
ORIGINATION FORM

Proposed Revisions to a Standard Plans Index (Please provide all information — Incomplete forms will be returned)

Contact Information:

Date: November 23, 2020

Originator: Joshua Turley

Phone: 414-5332

Email: Joshua.Turley@dot.state.fl.us

Standard Plans:

Index Number: 649-031

Sheet Number (s): 1, 2, 3, 4, and 6 of 6

Index Title: Mast Arm Assemblies

Summary of the changes:

Sheet 1: Note 4I added optional other materials.

Sheet 2: Added Note 4.

Sheet 3 & 4: Added bolt as option for splice connection.

Sheet 6: Clarified that a domed shape top cap is permissible.

Commentary / Background:

Changes are added because of repeated shop drawing comments that need to be approved everytime. Purpose is to prevent shop drawings from being rejected due to these changes, and to reduce the number of shop drawings related to the items clarified.

Other Affected Offices / Documents: (Provide name of person contacted)

Yes	No	
☐	☒	Other Standard Plans –
☐	☒	FDOT Design Manual –
☐	☒	Basis of Estimates Manual –
☐	☒	Standard Specifications –
☐	☒	Approved Product List –
☐	☒	Construction –
☐	☒	Maintenance –

Origination Package Includes:

(Email or hand deliver package to Rick Jenkins)

Yes	N/A	
☒	☐	Redline Mark-ups
☐	☒	Proposed Standard Plan Instruction (SPI)
☐	☒	Revised SPI
☐	☒	Other Support Documents

Implementation:

- ☒ Design Bulletin (Interim)
- ☐ DCE Memo
- ☐ Program Mgmt. Bulletin
- ☐ FY-Standard Plans (Next Release)

Contact the Roadway Design Office for assistance in completing this form

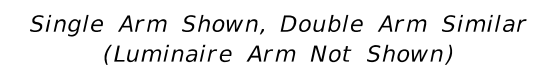
1. *Shop Drawings:* This Index is considered fully detailed, only submit shop drawings for minor modifications not detailed in the Plans.

4. Materials:
- A. Poles, Mast Arms and Backing Rings:
 - a. Less than $\frac{3}{16}$ ": ASTM A1011 Grade 50, 55, 60 or 65
 - b. Greater than or equal to $\frac{3}{16}$ ": ASTM A572 Grade 50, 55, 60 or 65
 - c. ASTM A595 Grade A (55 ksi yield) or Grade B (60 ksi yield)
 - B. Steel Plates: ASTM A36
 - C. Weld Metal: E70XX
 - D. Bolts, Nuts and Washers:
 - a. High Strength Hex Head Bolts: ASTM F3125, Grade A325, Type 1
 - b. Nuts: ASTM A563 DH Heavy-Hex
 - c. Washers: ASTM F436 Type 1, one under turned element
 - E. Anchor Bolts, Nuts and Washers:
 - a. Anchor Bolts: ASTM F1554 Grade 55
 - b. Nuts: ASTM A563 Grade A Heavy-Hex (5 per anchor bolt)
 - c. Plate Washers: ASTM A36 (2 per bolt)
 - F. Threaded Bars/Studs: ASTM A36 or ASTM A307
 - G. Handhole Frame: ASTM A709 or ASTM A36, Grade 36
 - H. Handhole Cover: ASTM A1011 Grade 50, 55, 60 or 65
 - I. Aluminum Pole Caps and Nut Covers: ASTM B26 (319-F), ASTM A1011
 - J. Stainless Steel Screws: AISI Type 316
 - K. Concrete: Class IV (Drilled Shaft) for all environmental classifications
 - L. Reinforcing Steel: Specification 415

- A. Welding:
 - a. Specification 460-6.4 and
 - b. AASHTO LRFD Specification for Structural Supports for Highway Signs, Luminaires, and Traffic Signals Section 14.4.4
- B. Poles and Mast Arms:
 - a. Round or 12-sided (Min.)
 - b. Taper pole diameter at 0.14 inches per foot
 - c. Upright poles must be a single section. For arms and upright poles, circumferential welds and laminated sections are not permitted.
 - d. Arms may be either one or two sections. See Sheet 4 for telescopic splice detail
 - e. Fabricate longitudinal seam welds with 60 percent minimum penetration or fusion welds except:
 - 1. Use a full-penetration groove weld within 6 inches of the circumferential tube-to-plate connection.
 - 2. Use full-penetration groove welds on the female end section of telescopic (i.e., slip type) field splices for a minimum length of one and one-half times the inside diameter of the female section plus 6 inches.
 - f. Locate longitudinal seams weld along the:
 - 1. Lower quadrant of the arms.
 - 2. Same side of the pole as the arm connections
 - g. Face handhole perpendicular from arm on single arm poles, perpendicular from the first arm of double arms poles facing away from traffic or see special instructions on the Mast Arm Tabulation Sheet.
 - h. Provide a 'J' or 'C' hook at the top of the pole for signal wiring support (See Sheet 6)
 - i. First and Second arm camber angle = 2°
 - j. Bolt holes diameters as follows:
 - 1. Bolts (except Anchor bolts): Bolt diameter plus $\frac{1}{16}$ " prior to galvanizing.
 - 2. Anchor Bolts: Bolt diameter plus $\frac{1}{2}$ " (Max.).

A. All Nuts, Bolts, Washers and Threaded Bars/Studs: ASTM F2329
B. All other steel items including plate washers ASTM A123

- A. Foundation: Specification 455 Drilled Shaft, except that payment is included in the cost of the Mast Arm.
- B. Install Pole vertically.
- C. Place structural grout pad with drain between top of foundation and bottom of baseplate in accordance with Specification 649-7.
- D. Attach Sign Panels and Signals centered on the elevation of the Mast Arm.
- E. Wire Access holes are 1½" or less in diameter.



ELEVATION AND NOTES

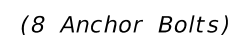
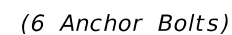
TABLE OF CONTENTS	
SHEET	SUBJECT
1	Elevation and Notes
2	Foundation and Base Plate Details
3	Single Arm Connection and Splice Details
4	Double Arm Connection and Splice Details
5	Luminaire Arm and Connection Details
6	Handhole and Pole Top Details



4. Detail 'A' Silicone Caulk may be applied after installation. Consult with Manufacturer



FOUNDATION



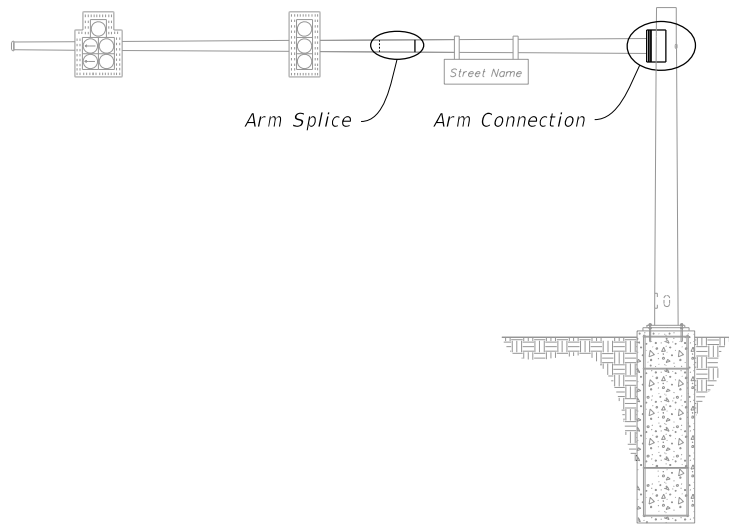
PLAN



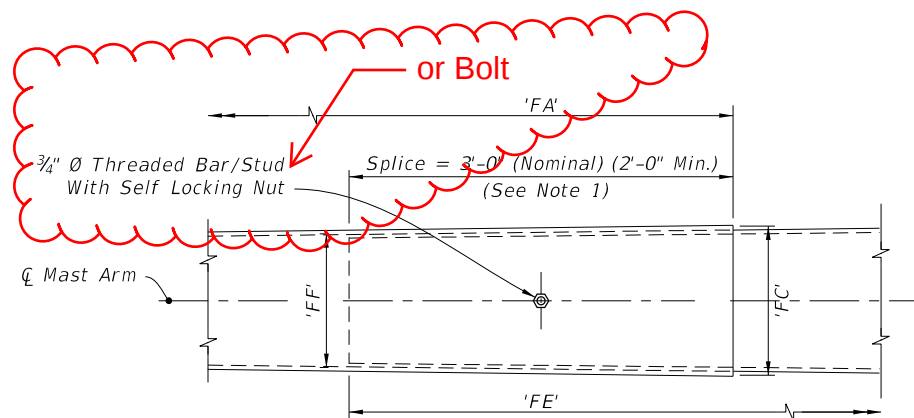
== BASE PLATE CONNECTION ==



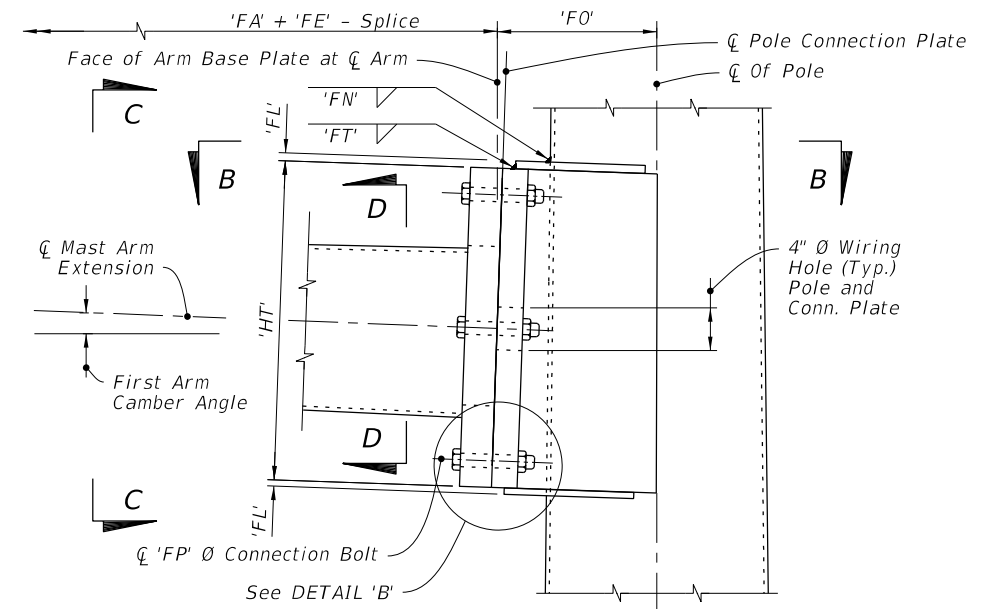
DETAIL 'A'



