

APPROVED 02-27-2024

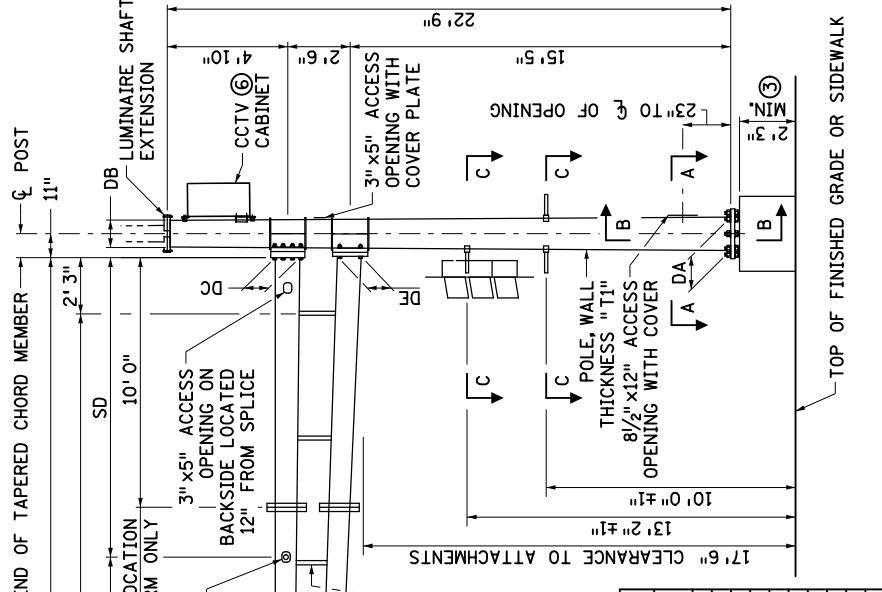
*Rom S...*  
STATE DESIGN ENGINEER

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**  
1 OF 12



**SIGNAL MOUNTING PLATE LOCATIONS**

DIMENSION	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"	12'0"
SD	-	-	-	-	-	10'0"	15'0"	20'0"	-
NO. OF PLATES	1	2	2	3	3	3	4	4	4

**MEMBER SIZES FOR MAST ARM ASSEMBLY**

DESCRIPTION	15'	20'	25'	30'	35'	40'	45'	50'	55'
MAST ARM LENGTH	15'	20'	25'	30'	35'	40'	45'	50'	55'
POLE DIAMETER AT BASE PLATE	A	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"
DIAMETER OF TOP CHORD AT BASE PLATE	DC	8.0"	8.3"	9.0"	9.7"	10.4"	11.1"	11.8"	12.5"
DIAMETER OF TOP CHORD AT TIP	DD	5.9"	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"
DIAMETER OF BOTTOM CHORD AT TIP	DF	6.21"	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"
WALL THICKNESS OF TOP CHORD	T2	0.1875"	0.1875"	0.1875"	0.1875"	0.1875"	0.1875"	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"

- NOTES:**
- USE 2" WIDE BY 5/8" THICK BAR FOR VERTICAL PICKETS AND PLACE AT THE SPACING SHOWN.
  - DIAMETER DIMENSIONS PROVIDED ARE THE OUTSIDE DIAMETER.
  - 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".
  - INCLUDES END MAST ARM SIGNAL MOUNT.
  - 21'1" MOUNTING HEIGHT AFTER DEFLECTION DUE TO SELF WEIGHT AND DEAD LOAD FROM SIGNS AND SIGNALS.
  - 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.

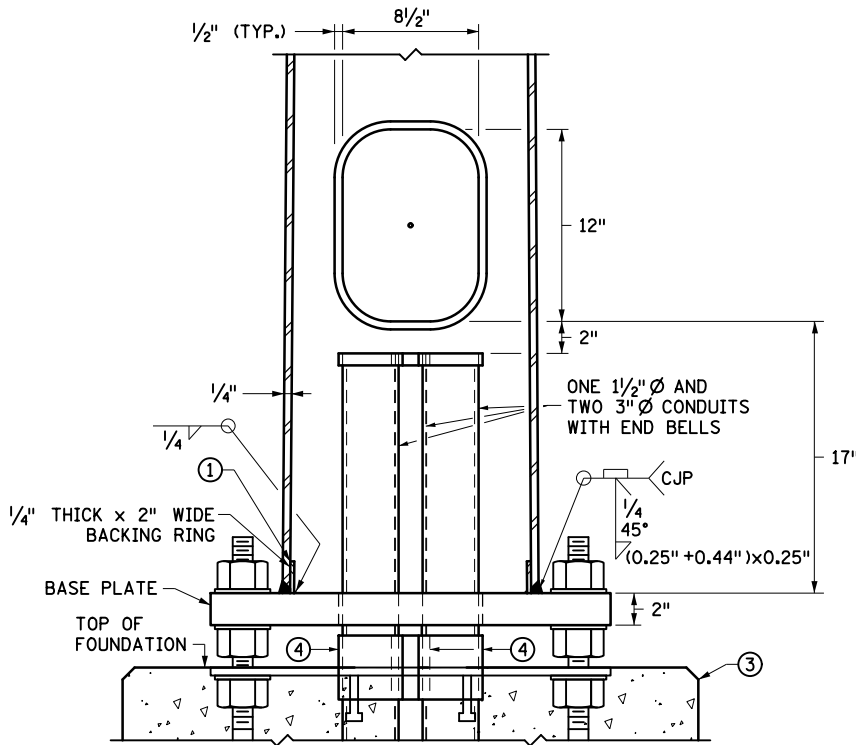
WELD IN ACCORDANCE WITH THE AMERICAN WELDING SOCIETY STRUCTURAL WELDING CODE (STEEL) ANSI/AWS D11 (CURRENT EDITION).

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.

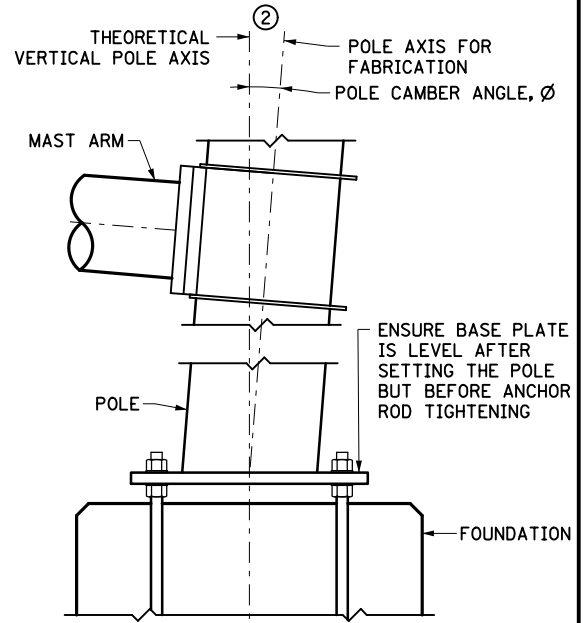
FOR SECTION A-A AND SECTION B-B, SEE SHEET 2 OF 12. FOR SECTION C-C, SEE SHEET 8 OF 12.

