

STANDARD CITY OF COLUMBUS MAST ARM

CITY OF COLUMBUS, OHIO
DEPARTMENT OF PUBLIC SERVICE
DIVISION OF DESIGN AND CONSTRUCTION

STD DWG
4120

8/10/2017

CITY ENGINEER

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TABLE 1 - PART A - POLE DIMENSIONS

DESIGN NO.	MAXIMUM DESIGN AREA SQ FT (NOTE A)	DESIGN DISTANCE FROM CL FT	POLE			ARM			
			TYPE	WALL THICK	SIZE	MAX LENGTH	TYPE	WALL THICK	SIZE
4	42	37.5	ROUND	.239	13x9.78x23'	38'	ROUND	.239	10.32X5.00**
12	42	47.5	ROUND	.299	14x10.78x23'	48'	ROUND	.299	11x8.62x17' +
								.179	9.19x4.68x32'-3"
13	40	59.5	ROUND	.299	16x12.78x23'	60'	ROUND	.299	13x8.80x30' +
								.239	9.62x5.14x32'
14	38	69.5	ROUND	.299	17x13.78x23'	70'	ROUND	.3125	14x9.1x35' +
								.239	9.90x4.42x37'
14	38	69.5	ROUND	.299	17x13.78x23'	70'	ROUND	0.313	14x8.68x38' +
								0.250	9.50x4.74x34'
C15	50	78.5	ROUND	.313	18x14.22x23'	79'	ROUND	.313	14.40x8.70x40.75' +
								.179	9.34x3.71x40.25'
C16 DOUBLE ARM	48 / 48	49.5 49.5	ROUND	.313	16x12.22x27'	50'/50'	ROUND	.250	12.00x9.55x17.5' +
								.179	10.19x5.40x34.25'
								.250	12.00x9.55x17.5' +
								.179	10.19x5.40x34.25'

ALL DIMENSIONS ARE IN INCHES, UNLESS OTHERWISE NOTED.

*=POLE HEIGHT SHALL BE VERIFIED BASED OFF THE CRITICAL PAVEMENT AND FOUNDATION ELEVATIONS.

**=SINGLE PIECE ARM

TABLE 1 - PART B - POLE DIMENSIONS

DESIGN NO.	ARM ATTACHMENT								ANCHOR BASE					PLATE SKIRT	
	A	B	C	D	E	F	G	P	BOLT CIRCLE	S	J	T	H	M	K
4	16.50	14.50	12.50	9.50	1.50	2	1.25	0.25	18	18.50	12.75	2	2.13	6.75	7.75
12	16.50	14.50	12.50	9.50	1.75	2	1.50	0.31	20	20.50	14.13	2	2.38	7.5	8.5
13	19.50	16.50	15	12	1.50	2	1.50	0.31	22	23	15.56	2	2.38	7.5	8.5
14	19.50	16.50	15	12	2.00	2	2.00	0.38	22	23	15.56	2	2.38	7.5	8.5
C15	24	19	18	13	2.00	2	2.00	0.38	24	24	17	2	2.38	7.5	8.5
C16 DOUBLE ARM	19	15	14	10	1.75	2	1.50	0.31	22	23	15.56	2	2.38	7.5	8.5
	19	15	14	10	1.75	2	1.50	0.31							

ALL DIMENSIONS ARE IN INCHES, UNLESS OTHERWISE NOTED.

THESE DESIGNS USE FULL PENETRATION WELDS AT THE ARM AND BASE PLATE CONNECTIONS.

NOTES:

A. MAXIMUM DESIGN AREA IS BASED ON 90 MPH DESIGN WIND SPEED WITH A PRESSURE OF 25 PSF.

B. DIMENSION LOCATIONS ARE ILLUSTRATED ON SHEETS 3 & 6.

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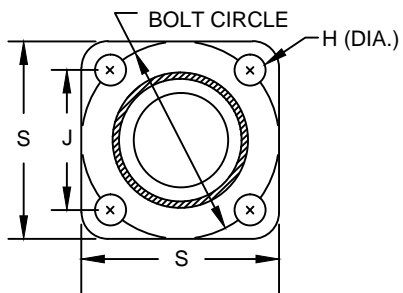
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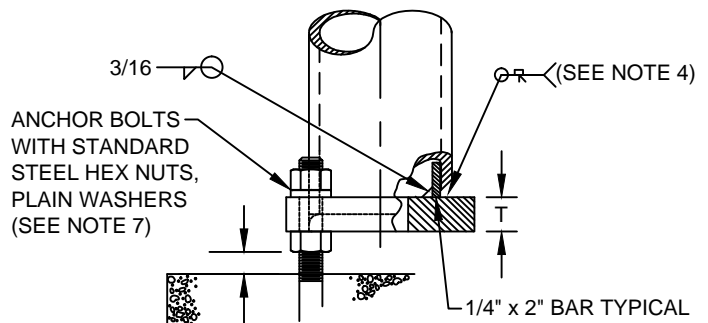
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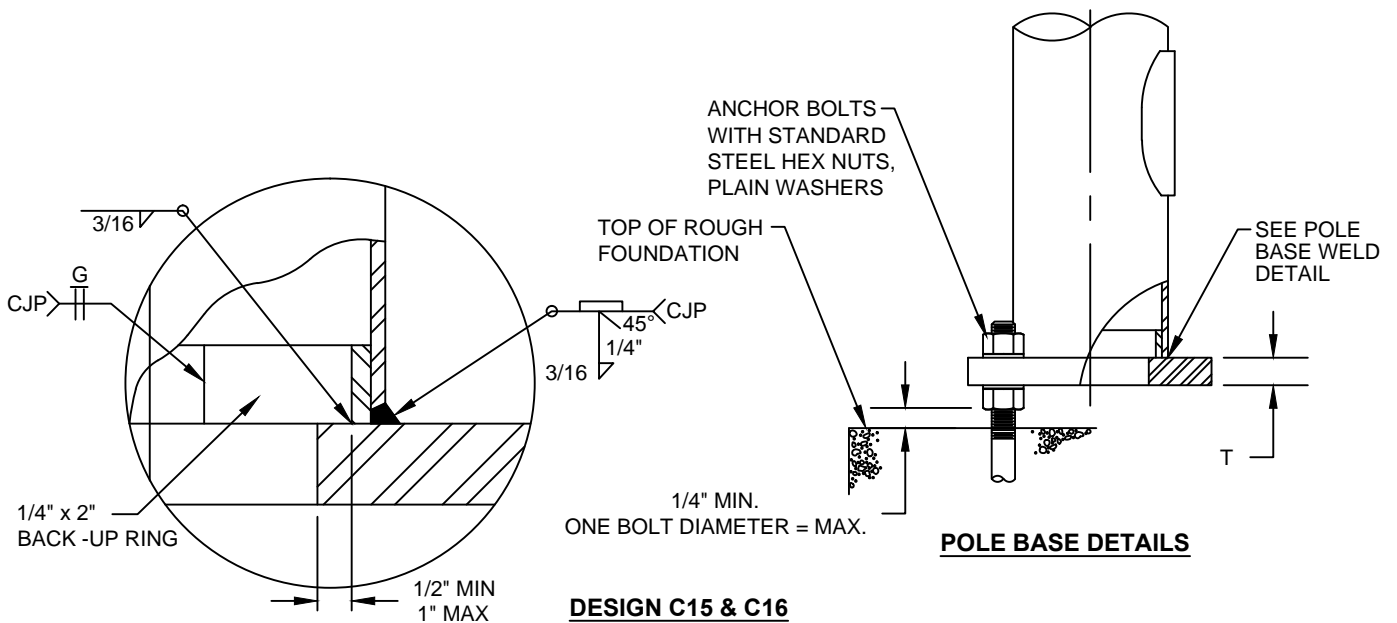


BASE PLATE



POLE BASE DETAILS

DESIGN 4, 12, 13, & 14



POLE BASE DETAILS

POLE BASE AND ARM FLANGE WELD DETAIL

DESIGN C15 & C16

BASE CONNECTION

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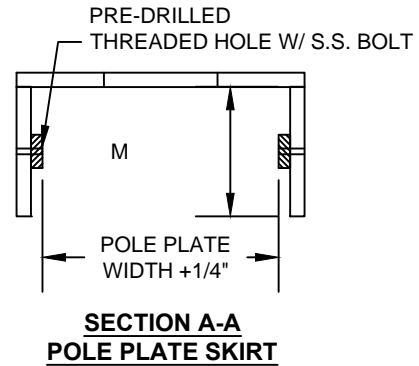
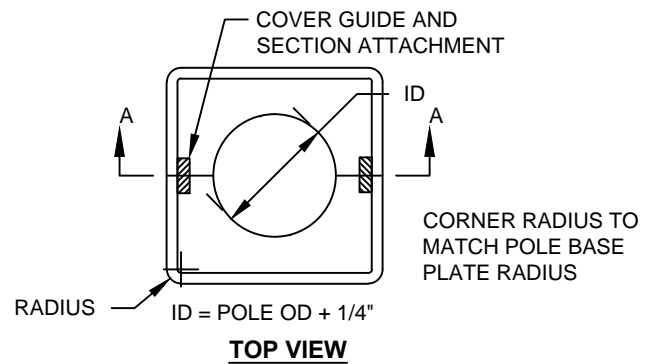
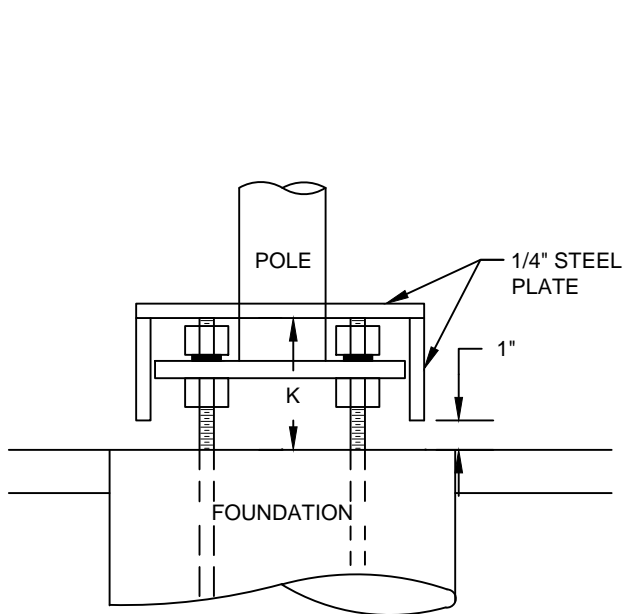
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STEEL BASE COVER