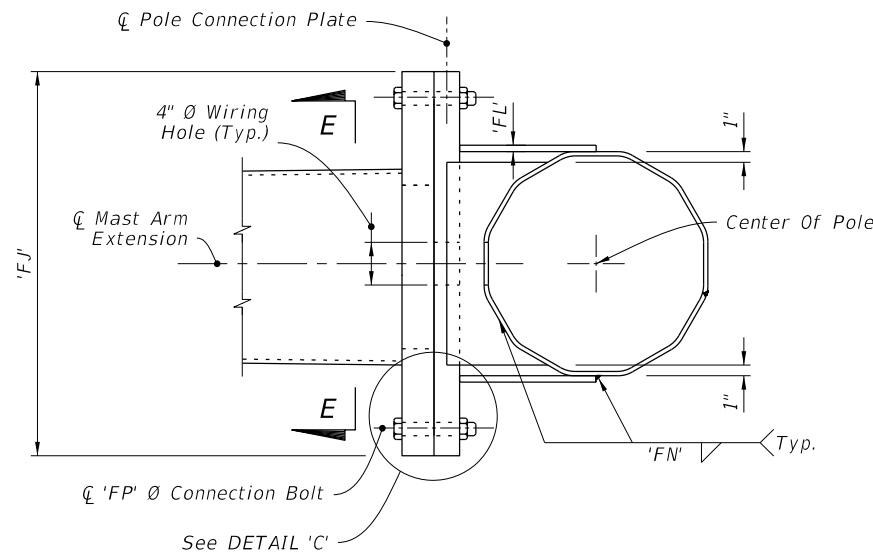
MAST ARM ASSEMBLY



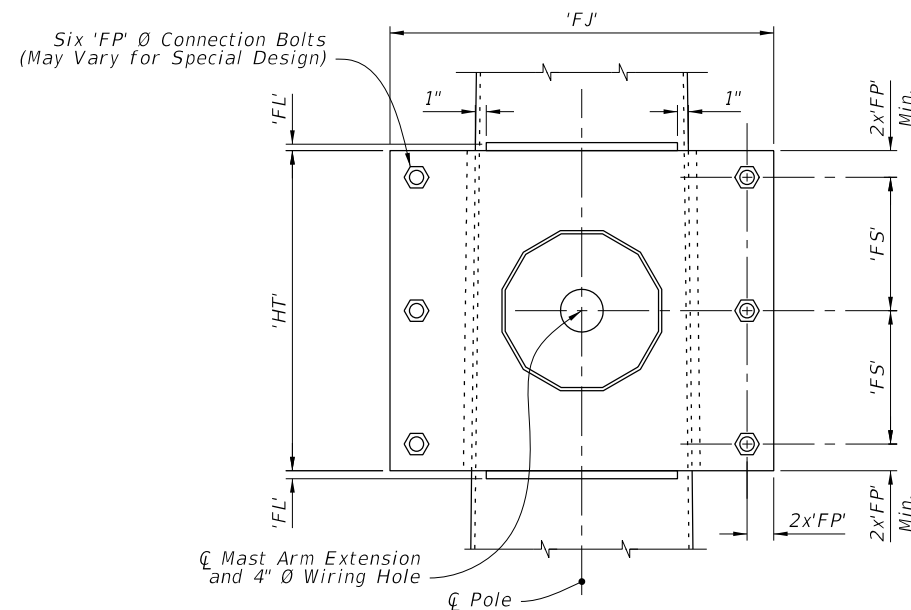
ARM SPLICE



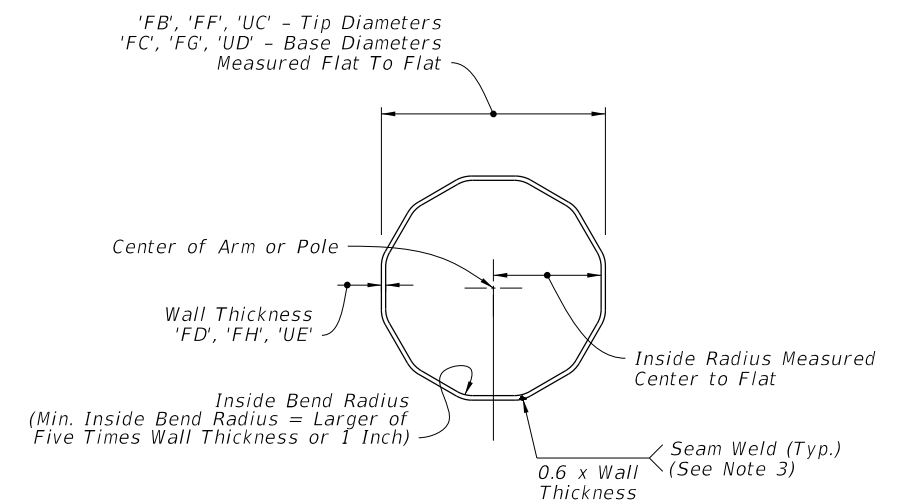
SINGLE ARM CONNECTION



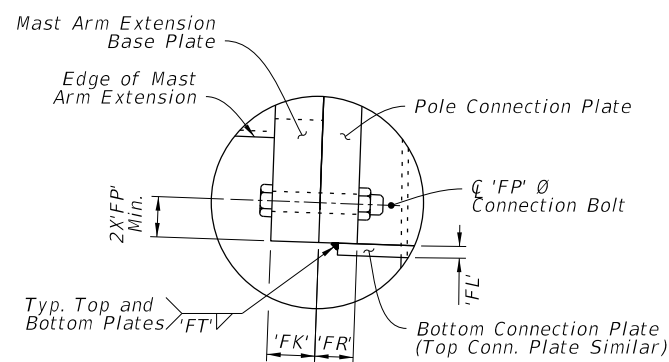
SECTION B-B



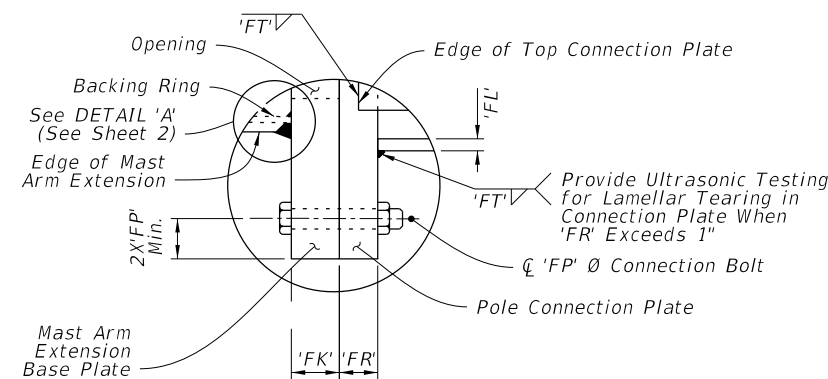
SECTION C-C



SECTION D-D



DETAIL 'B'



DETAIL 'C'

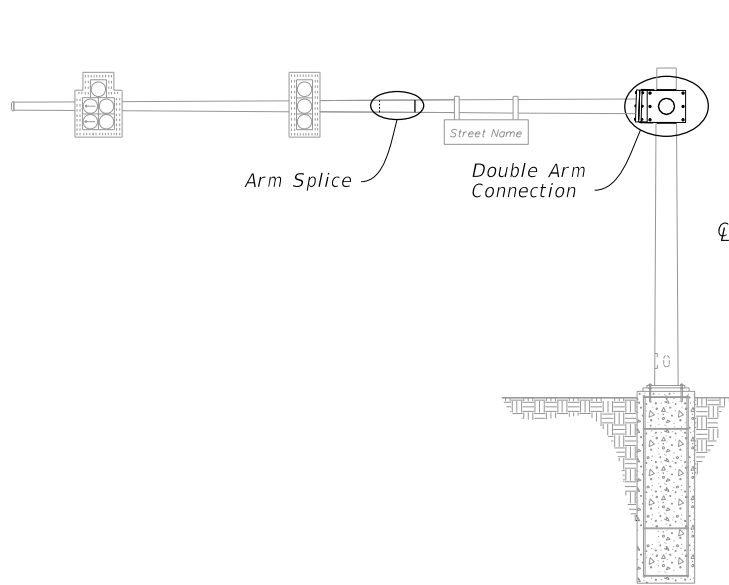
NOTE:

1. Install the 'Slip Joint' splice with a tight fit and no change in the Mast Arm taper due to the splice.
2. Details shown on this sheet are for 12 sided pole sections. However, sections with more than 12 sides and round sections are permitted provided outside diameter and wall thickness are not reduced.
3. Match mark the Arm and Connection Plates to ensure proper assembly and the seam weld is in the proper location (seam located at the bottom side of the Arm).

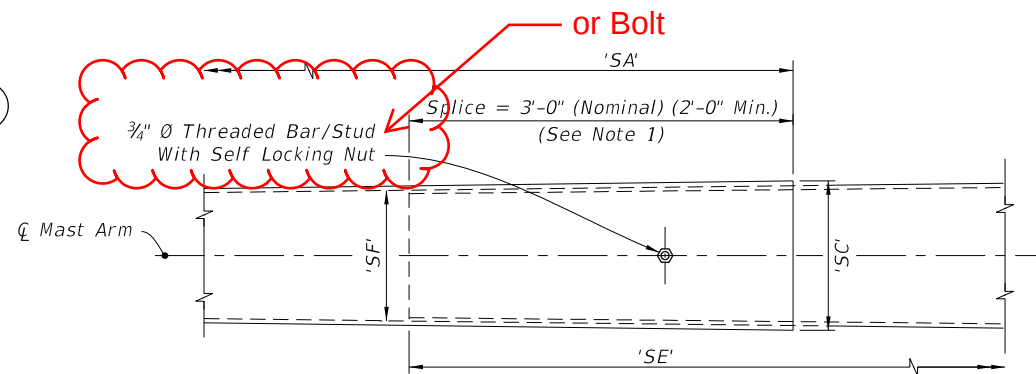
SINGLE ARM CONNECTIONS & SPLICE DETAILS

10/12/2020 8:22:17 AM

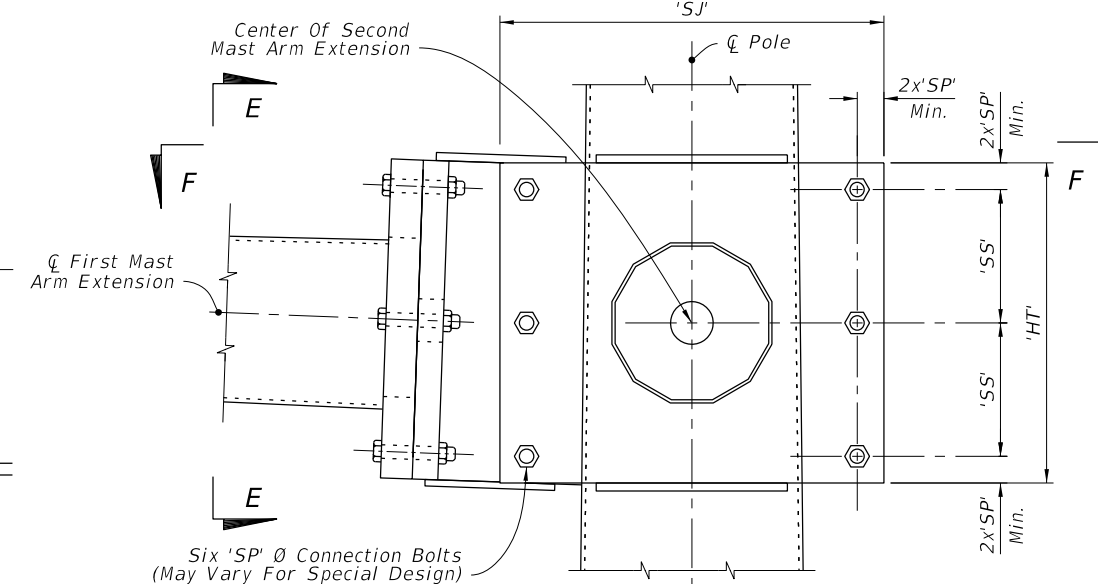
LAST REVISION	DESCRIPTION:	FY 2021-22 STANDARD PLANS	MAST ARM ASSEMBLIES	INDEX	SHEET
11/01/18	11/01/21	FDOT		649-031	3 of 6



