1. Boxes shall not be installed in roadways or driveways.
2. Boxes shall be on the Approved Product List (APL).
3. Boxes shall be installed flush with the finished grade surface.
4. Fiber Optic splice boxes shall be provided with cable hanger racks designed to support cables and splice enclosures. Cost of racks to be included in cost of splice box.
5. Fiber optic boxes shall contain only Fiber Optic Cable, Conduit, and Locate Wire.
6. Conduit center line shall be aligned to top edge of box to facilitate cable pulling.
7. All boxes shall have 1'-0" wide (min) concrete apron. Concrete for concrete aprons shall be Class NS with a minimum strength of 28 days of 2.5 Ksi. Aprons shall be sloped away from box. Cost of apron to be included in the cost of each box.
8. Prevent the ingress of Water, Dirt, Sand, and other foreign materials into the conduit prior to, during and after construction using a foam-sealing material, rubber plug, or other device designed for this application and approved.
FOR USE IN AREAS NOT EXPOSED TO VEHICULAR TRAFFIC

FIGURE A

Note:
1. Sidewalk patches to match existing joints.
2. Entire sidewalk slab must be replaced when specified in the plans.
3. Backfill and tamp with material from trench except at driveways. At driveways, backfill a length of trench within the driveway entirely with Flowable Fill.

FOR USE IN ASPHALT ROADWAY ADJACENT TO GUTTER WHEN PLACEMENT OUTSIDE OF THE PAVEMENT IS NOT FEASIBLE.

FIGURE B

Note:
1. Trench not to be open more than 250' at a time when construction area is subject to vehicular or pedestrian traffic.
2. Asphalt to be sawcut to leave neat lines at the pavement cut.
3. See note 3 Figure C.

*May be adjusted due to field conditions upon approval of project engineer.

FOR USE IN INSTALLING CONDUIT UNDER A NEW ROADWAY PRIOR TO INSTALLATION OF BASE AND PAVEMENT

FIGURE D

FOR USE IN INSTALLING CONDUIT UNDER SIDEWALK

FIGURE E

FOR USE IN INSTALLING CONDUIT UNDER EXISTING ASPHALT PAVEMENT NOT ADJACENT TO GUTTER WHEN JACKING OR DIRECT BORING IS NOT FEASIBLE.

FIGURE C

Note:
1. Rigid conduit must be used when jacking under existing pavement at 36" minimum depth.
2. Asphalt to be sawcut at the edges of the trench.
3. The removal and replacement of the additional pavement width (8") will not be required when the trench can be constructed without disturbing the asphalt surface on either side.

*May be adjusted due to field conditions upon approval of project engineer.

For Use Installing Conduit Under Sidewalk

Asphalt to be sawcut to leave neat lines at the pavement cut.

Note:
1. Conduit located behind guardrail
2. Conduit located in front of guardrail
3. Slope may vary

 Pullbox Entry of Conduit Under Sidewalks

**FIGURE A**

Note:
Ends of conduit shall be sealed in accordance with Section 630 of the Standard Specifications for Road and Bridge Construction.

Conduit Installation Details Across Existing Drain Pipes or Utilities

**FIGURE B**

**FIGURE C**

For Use Under Railroads

**SECTION AA**

Conduit installation details across existing drain pipes or utilities.

**GENERAL NOTES:**

1. The contractor, with approval from the Engineer, may adjust the final burial depth of the conduit(s) in order to transverse nonmovable object conflicts.

2. Backfill with excavated material and compact the soil until firm and unyielding. Remove rock and debris from backfill material.

3. Where conduits are to be installed over existing underground structures (e.g., drain pipes or utility lines) which are less than 30" deep, the contractor shall encase the conduit in 2500 PSI Class I concrete for the entire length of conduit that is installed at a depth of less than 30".

4. If the amount of cover over the encasement is less than 6", the contractor shall install the conduit to pass below the underground structures (e.g., drain pipes).
STEEL STRAIN POLE NOTES

1) Designed in accordance with FDOT Structures Manual.


3) See Standard Index No. 17727 for grounding and span wire details.

4) Foundation Materials:
   - a. Reinforcing Steel: ASTM A615 Grade 60.
   - b. Concrete: Class IV, (Drilled Shaft) 4,000 psi (F’c) minimum Compressive Strength at 28-days for all environmental classifications.
   - c. Anchor Bolts: ASTM F1554 Grade 55 with ASTM A563 Grade A hex-nut and plate washers (all galvanized in accordance with ASTM F2329).

5) Strain Pole Specifications:
   - a. Poles: ASTM A1011 Grade 50, 55, 60 or 65 (less than 1") or ASTM A577 Grade 50, 55, 60 or 65 (1" and over) or ASTM A955 Grade A (55 ksi yield) or Grade B (60 ksi yield).
   - c. Weld Metal: E70XX.
   - d. Bolts: A232, Type 2, Hole Diameter: Bolt diameter plus 0.125".
   - e. Base Plate: Hole Diameter: anchor bolt diameter plus 0.125".
   - f. Handhole: Frame, ASTM A656 Grade 36 or ASTM A36, Cover, ASTM A1011 Grade 50, 55, 60 or 65.
   - g. Aluminum Caps and Covers: ASTM B-261 1319-F.
   - h. Stainless Steel Screws: AISI Type 316.
   - i. Galvanization: All nuts, bolts and washers; ASTM F2329. All other steel; ASTM A123.

6) Pole Notes:
   - a. See the Signalization Plans for clamp spacing, cable sizes and forces, signal and sign mounting locations and details.
   - b. Tapered with the diameter changing at a rate of 0.14 inch per foot.
   - c. Transverse welds are allowed only at the base.
   - d. Poles constructed out of two or more sections with overlapping splices are not permitted.
   - e. Locate the handhole 180 degrees from 2-inch wire entrance pipe.
   - f. Furnish each pole with a 2"x4" (max) aluminum identification tag. Submit details for approval. Secure to pole with 0.125" stainless steel rivets or screws.
   - g. Locate the handhole 180 degrees from 2-inch wire entrance pipe. Identify the handhole 180 degrees from 2-inch wire entrance pipe.
   - h. Stainless Steel Screws: AISI Type 316.
   - i. Galvanization: All nuts, bolts and washers; ASTM F2329. All other steel; ASTM A123.

5) Strain Pole Specifications:
   - a. Poles: ASTM A1011 Grade 50, 55, 60 or 65 (less than 1") or ASTM A577 Grade 50, 55, 60 or 65 (1" and over) or ASTM A955 Grade A (55 ksi yield) or Grade B (60 ksi yield).
   - c. Weld Metal: E70XX.
   - d. Bolts: A232, Type 2, Hole Diameter: Bolt diameter plus 0.125".
   - e. Base Plate: Hole Diameter: anchor bolt diameter plus 0.125".
   - f. Handhole: Frame, ASTM A656 Grade 36 or ASTM A36, Cover, ASTM A1011 Grade 50, 55, 60 or 65.
   - g. Aluminum Caps and Covers: ASTM B-261 1319-F.
   - h. Stainless Steel Screws: AISI Type 316.
   - i. Galvanization: All nuts, bolts and washers; ASTM F2329. All other steel; ASTM A123.

6) Pole Notes:
   - a. See the Signalization Plans for clamp spacing, cable sizes and forces, signal and sign mounting locations and details.
   - b. Tapered with the diameter changing at a rate of 0.14 inch per foot.
   - c. Transverse welds are allowed only at the base.
   - d. Poles constructed out of two or more sections with overlapping splices are not permitted.
   - e. Locate the handhole 180 degrees from 2-inch wire entrance pipe.
   - f. Furnish each pole with a 2"x4" (max) aluminum identification tag. Submit details for approval. Secure to pole with 0.125" stainless steel rivets or screws.
   - g. Locate the handhole 180 degrees from 2-inch wire entrance pipe. Identify the handhole 180 degrees from 2-inch wire entrance pipe.
   - h. Stainless Steel Screws: AISI Type 316.
   - i. Galvanization: All nuts, bolts and washers; ASTM F2329. All other steel; ASTM A123.
## TABLE OF STRAIN POLE VARIABLES

