FOR USE IN AREAS NOT EXPOSED TO VEHICULAR TRAFFIC

FIGURE A

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

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

FIGURE B

Note:
1. Trench not to be open more than 360' at a time when construction area is subject to vehicular or pedestrian traffic.
2. Asphalt to be sawcut to leave neat lines at the pavement cut.
3. See note 3 Figure C.

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

CONDUIT INSTALLATION DETAILS

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

FIGURE D

FOR USE IN INSTALLING CONDUIT UNDER SIDEWALK

FIGURE E

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

FIGURE C

Note:
1. Rigid conduit must be used when jacking under existing pavement at 36" minimum depth.
2. Asphalt to be sawcut at the edges of the trench.
3. The removal and replacement of the additional pavement width (½") will not be required when the trench can be constructed without disturbing the asphalt surface on either side.


MID. 36" OR AS DIRECTED BY THE ENGINEER

Conduit Located Behind Guardrail

Conduit Located In Front Of Guardrail

As Scaled From Plans

Drainage Pipe Beneath Roadway And / Or Utilities

Trench Depth

Slope May Vary

NOTE: - See Note 3

FIGURE F
**GENERAL NOTES:**

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

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

3. Where conduits are to be installed over existing underground structures (e.g., drain pipes or utility lines) which are less than 30" deep, the contractor shall encase the conduit in 2500 PSI Class I concrete for the entire length of conduit that is installed at a depth of less than 10'.

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

**FIGURE A**

- Conduit entry of conduit under sidewalks
- Cover
- Pullbox
- Conduit
- 12" Bed of peacock or crushed stone for drainage

**FIGURE B**

- Conduit installation details
- Conduit
- Pullbox
- Side street
- Street surface
- Pullbox
- Curb & gutter
- Grade
- Under sidewalk
- Under roadway
- Under nontraffic bearing surface

**FIGURE C**

- Conduit depth to be at RR requirement but not less 4'
- Conduit (PVC)
- Conduit (Rigid)
- 3" Warning Tape (When Required)
- Orange Insulated Local Wire (When Required)
- Locate Wire

**SECTION AA**

- Conduit installation details across existing drain pipes or utilities
- Conduit
- Pullbox
- 12" Bed of peacock or crushed stone for drainage
- 6" Minimum
- 3" Warning Tape (When Required) (On Top of Class I Conc.)

**SECTION**

- FIGURE B
- FIGURE A
- FIGURE C
Notes:
1. The messenger wire of the interconnect cables shall be grounded to the copper ground wire of the pole or to the external wire extending down the pole.
2. When utilizing the external ground wire to the pole, a piece of 1/2" conduit shall extend up the pole externally to a point 8' above finish grade to protect the ground wire connecting the messenger wire to the ground rod.
3. Locking cable ties or lashing wire when used shall be placed no further than 12' apart except at the point of cable drop or terminations where one (1) shall be placed at the point where the cables separate from the messenger wire and another placed 6' (max) from that tie. When using Figure "B" interconnect cable only the locking cable ties shall be used.
4. If accessible the internal ground wire of the support pole may be used to ground the messenger wire.
5. Lashing wire should normally be used for distances of 12' or greater.
6. Meet all grounding requirements of Section 620 of the Standard Specifications.
NOTES:

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

Rectangular boxes are depicted. Round Fiber optic splice boxes and lids are allowed.

PULL BOX

FIBER OPTIC BOX

SPICE BOX (200' Min.) Stored Fiber, Pull Box (50' Min.) Stored Fiber.
GENERAL NOTES:

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

2. The service installation shall meet the requirements of the national electric code and applicable local codes.

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

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

AERIAL FEED

DETAIL A

Concrete Pole Prestressed Type P-II, 36' Long

Clevis With Insulators

Conductor Weatherhead Height
As Required By Power Company

Meter As Required Height Specified
By Power Company

Service Disconnect

#6 AWG Insulated Grounding Electrode
Conductor In 1/2" Rigid Galvanized
Steel Conduit

6' (Min.) Depth To
Ground Rod (Typ.)

12" Bed Of Pea Gravel
Or Crushed Stone
For Drainage (Typ.)