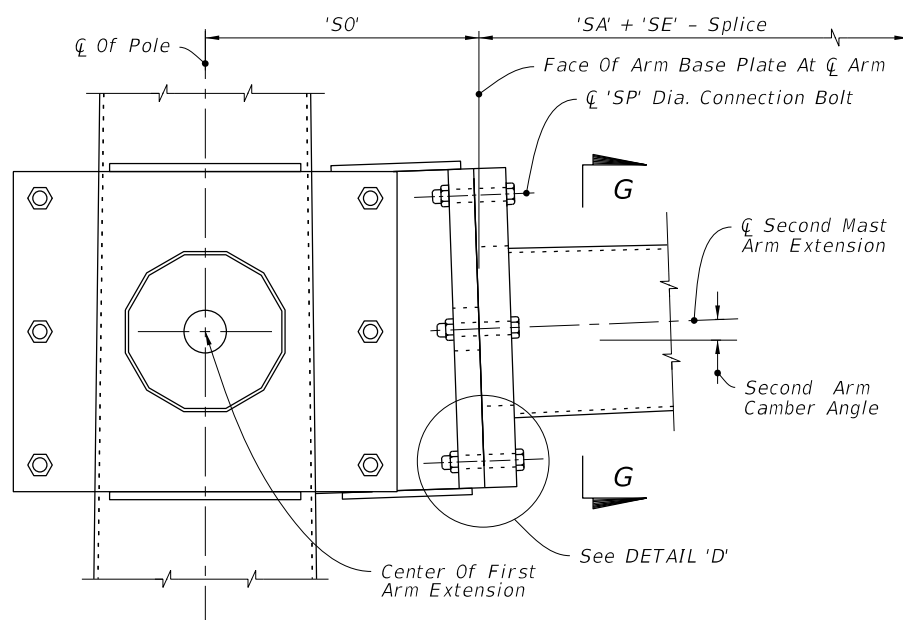
MAST ARM ASSEMBLY



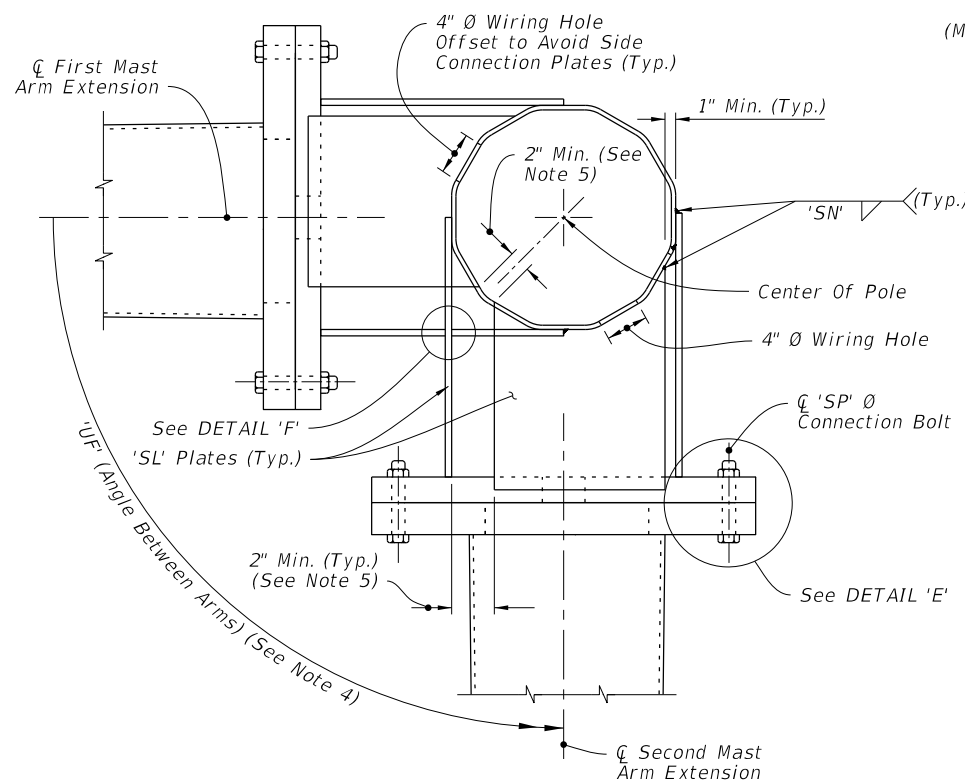
ARM SPLICE



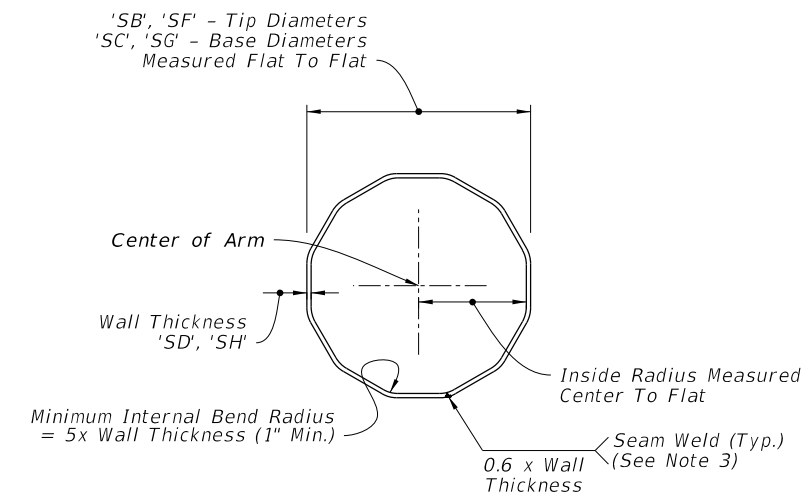
DOUBLE ARM CONNECTION



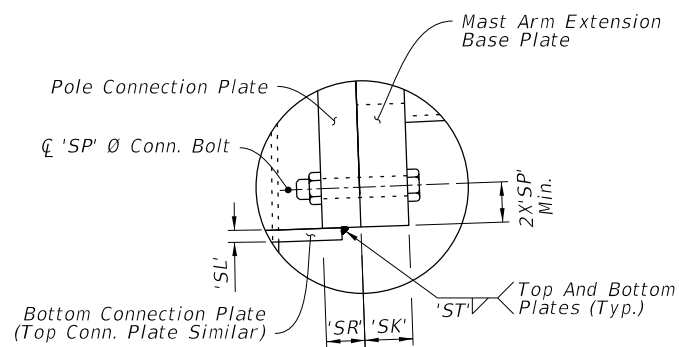
SECTION E-E



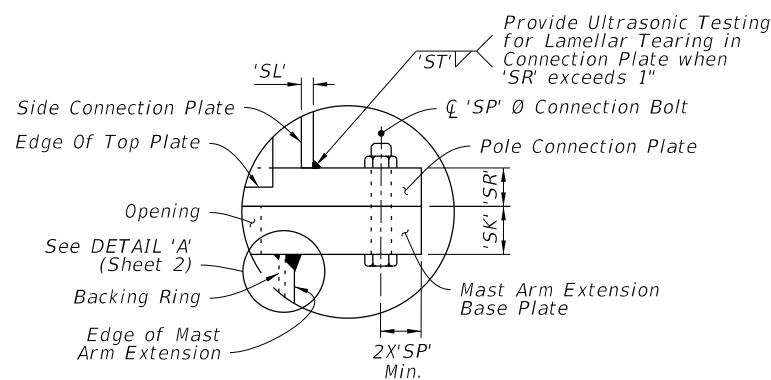
SECTION F-F



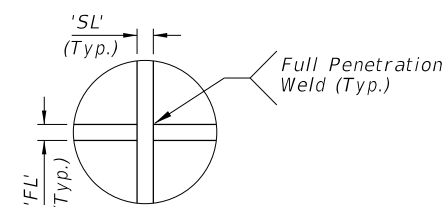
SECTION G-G



DETAIL 'D'



DETAIL 'E'



DETAIL 'F'

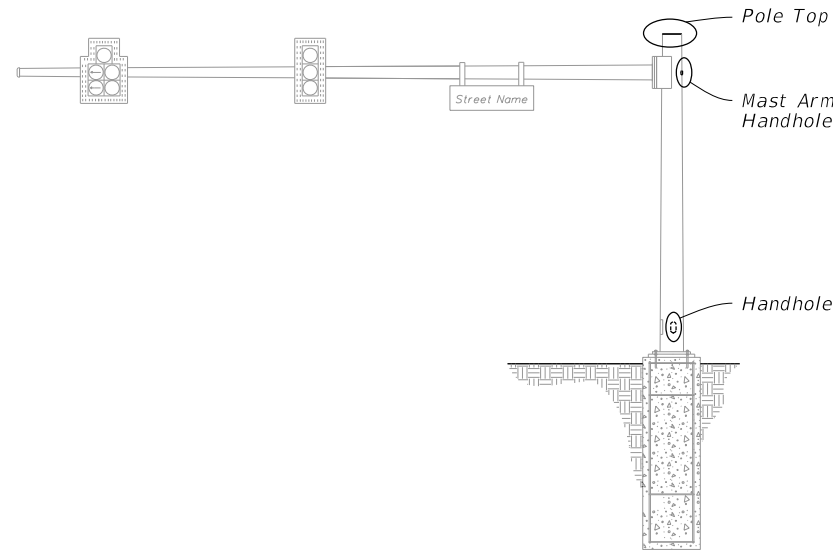
NOTE:

1. Install the 'Slip Joint' splice with a tight fit and no change in the Mast Arm taper due to the splice.
2. Details shown on this sheet are for 12 sided pole sections. However, sections with more than 12 sides and round sections are permitted provided outside diameter and wall thickness are not reduced.
3. Match mark the Arm and Connection Plates to ensure proper assembly and the seam weld is in the proper location (seam located at the bottom side of the Arm).
4. 'UF' measured counter clockwise from C First Mast Arm Extension.
5. Adjust width of top and bottom Connection Plates to maintain minimum clearance shown.

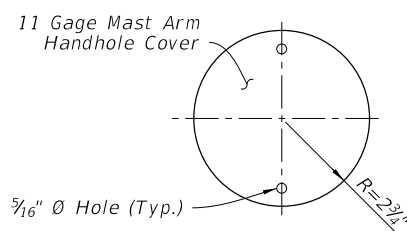
DOUBLE ARM CONNECTIONS & SPLICE DETAILS

10/12/2020 8:22:21 AM

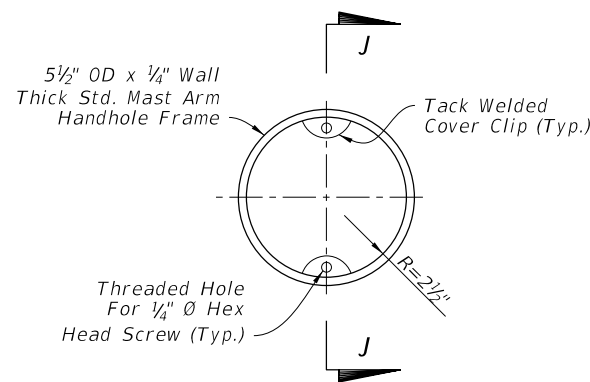
LAST REVISION	DESCRIPTION:	FY 2021-22 STANDARD PLANS	MAST ARM ASSEMBLIES	INDEX	SHEET
11/01/19	11/01/21	FDOT		649-031	4 of 6



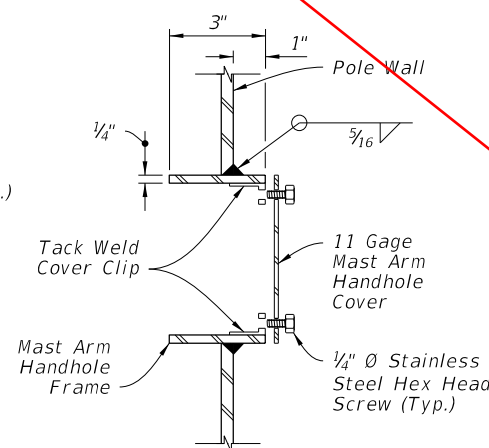
MAST ARM ASSEMBLY



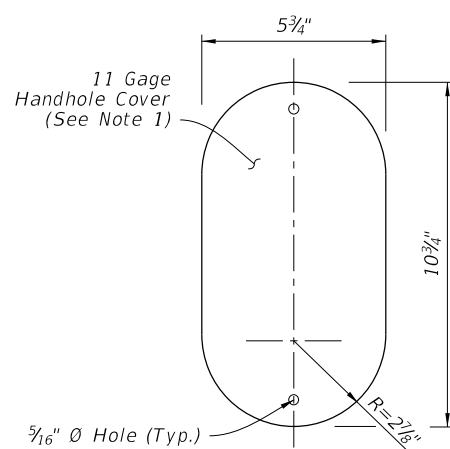
COVER



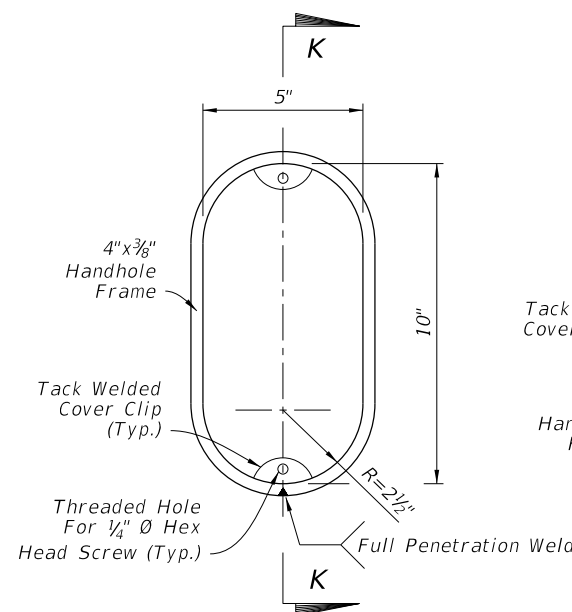
FRAME



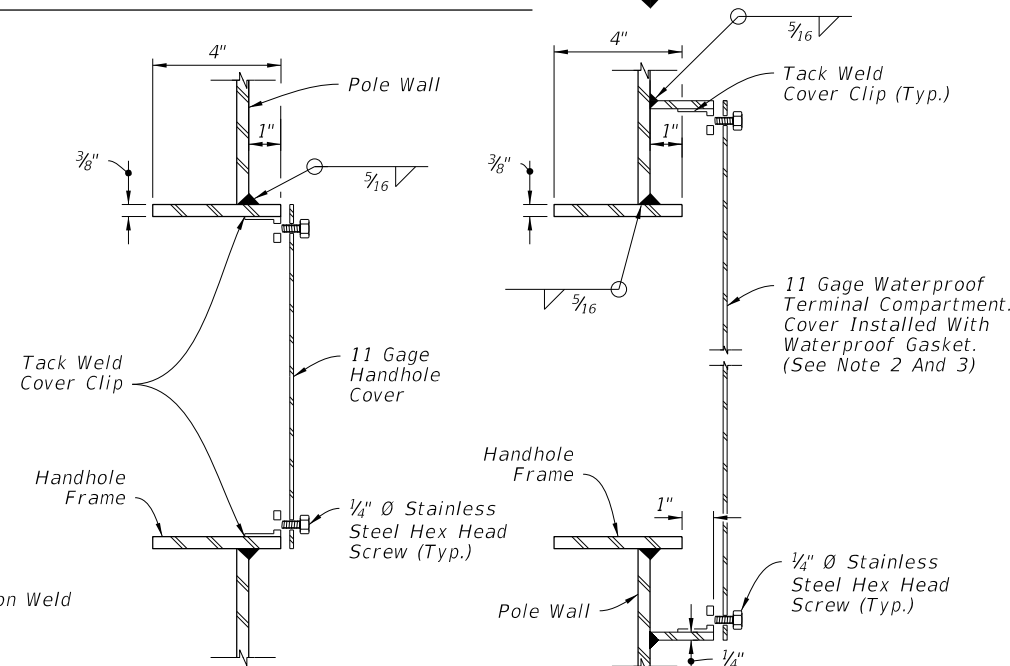
SECTION J-J



COVER



FRAME



SECTION K-K
(Thru Handhole)