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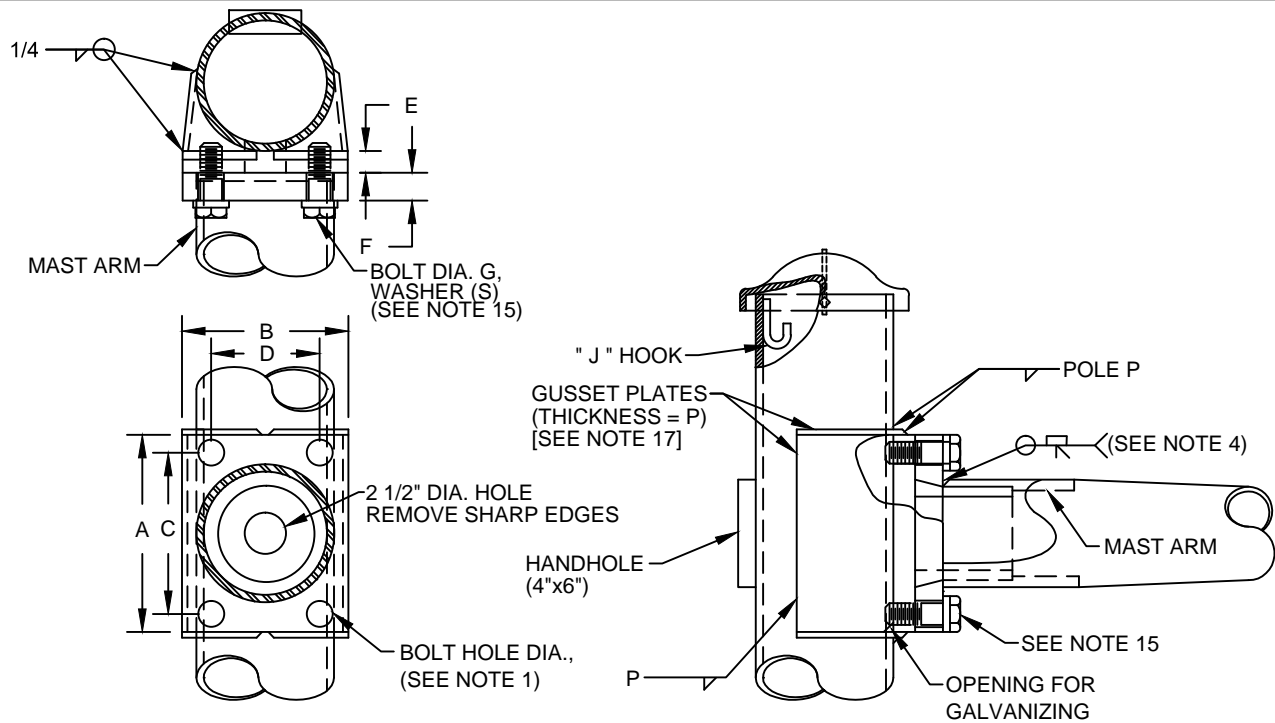
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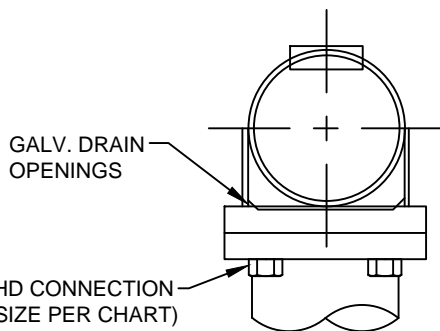
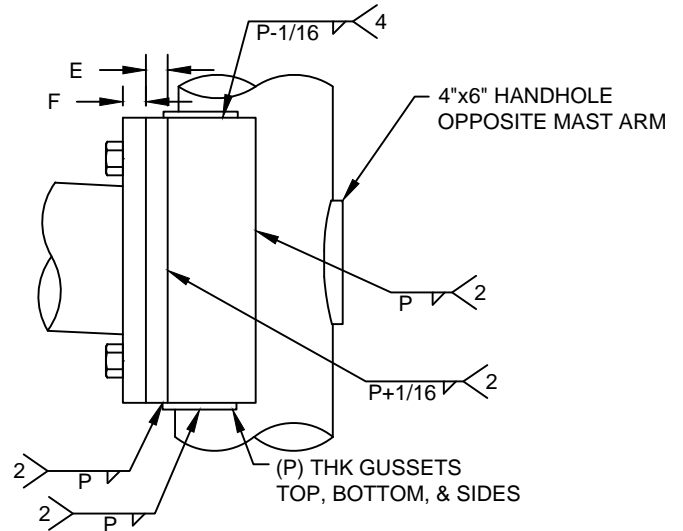
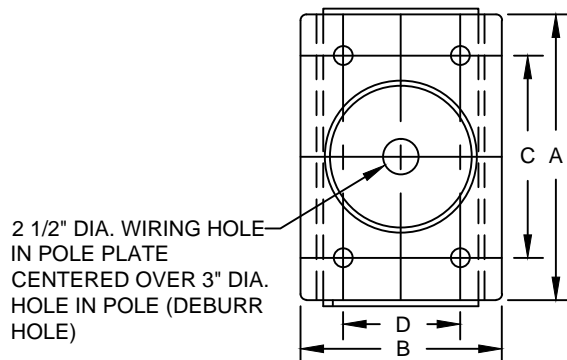
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ARM ATTACHMENT (TYP.)
DESIGN 4, 12, 13 & 14