U.L. Approved Ground Rod,
1/2" Dia. 40 Long Copper
Clad (All Service Points)

Concrete Pole, Prestressed Type P-II, 12' Long

Meter As Required Height Specified
By Power Company

Service Disconnect

#6 AWG Insulated Grounding Electrode
Conductor In 1/2" Rigid Galvanized
Steel Conduit

6' (Min.) Depth To
Ground Rod (Typ.)

Concrete Pad

Grade

4' (Min.) Depth To
Ground Rod (Typ.)

12" Bed Of Pea Gravel
Or Crushed Stone
For Drainage (Typ.)

AERIAL FEED

UNDERGROUND FEED

DETAIL B

Concrete Pole, Prestressed Type P-II, 36' Long

Clevis With Insulators

Conductor Weatherhead Height
As Required By Power Company

Meter As Required Height Specified
By Power Company

Service Disconnect

#6 AWG Insulated Grounding Electrode
Conductor In 1/2" Rigid Galvanized
Steel Conduit

6' (Min.) Depth To
Ground Rod (Typ.)

12" Bed Of Pea Gravel
Or Crushed Stone
For Drainage (Typ.)

U.L. Approved Ground Rod,
1/2" Dia. 40 Long Copper
Clad (All Service Points)

Concrete Pad

Grade

4' (Min.) Depth To
Ground Rod (Typ.)

12" Bed Of Pea Gravel
Or Crushed Stone
For Drainage (Typ.)
Keyed Notes:
2. Service Feeder in Rigid Galvanized Steel Conduit.
3. Meter Socket by Contractor.
4. Service Main Disconnect.
6. Concrete Riser Pole.
7. Weatherhead.
8. Electrical Panel - Number and Rating of Branch Circuit Breakers shall be as indicated on Distribution Point Description on Lighting Plan Sheets.
10. Copper Clad Ground Rod, 40 Long.
11. Insulated Copper Ground Wire. Bond the Service Neutral to Ground at Service Main Disconnect.
12. Fused Control Power Transformer 0.5 KVA, Single Phase, 480V Primary, 120V Secondary (Part of Lighting Contactor, Shown Outside for Clarity).
13. Lightning Arrester 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.

PHOTO ELECTRIC CONTROLLER DETAIL

To Electrical Service Drop

Side or Back of Enclosure

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.

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 Section 620. The bond wire shall be run in conduit with the Electrical Service Wire or Signal Cable.
4. Meet all grounding requirements of Section 620 of the Standard Specifications.
5. The Service Disconnect shall be lockable by padlock and four keys provided to the maintaining agency. The door shall have a minimum of three hinges and be lockable. No screws to be used to attach door.
6. The Service Disconnect shall be Nema 3R or better.
GENERAL NOTES:

1. Work these Index drawings with the Strain Pole Schedule in the Plans.
2. Shop Drawings: This Index is considered fully detailed and no shop drawings are necessary.
3. Submit shop drawings for minor modifications not detailed in the plans.
4. Fabrication:
   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 head, plated
5. Pole Taper for pole width, strands, reinforcing and void: 0.081 in/ft per face.
6. Concrete Cover: 1” minimum
7. Pole Taper for pole width, strands, reinforcing and void: 0.081 in/ft per face.
8. 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.
9. Tie ground wires to the interior of reinforcing steel to prevent displacement during concreting operations.
10. Spiral Reinforcing: As shown, plus one turn for splices and two turns at both the tip and butt ends of the pole.
11. Financial Project ID.

Provide Aluminum Identification Tags on the poles with the following information:

a. Financial Project ID:
   i. Pole Manufacturer
   ii. Standard Pole Type Number
   iii. Pole Length (L)

5. Support locations are for strand release, storage, lifting and transport. Keep BF oriented downward until final erection.
6. Perk-up and support locations shown may vary within a tolerance of ±1°.
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.
SPIRAL REINFORCING ELEVATION
(Strands, Holes, and Fixtures Not Shown)

Identification Markings

Front Face

Back Face

A

Final Grade Location

Pole Height Dim. H

Pole Length Dim. L

20% L

20% L

POLE ELEVATION
(Strands and Reinforcing Not Shown)

NOTES:

Strands shown are continuous from Tip End to Butt End.
Elevation view scale is exaggerated vertically for clarity.

