE CONTROL JOINTS AND EDGE OF CONCRETE WALK ARE A MINIMUM OF 9" FROM THE CENTER OF THE PUSHBUTTON FOUNDATION.

(3) FURNISH AND INSTALL THE MANUFACTURER-PROVIDED CABLE TETHER ASSEMBLY IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.

(4) FURNISH AND INSTALL 3" WIDE TUBULAR DELINEATOR/MARKER SHEETING FROM MnDOT'S APL FOR SIGNING/SHEETING MATERIALS THAT MATCHES THE COLOR OF THE NEAREST EDGE LINE.

APS PEDESTRIAN PUSHBUTTON LOCATION

NOTES:

(5) POSITION THE FACE OF THE PUSHBUTTON PARALLEL WITH THE OUTSIDE EDGE OF THE CROSSWALK.

(6) CONSTRUCT A MINIMUM 4'x4' LANDING AREA ADJACENT TO EACH PUSHBUTTON, WITH A 2% MAXIMUM SLOPE IN ALL DIRECTIONS.

(7) POSITION PUSHBUTTONS WITHIN 5' OF THE OUTSIDE EDGE OF THE CROSSWALK. DISTANCE IS MEASURED PERPENDICULARLY FROM EXTENSION OF CROSSWALK.

(8) POSITION PUSHBUTTONS BETWEEN 1.5' AND 10' FROM THE BACK OF CURB OR EDGE OF ROADWAY, MEASURED IN THE DIRECTION OF TRAVEL. STANDALONE PUSHBUTTON STATIONS SHOULD BE 4' MINIMUM FROM THE BACK OF CURB TO AVOID KNOCKDOWNS.

(9) POSITION PUSHBUTTONS AT LEAST 10' APART (PUSHBUTTON FACE TO PUSHBUTTON FACE).

(10) PROVIDE A MAINTENANCE ACCESS ROUTE (MAR) WHEREVER POSSIBLE FOR SNOW REMOVAL PURPOSES. A MAR REQUIRES A 6' MINIMUM CLEAR DISTANCE FOR SIDEWALKS (10' FOR SHARED-USE PATHS) BETWEEN A PUSHBUTTON AND ANY OBSTRUCTIONS, INCLUDING BUILDINGS, V-CURB, ELECTRICAL FOUNDATIONS, SIGNAL CABINETS, OR ANOTHER PUSHBUTTON.

(11) POSITION PUSHBUTTON 2' MINIMUM FROM CURB RAMP GRADE BREAK AND BACK OF SIDEWALK.

(12) CONSTRUCT AN 8%-10% WALKABLE CONCRETE FLARE WHEN THE PUSHBUTTON IS OFFSET FROM THE EDGE OF THE CROSSWALK SO USERS DEPARTING FROM THE PUSHBUTTON WILL TRAVERSE A CONCRETE SURFACE.

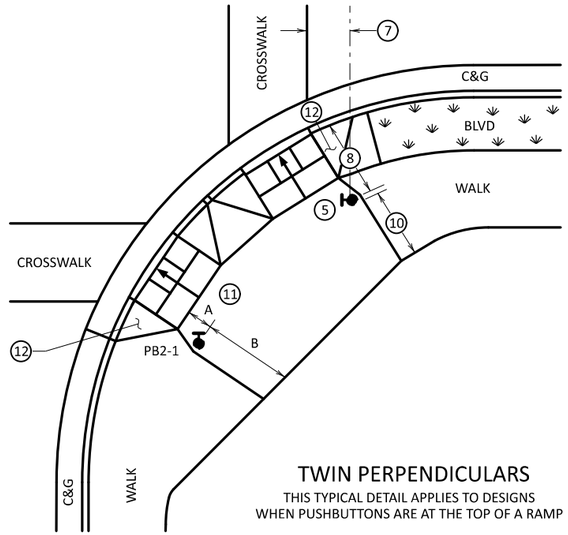
SAMPLE TABLE				
SIGNAL CONTROL POINTS			DISTANCE TO FRONT OF LANDING (FT)	DISTANCE TO BACK OF LANDING (FT)
SIGNAL NO.	X	Y		
PB2-1	-	-	A	B
PB4-2	-	-	C	D

