GENERAL NOTES:
1. Install conduit in accordance with Specification 630.
2. 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.
VERTICAL CLEARANCE NOTE:
Maintain 1'-0" minimum vertical clearance when crossing over pipe and/or utilities.
If minimum vertical clearance cannot be maintained, conduit is to be routed under pipe maintaining 1'-0" minimum vertical clearance.
### CONDUIT INSTALLATION DETAILS

#### PLANEMNT NOT EXPOSED TO VEHIICAL TRAFFIC

- **Undisturbed Material**
- **Backfill**
- **Conduit**
- **Finished Grade**

#### PLACEMENT UNDER NEW ROADWAY PRIOR TO INSTALLATION OF BASE AND PAVEMENT

- **Undisturbed Material**
- **Subgrade Elevation**
- **Conduit**

### 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.

#### PLACEMENT UNDER EXISTING PAVEMENT NOT ADJACENT TO GUTTER

- **Undisturbed Material**
- **Flowable Fill**
- **Conduit**

#### PLACEMENT UNDER EXISTING PAVEMENT ADJACENT TO GUTTER

- **Undisturbed Material**
- **Flowable Fill**
- **Conduit**

**Width of Pavement Removal (See Pavement Removal Note)**

- **Pavement**
- **Base**
- **Gutter**

**Subgrade Elevation**

**11/01/18**

**CONDUIT INSTALLATION DETAILS**  
**FY 2020-21**  
**STANDARD PLANS**  
**630-001 3 of 4**
**Conduit Installation Details**

**Below Existing**
- Finished Grade
- Existing Utility or Drainage Structure
- Size Varies
- New Conduit(s)
- Orange Insulated Locate Wire (When Required)

**Above Existing - Depth 2'-6" or Less**
- Concrete (See Note 1)
- Orange Insulated Locate Wire (When Required)

**Above Existing - Depth 2'-6" or Greater**
- Concrete (See Note 1)
- Orange Insulated Locate Wire (When Required)

**Placement under Railroad**
- Wire (When Required)
- Orange Insulated Locate Wire

**Notes:**
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. Where conduits are to be installed over existing underground structures (e.g., drainage pipes or utility lines) which are 2'-6" deep or greater, encase the conduit in Class NS concrete for the entire length of conduit that is installed at a depth of 2'-6" or greater, and the new conduit is not encased in concrete.

**Placement Across Existing Drainage Pipes or Utilities**
- Pull Box (See Index 635-001)
- Conduit
- Railroad R/W
- Sidewalk
**Plan (Two Span Connections Shown)**

- **Steel Strain Pole**
  - Automatic Compression Type Clamp (Feed Through Deadend)
  - Catenary Or Messenger Wire

- **Prestressed Concrete Strain Pole**
  - Automatic Compression Type Clamp (Feed Through Deadend)
  - Catenary Or Messenger Wire

- **Steel Strain Pole**
  - Automatic Compression Type Clamp (Feed Through Deadend)
  - Catenary Wire
  - No. 6 Bare Copper Ground Wire
  - Crimp Type Electrical Connector
  - Tapped Lug For Grounding
  - Locking Cable Ties Or Lashing Wire (See Note 3)
  - Messenger Wire
  - Signal Cable

- **Prestressed Concrete Strain Pole**
  - Automatic Compression Type Clamp (Feed Through Deadend)
  - Catenary Wire
  - No. 6 Bare Copper Ground Wire
  - Pigtail Min. Of 24" Crimp Type Electrical Connector
  - Tapped Lug For Grounding
  - Locking Cable Ties Or Lashing Wire (See Note 3)
  - Messenger Wire
  - Signal Cable

**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. Hole for eyebolt will require field reaming for 1" & 1 1/4" 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°.

**Elevation**

- **Steel Strain Pole**
  - #6 Bare Copper Ground Wire
  - 1 1/2" PVC Conduit For Ground Wire
  - Finished Grade
  - 6" Ø X 20' Grounding Electrode (Copperclad)
  - Drilled Shaft (See Index 649-0110)

- **Prestressed Concrete Strain Pole**
  - #6 Bare Copper Ground Wire
  - 1 1/2" PVC Conduit For Ground Wire
  - Finished Grade
  - 6" Ø X 20' Grounding Electrode (Copperclad)

**Index:**

- 634-001

**Sheet:**

- 1 of 1
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 1/2" 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, only use locking cable ties.