<table>
<thead>
<tr>
<th>POLE TYPE</th>
<th>MAXIMUM ALLOWABLE MOMENT (kip-ft)</th>
<th>I (in)</th>
<th>K (in)</th>
<th>BA (in)</th>
<th>BB (in)</th>
<th>BC (in)</th>
<th>BF (in)</th>
<th>DA (ft)</th>
<th>DB (ft)</th>
<th>No. of #5 Bars</th>
</tr>
</thead>
<tbody>
<tr>
<td>PS-IV</td>
<td>93.4</td>
<td>0.250</td>
<td>14</td>
<td>8</td>
<td>25</td>
<td>3.50</td>
<td>2.0</td>
<td>60</td>
<td>14</td>
<td>4</td>
</tr>
<tr>
<td>PS-V</td>
<td>138.9</td>
<td>0.313</td>
<td>16</td>
<td>16</td>
<td>28</td>
<td>3.50</td>
<td>2.0</td>
<td>60</td>
<td>16</td>
<td>4</td>
</tr>
<tr>
<td>PS-VI</td>
<td>205.8</td>
<td>0.313</td>
<td>18</td>
<td>18</td>
<td>30</td>
<td>3.50</td>
<td>2.0</td>
<td>60</td>
<td>16</td>
<td>4</td>
</tr>
<tr>
<td>PS-VII</td>
<td>290.3</td>
<td>0.313</td>
<td>21</td>
<td>21</td>
<td>33</td>
<td>3.50</td>
<td>2.0</td>
<td>60</td>
<td>16</td>
<td>4.5</td>
</tr>
<tr>
<td>PS-VIII</td>
<td>338.0</td>
<td>0.313</td>
<td>23</td>
<td>23</td>
<td>35</td>
<td>3.50</td>
<td>2.0</td>
<td>60</td>
<td>17</td>
<td>4.5</td>
</tr>
<tr>
<td>PS-IX</td>
<td>400.9</td>
<td>0.313</td>
<td>25</td>
<td>25</td>
<td>38</td>
<td>4.0</td>
<td>3.25</td>
<td>60</td>
<td>17</td>
<td>5</td>
</tr>
<tr>
<td>PS-X</td>
<td>469.1</td>
<td>0.313</td>
<td>27</td>
<td>27</td>
<td>35</td>
<td>4.0</td>
<td>3.25</td>
<td>60</td>
<td>18</td>
<td>5</td>
</tr>
</tbody>
</table>

### FOUNDATION NOTES:

The foundations for Steel Strain Poles are designed based upon the following conservative soil criteria which covers the great majority of soil types found in Florida:

- **Classification:** Cohesiveless (Fine Sand)
- **Friction Angle:** 30 Degrees (30°)
- **Unit Weight:** 50 pcf (assumed saturated)
- **Standard Development:** Openings for the soil types of the specific site location to be of lesser strength properties should an analysis be required. Auger borings, SPT borings or CPT soundings may be utilized as needed to verify the assumed soil properties; and at relatively uniform sites, a single boring or sounding may cover several foundations. Furthermore, borings in the area that were performed for other purposes may be used to confirm the assumed soil properties.

### BASE AND FOUNDATION DETAILS AND TABLE OF VARIABLES
NOTE: A properly sized Service Head (Weather Head) shall be installed and fastened securely on the standard pipe for each pole location. At locations other than service entrance, the service head face is to be left closed to outside atmosphere. Service entrance installation per Index No. 17723.

### POLE TOP NOTE:
Any combination of the above two options may be used, provided both lifting and wiring is accommodated.

**POLE TOP CUT-AWAY (Option 'a')**
- Cast Aluminum Pole top cap
- Ø 1/4 thick held in place with 3 stainless steel screws
- Ø 1/2 min. Ø Bolt
- Flat Washer
- Hole Cap Plate

**POLE TOP CUT-AWAY (Option 'b')**
- Ø 1/2 min. Ø Bolt
- Full Penetration Weld
- Partial Penetration Weld
- Tack Welded
- Cover Clip (Typ.)

**TOP VIEW**
- Ø 1/2 lifting Bar with ( bolt size + 1/2") Ø hole and matching flat tack welded to underside of bar
- Ø 1/4 Hand
- 2" Hook for wiring
- Ø 1/4 Hand
- 2" Hook for wiring

**VIEW E-E**

**SECTIONS D-D (thru Hand Hole)**
- Ø 2" hole for Ø 1/4" Bolt
- Ø 3/8" Ø Bolt with Nut, (ace Nut and Flat Washers Typ.)
- Ø 2" hole for Ø 1/4" Bolt

**CATEenary AND MESSENGER WIRE CLAMPS**
NOTE: Clamps have been sized for Design Cable Loads shown in the Table, and a Maximum Pole Diameter at the Clamp Location of 2'-1".

<table>
<thead>
<tr>
<th>Diameter (in.)</th>
<th>Minimum Breaking Strength (kip)</th>
<th>Plate Thickness (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2</td>
<td>25</td>
<td>1</td>
</tr>
<tr>
<td>1/4</td>
<td>11.5</td>
<td>3/8</td>
</tr>
<tr>
<td>3/8</td>
<td>5</td>
<td>1/4</td>
</tr>
<tr>
<td>1/4</td>
<td>3.15</td>
<td>3/8</td>
</tr>
</tbody>
</table>

**ATTACHMENT DETAILS**

**VIEW E-E**
- Ø 2" hole for Ø 1/4" Bolt
- Ø 3/8" hole for Ø 1/4" Bolt
- Stainless Steel Passivated Cotter Pin

**CAST Aluminum Pole Top Cap**
- Ø 1/4 thick with 3 stainless steel screws

**POLE WALL**
- Ø 1/2" Ø Hole for 2" (nominal) Ø Schedule 80 Pipe

**INDEX NO.**
17723

**FOOT 2014**
DESIGN STANDARDS
STEEL STRAIN POLE

**FREQUENCY OF USE**
3 of 3
GENERAL NOTES:

Materials:
Concrete: Class V Special or Class VI 8 ksi minimum at 28 days
4 ksi minimum at transfer
Prestressed Strands: ASTM A416 Grade 270 stress relieved or low relaxation
Spiral Reinforcing: ASTM A62 cold-drawn steel wire

Provide a minimum concrete cover of 1 inch.

For spiral reinforcing, one turn is required for splices and two turns are required at both the tip and butt ends of the pole.

The design Front Face and Back Face of poles may vary transversely from the section shown by ± 1/16 to assist with removal from forms. Balance addition and subtraction of face widths to maintain section areas shown.

Provide hand hole and coupler cover plates made of non-corrosive materials. Attach cover plates to poles using lead anchors or threaded inserts embedded in the poles in conjunction with round headed chrome plated screws.

Tie ground wires to the interior of reinforcing steel as necessary to prevent displacement during concreting operations.

Provide Aluminum Identification Markings on the poles where indicated on the following sheets. Include the following information using inset numerals with 1" height or as approved in the Producer’s Quality Control Plan:

Financial Project ID
Pole Manufacturer
Standard Pole Type Number
Pole Length (L)

Pick-up and support locations shown may vary with a tolerance of ± 3".

This Design Standard is considered fully detailed and no shop drawings are necessary. Submit shop drawings for minor modifications not detailed in the plans.

Cut the tip end of the prestressed strand first or simultaneously with the butt end.

INSTALLATION NOTES:

If a two point attachment is required by the plans, provide an eye bolt hole for the messenger wire or field-drill at the location indicated in the plans. When required, field-drill the eyebolt hole for the tether wire prior to installation.
**LIGHTING AND TRAFFIC MONITORING POLES TYPE P-III**

**POLE ELEVATION**
(See Design Standard Index 17900 and Specification 744 for Modifications to Type P-III Poles Used at Traffic Monitoring Sites)

**STRAND LEGEND**
- Prestressed Strand
  0.00 In. Grade 210, 135
  43 Kips Before Transfer
  (4 strands total)

**NOTES:**
- Work this Index with the Strain Pole Schedule in the plans.
- Strands shown are continuous from Tip End to Butt End.
- Elevation view scale is exaggerated vertically for clarity.
- For final erection, tilt pole upright with single point attachment located a distance 33.3% L from Tip End face.
- Taper includes pole width, strands, reinforcing and void.
- Support locations are for strand release, storage, lifting and transport. Keep Back Face oriented downward until final erection.
- Dimension may vary from 23' to 33' to accommodate smaller radius of optional stepped (PVC) void. The void diameter shall not be less than 23'.

**POLE ELEVATION**
(See Design Standard Index 17900 and Specification 744 for Modifications to Type P-III Poles Used at Traffic Monitoring Sites)

**STRAND LEGEND**
- Prestressed Strand
  0.00 In. Grade 210, 135
  43 Kips Before Transfer
  (4 strands total)

**NOTES:**
- Work this Index with the Strain Pole Schedule in the plans.
- Strands shown are continuous from Tip End to Butt End.
- Elevation view scale is exaggerated vertically for clarity.
- For final erection, tilt pole upright with single point attachment located a distance 33.3% L from Tip End face.
- Taper includes pole width, strands, reinforcing and void.
- Support locations are for strand release, storage, lifting and transport. Keep Back Face oriented downward until final erection.
- Dimension may vary from 23' to 33' to accommodate smaller radius of optional stepped (PVC) void. The void diameter shall not be less than 23'.
CONCRETE POLES

REV: 07/01/13

DESCRIPTION:

POLE ELEVATION
(Strands and Reinforcing Not Shown)

SPIRAL REINFORCING ELEVATION
(Strands, Holes, and Fixtures Not Shown)

TIP END SECTION (TOP)
(For Dorman Strand Locations See Section A-A)

STRAIN LEGEND

- Prestressed Strand
  0.5 In. Grade 270, LRS
  31 Kips Before Transfer
  (6 strands total)

- Dorman Strand
  0.5 In. Grade 270, LRS
  (3 strands total)
  One 24' Splice Allowed Per Strand

NOTES:
Work this Index with the Strain Pole Schedule in the plans.
Strands shown are continuous from Tip End to Butt End.