POLE TYPE	MAST ARM LENGTH	POLE CAMBER ANGLE ∅
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"



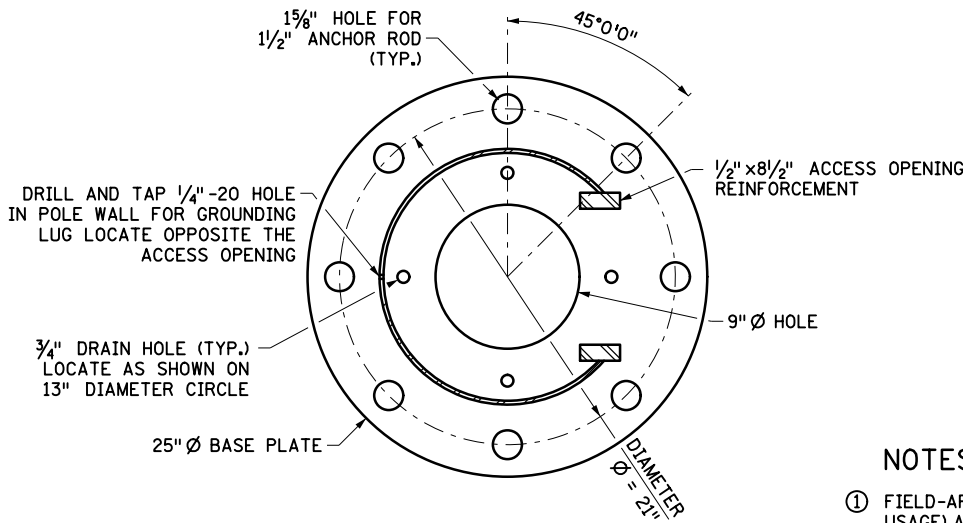
**SECTION B-B**

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.

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**POLE AND MAST ARM TYPE TS**

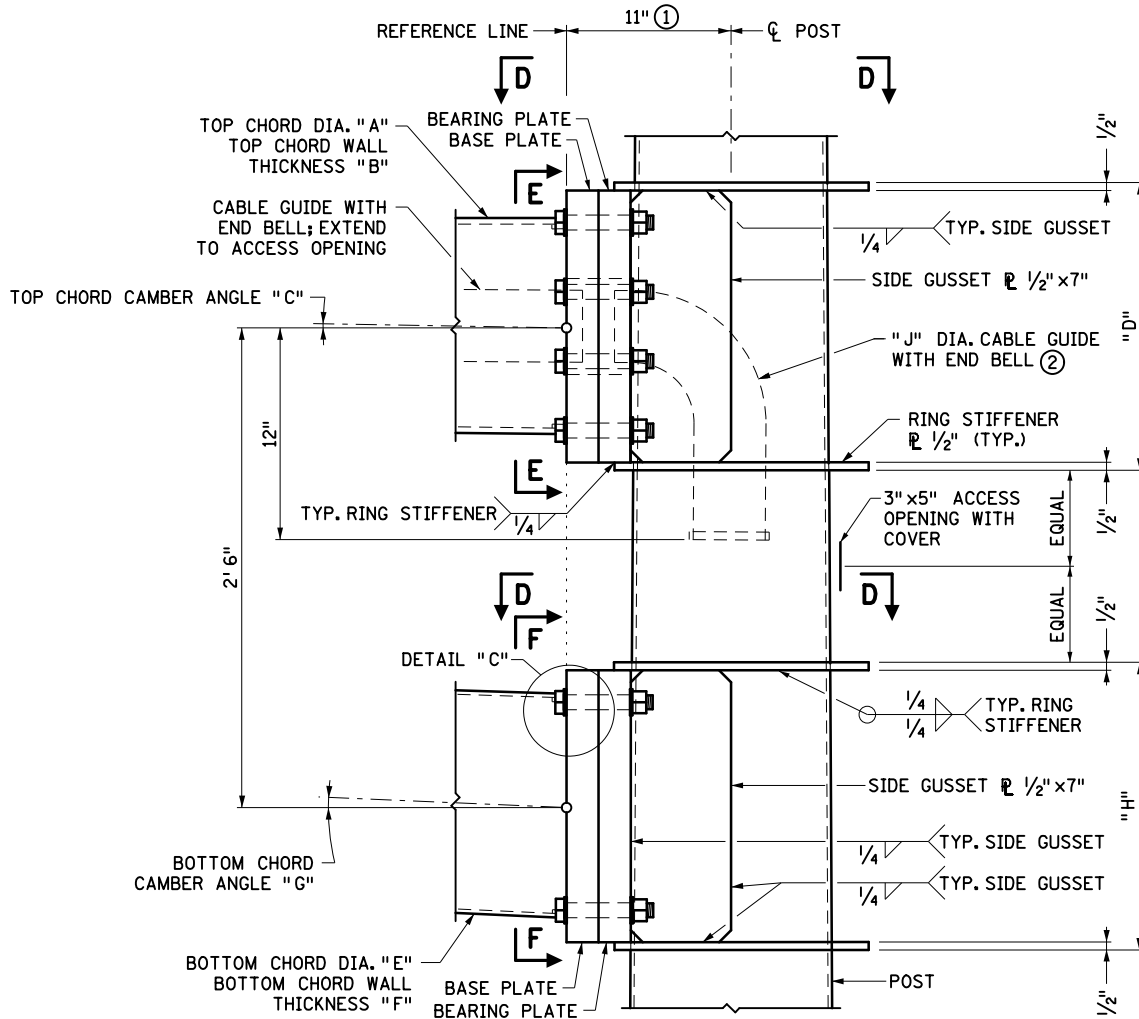
POLE DETAILS  
FOR MAST ARM LENGTHS 15' TO 55'

SPECIFICATION  
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2565

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PLATE  
NO.

**8124A**

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**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.

