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.
**PLACEMENT WITHIN THE UTILITY STRIP**

**PLACEMENT UNDER SIDEWALK**

**PLACEMENT BEHIND GUARDRAIL**

**PLACEMENT IN FRONT OF GUARDRAIL**

**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.
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 NOT EXPOSED TO VEHICULAR TRAFFIC**

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

**NOT ADJACENT TO GUTTER**

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

**PLACEMENT UNDER EXISTING PAVEMENT ADJACENT TO GUTTER**
**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" deep.

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

**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" deep.

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.

---

**PLACEMENT ACROSS EXISTING DRAINAGE PIPES OR UTILITIES**

**SECTION A-A**
**Description:**

- **Steel Strain Pole**
  - Automatic Compression Type Clamp (Feed Through Deadend)
  - Wire Entrance (See Index 649-010)
- **Prestressed Concrete Strain Pole**
  - Automatic Compression Type Clamp (Feed Through Deadend)
  - Wire Entrance (See Index 649-010)

**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" & 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 2-½" drain holes in the bottom of the installed signals.
9. Method of framing corner Strain Poles angles 10° to 120°.

**Installation Details:**

- **Steel Strain Pole**
  - No. 6 Bare Copper Ground Wire
  - Crimp Type Electrical Connector
  - Tapped Lug For Grounding
  - 1'-0" (Min.)
  - 60° (Min.)
  - 3'-6"
  - ½" PVC Conduit For Ground Wire
  - Split Clamp
  - 6' (Min.)
  - 2" (Min.)
  - Class NS Concrete Foundation
  - Drilled Shaft (See Index 649-0110)

- **Prestressed Concrete Strain Pole**
  - No. 6 Bare Copper Ground Wire
  - Crimp Type Electrical Connector
  - Locking Cable Ties Or Lashing Wire (See Note 3)
  - 1'-0" (Min.)
  - 1½" (Min.)
  - 6' (Min.)
  - 8" To 12" Strip Coil Or Drip Loop
  - 8" To 12" Strip Coil Or Drip Loop
  - Drain Holes (See Note 8)
  - 6" (Min.)
  - #6 Bare Copper Ground Wire
  - Tapped Lug Inside For Ground Wire
  - Wire Entrance (See Index 649-0110)
  - 5" Hook
  - Split Clamp
  - 1½" PVC Conduit For Ground Wire
  - Finished Grade
  - Class NS Concrete Foundation
  - Drilled Shaft (See Index 649-0110)
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 3/4" 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.

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. 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 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.
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. Goose Copper Clad Ground Rod, 40 Long.
11. #6 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. Lightning Arrestor Mounted on Outside of Enclosure.
15. 2 Pole Electrical Lighting Contactor.
16. Photo Electric Switch-120V Rated.
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 airtight and a clear silicone sealant to cover hole. Install Photo Electric Controller.

PHOTO ELECTRIC CONTROLLER DETAIL
From Service Grade (Typical) galvanized steel conduit.

"rigid" ground wire in #6 AWG insulated copper.

See Note 1.

Lightning Arrestor Ground Bushing (Nonmetallic) Molded Bushing

From Service Grade From Service

Electrical Service Wire

The Service Disconnect shall be NEMA 3R or better.

6. Lockable. No screws to be used to attach door.

5. Meet all grounding requirements of Specification 620.

4. 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.

3. 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.

1. Electrical Service Wire or Signal Cable.

NOTES:

FIGURE A

AERIAL FEED
NO METER USED

FIGURE B

AERIAL FEED
METER USED

FIGURE C

UNDERGROUND FEED
NO METER USED

FIGURE D

TYPE "B" UNDERGROUND FEED
METER USED

FIGURE E

UNDERGROUND CABINET MOUNTED
METER USED
GENERAL NOTES:

1. Work these Index drawings with the Strain Pole Schedule in the plans. Submit shop drawings for minor modifications not detailed in the plans.
2. Materials:
   A. Concrete: Class V Special or Class VI
   B. Prestress Strands & Spiral Reinforcing: Specification Section 641
   C. Hand and coupler cover plates: Non-corrosive material
   D. Screws: Round headed, chrome plated
3. Fabrication:
   A. Pole Taper for pole width, strands, reinforcing and void: 0.001 in/ft 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 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. Tie 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)
4. Support locations are for strand release, storage, lifting and transport. Keep BF oriented downward until final erection.
5. Pick-up and support locations shown may vary within a tolerance of ±3".
6. Two point attachment: provide an eye bolt hole for the messenger wire.
7. Tether Wire: When required, field-drill the eyebolt hole prior to installation.
SERVICE POLE P-IIA (12 Ft.) & P-IIB (36 Ft.) ELEVATION

(Poles 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 2⅛ to 3½ to accommodate smaller radius of optional stepped (PVC) void. The void diameter shall not be less than 2".
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.

POLE TYPE P-III
**DESCRIPTION:**

**REVISION LAST OF STANDARD PLANS FY 2019-20 SHEET INDEX 11/01/17**

**CONCRETE POLES**

**POLE ELEVATION**

*Strands and Reinforcing Not Shown*

- **Pole Height Dim. H**
- **Pole Length Dim. L**
- **Depth Dim. D**

**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 4½" to accommodate smaller radius of optional stepped (PVC) void. The void diameter shall not be less than 2½".

**SPiral REINFORCING ELEVATION**

*Strands, Holes, and Fixtures Not Shown*

- **2½" Galv. Nipple (On E)**
- **2½" Galv. Nipple (On C)**
- **2½" Galv. Nipple (On C)**

**POLE ELEVATION**

*Strands and Reinforcing Not Shown*

- **Pole Height Dim. H**
- **Pole Length Dim. L**
- **Depth Dim. D**

**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 4½" to accommodate smaller radius of optional stepped (PVC) void. The void diameter shall not be less than 2½".
**Spiral Reinforcing Elevation**

(Strands, Holes, and Fixtures Not Shown)

- Front Face (Roadway)
- Back Face
- Tip End
- Butt End

**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)

**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 4²” to accommodate smaller radius of optional stepped (PVC) void. The void diameter shall not be less than 4.”

**STRAND LEGEND**

- Prestressed Strand
  - Ø 0.5 in. – 31 kips Before Transfer (8 strands total)
  - Ø 0.5 in. (4 strands total)

- Dormant Strand
  - Ø 0.5 in (14 strands total)
  - Ø 24 Splice Allowed Per Strand

**POLE TYPE P-V**

**CONCRETE POLES**

**FY 2019-20**

**STANDARD PLANS**

**INDEX**

641-010  5 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 (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.
- Dimension may vary from 3" to 4½" to accommodate smaller radius of optional stepped (PVC) void. The void diameter shall not be less than 8½.

Strain Pole Type P-VI

Concrete Poles

FY 2019-20
Standard Plans

Index 641-010
Sheet 6 of 8
GENERAL NOTES:

1. Work this Index with Specifications 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. Reinf. Steel: ASTM A615, Grade 60
   D. Spiral Reinf. Steel: ASTM A1318 Cold-Drawn
   E. Bolts: ASTM F1554, Grade 55
   F. Washers: ASTM F436
   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

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 Reinf. 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 9" 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:
      F. Project Name
      G. Contractor
      H. Pole Length

8. Cabinet Installation:
   A. Splice fiber optic cables in cabinet to preterminator 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. 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.

CONCRETE CCTV POLE
ASSEMBLY

NOTES:
1. Install all handhole and opening covers prior to shipping.
2. Install ½" Ø x 5" long stud with hex nut in insert before shipment.
3. As an alternate, embed 6½" Ø x 18" stainless steel threaded rods with a threaded nut. At top of rod, thread a coupling nut to attach plate at 4½" x 1½" stainless steel bolts.
4. Handhole frame may be Cast Aluminum 356.2.