ARM ATTACHMENT (TYP.)
DESIGN C15

ARM ATTACHMENTS

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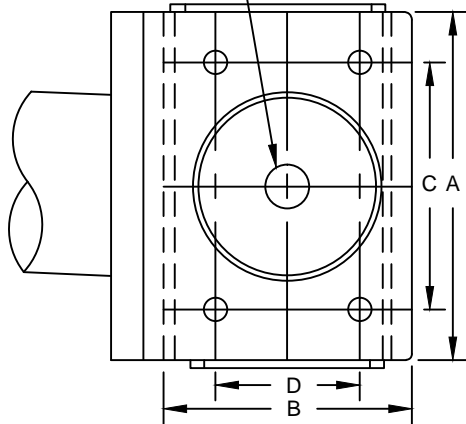
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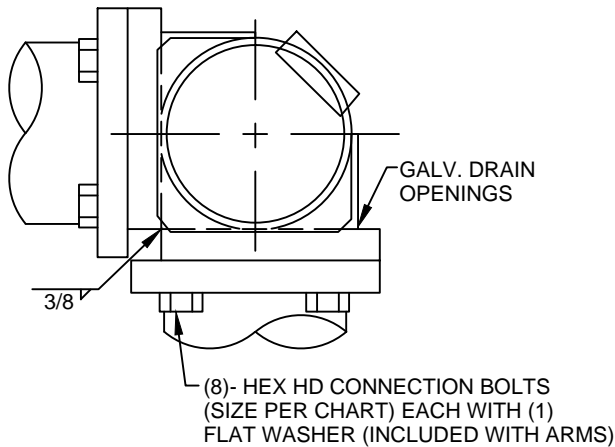
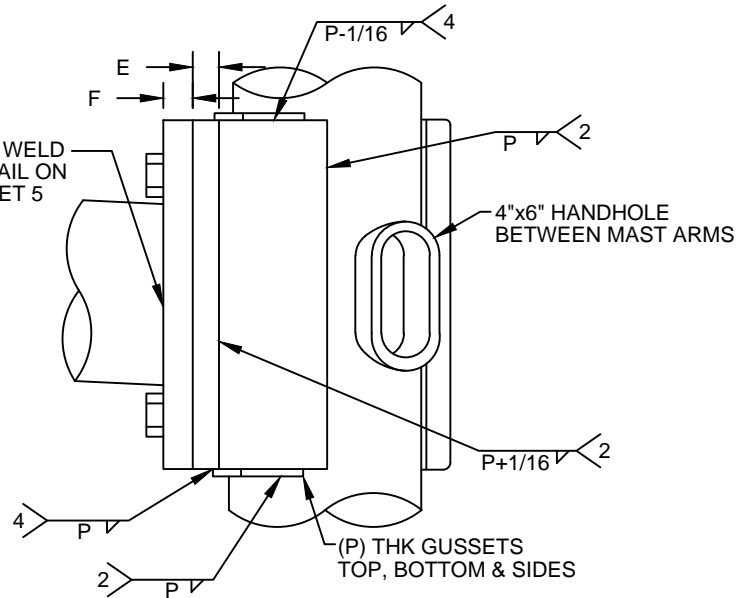
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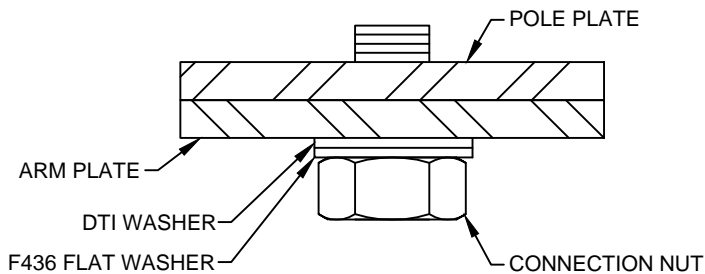
2.5" DIA. WIRING HOLE IN
POLE PLATE CENTERED
OVER 3" DIA. HOLE IN POLE
(DEBURR HOLE)



SEE WELD
DETAIL ON
SHEET 5



ARM ATTACHMENT (TYP.)
DESIGN C16



DTI WASHER PLACEMENT
(FOR DESIGNS 13, 14, C15 & C16)
(SEE NOTE 15)

