GENERAL NOTES:
1. Install conduit in accordance with Specification 630.

7. When installing conduit under sidewalk by open trench, replace the entire sidewalk slab.

3. Trench not to be open more than 250' at a time when construction area is subject to vehicular or pedestrian traffic.

4. Sawcut asphalt at the edges of the trench to leave neat lines.

4. Sawcut asphalt at the edges of the trench to leave neat lines.
VERTICAL CLEARANCE NOTE:
Maintain 1'-0" minimum vertical clearance when crossing over pipe and utilities. If minimum vertical clearance cannot be maintained, conduit is to be routed under pipe maintaining 1'-0" minimum vertical clearance.

PLACEMENT WITHIN THE UTILITY STRIP

PLACEMENT UNDER SIDEWALK

PLACEMENT BEHIND GUARDRAIL

PLACEMENT IN FRONT OF GUARDRAIL
NOTES:

1. Pavement Removal: The removal and replacement of the additional pavement width (i.e., 6" Width either side of trench) will not be required when the trench can be constructed without disturbing the asphalt surface on either side.

2. Placement Under Existing Pavement: Place conduit prior to installation of base and pavement, unless otherwise shown in the Plans or approved by the Engineer.
DESCRIPTION:

1. Where conduits are to be installed over existing underground structures (e.g., drainage pipes or utility lines) which are less than 2'-6" deep, encase the conduit in Class NS concrete for the entire length of conduit that is installed at a depth of less than 2'-6".

2. Place 3" Warning Tape when new conduit is installed at a depth of 1'-6" or greater, and the new conduit is not encased in concrete.

NOTES:
**DESCRIPTION:**

1. Use only span wire mounting assemblies listed on the APL. For specific details and requirements, see the vendor drawings on the APL.

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. Use only stainless steel hardware on all signal attachments.

5. Note for eyebolt will require field reaming for 1" & 1½" eyebolts.

6. Meet all grounding requirements of Specification 620.

7. The load face of pole is to be perpendicular to the resultant load.

8. Field drill 2-12 drain holes in the bottom of the installed signals.

9. Method of framing corner Strain Poles angles 10° to 120°.

**NOTES:**

1. Use only span wire mounting assemblies listed on the APL. For specific details and requirements, see the vendor drawings on the APL.

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. Use only stainless steel hardware on all signal attachments.

5. Note for eyebolt will require field reaming for 1" & 1½" eyebolts.

6. Meet all grounding requirements of Specification 620.

7. The load face of pole is to be perpendicular to the resultant load.

8. Field drill 2-12 drain holes in the bottom of the installed signals.

9. Method of framing corner Strain Poles angles 10° to 120°.
CABLE DROP AND TERMINATION WITH FIGURE 8 CABLE

CABLE DROP AND TERMINATION WITH MESSENGER WIRE AND COMPRESSION CLAMP

CABLE DROP AND TERMINATION WITH MESSENGER WIRE AND SUSPENSION CLAMP

NOTES:
1. Meet all grounding requirements of Specification 620.
2. If accessible, ground the messenger wire of the interconnect cables to the copper ground wire of the pole or to the external wire extending down the pole.
3. When utilizing the external ground wire, install a piece of ½" conduit extending up 8' from the finish grade to protect the ground wire connecting the messenger wire to the ground rod.
4. Use either locking cable ties or lashing wire, placed no further than 12" apart. Except at the point of cable drop or terminations, place one (1) at the point where the cables separate from the messenger wire and place another at a maximum distance of 4' from that tie.
5. When installing figure 8 interconnect cable, use locking cable ties only.
6. Lashing wire should normally be used for distances of 12' or greater.

1. Meet all grounding requirements of Specification 620.
2. If accessible, ground the messenger wire of the interconnect cables to the copper ground wire of the pole or to the external wire extending down the pole.
3. When utilizing the external ground wire, install a piece of ½" conduit extending up 8' from the finish grade to protect the ground wire connecting the messenger wire to the ground rod.
4. Use either locking cable ties or lashing wire, placed no further than 12" apart. Except at the point of cable drop or terminations, place one (1) at the point where the cables separate from the messenger wire and place another at a maximum distance of 4' from that tie.
5. When installing figure 8 interconnect cable, use locking cable ties only.
6. Lashing wire should normally be used for distances of 12' or greater.
NOTES:
1. Provide fiber optic splice boxes with cable hanger racks designed to support cables and splice enclosures.
2. Install a 1'-0" wide (Min.) concrete apron around all boxes using Class NS concrete. Slope the apron away from the box.
3. Where multiple pull boxes are placed side by side, maintain at least 8" between the pull boxes.
4. Rectangular boxes shown, others similar.
GENERAL NOTES:

1. It shall be the contractor's responsibility to provide a complete service assembly as per the plans and service specifications.

2. The service installation shall meet the requirements of the National Electric Code and applicable local codes.

3. Shop drawings are not required for service equipment, unless noted in the plans.

4. A Pull Box is required at each service point, see Index 635-001.

DETAIL A
AERIAL FEED

- Concrete Pole, Prestressed Type P-II, 36' Long
- Clevis with Insulators
- Conductor Weatherhead Height
  - As Required By Power Company
- Meter As Required Height Specified
  - By Power Company
- Service Disconnect

DETAIL B
UNDERGROUND FEED

- Concrete Pole, Prestressed Type P-II, 12' Long
- Clevis with Insulators
- Conductor Weatherhead Height
  - As Required By Power Company

For Drainage (Typ.)
- Or Crushed Stone
- 12" Bed Of Pea Rock
- 6' (Max.) Depth To Grade
- Pull Box
- Concrete Pad
- Grade
- U.L. Approved Ground Rod
  - #6 AWG Insulated Grounding Electrode Conductor In 3/4" Rigid Galvanized Steel Conduit
- Connection For Pole Ground, Bond Wire, And Ground Rod
  - 12" Bed Of Pea Rock
  - Or Crushed Stone
  - For Drainage (Typ.)
Keyed Notes:
2. Service Feeder in Rigid Galvanized Steel Conduit.
3. Meter Socket by Contractor.
4. Service Main Disconnect.
6. Concrete Riser Pole.
7. Weatherhead.
8. Electrical Panel. Number and Rating of Branch Circuit Breakers shall be as indicated on Distribution Point Description on Lighting Plan Sheets.
10. Copper Clad Ground Rod, 40' Long.
11. Insulated Copper Ground Wire. Bond the Service Neutral to Ground at Service Main Disconnect.
12. Fused Control Power Transformer 0.5 KVA, Single Phase, 480V Primary, 120V Secondary (Part of Lighting Contactor, Shown Outside for Clarity).
13. Lighting Arrester Mounted on Outside of Enclosure.
15. 2 Pole Electrical Lighting Contactor.
16. 120V Photoelectric cell, 1800VA with 2000V Peak Surge Protection.
17. Hand-off Automatic Selector Switch (Part of Lighting Contactor, Shown Outside for Clarity).
18. Concrete Pad.
20. Mount on Riser Pole.
21. Ground BUS.
22. NEMA 4X SST Ground Mounted Storage Cabinet with Two Shelves. Only Required for High Mast Lighting Systems.

Cut a 2" hole in the side of the Lighting Control Panel enclosure for the operation and mounting of the Photo Electric controller. Use a gasket and a clear silicone sealant to cover hole. Install Photo Electric Controller.

PHOTOELECTRIC CONTROLLER DETAIL

ONE LINE DIAGRAM DISTRIBUTION POINT

TYPICAL DISTRIBUTION POINT SCHEMATIC DETAIL

RISER DIAGRAM - TYPICAL DISTRIBUTION POINT
1. The lightning arrester can be located on the side or bottom of the service 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 Specification 620. The bond wire shall be run in conduit with the Electrical Service Wire or Signal Cable.
4. Meet all grounding requirements of Specification 620.
5. The Service 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 Service Disconnect shall be NEMA 3R or better.
GENERAL NOTES:

1. Work these Index drawings with the Strain Pole Schedule in the Plans.
2. Shop Drawings: This Index is considered fully detailed and no shop drawings are necessary. Submit shop drawings for minor modifications not detailed in the plans.
3. Materials:
   a. Concrete: Class V Special or Class VI
   b. Prestress Strands & Spiral Reinforcing: Specification 641
   c. Hand and coupler cover plates: Non-corrosive material
   d. Screws: Round headed, chrome plated
4. Fabrication:
   a. Pole Taper for pole width, strands, reinforcing and void: 0.081 inch per face.
   b. Concrete Super T minimum
   c. Spiral Reinforcing: As shown, plus one turn for splices and two turns at both the tip and butt ends of the pole.
   d. The design dimensions for Front Face (FF) and Back Face (BF) of the poles may vary transversely from the section shown by ± ¼" to assist with removal of the face widths to maintain section areas shown.
   e. Tie ground wires to the interior of reinforcing steel to prevent displacement during concreting operations.
   f. Cut the tip end of the prestressed strand first or simultaneously with the butt end.
   g. Provide cover plates and screws for hand hole and couplers. Attach cover plates to the poles using lead anchors or embedded threaded inserts.
   h. Provide aluminum identification tags on the poles with the following information:
      a. Financial Project ID
      b. Pole Manufacturer
      c. Standard Pole Type Number
      d. Pole Length (L)
5. Support locations are for strand release, storage, lifting and transport. Keep BF oriented downward until final erection.
6. Pick-up and support locations shown may vary within a tolerance of ±2".
7. Two point attachment: provide an eye bolt hole for the messenger wire.
8. Tether Wire: When required, field-drill the eyebolt hole prior to installation.
SERVICE POLE P-II A (12 Ft.) & P-II B (36 Ft.) ELEVATION
(Strands Not Shown)

PEDESTAL POLE P-IIC (12 Ft.) ELEVATION
(Strands Not Shown)

NOTES:
- 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 of 4 Ft. (for P-IIB) or 10 Ft. (for P-II A) from the Tip End.
- * Dimension may vary from 2 1/4" to 3 1/2" to accommodate smaller radius of cylindrical void.