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.
**SERVICE POINT DETAILS**

**GENERAL NOTES:**

1. It shall be the contractors 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.

---

**AERIAL FEED**

- Concrete Pole Prestressed Type P-II, 30’ Long
- Clevis With Insulators
- Conductor Weatherhead Height
  - As Required By Power Company
- Meter As Required
  - Height Specified By Power Company
- Service Disconnect

**UNDERGROUND FEED**

- Concrete Pole, Prestressed Type P-II, 12’ Long
- Clevis With Insulators
- Conductor Weatherhead Height
  - As Required By Power Company
- Meter As Required
  - Height Specified By Power Company
- Service Disconnect

---

**DETAIL A**

- #6 AWG Insulated Grounding Electrode Conductor In 1” Rigid Galvanized Steel Conduit
- 6’ (Min.) Depth To Ground Rod (Typ.)
- 12” Bed Of Pea Rock Or Crushed Stone For Drainage (Typ.)
- U.L. Approved Ground Rod, ¾ Dia. 40’ Long Copper Clad (All Service Points)

**DETAIL B**

- Concrete Pad
- Grade
- 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 in Distribution Point Description on Lighting Plan Sheets.
10. #6 Insulated Copper Ground Wire. Bond the Service Neutral to Ground at Service Main Disconnect.
11. Fused Control Power Transformer 0.5 KVA, Single Phase, 480V Primary, 120V Secondary (Part of Lighting Contactor, Shown Outside for Clarity).
12. Lightning Arrestor Mounted on Outside of Enclosure.
13. Lighting Control Panel Main Breaker.
14. 2 Pole Electrical Lighting Contactor.
15. 120V Photoelectric cell, 1800VA with 2000V Peak Surge Protection.
17. Concrete Pad.
18. Underground Feeder Conduct.
19. Mount on Riser Pole.
20. Ground BUS.
21. Ground BUS.
22. NEMA 4X SST Ground Mounted Storage Cabinet with Two Shelves. Only Required for High Mast Lighting Systems.

[Diagram of distribution point with notes and diagrams]

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

PHOTOELECTRIC CONTROLLER DETAIL

TYPICAL DISTRIBUTION POINT SCHEMATIC DETAIL

RISER DIAGRAM - TYPICAL DISTRIBUTION POINT
AERIAL FEED (NO METER USED)  
FIGURE A

AERIAL FEED (METER USED)  
FIGURE B

UNDERGROUND FEED (NO METER USED)  
FIGURE C

TYPE "B" UNDERGROUND FEED (METER USED)  
FIGURE D

NOTES:

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.

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.

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 in/ft per face.
   B. Concrete Cover: 1” 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 from forms. Balance addition and subtraction 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 ±3”.
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.
CONCRETE POLES

SERVICE AND PEDESTAL POLE TYPE P-II

SERVICE POLE P-IIA (12 Ft.) & P-IIB (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-IIA & P-IIC) or 10 Ft. (for P-IIB) from the Tip End.
- * Dimension may vary from 2½" to 3½" to accommodate a smaller radius at optional stepped (PVC) void. The void diameter shall not be less than 2".

SERVICE POLE P-IIA (12 Ft.) & P-IIB (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-IIA & P-IIC) or 10 Ft. (for P-IIB) from the Tip End.
- * Dimension may vary from 2½" to 3½" to accommodate a smaller radius at optional stepped (PVC) void. The void diameter shall not be less than 2".
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.

POLE TYPE P-III

STRAND LEGEND
- Prestressed Strand: 0.5 in ~ 31 kips Before Transfer (4 strands total)
**DESCRIPTION:**

**REVISION**

**INDEX**

**CONCRETE POLES**

**FY 2020-21**

**STANDARD PLANS**

**SHEET**

**641-010**

**11/01/17**
CONCRETE POLES

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

POLE ELEVATION
(Strands and Reinforcing Not Shown)

STRAND LEGEND
- Prestressed Strand: 0.3 in. ~ 33 kips Before Transfer (8 strands total)
- Dormant Strand: 0.5 in. (4 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 10% L from Tip End.
- Dimention may vary from 3" to 4¼" to accommodate smaller radius of optional stepped (PVC) void. The void diameter shall not be less than 6½".
STRAIN POLE TYPE P-VII

POLE ELEVATION
(Strands and Reinforcing Not Shown)

SPIRAL REINFORCING ELEVATION
(Strands, Holes, and Fixtures 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 30% L from the Tip End.
- Dimension may vary from 3¾" to 5" to accommodate shallower radius of optional stepped (PVC) void. The void diameter shall not be less than 6½".

FACTOR:
0.162 In./Ft. Total Taper

SECTION A-A
(Typical Square Section)

TIP END SECTION (TOP)
(For Dorman Strand Locations, See Section A-A)
STRAIN POLE TYPE P-VIII

POLE ELEVATION
(Strands and Reinforcing Not Shown)

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

SECTION A-A
(Typical Square Section)