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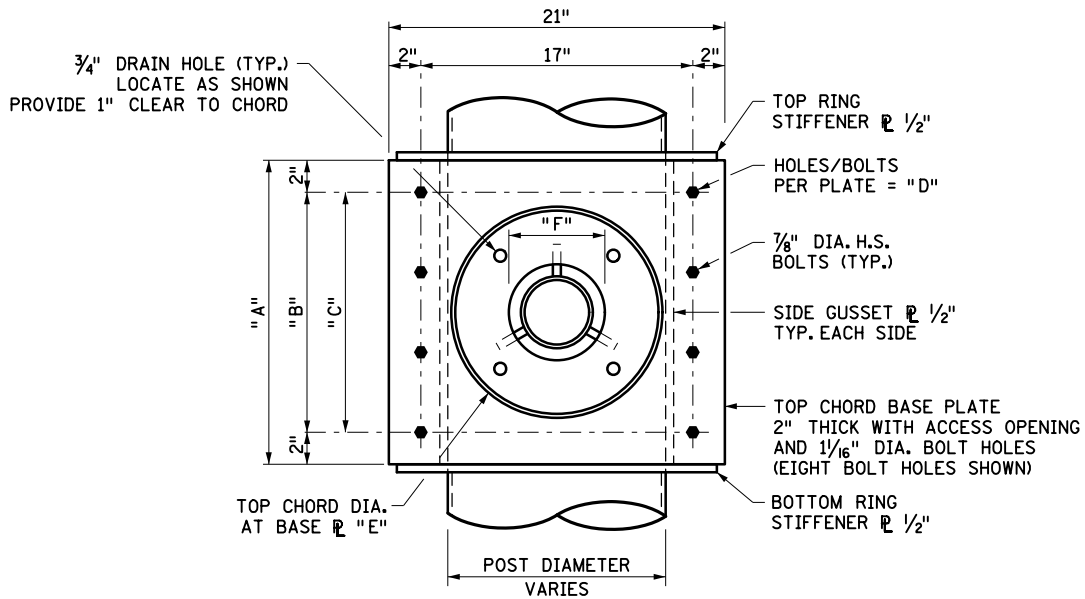
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 DEPARTMENT OF TRANSPORTATION

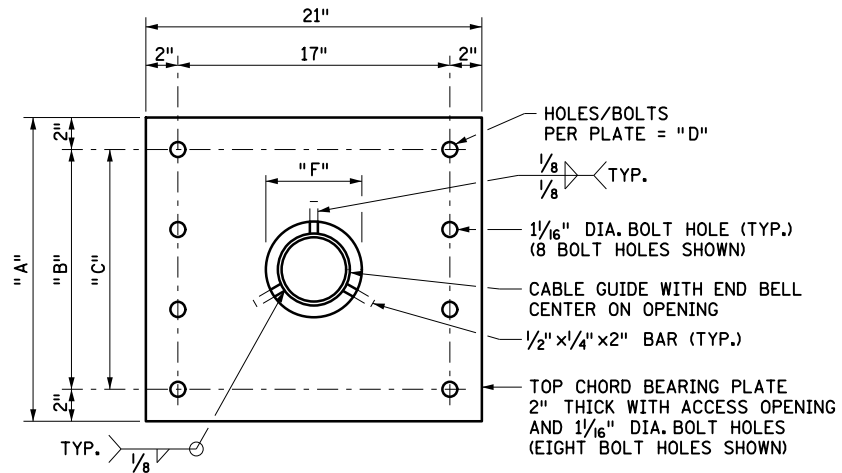
**POLE AND MAST ARM TYPE TS**  
 MAST ARM CONNECTION DETAILS  
 FOR MAST ARM LENGTHS 15' TO 55'

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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. ø 4 1/2"	2 SPS. ø 4 1/2"	2 SPS. ø 4 1/2"	3 SPS. ø 5"	3 SPS. ø 5"	3 SPS. ø 5"	3 SPS. ø 5"	3 SPS. ø 5"	3 SPS. ø 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"

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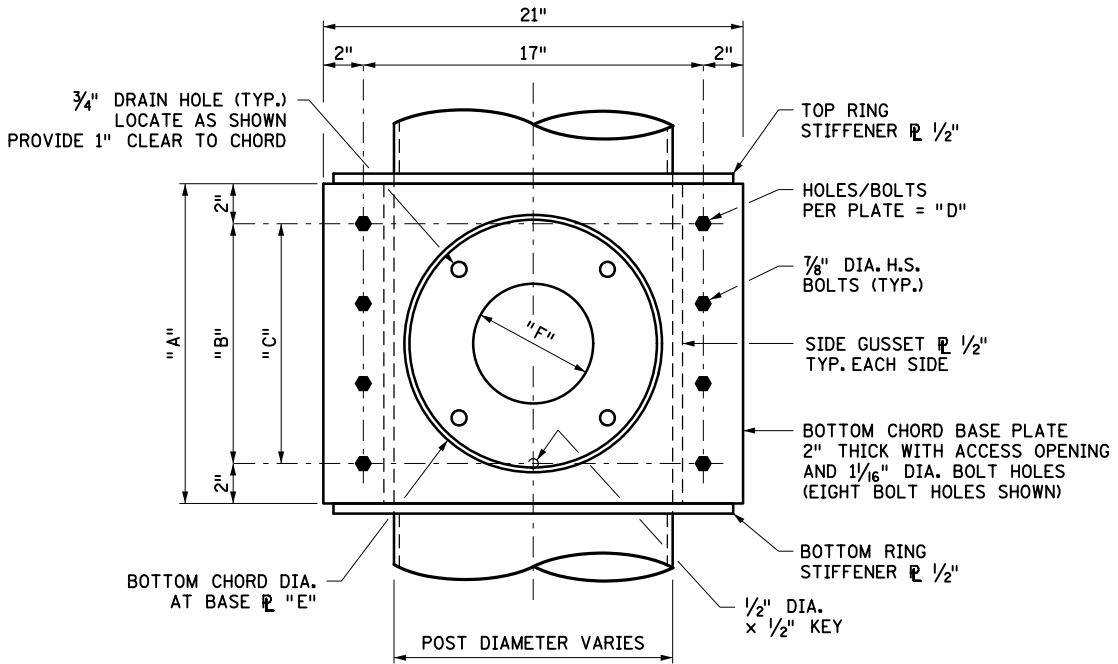
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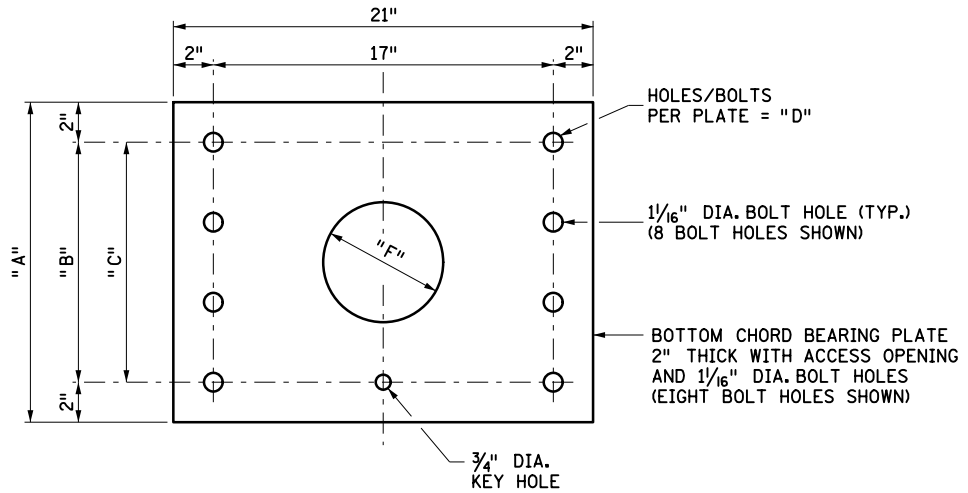
POLE AND MAST ARM TYPE TS  
TOP CHORD CONNECTION DETAILS  
FOR MAST ARM LENGTHS 15' TO 55'