1. Install all handhole and opening covers prior to shipping.
2. Install ½" Ø x 5" long stud with hex nut in insert before shipment.
3. As an alternate, embed 6½" Ø x 18" stainless steel threaded rods with a threaded nut. At top of rod, thread a coupling nut to attach plate at 4½" x 1½" stainless steel bolts.
4. Handhole frame may be Cast Aluminum 356.2.

1. Install all handhole and opening covers prior to shipping.
2. Install ½" Ø x 5" long stud with hex nut in insert before shipment.
3. As an alternate, embed 6½" Ø x 18" stainless steel threaded rods with a threaded nut. At top of rod, thread a coupling nut to attach plate at 4½" x 1½" stainless steel bolts.
4. Handhole frame may be Cast Aluminum 356.2.

1. Install all handhole and opening covers prior to shipping.
2. Install ½" Ø x 5" long stud with hex nut in insert before shipment.
3. As an alternate, embed 6½" Ø x 18" stainless steel threaded rods with a threaded nut. At top of rod, thread a coupling nut to attach plate at 4½" x 1½" stainless steel bolts.
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4. Handhole frame may be Cast Aluminum 356.2.

1. Install all handhole and opening covers prior to shipping.
2. Install ½" Ø x 5" long stud with hex nut in insert before shipment.
3. As an alternate, embed 6½" Ø x 18" stainless steel threaded rods with a threaded nut. At top of rod, thread a coupling nut to attach plate at 4½" x 1½" 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:
      a. Less than or equal to YS: ASTM A1011 Grade 50, 55, 60 or 65
      b. Greater than or equal to YS: ASTM A325 Grade 50, 55, 60 or 65
   B. Steel Plates: ASTM A36
   C. Cold Rolled, ERX
   D. Bolts, Nuts and Washers:
      a. High Strength Bolts, ASTM F3125, Grade A325, Type 1
      b. Nuts, ASTM A663 Grade DH Heavy-Hex
      c. Washers, ASTM F436 Type 1, one under turned element
   E. Anchor Bolts, Nuts and Washers:
      a. Anchor Bolts: ASTM F1554 Grade 55
      b. Nuts, ASTM A663 Grade A Heavy-Hex (5 per anchor bolt)
      c. Plate Washers: ASTM A18 (2 per bolt). Split-lock washers and self-locking nuts are not permitted
   F. Handhole Frame: ASTM A470 or ASTM A496, Grade 36
   G. Handhole Cover: ASTM A470 or ASTM A496, Grade 36
   H. Aluminum Pole Caps and Nut Covers: 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:
      a. Bolts (except Anchor Bolts): Bolt diameter plus \( \frac{1}{8} \) maximum
      b. Anchor Bolts: Bolt diameter plus \( \frac{3}{8} \) maximum
   D. Locate handhole 180° from 2" wire entrance pipe.
   E. Identification Tag: (Submit details for approval.)
      a. (4" x 4") aluminum identification tag.
      b. Locate on the inside of the pole and visible from the handhole.
      c. Secure to pole with 1/8" diameter stainless steel rivets or screws.
   F. Provide the following information on the ID Tag:
      1. Financial Project ID
      2. Pole Type
      3. Pole Height
      4. Manufacturer's Name
      5. FY of Steel
      6. Base Wall Thickness
   G. Provide a 2" or "C" hook at the top of the pole for signal wiring support (See Sheet 3).
   H. Hot Dip Galvanize after fabrication.

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 baseplate in accordance with Specification 469-6.
### STEEL STRAIN POLE DATA TABLE

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<th>BC (in)</th>
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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.