STRAND LEGEND
- Prestressed Strand
  0.5 in. ~ 31 kips Before Transfer (12 strands total)
- Dormant Strand
  0.5 in. (6 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 10% L from the Tip End.
* Dimension may vary from 3\(\frac{3}{4}"\) to 5" to accommodate
smaller radius of optional stepped (PVC) void. The void
diameter shall not be less than 6\(\frac{1}{2}"\).
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 8 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 A135 Cold-Drawn
   E. Bolts: ASTM F1554, Grade 55
   F. Washers: ASTM F2329
   G. Steel plates and Pole Cap: ASTM A36 or ASTM A709, Grade 50
   H. Galvanization Bolts, nuts and washers: ASTM F2329
   I. All other steel: ASTM A123
   J. Dome Type CCTV Camera
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 reinforcing steel lap splice to consist of a 3'-0" lap length at each splice. No more than two opposing rebars 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 handleless 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. Sizes and types of conduits and innerducts for network communications between the pullbox and cabinet are stated in the Contract Documents.
   H. Tie ground wires to the interior of reinforcing steel as necessary to prevent displacement during concreting operations.
   I. Store, handling and Erection locations shown may vary within ±3".
   J. Work this Index with Specification 641.
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 SPD's protection on outlets for equipment in cabinet.
   D. Ensure all electronic equipment power is protected and conditioned with SPDs.
   E. Ensure that equipment cabinet is bonded to CCTV pole grounding system.
   F. Furnish and install Surge Protection Devices (SPDs) on all cabling in cabinet.
   G. Sizes and types of conduits and innerducts for network communications between the pullbox and cabinet are stated in the Contract Documents.
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 wire within the pole is 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 slots, etc.) with lowering device manufacturer.

CCTV POLE ASSEMBLY

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LAST REVISION: 01/01/17
DESCRIPTION: FY 2020-21
STANDARD PLANS
CONCRETE CCTV POLE
INDEX
SHEET
641-020
1 of 5
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:
     - a. less than or equal to 60 ksi: ASTM A1011 Grade 50, 55, 60 or 65
     - b. Greater than or equal to 60 ksi: ASTM A572 Grade 50, 55, 60 or 65
     - c. ASTM A595 Grade A (55 ksi yield) or Grade B (60 ksi yield)
   - B. Steel Plates: ASTM A36
   - C. Bolt, Nut and Washer:
     - a. Anchor Bolts: ASTM F1554 Grade 55
     - b. Nuts: ASTM A563 Grade A Heavy-Hex
     - c. Plate Washers: ASTM A16 (per bolt), Splitlock washers and self-locking nuts are not permitted
   - D. Bolts, Nuts and Washers:
     - a. Anchor Bolts: ASTM F1554 Grade 55
     - b. Nuts: ASTM A563 Grade A Heavy-Hex (5 per anchor bolt)
     - c. Plate Washers: ASTM A16 (per bolt), Split-lock washers and self-locking nuts are not permitted
   - E. Handhole Cover: ASTM A1011 Grade 50, 55, 60 or 65
   - F. Handhole Frame: ASTM A36 or ASTM A307
   - G. Handhole Cover: ASTM A1011 Grade 50, 55, 60 or 65
   - H. Aluminum Pole Caps and Nut Covers: ASTM B26 (319-F)
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:
     - a. Anchor Bolts: Bolt diameter plus 1/16", prior to galvanizing
     - b. Anchor Bolts: Bolt diameter plus 1/16", maximum
   - D. Locate handhole 180° from 2" wire entrance pipe.
   - E. Identification Tag: (Submit details for approval.)
     - a. 2" x 4" (Max.) aluminum identification tag
     - b. Anchor Bolts: Bolt diameter plus 1/16", maximum
   - F. Locate handhole 50" from 2" wire entrance pipe.
   - G. Identification Tag: (See Sheet 3)
   - H. Fabricate longitudinal seam welds in pole with 60 percent minimum penetration or groove welds.
5. Coatings:
   - A. All Nuts, Bolts, Washers and Threaded Bars/Studs: ASTM F2329
   - B. All other steel items including plate washers: ASTM A123
6. Construction:
   - A. Foundation: Specification 455, 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 460-6.4.
   - D. Reinforcing Steel: Specification 415
   - E. Stainless Steel Screws: AISI Type 316
   - F. Handhole Cover: ASTM A1011 Grade 50, 55, 60 or 65
   - G. Handhole Frame: ASTM A709 or ASTM A36, Grade 36
   - H. Alumunium 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. Concrete: Class IV (Drilled Shaft) for all environmental classifications.
   - L. Reinforcing Steel: Specification 415
   - M. Stainless Steel Screws: AISI Type 316
   - N. Concrete: Class IV (Drilled Shaft) for all environmental classifications.
   - O. Stainless Steel Screws: AISI Type 316
   - P. Concrete: Class IV (Drilled Shaft) for all environmental classifications.
   - Q. Stainless Steel Screws: AISI Type 316
   - R. Concrete: Class IV (Drilled Shaft) for all environmental classifications.
   - S. Stainless Steel Screws: AISI Type 316
   - T. Concrete: Class IV (Drilled Shaft) for all environmental classifications.
   - U. Stainless Steel Screws: AISI Type 316
   - V. Concrete: Class IV (Drilled Shaft) for all environmental classifications.
   - W. Stainless Steel Screws: AISI Type 316
   - X. Concrete: Class IV (Drilled Shaft) for all environmental classifications.
   - Y. Stainless Steel Screws: AISI Type 316
   - Z. Concrete: Class IV (Drilled Shaft) for all environmental classifications.