SECTION K-K
(Terminal Compartment)

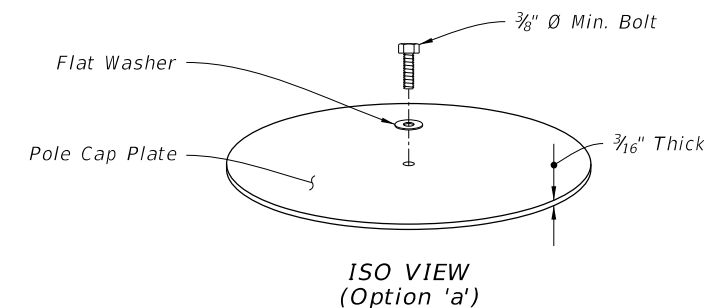
HANDHOLE

NOTES:

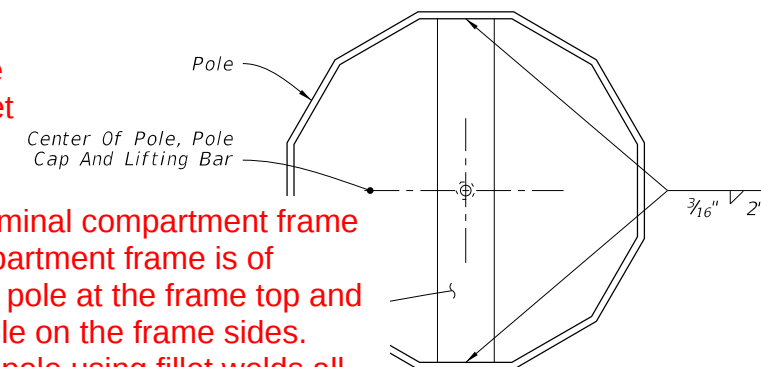
1. Handhole covers may be omitted when Terminal Compartment is provided.
2. See Mast Arm Tabulation sheet to see if Terminal Compartment is required and for locations.
3. Terminal Compartment Frame Height 2'-0" minimum to 2'-6" maximum. Align bottom of Terminal Compartment a minimum of 1" below the bottom of the Handhole Frame.
4. Any combination of Option 'a' or 'b' may be used, provided both lifting and wiring is accommodated.
- 5.

ADDED to Note 4:
Cap may be flat plate
or domed cap with set
screws.

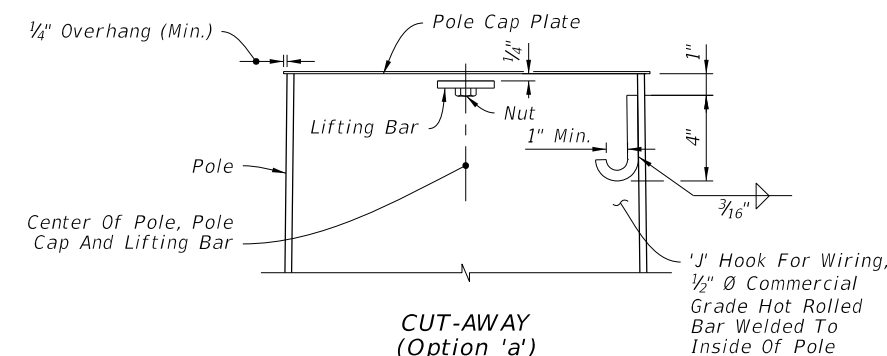
ADDED Note 5: An alternate terminal compartment frame
detail is allowed where the compartment frame is of
constant depth and cuts into the pole at the frame top and
bottom but lays flush with the pole on the frame sides.
The frame is then welded to the pole using fillet welds all
around the outside.



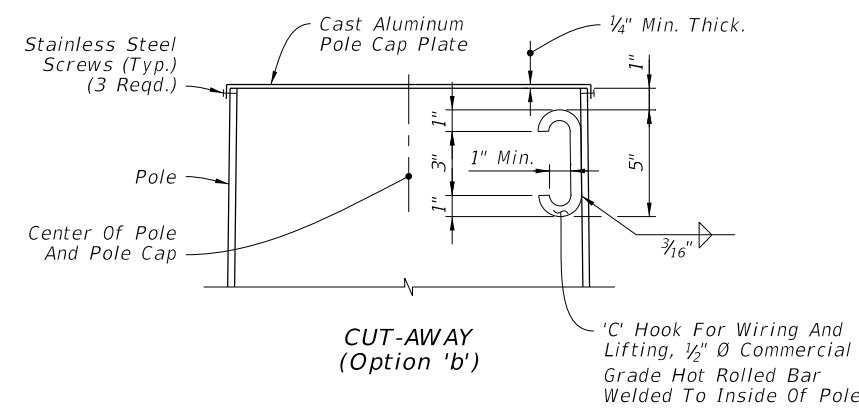
ISO VIEW
(Option 'a')



TOP VIEW
(Option 'a')



CUT-AWAY
(Option 'a')



CUT-AWAY
(Option 'b')

POLE TOP

HANDHOLE AND POLE TOP DETAILS

10/12/2020 8:22:28 AM

LAST REVISION	DESCRIPTION:	FY 2021-22 STANDARD PLANS	MAST ARM ASSEMBLIES	INDEX	SHEET
11/01/21	11/01/21			649-031	6 of 6

GENERAL NOTES:

1. Shop Drawings: This Index is considered fully detailed, only submit shop drawings for minor modifications not detailed in the Plans.
2. Prior to Fabrication: Verify the installed foundation elevation will result in the required signal elevation and adjust the Pole height as needed.
3. Details for Signal and Sign locations, Signal Head attachment, Sign attachment, Pedestrian Head attachment, and Foundation Conduit are not shown for simplicity.
4. Materials:

A. Poles, Mast Arms and Backing Rings:

a. Less than 3⁄16": ASTM A1011 Grade 50, 55, 60 or 65

b. Greater than or equal to 3⁄16": ASTM A572 Grade 50, 55, 60 or 65

c. ASTM A595 Grade A (55 ksi yield) or Grade B (60 ksi yield)

B. Steel Plates: ASTM A36

C. Weld Metal: E70XX

D. Bolts, Nuts and Washers:

a. High Strength Hex Head Bolts: ASTM F3125, Grade A325, Type 1

b. Nuts: ASTM A563 DH Heavy-Hex

c. Washers: ASTM F436 Type 1, one under turned element

E. Anchor Bolts, Nuts and Washers:

a. Anchor Bolts: ASTM F1554 Grade 55

b. Nuts: ASTM A563 Grade A Heavy-Hex (5 per anchor bolt)

c. Plate Washers: ASTM A36 (2 per bolt)

F. Threaded Bars/Studs: ASTM A36 or ASTM A307

G. Handhole Frame: ASTM A709 or ASTM A36, Grade 36

H. Handhole Cover: ASTM A1011 Grade 50, 55, 60 or 65

I. Pole Caps and Nut Covers: Fabricate from cast aluminum or galvanized carbon steel.

J. Stainless Steel Screws: AISI Type 316

K. Concrete: Class IV (Drilled Shaft) for all environmental classifications.

L. Reinforcing Steel: Specification 415

5. Fabrication:

A. Welding:

a. Specification 460-6.4 and

b. AASHTO LRFD Specification for Structural Supports for Highway Signs, Luminaires, and Traffic Signals Section 14.4.4

B. Poles and Mast Arms:

a. Round or 12-sided (Min.)

b. Taper pole diameter at 0.14 inches per foot

c. Upright poles must be a single section. For arms and upright poles, circumferential welds and laminated sections are not permitted.

d. Arms may be either one or two sections. See Sheet 4 for telescopic splice detail

e. Fabricate longitudinal seam welds with 60 percent minimum penetration or fusion welds except:

1. Use a full-penetration groove weld within 6 inches of the circumferential tube-to-plate connection.

2. Use full-penetration groove welds on the female end section of telescopic (i.e., slip type) field splices for a minimum length of one and one-half times the inside diameter of the female section plus 6 inches.

f. Locate longitudinal seams weld along the:

1. Lower quadrant of the arms.

2. Same side of the pole as the arm connections

g. Face handhole perpendicular from arm on single arm poles, perpendicular from the first arm of double arms poles facing away from traffic or see special instructions on the Mast Arm Tabulation Sheet.

h. Provide a 'J' or 'C' hook at the top of the pole for signal wiring support (See Sheet 6)

i. First and Second arm camber angle = 2°

j. Bolt holes diameters as follows:

1. Bolts (except Anchor bolts): Bolt diameter plus 1⁄16" prior to galvanizing.

2. Anchor Bolts: Bolt diameter plus 1⁄2" (Max.).

6. Coatings:

A. All Nuts, Bolts, Washers and Threaded Bars/Studs: ASTM F2329

B. All other steel items including plate washers ASTM A123

7. Construction:

A. Foundation: Specification 455 Drilled Shaft, except that payment is included in the cost of the Mast Arm.

B. Install Pole vertically.

C. Place structural grout pad with drain between top of foundation and bottom of baseplate in accordance with Specification 649-7.

D. Attach Sign Panels and Signals centered on the elevation of the Mast Arm.

E. Wire Access holes are 1 1⁄2" or less in diameter.

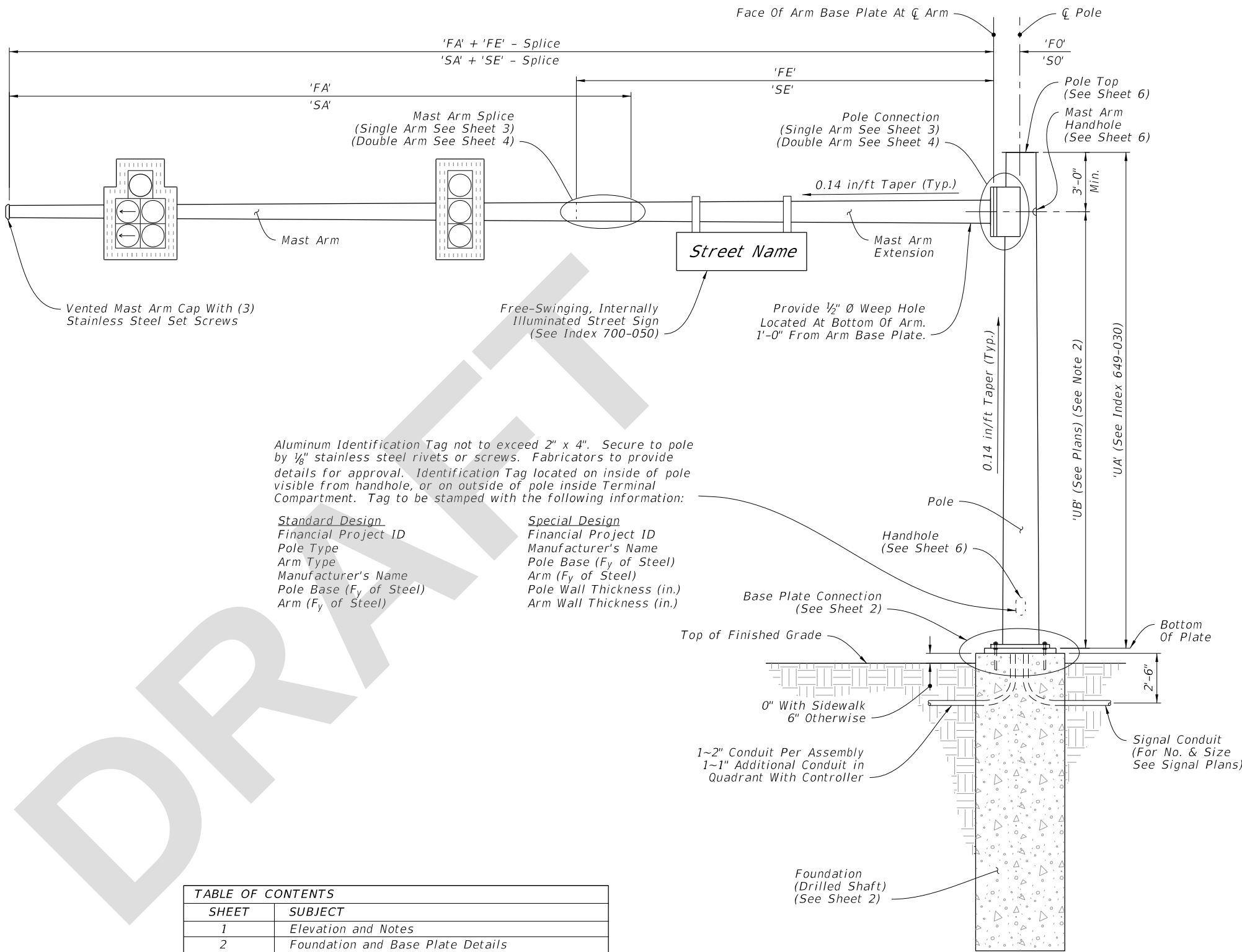


TABLE OF CONTENTS	
SHEET	SUBJECT
1	Elevation and Notes
2	Foundation and Base Plate Details
3	Single Arm Connection and Splice Details
4	Double Arm Connection and Splice Details
5	Luminaire Arm and Connection Details
6	Handhole and Pole Top Details

