MECHANICAL DAMPENING DEVICE (SEE NOTE 16)

SIGNAL HEAD WITH BACKPLATE

1/2" MIN. STAINLESS OR GALV. STEEL HEX HEAD THROUGH BOLT WITH LOCK NUT, SNAP.

1 3/8" DIA. HOLE IN MASTARM, WITH 1 in GROMMET OR BUSHING (TYPICAL) APPLICABLE TO ALL SIGNAL HEADS

RISE: 3" MIN., 12 in MAX., AFTER ERECTION OF SIGNALS (DESIGNS 4-12); RISE: 3" MIN., 30" MAX. AFTER ERECTION OF SIGNALS (DESIGN 13, 14, C15 & C16)

POLE SHALL BE VERTICAL WITH MAX. OFFSET OF S/3 ALONG CENTERLINE

POLE LENGTH

VARIES (OVERLAP WHEN REQUIRED)

(SEE NOTE 5)

HANDBOLES (4"x6")

19' MAX., 17' PREFERRED 16.5' MIN.

HANDBOLES (5"x8")

MECHANICAL DAMPENING DEVICE (SEE NOTE 16)

BRACKET ARM WHEN REQUIRED (SEE NOTE 6)

1 3/8" DIA. HOLE IN MASTARM, WITH 1 in GROMMET OR BUSHING (TYPICAL) APPLICABLE TO ALL SIGNAL HEADS

RISE: 3" MIN., 30" MAX. AFTER ERECTION OF SIGNALS (DESIGN 13, 14, C15 & C16)

STANDARD CITY OF COLUMBUS MAST ARM

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

STD DWG

4120

CITY ENGINEER

10/01/2018

SHT 1 OF 10
### TABLE 1 - PART A - POLE DIMENSIONS

<table>
<thead>
<tr>
<th>DESIGN NO.</th>
<th>MAXIMUM DESIGN AREA SQ FT (NOTE A)</th>
<th>DESIGN DISTANCE FROM C FT</th>
<th>POLE TYPE</th>
<th>WALL THICK</th>
<th>BASE DIAMETER</th>
<th>MAX LENGTH</th>
<th>ARM TYPE</th>
<th>WALL THICK</th>
<th>SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>42</td>
<td>37.5</td>
<td>ROUND</td>
<td>.239</td>
<td>13</td>
<td>38'</td>
<td>ROUND</td>
<td>.239</td>
<td>10.32X5.00'</td>
</tr>
<tr>
<td>12</td>
<td>42</td>
<td>47.5</td>
<td>ROUND</td>
<td>.299</td>
<td>14</td>
<td>48'</td>
<td>ROUND</td>
<td>.299</td>
<td>11x8.62x17' +</td>
</tr>
<tr>
<td>13</td>
<td>40</td>
<td>59.5</td>
<td>ROUND</td>
<td>.299</td>
<td>16</td>
<td>60'</td>
<td>ROUND</td>
<td>.299</td>
<td>13x8.80x30' +</td>
</tr>
<tr>
<td>14</td>
<td>38</td>
<td>69.5</td>
<td>ROUND</td>
<td>.299</td>
<td>17</td>
<td>70'</td>
<td>ROUND</td>
<td>.3125</td>
<td>14x9.1x35' +</td>
</tr>
<tr>
<td>14</td>
<td>38</td>
<td>69.5</td>
<td>ROUND</td>
<td>.299</td>
<td>17</td>
<td>70'</td>
<td>ROUND</td>
<td>.0.313</td>
<td>14x8.68x38' +</td>
</tr>
<tr>
<td>C15</td>
<td>50</td>
<td>78.5</td>
<td>ROUND</td>
<td>.313</td>
<td>18</td>
<td>79'</td>
<td>ROUND</td>
<td>.313</td>
<td>14.40x8.70x40.75' +</td>
</tr>
<tr>
<td>C16 DOUBLE ARM</td>
<td>49.5 / 49.5</td>
<td>50 / 50'</td>
<td>ROUND</td>
<td>.313</td>
<td>16</td>
<td>50'/50'</td>
<td>ROUND</td>
<td>.250</td>
<td>12.00x9.55x17.5' +</td>
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</table>

*All dimensions are in inches, unless otherwise noted.  *=single piece arm

### TABLE 1 - PART B - POLE DIMENSIONS

<table>
<thead>
<tr>
<th>DESIGN NO.</th>
<th>ARM ATTACHMENT</th>
<th>ANCHOR BASE</th>
<th>PLATE SKIRT</th>
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<tr>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>4</td>
<td>16.50</td>
<td>14.50</td>
<td>12.50</td>
</tr>
<tr>
<td>12</td>
<td>16.50</td>
<td>14.50</td>
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<tr>
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<td>19.50</td>
<td>16.50</td>
<td>15</td>
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<tr>
<td>14</td>
<td>19.50</td>
<td>16.50</td>
<td>15</td>
</tr>
<tr>
<td>C15</td>
<td>24</td>
<td>19</td>
<td>18</td>
</tr>
<tr>
<td>C16 DOUBLE ARM</td>
<td>19</td>
<td>15</td>
<td>14</td>
</tr>
</tbody>
</table>