SPECIFICATION  
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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. ø 4 1/2"	2 SPS. ø 4 1/2"	2 SPS. ø 4 1/2"	2 SPS. ø 4 1/2"	2 SPS. ø 4 1/2"	2 SPS. ø 4 1/2"	3 SPS. ø 4"	3 SPS. ø 4"	3 SPS. ø 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"

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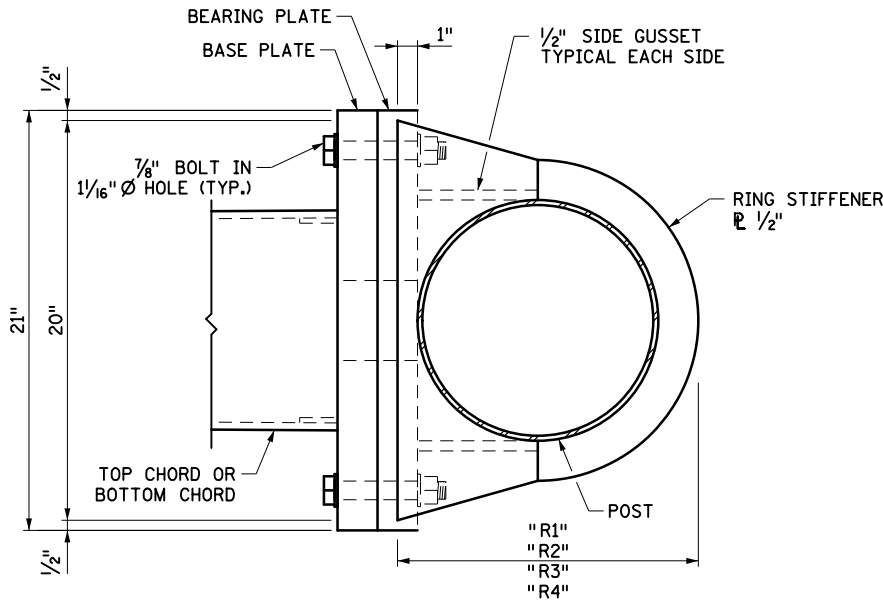
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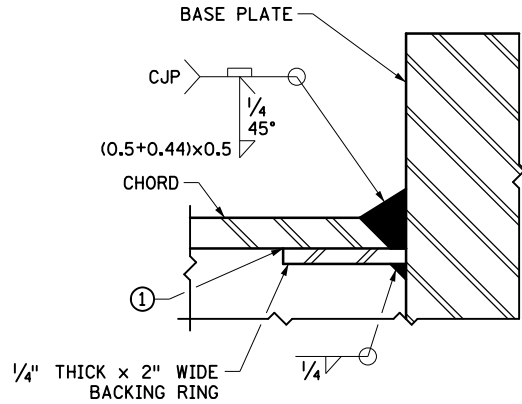
**POLE AND MAST ARM TYPE TS**  
BOTTOM CHORD CONNECTION DETAILS  
FOR MAST ARM LENGTHS 15' TO 55'

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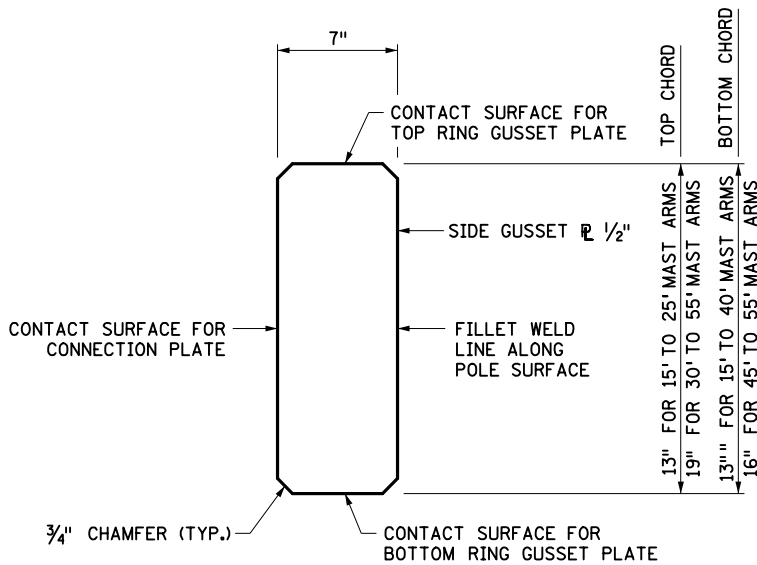
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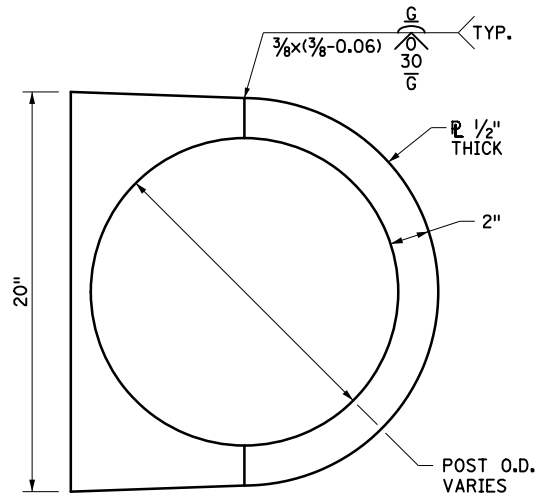
SECTION D-D  
CABLE GUIDE NOT SHOWN FOR CLARITY



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	16 1/2"
TOP CHORD - BOTTOM RING STIFFENER PLATE	R2	16 5/8"
BOTTOM CHORD - TOP RING STIFFENER PLATE	R3	16 7/8"
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.