ELEVATION AND 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:
     - a. less than or equal to 60 ksi: ASTM A1011 Grade 50, 55, 60 or 65
     - b. Greater than or equal to 60 ksi: ASTM A572 Grade 50, 55, 60 or 65
     - c. ASTM A595 Grade A (55 ksi yield) or Grade B (60 ksi yield)
   - B. Steel Plates: ASTM A36
   - C. Bolt, Nut and Washer:
     - a. Anchor Bolts: ASTM F1554 Grade 55
     - b. Nuts: ASTM A563 Grade A Heavy-Hex
     - c. Plate Washers: ASTM A16 (per bolt), Splitlock washers and self-locking nuts are not permitted
   - D. Bolts, Nuts and Washers:
     - a. Anchor Bolts: ASTM F1554 Grade 55
     - b. Nuts: ASTM A563 Grade A Heavy-Hex (5 per anchor bolt)
     - c. Plate Washers: ASTM A16 (per bolt), Split-lock washers and self-locking nuts are not permitted
   - E. Handhole Cover: ASTM A1011 Grade 50, 55, 60 or 65
   - F. Handhole Frame: ASTM A36 or ASTM A307
   - G. Handhole Cover: ASTM A1011 Grade 50, 55, 60 or 65
   - H. Aluminum Pole Caps and Nut Covers: ASTM B26 (319-F)

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:
     - a. Anchor Bolts: Bolt diameter plus 1/16", prior to galvanizing
     - b. Anchor Bolts: Bolt diameter plus 1/16", maximum
   - D. Locate handhole 180° from 2" wire entrance pipe.
   - E. Identification Tag: (Submit details for approval.)
     - a. 2" x 4" (Max.) aluminum identification tag
     - b. Anchor Bolts: Bolt diameter plus 1/16", maximum
   - F. Locate handhole 50" from 2" wire entrance pipe.
   - G. Identification Tag: (See Sheet 3)
   - H. Fabricate longitudinal seam welds in pole with 60 percent minimum penetration or groove welds.

5. Coatings:
   - A. All Nuts, Bolts, Washers and Threaded Bars/Studs: ASTM F2329
   - B. All other steel items including plate washers: ASTM A123
6. Construction:
   - A. Foundation: Specification 455, 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.
### STEEL STRAIN POLE DATA TABLE

<table>
<thead>
<tr>
<th>POLE TYPE</th>
<th>POLE (in)</th>
<th>BASE CONNECTION.downcase</th>
<th>SHAFT</th>
<th>POLE DESC</th>
<th>BASE PLATE Dia.</th>
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</thead>
<tbody>
<tr>
<td>PS-IV</td>
<td>2.50</td>
<td>0.25</td>
<td>6</td>
<td>Diameter</td>
<td>Diameter</td>
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<td>PS-V</td>
<td>3.13</td>
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<tr>
<td>PS-VI</td>
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### NOTE:
1. Double Nuts: Bottom nut may be half-height "jam" nut. Provide individual nut covers (not shown) for each bolt.
**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'-7". 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 the 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.

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**HANDHOLE**

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

**WIRE ENTRANCE DETAIL**

2 - 3/16" Holes For 2 - 4" x 3/4" Steel Passivated Cotter Pins

Automatic Compression Type Clamp (Feed Through Threaded) 1/4" Thick Claws ASTM A709 Grade 50

**DETAL *B***

1/4" Bolt With Double Nuts and Washers (Typ.)

1/2" Bolt With Double Nuts and Washers (Typ.)

1/2" NPS, Sch. 80 Pipe 2'-0" Long ASTM A500 Grade B

Steel Clamp ASTM A500 Grade 50 (See Table For Thickness)

Steel Clamp ASTM A500 Grade 50 (See Table For Thickness)

Steel Clamp, ASTM A709 Grade 50 (See Table For Thickness)

Steel Passivated Cotter Pins

**POLE ASSEMBLY**

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**CLAMP THICKNESS TABLE**

<table>
<thead>
<tr>
<th>Diameter (in)</th>
<th>Minimum Breaking Strength (kip)</th>
<th>Plate Thickness (in)</th>
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<td>2/4</td>
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---

**CATEGOR Y AND MESSENGER WIRE CLAMPS**

**SECTION C-C**

11 Gage Handhole Cover

Handhole Frame

4 x 6" Handhole Frame

Tack Welded Cover Clip (Typ.)

Tack Welded Cover Clip (Typ.)

Threaded Hole For 1/2" Hex Head Screw (Typ.)

Full Penetration Weld

Partial Penetration Weld (Typ.)