SERVICE AND PEDESTAL POLE TYPE P-II
SPIRAL REINFORCING ELEVATION
(Strands, Holes, and Fixtures Not Shown)

POLE ELEVATION
(Strands and Reinforcing Not Shown)

NOTES:
- 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.
- Dimension may vary from 2½" to 3¾" to accommodate smaller radius of optional stepped (PVC) void. The void diameter shall not be less than 2½".

POLE TYPE P-III

TIP END SECTION (TOP)

SECTON A-A
(Typical Square Section)
**CONCRETE POLES**

**STANDARD PLANS FY 2020-21**

**DESCRIPTION:**

**Revision:**

- **11/01/17**

**Sheet Index:**

- **641-010**

-- **4 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. - 31 kips Before Transfer (6 strands total)

- Dormant Strand
  
  - 0.5 in. (3 strands total)
  
  - One 24" Splice Allowed Per Strand

**NOTES:**

- 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.
- Dimension may vary from 3" to 4¼" to accommodate smaller radius of optional stepped (PVC) void. The void diameter shall not be less than 2½".

**STRAIN POLE TYPE P-IV**

**ONE ADDITIONAL TURN AT END**

**FLOOR**

**41 Turns @ 3" Pitch**

---

**2¾" Galv. Nipple (On ¡)**

*Circular Void* (Two-Wire System Only)

---

**48" No. 6 Bare Copper Ground Wire**

---

**15% L** (Typ.)

---

**1½" Min (Typ.)**

---

**SECTION A-A**

(Typical Square Section)

---

**Tip End**

---

**Front Face (Roadway)**

---

**Back Face**

---

**Front Face (Roadway)**

---

**Circular Void**

---

**Back Face**

---

**Support Locations**

(Horizontal Pole)

---

**15'L**

---

**Pole Height Dim. H**

---

**Pole Length Dim. L**

---

**Depth Dim. D**

---

**STRAIN POLE TYPE P-IV**

---

**2½" Galv. Nipple (On ¡)**

---

**コミュニケーションポールタイプP-IV**

---

**15'-0" from Top**

---

**Circular Void**

---

**Butt End**

---

**Final Grade Location**

---

**Every Hole**

---

**NOTES:**

- 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.
- Dimension may vary from 3" to 4¼" to accommodate smaller radius of optional stepped (PVC) void. The void diameter shall not be less than 2½".

**TIP END SECTION (TOP)**

(For Dormant Strand Locations See Section A-A)

---

**Circular Void**

---

**Back Face**

---

**1½" Min (Typ.)**

---

**Front Face (Roadway)**

---

**Circular Void**

---

**Front Face (Roadway)**

---

**Circular Void**

---

**Circular Void**

---

**Back Face**

---

**Butt End**

---

**Front Face (Roadway)**

---

**Circular Void**

---

**Front Face (Roadway)**

---

**Circular Void**

---

**Circular Void**

---

**Back Face**

---

**Butt End (Bottom)**

---

**NOTES:**

- 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.
- Dimension may vary from 3" to 4¼" to accommodate smaller radius of optional stepped (PVC) void. The void diameter shall not be less than 2½".
**DESCRIPTION:**

**REVISION LAST OF STANDARD PLANS FY 2020-21 SHEET INDEX 11/01/17**

**CONCRETE POLES**

---

**SPiral Reinforcing Elevation**

(Strands, Holes, and Fixtures Not Shown)

---

**Pole Elevation**

(Strands and Reinforcing Not Shown)

---

**Notes:**

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 12.5% L from the Tip End.

* Dimension may vary from 3½" to 4½" to accommodate smaller radius of optional stepped (PVC) void. The void diameter shall not be less than 4".

---

**Strain Pole Type P-V**

---

**STRAND LEGEND**

- Prestressed Strand: 0.5 in. ~ 31 kips Before Transfer (8 strands total)
  - Dormant Strand: 0.5 in. ~ 14 kips total
  - One 24" Splice Allowed Per Strand

---
GENERAL NOTES:
1. Work this Index with Specification 641.
2. This Index is considered fully detailed and no shop drawings are necessary. Submit Shop Drawings for minor modifications not detailed in the Plans.
3. Install pole plumb.
4. Provide either round or 12-sided Poles.
5. See Index 635-001 for additional details for Pull Boxes.
6. Materials:
   A. Pole: Use Class VI concrete with 6 ksi minimum strength at transfer.
   B. Prestressing Strands: ASTM A416, Grade 270 low relaxation.
   C. Reinforcing Steel: ASTM A615, Grade 60
   D. Spiral Reinforcing: ASTM A1024 Cold-Drawn
   E. Bolts: ASTM F1554, Grade 55
   F. Nuts: ASTM A563, Grade A Heavy Hex
   G. Washers: ASTM F236
   H. Steel plates and Pole Cap: ASTM A572 or ASTM A709, Grade 50
   I. Galvanization Bolts, nuts and washers: ASTM F2239
   J. All other steel: ASTM A123

7. Pole Fabrication:
   A. Cut the tip end of the prestressed strand first or simultaneously with the butt end.
   B. For spiral reinforcing, one turn is required for spiral splices and two turns are required at the top and bottom of poles.
   C. For Re-Forcing Steel, lap splice to consist of a 3'-0" lap length at each splice. No more than two opposing rebar to be spliced at the same cross section. Stagger lap splices as needed.
   D. Provide a Class 3 surface finish in accordance with Specification 400.
   E. Provide a 1" minimum cover.
   F. Provide handhole 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.
   G. Provide 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 Producers’ Quality Control Program:
      - Financial Project ID
      - Pole Manufacturer
      - Pole Length
   H. Tie ground wires to the interior of reinforcing steel as necessary to prevent displacement during concreting operations.
   I. Storage, Handling and Erection locations shown may vary within ± 3".

8. Cabinet Installation:
   A. Splice Fiber optic cables in cabinet to preterminater patch panel.
   B. Furnish and install Surge Protection Devices (SPDs) on all cabling in cabinet.
   C. Furnish and install secondary SPDs protection on outlets for equipment in cabinet.
   D. Ensure that all electronic equipment power is protected and conditioned with SPDs.
   E. Ensure that equipment cabinet is bonded to CCTV pole grounding system.
   F. Bury all cabinets to be lower than two opposing rebar to be spliced at the same cross section. Stagger lap splices as needed.
   G. Sizes and types of conduits and innerducts for network communications between the pullbox and cabinet are stated in the Contract Documents.
   H. Provide 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 Producers’ Quality Control Program:
      - Financial Project ID
      - Pole Manufacturer
      - Pole Length

9. Lowering Device Installation:
   A. Place the lowering cable that moves within the pole in an interior conduit to prevent it from tangling or interfering with any electrical wire that is in the pole. Ensure that any electrical wires within the pole are routed securely and free from slack.
   B. Mount lowering arm perpendicular to the roadway or as shown in the plans. Position CCTV pole so that the camera can be safely lowered without requiring lane closures.
   C. Coordinate all lowering device hardware requirements (including Tenon, Tenon mounting plates, parking slides, etc.) with lowering device manufacturer.

CCTV POLE ASSEMBLY
NOTES:
1. Diameter of 12-sided poles are measured flat to flat.
2. Total Taper applies to pole, strands and reinforcing.
3. For 12-Sided Pole and Round Poles Option 2, Stress prestressed strand to 70% of Ultimate before transfer. For Round Pole Option 3, stress prestressed strand to 60% of Ultimate before transfer.
4. Pole Design Tables, Burial Depth is based on level ground (flatter than 1:5). Increase the burial depth in accordance with the Additional Burial Depth Due To Ground Slope table for foundations with slopes 1:5 and steeper. Use the higher value for slope or diameter values that fall between those shown on the table.

