# ORIGINATION FORM

## Proposed Revisions to a Design Standards Index

(Please provide all information – Incomplete forms will be returned)

**Contact Information:**

Date: July 24, 2017
Originator: **Charlie Harvey**
Phone: (850) 414-4300
Email: charlie.harvey@dot.state.fl.us

**Design Standards:**

Index Number: **17745**
Sheet Number (s): 1, 2 and 6 of 6
Index Title: Mast Arm Assemblies

**Summary of the changes:**

Sheet 1: Added Separate conduit for lighting to the foundation.
Sheet 2:Change foundation reinforcing lap splice to 2'-0"; Change backing ring to 2".
Sheet 6: Changed the handhole diameter to 5" in the upper MAST ARM HANDHOLE detail; Clarified Note 2.

**Commentary / Background:**

Sheet 2: Standard reinforcing lap splice is 2'-0". Standard backing ring is 2". This is to bring 17745 in line with other standards.
Sheet 6: This clarification was needed to eliminate possible interpretations that a Terminal Compartment is optional to the Contractor regardless of the plan content. This issue is being further coordinated with industry and the CADD Office to provide a consistent location for this information on the Mast Arm Tabulation Sheet for next cycle.

**Other Affected Offices / Documents:** (Provide name of responsible personnel)

| Yes | No | |
|---|---|---|
| ☐ | ☑ | Other Design Standards – |
| ☐ | ☑ | Plans Preparation Manual – |
| ☐ | ☑ | Basis of Estimates Manual – |
| ☐ | ☑ | Standard Specifications – |
| ☐ | ☑ | Approved Product List – |
| ☐ | ☑ | Construction – |
| ☐ | ☑ | Maintenance – |

**Origination Package Includes:** (Email or hand deliver package to Derwood Sheppard)

| Yes | N/A | |
|---|---|---|
| ☑ | ☐ | Redline Mark-ups |
| ☐ | ☐ | Proposed IDS |
| ☐ | ☐ | Revised IDS |
| ☐ | ☐ | Other Support Documents |

**Implementation:**

☐ Design Bulletin (DSR) ☐ DCE Memo ☐ Program Mgmt. Bulletin ☑ Design Standards e-Booklet (Next Release)

**Contact the Roadway Design Office for assistance in completing this form**

## 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.

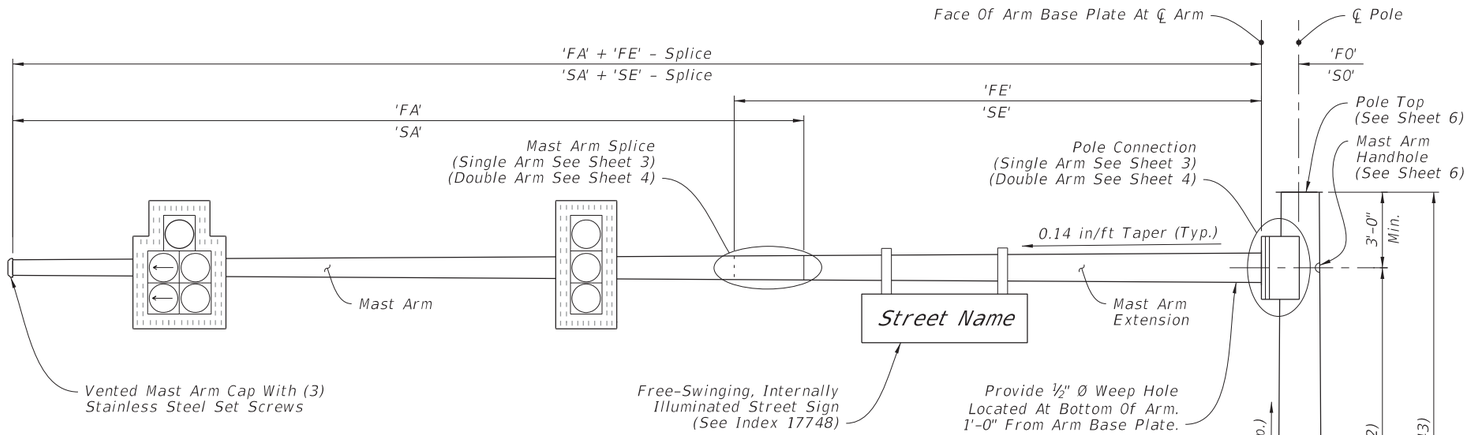
3. Details for Signal and Sign locations, Signal Head attachment, Sign attachment, Pedestrian Head attachment, and Foundation Conduit are not shown for simplicity.

4. Materials:
   Split-lock washers and self-locking nuts are not permitted
   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 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)
   J. Stainless Steel Screws: AISI Type 316
   K. Concrete: Class IV (Drilled Shaft) for all environmental classifications.
   L. Reinforcing Steel: Specification Section 415

5. Fabrication:
   A. Pole and Mast Arm Taper: Change diameter at a rate of 0.14 inches per foot.
   B. Upright splices are not allowed. Transverse welds are only permitted at the base.
   C. First and Second arm camber angle = 2°
   D. Provide bolt hole diameters as follows:
      a. Bolts (except Anchor Bolts): Bolt diameter plus 1/16", prior to galvanizing.
      b. Anchor Bolts: Bolt diameter plus 1/2" (Max.)
   E. Face handhole perpendicular from arm on single arm poles, perpendicular from first arm of double arm poles facing away from traffic or see special instructions on the Mast Arm Tabulation Sheet.
   F. Seam weld on bottom side of arm. Seam weld under Arm 1 side of pole.
   G. Provide a 'J' or 'C' hook at the top of the pole for signal wiring support (See Sheet 6).
   H. Perform all welding in accordance with Specification Section 460-6.4.
   I. Hot Dip Galvanize after fabrication.