Elevation view scale is exaggerated vertically for clarity.

For final erection, tilt pole upright with single point attachment located a distance 20% L from the Tip End face.

* Taper includes pole width, strands, reinforcing and void.

** Support locations are for strand release, storage, lifting and transport. Keep Back Face oriented downward until final erection.

*** Dimension may vary from 3" to 4" to accommodate smaller radius of optional stepped (PVC) void. The void diameter shall not be less than 2 1/2".

STRAIN POLE TYPE P-IV
SPRAL REINFORCING ELEVATION
(Strands, Holes, and Fixtures Not Shown)

POLE ELEVATION
(Strands and Reinforcing Not Shown)

STRAND LEGEND

- Prestressed Strand
  0.5 In. Grade 270, LRS
  31 Kips Before Transfer
  (8 strands total)

- Dormant Strand
  0.5 In. Grade 270, LRS
  4 strands total
  One 24" Splice Allowed Per Strand

NOTES:

Work this Index with the Strain Pole Schedule in the plans.

Strands shown are continuous from Tip End to Butt End.

Elevation view scale is exaggerated vertically for clarity.

For final erection, tilt pole upright with single point attachment
located a distance 32.5% L from the Tip End face.

* Taper includes pole width, strands, reinforcing and void.
  (0.081 In./Ft. per face)

** Support locations are for strand release, storage, lifting
  and transport. Keep Back Face oriented downward until
  final erection.

*** Dimension may vary from 3\(\frac{1}{4}\)" to 4\(\frac{1}{2}\)" to accommodate
  smaller radius of optional stepped (PVC) void. The void
  diameter shall not be less than 4".

STRAIN POLE TYPE P-V

INDEX NO. 17725

5 of 8
**CONCRETE POLES**

**SPiral Reinforcing ElevatIon**

(Strands, Holes, and Fixtures Not Shown)

- 24" Ø Galv. Nipple (On Q)
  - (One-Wire System Only)
- 24" No. 6 Bare Copper Ground Wire
- 6" Pitch

**Pole Height Dim. H**

**Pole Length Dim. L**

**POLE ELEVATION**

(Strands and Reinforcing Not Shown)

- #5 Gauge Spiral Reinforcing
- 10'-0" from Top
- 12" Void & Section
- Face

**STRAND LEGEND**

- Prestressed Strand
  - 0.5 In. Grade 270, LRS
  - 31 Kips Before Transfer
  - (8 strands total)
- Dormant Strand
  - 0.5 In. Grade 270, LRS
  - (16 strands total)

**TIP END SECTION (TOP)**

(For Dormant Strand Locations, See Section A-A)

- Front Face (Roadway)
- Identification Markings
- Front Face (Roadway)

**SECTION A-A**

(Typical Square Section)

**NOTES:**

Work this Index with the Strain Pole Schedule in the plans.

Strands shown are continuous from Tip End to Butt End.

Elevation view scale is exaggerated vertically for clarity.

For final erection, tilt pole upright with single point attachment located a distance 10% L from Tip End Face.

- Taper includes pole width, strands, reinforcing and void.
  (0.001 In./Ft. per face)
- Support locations are for strand release, storage, lifting and transport. Keep Back Face oriented downward until final erection.
- Dimension may vary from 3" to 4" to accommodate a smaller radius of optional stepped (PVC) void. The void diameter shall not be less than 6".

**Strain Pole Type P-VI**

**REV ISIO N**

C:\\Projects\\standards\\roadway\\17700-s\\17725-06.dgn

**DESCRIPTION:**

FDOT 2014 DESIGN STANDARDS

**INDEX NO.**

17725

**CONCRETE POLES**

**SHEET NO.**

6 of 8
**Spiral Reinforcing Elevation**

(Strands, Holes, and Fixtures Not Shown)

**Pole Elevation**

(Strands and Reinforcing Not Shown)

**Strand Legend**

- Prestressed Strand 0.5 In Grade 270, LRS 31 Kips Before Transfer (10 strands total)
- Dormant Strand 0.5 In Grade 270, LRS (6 strands total)
  - One 24" Splice Allowed Per Strand

---

**Notes:**

- Work this Index with the Strain Pole Schedule in the plans.
- Strands shown are continuous from Tip End to Butt End.
- Elevation view scale is exaggerated vertically for clarity.
- For final erection, tilt pole upright with single point attachment located a distance 10% L from the Tip End face.
- Taper includes pole width, strands, reinforcing and void.
- Support locations are for strand release, storage, lifting and transport. Keep Back Face oriented downward until final erection.
- Dimension may vary from 3/8" to 5" to accommodate smaller radius of optional stepped (PVC) void. The void diameter shall not be less than 6".

---

**Strain Pole Type P-VII**
SPIRAL REINFORCING ELEVATION
(Strands, Holes, and Fixtures Not Shown)

POLE ELEVATION
(Strands and Reinforcing Not Shown)

STRAIN POLE TYPE P-VIII

TIP END SECTION (TOP)
(For Dormant Strand Locations, See Section A-A)

SECTION A-A
(Typical Square Section)

NOTES:

Work this Index with the Strain Pole Schedule in the plans.
Strands shown are continuous from Tip End to Butt End.

Elevation view scale is exaggerated vertically for clarity.

For final erection, tilt pole upright with single point attachment located a distance 10% L from the Tip End face.

* Taper includes pole width, strands, reinforcing and void.

** Support locations are for strand release, reinforcement and void.

*** Dimension may vary from 3\(\frac{1}{2}\) to 5\(\frac{1}{2}\) to accommodate smaller radius of optional stepped (PVC) void. The void diameter shall not be less than \(8\frac{1}{8}\).
Notes:
1. With the approval of the resident engineer, the service head hole for joint use poles may be drilled by the utility company at an angle of 90° but not less than 45° to the face of the pole.
2. Lashing wire should normally be used for distances of 12' or greater.
3. All hardware for signal attachment shall be stainless steel.
4. Meet all grounding requirements of Section 620 of the Standard Specifications.
Notes:

1. This drawing is representative of a Proprietary Pivotal Adjustable Hanger Assembly listed on the Department’s Approved Products List (APL). For specific details and requirements see the vendor drawings on the APL at www3.dot.state.fl.us/trafficcontrolproducts/. The proprietary pivotal adjustable hanger assembly shall be assembled in accordance with the manufacturer’s detailed drawings, procedures and specifications.

2. With the approval of the resident engineer, the service head hole for joint use poles may be drilled by the utility company at an angle of 90° but not less than 45° to the face of the pole.

3. Lashing wire should normally be used for distances of 12’ or greater.

4. The overlapped connection of adjustable hangers shall use a minimum of 2 bolts with a minimum spacing of 2” between bolts.

5. Meet all grounding requirements of Section 620 of the Standard Specifications.
DESCRIPTION:

AERIAL INTERCONNECT

Cable Suspension Clamp

UL Approved Split Bolt Connector

Locking Cable Ties Or Lashing Wire

Interconnect Cable

No. 6 Stranded Copper Ground Wire

FIGURE A
CABLE DROP AND TERMINATION DETAIL
AERIAL INTERCONNECT FIGURE "8"

FIGURE B
CABLE DROP AND TERMINATION DETAIL
AERIAL INTERCONNECT MESSENGER WIRE WITH CLAMPS

Notes:

1. The messenger wire of the interconnect cables shall be grounded to the copper ground wire of the pole or to the external wire extending down the pole.

2. When utilizing the external ground wire to the pole, a piece of 12" conduit shall extend up the pole externally to a point above finish grade to protect the ground wire connecting the messenger wire to the ground rod.

3. Locking cable ties or lashing wire when used shall be placed no further than 12" apart except at the point of cable drop or terminations where one (1) shall be placed at the point where the cables separate from the messenger wire and another placed 4" (max) from that tie. When using Figure "8" interconnect cable only the locking cable ties shall be used.

4. If accessible the internal ground wire of the support pole may be used to ground the messenger wire.

5. Lashing wire should normally be used for distances of 12' or greater.

6. Meet all grounding requirements of Section 620 of the Standard Specifications.

FIGURE C
CABLE DROP DETAIL
AERIAL INTERCONNECT MESSENGER WIRE WITH CLAMPS
NOTES:

1. The lightning arrester can be located on the side or bottom of the main disconnect enclosure at the Contractor's option.