ADDITIONAL BURIAL DEPTH DUE TO GROUND SLOPE

<table>
<thead>
<tr>
<th>Ground Slope</th>
<th>Additional Burial Depth (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:5</td>
<td>3</td>
</tr>
<tr>
<td>1:4</td>
<td>3</td>
</tr>
<tr>
<td>1:3</td>
<td>3</td>
</tr>
<tr>
<td>1:2</td>
<td>3</td>
</tr>
</tbody>
</table>

12-SIDED POLE DESIGN TABLE

<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>
</tr>
</thead>
<tbody>
<tr>
<td>63</td>
<td>50</td>
<td>12</td>
<td>0.18</td>
<td>0.172</td>
<td>3</td>
<td>3</td>
<td>12</td>
<td>2.134</td>
<td>1</td>
<td>0.8</td>
</tr>
<tr>
<td>69</td>
<td>55</td>
<td>14</td>
<td>0.18</td>
<td>0.172</td>
<td>3</td>
<td>3</td>
<td>12</td>
<td>2.482</td>
<td>2</td>
<td>0.8</td>
</tr>
<tr>
<td>75</td>
<td>60</td>
<td>15</td>
<td>0.18</td>
<td>0.172</td>
<td>3</td>
<td>3</td>
<td>12</td>
<td>2.867</td>
<td>2</td>
<td>0.8</td>
</tr>
<tr>
<td>80</td>
<td>65</td>
<td>15</td>
<td>0.18</td>
<td>0.172</td>
<td>3</td>
<td>3</td>
<td>12</td>
<td>3.200</td>
<td>2</td>
<td>0.8</td>
</tr>
<tr>
<td>86</td>
<td>70</td>
<td>16</td>
<td>0.18</td>
<td>0.172</td>
<td>3</td>
<td>3</td>
<td>12</td>
<td>3.500</td>
<td>2</td>
<td>0.8</td>
</tr>
</tbody>
</table>

ROUND POLE DESIGN TABLE

<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>
</tr>
</thead>
<tbody>
<tr>
<td>63</td>
<td>50</td>
<td>12</td>
<td>0.18</td>
<td>0.172</td>
<td>3</td>
<td>3</td>
<td>12</td>
<td>3.500</td>
<td>2</td>
<td>0.8</td>
</tr>
<tr>
<td>69</td>
<td>55</td>
<td>14</td>
<td>0.18</td>
<td>0.172</td>
<td>3</td>
<td>3</td>
<td>12</td>
<td>3.761</td>
<td>2</td>
<td>0.8</td>
</tr>
<tr>
<td>75</td>
<td>60</td>
<td>15</td>
<td>0.18</td>
<td>0.172</td>
<td>3</td>
<td>3</td>
<td>12</td>
<td>3.968</td>
<td>2</td>
<td>0.8</td>
</tr>
<tr>
<td>80</td>
<td>65</td>
<td>15</td>
<td>0.18</td>
<td>0.172</td>
<td>3</td>
<td>3</td>
<td>12</td>
<td>4.175</td>
<td>2</td>
<td>0.8</td>
</tr>
<tr>
<td>86</td>
<td>70</td>
<td>16</td>
<td>0.18</td>
<td>0.172</td>
<td>3</td>
<td>3</td>
<td>12</td>
<td>4.357</td>
<td>2</td>
<td>0.8</td>
</tr>
</tbody>
</table>

CAMERA LOWERING DEVICE

1. Diameter of 12-sided poles are measured flat to flat.
2. Total Taper applies to pole, strands and reinforcing.
3. For 12-Sided Pole and Round Poles Option 2, Stress prestressed strand to 70% of Ultimate before transfer. For Round Pole Option 3, stress prestressed strand to 60% of Ultimate before transfer.
4. Pole Design Tables, Burial Depth is based on level ground (flatter than 1:5). Increase the burial depth in accordance with the Additional Burial Depth Due To Ground Slope table for foundations with slopes 1:5 and steeper. Use the higher value for slope or diameter values that fall between those shown on the table.
NOTES:
1. Install all handhole and opening covers prior to shipping.
2. Install 1/2" x 5" long stud with hex nut in insert before shipment.
3. As an alternate, embed 4-1/2" Ø x 18" stainless steel threaded rods with a threaded nut. At top of rod, thread a coupling nut to attach plate w/ 4-1/2" x 1/2" stainless steel bolts.
4. Handhole frame may be Cast Aluminum 356.2.

ASSEMBLY

1. Install all handhole and opening covers prior to shipping.
2. Install 1/2" x 5" long stud with hex nut in insert before shipment.
3. As an alternate, embed 4-1/2" Ø x 18" stainless steel threaded rods with a threaded nut. At top of rod, thread a coupling nut to attach plate w/ 4-1/2" x 1/2" stainless steel bolts.
4. Handhole frame may be Cast Aluminum 356.2.
NOTES:
1. Work with Index 634-001 for grounding and span wire details. See the Plans for clamp spacing, cable sizes and forces, signals and sign mounting locations and details.

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

3. Materials:
   A. Strain Pole and Backing Rings:
      - Less than or equal to Fy = 45 ksi: ASTM A1011 Grade 50, 55, 60 or 65
      - Greater than or equal to Fy = 60 ksi: ASTM A325 Grade 50, 55, 60 or 65
      - ASTM A307 Grade A (55 ksi yield) or Grade B (80 ksi yield)

   B. Steel Plates: ASTM A36

   C. Weld Metal: EN 295

   D. Bolts, Nuts and Washers:
      - Anchor Bolts: ASTM F1554 Grade 55
      - Nuts: ASTM A563 Grade A Heavy-Hex
      - Washers: ASTM F136 Type 1, one under turned element

   E. Anchor Bolts, Nuts and Washers:
      - Anchor Bolts: ASTM F136 Grade 55
      - Nuts: ASTM A663 Grade A Heavy-Hex (5 per anchor bolt)
      - Plate Washers: ASTM A18 (2 per bolt), split-lock washers and self-locking nuts are not permitted

   F. Handhole Frame: ASTM A407 or ASTM A48, Grade 36

   G. Handhole Cover: ASTM A502 Grade A, 55, 60 or 65

   H. Aluminum Pole Caps and Nut Cover: ASTM B26 (319-F)

   I. Stainless Steel Screws: AISI Type 316

   J. Threaded Bars/Studs: ASTM A307 or ASTM A325

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

   L. Reinforcing Steel: Specification 415

4. Fabrication:
   A. Pole Taper: Change diameter at a rate of 0.14 inches per foot, round or 12-sided (Min.)

   B. Upright splices are not permitted. Transverse welds are only permitted at the base.

   C. Provide bolt hole diameters as follows:
      - Bolts (except Anchor Bolts): Bolt diameter plus \( \frac{1}{8} \)", prior to galvanizing.
      - Anchor Bolts: Bolt diameter plus \( \frac{1}{4} \)", maximum.

   D. Locate handhole 180° from wire entrance pipe.

   E. Identification Tag:
      - Submit details for approval.

   F. Provide a 'J' or 'C' hook at the top of the pole for signal wiring support (See Sheet 3).

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

   H. Aluminum Pole Caps and Nut Cover: ASTM B26 (319-F)

   I. Stainless Steel Screws: AISI Type 316

   J. Threaded Bars/Studs: ASTM A307 or ASTM A325

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

   L. Reinforcing Steel: Specification 415

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

   B. Hot Dip Galvanized after fabrication.

   C. All other steel items including plate washers: ASTM A123

6. Construction:
   A. Foundation: Specification 645, except that payment is included in the cost of the strain pole.

   B. After installation, place wire screen between top of foundation and bottom of base plate in accordance with Specification 649-6.

   C. Perform all welding in accordance with Specification 460-6.

   D. Fabricate longitudinal seam welds in pole with 60 percent minimum penetration or fusion welds except, within 6" of the base plate connection use full-penetration groove welds.

   E. Hot Dip Galv anize after fabrication.

   F. Locate handhole 180° from 2" wire entrance pipe.

   G. Locate handhole 180° from 2" wire entrance pipe.

   H. Secure to pole with 2" x 4" (Max.) aluminum identification tag.

   I. All nuts, bolts, washers and threaded bars/studs: ASTM F2329

   J. After installation, place wire screen between top of foundation and bottom of base plate in accordance with Specification 649-6.

   K. Perform all welding in accordance with Specification 460-6.

   L. Fabricate longitudinal seam welds in pole with 60 percent minimum penetration or fusion welds except, within 6" of the base plate connection use full-penetration groove welds.

   M. Hot Dip Galv anize after fabrication.

   N. Reinforcing steel: Specification 415

   O. Anchor Bolts: ASTM F1554 Grade 55

   P. Nuts: ASTM A563 Grade DH Heavy-Hex

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

   R. Provide a 'J' or 'C' hook at the top of the pole for signal wiring support (See Sheet 3).

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

   T. Aluminum Pole Caps and Nut Cover: ASTM B26 (319-F)

   U. Stainless Steel Screws: AISI Type 316

   V. Threaded Bars/Studs: ASTM A307 or ASTM A325

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

   X. Reinforcing Steel: Specification 415

   Y. Hot Dip Galvanized after fabrication.

   Z. All other steel items including plate washers: ASTM A123

ELEVATION AND NOTES

STRAY POLE ASSEMBLY
POLE ASSEMBLY

DESCRIPTION:

1. Clamps have been sized for Design Cable Loads shown in the Clamp Thickness Table, and a Maximum Pole Diameter at the Clamp location of 2'-1'. Use one clamp per cable.

2. Install a properly sized Weather Head, fastened securely to the standard pipe for each pole location. At locations other than the wire entrance, the Weather Head Face is to be left closed to outside atmosphere. Wire entrance installed per Index 634-001.

3. Any combination of Option 'a' or 'b' may be used provided both lifting and wiring is accommodated.

NOTES:

1. Clamps have been sized for Design Cable Loads shown in the Clamp Thickness Table, and a Maximum Pole Diameter at the Clamp location of 2'-1'. Use one clamp per cable.

2. Install a properly sized Weather Head, fastened securely to the standard pipe for each pole location. At locations other than the wire entrance, the Weather Head Face is to be left closed to outside atmosphere. Wire entrance installed per Index 634-001.