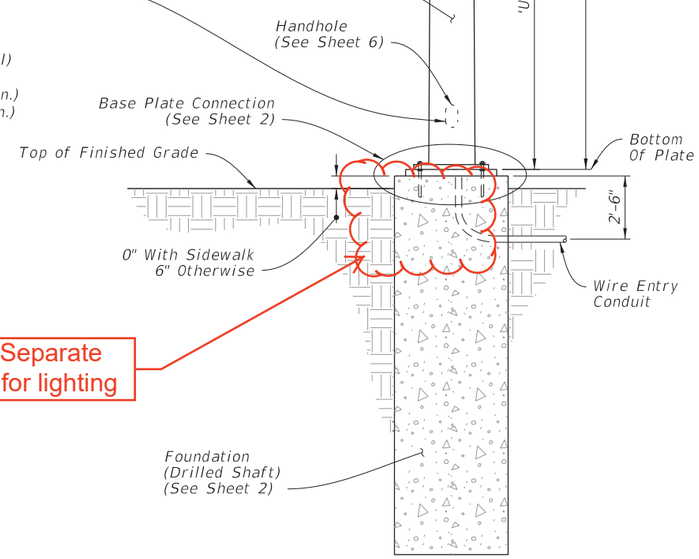
6. Coatings:
   A. All Nuts, Bolts, Washers and Threaded Bars/Studs: ASTM F2329
   B. All other steel items ASTM A123

7. Construction:
   A. Foundation: Specification Section 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 Section 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.




Aluminum Identification Tag not to exceed 2" x 4". Secure to pole by ⅛" stainless steel rivets or screws. Fabricators to provide details for approval. Identification Tag located on inside of pole visible from handhole, or on outside of pole inside Terminal Compartment. Tag to be stamped with the following information:

| Standard Design | Special Design |
|---|---|
| Financial Project ID | Financial Project ID |
| Pole Type | Manufacturer's Name |
| Arm Type | Pole Base ($F_y$ of Steel) |
| Manufacturer's Name | Arm ($F_y$ of Steel) |
| Pole Base ($F_y$ of Steel) | Pole Wall Thickness (in.) |
| Arm ($F_y$ of Steel) | Arm Wall Thickness (in.) |




Added: Separate conduit for lighting

| TABLE OF CONTENTS | |
|---|---|
| SHEET NO. | 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)

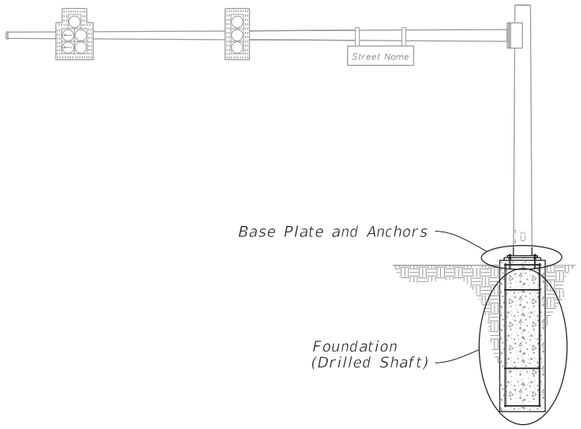
MAST ARM ASSEMBLY

ALL SHEETS 649-031

ELEVATION AND NOTES

10/25/2016 8:28:44 AM

| LAST REVISION | REVISION | DESCRIPTION: | FDOT FY 2017-18 DESIGN STANDARDS | MAST ARM ASSEMBLIES | INDEX NO. | SHEET NO. |
|---|---|---|---|---|---|---|
| 11/01/16 | | | | | ~~17745~~ | 1 of 6 |

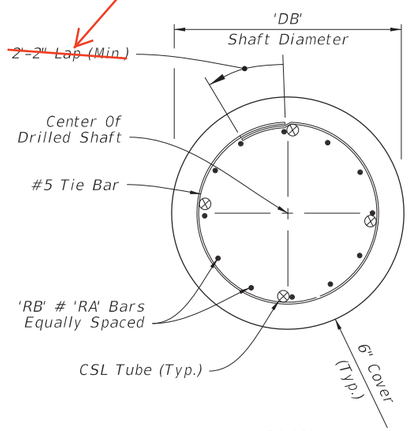



MAST ARM ASSEMBLY

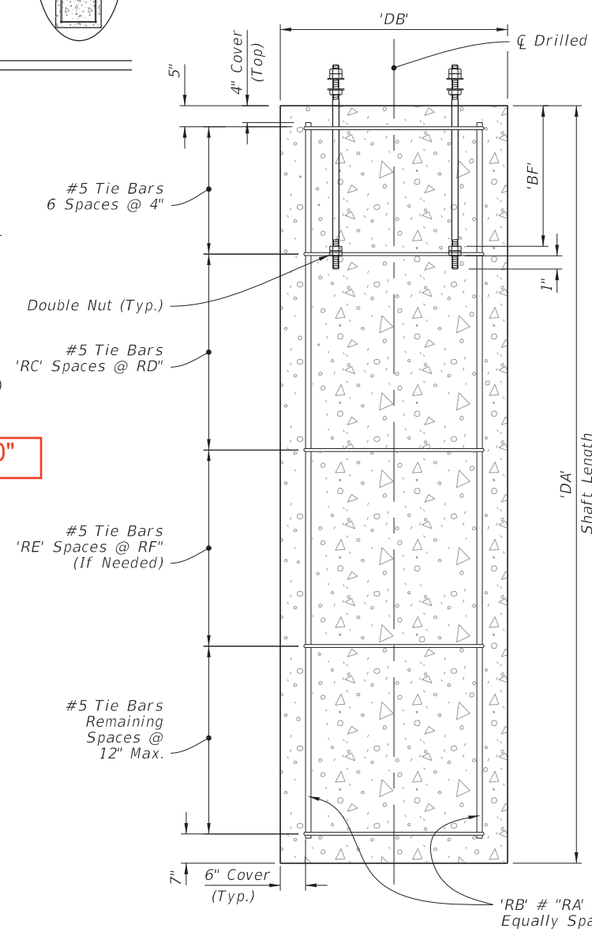
## NOTES:

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 No. 17743 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 ½" height 'jam' nut. Provide individual nut covers (not shown) for each bolt.