Single Arm Shown, Double Arm Similar
(Luminaire Arm Not Shown)

MAST ARM ASSEMBLY

DRAFT - 5
ELEVATION AND NOTES

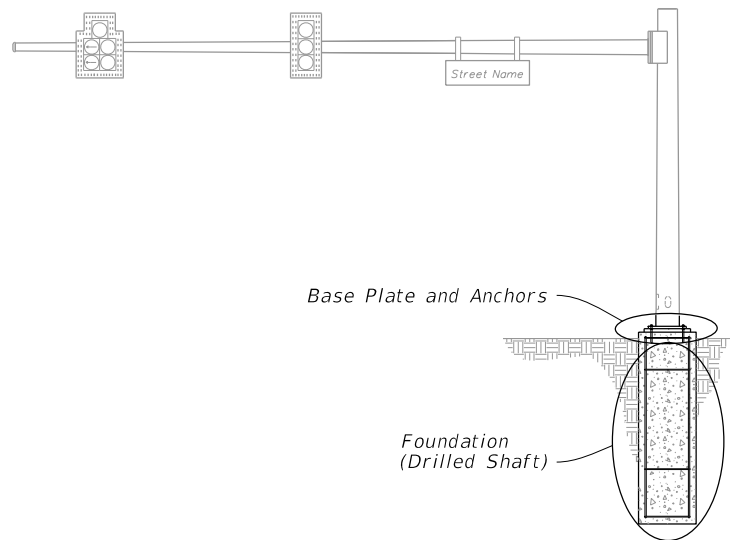


FY 2022-23
STANDARD PLANS

MAST ARM ASSEMBLIES

INDEX
649-031

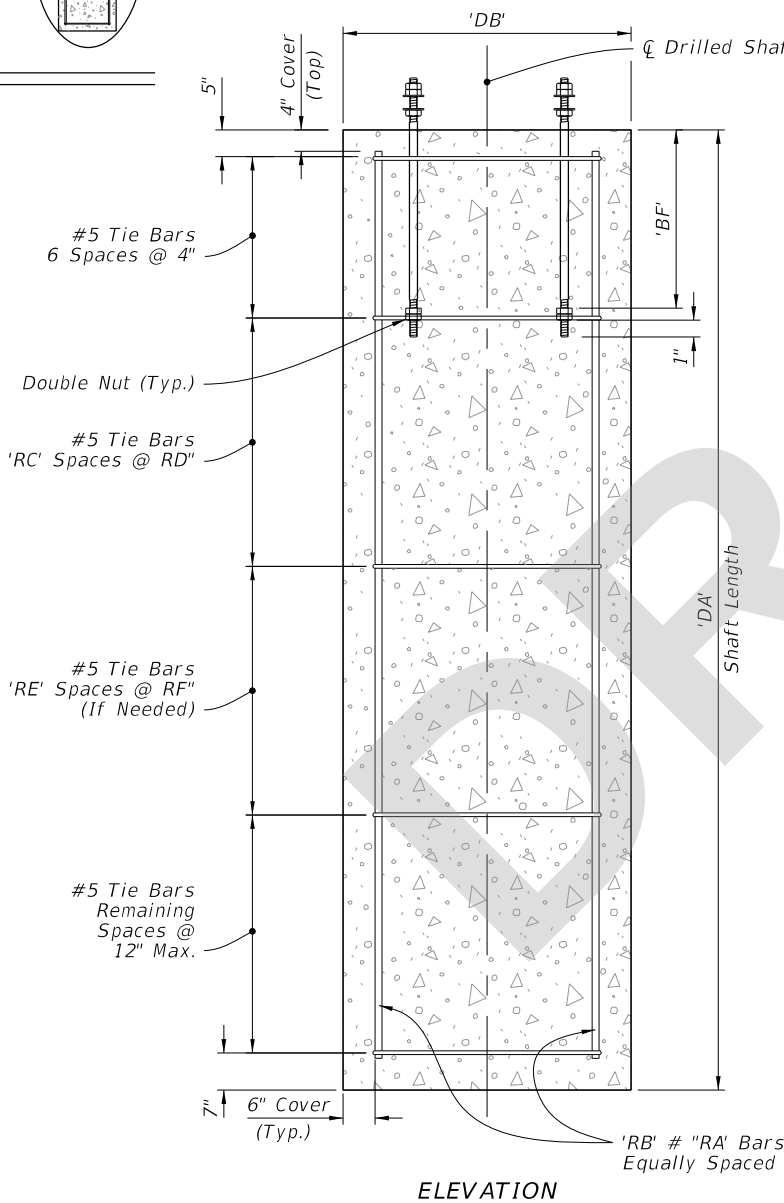
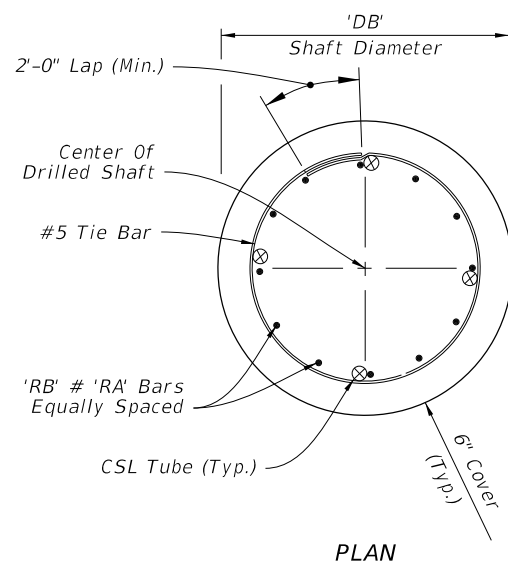
SHEET
1 of 6



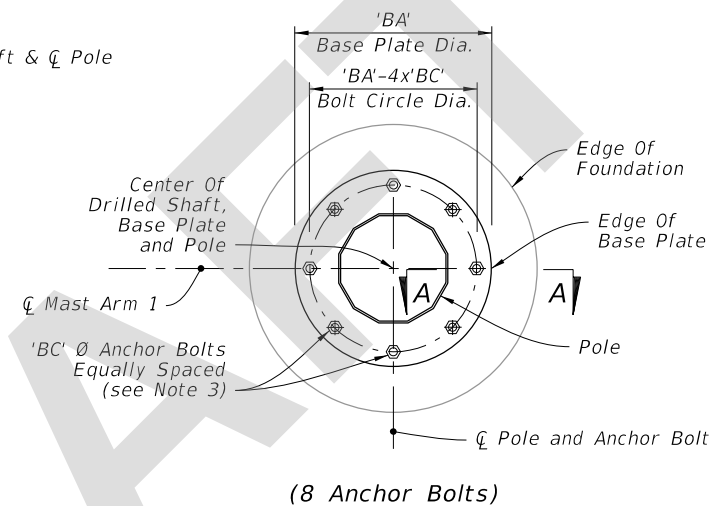
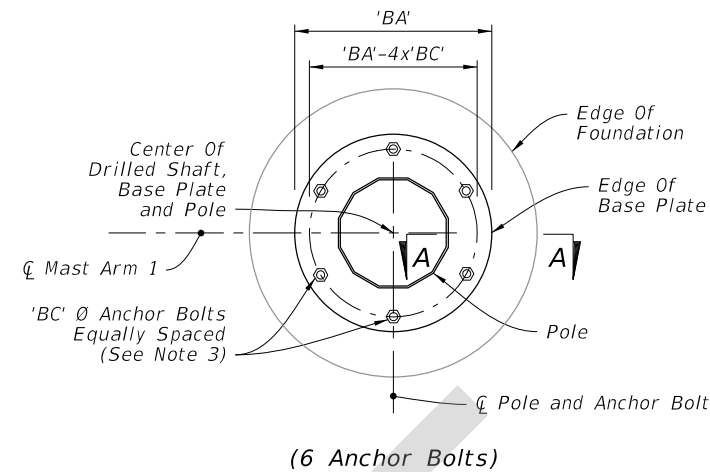
MAST ARM ASSEMBLY

NOTES:

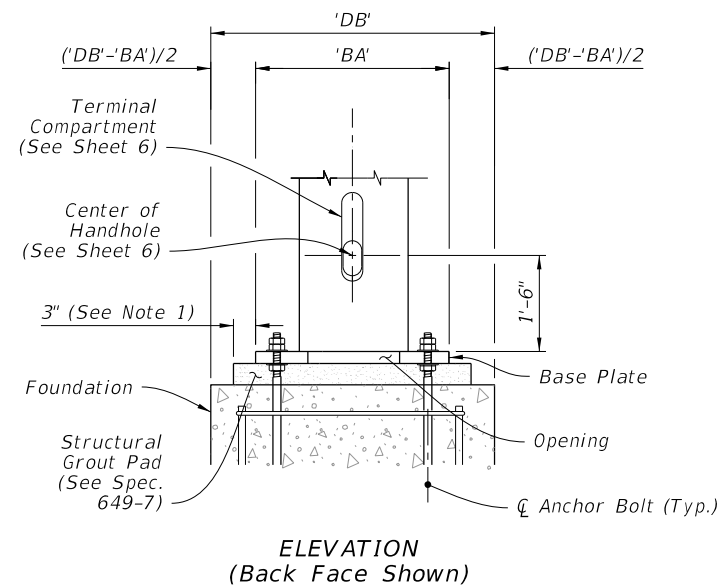
1. The Structural Grout Pad diameter may be reduced where the footprint of the Grout Pad does not provide adequate clearance for the sidewalk and/or accessibility considerations.
2. See Index 649-030 and the plans for actual quantity of bolts in the Base Plate Connection.
3. The bottom hex nut of the Double Nuts shown in Section A-A may be substituted by a half-height anchor 'jam' nut. Provide individual nut covers (not shown) for each bolt.
4. Detail 'A' Silicone Caulk may be applied after installation. Consult with Manufacturer to determine the suitability of the caulk to be applied.