---

**POLE ASSEMBLY**

**SECTION A-A**

**SECTION B-B**

**JOINT WELD DETAIL**

**DETAIL 'A'**

**FOUNDATION AND BASE DETAILS**

**STEEL STRAIN POLE**

**DESCRIPTION:**

**FY 2019-20 STANDARD PLANS**

**INDEX:**

**SHEET:**
POLE ASSEMBLY

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.
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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 ½") or ASTM A572 Grade 50, 60 or 65 (greater than or equal to ½") or ASTM A595 Grade A (85 ksi yield) or Grade B (60 ksi yield).
B. Steel Plates and Pole Cap: ASTM A6 or ASTM A709 Grade 50.
C. Weigh Metal: E70XX.
D. Bolts: ASTM F1322, Grade A25, Type 1.
F. Washers: ASTM F-436.
G. Anchor Bolts: ASTM F1554 Grade 55 with ASTM A563 Grade A hex nuts and ASTM A36 plate washers.
H. Handhole Frame: ASTM A309 Grade 36 or ASTM A36.
I. Handhole Cover: ASTM A1011 Grade 50, 55, 60 or 65.
J. Stainless Steel Screws: AISI Type 316.
K. Reinforcing Steel: ASTM A615 Grade 60.
L. Galvanization: Bolts, nuts and washers: ASTM F3322K. All other steel including plate washer: ASTM A123.
M. Concrete: Class IV (Drilled Shaft) for all environment classifications.
4. Fabrication:
A. Welding:
   a. Specification Section 460-4.4 and
B. Poles:
   a. Round or 16-sided (Min)
   b. Taper pole diameter at 0.14 inches per foot
   c. Fabricate pole longitudinal seam welds (2 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 and
      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 female splices)
   e. Circumferentially welded pole shafts and laminated pole shafts are not permitted
   f. Cautions: Refer to "General" for galvanizing
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 ½" 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. Manufacturer's Name
      5. Yield Strength (Fy of Steel)
      6. Base Wall Thickness
D. Except for Anchor Bolts, bolt hole diameters are bolt diameter plus ½" and anchor bolt holes are bolt diameter plus ½" (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 ½" 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. Pole Top (See Sheet 5)
6. Cabinet Installation:
A. Splice fiber optic cables in cabinet to preterminated 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. Install the pole mounted cabinet with the hinges next to the pole.
G. Sizes and types of conduits and inner ducts for network communications between the pullbox and cabinet are stated in the Contract Documents.
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. Mount 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.

---

**Diagram**: *STAEL CCTV POLE ASSEMBLY*
**SHAF T 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>40</td>
<td>4'–0&quot;</td>
<td>10'–0&quot;</td>
<td>(16) #11</td>
</tr>
<tr>
<td>55</td>
<td>4'–0&quot;</td>
<td>12'–0&quot;</td>
<td>(16) #11</td>
</tr>
<tr>
<td>60</td>
<td>4'–6&quot;</td>
<td>13'–0&quot;</td>
<td>(16) #11</td>
</tr>
<tr>
<td>65</td>
<td>5'–0&quot;</td>
<td>14'–0&quot;</td>
<td>(16) #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>
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<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>
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**BASE PLATE AND ANCHOR BOLT DESIGN TABLE**

<table>
<thead>
<tr>
<th>Pole Overall Height (ft)</th>
<th>Base Plate Diameter (in.)</th>
<th>Anchor Bolt Diameter (in.)</th>
<th>Number of Bolts</th>
<th>Anchor Bolt Embedment (in.)</th>
<th>Minimum Anchor Bolt Projection (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>27</td>
<td>3&quot;</td>
<td>6</td>
<td>1.25</td>
<td>9.5</td>
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<tr>
<td>55</td>
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<td>3&quot;</td>
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**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 (in.)</td>
<td>Base Diameter (in.)</td>
</tr>
<tr>
<td>45</td>
<td>15'</td>
<td>0.25</td>
<td>12</td>
</tr>
<tr>
<td>55</td>
<td>20'</td>
<td>0.25</td>
<td>18</td>
</tr>
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**FOUNDATION NOTES:**

1. Shaft Length is based on 1'-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.

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DESCRIPTION:

Handhole location

ASSEMBLY

Edge of Base Plate

Anchor Bolts (Typ.)