Changed Lap to 2'-0"

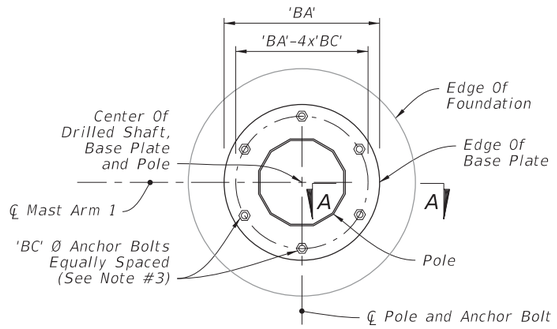



PLAN

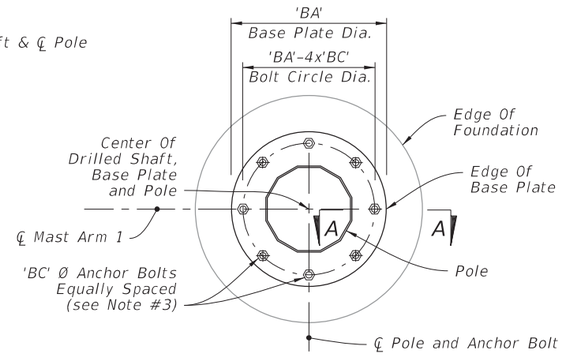



ELEVATION

FOUNDATION

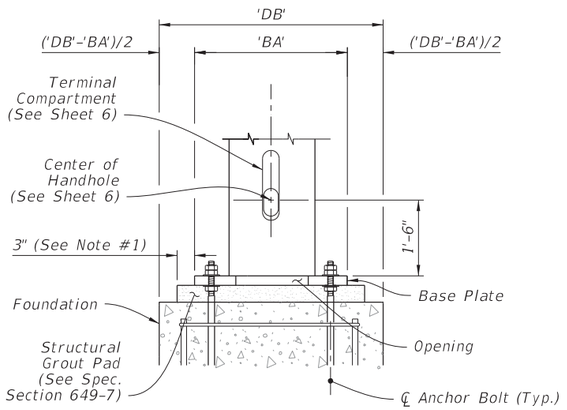



(6 Anchor Bolts)



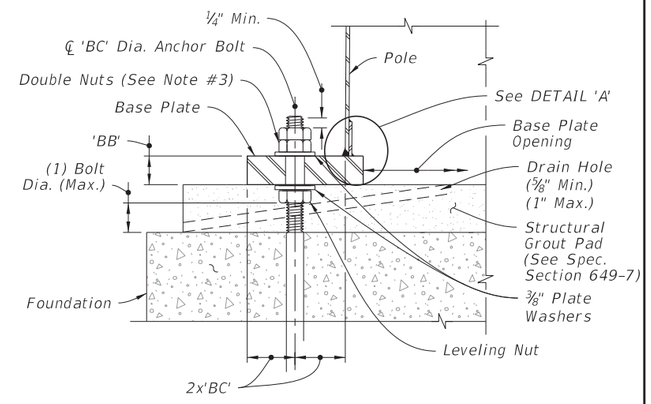

(8 Anchor Bolts)

PLAN



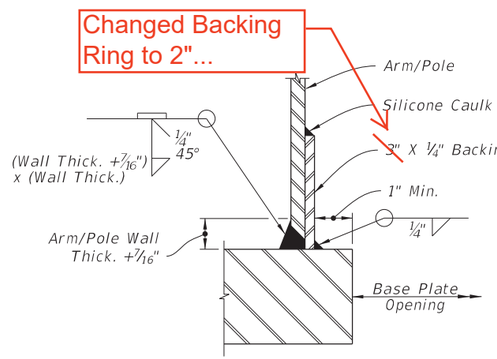

ELEVATION
(Back Face Shown)

BASE PLATE CONNECTION




SECTION A-A

Changed Backing Ring to 2"...



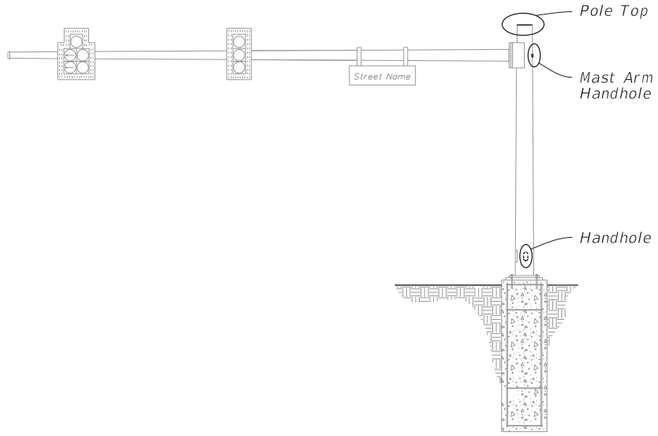

JOINT WELD DETAIL

DETAIL 'A'

FOUNDATION AND BASE PLATE DETAILS

10/14/2016 1:16:10 PM

| LAST REVISION ~~11/01/16~~ | REVISION DESCRIPTION 11/01/17 | FDOT FY 2017-18 DESIGN STANDARDS | MAST ARM ASSEMBLIES | INDEX NO. ~~17745~~ | SHEET NO. 2 of 6 |
|---|---|---|---|---|---|