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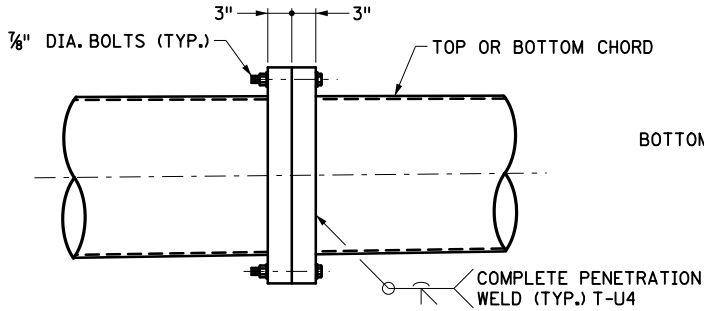
**POLE AND MAST ARM TYPE TS**  
STIFFENER PLATE/GUSSET PLATE CONNECTION DETAILS  
FOR MAST ARM LENGTHS 15' TO 55'

SPECIFICATION  
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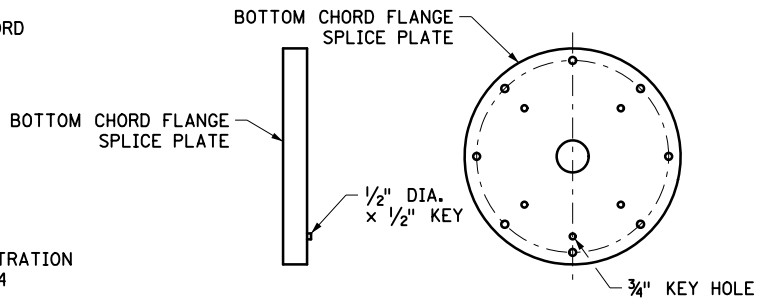
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## FLANGE SPLICE PLATE

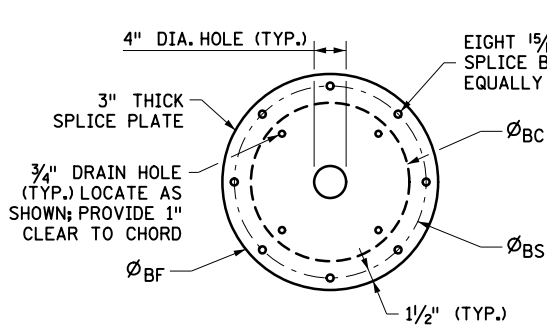
POLE TYPE	MAST ARM LENGTH	TOP CHORD			BOTTOM CHORD		
		FLANGE SPLICE PLATE DIAMETER $\varnothing$ TF	BOLT CIRCLE DIAMETER $\varnothing$ TS	CHORD DIAMETER @ SPLICE $\varnothing$ TC	FLANGE SPLICE PLATE DIAMETER $\varnothing$ BF	BOLT CIRCLE DIAMETER $\varnothing$ BS	CHORD DIAMETER @ SPLICE $\varnothing$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



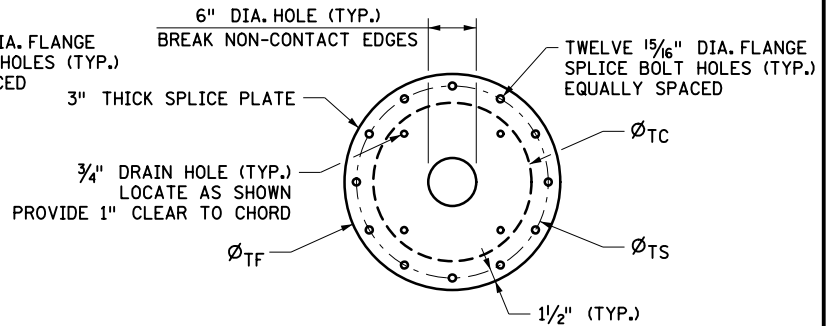
FLANGE SPLICE



SPLICE KEY



BOTTOM CHORD FLANGE SPLICE PLATE



TOP CHORD FLANGE SPLICE PLATE

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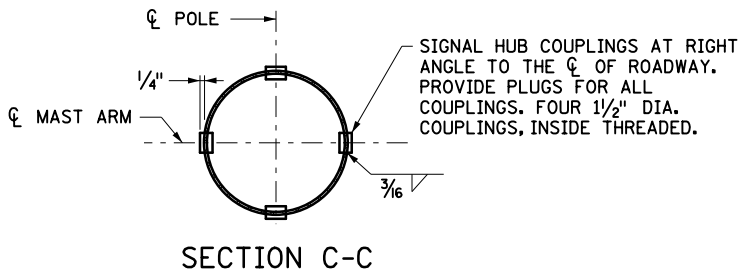
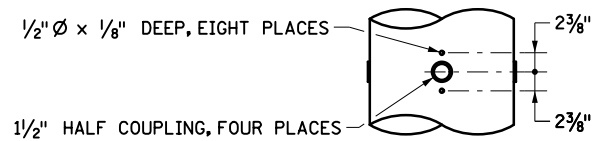
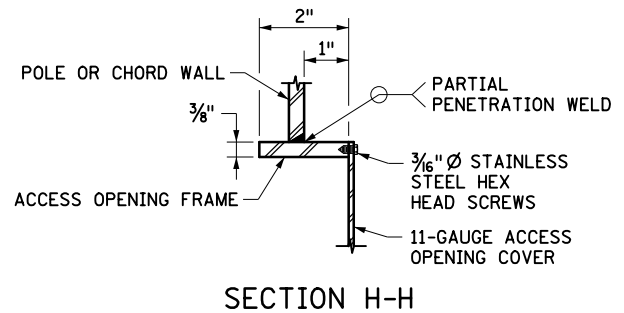
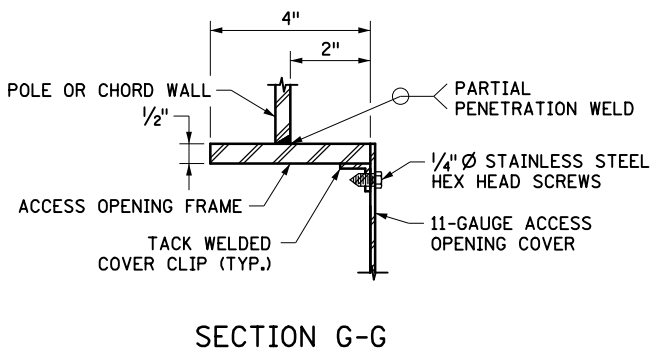
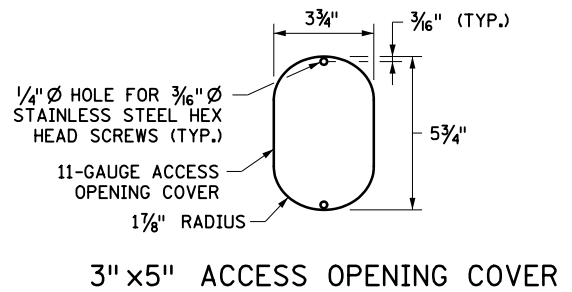
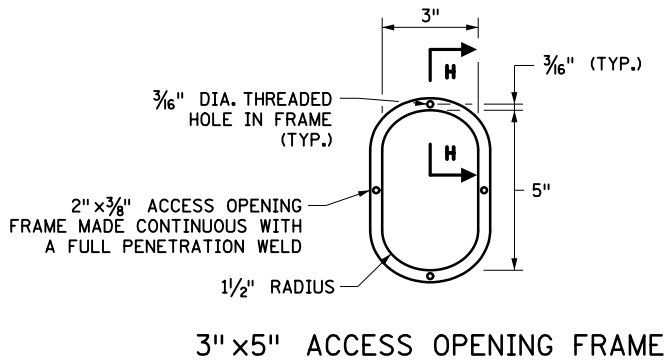
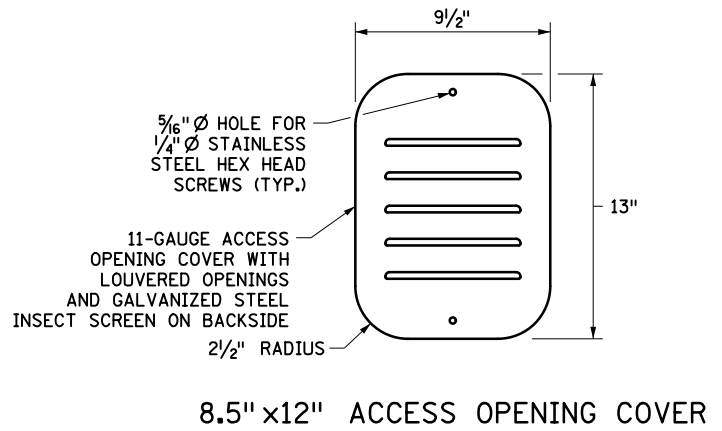
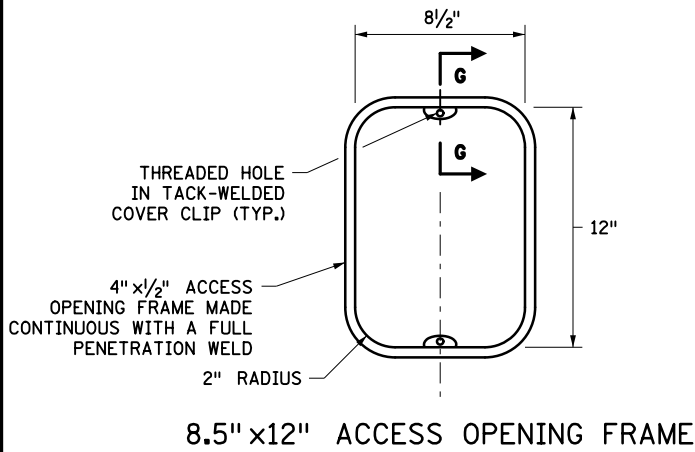
  