For final erection, tilt pole upright with single point attachment located a distance 33.3% L from Tip End.

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

POLE TYPE P-III

CONCRETE POLES

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FAE 2018-19

STANDARD PLANS

DESCRIPTION:

POLE ELEVATION

Transfer (4 strands total)

0.5 in. ~ 31 kips Before Prestressed Strand:
Horizontal Pole

Support Locations

Strands shown are continuous from Tip End to Butt End.
Elevation view scale is exaggerated vertically for clarity.

For final erection, tilt pole upright with single point attachment located a distance 33.3% L from Tip End.

* Dimension may vary from 2½" to 3¾" to accommodate smaller radius of optional stepped (PVC) void. The void diameter shall not be less than 2½".
### SPIRAL REINFORCING ELEVATION
(Strands, Holes, and Fixtures Not Shown)

- **2½" Galv. Nipple (On £)**
  - (One-Wire System Only)
- **2½" Galv. Nipple (On £)**
  - (Two-Wire System Only)
- **2½" Hole**
  - (Two-Wire System Only)
- **3" Hole**
  - (Strands, Holes, and Fixtures Not Shown)
- **24" No. 6 Bare Copper Ground Wire**
- **48" No. 6 Bare Copper Ground Wire**
- **Identification Markings**
  - **Front Face (Roadway)**
  - **Back Face**
  - **2" Galv. Coupler with Cover**

### POLE ELEVATION
(Strands and Reinforcing Not Shown)

- **Back Face**
  - **© & Section**
  - **Front Face (Roadway)**
  - **© Chamfer (Typ.)**
- **Front Face (Roadway)**
  - **© Void & Section**
- **© Void & Section**
  - **© Void & Section**
- **© Void & Section**
  - **© Void & Section**
- **© Void & Section**
  - **© Void & Section**

### STRAND LEGEND

- **Prestressed Strand**
  - 0.5 in. ~ 31 kips Before Transfer (6 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 20% L from the Tip End.
- *Dimension may vary from 3" to 4¼" to accommodate smaller radius of optional stepped (PVC) void. The void diameter shall not be less than 2½".*

**STRAIN POLE TYPE P-IV**

**CONCRETE POLES**

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**SHEET**

**FY 2018-19 STANDARD PLANS**

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**4 of 8**
One Additional Turn at End

1" Cover

#5 Gauge Spiral Reinforcing

50% Turns @ 2" Pitch

6" Pitch

*Strands, Holes, and Fixtures Not Shown*

**SPIRAL REINFORCING ELEVATION**

(Strands, Holes, and Fixtures Not Shown)

2½" Galv. Nipple (On E)

(One-Wire System Only)

2½" Galv. Nipple (In E)

(Two-Wire System Only)

Plug Void End with Min. 3" of Concrete

120% L

120% L

#5 Gauge Spiral Reinforcing

Circular Void

#5 Gauge Spiral Reinforcing

Circular Void

STRAND LEGEND

- Prestressed Strand
  - Ø 7/8 in. ~ 31 kips Before Transfer (8 strands total)

- Dormant Strand
  - Ø 5/8 in. (8 strands total)
  - One 24" Splice Allowed Per Strand

STRAIN POLE TYPE P-V

(Spiral Elevation view scale is exaggerated vertically for clarity.)

For final erection, tilt pole upright with single point attachment located a distance 12.5% L from the Tip End.

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

NOTES:
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 10% L from Tip End.
- Dimension may vary from 3" to 4¼" to accommodate smaller radius of optional stepped (PVC) void. The void diameter shall not be less than 6½".

STRAIN POLE TYPE P-VI

CONCRETE POLES
**SPIRAL REINFORCING ELEVATION**

(Strands, Holes, and Fixtures Not Shown)

- **#5 Gauge Spiral Reinforcing**
- **10'-0" 41 Turns @ 3" Pitch**
- **Pole Length Dim. L**
- **Depth Dim. D**
- **Pole Height Dim. H**

**POLE ELEVATION**

(Strands and Reinforcing Not Shown)

- **1½" (Typ.)**
- **1½" Min. (Typ.)**
- **#5 Gauge Spiral**
- **6½" (Min.)**
- **3¾" * (Typ.)**

**STRAND LEGEND**

- **- Prestressed Strand**
  - 0.5 in. - 31 kips Before Transfer (10 strands total)
- **- Dormant Strand**
  - 0.5 in. (6 strands total) One 24" Splice Allowed Per Strand

**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 30% L from the Tip End.
- * Dimension may vary from 3½" to 5" to accommodate smaller radius of optional stepped (PVC) void. The void diameter shall not be less than 6½".