*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.
BASE PLATE

ANCHOR BOLTS WITH STANDARD STEEL HEX NUTS, PLAIN WASHERS (SEE NOTE 7)

1/4" MIN.
ONE BOLT DIAMETER = MAX.

POLE BASE DETAILS

DESIGN 4, 12, 13, & 14

BASE CONNECTION

CITY OF COLUMBUS MAST ARM

STANDARD

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

STD DWG
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10/01/2018

SHT 3 OF 10
FOUNDATION

POLE

1/4" STEEL PLATE

1"

POLE PLATE SKIRT

SECTION A-A

TOP VIEW

COVER GUIDE AND SECTION ATTACHMENT

CORNER RADIUS TO MATCH POLE BASE PLATE RADIUS

RADIUS

ID = POLE OD + 1/4"

PRE-DRILLED THREADED HOLE W/ S.S. BOLT

POLE PLATE WIDTH +1/4"

SECTION A-A POLE PLATE SKIRT

STEEL BASE COVER

STANDARD
CITY OF COLUMBUS
MAST ARM

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

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CITY ENGINEER

SHT 4 OF 10
ARM ATTACHMENT (TYP.)
DESIGN 4, 12, 13 & 14

1/4

MAST ARM

BOLT DIA. G, WASHER (S) (SEE NOTE 15)

"J" HOOK

GUSSET PLATES (THICKNESS = P) [SEE NOTE 4]

OPENING FOR GALVANIZING

2 1/2" DIA. HOLE REMOVE SHARP EDGES

HANDHOLE (4"x6")

BOLT HOLE DIA., (SEE NOTE 1)

POLE P

SEE NOTE 15

2 1/2" DIA. WIRING HOLE IN POLE PLATE CENTERED OVER 3" DIA. HOLE IN POLE (DEBURR HOLE)

4"x6" HANDHOLE OPPOSITE MAST ARM

(P) THK GUSSETS TOP, BOTTOM, & SIDES

GALV. DRAIN OPENINGS

(4) HEX HD CONNECTION BOLTS (SIZE PER CHART) EACH WITH (1) FLAT WASHER (INCLUDED WITH ARM) (SEE NOTE 15)

ARM ATTACHMENTS

STANDARD
CITY OF COLUMBUS
MAST ARM

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

STD DWG 4120

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CITY ENGINEER

SHT 5 OF 10
2.5" DIA. WIRING HOLE IN POLE PLATE CENTERED OVER 3" DIA. HOLE IN POLE (DEBURR HOLE)

GALV. DRAIN OPENINGS

(8)- HEX HD CONNECTION BOLTS (SIZE PER CHART) EACH WITH (1) FLAT WASHER (INCLUDED WITH ARMS)

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

See weld detail on sheet 5

4"x6" HANDHOLE BETWEEN MAST ARMS

(P) THK GUSSETS TOP, BOTTOM & SIDES

(8)- HEX HD CONNECTION BOLTS (SIZE PER CHART) EACH WITH (1) FLAT WASHER (INCLUDED WITH ARMS)

ARM ATTACHMENT (TYP.)

DESIGN C16

ARM ATTACHMENTS/ DTI WASHER PLACEMENT

STANDARD
CITY OF COLUMBUS
MAST ARM

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

POLE PLATE

ARM PLATE

DTI WASHER

F436 FLAT WASHER

CONNECTION NUT
POLE EXTENSION FOR BRACKET ARM

POLE CAP, 3 SET SCREWS MINIMUM
THRU BOLT STYLE
"J" HOOK
3"x5" HANDHOLE
EXTENDED SIGNAL SUPPORT POLE
4"x6" HANDHOLE
"J" HOOK

POLE EXTENSION
STANDARD
CITY OF COLUMBUS
MAST ARM

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

STD DWG
4120
10/01/2018
SHT 7 OF 10
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. MECHANICAL DAMPENING DEVICES SHALL BE INSTALLED ON ALL ARMS 59' OR LONGER. 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.
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).


29. THE ARM SHALL NOT HAVE PRE-DRILLED HOLES FOR SIGNAL HEAD CABLE ENTRY. THE CONTRACTOR SHALL FIELD DRILL THESE HOLES.