3. Any combination of Option 'a' or 'b' may be used provided both lifting and wiring is accommodated.

CLAMP THICKNESS TABLE

<table>
<thead>
<tr>
<th>Cable Diameter (in)</th>
<th>Minimum Breaking Strength (kip)</th>
<th>Plate Thickness (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8</td>
<td>3/16</td>
<td>3/8</td>
</tr>
<tr>
<td>1/2</td>
<td>3/16</td>
<td>3/8</td>
</tr>
<tr>
<td>3/4</td>
<td>3/16</td>
<td>3/8</td>
</tr>
</tbody>
</table>

Handhole Frame

11 Gage Handhole Cover

Wire Entrance Detail

Pole Top

Catenary And Messenger Wire Clamps

HANDHOLE

WIRE ENTRANCE DETAIL

POLE TOP

ATTACHMENT DETAILS
GENERAL NOTES:
1. Work this Index with Specification 649.
2. This Index is considered fully detailed; only submit shop drawings for minor modifications not detailed in the Plans.
3. MATERIALS:
   A. Pole: ASTM A1011 Grade 50, 55, 60 or 65 (less than 1½") or ASTM A572 Grade 50, 60 or 65 (greater than or equal to 1½") or ASTM A595 Grade A (55 ksi yield) or Grade B (60 ksi yield).
   B. Steel Plates and Pole Cap: ASTM A56 or ASTM A709 Grade 50.
   C. Weld Metal: E70XX.
   D. Bolts: ASTM F1322, Grade A325, Type 1.
   E. Washers: ASTM A491.
   F. Anchor Bolts: ASTM F1554 Grade 55 with ASTM A563 Grade A heavy hex nuts and ASTM A36 plate washers.
   G. Handhole Frame: ASTM A109 Grade 36 or ASTM A36.
   H. Handhole Cover: ASTM A1011 Grade 50, 55, 60 or 65.
   I. Stainless Steel Screws: AISI Type 316.
   J. Reinforcing Steel: ASTM A615 Grade 60.
   K. Galvanization: Bolts, nuts and washers: ASTM F2329. All other steel including plate washer: ASTM A123.
   L. Concrete: Class IV (Drilled Shaft) for all environment classifications.
4. Fabrication:
   A. Welding:
   B. Poles:
      a. Round or 16-sided (Min.)
      b. Taper pole diameter at 0.14 inches per foot
      c. Fabricate Pole longitudinal seam welds (T maximum) with 60 percent minimum penetration or fusion welds except as follows:
         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.
      d. Pole shaft may be either one or two sections (with telescopic field splices).
      e. Circumferentially welded pole shafts and laminated pole shafts are not permitted.
   C. Identification Tag: (Submit details for approval)
      a. 2" x 4" (Max.) aluminum tag
      b. Locate on the inside of the pole and visible from the handhole
      c. Secure with 1/8" diameter stainless steel rivets or screws
      d. Include the following information on the ID Tag:
         1. Financial Project ID
         2. Pole Type
         3. Pole Height
         4. Manufacturers Name
         5. Yield Strength (Fy of Steel)
         6. Base Wall Thickness
   D. Pole Installation:
      a. Do not install additional wire access holes (not shown in this Index) with a diameter that exceeds 1½" in diameter.
      b. Install Anchor Bolts in accordance with Specification 649-5.
      c. Cable Supports: Electrical cable guides and eyebolts.
         a. Locate top and bottom cable guides within the pole aligned with each other.
         b. Position one cable guide 2" below the handhole.
         c. Position other cable guide 1" directly below the top of the tenon.
         d. Position Park Stands 2" below the top of the handhole.
      d. Include the following information on the ID Tag:
         1. Financial Project ID
         2. Pole Type
         3. Pole Height
         4. Manufacturers Name
         5. Yield Strength (Fy of Steel)
         6. Base Wall Thickness
      e. Except for Anchor Bolts, bolt hole diameters are bolt diameter plus 1/16" and anchor bolt holes are bolt diameter plus 1/4" (Max.) prior to galvanizing.
   5. Pole Installation:
      a. Do not install additional wire access holes (not shown in this Index) with a diameter that exceeds 1½" in diameter.
      b. Install Anchor Bolts in accordance with Specification 649-5.
      c. Cable Supports: Electrical cable guides and eyebolts.
         a. Locate top and bottom cable guides within the pole aligned with each other.
         b. Position one cable guide 2" below the handhole.
         c. Position other cable guide 1" directly below the top of the tenon.
         d. Position Park Stands 2" below the top of the handhole.
      d. Include the following information on the ID Tag:
         1. Financial Project ID
         2. Pole Type
         3. Pole Height
         4. Manufacturers Name
         5. Yield Strength (Fy of Steel)
         6. Base Wall Thickness
      e. Except for Anchor Bolts, bolt hole diameters are bolt diameter plus 1/16" and anchor bolt holes are bolt diameter plus 1/4" (Max.) prior to galvanizing.
   6. Cabinet Installation:
      a. Splice fiber optic cables in cabinet to preterminater patch panel.
      b. Furnish and Install Surge Protection Devices (SPDs) on all cabling in cabinet.
      c. Furnish and install secondary SPDs protection on outlets for equipment in cabinet.
      d. Ensure that all electronic equipment power is protected and conditioned with SPDs.
      e. Coordinate all lowering device hardware requirements (Including Tenon, Tenon mounting plates, parking stands, etc.) with lowering device manufacturer.
   7. Lowering Device Installation:
      a. Place the lowering cable that moves within the pole in an interior conduit to prevent it from tangling or interfering with any electrical wire that is in the pole. Ensure that any electrical wire within the pole is routed securely and free from slack.
      b. Coordinate all lowering device hardware requirements (Including Tenon, Tenon mounting plates, parking stands, etc.) with lowering device manufacturer.
      c. Coordinate all lowering device hardware requirements (Including Tenon, Tenon mounting plates, parking stands, etc.) with lowering device manufacturer.
SHAFT DESIGN TABLE

<table>
<thead>
<tr>
<th>Pole Overall Height (ft)</th>
<th>Shaft Diameter</th>
<th>Shaft Length</th>
<th>Longitudinal Reinforcement</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>6'-0&quot;</td>
<td>1'-0&quot;</td>
<td>(14) #11</td>
</tr>
<tr>
<td>55</td>
<td>6'-0&quot;</td>
<td>1'-0&quot;</td>
<td>(14) #11</td>
</tr>
<tr>
<td>60</td>
<td>6'-6&quot;</td>
<td>1'-0&quot;</td>
<td>(16) #11</td>
</tr>
<tr>
<td>65</td>
<td>6'-6&quot;</td>
<td>1'-0&quot;</td>
<td>(16) #11</td>
</tr>
<tr>
<td>70</td>
<td>5'-0&quot;</td>
<td>1'-0&quot;</td>
<td>(18) #11</td>
</tr>
</tbody>
</table>

ADDITIONAL SHAFT DEPTH DUE TO GROUND SLOPE

<table>
<thead>
<tr>
<th>Ground Slope</th>
<th>4'-0&quot; Shaft Diameter</th>
<th>5'-0&quot; Shaft Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:5</td>
<td>3'-0&quot;</td>
<td>3'-0&quot;</td>
</tr>
<tr>
<td>1:4</td>
<td>3'-0&quot;</td>
<td>3'-0&quot;</td>
</tr>
<tr>
<td>1:3</td>
<td>3'-0&quot;</td>
<td>3'-0&quot;</td>
</tr>
<tr>
<td>1:2</td>
<td>3'-0&quot;</td>
<td>3'-0&quot;</td>
</tr>
</tbody>
</table>

FOUNDATION NOTES:

1. Shaft Length is based on 3'-0" height above the finished grade.
2. Shaft Design Table Shaft Length is based on level ground (flatter than 1:5). Increase the shaft depth in accordance with the Additional Shaft Depth Due To Ground Slope table for foundations with slopes 1:5 and steeper. Use the higher value for slope or diameter values that fall between those shown on the table.

BASE PLATE AND ANCHOR BOLT DESIGN TABLE

<table>
<thead>
<tr>
<th>Pole Overall Height (ft)</th>
<th>Base Plate Diameter (in.)</th>
<th>Base Plate Thickness (in.)</th>
<th>Anchor Bolt Diameter (in.)</th>
<th>Number of Bolts</th>
<th>Anchor Bolt Embedment (in.)</th>
<th>Anchor Bolt Projection (in.)</th>
<th>Minimum Anchor Bolt Projection (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>22</td>
<td>8</td>
<td>1.75</td>
<td>6</td>
<td>1.5</td>
<td>1.5</td>
<td>9.5</td>
</tr>
<tr>
<td>55</td>
<td>22</td>
<td>8</td>
<td>1.75</td>
<td>6</td>
<td>1.5</td>
<td>1.5</td>
<td>9.5</td>
</tr>
<tr>
<td>60</td>
<td>22</td>
<td>8</td>
<td>1.75</td>
<td>6</td>
<td>1.5</td>
<td>1.5</td>
<td>9.5</td>
</tr>
<tr>
<td>65</td>
<td>22</td>
<td>8</td>
<td>2</td>
<td>6</td>
<td>1.75</td>
<td>1.75</td>
<td>7.5</td>
</tr>
<tr>
<td>70</td>
<td>20</td>
<td>8</td>
<td>2</td>
<td>6</td>
<td>1.75</td>
<td>1.75</td>
<td>7.5</td>
</tr>
</tbody>
</table>

POLE DESIGN TABLE

<table>
<thead>
<tr>
<th>Pole Overall Height (ft)</th>
<th>Section 1 (Top)</th>
<th>Section 2 (Bottom)</th>
<th>Joint</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Length</td>
<td>Wall Thickness</td>
<td>Diameter</td>
</tr>
<tr>
<td>50</td>
<td>25'-0&quot;</td>
<td>0.75</td>
<td>14</td>
</tr>
<tr>
<td>55</td>
<td>30'-0&quot;</td>
<td>0.75</td>
<td>15</td>
</tr>
<tr>
<td>60</td>
<td>35'-0&quot;</td>
<td>0.75</td>
<td>18</td>
</tr>
<tr>
<td>65</td>
<td>35'-0&quot;</td>
<td>0.75</td>
<td>18</td>
</tr>
<tr>
<td>70</td>
<td>38'-0&quot;</td>
<td>0.75</td>
<td>22</td>
</tr>
</tbody>
</table>
ASSEMBLY

Handhole Base Plate And Pole
Center of Drilled Shaft, Anchor Bolt Base Plate, Foundation

CCTV Pole
Finished Grade

Handhole Cover Plate
Handhole Ring

2'-3"
1"
2
1'-7"

Anchor Bolts (Typ.)