A - DISTANCE MEASURED FROM THE PUSHBUTTON TO THE FRONT OF LANDING/TOP OF RAMP

B - CLEAR DISTANCE MEASURED FROM THE PUSHBUTTON TO THE BACK OF LANDING/EDGE OF WALK

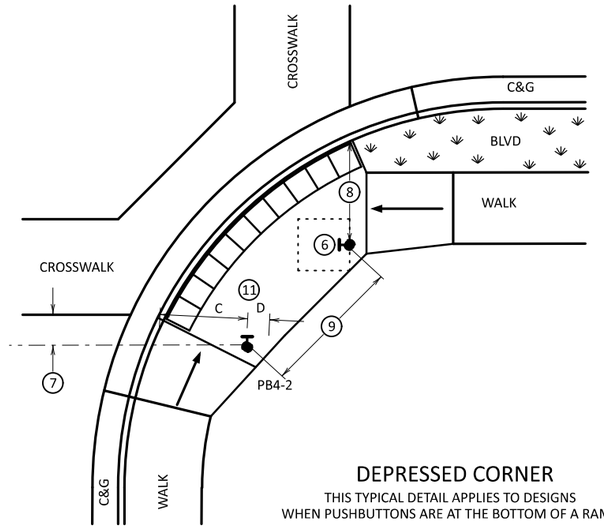
C - DISTANCE MEASURED FROM THE PUSHBUTTON TO THE OUTSIDE EDGE OF DOMES IN THE DIRECTION OF TRAVEL

D - CLEAR DISTANCE FROM THE PUSHBUTTON TO THE BACK OF LANDING MEASURED IN THE OPPOSITE DIRECTION OF TRAVEL



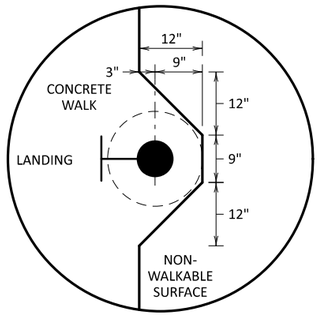
TWIN PERPENDICULARS

THIS TYPICAL DETAIL APPLIES TO DESIGNS WHEN PUSHBUTTONS ARE AT THE TOP OF A RAMP

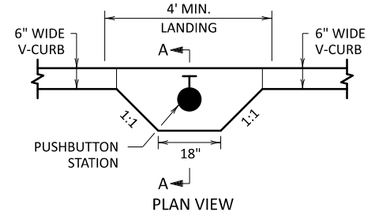


DEPRESSED CORNER

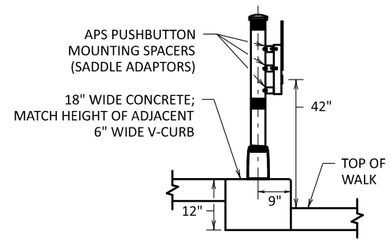
THIS TYPICAL DETAIL APPLIES TO DESIGNS WHEN PUSHBUTTONS ARE AT THE BOTTOM OF A RAMP