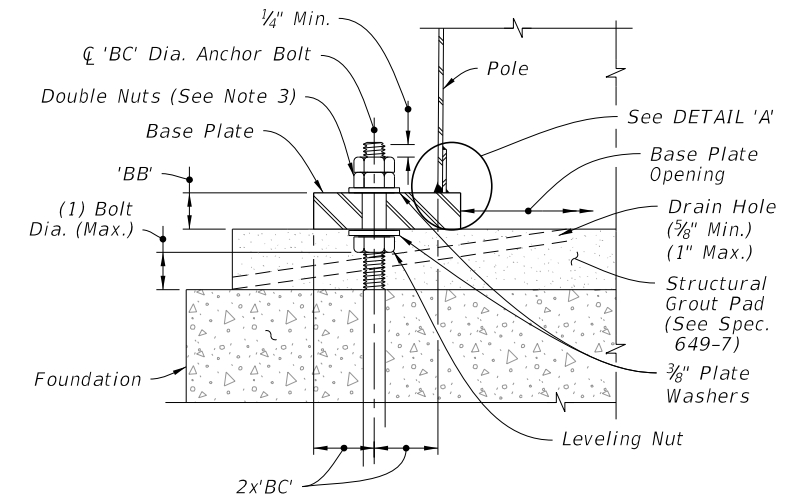
FOUNDATION



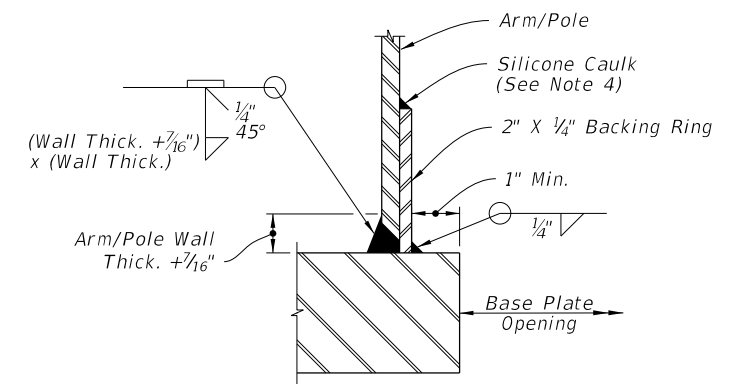
PLAN



BASE PLATE CONNECTION



SECTION A-A



JOINT WELD DETAIL

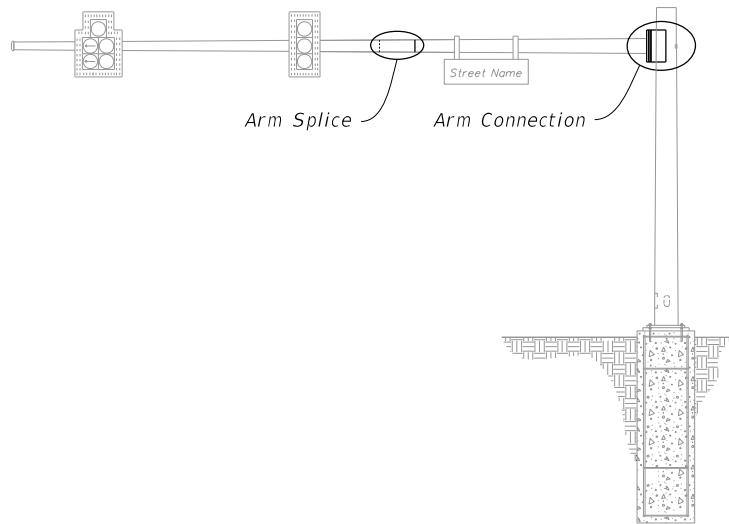
DETAIL 'A'

DRAFT - 5

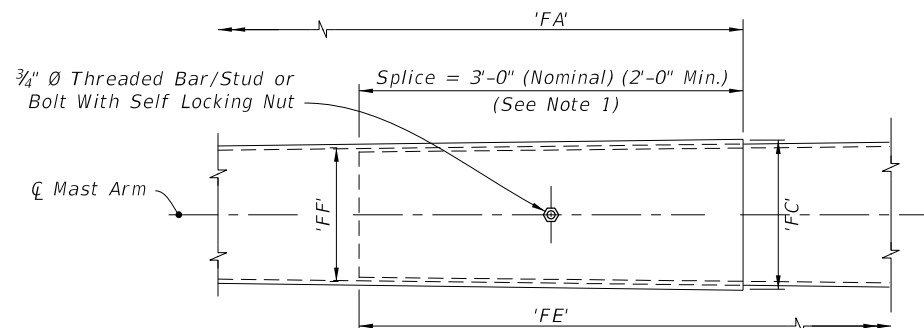
FOUNDATION AND BASE PLATE DETAILS

7/21/2021 9:14:56 AM

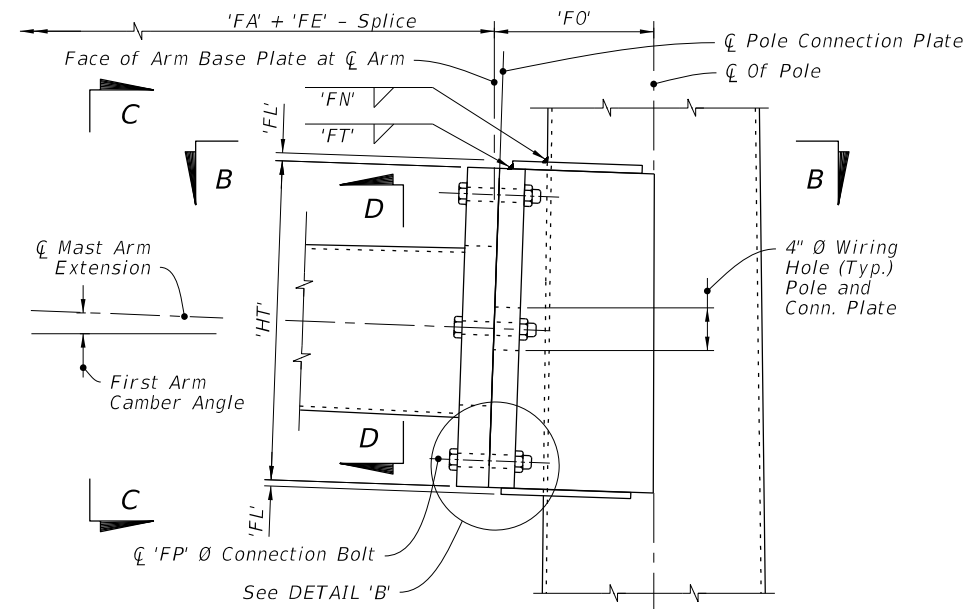
LAST REVISION	DESCRIPTION:	FY 2022-23 STANDARD PLANS	MAST ARM ASSEMBLIES	INDEX	SHEET
11/01/21				649-031	2 of 6



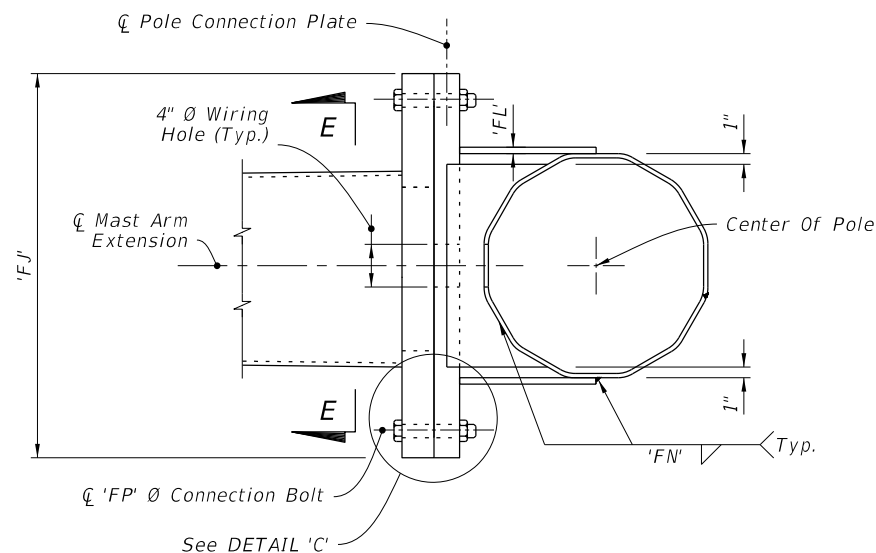
MAST ARM ASSEMBLY



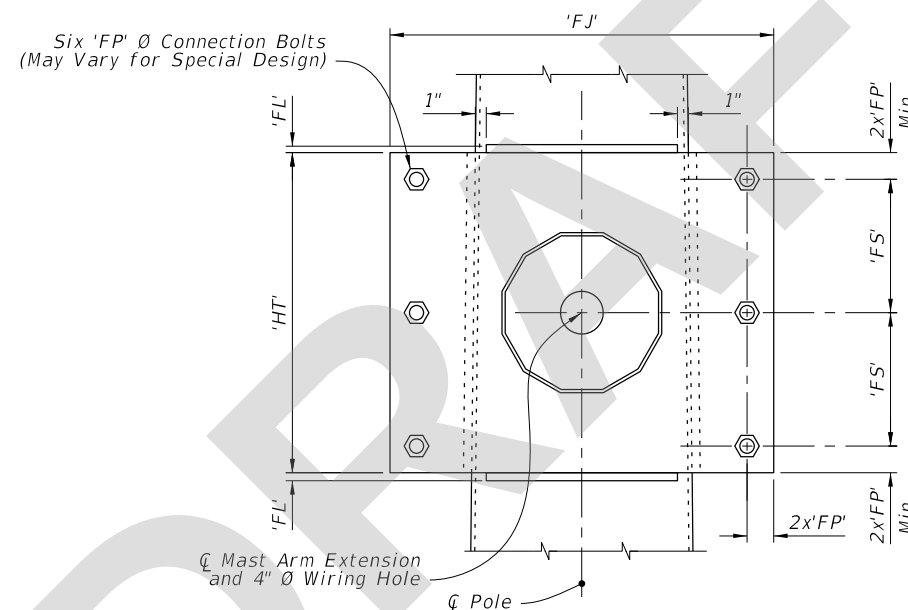
ARM SPLICE



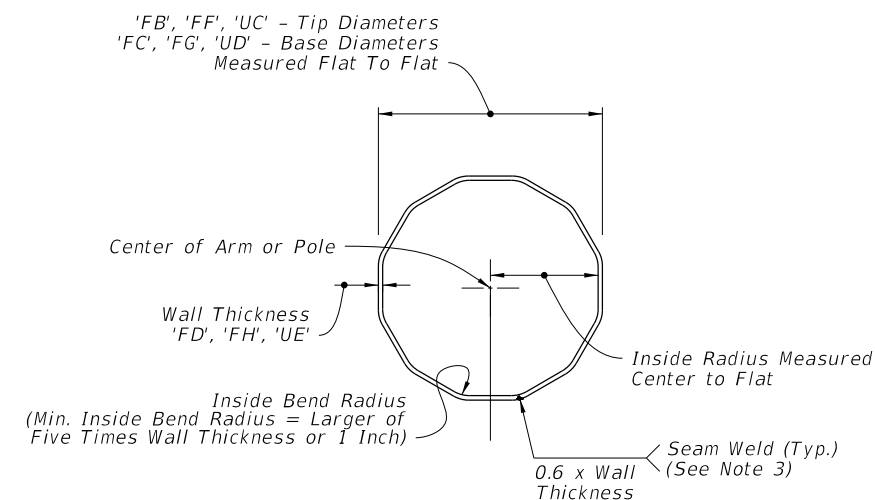
SINGLE ARM CONNECTION



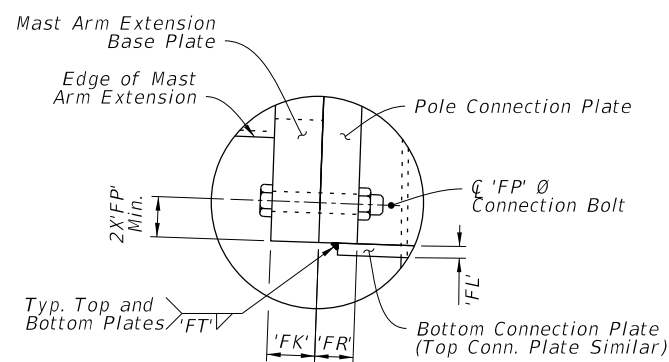
SECTION B-B



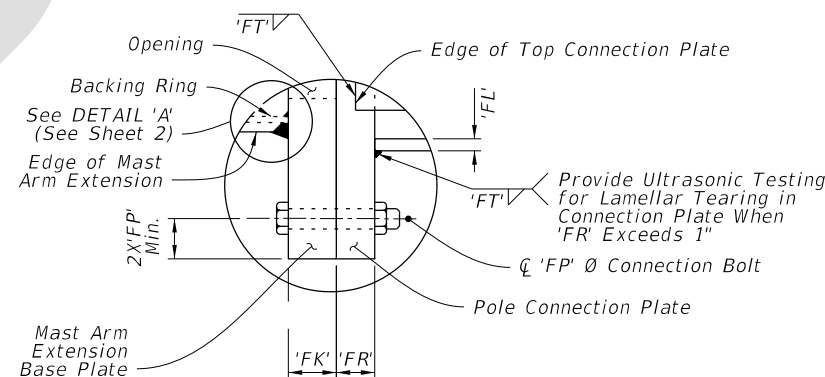
SECTION C-C



SECTION D-D



DETAIL 'B'



DETAIL 'C'

NOTE:

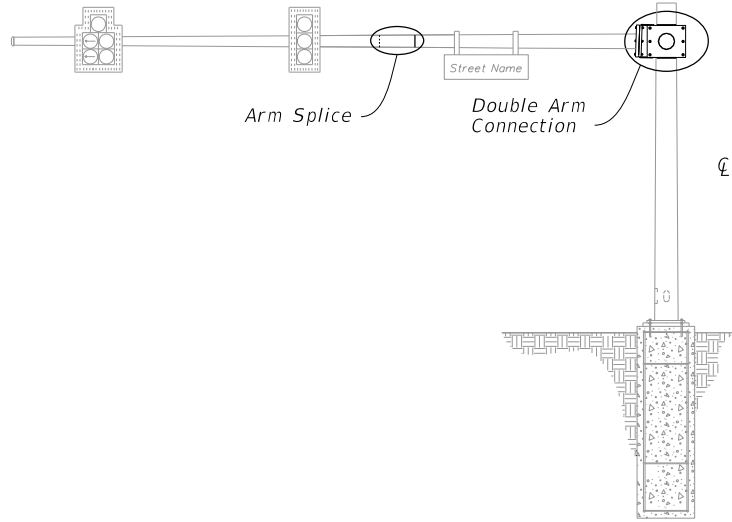
1. Install the 'Slip Joint' splice with a tight fit and no change in the Mast Arm taper due to the splice.
2. Details shown on this sheet are for 12 sided pole sections. However, sections with more than 12 sides and round sections are permitted provided outside diameter and wall thickness are not reduced.
3. Match mark the Arm and Connection Plates to ensure proper assembly and the seam weld is in the proper location (seam located at the bottom side of the Arm).