Edge Of Base Plate
Edge Of Foundation

Center of Drilled Shaft, Anchor Bolts (Typ.)

PLAN

HANDHOLE LOCATION

Pole
Handhole
Handhole Ring
Anchor Bolt

Wire Screen (See Spec. 649)
Foundation
Finished Grade

ELEVATION

2-Cable Guides (Typ.)

Rim, Supplied With Hole In Handhole 3/8" drill & Tap

Identification Tag (See Pole Notes)

7" x 27" x 2" Handhole Frame

7" x 1" x 3/8" Wall Thickness

NOTE:
To secure the cover plate, install a steel chain from the cover to the pole or, by mounting the cover with hinges and install a pad lock tab.

PARK STAND DETAILS

CABLE GUIDE DETAIL

HANDHOLE DETAIL

COVER PLATE

SECTION C-C

STEEL CCTV POLE

FY 2020-21
STANDARD PLANS

INDEX
649-020

4 of 6
**DESCRIPTION:**

- **Steel CCTV Pole Grounding**
- **Pole Mounted CCTV Cabinet**
- **Ground Rod Array Placement**

**Steel CCTV Pole**

- **Dome Type CCTV Camera**
- **Concrete Slab**
- **Fiber Optic Communications (Typ.)**

**CCTV Pole**

- **Grounding Conduit**
- **Primary Ground Rod A**
- **Ground Rod B**
- **Ground Rod C**
- **Ground Rod D**

**Finished Grade**

- **2'-0" M in. - 8' M Max.**

**Pull Box**

- **Concrete Slab**
- **Fiber Optic Pull Box**

**GROUND MOUNTED CABINET**

- **2" PVC Camera Cabling Conduit**
- **#4 AWG Ground Wire**

**Steel CCTV Pole Foundation**

- **8" x 20' Copper-Clad Steel Ground Rod (Typ.)**
- **Foundation (Driven Shaft) (See Detail "C")**

**Detail "B"**

- **#2 AWG Tin-Plated Bare Solid Copper Wire Continuous to the Base of the CCTV Pole**
- **Primary Ground Rod**
- **Exothermic Weld (Typ.)**

**Detail "C"**

- **1/2" PVC Conduit for Grounding Conductors**
- **Concrete Slab**
- **Fiber Optic Pull Box**

**Detail "D"**

- **#2 AWG Tin-Plated Bare Solid Copper Wire to Ground Mounted Cabinet**
- **Primary Ground Rod A**

**Detail "E"**

- **Composite Camera Cable**
- **Fiber Optic Pull Box**
- **1-1/2" RGS Conduit Riser for Power Service Assembly**

**STEEL CCTV POLE**

- **3'-0" Max.**
- **To Power Service Assembly**

**POLE MOUNTED CABINET**

- **10/29/2019**
- **8:22:26 AM**
- **REV IS IO N**

**INDEX**

- **FY 2020-21**
- **STANDARD PLANS**

**SHEET**

- **649-020**
- **6 of 6**
### ARM AND BASE PLATE

<table>
<thead>
<tr>
<th>Arm ID</th>
<th>Arm Length (ft)</th>
<th>Total Arm Extension (in)</th>
<th>Base Plate</th>
</tr>
</thead>
<tbody>
<tr>
<td>A07/3</td>
<td>30</td>
<td>11 0.250</td>
<td>22 25 3</td>
</tr>
<tr>
<td>A07/3/N</td>
<td>30</td>
<td>12 0.250</td>
<td>30 36</td>
</tr>
<tr>
<td>A07/2</td>
<td>30</td>
<td>11 0.250</td>
<td>22 27 3</td>
</tr>
<tr>
<td>A07/2/N</td>
<td>30</td>
<td>14 0.250</td>
<td>30 36</td>
</tr>
<tr>
<td>A07/5</td>
<td>50</td>
<td>12 0.250 20 1.5 30</td>
<td>30 36 3</td>
</tr>
<tr>
<td>A07/5/N</td>
<td>50</td>
<td>13 0.250 20 1.5 30</td>
<td>30 36 3</td>
</tr>
<tr>
<td>A07/0</td>
<td>60</td>
<td>12 0.250 27.5 1.5 30</td>
<td>30 36 3</td>
</tr>
<tr>
<td>A07/0/N</td>
<td>60</td>
<td>13 0.250 27.5 1.5 30</td>
<td>30 36 3</td>
</tr>
<tr>
<td>A07/3</td>
<td>70</td>
<td>12 0.250 25 1.5 30</td>
<td>30 36 3</td>
</tr>
<tr>
<td>A07/3/N</td>
<td>70</td>
<td>13 0.250 25 1.5 30</td>
<td>30 36 3</td>
</tr>
<tr>
<td>A07/3</td>
<td>70</td>
<td>15 0.250 47 20</td>
<td>30 36 3</td>
</tr>
<tr>
<td>A07/3/N</td>
<td>70</td>
<td>15 0.250 47 20</td>
<td>30 36 3</td>
</tr>
</tbody>
</table>

### POLE, BASE PLATE AND ARM CONNECTION

<table>
<thead>
<tr>
<th>Pole ID</th>
<th>P=Parallel</th>
<th>S=SingleArm</th>
<th>D=DoubleArm</th>
<th>L=Light</th>
<th>Upright</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1/5</td>
<td>25</td>
<td></td>
<td></td>
<td>1</td>
<td>0.75</td>
</tr>
<tr>
<td>P1/3</td>
<td>25</td>
<td></td>
<td></td>
<td>1</td>
<td>0.75</td>
</tr>
<tr>
<td>P1/2</td>
<td>25</td>
<td></td>
<td></td>
<td>1</td>
<td>0.75</td>
</tr>
<tr>
<td>P1/1</td>
<td>25</td>
<td></td>
<td></td>
<td>1</td>
<td>0.75</td>
</tr>
<tr>
<td>P1/0</td>
<td>25</td>
<td></td>
<td></td>
<td>1</td>
<td>0.75</td>
</tr>
</tbody>
</table>

### DRILLED SHAFT

<table>
<thead>
<tr>
<th>Drilled Shaft ID</th>
<th>DA (ft)</th>
<th>DB (ft)</th>
<th>RA</th>
<th>RB</th>
<th>RC</th>
<th>AD (in)</th>
<th>RE</th>
<th>RC (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS/12/4.0</td>
<td>12</td>
<td>4.0</td>
<td>11</td>
<td>14</td>
<td>8</td>
<td>12</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>DS/12/4.5</td>
<td>12</td>
<td>4.5</td>
<td>11</td>
<td>14</td>
<td>10</td>
<td>12</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>DS/14/4.0</td>
<td>14</td>
<td>4.0</td>
<td>11</td>
<td>16</td>
<td>10</td>
<td>14</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>DS/14/4.5</td>
<td>14</td>
<td>4.5</td>
<td>11</td>
<td>16</td>
<td>10</td>
<td>14</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>DS/16/4.0</td>
<td>16</td>
<td>4.0</td>
<td>11</td>
<td>18</td>
<td>10</td>
<td>16</td>
<td>10</td>
<td>16</td>
</tr>
<tr>
<td>DS/16/4.5</td>
<td>16</td>
<td>4.5</td>
<td>11</td>
<td>18</td>
<td>10</td>
<td>16</td>
<td>10</td>
<td>16</td>
</tr>
<tr>
<td>DS/18/5.0</td>
<td>18</td>
<td>5.0</td>
<td>11</td>
<td>18</td>
<td>10</td>
<td>18</td>
<td>10</td>
<td>18</td>
</tr>
<tr>
<td>DS/18/5.0</td>
<td>18</td>
<td>5.0</td>
<td>11</td>
<td>18</td>
<td>10</td>
<td>18</td>
<td>10</td>
<td>18</td>
</tr>
<tr>
<td>DS/20/5.0</td>
<td>20</td>
<td>5.0</td>
<td>11</td>
<td>18</td>
<td>10</td>
<td>20</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>DS/20/5.0</td>
<td>20</td>
<td>5.0</td>
<td>11</td>
<td>18</td>
<td>10</td>
<td>20</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>DS/25/5.0</td>
<td>25</td>
<td>5.0</td>
<td>11</td>
<td>18</td>
<td>10</td>
<td>25</td>
<td>10</td>
<td>25</td>
</tr>
</tbody>
</table>

### LUMINAIRE AND CONNECTION

<table>
<thead>
<tr>
<th>LA (ft)</th>
<th>LB (ft)</th>
<th>LC (in)</th>
<th>LD (in)</th>
<th>LE (ft)</th>
<th>LF (ft)</th>
<th>LG (in)</th>
<th>LH (in)</th>
<th>LM (in)</th>
<th>LJ (in)</th>
<th>LL (deg)</th>
<th>US (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

**NOTE:**
1. Work this Index with Index 649-031.
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:
      - Less than 16; ASTM A1011 Grade 50, 55, 60 or 65
      - Greater than or equal to 16; ASTM A572 Grade 50, 55, 60 or 65
      - ASTM A695 Grade A (5 ksi yield) or Grade B (60 ksi yield)
   B. Steel Plates: ASTM A36
   C. Weld Metals: E70XX
   D. Bolts, Nuts and Washers:
      - High Strength Hex Head Bolts: ASTM F1554 Grade 55
      - Nuts: ASTM A563 DH Heavy-Hex
      - Washers: ASTM F436 Type 1, one under turned element
      - Anchor Bolts, Nuts and Washers:
        - Anchor Bolt: ASTM F1554 Grade 55
        - Nuts: ASTM A563 Grade A Heavy-Hex (5 per anchor bolt)
        - Plate Washers: ASTM A563 (2 per bolt)
   E. Threaded Bars/Studs: ASTM A307
   F. Handhole Frame: ASTM A109 or ASTM A496, Grade 36
   G. Handhole Cover: ASTM A1011 Grade 50, 55, 60 or 65
   H. Aluminum Pole Caps and Nut Covers: ASTM B26 (319-F)
   I. Stainless Steel Screws: AISI Type 316
   J. Concrete: Class IV (Drilled Shaft) for all environmental classifications.
   K. Reinforcing Steel: Specification 415
   L. Welding:
      - Use a full-penetration groove weld within 6 inches of the penetration or fusion welds except:
        - Permitted.
   