PUSHBUTTON STATION FOUNDATION FORMING



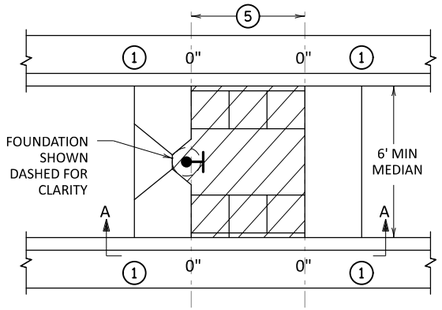
PLAN VIEW



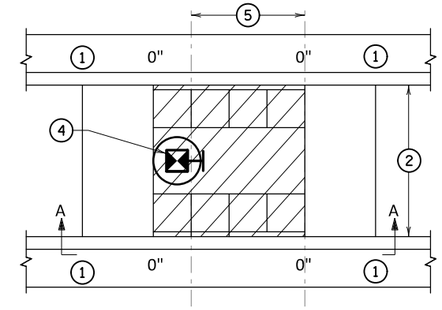
SECTION A-A

INTEGRAL PUSHBUTTON STATION WITH V-CURB

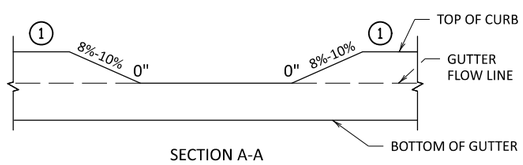
LEAD EXPERT OFFICE	JEFF PERKINS ASSISTANT DIVISION DIRECTOR OPERATIONS DIVISION		ACCESSIBLE PEDESTRIAN SIGNAL (APS) PUSHBUTTON STATION AND LOCATION	APPROVED: 02-21-2024 REVISED:	THOMAS STYRBICKI STATE DESIGN ENGINEER	STANDARD PLAN 5-297.885	1 OF 2
	DEPARTMENT OF TRANSPORTATION		STANDARD PLAN	STATE PROJ. NO.		SHEET NO.	
				TRUNK HWY.		TOTAL SHEETS	



PEDESTRIAN PUSHBUTTON STATION DETAIL



SIGNAL PEDESTAL DETAIL

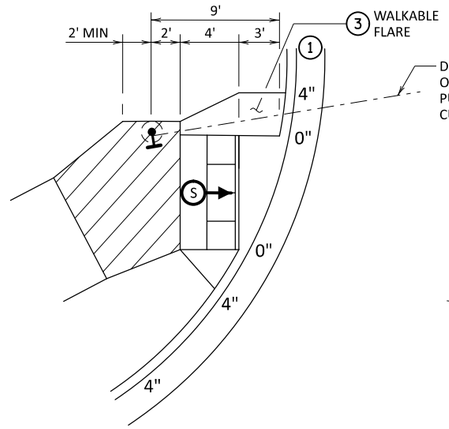


SECTION A-A

MEDIAN FLARE THROUGH

IF NEEDED DUE TO DIFFERENCE OF FLOW LINE ELEVATIONS, THE LOW SIDE OF THE REFUGE MAY BE RAMPED IF THE MEDIAN WIDTH IS SUFFICIENT TO PROVIDE BOTH A RAMP AND A LANDING ADJACENT TO THE PUSHBUTTON.

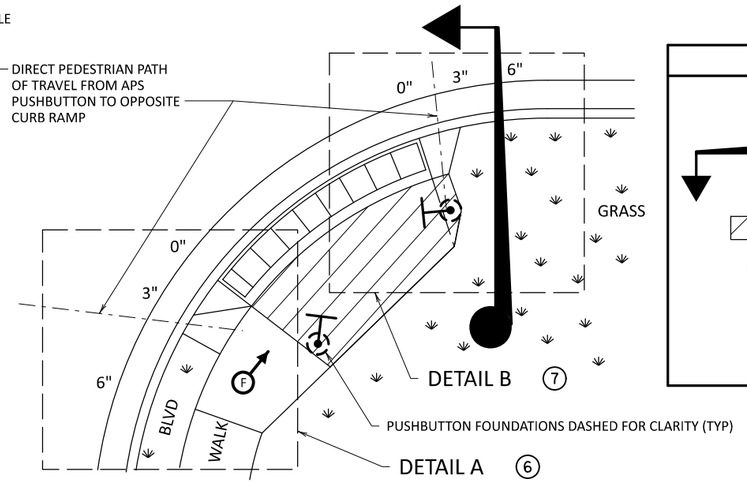
IF 6' MEDIAN IS ACHIEVED FROM FACE OF CURB TO FACE OF CURB, CONSTRUCT THE FLARE THROUGH INTEGRAL TO THE CURB. 6' MINIMUM DISTANCE IS REQUIRED TO CONSTRUCT REFUGE WITH 2' MINIMUM DETECTABLE WARNING SURFACE SEPARATION.