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**POLE AND MAST ARM TYPE TS**  
FLANGE SPLICE DETAILS  
FOR MAST ARM LENGTHS 15' TO 55'

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NOTES:  
PLACE FASTENERS TO A SNUG-TIGHT CONDITION.

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**POLE AND MAST ARM TYPE TS**  
ACCESS OPENING AND ATTACHMENT DETAILS  
FOR MAST ARM LENGTHS 15' TO 55'

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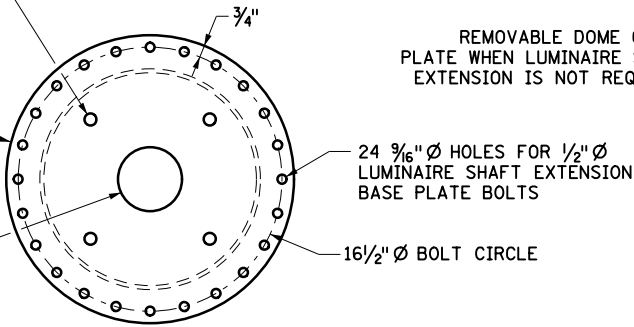
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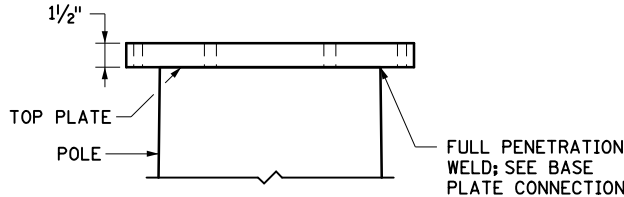
3/4" Ø DRAIN HOLE (TYP.), LOCATE AS SHOWN, PROVIDE 1" CLEAR TO CHORD