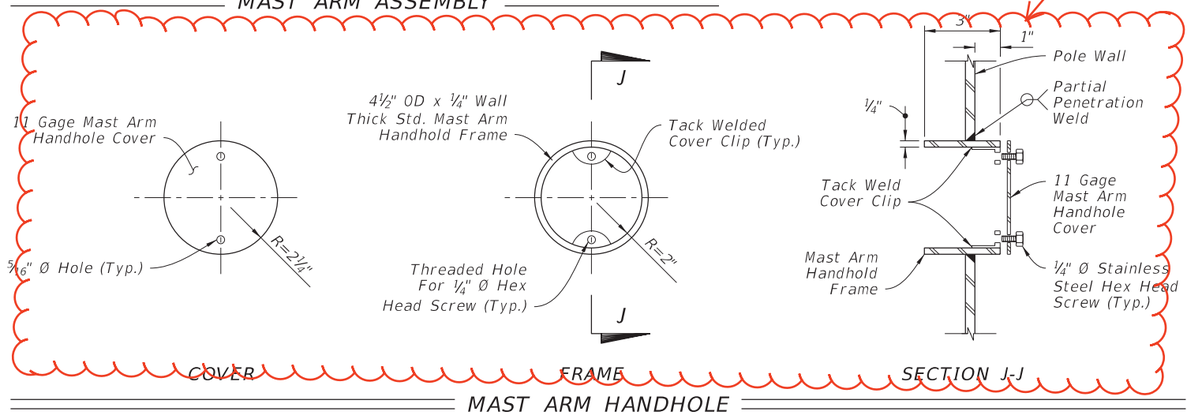

## MAST ARM ASSEMBLY

### NOTES:

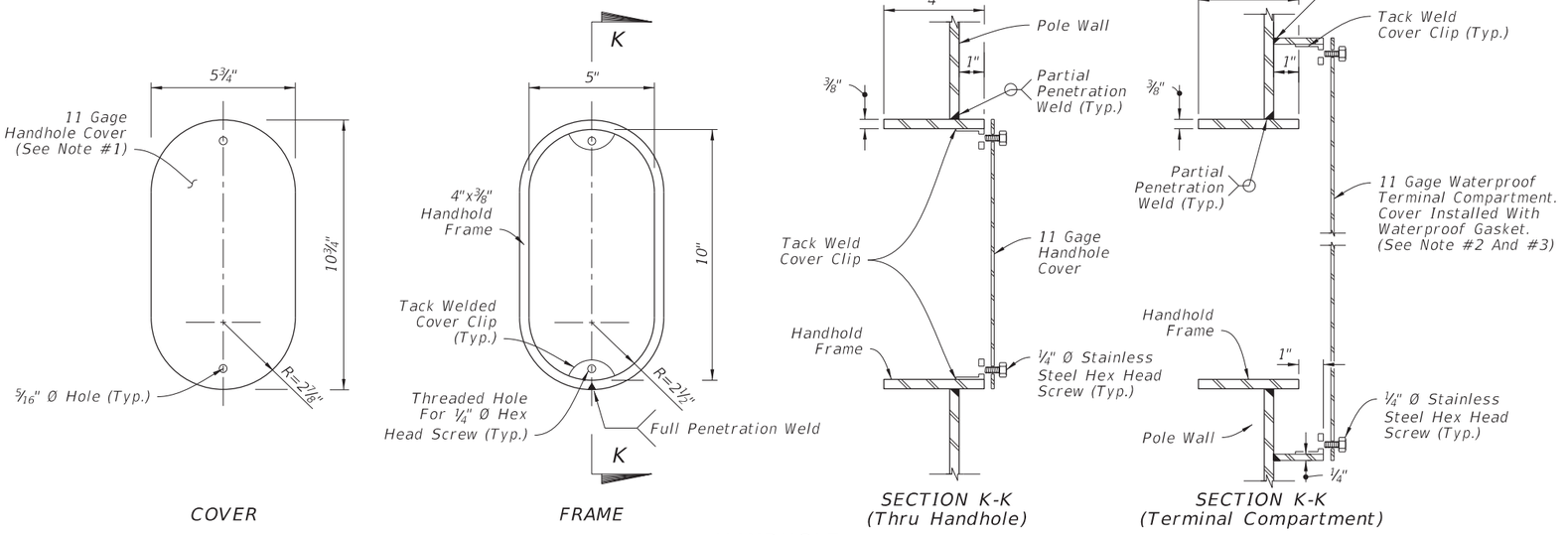
1. Handhole covers may be omitted when Terminal Compartment is provided.
2. Terminal Compartment is optional. See Mast Arm Tabulation to see if required and for locations.
3. Terminal Compartment Frame Height 2'-0" minimum to 2'-6" maximum. Align bottom of Terminal Compartment a minimum of 1" below the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