SINGLE ARM CONNECTIONS & SPLICE DETAILS

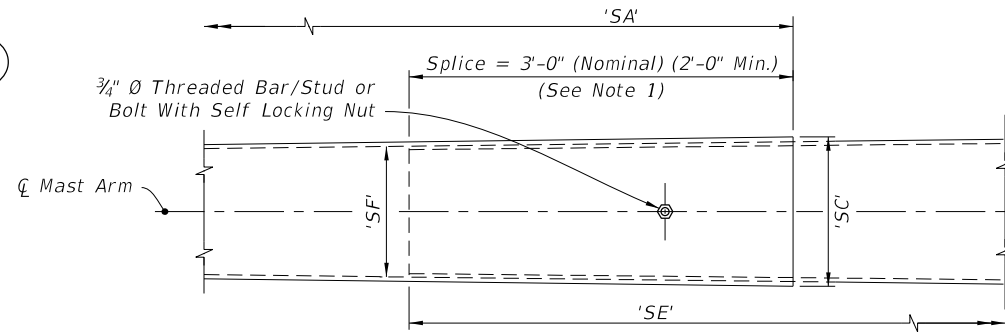
DRAFT - 5

7/21/2021 9:15:01 AM

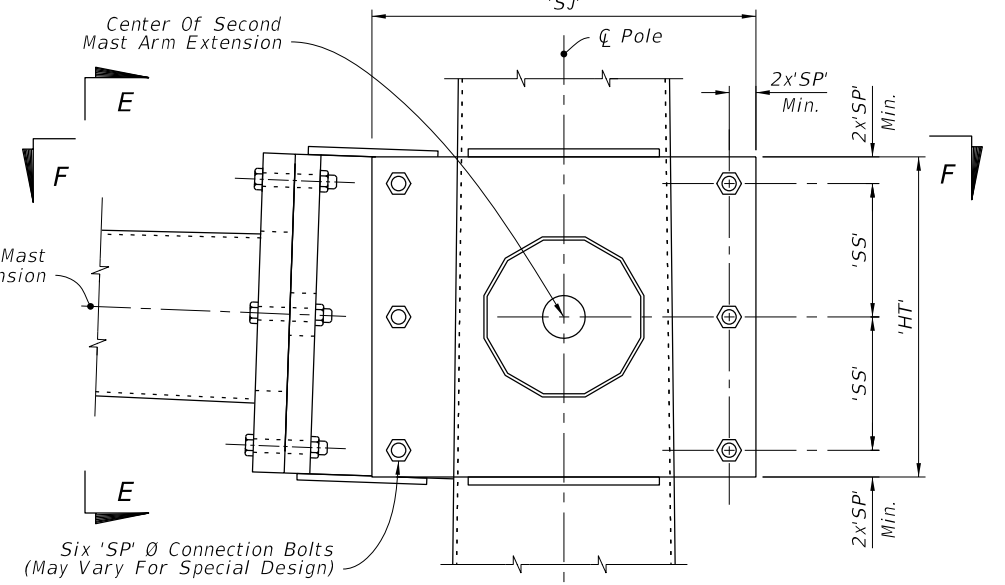
LAST REVISION	DESCRIPTION:	FY 2022-23 STANDARD PLANS	MAST ARM ASSEMBLIES	INDEX	SHEET
11/01/21				649-031	3 of 6



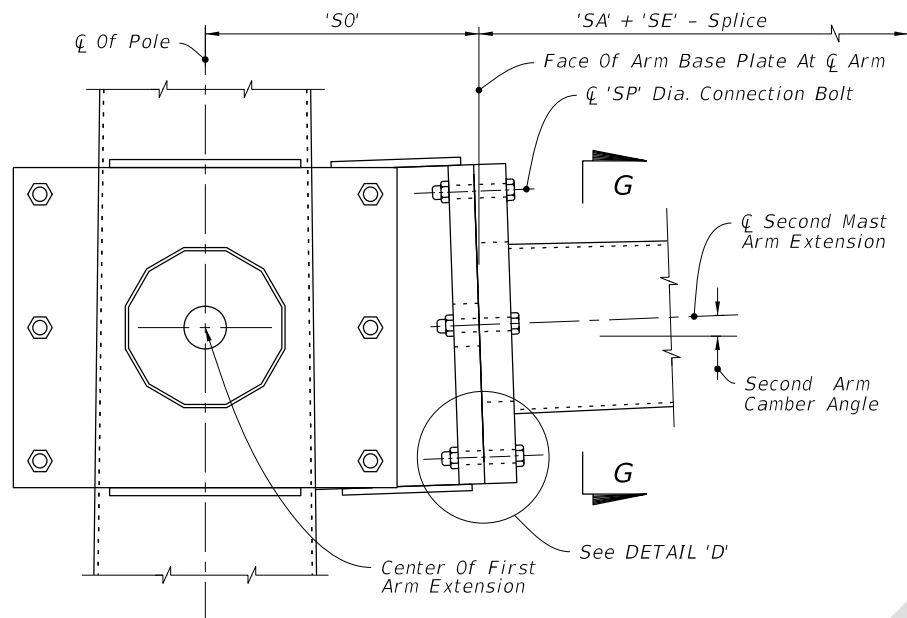
MAST ARM ASSEMBLY



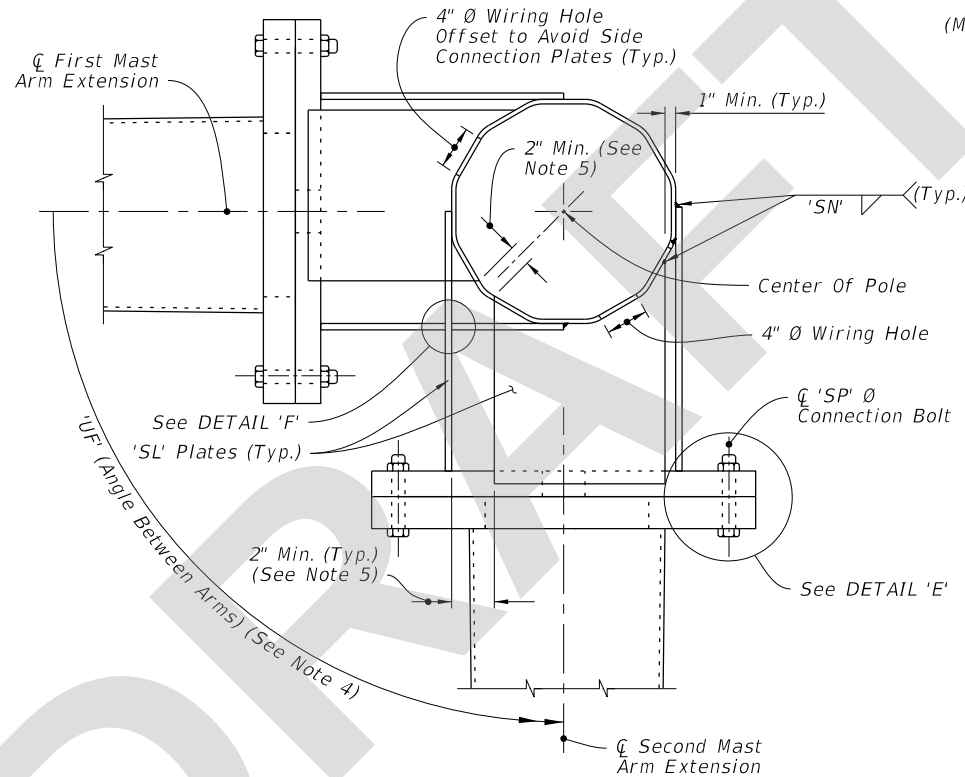
ARM SPLICE



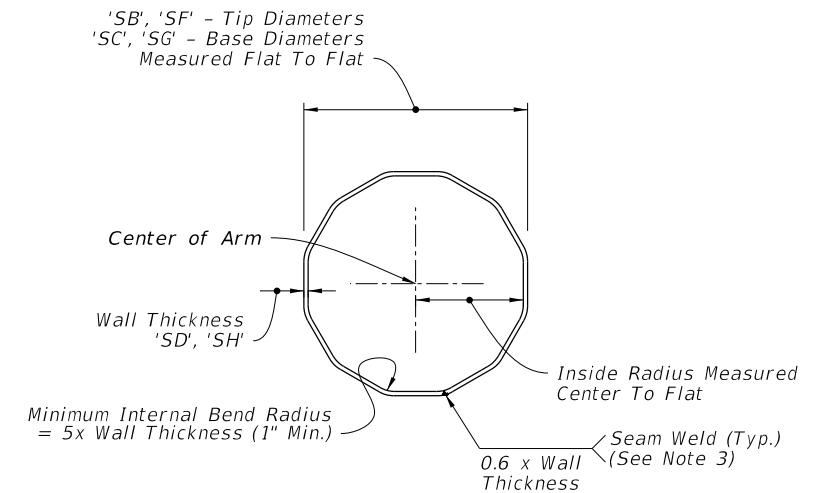
DOUBLE ARM CONNECTION



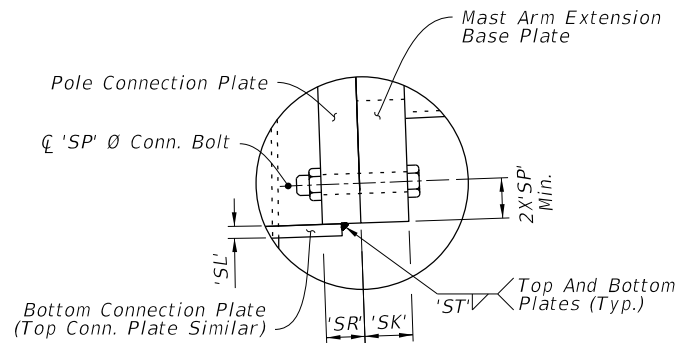
SECTION E-E



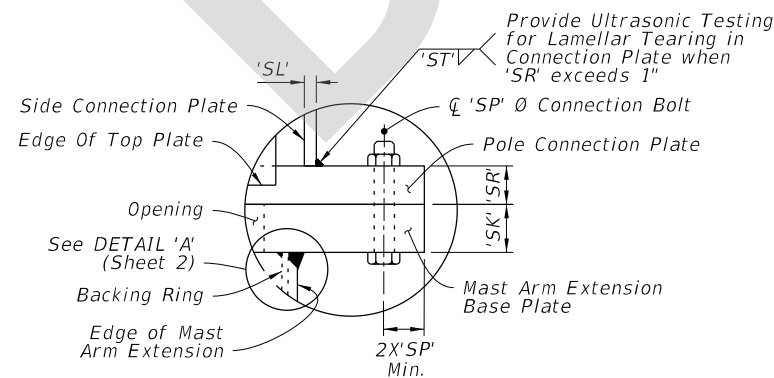
SECTION F-F



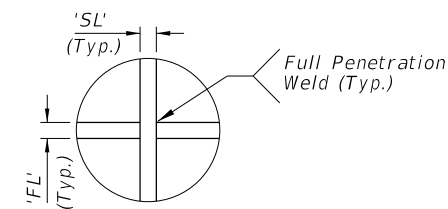
SECTION G-G



DETAIL 'D'



DETAIL 'E'



DETAIL 'F'

NOTE:

1. Install the 'Slip Joint' splice with a tight fit and no change in the Mast Arm taper due to the splice.
2. Details shown on this sheet are for 12 sided pole sections. However, sections with more than 12 sides and round sections are permitted provided outside diameter and wall thickness are not reduced.
3. Match mark the Arm and Connection Plates to ensure proper assembly and the seam weld is in the proper location (seam located at the bottom side of the Arm).
4. 'UF' measured counter clockwise from CL First Mast Arm Extension.
5. Adjust width of top and bottom Connection Plates to maintain minimum clearance shown.