SEMI-DIRECTIONAL RAMP

3' DOME SETBACK, 4' LONG RAMP, AND PUSHBUTTON 9' FROM THE BACK OF CURB (SHOWN).

USED FOR APS APPLICATIONS WHERE THE PAR DOES NOT CONTINUE PAST THE PUSHBUTTON.



PUSHBUTTON LANDING AND EXTENDED WALKABLE FLARE REQUIREMENTS

FAN RAMP SHOWN IN DETAIL, APPLIES TO ALL RAMPS WITH PUSHBUTTONS

ADA LEGEND

	PEDESTRIAN PUSHBUTTON STATION WITH FOUNDATION
	SIGNAL PEDESTAL WITH FOUNDATION
	PROPOSED SIGNAL POLE
X"	CURB HEIGHT
	LANDING AREA - 4'x4' MIN. DIMENSIONS AND MAX 2.0% SLOPE IN ALL DIRECTIONS
S	INDICATES PEDESTRIAN RAMP - SLOPE SHALL BE BETWEEN 5.0% MINIMUM AND 8.3% MAXIMUM IN THE DIRECTION SHOWN AND CROSS SLOPE SHALL NOT EXCEED 2.0%
F	INDICATES PEDESTRIAN RAMP - SLOPE SHALL BE GREATER THAN 2.0% AND LESS THAN 5.0% IN THE DIRECTION SHOWN AND CROSS SLOPE SHALL NOT EXCEED 2.0%

7 DETAIL B TABLE

POINT	DESCRIPTION	PUSHBUTTON STATION	SIGNAL PEDESTAL	SIGNAL POLE
U	LANDING EXTENSION	12"	12"	18"
V	PUSHBUTTON OFFSET FROM FRONT OF LANDING (MIN)	24"	30"	30"
W	OFFSET (PARALLEL TO ROADWAY) FROM PROJECTED EDGE OF RAMP TO CENTER OF FOUNDATION	3"	6" (10)	18" (10)

(6) USE AS THE PEDESTRIAN FACILITY APPROACHES FROM THE SAME SIDE AS THE PUSHBUTTON.

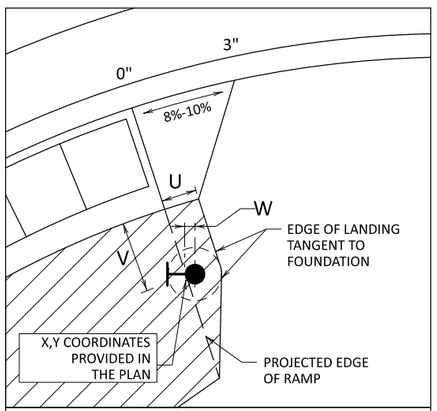
(7) USE WHEN PEDESTRIAN FACILITIES DO NOT CONTINUE PAST THE PUSHBUTTON.

(8) WHEN SIGNAL PEDESTALS (INCLUDING RRFBS) AND SIGNAL POLES ARE USED FOR PUSHBUTTON LOCATIONS, PLACE WITHIN THE PEDESTRIAN RAMP LANDING AREA AS SHOWN.