---

**ATTACHMENT DETAILS**

---

**STANDARD PLANS**

**STEEL STRAIN POLE**

---

**INDEX**

---

**SHEET**

---

**DESCRIPTION:**

---

**LAST REVISION 01/01/17**

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**FY 2020-21**

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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 10 ksi) or ASTM A572 Grade 50, 60 or 65 (greater than or equal to 10 ksi) or ASTM A995 Grade A (55 ksi yield) or Grade B (60 ksi yield).
   b. Steel Plates and Pole Cap: ASTM A36 or ASTM A709 Grade 50.
   c. Weld Metal: E70XX.
   d. Bolts: ASTM F3125, Grade A325, Type 1.
   e. Washers: ASTM A36.
   f. Anchor Bolts: ASTM F1554 Grade 55 with ASTM A563 Grade A 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.
4. Foundation:
   a. Specification 460-4.4 and
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. Fabricate Pole longitudinal seam welds (if maximum) with 60% 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 and
      2. Use full-penetration groove welds on the female end section of telescopic pipe if type (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 shall be made either one or two sections (with telescopic field splices)
   e. Circumferentially welded pole shafts and laminated pole shafts are not permitted
   f. Pole Top (See Sheet 5).
   g. Pull Box Option (See Sheet 6).
   h. CCTV Pole (See Sheet 2).
6. 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. Lowering device 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 stands, etc.) with lowering device manufacturer.

**STEEL CCTV POLE ASSEMBLY**

**STEEL CCTV POLE**

**AIR TERMINAL** (See Sheet 6)

**DOMINO TYPE CCTV CAMERA**

**HANDHOLE** (See Sheet 4)

**Air Terminal (See Sheet 6)**

**Pole Top (See Sheet 5)**

**Ground Rod (See Sheet 5)**
NOTES:
1. Shaft Length is based on 1'-0" height above the finished grade.
2. Double Nuts: Bottom nut may be half-height (full nut. Provide individual nut covers (not shown) 10" each bolt.
3. Conduit and CSL Tubes not shown for clarity.
4. Work these details with Data Table on Sheet 2.
# ARM AND BASE PLATE

<table>
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<tr>
<th>Arm ID</th>
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## POLE, BASE PLATE AND ARM CONNECTION

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## LUMINAIRE AND CONNECTION

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**Handhole and Pole Top Details**

**DESCRIPTION:**

- **SHEET 10/2019**
- **11/01/18**
- **REVISION**
- **GENERAL NOTES:**
  - Include baseplate in accordance with Specification 649-7.
  - Coatings: Bolt diameter plus ½" (Max).
  - Anchor Bolts: Bolt diameter plus ½" (Max).
  - Fabricate longitudinal seam welds with 60 percent minimum penetration or fusion welds except:
    - Vertical seams: 50 percent minimum penetration.
    - Horizontal seams: 75 percent minimum penetration.
  - Faces Handhole perpendicular from arm on single arm poles, 2. Same side of the pole as the arm connections.
  - Fabricate longitudinal seam welds with 60 percent minimum penetration or fusion welds except:
    - Vertical seams: 50 percent minimum penetration.
    - Horizontal seams: 75 percent minimum penetration.
  - Upright poles must be a single section. For arms and upright poles, circumferential welds and laminated sections are not permitted.
  - Arms may be either one or two sections. See Sheet 4 for permitted.
  - arms may be either one or two sections. See Sheet 4 for permitted.
  - Fabricate longitudinal seam welds with 60 percent minimum penetration or fusion welds except:
    - 1. Sides of the arm as the arm connections.
    - 2. Face handhole perpendicular from arm on single arm poles, perpendicular from the first arm of double arms poles facing away from traffic or see special instructions on the Mast Arm Tabulation Sheet.
    - Provide a 2" x 4" hole at the top of the pole for signal wiring support. (See Sheet 6)
    - First and Second arm camber angle = 2°.
    - Bolt holes diameters as follows:
      - 1. Bolt diameters (except Anchor bolts): Bolt diameter plus ½" (Max.)
    - 2. Anchor Bolts: Bolt diameter plus ½" (Max.)
  - Coatings:
    - All nuts, bolts, washers, and threaded bars/studs: ASTM F2329
    - All other steel items including plate washers: ASTM A123

**5. Fabrication:**

- **Welding:**
- **Bolts and Mast Arms:**
  - Round or 12-sided (Min.)
    - Taper pole diameter at 0.14 inches per foot
    - Upright poles must be a single section. For arms and upright poles, circumferential welds and laminated sections are not permitted.
    - Arms may be either one or two sections. See Sheet 4 for permitted.
  - Face handhole perpendicular from arm on single arm poles, perpendicular from the first arm of double arms poles facing away from traffic or see special instructions on the Mast Arm Tabulation Sheet.
    - Provide a 2" x 4" hole at the top of the pole for signal wiring support. (See Sheet 6)
    - First and Second arm camber angle = 2°.
    - Bolt holes diameters as follows:
      - 1. Bolt diameters (except Anchor bolts): Bolt diameter plus ½" (Max.)
    - 2. Anchor Bolts: Bolt diameter plus ½" (Max.)
- **Coatings:**
  - All nuts, bolts, washers, and threaded bars/studs: ASTM F2329
  - All other steel items including plate washers: ASTM A123