5. Fabrication:
   A. Welding:
      a. Specification 460-8-4 and
      b. AASHTO LRFD Specification for Structural Supports for Highway Signs, Luminaries, and Traffic Signals Section 14.4
   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.
   
6. Coatings:
   A. All Nuts, Bolts, Washers and Threaded Bars/Stub: 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 grade pad with drain between top of foundation and bottom of baseplate in accordance with Specification 648-7
   D. Attach Sign Panels and Signals centered on the elevation of the Mast Arm.
   E. Wire Access holes are 1/4" or less in diameter.

---

**TABLE OF CONTENTS**

<table>
<thead>
<tr>
<th>SHEET</th>
<th>SUBJECT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Elevation and Notes</td>
</tr>
<tr>
<td>2</td>
<td>Foundation and Base Plate Details</td>
</tr>
<tr>
<td>3</td>
<td>Mast Arm Connection and Splice Details</td>
</tr>
<tr>
<td>4</td>
<td>Double Arm Connection and Splice Details</td>
</tr>
<tr>
<td>5</td>
<td>Luminaire Arm and Connection Details</td>
</tr>
<tr>
<td>6</td>
<td>Handhole and Pole Cap Details</td>
</tr>
</tbody>
</table>

---

**ELEVATION AND NOTES**

**Single Arm Shown, Double Arm Similar (Luminaire Arm Not Shown)
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.
**DOUBLE ARM CONNECTIONS & SPLICE DETAILS**

**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 First Mast Arm Extension.

5. Adjust width of top and bottom Connection Plates to maintain minimum clearance shown.

---

**DESCRIPTION:**

**FY 2020-21 STANDARD PLANS**

**MAST ARM ASSEMBLIES**

**INDEX**

649-031

**SHEET**

4 of 6
Mast Arm Assemblies

**Notes:**
1. Galvanized steel luminaire type and luminaire length may be found in the Lighting Plans.
2. Align Luminaire Arm with Single Mast Arm or First Arm of Double Mast Arm unless indicated otherwise in the plans.
3. The fabricator may substitute a 1/2" thick bent plate with the same flange width, height, and length as the MC 10x33.6 Channel section.
4. 'LC' measure counter clockwise from First Mast Arm.

**Description:**

** Mast Arm Assembly **

** Luminaire Elevation **

** Luminaire Orientation **

** Section H-H **

** Section I-I **

** Detail 'G' **

Luminaire Arm and Connection Details

** Luminaire Connection Elevation **

** Section I-I **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section H-H **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section I-I **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section H-H **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section I-I **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section H-H **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section I-I **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section H-H **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section I-I **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section H-H **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section I-I **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section H-H **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section I-I **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section H-H **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section I-I **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section H-H **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section I-I **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section H-H **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section I-I **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section H-H **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section I-I **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section H-H **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section I-I **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section H-H **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section I-I **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section H-H **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section I-I **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section H-H **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section I-I **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section H-H **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section I-I **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section H-H **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section I-I **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section H-H **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section I-I **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section H-H **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section I-I **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section H-H **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section I-I **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section H-H **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section I-I **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section H-H **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section I-I **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section H-H **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section I-I **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section H-H **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section I-I **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section H-H **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section I-I **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section H-H **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **

** Section I-I **

** Luminaire Arm and Connection Details **

** Luminaire Connection Elevation **
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.

11 Gage Mast Arm Cover

Handhole Cover

11/01/17

COVER

SECTION J-J

HANDHOLE

SECTION K-K

(Thru Handhole)

(Through Handhole)

POLE TOP

Handhole Frame

Mast Arm Frame

Pole Wall

Cover Clip (Typ.)

Tack Weld

Penetration Weld (Typ.)

Partial Penetration Weld

Cover Clip

Handhole Cover

11 Gage Waterproof Terminal Compartment. Cover Installed With Waterproof Gasket. (See Note 2 and 3)

Cover Clip (Typ.)

Tack Welded

Penetration Weld (Typ.)

Partial Penetration Weld

Cover Clip

Handhole Cover

11 Gage Mast Arm Cover

1⅝" Hole (Typ.)

1⅝" Hole (Typ.)

11/01/17

COVER

SECTION J-J

HANDHOLE

SECTION K-K

(Thru Handhole)

(Through Handhole)

POLE TOP

Handhole Frame

Mast Arm Frame

Pole Wall

Cover Clip (Typ.)

Tack Weld

Penetration Weld (Typ.)

Partial Penetration Weld

Cover Clip

Handhole Cover

11 Gage Mast Arm Cover

1⅝" Hole (Typ.)

1⅝" Hole (Typ.)

11/01/17

COVER

SECTION J-J

HANDHOLE

SECTION K-K

(Thru Handhole)

(Through Handhole)

POLE TOP

Handhole Frame

Mast Arm Frame

Pole Wall

Cover Clip (Typ.)

Tack Weld

Penetration Weld (Typ.)

Partial Penetration Weld

Cover Clip

Handhole Cover

11 Gage Mast Arm Cover

1⅝" Hole (Typ.)

1⅝" Hole (Typ.)

11/01/17

COVER

SECTION J-J

HANDHOLE

SECTION K-K

(Thru Handhole)

(Through Handhole)

POLE TOP

Handhole Frame

Mast Arm Frame

Pole Wall

Cover Clip (Typ.)

Tack Weld

Penetration Weld (Typ.)

Partial Penetration Weld

Cover Clip

Handhole Cover

11 Gage Mast Arm Cover

1⅝" Hole (Typ.)

1⅝" Hole (Typ.)

11/01/17

COVER

SECTION J-J

HANDHOLE

SECTION K-K

(Thru Handhole)

(Through Handhole)

POLE TOP

Handhole Frame

Mast Arm Frame

Pole Wall

Cover Clip (Typ.)

Tack Weld

Penetration Weld (Typ.)

Partial Penetration Weld

Cover Clip

Handhole Cover

11 Gage Mast Arm Cover

1⅝" Hole (Typ.)

1⅝" Hole (Typ.)
CONCRETE POLE MOUNTED SIGNAL

NOTES:
1. As an option, pedestrian signals may be installed on concrete poles and pedestals using lead anchors (two bolts same size per hub) in lieu of the stainless steel bands.
2. Repair drilled or punched holes in galvanized steel poles or pedestals in accordance with Specification 562. Install grommets or bushings in each hole.
4. See APL for Department-approved Pedestrian Signal Assemblies and hardware.
5. Construct footing with Class I Concrete, footing may be Cast-In-Place (CIP) or Precast.
6. For Steel Strain Poles see Index 649-010.
7. For Prestressed Concrete Poles see Index 641-010.
8. Install 4 – 5/8” x 18” Anchor Bolts With Double Nuts. (ASTM F1554 Grade 55)
9. Meet the requirements of Specification 644 for aluminum poles and transformer bases.

PEDESTAL MOUNTED SIGNAL

STRAIN POLE MOUNTED SIGNAL

NEW CONSTRUCTION (See Note 7)

EXISTING CONSTRUCTION

FINISHED GRADE (Typ.)

8'0" (Max.)

PRESTRESSED CONCRETE PILLAR (Existing)

GROUNDING ELECTRODE

PULL BOX (Typ.)

CONCRETE APRON (Typ.)

8'0" (Max.)

CONCRETE APRON (Typ.)

8'0" (Max.)

PEDESTAL MOUNTED SIGNAL

PEDESTRIAN CONTROL SIGNAL

INDEX

653-001

1 of 1
NOTES:

1. A transformer base is required for both conventionally-powered and solar-powered applications (conventional power shown).
2. Install the RRFB in pairs, one on either side of approach traffic.
3. Install controller on the backside of post from approach traffic.
4. Install a 30" X 30" W11-2 sign on two-lane roadways and a 36" X 30" W11-2 sign for multilane roadways.
5. Install push button and R10-25 sign in accordance with Index 665-003.
6. Engage all threads on the transformer base and post unless the aluminum post is fully seated into base.
7. Meet the requirements of Specification 646 for aluminum poles and transformer bases.
8. Install a concrete slab around all pull boxes. The minimum slab dimension is 4'-0" by 4'-0". In urban areas where space is limited slab dimensions may be adjusted as shown in the Plans.
9. For assemblies connected to conventional power, provide single pole non-fused watertight breakaway electrical connectors in the frangible transformer base.
10. When wire entry holes are drilled in the sign column, use a bushing or rubber grommet to protect conductors.
11. For solar-powered applications, orient solar panel to face South for optimal exposure to sunlight.