Clarified Note 2

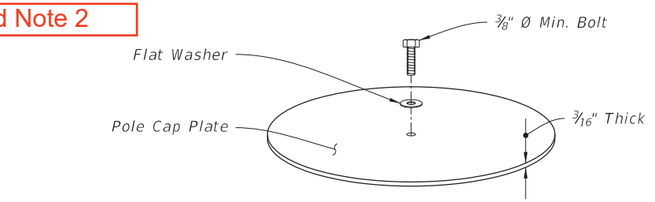
Changed Handhole Diameter



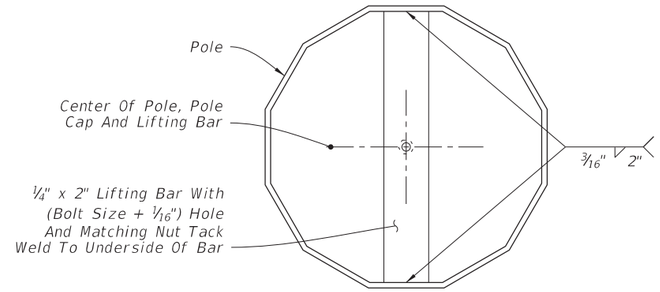

## MAST ARM HANDHOLE



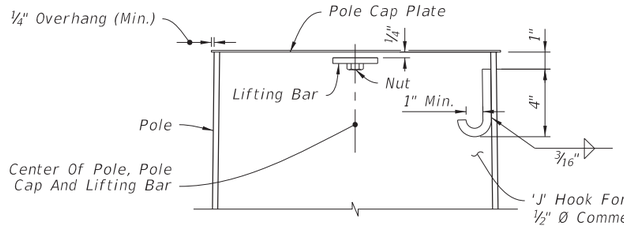

## HANDHOLE



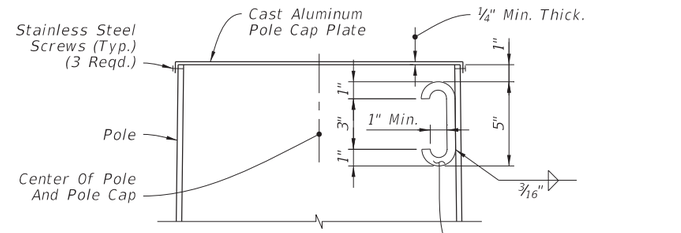

ISO VIEW
(Option 'a')




TOP VIEW
(Option 'a')




CUT-AWAY
(Option 'a')




CUT-AWAY
(Option 'b')

## POLE TOP

# HANDHOLD AND POLE TOP DETAILS

10/20/2016 8:16:50 AM

| LAST REVISION | REVISION | DESCRIPTION | FDOT | | INDEX NO. | SHEET NO. |
|---|---|---|---|---|---|---|
| ~~11/01/16~~ | | 11/01/17 | FY 2017-18 DESIGN STANDARDS | MAST ARM ASSEMBLIES | ~~17745~~ | 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.

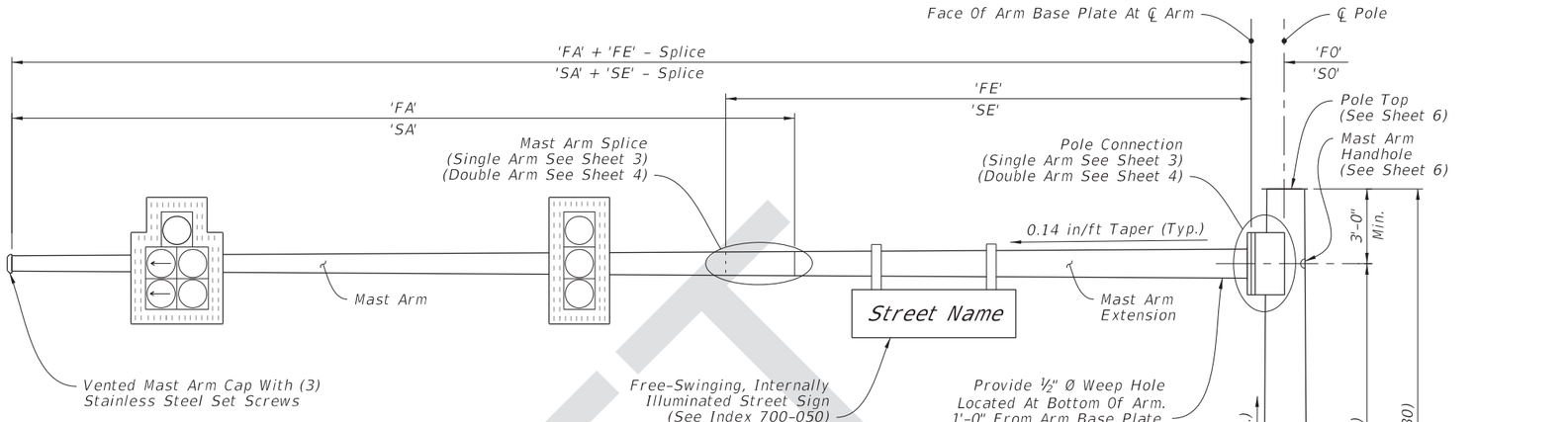
3. Details for Signal and Sign locations, Signal Head attachment, Sign attachment, Pedestrian Head attachment, and Foundation Conduit are not shown for simplicity.

4. Materials:
   Split-lock washers and self-locking nuts are not permitted
   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 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)
   J. Stainless Steel Screws: AISI Type 316
   K. Concrete: Class IV (Drilled Shaft) for all environmental classifications.
   L. Reinforcing Steel: Specification Section 415

5. Fabrication:
   A. Pole and Mast Arm Taper: Change diameter at a rate of 0.14 inches per foot.
   B. Upright splices are not allowed. Transverse welds are only permitted at the base.
   C. First and Second arm camber angle = 2°
   D. Provide bolt hole diameters as follows:
      a. Bolts (except Anchor Bolts): Bolt diameter plus 1/16", prior to galvanizing.
      b. Anchor Bolts: Bolt diameter plus 1/2" (Max.)
   E. Face handhole perpendicular from arm on single arm poles, perpendicular from first arm of double arm poles facing away from traffic or see special instructions on the Mast Arm Tabulation Sheet.
   F. Seam weld on bottom side of arm. Seam weld under Arm 1 side of pole.
   G. Provide a 'J' or 'C' hook at the top of the pole for signal wiring support (See Sheet 6).
   H. Perform all welding in accordance with Specification Section 460-6.4.
   I. Hot Dip Galvanize after fabrication.