**6. Construction:**

- **Foundation:** Specification 455 Drilled Shaft, except that payment is included in the cost of the Mast Arm.
- **Install Pole Vertically:**
- **Place Structural Grade: 649-7**
- **Attach Sign Panels and Signals mounted on the elevation of the Mast Arm.**
- **Wire Access holes are ½" or less in diameter.**

**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.

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<td>2</td>
<td>Mast Arm Assembly</td>
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<tr>
<td>3</td>
<td>Mast Arm Assembly Details</td>
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<td>4</td>
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**STANDARD PLANS**

**FY 2020-21**

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**ELEVATION AND NOTES**

**LAST REVISION**

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**STANDARD PLANS**

**MAST ARM ASSEMBLIES**
NOTES:

1. The Structural Grout Pad diameter may be reduced where the footprint of the Grout Pad does not provide adequate clearance for the sidewalk and/or accessibility considerations.

2. See Index 649-030 and the plans for actual quantity of bolts in the Base Plate Connection.

3. The bottom hex nut of the Double Nuts shown in Section A-A may be substituted by a half-height anchor 'jam' nut. Provide individual nut covers (not shown) for each bolt.

4. Sections A-A may be substituted by a half-height anchor 'jam' nut. Provide individual nut covers (not shown) for each bolt.

5. 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.

6. See Index 649-030 and the plans for actual quantity of bolts in the Base Plate Connection.

7. Provide adequate clearance for the sidewalk and/or accessibility considerations.

8. Where the footprint of the Grout Pad does not provide adequate clearance for the sidewalk and/or accessibility considerations.

9. See Index 649-030 and the plans for actual quantity of bolts in the Base Plate Connection.

10. Provide adequate clearance for the sidewalk and/or accessibility considerations.

11. See Index 649-030 and the plans for actual quantity of bolts in the Base Plate Connection.

12. Provide adequate clearance for the sidewalk and/or accessibility considerations.

13. See Index 649-030 and the plans for actual quantity of bolts in the Base Plate Connection.

14. Provide adequate clearance for the sidewalk and/or accessibility considerations.

15. See Index 649-030 and the plans for actual quantity of bolts in the Base Plate Connection.

16. Provide adequate clearance for the sidewalk and/or accessibility considerations.

17. See Index 649-030 and the plans for actual quantity of bolts in the Base Plate Connection.

18. Provide adequate clearance for the sidewalk and/or accessibility considerations.

19. See Index 649-030 and the plans for actual quantity of bolts in the Base Plate Connection.

20. Provide adequate clearance for the sidewalk and/or accessibility considerations.

21. See Index 649-030 and the plans for actual quantity of bolts in the Base Plate Connection.

22. Provide adequate clearance for the sidewalk and/or accessibility considerations.

23. See Index 649-030 and the plans for actual quantity of bolts in the Base Plate Connection.

24. Provide adequate clearance for the sidewalk and/or accessibility considerations.

25. See Index 649-030 and the plans for actual quantity of bolts in the Base Plate Connection.

26. Provide adequate clearance for the sidewalk and/or accessibility considerations.

27. See Index 649-030 and the plans for actual quantity of bolts in the Base Plate Connection.

28. Provide adequate clearance for the sidewalk and/or accessibility considerations.

29. See Index 649-030 and the plans for actual quantity of bolts in the Base Plate Connection.

30. Provide adequate clearance for the sidewalk and/or accessibility considerations.

31. See Index 649-030 and the plans for actual quantity of bolts in the Base Plate Connection.

32. Provide adequate clearance for the sidewalk and/or accessibility considerations.

33. See Index 649-030 and the plans for actual quantity of bolts in the Base Plate Connection.

34. Provide adequate clearance for the sidewalk and/or accessibility considerations.

35. See Index 649-030 and the plans for actual quantity of bolts in the Base Plate Connection.

36. Provide adequate clearance for the sidewalk and/or accessibility considerations.

37. See Index 649-030 and the plans for actual quantity of bolts in the Base Plate Connection.

38. Provide adequate clearance for the sidewalk and/or accessibility considerations.

39. See Index 649-030 and the plans for actual quantity of bolts in the Base Plate Connection.

40. Provide adequate clearance for the sidewalk and/or accessibility considerations.

41. See Index 649-030 and the plans for actual quantity of bolts in the Base Plate Connection.

42. Provide adequate clearance for the sidewalk and/or accessibility considerations.

43. See Index 649-030 and the plans for actual quantity of bolts in the Base Plate Connection.

44. Provide adequate clearance for the sidewalk and/or accessibility considerations.

45. See Index 649-030 and the plans for actual quantity of bolts in the Base Plate Connection.

46. Provide adequate clearance for the sidewalk and/or accessibility considerations.

47. See Index 649-030 and the plans for actual quantity of bolts in the Base Plate Connection.

48. Provide adequate clearance for the sidewalk and/or accessibility considerations.

49. See Index 649-030 and the plans for actual quantity of bolts in the Base Plate Connection.

50. Provide adequate clearance for the sidewalk and/or accessibility considerations.
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).
**DOUBLE ARM CONNECTIONS & SPLICE DETAILS**