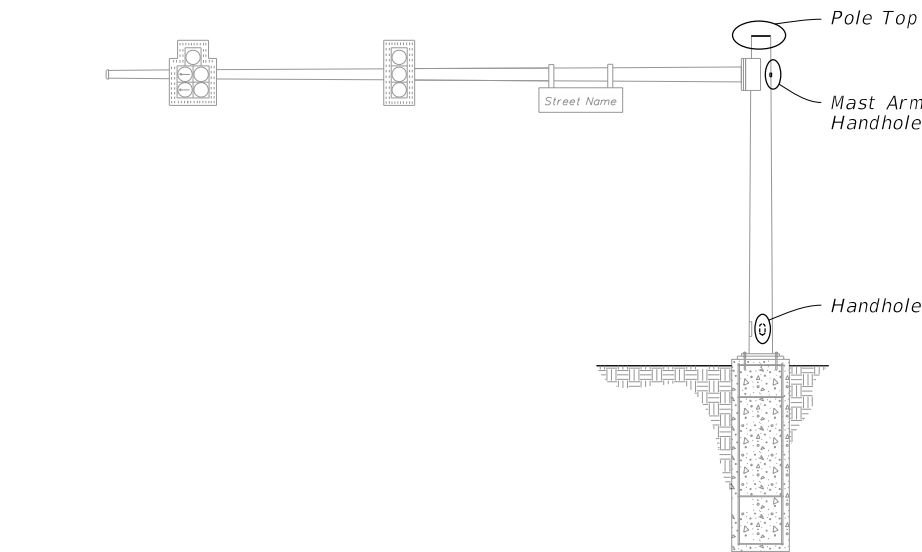
DOUBLE ARM CONNECTIONS & SPLICE DETAILS

DRAFT - 5

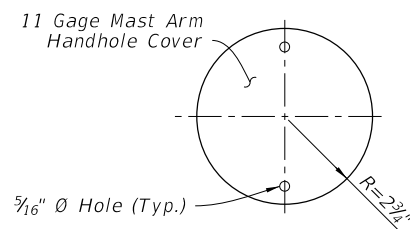
7/21/2021 9:15:04 AM

LAST REVISION	DESCRIPTION:	FDOT	FY 2022-23 STANDARD PLANS	MAST ARM ASSEMBLIES	INDEX	SHEET
11/01/21					649-031	4 of 6

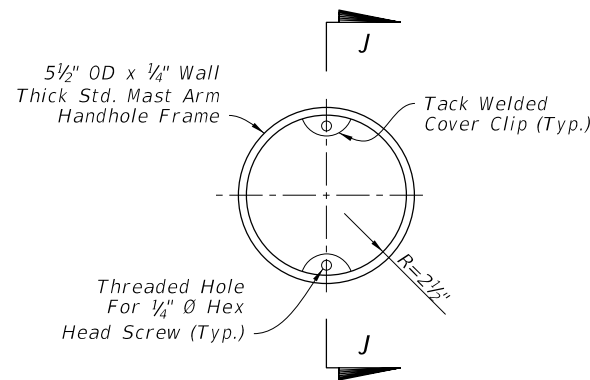
7/21/2021 9:15:09 AM



MAST ARM ASSEMBLY



COVER

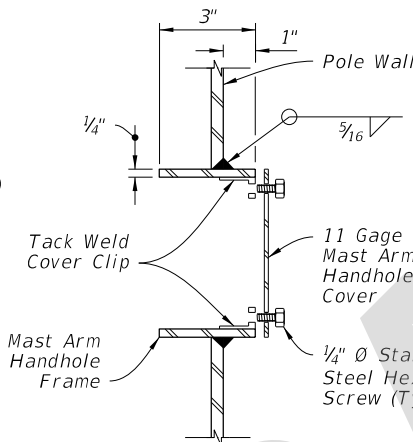


FRAME

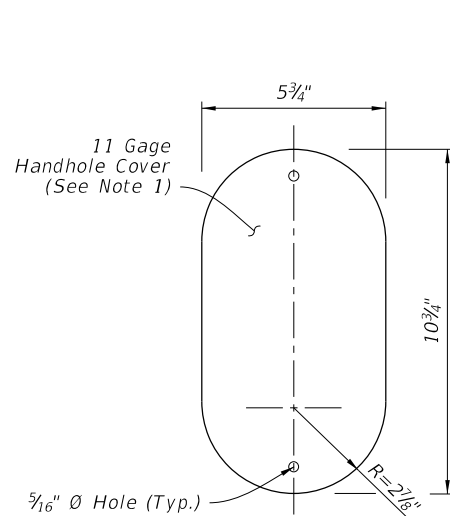
MAST ARM HANDHOLE

NOTES:

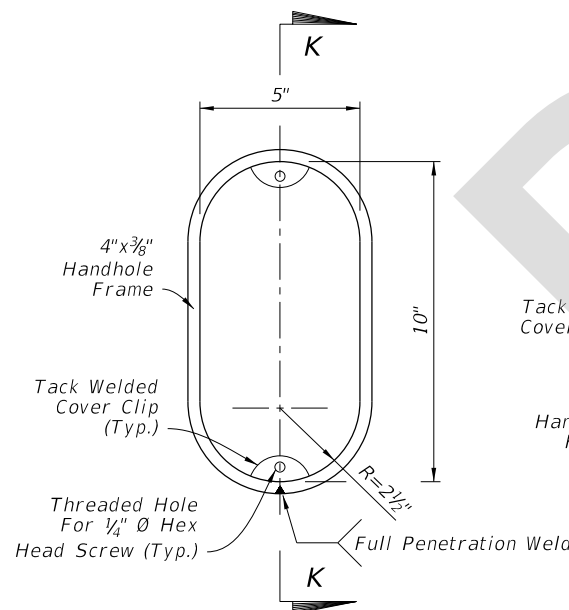
1. Handhole covers may be omitted when Terminal Compartment is provided.
2. See Mast Arm Tabulation sheet to see if Terminal Compartment is required and for locations.
3. Terminal Compartment Frame Height 2'-0" minimum to 2'-6" maximum. Align bottom of Terminal Compartment a minimum of 1" below the bottom of the Handhole Frame.
4. Any combination of Option 'a' or 'b' may be used, provided both lifting and wiring is accommodated. Cap may be flat plate or domed cap with set screws.
5. An alternate terminal compartment frame detail is allowed where the compartment frame is of constant depth and cuts into the pole at the frame top and bottom but lays flush with the pole on the frame sides. The frame is then welded to the pole using fillet welds all around the outside.



SECTION J-J

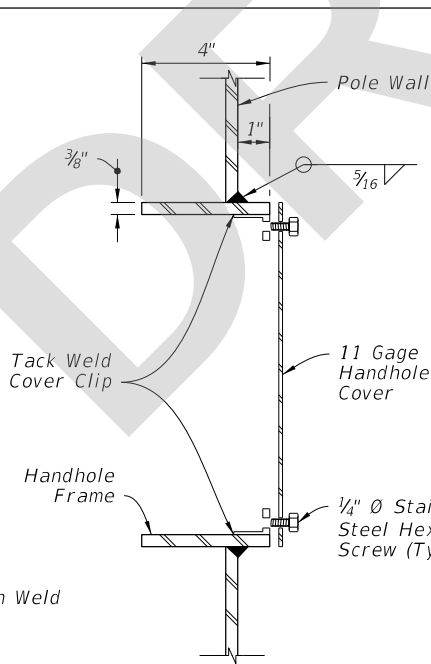


COVER

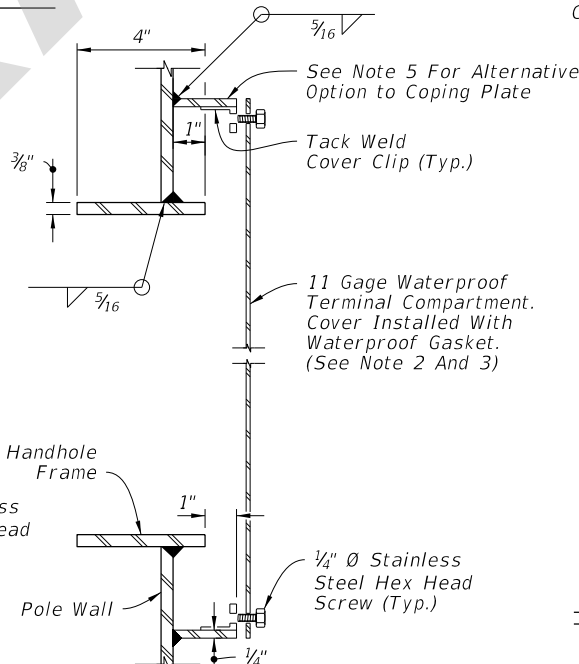


FRAME

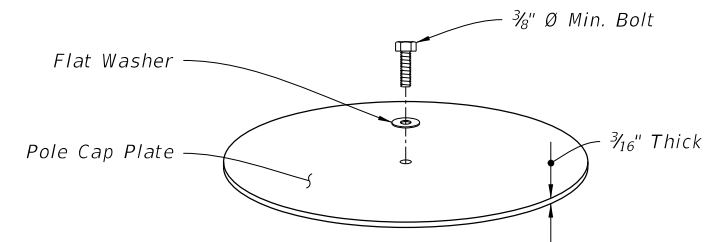
HANDHOLE



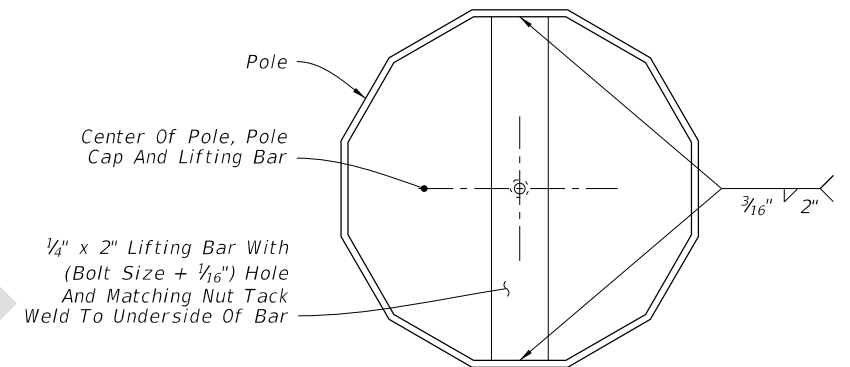
SECTION K-K
(Thru Handhole)



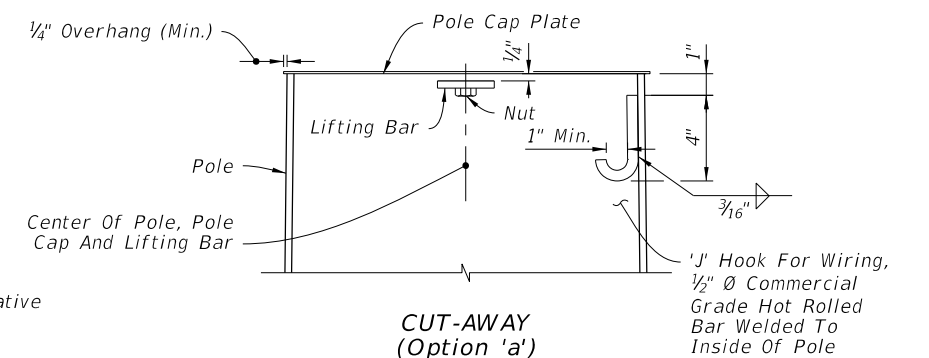
SECTION K-K
(Terminal Compartment)



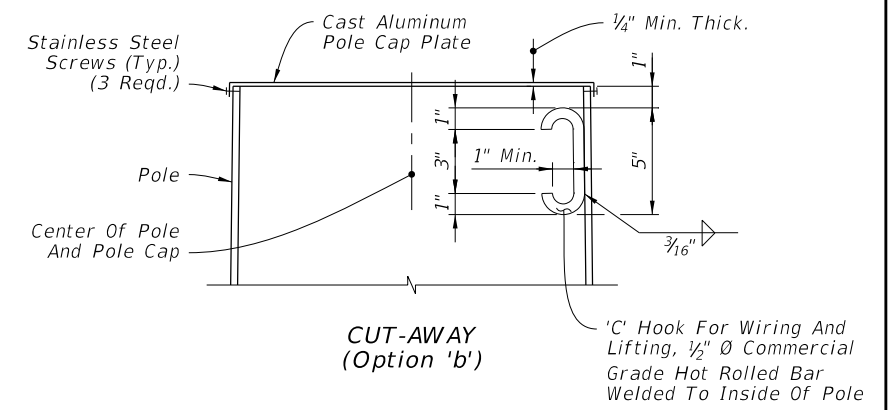
ISO VIEW
(Option 'a')



TOP VIEW
(Option 'a')



CUT-AWAY
(Option 'a')



CUT-AWAY
(Option 'b')

POLE TOP

HANDHOLE AND POLE TOP DETAILS



FY 2022-23
STANDARD PLANS

MAST ARM ASSEMBLIES

INDEX
649-031

SHEET
6 of 6

LAST
REVISION
11/01/21

REVISION

DESCRIPTION:

DRAFT - 5