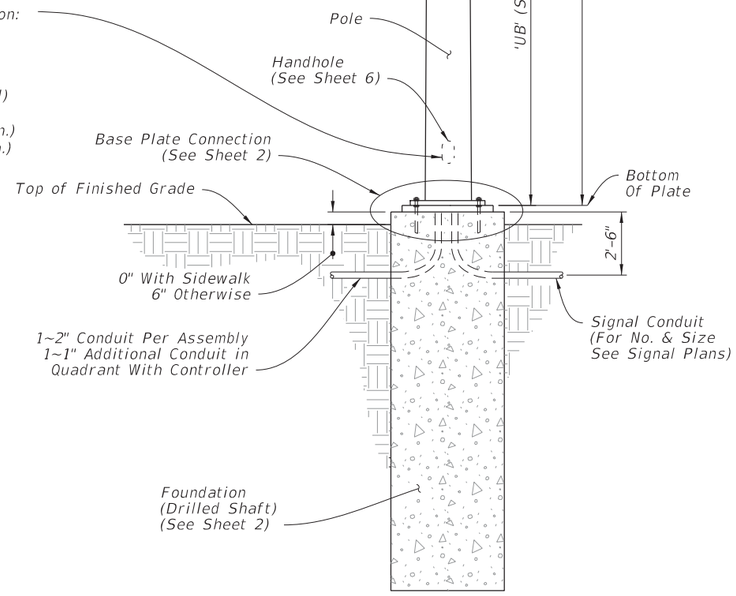
6. Coatings:
   A. All Nuts, Bolts, Washers and Threaded Bars/Studs: ASTM F2329
   B. All other steel items ASTM A123

7. Construction:
   A. Foundation: Specification Section 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 Section 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.




*Aluminum Identification Tag not to exceed 2" x 4". Secure to pole by ⅛" stainless steel rivets or screws. Fabricators to provide details for approval. Identification Tag located on inside of pole visible from handhole, or on outside of pole inside Terminal Compartment. Tag to be stamped with the following information:*

| Standard Design | Special Design |
|---|---|
| Financial Project ID | Financial Project ID |
| Pole Type | Manufacturer's Name |
| Arm Type | Pole Base ($F_y$ of Steel) |
| Manufacturer's Name | Arm ($F_y$ of Steel) |
| Pole Base ($F_y$ of Steel) | Pole Wall Thickness (in.) |
| Arm ($F_y$ of Steel) | Arm Wall Thickness (in.) |




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

MAST ARM ASSEMBLY

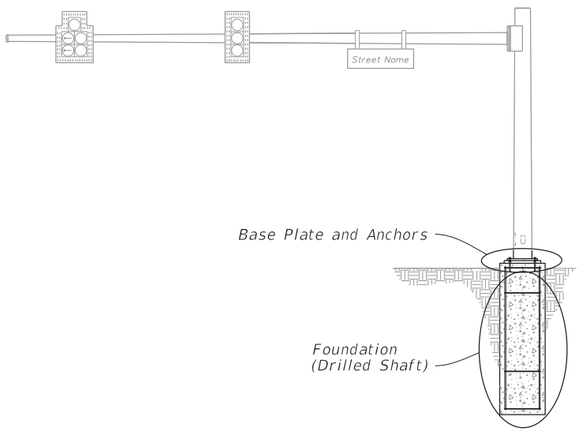
| TABLE OF CONTENTS | |
|---|---|
| SHEET NO. | SUBJECT |
| 1 | Elevation and Notes |
| 2 | Foundation and Base Plate Details |
| 3 | Single Arm Connection and Splice Details |
| 4 | Double Arm Connection and Splice Details |
| 5 | Luminaire Arm and Connection Details |
| 6 | Handhole and Pole Top Details |



8/30/2017 12:32:13 PM

ELEVATION AND NOTES

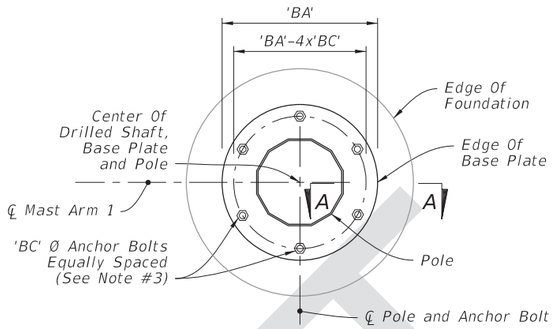
| LAST REVISION | REVISION | DESCRIPTION: | FDOT | FY 2018-19 STANDARD PLANS | MAST ARM ASSEMBLIES | INDEX | SHEET |
|---|---|---|---|---|---|---|---|
| 11/01/17 | | | | | | 649-031 | 1 of 6 |



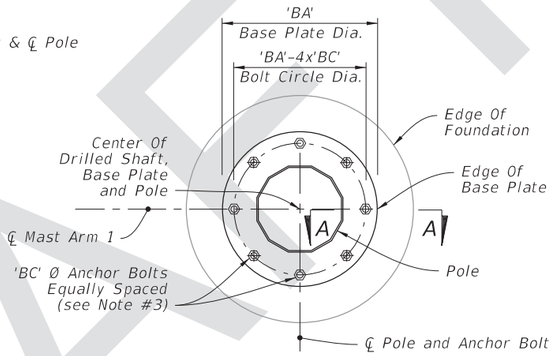

## MAST ARM ASSEMBLY

### 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 ½" height 'jam' nut. Provide individual nut covers (not shown) for each bolt.

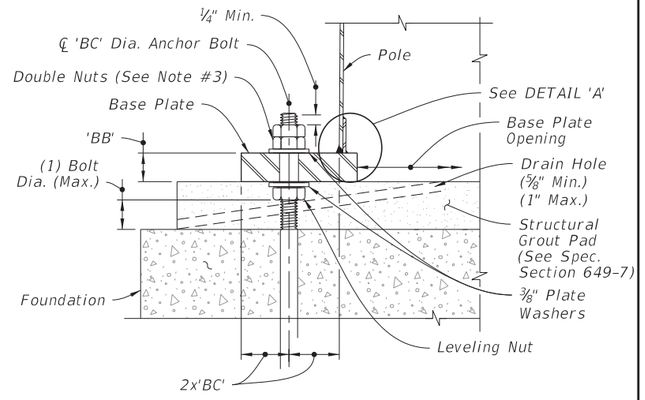



(6 Anchor Bolts)