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 $\Sigma$ First Mast Arm Extension.
5. Adjust width of top and bottom Connection Plates to maintain minimum clearance shown.
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 for locations.
3. Terminal Compartment Frame Height 2'-0" minimum to 2'-6" maximum. Align bottom of Terminal Compartment a minimum of 3" 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.
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 8 – 5/8 x 18” Anchor Bolts With Double Nuts. (ASTM F1554 Grade 55)
9. Meet the requirements of Specification 646 for aluminum poles and transformer bases.
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 36" W11-2 sign for multiline 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.

DETAL "A":
- Solar Panel (Optional)
- Transformer Base
- Transformer Base and Foundation (See Detail "B" for Conventionally-Powered Applications)
- Rectangular Rapid Flashing Beacon
- Push Button
- R10-25 Sign
- #6 TW Green Ground Wire
- Concrete Apron (Typ.)
- Finished Grade
- Ground Rod (Typ.)
- To Power Service Point
- To Drainage

DETAL "B":
- Rectangular Rapid Flashing Beacon
- Solar Panel (Optional)
- Solar Battery Compartment (If Installed) and Controller
- #21-2 Sign (See Note 5)
- #6 TW Green Ground Wire
- Concrete Apron (Typ.)
- Finished Grade
- Ground Rod (Typ.)
- To Power Service Point
- To Drainage

INDEX 654-001
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 634

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'-0": One
      b. 4'-0" ≤ 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.

DESCRIPTION:

SPAN WIRE MOUNTED SIGN DETAILS

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 634

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:
      i. Sign width < 4'-0": One
      ii. 4'-0" ≤ sign width ≤ 7'-0": Two
   c. Number of wind beams required based on sign depth:
      i. Sign depth ≤ 3'-6": One
      ii. 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.

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 chuck 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 1 ½ 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 1 ½ diameter PVC conduit.

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


10. See Index 641-020 for concrete pole details and Index 649-020 for steel pole details.

CAMERA LOWERING DEVICE DETAIL

CAMERA MOUNTING WITH LOWERING DEVICE

DESCRIPTION:

REV ISIO N 11/01/17

INDEX 659-020

 SHEET 1 of 2

FA DOT

STANDARD PLANS

FY 2020-21
Pole Plate With Stainless Steel Band
(Or Method Approved By Engineer)

Bond #4 AWG Tin-Plated Bare Solid Copper Ground Wire To
Camera Support Base By An Aluminum To Copper #2-#12 AWG
Lug. Attached To Camera Base With A Stainless Steel Screw.
Remove Paint Or Protective Coating Where Attaching Lug.

Bracket Design May Vary
By CCTV Manufacturer

Fixed Mounting Bracket Must Be
Designed To Match Mounting
Provisions For CCTV Camera

Strain Relief
Fitting

Camera Connector Harness
Supplied To Match Camera

Dome Type Camera
Assembly (TYP)

Camera Cabling To
Camera Support Base By An Aluminum To Copper #2-#14 AWG
Bond #4 AWG Tin-Plated Bare Solid Copper Ground Wire To
Camera Support Base By An Aluminum To Copper #2-#12 AWG
Lug. Attached To Camera Base With A Stainless Steel Screw.
Remove Paint Or Protective Coating Where Attaching Lug.

GENERAL NOTES:

1. Verify the pole type, the dimensions of the pole at the pole 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

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.

6. See Index 641-020 for concrete pole details and Index 649-020 for
steel pole details.

7. Galvanized pipe connections and conduit entry points shall be sealed in
accordance with Specification 630.
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. Except across expansion joints, saw-cut to a standard depth of 3", but no more than 4' below the top of the final surface.
3. In 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 a second enclosure over the end of each conductor and place a third enclosure over the exposed end of the shielded cable. Use a nonmetallic material to prevent excessive loop sealant from entering the rigid conduit.
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.

INSTALLATION WITHOUT CURB & GUTTER

1. Drill a hole through the curb at a point which the required saw-cut depth is obtained just prior to leaving the top inside edge of the curb. Place a second enclosure over the end of each conductor and place a third enclosure over the exposed end of the shielded cable. Use a nonmetallic material to prevent excessive loop sealant from entering the flexible conduit.
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.

INSTALLATION WITH CURB & GUTTER

1. Drill a hole 6" to 1" larger in diameter than the rigid conduit to be used through the roadway asphalt (or concrete) surface and back at an appropriate angle to intercept the trench or pull box hole.
2. Install a molded bushing (nonmetallic) on the roadway surface and base at an appropriate angle to intercept the trench or pull box hole.
3. Place the top of the rigid conduit approximately 2" below the top of the roadway surface.
4. Fill the hole with loop sealant to the level of the roadway surface.
5. Use a nonmetallic material to prevent excessive loop sealant from entering the rigid conduit.