18" Ø TOP PLATE; CENTER ON POLE

6" Ø HOLE; BREAK EDGES



TOP VIEW



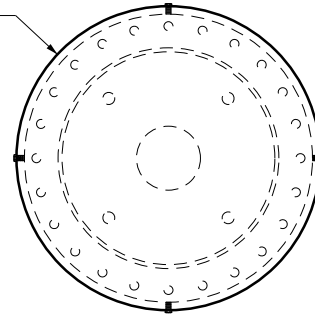
SIDE VIEW

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

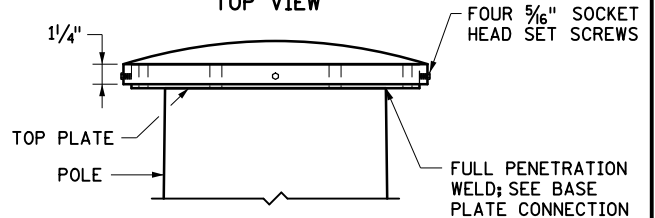
REMOVABLE DOME COVER PLATE WHEN LUMINAIRE SHAFT EXTENSION IS NOT REQUIRED

24 3/16" Ø HOLES FOR 1/2" Ø LUMINAIRE SHAFT EXTENSION BASE PLATE BOLTS

16 1/2" Ø BOLT CIRCLE



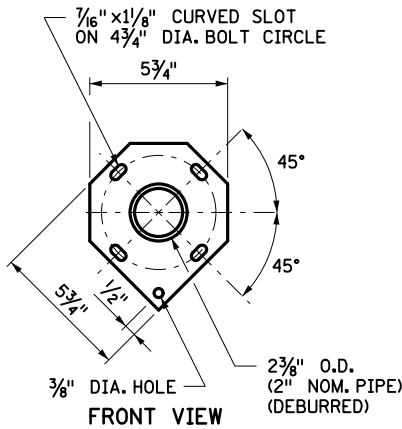
TOP VIEW



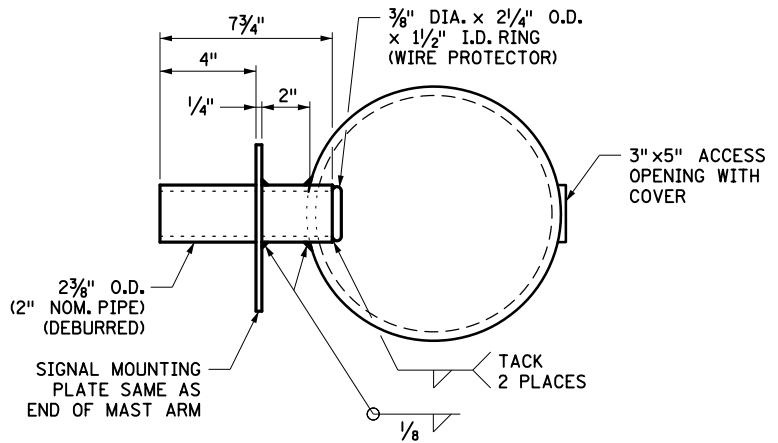
SIDE VIEW

POLE TOP WITHOUT LUMINAIRE SHAFT EXTENSION

POLE CAP DETAIL

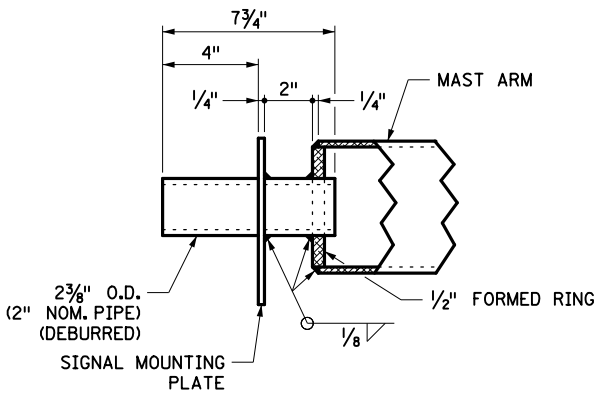


FRONT VIEW



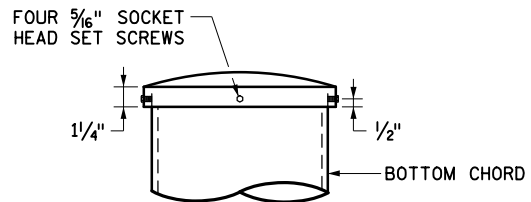
SIGNAL MOUNTING DETAIL

MID MAST ARM



SIDE VIEW

SIGNAL MOUNTING DETAIL  
END OF MAST ARM



REMOVABLE CHORD CAP DETAIL

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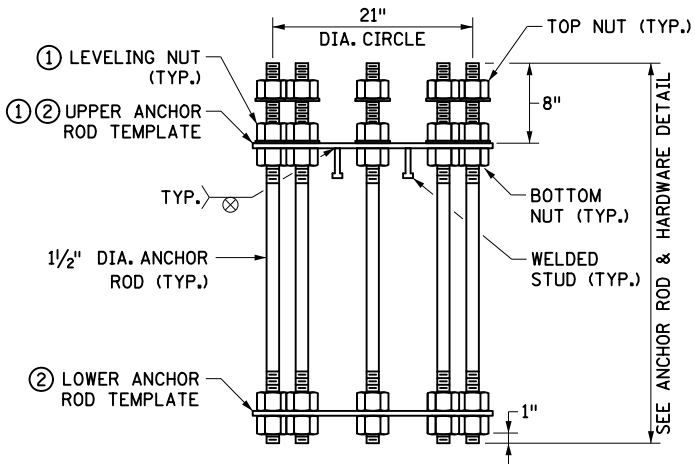
*Rom S*  
STATE DESIGN ENGINEER

STATE OF MINNESOTA  
DEPARTMENT OF TRANSPORTATION

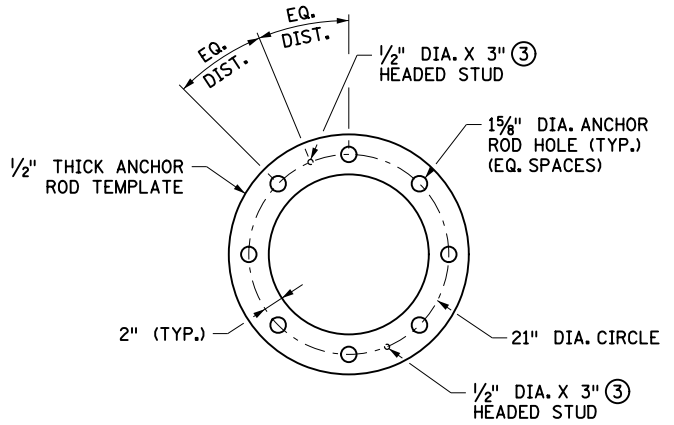
POLE AND MAST ARM TYPE TS  
MISCELLANEOUS DETAILS  
FOR MAST ARM LENGTHS 15' TO 55'

SPECIFICATION  
REFERENCE  
2565

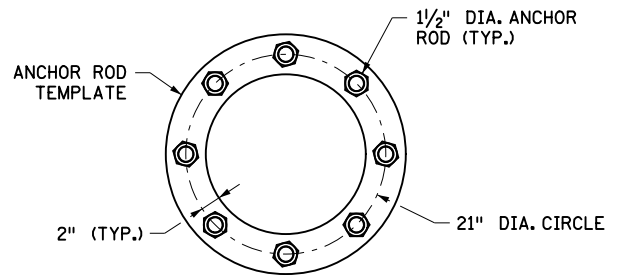
STANDARD  
PLATE  
NO.  
8124A  
9 OF 12



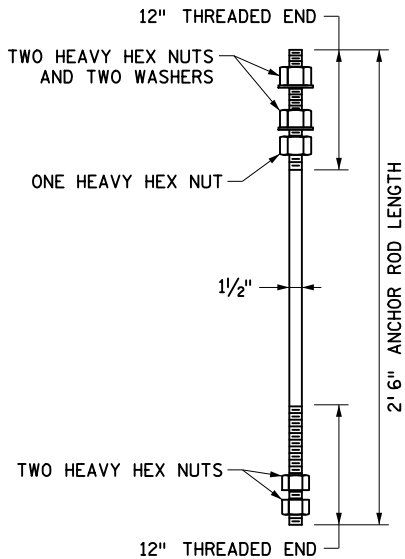
**ANCHOR ROD ASSEMBLY DETAIL**



**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.

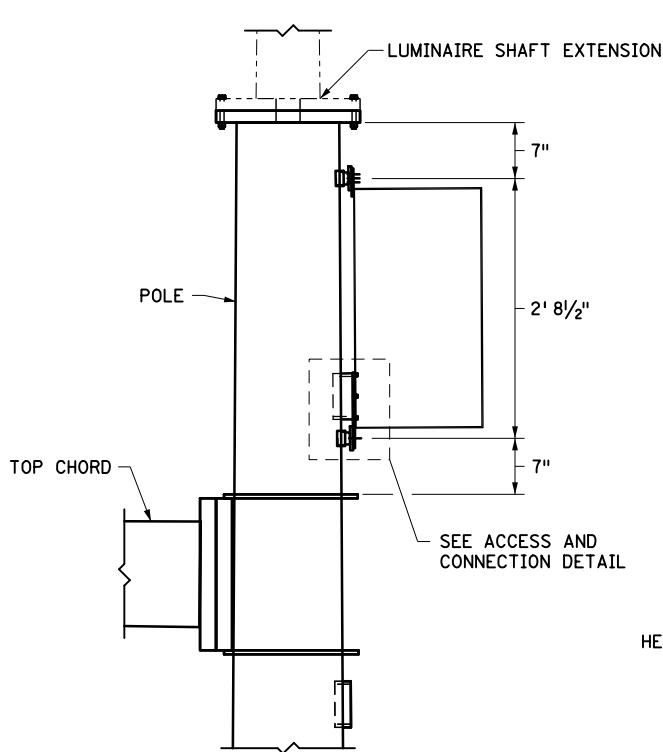
FURNISH AND INSTALL TYPE B ANCHOR RODS IN ACCORDANCE WITH SPEC. 3385.