Center of Drilled Shaft, Base Plate and Pole

Handhole

Handhole Cover Plate

CCTV Pole

Base Plate

Foundation

Finished Grade

PARK STAND DETAILS

Working Park Stand

2-Park Stands (Inside Pole Wall)

Identification Tag

(See Pole Notes)

Threaded Hole

For 1/4 x 3/8 Bolt

Identification Tag

(See Note 1)

1/2 Ø Drill & Tap

Hole in Handhole

 Rim. Supplied With

1/2 x 3/8 Bolt

喉

2-Cable Guides

For Wire Tie Off

FRAME

Handhole Ring

Handhole

Handhole Frame

2-Cable Guides

For Wire Tie Off

SECTION C-C

Eye Bolt Option

Eye Bolt Option

Cover Plate

Rod Option

Cable Guide Detail

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.
### ARM AND BASE PLATE

<table>
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<tr>
<th>Arm ID</th>
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<th>Arm Length (ft)</th>
<th>Total Arm Extension</th>
<th>Base Plate</th>
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### POLE, BASE PLATE AND ARM CONNECTION

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### LUMINAIRE AND CONNECTION

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<th>LF (ft)</th>
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### NOTE:
1. Work this Index with Index 649-030.
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 "jam" nut. Provide individual nut covers (not shown) for each bolt.

1. The Structural Grout Pad diameter may be reduced.

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 "jam" nut. Provide individual nut covers (not shown) for each bolt.
DESCRIPTION:
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).

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).
DESCRIPTION:

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.

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.
NOTES:

1. 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 1/8" thick bent plate with the same flange width, height, and length as the MC 10x33.6 Channel section.

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

COVER

SECTION J-J

HANDHOLE

SECTION K-K (Thru Handhole)

SECTION K-K (Terminal Compartment)

FLAT WASHER

1 1/8" THICK

POLE TOP

CUT-AWAY (Option 'a')

CUT-AWAY (Option 'b')

POLE TOP DETAILS

HANDHOLE AND POLE TOP DETAILS

COVER

FRAME

MAST ARM HANDHOLE

MAST ARM ASSEMBLY

Handhole Frame

Handhole Frame

Threaded Hole For ½" Hex Head Screw (Typ.)

Threaded Hole For ½" Hex Head Screw (Typ.)

½" Ø Stainless Steel Hex Head Screw (Typ.)

½" Ø Stainless Steel Hex Head Screw (Typ.)

11 Gage Mast Arm Handhole Cover

11 Gage Mast Arm Handhole Cover

Partial Penetration Weld

Partial Penetration Weld

11 Gage Waterproof Terminal Compartment. Cover installed with Waterproof Gasket. (See Note 2 and 3)

1 1/4" Min. Thick

Cast Aluminum Pole Cap Plate

Pole Cap Plate

Center Of Pole, Pole Cap And Lifting Bar

½" Overhang (Min.)

4" Screw (Typ.)

Steel Hex Head Stainless

4" Hole (Typ.)

4" Hole (Typ.)

1 1/2" Min. Bolt

Flat Washer

Pole Cap Plate

Pole Cap Plate

Lifting Bar

½" Min. Thick.

½" Min. Thick.

1/8" Min. Thick.

1" Min. Thick.

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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 Specifications 562.
3. 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 - 1/2 x 18" Anchor Bolts With Double Nuts. (ASTM F1554 Grade 55)
9. Meet the requirements of Specifications 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 multilane roadways.
5. 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 Specifications 646 for aluminum poles and transformer bases.
8. Install a concrete slab around 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.

DESIGN:
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 multilane roadways.
5. 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 Specifications 646 for aluminum poles and transformer bases.
8. Install a concrete slab around 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.
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 = 3'-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:**

**SIGN MOUNTING DETAIL**

- **SIGN MOUNTING DETAIL**
- **OPPOSING SIGN MOUNTING DETAIL**

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

- **SIGN MOUNTING DETAIL**
- **OPPOSING SIGN MOUNTING DETAIL**
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 size 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 1/4" 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 1/4" 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.