**ARM ATTACHMENTS/
DTI WASHER PLACEMENT**

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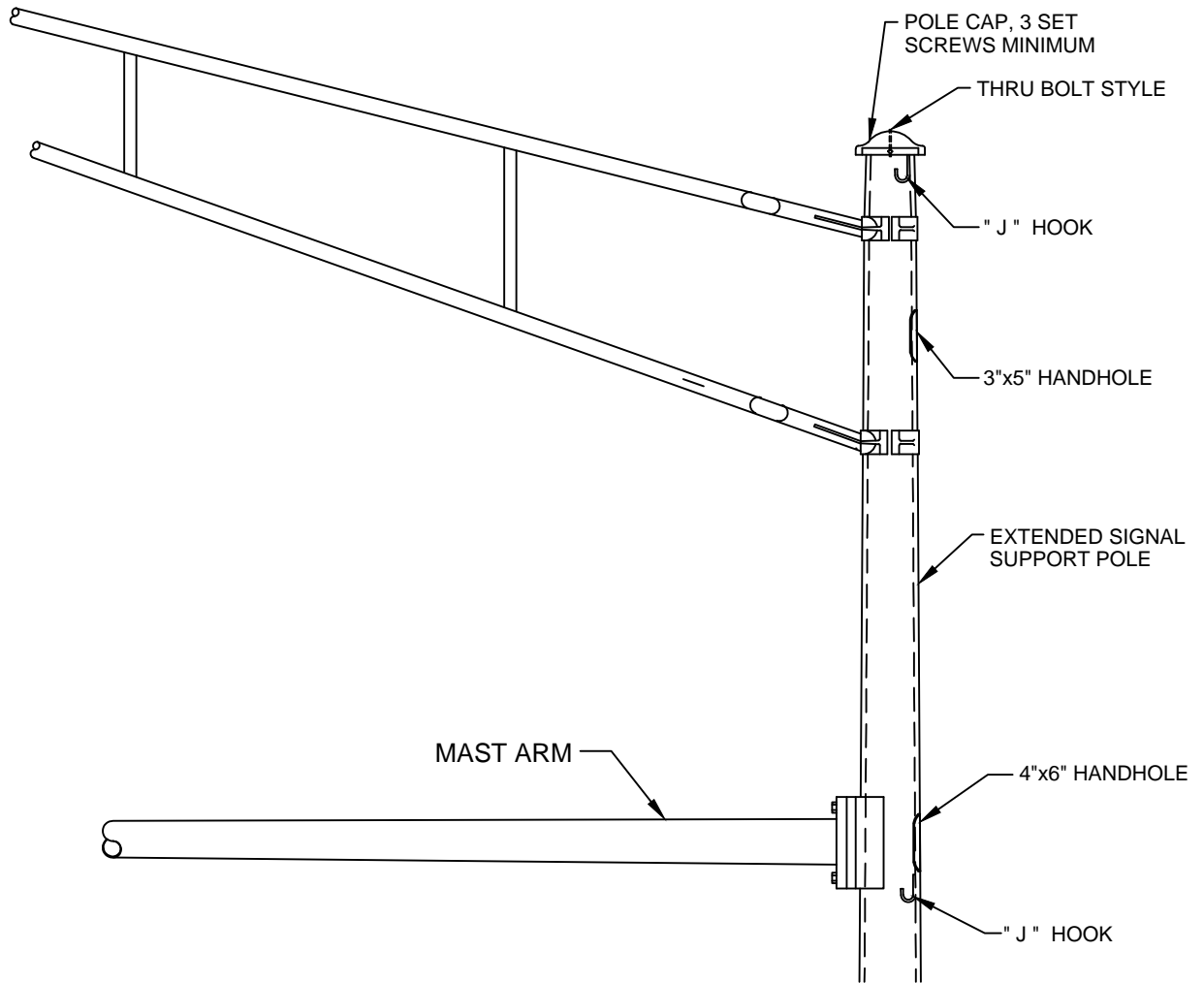
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POLE EXTENSION FOR BRACKET ARM