**STRAIN POLE TYPE P-VII**

**CONCRETE POLES**

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**SHEET**

7 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 6ksi minimum strength at transfer.
   B. Prestressing Strands: ASTM A416, Grade 270 low relaxation.
   C. Reinforcing Steel: ASTM A615, Grade 60.
   D. Spiral Reinforcing: ASTM A196 Cold-Drawn.
   E. Bolts: ASTM F1554, Grade 55.
   F. Steel plates and Pole Cap: ASTM A36 or ASTM A709, Grade 50.
   G. Galvanization bolts, nuts and washers: ASTM F2329.
   H. 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 Reinforcing Steel, lap splice to consist of a 1'-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. Provided a Class 3 surface finish in accordance with Specification 400.
   E. Provide a 1" minimum cover.
   F. Provide handhole and coupler cover plates made of non-corrosive materials. Attach cover plates to poles using lead anchors or threaded inserts embedded in the poles in conjunction with round headed chrome plated screws.
   G. Furnish and install secondary TVSS protection on outlets for equipment in cabinet.
   H. Furnish and install TVSS protection on all cabling in cabinet.
   I. Storage, handling and erection locations shown may vary within ± 3".
8. Cabinet Installation:
   A. Splice Fiber optic cables in cabinet to preterminated patch panel.
   B. Furnish and install TVSS protection on all cabling in cabinet.
   C. Furnish and install secondary TVSS protection on outlets for equipment in cabinet.
   D. Ensure that all electronic equipment power is protected and conditioned with TVSS devices.
   E. 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.
   F. Provide identification markings on the poles where indicated on the following sheets. Include the following information using inset numerals with 1" height or as approved in the Producers' Quality Control Program:
      - Financial Project ID
      - Pole Manufacturer
      - Pole Length
   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:
      - Foundation
      - Concrete
      - Diameter
      - Wall Thickness
      - Lifting Hole
   H. Tie ground wires to the interior of reinforcing steel as necessary to prevent displacement during concreting operations.
9. Lowering Device Installation:
   A. Place the lowering cable that moves within the pole in an interior conduit to prevent it from tangling or interfering with any electrical wire that is in the pole. Ensure that any electrical wires that are routed are routed securely and free from slack.
   B. Mount lowering arm perpendicular to the roadway or as shown in the plans. Position CCTV pole so that the camera can be safely lowered without requiring lane closures.
   C. Coordinate all lowering device hardware requirements (including Tenon, Tenon mounting plates, parking stacks, etc.) with lowering device manufacturer.

CONCRETE CCTV POLE
**CONCRETE CCTV POLE GROUNDING**

**POLE MOUNTED CABINET**

- **DETAIL "C"**
  - Composite Camera Cable
  - CCTV Pole
  - Pole Plate with Stainless Steel Band

- **GROUND MOUNTED CABINET**
  - Composite Camera Cable
  - CCTV Pole
  - 1½" RGS conduit riser for power service assembly

- **DETIAL "B"**
  - ½" x 10' PVC conduit
    - Sleeve to protect any external ground wire from mechanical damage
    - Ensure conduit are sealed to prevent water intrusion

- **DETIAL "A"**
  - Primary Ground Rod A
  - Ground Rod B
  - Ground Rod C
  - Ground Rod D
  - Connctions may be combined
  - Connection to power service assembly

- **CONCRETE CCTV POLE GROUNDING**
  - ½" Ø x 20' Copper-Clad steel ground rod (Typ.)
  - ½" X 10' PVC conduit
    - Sleeve to protect any external ground wire from mechanical damage
    - Ensure conduit are sealed to prevent water intrusion

- **FIBER OPTIC COMMUNICATIONS**
  - 40'-0" Typ.
  - As shown on plans

- **BASE AS REQUIRED**
  - To camera support
  - Bare solid copper wire
  - Bond #2 AWG tin-plated bare solid copper ground wire to the air terminal

- **GROUNDING CONDUIT**
  - 2" PVC camera cabinet conduit
  - Ground mounted cabinet
  - Fiber optic communications conduit (as shown on plans)

- **GROUND SLAB**
  - Foundation (See Sheet 2)
  - 12" Min. 3'-0" Max.
  - 40"-0" (Typ.)