2. Liquidtight flexible conduit is approved for use from the electrical disconnect to the cabinet when both are installed on the same pole.

3. Bond all elements together to form an Intersection Grounding Network in accordance with Section 620 of the Department's current Standard Specifications for Road and Bridge Construction. The bond wire shall be run in conduit with the Electrical Service Wire or Signal Cable.

4. Meet all grounding requirements of Section 620 of the Standard Specifications.

5. The Main Disconnect shall be lockable by padlock and four keys provided to the maintaining agency. The door shall have a minimum of three hinges and be lockable. No screws to be used to attach door.

6. The Main Disconnect shall be Nema 3R or better.
### Pole Selection Table - Single Arm - With & Without Luminaires

<table>
<thead>
<tr>
<th>Pole Type</th>
<th>D1</th>
<th>D3</th>
<th>D5</th>
<th>D6</th>
<th>D7</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>51</td>
<td>52</td>
<td>S1</td>
<td>S4</td>
<td>S6</td>
</tr>
<tr>
<td>S2</td>
<td>S2</td>
<td>S3</td>
<td>S4</td>
<td>S4</td>
<td>S5</td>
</tr>
<tr>
<td>S3</td>
<td>S4</td>
<td>S4</td>
<td>S4</td>
<td>S5</td>
<td>S6</td>
</tr>
</tbody>
</table>

Arm 1 is listed first.

### Pole Selection Table - Double Arm - Without Luminaires

<table>
<thead>
<tr>
<th>Pole Type</th>
<th>D1</th>
<th>D3</th>
<th>D5</th>
<th>D6</th>
<th>D7</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>51</td>
<td>52</td>
<td>S1</td>
<td>S4</td>
<td>S6</td>
</tr>
<tr>
<td>S2</td>
<td>S2</td>
<td>S3</td>
<td>S4</td>
<td>S4</td>
<td>S5</td>
</tr>
<tr>
<td>S3</td>
<td>S4</td>
<td>S4</td>
<td>S4</td>
<td>S5</td>
<td>S6</td>
</tr>
</tbody>
</table>

### Arm Design Table - All Cases

<table>
<thead>
<tr>
<th>Arm Type</th>
<th>Arm Length</th>
<th>MAST ARM</th>
<th>ARM EXTENSION</th>
<th>ARM CONNECTION &amp; WELDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1</td>
<td>36'-0&quot;</td>
<td>36.99</td>
<td>14</td>
<td>0.1793</td>
</tr>
<tr>
<td>D2</td>
<td>36'-0&quot;</td>
<td>36.90</td>
<td>14</td>
<td>0.1793</td>
</tr>
<tr>
<td>D3</td>
<td>46'-0&quot;</td>
<td>36.1</td>
<td>14</td>
<td>0.1793</td>
</tr>
<tr>
<td>D4</td>
<td>46'-0&quot;</td>
<td>36.1</td>
<td>14</td>
<td>0.1793</td>
</tr>
<tr>
<td>D5</td>
<td>60'-0&quot;</td>
<td>35.8</td>
<td>13</td>
<td>0.1793</td>
</tr>
<tr>
<td>D6</td>
<td>78'-0&quot;</td>
<td>39.1</td>
<td>15</td>
<td>0.1793</td>
</tr>
</tbody>
</table>

Arm Camber Angle = 2 degrees

### Pole, Connection and Shaft Design Table - Single & Double Arm

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>25</td>
<td>12.53</td>
<td>16</td>
<td>0.375</td>
<td></td>
<td>6</td>
<td>30</td>
<td>2.5</td>
<td>1.75</td>
<td>36</td>
<td>0</td>
<td>20</td>
<td>25</td>
<td>0.75</td>
<td>0.438</td>
<td>15.5</td>
<td>1</td>
<td>2</td>
<td>8</td>
<td>0.438</td>
<td>12</td>
<td>4</td>
<td>11</td>
<td>14</td>
<td>9</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S2</td>
<td>25</td>
<td>14.53</td>
<td>16</td>
<td>0.375</td>
<td></td>
<td>6</td>
<td>30</td>
<td>2.5</td>
<td>1.75</td>
<td>36</td>
<td>0</td>
<td>20</td>
<td>25</td>
<td>0.75</td>
<td>0.438</td>
<td>15.5</td>
<td>1</td>
<td>2</td>
<td>8</td>
<td>0.438</td>
<td>12</td>
<td>4</td>
<td>11</td>
<td>14</td>
<td>9</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S3</td>
<td>25</td>
<td>17.53</td>
<td>21</td>
<td>0.375</td>
<td></td>
<td>6</td>
<td>37</td>
<td>2.5</td>
<td>2.5</td>
<td>36</td>
<td>0</td>
<td>30</td>
<td>36</td>
<td>0.75</td>
<td>0.438</td>
<td>22</td>
<td>1.25</td>
<td>2</td>
<td>12.5</td>
<td>0.438</td>
<td>15</td>
<td>4.5</td>
<td>11</td>
<td>16</td>
<td>10</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S4</td>
<td>25</td>
<td>22.53</td>
<td>26</td>
<td>0.375</td>
<td></td>
<td>6</td>
<td>42</td>
<td>2.5</td>
<td>2.5</td>
<td>40</td>
<td>0</td>
<td>30</td>
<td>36</td>
<td>0.75</td>
<td>0.438</td>
<td>22</td>
<td>1.25</td>
<td>2</td>
<td>12.5</td>
<td>0.438</td>
<td>17</td>
<td>5</td>
<td>11</td>
<td>18</td>
<td>10</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S5</td>
<td>25</td>
<td>23.53</td>
<td>27</td>
<td>0.375</td>
<td></td>
<td>6</td>
<td>45</td>
<td>2.5</td>
<td>2.5</td>
<td>45</td>
<td>0</td>
<td>30</td>
<td>36</td>
<td>0.75</td>
<td>0.438</td>
<td>22</td>
<td>1.25</td>
<td>2</td>
<td>12.5</td>
<td>0.438</td>
<td>18</td>
<td>5</td>
<td>11</td>
<td>18</td>
<td>10</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S6</td>
<td>25</td>
<td>21.53</td>
<td>25</td>
<td>0.375</td>
<td></td>
<td>6</td>
<td>41</td>
<td>2.5</td>
<td>2.5</td>
<td>40</td>
<td>0</td>
<td>30</td>
<td>34</td>
<td>0.75</td>
<td>0.5</td>
<td>16.5</td>
<td>1.25</td>
<td>2</td>
<td>12.5</td>
<td>0.5</td>
<td>15</td>
<td>5</td>
<td>11</td>
<td>18</td>
<td>10</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
#### Luminaire and Luminaria Data

<table>
<thead>
<tr>
<th>Luminaire Type</th>
<th>LA (ft)</th>
<th>LB (ft)</th>
<th>LC (in)</th>
<th>LD (in)</th>
<th>LE</th>
<th>LF (ft)</th>
<th>LG (in)</th>
<th>LH (in)</th>
<th>LI (in)</th>
<th>LK (in)</th>
<th>LL (deg)</th>
<th>UG (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1</td>
<td>40</td>
<td>10</td>
<td>3</td>
<td>0.125</td>
<td>0.5</td>
<td>8</td>
<td>0.5</td>
<td>0.75</td>
<td>0.25</td>
<td>0</td>
<td>37.5</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1. Work this index with Index No. 17745.
2. Design Wind Speed = 150 mph with Signal Backplates.
### POLE SELECTION TABLE - SINGLE ARM - WITH & WITHOUT LUMINAIRE

<table>
<thead>
<tr>
<th>ARM TYPE</th>
<th>E1</th>
<th>E2</th>
<th>E3</th>
<th>E4</th>
<th>E5</th>
<th>E6</th>
<th>E7</th>
</tr>
</thead>
<tbody>
<tr>
<td>POLE TYPE</td>
<td>T1 &amp; T21 Lum</td>
<td>T2 &amp; T22 Lum</td>
<td>T3 &amp; T23 Lum</td>
<td>T4 &amp; T24 Lum</td>
<td>T6 &amp; T25 Lum</td>
<td>T7 &amp; T26 Lum</td>
<td>T8 &amp; T27 Lum</td>
</tr>
</tbody>
</table>

**Arm 1 is listed first.**

### POLE SELECTION TABLE - DOUBLE ARM - WITHOUT LUMINAIRE

<table>
<thead>
<tr>
<th>ARM TYPE</th>
<th>E1</th>
<th>E2</th>
<th>E3</th>
<th>E4</th>
<th>E5</th>
<th>E6</th>
<th>E7</th>
</tr>
</thead>
<tbody>
<tr>
<td>POLE TYPE</td>
<td>T1</td>
<td>T2</td>
<td>T3</td>
<td>T4</td>
<td>T5</td>
<td>T6</td>
<td>T7</td>
</tr>
</tbody>
</table>