POLE EXTENSION

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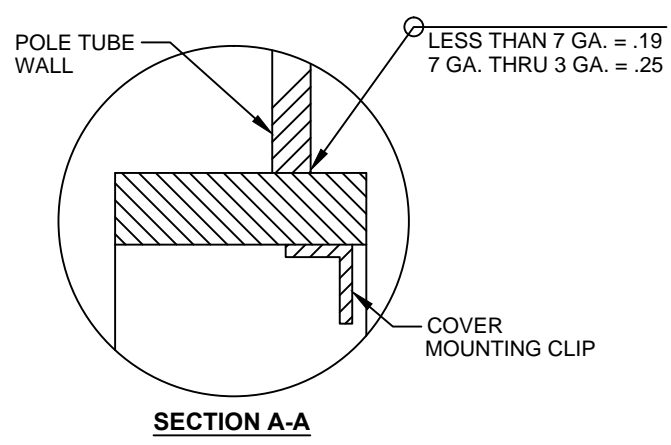
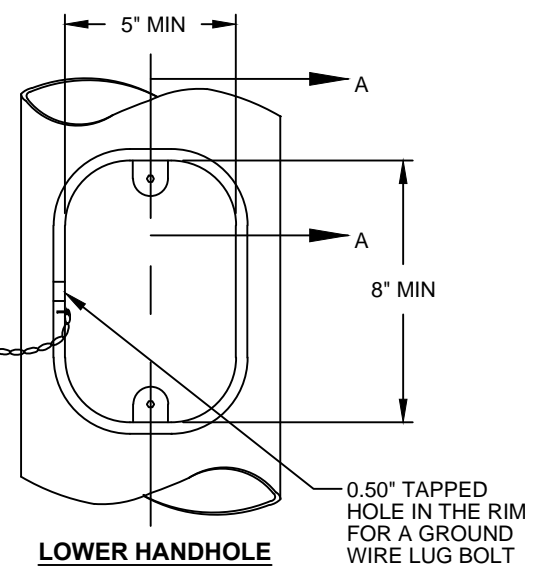
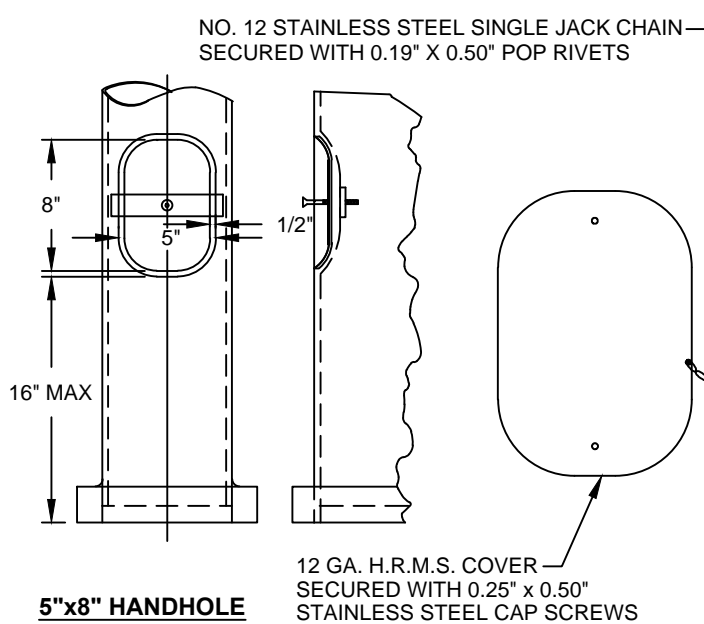
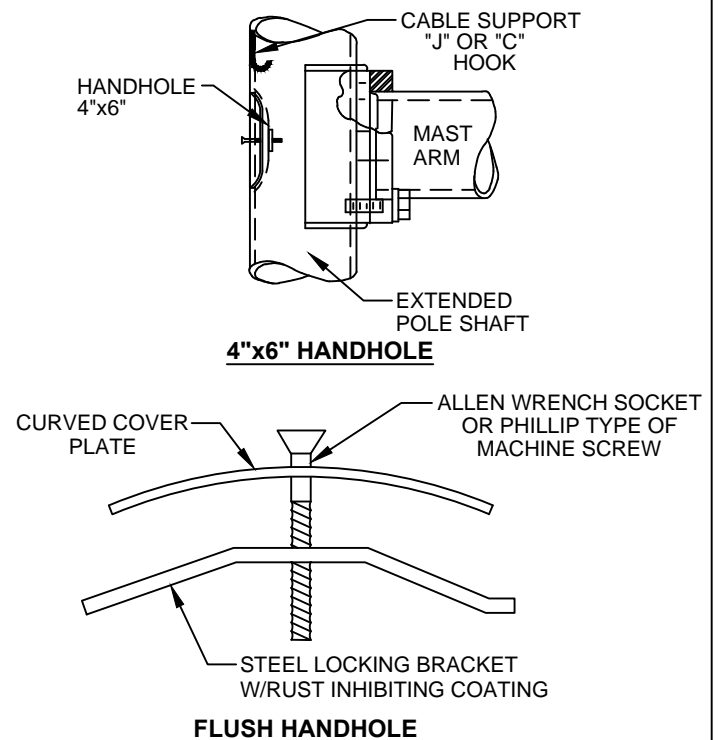
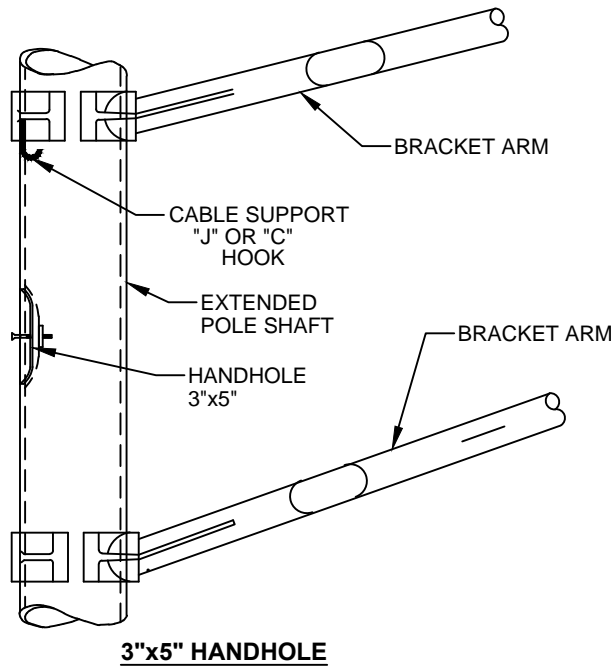
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HANDHOLE	
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NOTES:

1. ARM PLATE HOLE DIAMETER SHALL BE BOLT DIAMETER PLUS 1/8" POLE PLATE TAPPED HOLE SHALL HAVE THREADS WITH 75% (MIN.) FULL PROFILE HEIGHT. THREADS MAY BE RETAPPED AFTER GALVANIZING. (SEE SHEET 5.)
2. FOR SIGN MOUNTING DETAILS, SEE CITY OF COLUMBUS STANDARD CONSTRUCTION DRAWING 4251 AND 4252.
3. FOR FOUNDATION DETAILS, SEE CITY OF COLUMBUS STANDARD CONSTRUCTION DRAWING 4160.
4. THE ARM ATTACHMENT PLATE SHALL BE WELDED USING A FULL PENETRATION WELD. THE POLE ATTACHMENT TO THE BASE PLATE SHALL BE WELDED USING A FULL PENETRATION WELD. (SEE SHEET 3 AND 5.)
5. FOR SIGNAL ATTACHMENT DETAILS, SEE CITY OF COLUMBUS STANDARD CONSTRUCTION DRAWING 4201.
6. FOR BRACKET ARM DETAILS, SEE CITY OF COLUMBUS STANDARD CONSTRUCTION DRAWINGS 4110.
7. A MINIMUM OF ONE BOLT THREAD SHALL REMAIN ABOVE THE ANCHOR NUT. (SEE SHEET 3.)
8. ALL UNUSED COUPLINGS SHALL BE PROVIDED WITH A REMOVABLE GALVANIZED CAST IRON PLUG.
9. FOR POLE AND BASE PLATE DIMENSIONS, SEE TABLES 1A AND 1B. (SEE SHEET 2.)
10. WHEN FREE SWINGING VEHICULAR SIGNAL HEADS ARE PERMITTED, THE WIRE ENTRANCE PART OF THE SIGNAL HEAD MAY BE ORIENTED IN ANY DIRECTION TO KEEP THE CABLE DRIP LOOP FROM RUBBING ON THE SIGNAL HEAD. THE SIGNAL HEAD SHALL HANG LEVEL AND PLUMB. (SEE CITY OF COLUMBUS STANDARD CONSTRUCTION DRAWING 4201.)
11. FOR DETAILS AND LOCATION OF HAND HOLES, SEE FLUSH HAND HOLE AND OPTIONAL HAND HOLE DETAILS. (SEE SHEET 8.)
12. THE DESIGN LOADS WERE CALCULATED AS THE EQUIVALENT AMOUNT OF SIGNAL AREA THAT COULD BE CARRIED AT THE END OF THE ARM.
13. THE DESIGN LOADS WERE DEVELOPED WITHOUT APPLYING GALLOPING FATIGUE LOADS. ALSO, THE STRESS REQUIREMENTS OF NOTE B, TABLE 11-2 IN THE AASHTO CODE WERE NOT APPLIED.
14. THESE STRUCTURES SHOULD BE INSPECTED FOR EXCESSIVE WIND INDUCED DEFLECTION IN THE VERTICAL DIRECTION. IF FOUND, A DAMPING DEVICE SHOULD BE PLACED ON THE ARM.
15. MAST ARM CONNECTION BOLTS SHALL BE ASTM A325 FOR DIAMETERS 1.50" AND SMALLER. BOLTS LARGER THAN DIAMETER 1.50" SHALL BE ASTM A449. DESIGNS 4 THROUGH 12 SHALL USE ASTM F436 FLAT WASHERS. DESIGN 13 AND C16 SHALL USE ASTM F959 DTI WASHERS. DESIGN 14 AND C15 SHALL USE ASTM F2437 TYPE 2 GRADE 5 DTI WASHERS. IF NECESSARY, I.D. OF DTI WASHERS SHALL BE GROUND OR REAMED TO FIT PROPERLY OVER ATTACHMENT BOLTS. PROVIDE PROPER DTI FEELER GAUGE TO ENGINEER. AN F436 WASHER SHALL BE USED DIRECTLY UNDER THE HEAD OF THE BOLT WITH ALL DTI WASHERS. ASSURE THAT THE FLAT WASHER DOES NOT SPIN DURING BOLT TIGHTENING WITH DTI WASHER. (SEE SHEET 5 AND 6).
16. AN APPROVED DAMPING DEVICE SHALL BE INSTALLED AS CLOSE AS POSSIBLE TO THE END OF THE ARM. INSTALL IF DIRECTED BY THE PLANS OR THE ENGINEER. FLAT PLATE DAMPERS SHALL ONLY BE USED FOR NEW CONSTRUCTION IF DIRECTED BY THE PLANS OR THE ENGINEER. (SEE SHEET 1.) (SEE STD DWG 4122 FOR VIBRATION MITIGATION DEVICE.)
17. RING-STIFFENED WRAP-AROUND HORIZONTAL PLATES ARE PERMITTED AS AN ALTERNATIVE TO THE HORIZONTAL PLATES SHOWN. (SEE SHEET 5.)
18. PRODUCT SHOP DRAWINGS FOR ALL ITEMS SHALL BE SUBMITTED FOR APPROVAL TO THE CITY OF COLUMBUS.
19. THE STRUCTURAL INTEGRITY OF ALL PRODUCTS SHALL TAKE PRECEDENCE OVER STATED DESIGN DIMENSIONS IF THESE DIMENSIONS IN THE OPINION OF THE MANUFACTURER NEED TO BE INCREASED FOR THAT MANUFACTURER'S PRODUCT TO MEET THE REQUIRED DESIGN LOADING REQUIREMENTS. THE MANUFACTURER SHALL SUBMIT DESIGN CHANGES TO THE CITY OF COLUMBUS FOR REVIEW AND APPROVAL. THE STATED DIMENSIONS ARE SHOWN TO ALLOW FLEXIBILITY IN FUTURE PART REPLACEMENTS AND TO CREATE A STANDARD FOR THE INTERCHANGEABILITY OF PARTS WITHIN THE CITY OF COLUMBUS.
20. ALL PRE-DRILLED HOLES FOR ALL BID ITEMS SHALL BE DEBURRED AND FREE OF ALL SHARP EDGES. ALL OUTSIDE WELDS ON MAST ARM STRUCTURES AND TRAFFIC PEDESTAL STRUCTURES SHALL BE ROLLED OR GROUND SMOOTH. ALL INSIDE WELDS ON MAST ARM STRUCTURES AND TRAFFIC PEDESTAL STRUCTURES SHALL BE VOID OF SHARP EDGES.
21. NO FOUNDATION BOLT PATTERN CHANGE SHALL BE ALLOWED FOR THE POLE SHAFT BASE PLATE. THE POLE BASE PLATE MUST FIT THE GIVEN FOUNDATION BOLT PATTERN AS SHOWN ON CITY OF COLUMBUS STANDARD CONSTRUCTION DRAWING 4160.