- **FINISHED GRADE**
  - 2" Min. - 8" Max.
  - Pull box
  - Ground Rod

- **CCTV POLE**
  - CCTV Pole (See Sheet 3)
  - Dome type CCTV Camera
  - 2'-0" Min.
  - 12" Min.

- **GROUNDING ELECTRICAL SYSTEM**
  - ½" X 10' PVC conduit
    - Sleeve to protect any external ground wire from mechanical damage
    - Ensure conduit are sealed to prevent water intrusion
  - Required (Connections may be combined)

- **GROUNDING CONDUCTORS**
  - ½" PVC conduit for grounding conductors
  - Pull box (See DETAIL "A")
  - Ground mounted cabinet
  - Ground Rod C as required
  - Ground Rod D as required

- **CONCRETE CCTV POLE FOUNDATION**
  - Foundation (See Sheet 2)
  - 12" Min. 3'-0" Max.
  - 40"-0" (Typ.)

- **CONCRETE CCTV POLE GROUNDING**
  - ½" Ø x 20' Copper-Clad steel ground rod (Typ.)
  - Ground Rod A
  - Primary Ground Rod Assembly (See DETAIL "B")
  - Ground Rod B
  - As required (See DETAIL "C")

- **GROUND ROD ARRAY PLACEMENT**
  - DETAIL "C"
  - Pole mounted CCTV cabinet (See DETAIL "D")
  - 1½" RGS conduit riser for power service assembly
  - 1½" RGS conduit to power service assembly

- **DETIAL "D"**
  - ½" X 10' PVC conduit
    - Sleeve to protect any external ground wire from mechanical damage
    - Ensure conduit are sealed to prevent water intrusion

- **DETIAL "B"**
  - Primary Ground Rod A
  - Ground Rod B
  - Ground Rod C
  - Ground Rod D
  - Connections may be combined
  - Connection to power service assembly

- **DETIAL "A"**
  - Primary Ground Rod A
  - Ground Rod B
  - Ground Rod C
  - Ground Rod D
  - Connections may be combined
  - Connection to power service assembly

- ** DETAIL "D"**
  - Pole mounted CCTV cabinet (See DETAIL "D")
  - 1½" RGS conduit to power service assembly
  - 1½" RGS conduit to power service assembly

- **DETIAL "B"**
  - Primary Ground Rod A
  - Ground Rod B
  - Ground Rod C
  - Ground Rod D
  - Connections may be combined
  - Connection to power service assembly
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.

Materials:
A. Strain Pole and Backing Rings:
   a. Less than or equal to 30 ksi yield, ASTM A1011, Grade 50, 55, 60 or 65
   b. Greater than or equal to 36 ksi yield, ASTM A572, Grade 50, 55, 60 or 65
B. Steel Plates: ASTM A36
C. Bolt Metal: EN10
D. Bolts, Nuts and Washers:
   a. High Strength Bolts, ASTM F1554, Grade 55
   b. Nuts: ASTM A563 Grade A Heavy-Hex
   c. Washers: ASTM F436 Type 1, one under turned element
E. Anchor Bolts, Nuts and Washers:
   a. Anchor Bolts: ASTM F1554 Grade 55
   b. Nuts: ASTM A563 Grade A Heavy-Hex (5 per anchor bolt)
   c. Plate Washers: ASTM A563 (2 per bolt). Split-lock washers and self-locking nuts are not permitted
F. Handhole Frame: ASTM A490 or ASTM A36, Grade 36
G. Handhole Cover: ASTM A1011 Grade A60B, 60 or 65
H. Aluminum Pole Caps and Nut Covers: ASTM B26 (319-F)
I. Stainless Steel Screws: AISI Type 316
J. Threaded Bars/Studs: ASTM A36 or ASTM A307
K. Concrete: Class IV (Drilled Shaft) for all environmental classifications.
L. Reinforcing Steel: Specification Section 415