### ARM DESIGN TABLE - ALL CASES

<table>
<thead>
<tr>
<th>ARM TYPE</th>
<th>ARM LENGTH</th>
<th>MAST ARM (in)</th>
<th>ARM EXTENSION</th>
<th>ARM CONNECTION &amp; WELDS (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1</td>
<td>36'-0&quot;</td>
<td>36.0 5.99</td>
<td>11 0.25</td>
<td>22 2 2</td>
</tr>
<tr>
<td>E2</td>
<td>36'-0&quot;</td>
<td>36.0 5.99</td>
<td>11 0.25</td>
<td>30 32 2.75</td>
</tr>
<tr>
<td>E3</td>
<td>46'-0&quot;</td>
<td>35.1 7.09</td>
<td>12 0.25</td>
<td>22 12.12 13 0.313 22 33 2</td>
</tr>
<tr>
<td>E4</td>
<td>46'-0&quot;</td>
<td>35.1 7.09</td>
<td>12 0.25</td>
<td>30 32 2.75</td>
</tr>
<tr>
<td>E5</td>
<td>60'-0&quot;</td>
<td>34.8 6.13</td>
<td>11 0.25</td>
<td>37.2 10.22 14 0.375 30 32 2.75</td>
</tr>
<tr>
<td>E6</td>
<td>70'-0&quot;</td>
<td>38.1 6.66</td>
<td>12 0.25</td>
<td>34.4 11.22 16 0.375 30 32 2.75</td>
</tr>
<tr>
<td>E7</td>
<td>78'-0&quot;</td>
<td>40.0 7.47</td>
<td>13 0.07</td>
<td>1.793 40 12.43 18 0.375 30 32 2.5</td>
</tr>
</tbody>
</table>

Arm Camber Angle = 2 degrees

### POLE, CONNECTION AND SHAFT DESIGN TABLE - SINGLE & DOUBLE ARM

#### UPRIGHT BASE CONNECTION

| POLE TYPE | UA (ft) | UC (in) | UD (in) | UE (in) | WG (ft) | No. Batts | BA (in) | BB (in) | BC (in) | BF (in) | HT (in) | FJ/ST (in) | FS/SS (in) | FT/ST (in) | FN/SH (in) | DA (ft) |
|-----------|--------|--------|--------|--------|--------|----------|--------|--------|--------|--------|--------|-----------|-----------|-----------|-----------|---------|--------|
| T1        | 25     | 10.53  | 14     | 0.375  | 6      | 26        | 2.5    | 1.5    | 5.5    | 11     | 22     | 0.5 0.375  | 14        | 1         | 2.0 0.375  | 12      |
| T2        | 25     | 12.53  | 16     | 0.375  | 6      | 28        | 2.5    | 1.5    | 5.5    | 11     | 22     | 0.5 0.375  | 14        | 1         | 2.0 0.375  | 12      |
| T3        | 25     | 15.53  | 19     | 0.375  | 6      | 35        | 2.5    | 2.0    | 2.0    | 30     | 32     | 0.375      | 19.5      | 1.25      | 2.25 0.375 | 12      |
| T4        | 25     | 18.53  | 22     | 0.5    | 6      | 38        | 2.5    | 2.0    | 2.0    | 30     | 32     | 0.375      | 19.5      | 1.25      | 2.25 0.375 | 15      |
| T5        | 25     | 18.53  | 22     | 0.5    | 6      | 38        | 2.5    | 2.0    | 2.0    | 30     | 32     | 0.375      | 19.5      | 1.25      | 2.25 0.375 | 16      |
| T6        | 25     | 18.53  | 22     | 0.5    | 6      | 38        | 2.5    | 2.0    | 2.0    | 30     | 32     | 0.375      | 19.5      | 1.25      | 2.25 0.375 | 14.5    |
| T21 Lum   | 39     | 8.54   | 14     | 0.375  | 37.5   | 26        | 2.5    | 1.5    | 4.0    | 22     | 22     | 0.5 0.375  | 10        | 1         | 2.0 0.375  | 11      |
| T22 Lum   | 39     | 10.04  | 16     | 0.375  | 37.5   | 30        | 2.5    | 1.75   | 4.0    | 22     | 22     | 0.5 0.375  | 11        | 1         | 2.0 0.375  | 12      |
| T23 Lum   | 39     | 13.54  | 19     | 0.375  | 37.5   | 35        | 2.5    | 2.0    | 2.0    | 30     | 32     | 0.375      | 13        | 1.25      | 2.25 0.375 | 12      |
| T24 Lum   | 39     | 16.54  | 22     | 0.375  | 37.5   | 38        | 2.5    | 2.0    | 2.0    | 30     | 32     | 0.375      | 15        | 1.25      | 2.25 0.375 | 14.5    |

#### CONNECTION PLATE DATA

<table>
<thead>
<tr>
<th>POLE TYPE</th>
<th>DA (ft)</th>
<th>DB (ft)</th>
<th>RA</th>
<th>BB</th>
<th>NC</th>
<th>RD (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>12</td>
<td>14</td>
<td>8</td>
<td>12</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>T2</td>
<td>12</td>
<td>14</td>
<td>8</td>
<td>12</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>T3</td>
<td>12</td>
<td>14</td>
<td>8</td>
<td>12</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>T4</td>
<td>12</td>
<td>14</td>
<td>8</td>
<td>12</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>T5</td>
<td>12</td>
<td>14</td>
<td>8</td>
<td>12</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>T6</td>
<td>12</td>
<td>14</td>
<td>8</td>
<td>12</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>T21 Lum</td>
<td>11</td>
<td>14</td>
<td>8</td>
<td>12</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>T22 Lum</td>
<td>12</td>
<td>14</td>
<td>8</td>
<td>12</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>T23 Lum</td>
<td>12</td>
<td>14</td>
<td>8</td>
<td>12</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>T24 Lum</td>
<td>14.5</td>
<td>16</td>
<td>10</td>
<td>8</td>
<td>12</td>
<td>9</td>
</tr>
</tbody>
</table>

#### DRILLED SHAFT DATA

<table>
<thead>
<tr>
<th>POLE TYPE</th>
<th>DA (ft)</th>
<th>DB (ft)</th>
<th>RA</th>
<th>BB</th>
<th>NC</th>
<th>RD (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>12</td>
<td>14</td>
<td>8</td>
<td>12</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>T2</td>
<td>12</td>
<td>14</td>
<td>8</td>
<td>12</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>T3</td>
<td>12</td>
<td>14</td>
<td>8</td>
<td>12</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>T4</td>
<td>12</td>
<td>14</td>
<td>8</td>
<td>12</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>T5</td>
<td>12</td>
<td>14</td>
<td>8</td>
<td>12</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>T6</td>
<td>12</td>
<td>14</td>
<td>8</td>
<td>12</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>T21 Lum</td>
<td>11</td>
<td>14</td>
<td>8</td>
<td>12</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>T22 Lum</td>
<td>12</td>
<td>14</td>
<td>8</td>
<td>12</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>T23 Lum</td>
<td>12</td>
<td>14</td>
<td>8</td>
<td>12</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>T24 Lum</td>
<td>14.5</td>
<td>16</td>
<td>10</td>
<td>8</td>
<td>12</td>
<td>9</td>
</tr>
</tbody>
</table>

#### LUMINAIRE AND LUMINAIRE CONNECTION

<table>
<thead>
<tr>
<th>LA (ft)</th>
<th>LB (ft)</th>
<th>LC (in)</th>
<th>LD (in)</th>
<th>LE</th>
<th>LF (ft)</th>
<th>LG (in)</th>
<th>LH (in)</th>
<th>LI (in)</th>
<th>LK (in)</th>
<th>LL (deg)</th>
<th>LG (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>10</td>
<td>3</td>
<td>0.375</td>
<td>0.5</td>
<td>8</td>
<td>0.375</td>
<td>0.25</td>
<td>0.25</td>
<td>0</td>
<td>37.5</td>
<td>37.5</td>
</tr>
</tbody>
</table>

### Notes:
1. Work this Index with Index No. 17745.
2. Design Wind Speed = 150 mph without Signal Backplates.
3. 130 mph with or without Signal Backplates.
4. 110 mph with or without Signal Backplates.
5. "E" MAST ARMS
Mast Arm Assemblies General Notes

1) Signal Structure Materials shall be as follows:
   - Poles & Mast Arms: ASTM A1011 Grade 50, 55, 60 or 65 (less than 2") or ASTM A327 Grade 50, 55, 60 or 65 (2" and over) or ASTM A395 Grade A (5 ksi yield) or Grade B (60 ksi yield)
   - Steel Plates: ASTM A36
   - Welded Metal: ET/EX
   - Anchor Bolts: ASTM A490 Type A
   - Nut Covers: ASTM A230 or ASTM A734
   - Stainless Steel Screws: AISI Type 316
   - Threaded Bar/Study: ASTM A325 Type 1

2) Reinforcing Steel shall be ASTM A615 Grade 60 ksi.