APPROVED 02-27-2024  
  
 STATE DESIGN ENGINEER

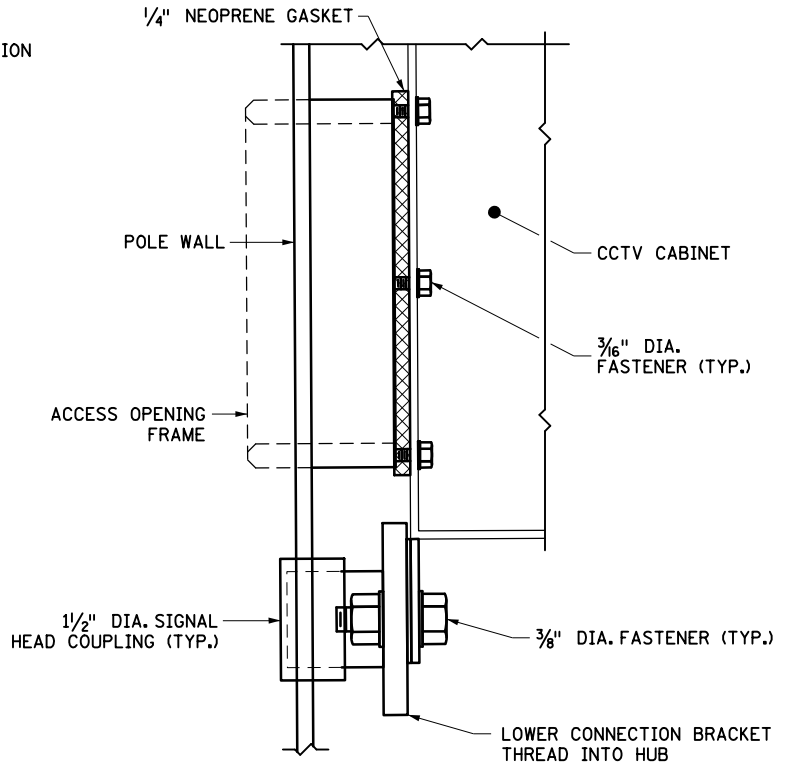
STATE OF MINNESOTA  
 DEPARTMENT OF TRANSPORTATION  
**POLE AND MAST ARM TYPE TS**  
 ANCHOR ROD ASSEMBLY DETAILS  
 FOR MAST ARM LENGTHS 15' TO 55'

**SPECIFICATION  
 REFERENCE**  
 2565

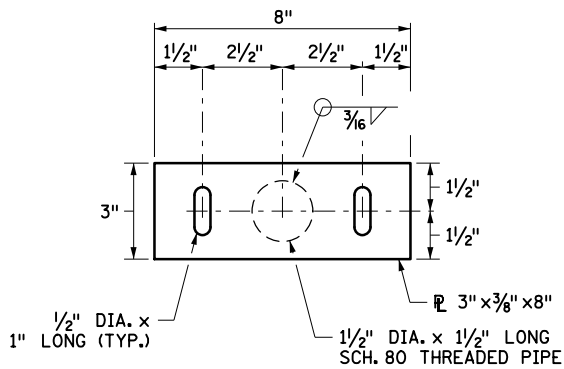
**STANDARD  
 PLATE  
 NO.**  
**8124A**  
 10 OF 12



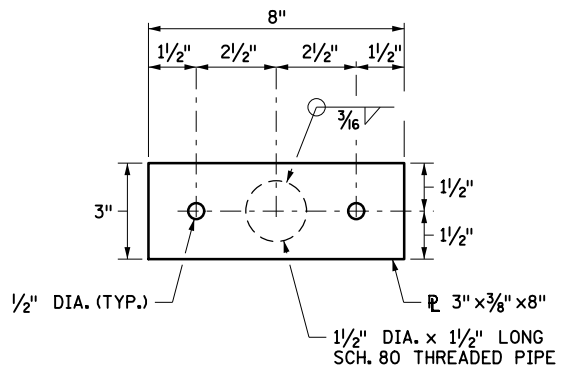
CCTV CABINET DETAIL



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.

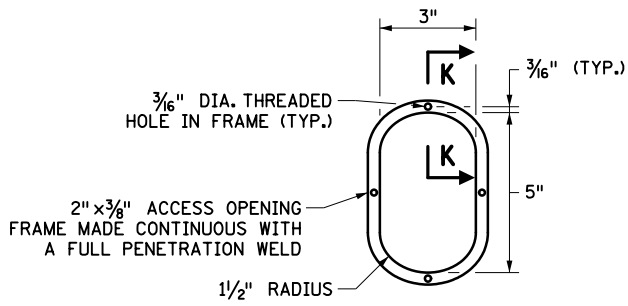
FURNISH AND INSTALL COMMON STRUCTURAL STEEL BOLTS, NUTS, AND WASHERS IN ACCORDANCE WITH SPEC. 3391 FOR THE CCTV CABINET TO POLE BRACKETING CONNECTIONS.

APPROVED 02-27-2024  
*Rom Sln*  
STATE DESIGN ENGINEER

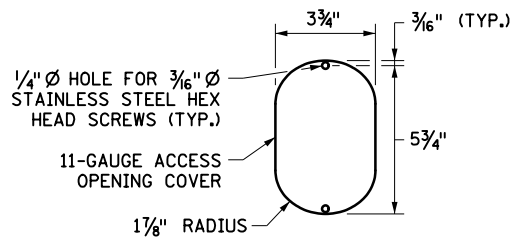
STATE OF MINNESOTA  
DEPARTMENT OF TRANSPORTATION  
**POLE AND MAST ARM TYPE TS**  
CCTV CONNECTION DETAILS (1 OF 2)  
FOR MAST ARM LENGTHS 15' TO 55'

SPECIFICATION  
REFERENCE  
2565

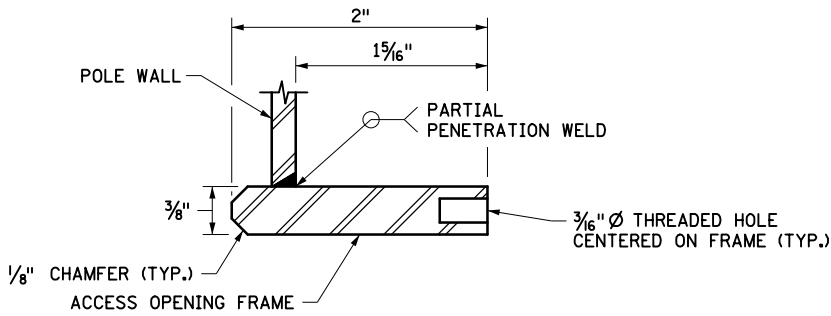
STANDARD  
PLATE  
NO.  
**8124A**  
11 OF 12



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

*Rom Sln*

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