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22. SIGNAL SUPPORTS SHALL BE HOT DIPPED GALVANIZED AND COATED IN ACCORDANCE WITH THE PLANS.
23. SUPPORTS SHALL HAVE 1, 2, OR 3 HAND HOLES, AS PER PLAN DESIGN, EACH COMPLETE WITH A COVER, A RECTANGULAR OR ELLIPTICAL REINFORCED FRAME, AND A STAINLESS STEEL FASTENER FOR THE COVER. THE FASTENER SHALL BE FLUSH WITH THE HAND HOLE SURFACE. THE HAND HOLES SHALL BE LOCATED 180 DEGREES FROM THE MAST ARM UNLESS SPECIFIED OTHERWISE. (SEE SHEET 8.)
 - A.) THE HAND HOLE NEAR THE BRACKET ARM SHALL HAVE A MINIMUM INSIDE OPENING OF 3" X 5" AND BE SIMILAR IN DESIGN TO THE BOTTOM HAND HOLE EXCEPT THAT NO GROUNDING PROVISION IS REQUIRED.
 - B.) THE HAND HOLE NEAR THE ARM ATTACHMENT SHALL HAVE A MINIMUM INSIDE OPENING OF 4" X 6" AND BE SIMILAR IN DESIGN TO THE BOTTOM HAND HOLE EXCEPT THAT NO GROUNDING PROVISION IS REQUIRED.
 - C.) THE BOTTOM HAND HOLE SHALL HAVE A MINIMUM INSIDE OPENING OF 5" X 8". A GROUNDING PROVISION CAPABLE OF ACCEPTING 4 - #4 AWG COPPER GROUNDING WIRES SHALL BE PROVIDED AND SHALL BE ATTACHED TO THE FRAME.
24. SUPPORT SHALL HAVE A REMOVABLE POLE CAP ATTACHED EITHER BY A MINIMUM OF 3 STAINLESS STEEL SET SCREWS OR BY A STAINLESS STEEL THROUGH BOLT. (SEE SHEET 7.)
25. SUPPORTS SHALL HAVE A STEEL POLE BASE PLATE/ANCHOR BOLT-NUT COVER (1/4" THICK SQUARE PLATE, TWO PIECE CONSTRUCTION, GALVANIZED TO ASTM A123 THEN COATED) THAT SKIRTS THE BOLTS, NUTS AND BASE PLATE. ALL SCREW HOLES SHALL BE PRE-DRILLED AND STAINLESS STEEL FASTENERS SHALL BE USED. (SEE SHEET 4.)
26. SUPPORTS SHALL HAVE 1, 2, OR 3 WELDED CABLE SUPPORT HOOKS ('J' OR 'C' HOOKS) LOCATED ON THE INSIDE OF THE POLE AND 90 DEGREES FROM THE MAST ARM. (SEE SHEET 7.)
27. THE ARM SHALL MAINTAIN A CIRCULAR CROSS-SECTION (CONSTANT CROSS-SECTIONAL RADIUS).
28. THE ARM SHALL HAVE A REMOVABLE END-OF-ARM CAP ATTACHED BY A MINIMUM OF 3 STAINLESS STEEL SET SCREWS. THIS WILL BE THE ONLY ATTACHMENT METHOD ACCEPTABLE. THE INSIDE DIAMETER OF THE END-OF-ARM CAP SHALL BE EQUAL TO THE END-OF-ARM OUTSIDE DIAMETER PLUS TWO TIMES THE ARM TAPER.
29. THE ARM SHALL NOT HAVE PRE-DRILLED HOLES FOR SIGNAL HEAD CABLE ENTRY. THE CONTRACTOR SHALL FIELD DRILL THESE HOLES.
30. THE SUPPORTS SHALL BE DESIGNED USING THE 2009 EDITION OF THE AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS. THE FOLLOWING CRITERIA SHALL BE USED FOR THE DESIGN: BASIC WIND SPEED - 90 MPH, DESIGN LIFE - 25 YEARS, FATIGUE CATEGORY III. ADDITIONALLY, THE SUPPORT DESIGNS SHALL NOT INCLUDE GALLOPING OR TRUCK INDUCED GUST LOADING.

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