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 1/4", prior to galvanizing
   b. Anchor Bolts: Bolt diameter plus 3/4", maximum
D. Locate handhole 180° from 2" wire entrance pipe.
E. Identification Tag: (Submit details for approval)
   a. Identification Tag: (Submit details for approval)
   b. Nuts: ASTM A563 Grade DH Heavy-Hex
   c. Washers: ASTM F436 Type 1, one under turned element
F. Anchor Bolts, Nuts and Washers:
   a. High Strength Bolts: ASTM F1554 Grade 55
   b. Nuts: ASTM A563 Grade A Heavy-Hex (5 per anchor bolt)
   c. Plate Washers: ASTM A563 (2 per bolt). Split-lock washers and self-locking nuts are not permitted
G. Handhole Frame: ASTM A490 or ASTM A36, Grade 36
H. Handhole Cover: ASTM A1011 Grade A60B, 60 or 65
I. Aluminum Pole Caps and Nut Covers: ASTM B26 (319-F)
J. Stainless Steel Screws: AISI Type 316
K. Concrete: Class IV (Drilled Shaft) for all environmental classifications.
L. Reinforcing Steel: Specification Section 415

Coatings:
A. Foundation: Specification Section 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 Section 460-6.
C. Coating: Enamel paint or equivalent.
D. Provide a 'J' or 'C' hook at the top of the pole for signal wiring support.
E. Taper to 1/2" diameter stainless steel rivets or screws.
F. Provide a 2" diameter stainless steel rivets or screws.

Construction:
A. Strain Pole and Backing Rings:
   a. Strain Pole and Backing Rings: ASTM A1011, Grade 50, 55, 60 or 65
   b. Greater than or equal to 36 ksi yield, ASTM A572, Grade 50, 55, 60 or 65
B. Steel Plates: ASTM A36
C. Bolt Metal: EN10
D. Bolts, Nuts and Washers:
   a. High Strength Bolts, ASTM F1554, Grade 55
   b. Nuts: ASTM A563 Grade A Heavy-Hex
   c. Washers: ASTM F436 Type 1, one under turned element
E. Anchor Bolts, Nuts and Washers:
   a. Anchor Bolts: ASTM F1554 Grade 55
   b. Nuts: ASTM A563 Grade A Heavy-Hex (5 per anchor bolt)
   c. Plate Washers: ASTM A563 (2 per bolt). Split-lock washers and self-locking nuts are not permitted
F. Handhole Frame: ASTM A490 or ASTM A36, Grade 36
G. Handhole Cover: ASTM A1011 Grade A60B, 60 or 65
H. Aluminum Pole Caps and Nut Covers: ASTM B26 (319-F)
I. Stainless Steel Screws: AISI Type 316
J. Concrete: Class IV (Drilled Shaft) for all environmental classifications.
K. Reinforcing Steel: Specification Section 415

ELEVATION AND NOTES

STRAIN POLE ASSEMBLY

ICE1.png
TABLE OF FACTORED FLEXURAL RESISTANCE $M_x$

<table>
<thead>
<tr>
<th>POLE TYPE</th>
<th>MAXIMUM ALLOWABLE MOMENT (kip-ft)</th>
<th>POLE</th>
<th>BASE CONNECTION</th>
<th>SHAFT</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

FOUNDATION

SECTION A-A

SECTION B-B

JOINT WELD DETAIL

DETAIL 'A'

FOUNDATION AND BASE DETAILS

STEEL STRAIN POLE

FY 2018-19

STANDARD PLANS

INDEX

SHEET

LID 649-010 2 of 3
**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'-1". Use one clamp per cable.
2. Install a properly sized Weather Head, fastened securely to the standard pipe for each pole location. At locations other than the wire entrance, the Weather Head face is to be left closed to outside atmosphere. Wire entrance installed per Index 634-001.
3. Any combination of Option 'a' or 'b' may be used provided both lifting and wiring is accommodated.