FRONT VIEW

SIDE VIEW

DETAI L "A"

DETAI L "B"

POLE WIRING AND FOOTING DETAIL

RECTANGULAR RAPID FLASHING BEACON ASSEMBLY

INDEX

1 of 1
NOTES:

1. Materials:
   A. Sign panels, wind beams and associated hardware: See Index 700-020
   B. Sign adjustable hangers, wire rope clamps and associated hardware: See APL
   C. Wire and additional hardware requirements: See Specification 834

2. **Type B and C Attachments**
   A. Extend wind beams to within 6" of the sign edge.
   B. Number of sign hangers required based on sign width:
      a. Sign width < 4'-6": One
      b. 4'-6" ≤ sign width ≤ 7'-0": Two
   C. Number of wind beams required based on sign depth:
      a. Sign depth < 3'-6": One
      b. 3'-6" ≤ sign depth ≤ 7'-0": Two

3. **Type D Attachments**
   Maximum sign width = 7'-0"

4. Align the bottom edges of signs to approximately the same elevation.

5. Use a minimum of 2 bolts with a minimum spacing of 2" for overlapped connection of the adjustable hangers.

---

**SIGN MOUNTING DETAIL**

---

**OPPOSING SIGN MOUNTING DETAIL**

---

**TYPICAL INSTALLATIONS FOR SIGN PANEL(S) MOUNTED ON SPAN WIRE**
GENERAL NOTES:

1. Lowering device to be shipped ready for pole attachment to include 100 ft. of composite power and signal cable prewired to lowering device at the factory.

2. The lowering device manufacturer shall supply both a portable lowering tool with a manual hand crank and a half-inch drill variable-speed reversible industrial-duty electric drill that matches the winch's manufacturer-recommended revolutions per minute. One lowering tool per every 10 lowering devices is required.

3. The lowering device manufacturer shall provide an on-site installation inspection and operator instruction and certification. This ensures the product is assembled correctly and that all necessary persons are trained in the proper, safe operation of the system. Before erecting the first pole the contractor must contact the lowering device supplier and schedule a manufacturer's representative to be on-site.


5. Camera to be mounted to camera junction box and stabilizing weight via 1½ Standard NPT Pipe Thread.

6. Use air terminal extension when the pole top junction box is wider than top of pole.

7. The stainless steel device lowering cable shall be installed inside the pole within a 1½ diameter PVC conduit.

8. All communication and power cables must be neatly bundled and secured.


10. Use a Camera Lowering Device listed on the Approved Product List (APL).

See Index 641-020 for concrete pole details and Index 649-020 for steel pole details.
Variies (2 Max.)

GENERAL NOTES:

1. Verify the pole type, the dimensions of the pole at the point of installation of the camera mount, and angle with respect to the roadway before manufacturing camera mount assembly.
2. Design camera mounting arm and connection to the pole according to FDOT Structures Manual (current edition).
3. No field welding shall be permitted.
4. Mounting bracket arm shall be level after installation.
5. The contractor shall submit shop drawings for the proposed fixed mounting arm, signed and sealed by a Professional Engineer registered in the State of Florida, to the Engineer for review and approval.
7. Galvanized pipe connections and conduit entry points shall be sealed in accordance with Specification 630.

REVISED: 01/01/17

DESCRIPTION:

REVISION

CAMERA MOUNTING DETAILS

INDEX

659-020

2 of 2
GENERAL NOTES:

1. If the loop lead-in is 75' or less from the edge of the loop detector to controller cabinet, continue the twisted pair to the cabinet. If the loop lead-in is greater than 75' continue the twisted pair an Intermediate Pullbox, splice to shielded lead-in wire and continue to the controller cabinet.

2. Provide sufficient saw-cut width to allow unforced placement of loop wires or lead-in cables into the saw-cut. Exempt across expansion joints, saw-cut to a standard depth of 3", but no more than 4" below the top of the final surface.

3. On resurfacing or new roadway construction projects, install the loop wires and lead-in cables in the asphalt structural course prior to the placement of the asphalt friction course. Place the loop wires and lead-in cables in a saw cut in the structural course.

4. Use nonmetallic hold down material to secure loop wires and lead-ins to the bottom of saw cuts. Place the hold down material approximately 12" intervals around loops and 24" intervals on lead-ins.

5. The minimum distance between the twisted pairs of loop lead-in wire is 6" from the loop to 12" from the pavement edge or curb.

6. Splice Connections in pull boxes with UL listed, watertight, insulated enclosures. Place one enclosure over the top of each conductor and place a third enclosure over the exposed end of the shielded cable. An alternate, a larger diameter enclosure that will accommodate both the splices of the conductors and the exposed end of the shielded cable may be used.

7. Do not disturb more than a 6" x 6" area of asphalt. Restore asphalt as directed by the Engineer.

8. Alternative installations may be approved by the State Traffic Operations Engineer.

NOTES:

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.

2. Install 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.

3. Insure the conduit fits snug within the drilled hole.

4. Fill the top of the hole with loop sealant to the level of the curb surface.

5. Use a nonmetallic material to prevent excessive loop sealant from entering the flexible conduit.

6. Splice Connections in pull boxes with UL listed, watertight, insulated enclosures. Place one enclosure over the end of each conductor and place a third enclosure over the exposed end of the shielded cable. As an alternate, a larger diameter enclosure that will accommodate both the splices of the conductors and the exposed end of the shielded cable may be used.

7. Do not disturb more than a 6" x 6" area of asphalt. Restore asphalt as directed by the Engineer.

8. Alternative installations may be approved by the State Traffic Operations Engineer.
**NOTES:**

1. The number of "Turns" indicated 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. When shown in the Plans, the leading edge of loop Types A, C, D, & F may extend past the stop line a maximum of 10' and the length of these loops may be extended to a maximum of 60'.

7. Do not install loop lead-in wires in the same pull box with signal power cable.

---

**LOOP TYPES**

**TYPE A**

- 2 Turns
- Stop Line

**TYPE B**

- 3 Turns
- Stop Line

**TYPE C**

- 4 Turns
- Stop Line

**TYPE D**

- 4 Turns
- Stop Line

**TYPE E**

- Variable
- 2 Turns

**TYPE F**

- Variable
- 4 Turns

**TYPE G**

- Variable
- Shielded lead-in

---

**LOOP CORNER AND LEAD-IN DETAILS**

---

**CONCRETE PAVEMENT EXPANSION JOINTS**

---

**VEHICLE LOOP INSTALLATION DETAILS**

---
DESCRIPTION:

1. Mount Signs above the detectors. See Index 700-102 for sign details.

2. Install Pushbuttons and Pedestrian Actuation Signs with faces parallel to the crossing direction, or as shown in the Plans.

3. Mount pushbuttons and Signs in accordance with Specification 665.

4. Install all grounding per Specification 620.

5. Pushbutton mounting height shown above is taken at the center of the actuation switch.

NOTES:
CABINET INSTALLATION DETAILS

NOTES:

1. If cabinet mounting requires relocation of hole in concrete pole, fill existing hole with concrete or cover with a noncorrosive cover plate.

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

NEW CONTROLLER CABINET

1. Service Slab: slope 1 1/2" to 1" for drainage. Not required in sidewalk, pavement areas, or where R/W is restricted.

2. The number, size and orientation of conduit sweep will vary according to site condition or locations. Provide two spare 2" PVC conduits in all bases. Place the exits of the spare conduits in the direction of the center rear of the cabinet base and into a pullbox. If obstructions prevent the spare conduit from exiting to the rear, or the rear of the cabinet is located on the R/W line, locate as directed by the Engineer. Cap all spare conduit sweeps with a weatherproof fitting.

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

4. Retrofit existing controller cabinets in accordance with Specification 678.

5. Retrofit installation procedure for signalized intersection controller cabinet are located at: http://www.fdot.gov/traffic/doc_library/doc_Library.shtm Generator Power for Signalized Intersection

POLE MOUNTED CONTROLLER CABINET

INTERCONNECT JUNCTION BOX

NOTES:

PEDESTAL MOUNTED CABINET

EXISTING CONTROLLER CABINET

GROUND MOUNTED CONTROLLER CABINET

GROUND MOUNTED

SIDE ELEVATION

SIDE ELEVATION

SIDE ELEVATION

SIDE ELEVATION

SIDE ELEVATION

SIDE ELEVATION

FRONT ELEVATION

FRONT ELEVATION

FRONT ELEVATION

FRONT ELEVATION

SIDE ELEVATION

SIDE ELEVATION

SIDE ELEVATION

SIDE ELEVATION

SIDE ELEVATION

SIDE ELEVATION
DESCRIPTION:

NOTE:

CABINET LAYOUT DETAILS (Four Lanes or Less)

NOTES:

1. Traffic monitoring site cabinet includes:
   A. One adjustable shelf; (equipped as shown)
   B. One backplane assembly; (equipped as shown)
   C. One J1 receptacle with mounting bracket;
   D. One J1 equipment cable 5 ft. long (Reference Sheet 4);
   E. All associated wiring and wiring harnesses.

2. Basic backplane assembly consists of:
   A. Two inductive loop terminal strips,
   B. One piece sensor terminal strip,
   C. One battery terminal strip,
   D. One solar panel terminal strip.

3. The contractor is responsible for contacting the TMS Manager at the Transportation Statistics Office for lane number information and verification.