3) Concrete shall be Class IV (Drilled Shaft) with a minimum 28-day compressive strength of 5,000 psi for all environmental classifications.


5) All steel items shall be galvanized as follows:
   - All Nuts, Bolts, Washers and Threaded Bars/Studs: ASTM A325 Type 1
   - All other steel items (including Pole & Mast Arm): ASTM A490

6) Locate handhole 180° from arm on single arm poles or 180° from first arm of double arm poles or see special instructions on Mast Arm Tabulation Sheet.

7) Except for Anchor Bolts, all bolt hole diameters shall be equal to the bolt diameter plus 0.08, prior to galvanizing. Hole diameters for Anchor Bolts shall not exceed the bolt diameter plus 0.08.

8) Sign Panels and Signals attached to the Mast Arm shall be centered in elevation on the arm. Wire access holes shall not exceed 1" in diameter.

9) Mast Arms and Poles shall be tapered with the diameter changing at a rate of 0.14 inch per foot.

10) The pole shall be installed vertically. Camber shall be accounted for in the Mast Arm connection as detailed.

11) If a Mast Arm damping device is required by the Engineer, it shall be installed within eight feet of the Mast Arm tip.


13) Provide "Y", or "C"-Hook at top of pole for signal cable support.

14) First and Second Arm Camber Angle = 2°.

15) Details for Signal and Sign Locations, Signal Head attachment, Sign Attachment, Pedestrian Head Attachment, and Foundation Conduct are not shown for clarity.

16) Use of split lock washer is not permitted.

17) This Design Standard is considered fully detailed and no shop drawings are necessary. Submit shop drawings for other modifications not detailed in the plans.

18) Verify CSL access tubes will not interfere with anchor bolt installation before excavating the shaft. When CSL access tube locations conflict with anchor bolt locations, move the CSL access tube location +/- two inches along the inner circumference of the reinforcing cage. Notify the Engineer before excavating the shaft if the CSL access tube locations cannot be moved out of conflict with anchor bolt locations.

TYPICAL ELEVATION AND NOTES

**NOTE:** Contractor shall verify this Dimension prior to fabrication of Pole.

**U B** (See Plans)

**U A** (See Index 17743)

**FE** (See Plans)

**SO** (See Sheet 1)

**SE** (See Sheet 4)

**SA** + **SE** - Splice

0.14 in/ft Taper, Typ.

0.125" 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:

- **MASS ARM ASSEMBLIES**
- **Financial Project ID**
- **Manufacturer's Name**
- **Arm Type**
- **Pole Type**
- **Standard Design**
- **Special Design**
- **Edition**

FDOT 2014 DESIGN STANDARDS

LAST REVISION
07/01/13

DESCRIPTION

INDEX NO.
17745

SHEET NO.
1 of 5
TYPICAL FOUNDATION AND BASE PLATE DETAILS

SECTION D-D

Section A-A

Section C-C

Section C-C (Alternate Detail)

Section E-E

FOUNDATION PLAN

BASE PLATE AND ANCHORAGE ELEVATION

(Typical Foundation & Base Plate Details)

5"

Base Plate and Anchorage Elevation

(Reinforcement Not Shown)

(CB) Anchor Bolt

Drilled Shaft

2'-6"

"D B" Anchor Bolts Equally Spaced

"BC" Anchor Bolts Equally Spaced

Base Plate, and Pole

Center of Drilled Shaft: Base Plate, and Pole

CENTER OF DRILLED SHAFT: BASE PLATE, AND POLE

CENTER OF DRILLED SHAFT: BASE PLATE, AND POLE

SECTION C-C (6 Anchor Bolts)

SECTION C-C (8 Anchor Bolts)

Partial Penetration Weld

Full Penetration Weld

8" Terminal Compartment Frame

6" Stainless Steel Hex Head Screws, Typ.

11 gauge Waterproof Cover, Cover shall Have Waterproof Outside

Handhole Cover

11 gauge Waterproof Compartment Cover, Cover shall have Waterproof Gasket

Weld Detail See Joint Details

Handhole Opening

Drilled Shaft

Diameter (Max)

(1) Bolt

Leveling Nut

Nut Cover (Not Shown) For Each Bolt

Double Nuts, Top Nut May be Partial Nuts, (Typ.)

Drilled Shaft

Center of Drilled Shaft, See Drilled Shaft Details

Center of Drilled Shaft

Center of Drilled Shaft: Base Plate, and Pole

Drilled Shaft

"BB" Anchor Bolt

"BC" Anchor Bolt

"BC" Anchor Bolt

11 Gage Terminal Compartment Cover

Bolt to frame with 4-1/2" stainless steel screws.

Bolt to frame with 4-1/2" stainless steel screws.

Handhole Cover may be included when Terminal Compartment is provided.

NOTE: See Index No. 17743 and the plan for actual quantity of bolts

NOTE: See Index No. 17743 and the plan for actual quantity of bolts
TYPICAL SINGLE ARM CONNECTION DETAILS

MAST ARM ASSEMBLIES

FDOT 2014
DESIGN STANDARDS

LAST REVISION 07/01/13

Mast Arm and Connection Plates shall be match marked to ensure proper assembly.

1. 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.

2. Mast Arm and Connection Plates shall be match marked to ensure proper assembly.

NOTE:

- **SECTION F-F**
- **SECTION H-H**
- **SECTION G-G**
- **DETAIL I**
- **DETAIL J**

**ELEVATION**
(Single Arm Connection)

**JOINT WELD DETAIL**

**DETAIL F**

- **Splice = 2"** (nominal)
- The 'Slip Joint' splice shall be a light fit with no change in the Mast Arm slope due to the splice.

**Arm Splice Detail**

- **6" Dia. Threaded Bar/ Stud with Self Locking Nut**
- **Inside Radius to Flat**
- **Min. Break Radius = 0.25 x Inside Radius**

**JOINT WELD DETAIL**

- **Seam Weld (Typ.)**
- **45°**

**DETAIL I**

- **Typ. Top and Bottom Plates**
- **Typ. Top and Bottom Plates**

- **Nylon Anchor**

**DETAIL J**

- **Base Plate**
- **Wall Thk.**
- **Hole Wiring 4" Dia.**
- **Wall Thk. + 1" Min.**
- **1" Min.**
- **Face of Arm Base Plate at 45°**
- **See DETAIL I**
- **See DETAIL J**

**SECTION G-G**

- **Six 797 Dia. Connection Bolts (map vary for Special Design)**
- **Connection Plate when fit exceeds 1/2"**
- **Provide Ultrasonic Testing for Lamellar Tearing in Connection Plate when fit exceeds 1/2"**

**SECTION H-H**

- **ArmPole**
- **Silicone Caulk**
- **1" Min.**
- **1/2" Backing Ring**
- **Typ. Top and Bottom Plates**
- **Typ. Top and Bottom Plates**

**SECTION F-F**

- **Center of Mast Arm and 4" Dia. Wiring Hole**
- **Break Radius Typical**
- **0.5 x Wall Thickness**
- **Wall Thk.**

**NOTE:**

**FDOT 2014**

**INDEX NO.**

**M AST ARM ASSEMBLIES**

**SHEET NO.**

**17745**

3 of 5
TYPICAL DOUBLE ARM CONNECTION DETAILS

NOTE:
1. 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.

2. Mast Arm and Connection Plates shall be match marked to ensure proper assembly.

FDOT 2014
DESIGN STANDARDS

MAST ARM ASSEMBLIES

LAST REVISION 01/01/12

17745 4 of 5
OPTION 2
(For Mast Arm Assembly)

OPTION 1
(For Span Wire Assembly)

NOTES:
1. Free-swinging, internally-illuminated street signs shall be installed on the signal pole for span wire assemblies. For mast arm assemblies the street sign may be installed on the arm or pole.

2. Free-swinging, internally-illuminated street signs shall meet the requirements of Section 899 of the Standard Specifications for Road and Bridge Construction.

3. Pole attachments and cantilever arm (or truss) assemblies may be accepted by Contractor certification provided the signs being supported meet the weight and area limitations included in Section 899 for "Acceptance by Certification".