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

**CAMERA MOUNTING DETAILS**

**SECTION AA**

**Fixed Mounting Bracket Detail**

Not To Scale

**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 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.
GENERAL NOTES:

1. If the loop lead-in is 7% 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 7% 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. 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 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. Drill a hole 6" to 1" larger in diameter than the rigid conduit to be used through the roadway asphalt (or concrete) surface and base at an appropriate angle to intercept the trench or pull box hole.

2. Install a molded bushing (nonmetallic) on 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°.

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

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 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.

INSTALLATION WITHOUT CURB & GUTTER

ALTERNATIVE 1

INSTALLATION WITH CURB & GUTTER

ALTERNATIVE 2

TWISTED PAIR AND LOOP LEAD-IN INSTALLATION
NOTE:
Loop conductors must follow saw-cut to bottom forming slack section at joint.

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, EXPANSION JOINTS, AND DETAILS

VEHICLE LOOP INSTALLATION DETAILS

FY 2019-20
STANDARD PLANS

INDEX
660-001

SHEET
2 of 2
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.
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 activation switch.
Vehicle movements & signal head number assignments are not directionally oriented but shall maintain their relative orientation about the intersection (i.e., movements 7 and 4 are always to the right of movements 1 and 6 etc.).

LEGEND

1. Vehicle Movement Number
2. Pedestrian Movement Number
3. Timing Function Number
4. Phase Number
5. Green Arrow (Left or Right)
6. Red Arrow
7. Yellow Arrow

SIGNALIZED INTERSECTION

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

LEGEND

1. Vehicle Movement Number
2. Pedestrian Movement Number
3. Timing Function Number
4. Phase Number
5. Green Arrow (Left or Right)
6. Red Arrow
7. Yellow Arrow
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.

FAO:
1. Retrofit existing controller cabinets in accordance with Specification 678.
2. Retrofit installation procedure for signalized intersection controller cabinet are located at: http://www.dot.gov/traffic/doc_library/doc__Library.html Generator Power for Signalized Intersection

POLE MOUNTED CONTROLLER CABINET

INTERCONNECT JUNCTION BOX

NEW CONTROLLER CABINET

EXISTING CONTROLLER CABINET

PEDESTAL MOUNTED CABINET
DESCRIPTION:

TRAFFIC MONITORING SITE

NOTE:
Fabricate bracket out of $\frac{3}{16}$ 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.

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 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 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)

CABINET LAYOUT DETAILS (Four Lanes or Less)
1. Traffic monitoring site cabinet includes:
   A. One adjustable shelf (equipped as shown)
   B. Two backplane assemblies (equipped as shown)
   C. Two J1 receptacles with mounting brackets
   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:

OPTION A

EQUIPMENT CABLE ASSEMBLY

OPTION B

CABINET LAYOUT DETAILS (Five to Eight Lanes)
DESCRIPTION:

**OPTION A**

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

**OPTION B**

- Numbers in parenthesis in the pinout chart identify lane numbers when connecting to a second J1 receptacle; or
- A second backplane for lanes 5 through 8 is required.

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/Classification Unit and separate equipment cable connecting to a second J1 receptacle; or
   - B. Single Vehicle Speed/Classification 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.
TYPICAL FOR UP TO 4 LANES OF SENSOR LEADS PULLED TO ONE SIDE OF THE ROADWAY

ROADWAYS WITH PAVED SHOULDERS

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

2. Cut a 3-ft deep slot for the Inductive loops. Loop slots will be cut wide enough to allow unforced placement of the loops, installed 1'-0" below final roadway surface (see Detail 'C').

3. Twist loop leads at the rate of 8 to 16 twists per foot. Loops 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 lane 1, 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. Splices will be performed using splice kits designed for direct burial. Splice kits will include screw-on connectors and a housing with sufficient sealant to fully encapsulate the spliced connections. Taped splices are not permitted.

6. 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.

7. 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'-0" 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 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 POWER POLE
WITH POLE MOUNTED CABINET
(Telemeter Sites)

PEDESTAL MOUNTED CABINET
(Portable Traffic Monitoring Sites)