### CLAMP THICKNESS TABLE

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### WIRE ENTRANCE DETAIL

- **11 Gage Handhole Cover**
- **4 x 3/4" Handhole Frame**
- **Threaded Hole For 1/2" Hex Head Screw (Typ.)**
- **Tack Weld Cover Clip (Typ.)**
- **Full Penetration Weld**

### FABRICATION DETAILS

- **Steel Clamp, ASTM A500 Grade B**
- **2 1/2" Bolt With Double Nuts And Washers (Typ.)**
- **2" Pipe 20' Long, ASTM A500 Grade B**

### POLE TOP

- **1 1/2" Thick Stainless Steel Hex Head Screw (Typ.)**
- **Weather Head (See Note #2)**
- **Pole Diameter at the Clamp location**

**ATTACHMENT DETAILS**

**DESCRIPTION:**

- **Steel Strain Pole**
- **FY 2018-19**
- **Standard Plans**

**LAST REV ISIO N:**

1 of 3
**GENERAL NOTES:**

1. Work this Index with Specification 649.
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. Materials:**
   - A. Pole: ASTM A301 Grade 50, 55, 60 or 65 (less than or equal to 1/4") or ASTM A372 Grade 50, 60 or 65 (greater than or equal to 1/4") or ASTM A995 Grade A (55 ksi yield) or Grade B (60 ksi yield).
   - B. Steel Plates and Pole Cap: ASTM A6 or ASTM A709 Grade 50.
   - C. Weld Metals: E70XX.
   - D. Rod: ASTM A403, Grade A325, Type 1.
   - E. Washers: ASTM F-436.
   - F. Anchor Bolts: ASTM F1554 Grade 55 with ASTM A563 Grade A.
   - G. Handhole Frame: ASTM A1011 Grade 50, 55, 60 or 65.
   - H. Handhole Cover: ASTM A1011 Grade 36, 40, 45 or 60.
   - I. Refrigerator, ASTM A475 Grade 60.
   - J. Galvanization: Coating, corrosion, and finish protection of all steel.
   - K. Concrete: Class IV (Drilled Shaft) for all environment classifications.

**4. Pole Fabrication:**
   - A. Provide either a round or 16 sided pole with a constant taper of 0.14 inches per foot.
   - B. Pole shaft may be either One or Two sections (with telescopic field splice).
   - C. Coordinate all lowering device hardware requirements (including Tenon, Tenon mounting and cabinet so that the camera can be safely lowered without requiring lane closures.
   - D. Ensure that all electronic equipment power is protected and conditioned with TVSS devices.
   - E. Mount lowering device perpendicular to the roadway or as shown in the plans. Position any electrical wire within the pole is routed securely and free from slack.

**5. Pole Installation:**
   - A. Do not install additional wire access holes (not shown in this Index) with a diameter that exceeds 1-1/2" in diameter.
   - B. Install Anchor Bolts in accordance with Specification 649-5.
   - C. Use a complete penetration weld for longitudinal seam welds within 6" of circumferential welds.
   - D. Use only circumferential welds at base.
   - E. Use a complete penetration weld for longitudinal seam welds within 6" of circumferential welds.

**6. Cabinet Installation:**
   - 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 outermost guide 1" directly above the top of the handhole.

**7. Lowering Device Installation:**
   - A. Route 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.

---

**STANDARD PLANS**

**STEEL CCTV POLE ASSEMBLY**
NOTES:
1. Shaft Length is based on 1'-0" height above the finished grade.
2. Double nuts: Bottom nut may be half height "Jam" Nut. Provide individual nut covers (Not Shown) for each bolt.
3. Conduit and CSL Tubes not shown for clarity.
NOTE:

To secure the cover plate, install a steel chain from the cover to the pole or by mounting the cover with hinges and installing a padlock tab.
**Description:**

**Steel CCTV Pole**

**Revision:**

**Last Revision:** 1/1/17

**Index:** 649-020

**Sheet:** 6 of 6

---

**POLE TOP PLATE**

**ELEVATION**

- **Pole Tip O.D. + ½"**
- **1" Plate**
- **8-⅛" Ø Holes Equally Spaced**

**PLAN VIEW**

- **Pole Top Plate**
- **2" Ø Hole With Nipple Grommet**
- **4-⅛" X 3 ⅜" Bolts With Double Nuts and Washers**