4. Pole attachments and cantilever arm (or truss) assemblies supporting signs not meeting the weight or area limitations included in Section 899 for "Acceptance by Certification" require the submittal of structural calculations and Shop Drawings that have been prepared by and sealed by the Specialty Engineer.
DESCRIPTION:

Two-Way Adjustable Pedestrian Signal Assembly,

Wood Pole

Metal Strain Pole

Pedestrian Signal Assembly, Two-Way Adjustable

Pedestrian Signal Assembly, Two-Way Adjustable

Pedestrian Signal Assembly, Two-Way Adjustable

Pedestrian Signal Assembly, Two-Way Adjustable

Detailed specifications and notes are provided in the images. For example:

Notes:
1. As an option, the contractor will be allowed to install pedestrian signals on concrete poles and pedestals with the use of lead anchors (two bolts same size per hub) in lieu of the stranded steel bands.

2. Holes drilled or punched in metal poles or pedestals shall be thoroughly reamed, cleaned of all burrs and covered with two (2) coats of zinc rich paint as specified in the standard specifications for road and bridge construction. Grommets or bushings shall be installed in holes.

3. Meet all grounding requirements of Section 620 of the Standard Specifications.
TWISTED PAIR AND LOOP LEAD-IN INSTALLATION WITH CURB & GUTTER

ALTERNATIVE 1

Drill a hole through the curb at the point which the required saw-cut depth is obtained just prior to cutting the top inside edge of the curb. Slide a section of flexible conduit at least 6" into the hole from the back side of the curb but not within 2" of the top of the hole. The conduit shall fit snug within the drilled hole. Fill the top of the hole with loop sealant to the level of the curb surface. A nonmetallic material should be used to prevent excessive loop sealant from entering the flexible conduit.

ALTERNATIVE 2

Drill a hole 9" to 1" larger in diameter than the rigid conduit to be used through the roadway, asphalt (or concrete) surface and base. In an appropriate angle to intercept the trench or pull box hole. Place a premeasured length of rigid conduit in the hole and drive the conduit into the trench or hole. Install a molded bushing (nonmetallic) on the roadway end of the rigid conduit. The top of the rigid conduit shall be approximately 2" below the roadway surface. Fill the hole with loop sealant to the level of the roadway surface. A nonmetallic material should be used to prevent excessive loop sealant from entering the rigid conduit.

TWISTED PAIR AND LOOP LEAD-IN INSTALLATION WITHOUT CURB & GUTTER

Cut a slot in the edge of the roadway of sufficient size and depth to snugly place the end of the flexible conduit. The end of the conduit shall be at least 6" into the roadway and approximately 2" below the top of the roadway surface. The departure angle of the conduit from the roadway shall be 30° to 45°.

NOTE:

Other alternatives may be approved by the State Traffic Operations Engineer.
Loop lead-in wires should not be installed in the same pull box with signal power cable.

1. The "number of turns" indicates at the specified point on the loop refers to the number of passes of loop wires which are placed in the saw-cut forming the complete loop.

2. Loop types or details not drawn to scale.

3. Loop Types are centered in a single lane except Type E which is centered on two lanes.

4. The number of individual loops in the Type G loop may vary up to a maximum of four (4).

5. Lead-in may be connected to either end of loop.

6. The leading edge of loop Types A, C, D & F may extend past the stop line a maximum of 6'. The length of these loops may be extended to a maximum of 60'. Each intersection should be individually designed and if the modifications noted above is required it must be noted or detailed in the plans.

7. Loop lead-in wires should not be installed in the same pull box with signal power cable.
PEDESTRIAN DETECTOR ASSEMBLY
INSTALLATION DETAILS

**FIGURE A**
POLE MOUNTED DETECTOR STATION

**FIGURE B**
PEDESTAL STATION DETECTOR STATION

**FIGURE C**
POST DETECTOR STATION
DETECTOR STATION

**FIGURE D**

**FIGURE E**

Notes:
1. Payment for sign is included in the price for the pedestrian detector.
2. Signs shall be mounted above detectors, explaining their purpose and use.
3. The positioning of pedestrian push button should clearly indicate which crosswalk signal is actuated by each push button.
4. Push buttons and signs are to be mounted in compliance with Standard Specifications, Section 665.
5. Meet all grounding requirements of Section 620 of the Standard Specifications.
6. A 30°FAR landing is required centered on each push button.

Note To Designers:
The designer should ensure the distance to the Push Button in FIGURES A & B is maintained. This distance can vary depending on post or pedestal type or whether a frangible base is used and sidewalk configuration. This is specified to meet Americans with Disabilities Act.
Case I
Pole Parallel To Curbline
Alternate To Figure E

Case II
Pole Diagonal To Curbline
Alternate To Figure E

NOTE:
1. Refer to the MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES Figure 2B-26 Pedestrian Signs. The STANDARD HIGHWAY SIGNS MANUAL (English) Sign R10-3b for Text Size, Spacing and Symbol Size. Also see DESIGN STANDARDS Index 17355 for details of FTP signs.
**CABINET INSTALLATION DETAILS**

**METAL POLE**

**CONCRETE POLE**

**WOOD POLE**

**POLE MOUNTED CABINET**

**BASE MOUNTED**

**INTERCONNECT JUNCTION BOX**

**PEDESTAL MOUNTED**

---

**Notes:**

1. The number, size, and orientation of conduit sweeps will vary according to site conditions or locations. Two spare 2" PVC conduits shall be provided in all bases. The spares shall exit in the direction of the center rear of the cabinet base, into a pullbox and capped with a weatherproof fitting. If obstructions prevent the spare conduit from exiting to the rear, or the rear of the cabinet is located on the R/W line, a side exit of the spare conduits will have to be approved by the project engineer. All spare conduit sweeps shall be capped with a weatherproof fitting.

2. Meet all grounding requirements of Section 620 of the Standard Specifications.

3. New controller cabinet installation shall meet the requirements of Section MST-1 of the Minimum Specifications for Traffic Control Signal Devices (MSTCSD).

---

**LHD**

The signalized intersection controller cabinet retrofit installation procedures are located at:


Cabinet installation details are located at:


---

**Description:**

Liquidtight flexible conduit is approved for use from the electrical disconnect to the cabinet when both are installed on the same pole.

* If holes for cabinet mounting require relocation, original holes shall be filled in with concrete or covered with a noncorrosive cover plate.

---

**Revision:**

07/01/13

---

**FDOT 2014 DESIGN STANDARDS**

**INDEX NO.**

17841

**SHEET NO.**

1 of 1
**SIGNAL INDICATIONS**  
Blank Indicates No Clearance Required

**LEGEND**
- Vehicle Movement Number
- Pedestrian Movement Number
- Timing Function Number
- Phase Number
- Green Arrow (Left or Right)
- Red Arrow
- Yellow Arrow

**Vehicle movements & signal head number assignments are not directionally oriented but shall maintain their relative orientation about the intersection (i.e., movements 7 and 4 are always to the right of movements 1 and 6 etc.).**

**Vehicle Movement Number**

<table>
<thead>
<tr>
<th>Movement</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**LEGEND**

- Vehicle Movement Number
- Pedestrian Movement Number
- Timing Function Number
- Phase Number
- Green Arrow (Left or Right)
- Red Arrow
- Yellow Arrow
**ADVANCE WARNING FOR R/R CROSSING**

**FUNCTIONAL BLOCK DIAGRAM**

- **Passive State** (Train Circuit Not Actuated)
- **Active State** (Train Circuit Actuated)

- **LOCATION OF THE ADVANCE WARNING SIGN**
  - **Location**
  - **Speed (mph)**
  - **Distance (ft)**

- **Design Standards**
  - **Power Service**
  - **Flasher Control Circuit**
  - **Flasher Cabinet**

- **Note:**
  - The distance is measured along the right edge of the pavement from RR stop bar to sign advance warning sign.

- **TYPICAL PLAN**

- **Description:**
  - Stationary background to form a portion of the distance message when "STOP AHEAD" sign is in closed mode.
  - Stationary background to form a portion of the distance message when "STOP AHEAD" sign is in open mode.
  - Sign control wiring to be as recommended by manufacturer.
  - Distance message when "STOP AHEAD" sign is in closed mode.
  - Distance message when "STOP AHEAD" sign is in open mode.

- **Class I Concrete**

- **Notes:**
  - "STOP AHEAD" is standard and preferred sign message.
  - Another message may be approved when appropriate for specific situations.
GENERAL NOTES

1. The location of flashing signals and stop lines shall be established based on future (or present installation of gate with appropriate track clearances.

2. Where plans call for railroad traffic control devices to be installed in curbed medians, the minimum median width shall be 12' 6".

3. Location of railroad traffic control device is based on the distance available between face of curb & sidewalk. 9' to 8' - Locate device outside sidewalk. Over 8' - Locate device between face of curb and sidewalk.

4. Stop line to be perpendicular to edge of roadway, approx. 15' from nearest rail, or 8' from and parallel to gate when present.