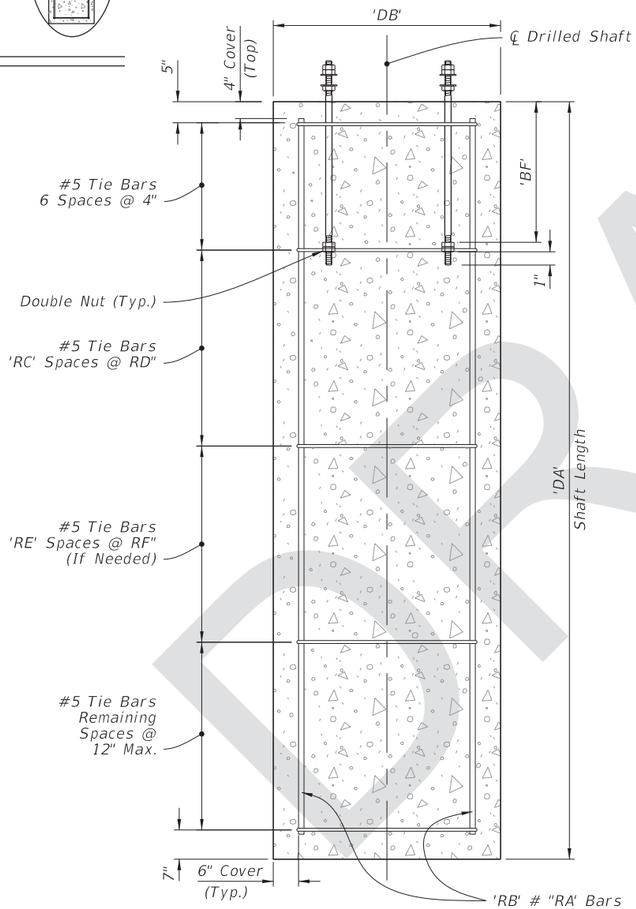



(8 Anchor Bolts)

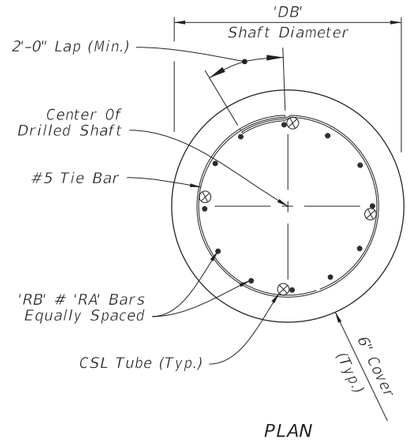
PLAN




## SECTION A-A

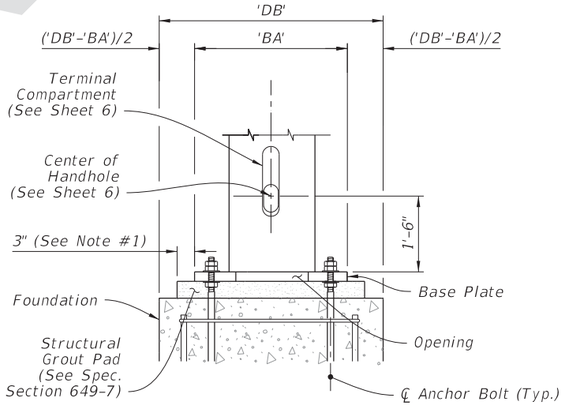



ELEVATION



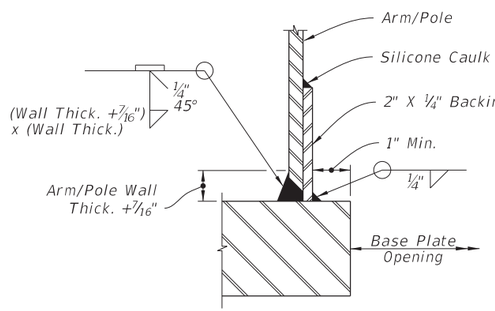

PLAN

## FOUNDATION




ELEVATION
(Back Face Shown)

## BASE PLATE CONNECTION




JOINT WELD DETAIL

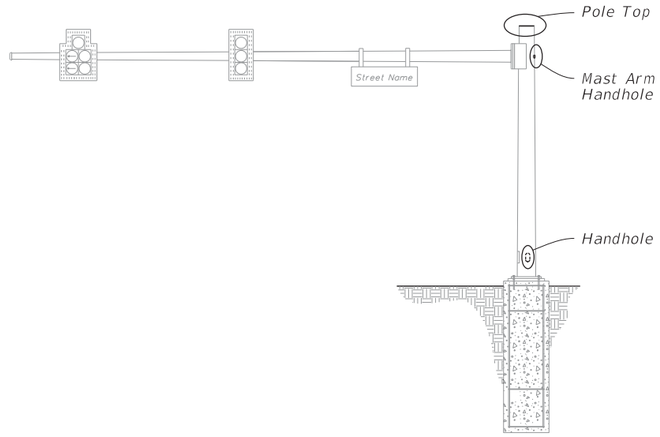
## DETAIL 'A'

## FOUNDATION AND BASE PLATE DETAILS



8/30/2017 12:32:14 PM

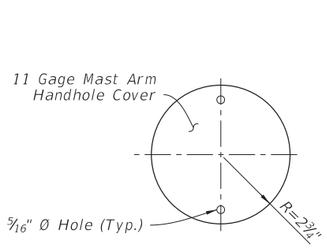
| LAST REVISION | REVISION | DESCRIPTION: | FDOT FY 2018-19 STANDARD PLANS | MAST ARM ASSEMBLIES | INDEX | SHEET |
|---|---|---|---|---|---|---|
| 11/01/17 | | | | | 649-031 | 2 of 6 |