NOTES:
1. Cut a size in the edge of the roadway of sufficient size and depth to slightly place the end of the flexible conduit.
2. Install the conduit at least 6" into the roadway pavement and approximately 2" below the top of the roadway surface.
3. The departure angle of the conduit from the roadway is between 30° to 45°.
**LOOP TYPES**

**TYPE A**
- 2 Turns
- Stop Line

**TYPE B**
- 3 Turns
- Stop Line

**TYPE C**
- 4 Turns
- Stop Line

**TYPE D**
- 2 Turns
- 4 Turns
- Stop Line

**TYPE E**
- 2 Turns
- Stop Line

**TYPE F**
- 4 Turns
- Stop Line

**TYPE G**
- Variable

**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 the 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.

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**CONCRETE PAVEMENT EXPANSION JOINTS**

**LOOP TYPES, EXPANSION JOINTS, AND DETAILS**

**VEHICLE LOOP INSTALLATION DETAILS**

**INDEX**

- 660-001

**REVISION**

- LAST
- REV: 0
- REV:

**DESCRIPTION:**

- FY 2020-21
- STANDARD PLANS

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**PLAN**

- Loop Wires
- Sealant
- Soft-Setting Sealer Injected Into Deep Section of Groove Over Wire

**VERTICAL SECTION**

- Pavement Joint
- Double Width Cut

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**LOOPS TO PULLBOX PULLBOX SPECIFIED UNDER SEPARATE PAY ITEMS.**

**NOTE:**

- Loop Wires
- Sealant
- Soft-Setting Sealer Injected Into Deep Section of Groove Over Wire
NOTES:

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.
### CABINET INSTALLATION DETAILS

**NEW CONTROLLER CABINET**

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

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

**EXISTING CONTROLLER CABINET**

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


### POLE MOUNTED CONTROLLER CABINET

**GROUND MOUNTED CONTROLLER CABINET**

**INTERCONNECT JUNCTION BOX**

**PEDESTAL MOUNTED CABINET**

**SIDE ELEVATION**

- **POLE MOUNTED**
- **GROUND MOUNTED**
- **PEDESTAL MOUNTED**

**FRONT ELEVATION**

**SIDE ELEVATION**

- **POLE MOUNTED**
- **GROUND MOUNTED**
- **PEDESTAL MOUNTED**

**NOTES:**

- 1. Retrofit existing controller cabinets in accordance with Specification 678.
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 strips
   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 1/8" - 3/16" 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.
Cabinet Cable (Furnished Separately)

Surge Suppressors (Furnished Separately)

Vehicle Speed/Classification Unit (See Note 4)

Adjustable Shelf

J1 Receptacle with Aluminum Mounting Bracket for Lanes 1 To 4 (See Note 3)

J1 Receptacle with Aluminum Mounting Bracket for Lanes 5 To 8 (See Note 3)

Backplane for Lanes 1 To 4 (See Note 3)

Backplane for Lanes 5 To 8 (See Note 3)

Equipment Cables (See Note 5)

J2 Receptacle

P1 Equipment Cable Plug (Lanes 1 Through 4)

P1 Equipment Cable Plug (Lanes 5 Through 8)

OPTION A
(Shown)

Cable Arrangement for More Than Four Lanes Monitored by a Single Vehicle Speed/Classification Unit

OPTION B

Wiring to Backplane

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).
NOTES:
1. Reference Sheet 1 or 2, Note 2 for items to be included with backplane.
2. All terminal strip contacts are on 1/2" centers (Clinch 142 Series or equal).
  Use insulated fork wire terminals.
3. The contractor is responsible for contacting the TMS Manager in the Transportation Statics Office for lane number information and verification.

CABINET BACKPLANE DETAIL

Loop Leads From
Lanes 1 & 2
(See Note 3)

Loop Leads From
Lanes 3 & 4
(See Note 3)

Piezo Sensor Leads
From Lanes 1 - 4
(See Note 3)

Surge Suppressor (Typ.)

Cabinet Backplane

8 in. x 24 in. x 1/4 in.
Thick Aluminum Backplane

Ground to Backplane

Solar Power
Voltage Regulator

Solar Terminal

Battery Terminal

Inductive Loop Lead-In
And Piezo Sensor Leads From Roadway

Ground
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.
ROADWAYS WITH PAVED SHOULDERS

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. Four turns of #14 AWG place 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 loop-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 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 sizing 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, 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. 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)*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 3'-0"
   b. 12', 15' or 20' poles: 3'-0" X 3'-0" wide, a depth of 3'-0"
   c. 20' or 35' poles: 3'-0" X 3'-0" wide, a depth of 4'-0"

SOLAR POWER POLE
WITH POLE MOUNTED CABINET
(Telemeter Sites)