5. When a cantilevered-arm flashing-light signal is used, the minimum vertical clearance shall be 17' from above the Crown of Roadway to the Lowest Point of the Overhead Signal Unit.

See FIGURE 1

TYPE I

TYPE II

TYPE III

TYPE IV

TYPE V

SIGNAL PLACEMENT AT RAILROAD CROSSING

(RAILWAY CROSSING)

SIGNAL PLACEMENT AT RAILROAD CROSSING

(TRAVELWAY CROSSING)

SIGNAL PLACEMENT AT RAILROAD CROSSING

(2 LANES, CURB & GUTTER)

SIGNAL PLACEMENT AT RAILROAD CROSSING

(2 LANES, CURB & GUTTER)
RAILROAD CROSSING AT
TWO (2)-LANE ROADWAY

RAILROAD CROSSING AT
MULTILANE ROADWAY

RAILROAD CROSSING AT
RELATIVE LOCATION OF CROSSING TRAFFIC
MULTI-LANE ROADWAY
CONTROL DEVICES

NOTES:
1. When computing pavement message, quantities do not include
traverse lines.

2. Placement of sign W10-1 in a residential or business district,
where low speeds are prevalent, the W10-1 sign may be placed
a minimum distance of 100' from the crossing. Where street
intersections occur between the RR pavement message and the
tracks an additional W10-1 sign and additional pavement
message should be used.

3. A portion of the pavement markings symbol should be directly
opposite the W10-1 sign.

4. Recommended location for FTP-83-06 or FTP-82-06 signs, 100'
urban and 300' rural. See Index 17353 for sign details.

5. Gate Length Requirements:
For Two-way undivided sections:
The gate should extend to within 2' of the center line. On
multiple approaches the maximum gate length may not reach to
within 2' of the center line. For those cases, the distance
from the gate to the center line shall be a maximum of 4'.

For one-way or divided sections:
The gate shall be of sufficient length such that the distance
from the gate tip to the inside edge of pavement is a maximum
of 4'.

<table>
<thead>
<tr>
<th>SPEED (mph)</th>
<th>25'</th>
<th>50'</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>400</td>
<td></td>
</tr>
<tr>
<td>55</td>
<td>325</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>175</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>125</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

URBAN: 85 MPH

- White Gate
- Flashing Signal (If Not with Gate)
- Stop Line
- Flashing Signal
- 24" White
- 6" Dbl Yellow
- 24" White

See Note 5

- Location of RR Center
- Located Within 12'
- Railroad Protection
- Device Is Not To Be
- Used

- Edge Of Travel Way
- Stop Bar Perpendicular
- To Edge Of Travel Way
- Gate When Present

- Future Gate Location
- 24" White
- 6" Dbl Yellow

- W10-1

- For Use Near
- Signalized Intersections

- Railroad Grade Crossing

- With Gates

- Traffic Control Devices
**RAILROAD GRADE CROSSING**

**TRAFFIC CONTROL DEVICES**

**Index No. 17882**

**Plan**

**Description:**

For additional information see the "Manual on Uniform Traffic Control Devices", Part B; The "Traffic Control Handbook", Part VII; and AASHTO "A Policy on Geometric Design of Streets and Highways".

**NOTE:**

For three or more driving lanes in one direction, 45 MPH or less.

<table>
<thead>
<tr>
<th>Specified Length Of Gate Arm</th>
<th>Dimension &quot;A&quot;</th>
<th>Dimension &quot;B&quot;</th>
<th>Dimension &quot;C&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 ft.</td>
<td>5'</td>
<td>36&quot;</td>
<td>9</td>
</tr>
<tr>
<td>15 ft.</td>
<td>6'</td>
<td>36&quot;</td>
<td>9</td>
</tr>
<tr>
<td>16-17 ft.</td>
<td>7'</td>
<td>36&quot;</td>
<td>9</td>
</tr>
<tr>
<td>18-19 ft.</td>
<td>8'</td>
<td>41&quot;</td>
<td>9</td>
</tr>
<tr>
<td>20-23 ft.</td>
<td>9'</td>
<td>46&quot;</td>
<td>9</td>
</tr>
<tr>
<td>24-28 ft.</td>
<td>10'</td>
<td>51&quot;</td>
<td>9</td>
</tr>
<tr>
<td>29-31 ft.</td>
<td>11'</td>
<td>56&quot;</td>
<td>9</td>
</tr>
<tr>
<td>32-34 ft.</td>
<td>12'</td>
<td>61&quot;</td>
<td>9</td>
</tr>
<tr>
<td>35-37 ft.</td>
<td>13'</td>
<td>66&quot;</td>
<td>9</td>
</tr>
<tr>
<td>38 And Over</td>
<td>14'</td>
<td>71&quot;</td>
<td>9</td>
</tr>
</tbody>
</table>

**MEDIAN SIGNAL GATES FOR**

**MULTILANE UNDIVIDED URBAN SECTIONS**

(THE MEDIAN WIDTH OF THE ROADWAY WILL DETERMINE THE SPECIFIED LENGTH OF THE GATE ARM UNIVERSITY OF FLORIDA)
TRAFFIC CONTROL DEVICES FOR MOVABLE SPAN BRIDGE SIGNALS

NOTES:

1. A bypass switch shall be installed to override each timing interval in case of a malfunction.
2. "STOP HERE ON RED" is omitted in Type I operation and "TRAFFIC SIGNALS" are omitted in Type II operation.
3. The time between beginning of flashing yellow on "Drawbridge Ahead" sign and the clearance of traffic signal to red, or beginning of flashing red should not be less than the travel time of a passenger car, from the sign location to the stop line, traveling at the 85 percentile approach speed.
4. Beginning of operation of drawbridge gates shall not be less than 15 seconds after steady red or 20 seconds after flashing red (actual time may be determined by the bridge tender).
5. Time of gate lowering and raising is dependent upon gate type.
6. Time of bridge opening is determined by the bridge tender.
7. Each gate shall be operated by a separate switch.
8. On each approach (Type II), all four red signals shall be on the same two circuit flashers, with the two top signals on one circuit, and the two bottom signals on the alternately flashing circuit.
9. A drawbridge Ahead sign is required for both types of signal operation. However a flashing beacon shall be added to the sign when physical conditions prevent a driver traveling at the 85th percentile approach speed from having continuous view of at least one signal indication for approximately 10 seconds.
10. Requirements on gate installation are contained in Section 4I of the "Manual on Uniform Traffic Control Devices".
11. In accordance with Traffic Engineering Manual (Topic Number 750-000-005) Section 2.1, SLIPPERY WHEN WET SIGNS shall be placed in advance of all MOVABLE and NONMOVABLE STEEL DECK BRIDGES.

SEQUENCE CHART

1. Operation During Bridge Preemption
2. Normal Operation

TRAFFIC CONTROL DEVICES FOR MOVABLE SPAN BRIDGE SIGNALS

TYPICAL BRIDGE MOUNTS

LEGEND:
- TRAFFIC SIGNALS
- DRAWBRIDGE SIGN
- DRAWBRIDGE AHEAD SIGN WITH YELLOW FLASHING BEACON
- STOP HERE ON RED SIGN WITH RED FLASHING BEACONS
- ENTRANCE GATE
- EXIT GATE
- 24" THERMOPLASTIC STOP BAR
- GATES
- SIGNALS & SIGNS
- DRAWBRIDGE

TYPE I
- TO BE USED WHERE BRIDGE OPERATORS ARE FULL TIME OR A DAILY BASIS.
- West Arm Mounted (On Bridge)
- Monotube Support Mounted (On Bridge)
- STOP HERE ON RED SIGN WITH RED FLASHING BEACONS
- DRAWBRIDGE AHEAD SIGN WITH YELLOW FLASHING BEACON

TYPE II
- TO BE USED WHERE TYPE I IS NOT APPLICABLE (USUALLY WHEN THE BRIDGE OPERATOR IS "ON CALL")
- Ground Mounted
- DRAWBRIDGE AHEAD SIGN
- FLASHING BEACON
- ENTRANCE GATE
- EXIT GATE
- 24" THERMOPLASTIC STOP BAR

NOTE:
* Field conditions may require adjustment of this standard distance.
BLACK OPAQUE LEGEND AND BORDER ON REFLECTORIZED YELLOW BACKGROUND
TO BE USED WITH TYPE I OPERATION, AS SHOWN ON PREVIOUS SHEET
MONOTUBE SUPPORT MOUNTING

NOTES:
1. 12 volt flashing red lights shall be mounted on gate arm and shall operate in the flashing mode only when gate arm is in the lower position or in the process of being lowered. The number of lights shall vary accordingly to length of the gate arm.
2. 16" alternate diagonal fully reflectorized red and white stripes.

TYPICAL LAMP PLACEMENT

GATE & ARM DETAIL