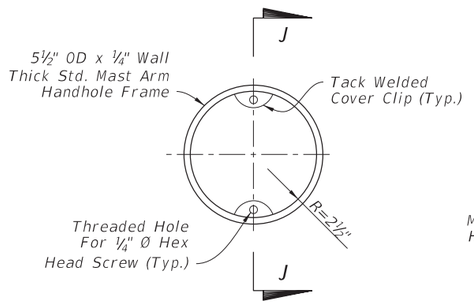

## MAST ARM ASSEMBLY

### 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.




COVER

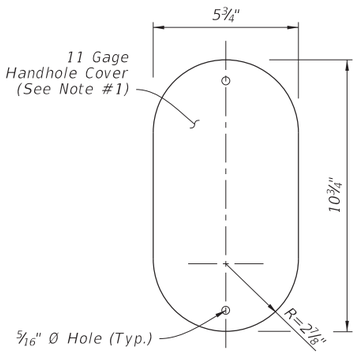



FRAME

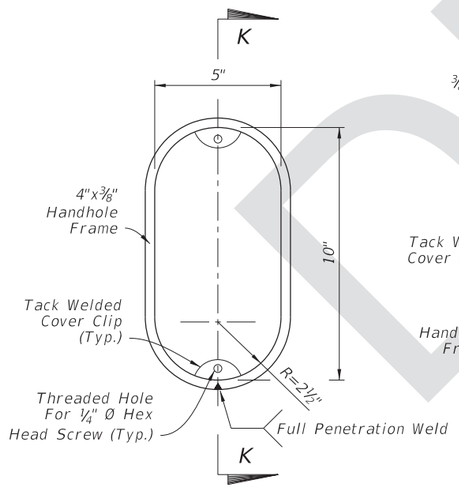



SECTION J-J

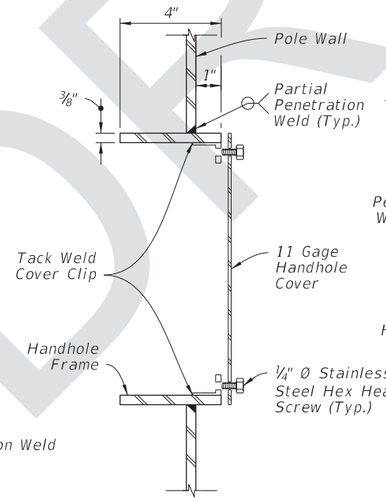
## MAST ARM HANDHOLE



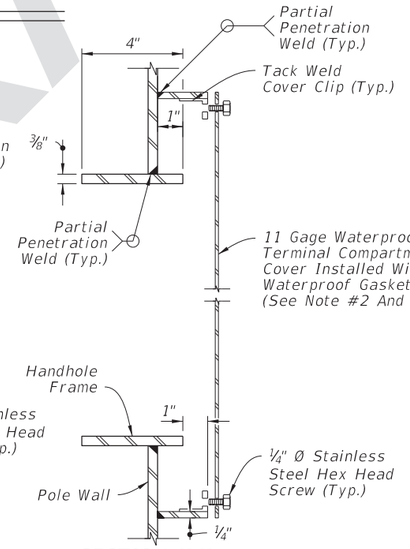

COVER




FRAME

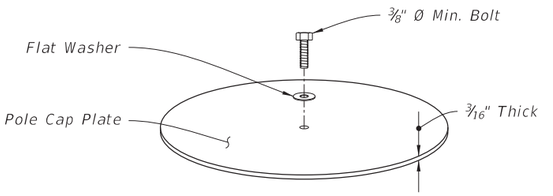



SECTION K-K
(Thru Handhole)

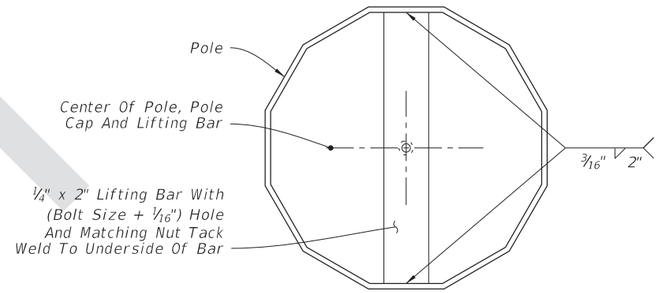



SECTION K-K
(Terminal Compartment)

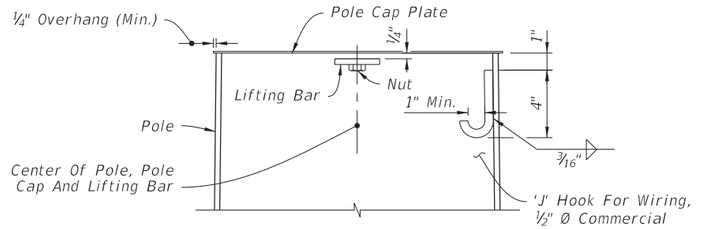
## HANDHOLE



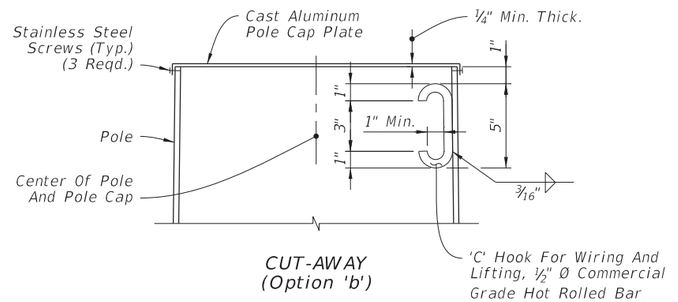

ISO VIEW
(Option 'a')




TOP VIEW
(Option 'a')




CUT-AWAY
(Option 'a')




CUT-AWAY
(Option 'b')

## POLE TOP

## HANDHOLE AND POLE TOP DETAILS



8/30/2017 12:32:14 PM

| LAST REVISION | REVISION | DESCRIPTION: | | | | |
|---|---|---|---|---|---|---|
| 11/01/17 | | | FDOT FY 2018-19 STANDARD PLANS | MAST ARM ASSEMBLIES | INDEX 649-031 | SHEET 6 of 6 |