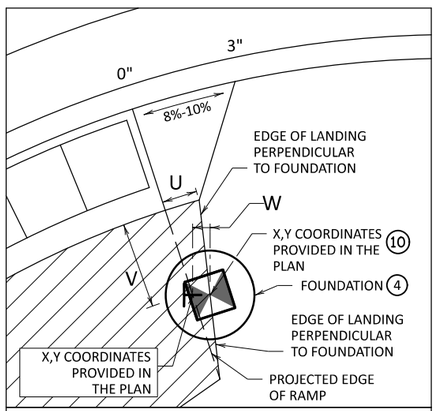
(9) EVALUATE EXISTING SIGNAL MAST ARM POLES FOR PLACING PUSHBUTTONS. FOR NEW SIGNAL MAST ARM POLES, CONSTRUCT OUTSIDE OF PEDESTRIAN RAMP LIMITS DUE TO IMPRECISE CONSTRUCTION PRACTICES, FIELD UNCERTAINTIES, AND COMPETING REQUIREMENTS OF ADA PUSHBUTTON AND TRAFFIC SIGNAL MAST ARM POLE LOCATIONS. EXCEPTIONS ARE CONGESTED URBAN AREAS AND RURAL ROADWAY INTERSECTIONS.

(10) X, Y COORDINATES GIVEN IN DESIGN ARE AT ALL FACE-OF-PUSHBUTTON LOCATIONS. PROVIDE ADDITIONAL X, Y COORDINATES FOR CENTER OF FOUNDATION AT NEW SIGNAL POLES AND PEDESTALS THAT CONTAIN PUSHBUTTONS. SEE OFFSET WIDTH, "W", IN THE TABLE FOR THE OFFSET OF THE PUSHBUTTON FACE TO THE CENTER OF THE SIGNAL COMPONENT.

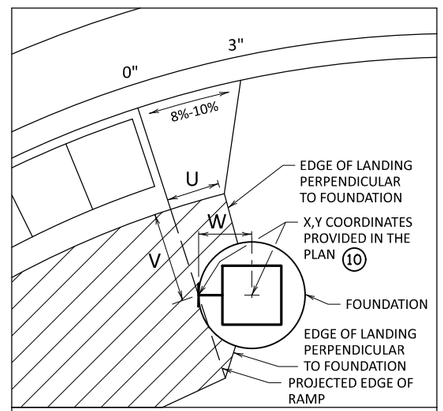
DETAIL A: EXTENDED FLARE



DETAIL B1: PUSHBUTTON STATION



(8) DETAIL B2: SIGNAL PEDESTAL



(8) (9) DETAIL B3: SIGNAL POLE

NOTES:

(1) CONSTRUCT FULL CURB HEIGHT.

(2) 7' MINIMUM DISTANCE (BACK OF CURB TO BACK OF CURB) IS REQUIRED TO ACCOMMODATE 2.5' DIAMETER PEDESTAL FOUNDATION, 2' DETECTABLE WARNING WIDTH, AND 3" DETECTABLE WARNING SETBACK.

(3) CONSTRUCT AN 8%-10% WALKABLE CONCRETE FLARE WHEN THE PUSHBUTTON IS OFFSET FROM THE EDGE OF THE CROSSWALK SO USERS DEPARTING FROM THE PUSHBUTTON WILL TRAVERSE ON A CONCRETE SURFACE.

(4) CONSTRUCT FOUNDATION FLUSH WITH ADJACENT LANDING (WITHIN ¼"). SEE STANDARD PLATE 8112.

(5) PEDESTRIAN ACCESS ROUTE/MAINTENANCE ACCESS ROUTE.

LEAD EXPERT OFFICE	JEFF PERKINS ASSISTANT DIVISION DIRECTOR OPERATIONS DIVISION		ACCESSIBLE PEDESTRIAN SIGNAL (APS) PUSHBUTTON STATION AND LOCATION	APPROVED: 02-21-2024 REVISED:	THOMAS STYRBICKI STATE DESIGN ENGINEER STANDARD PLAN 5-297.885	2 OF 2

DEPARTMENT OF TRANSPORTATION		STANDARD PLAN	STATE PROJ. NO.	SHEET NO.
			TRUNK HWY.	TOTAL SHEETS