4. Speed/Classification unit and modem furnished separately.

5. Cable ends must be fabricated to fit the vehicle speed/ classification unit (Reference Sheet 4).

NOTE:
Fabricate bracket out of 1/16 - 1/8 inch thick aluminum. Dimensions may vary depending on the manufacturer of the J1 receptacle being furnished. The cabinet manufacturer will construct the mounting bracket to fit the receptacle.

J1 MOUNTING BRACKET
Cabinet Cable (Furnished Separately)

Surge Suppressors

Vehicle Speed/Classification Unit (See Note 4)

Cable Arrangement For More Than Four Lanes Monitored
By a Single Vehicle Speed/Classification Unit

OPTION A
(Shown)

OPTION B

Equipment Cables (See Note 5)

J1 Receptacle

P1 Equipment Cable Plug (Lanes 1 Through 4)

P1 Equipment Cable Plug (Lanes 5 Through 8)

Aluminum Bracket For J1 receptacle (Reference Detail, Sheet 3) (Attach To Shelf Mounting Rail In Cabinet)

Wiring To Backplane

Battery Terminal

Solar Terminal

Solar Power

Surge Suppression

CABINET LAYOUT DETAILS (Five to Eight Lanes)

NOTES:

1. Traffic monitoring site cabinet includes:
   A. One adjustable shelf (equipped as shown)
   B. Two backplane assembly (equipped as shown)
   C. Two J1 receptacle with mounting bracket.
   D. One J1 equipment cable 5 ft. long (Reference Sheet 4).
   E. All associated wiring and wiring harnesses.

2. Basic backplane assembly consists of:
   A. Two inductive loop terminal strips;
   B. One piezo sensor terminal strip;
   C. One battery terminal strip;
   D. One solar panel terminal strip.

3. The contractor is responsible for contacting the TMS Manager in the Transportation Statistics Office for lane number information and verification.

4. Speed/Classification unit and modem furnished separately.

5. Cable ends must be fabricated to fit the vehicle speed/ classification unit (Reference Sheet 4) for pinout charts, receptacle, and plug details.
**DESCRIPTION:**

- **OPTION A:** Single Vehicle Speed/Class. Unit capable of up to eight lanes of inputs and a single equipment cable with split ends to fit two J1 receptacles; or
- **OPTION B:** Second Vehicle Speed/Class. Unit and separate equipment cable connecting to a second J1 receptacle.

**NOTES:**

1. The contractor is responsible for contacting the EMS Manager in the Transportation Statistics Office for lane number information and verification.
2. The equipment cable can accommodate up to four lanes of inductive loop and piezo sensor inputs. (Reference Sheet 1 for cabinet layout)
3. For more than four lanes and up to eight lanes of inputs, the following options are available:
   - **A. Second Vehicle Speed/Class. Unit** and separate equipment cable connecting to a second J1 receptacle; or
   - **B. Single Vehicle Speed/Class. Unit** capable of up to eight lanes of inputs and a single equipment cable with split ends to fit two J1 receptacles. (Reference Sheet 2 detail)
4. Numbers in parenthesis in the pinout chart identify lane numbers when a second backplane for lanes 5 through 8 is required.
5. Cable ends must be fabricated to fit the vehicle Speed/Classification Unit.

**J1 EQUIPMENT CABLE PLUG**

<table>
<thead>
<tr>
<th>26 Female Pin Slots</th>
<th>26 Recessed Male Pins</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Loop 1a (5a) yellow</td>
</tr>
<tr>
<td>B</td>
<td>Loop 2a (6a) blue</td>
</tr>
<tr>
<td>C</td>
<td>Loop 2b (6b) tan</td>
</tr>
<tr>
<td>D</td>
<td>Loop 3a (7a) green</td>
</tr>
<tr>
<td>E</td>
<td>Loop 3b (7b) red</td>
</tr>
<tr>
<td>F</td>
<td>Loop 4a (8a) w/purple</td>
</tr>
<tr>
<td>G</td>
<td>Loop 4b (8b) w/brown</td>
</tr>
<tr>
<td>H</td>
<td>Gnd</td>
</tr>
</tbody>
</table>

**J1 RECEPTACLE PINOUT**

<table>
<thead>
<tr>
<th>26 Recessed Male Pins</th>
<th>26 Female Pin Slots</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Loop 1a (5a) yellow</td>
</tr>
<tr>
<td>B</td>
<td>Loop 2a (6a) blue</td>
</tr>
<tr>
<td>C</td>
<td>Loop 2b (6b) tan</td>
</tr>
<tr>
<td>D</td>
<td>Loop 3a (7a) green</td>
</tr>
<tr>
<td>E</td>
<td>Loop 3b (7b) red</td>
</tr>
<tr>
<td>F</td>
<td>Loop 4a (8a) w/purple</td>
</tr>
<tr>
<td>G</td>
<td>Loop 4b (8b) w/brown</td>
</tr>
<tr>
<td>H</td>
<td>Gnd</td>
</tr>
</tbody>
</table>

**Connect To Electronic Unit**

**Electronics Unit**

- Veh. Speed/Class. Unit
- Cabinet Cable
- Equipment Cable

**Electronics Unit**

- Veh. Speed/Class. Unit
- Cabinet Cable
- Equipment Cable

**Electronics Unit**

- Veh. Speed/Class. Unit
- Cabinet Cable
- Equipment Cable
NOTES:

1. Install axle sensors and loops associated with axle sensors after placement of the friction course.

2. Cut a 3" deep slot for the Inductive loops. Loop slots will be cut wide enough to allow unforced placement of the wire into the bottom of the slot. Each turn of #14 AWG places the IMSA 51-7 copper wire in the slot. Place short pieces of backer rod (2" to 3" in length) every 18" to 24" to hold the loop wire in the bottom of the slot.

3. Twist loop leads at the rate of 8 to 16 twists per foot. Leads that are within 150' of the cabinet, extend the twisted pair loop wire directly to the cabinet. For distances over 150', #14 IMSA 50-2 shielded lead-in cable must be spliced to the loop wire twisted pair at the first pull box to which the loop wire is pulled.

4. Marking will consist of two rounds of contrasting colored tape, one color for the lane number and the second color for the lead loop location in the lane. The first band closest to the cabinet will represent the lane number, one round of tape will be for lane 1 and two rounds will be lane 2, etc. The lead loop in lane one would have one round of tape and a second round of a contrasting colored tape for the lead loop in the lane. The trailing loop would not have a second contrasting colored band of tape.

5. See Index 635-001 for pull box and apron details.

6. All splices will be performed using splice kits designed for direct burial. Splice kits will include screw on wire connectors and a housing with sufficient sealant to fully encapsulate the spliced connections. Taped splices are not permitted.

7. Use a chalk line or string and paint to layout the position of the sensor and lead-in cable slots. Ensure saw cuts do not deviate more than 0.5 inches from the chalk line. Use a single blade or ganged blade saw wide enough to cut the axle sensor slot at full width in a single pass. Cutting two slots and chipping out roadway material between them is not allowed.

8. All sensor slots and any cuts in the roadway will be thoroughly blown out to ensure there is no dust or debris prior to installation of sensors or leads.

9. Install Exit Windows at least 2' apart.
NOTES:
1. The unit must be capable of detecting up to eight lanes of traffic (in either or both directions) when mounted perpendicular to the roadway.

2. Coverage area of the unit is affected by the roadway geometry: distance from the travel lanes, median type and width, barrier walls, etc.

3. Mounting height of the unit and offset from the roadway must be determined on a site-by-site basis, in accordance with the manufacturer's recommended guidelines. Offset of pole must be greater than or equal to minimum clear zone requirements.
NOTE:
1. Cabinet installed per Index 676-010 except cabinet center will be 4 feet above grade.
2. Place pole in accordance with the Standard Specification 125.4 and 125.8.2.
3. Use #10 AWG stranded copper wire for Solar Panel Array installations. Green insulation is THHN or THWN for negative, 12 volts wiring. Black insulation is THHN or THWN for positive, 12 volts wiring. Ground insulation is THHN or THWN for ground bonding of the solar panel frame to the pole and earth.
4. Solar panel should be installed facing due south with angle of tilt equal to the sum of the following equation. The Latitude of the panel's location, multiplied by 0.76, plus 3.1 degrees. Equation expressed as (LAT)X(0.76)+(3.1°)
5. Encase all wiring from the weather head to the solar panel in outdoor flexible conduit.
6. Concrete Base Requirements.
   a. 4' poles: 2'-0" x 2'-0" wide, a depth of 2'-0"
   b. 12', 15' or 20' poles: 3'-0" x 3'-0" wide, a depth of 3'-0"
   c. 30' or 35' poles: 3'-0" x 3'-0" wide, a depth of 4'-0"

---

**Solar Panel(s)**

See Detail 'D'

6" Min. Rod With Clamp

Copper Clad Ground

8' x 40 ft. (Min.)

Cabinet

Index 635-001

4" Nom. Aluminum Pole

(See Note 6)

Flexible Conduit

(See Note 5)

Bare Copper Wire

#4 AWG Solid

Red insulation is THHN or THWN for positive 12 volts wiring, Black insulation is THHN or THWN for negative, 12 volts wiring. Green insulation is THHN or THWN for ground bonding of the solar panel frame to the pole and earth.

4' Weather Head

Solar Panel(s)

(See Detail 'E')

Locknut

Washer

Ground Lug

Casing

Assembly

Base

#10 Screw

Stainless Steel

Above grade.

---

**Solar Power Pole**

WITH POLE MOUNTED CABINET

(Telemeter Sites)

---

**Pedestal Mounted Cabinet**

(Portable Traffic Monitoring Sites)

---

**Detail 'E'**