---

**CAP PLATE DETAIL**

**ELEVATION**

- **Cap Plate ⅛" Thick**

**PLAN VIEW**

- **Pole Top Plate**
- **Pole Top Plate**
- **4-⅛" X 3 ⅜" Bolts With Double Nuts and Washers**

---

**POLE TOP DETAIL**

**ELEVATION**

- **Cap Plate ⅛" Thick**

**PLAN VIEW**

- **Pole Top Plate**
- **Pole Top Plate**
- **4-⅛" X 3 ⅜" Bolts With Double Nuts and Washers**

---

**LOWERING DEVICE TENON**

**ELEVATION**

- **Cap Plate ⅛" Thick**

**PLAN VIEW**

- **Pole Top Plate**
- **Pole Top Plate**
- **4-⅛" X 3 ⅜" Bolts With Double Nuts and Washers**

---

**TENON COVER**

**ELEVATION**

- **Cap Plate ⅛" Thick**

**PLAN VIEW**

- **Pole Top Plate**
- **Pole Top Plate**
- **4-⅛" X 3 ⅜" Bolts With Double Nuts and Washers**

---

**TENON CAP**

**ELEVATION**

- **Cap Plate ⅛" Thick**

**PLAN VIEW**

- **Pole Top Plate**
- **Pole Top Plate**
- **4-⅛" X 3 ⅜" Bolts With Double Nuts and Washers**

---
**DESCRIPTION:**

- **Steel CCTV Pole Grounding**

**STEEL CCTV POLE GROUNDING**

**MOUNTED CABINET**

- Composite Camera Cable
- **CCTV Pole**
- Pole Plate With Stainless Steel Band
- Factory Installed Pole Opening For Cabinet Entrance
- 1½" RGS Conduit Riser For Power Service Assembly

**GROUND MOUNTED CABINET**

- Composite Camera Cable
- **CCTV Pole**
- Pole Mounted CCTV Cabinet (See DETAIL "E")
- 1½" RGS Conduit To Power Service Assembly
- Composite Camera Cable
- **CCTV Pole**
- Pole Mounted CCTV Cabinet (See DETAIL "E")
- 1½" RGS Conduit To Power Service Assembly
- Composite Camera Cable
- **CCTV Pole**
- Pole Mounted CCTV Cabinet (See DETAIL "E")
- 1½" RGS Conduit To Power Service Assembly
- Composite Camera Cable
- **CCTV Pole**
- Pole Mounted CCTV Cabinet (See DETAIL "E")
- 1½" RGS Conduit To Power Service Assembly

**POLE MOUNTED CABINET**

- Composite Camera Cable
- **CCTV Pole**
- Pole Mounted CCTV Cabinet (See DETAIL "E")
- 1½" RGS Conduit To Power Service Assembly

**GROUND ROD ARRAY PLACEMENT**

**DETAIL "B"**

- Dome Type CCTV Camera
- Drilled Shaft Foundation
- Finished Grade
- **Dome Type CCTV Camera**
- Drilled Shaft Foundation
- Finished Grade

**DETAIL "C"**

- Steel CCTV Pole
- #2 ARG Tin-Plated Bare Solid Copper Wire To Ground Mounted Cabinet
- Exothermic Weld (Typ.)
- Primary Ground Rod
- Fiber Optic Communications Conduits (As Shown On Plans)
- **Steel CCTV Pole**
- #2 ARG Tin-Plated Bare Solid Copper Wire To Ground Mounted Cabinet
- Exothermic Weld (Typ.)
- Primary Ground Rod
- Fiber Optic Communications Conduits (As Shown On Plans)

**DETAIL "D"**

- Steel CCTV Pole
- #2 ARG Tin-Plated Bare Solid Copper Wire To Ground Mounted Cabinet
- Exothermic Weld (Typ.)
- Primary Ground Rod
- Fiber Optic Communications Conduits (As Shown On Plans)
- **Steel CCTV Pole**
- #2 ARG Tin-Plated Bare Solid Copper Wire To Ground Mounted Cabinet
- Exothermic Weld (Typ.)
- Primary Ground Rod
- Fiber Optic Communications Conduits (As Shown On Plans)

**DETAIL "E"**

- Steel CCTV Pole
- #2 ARG Tin-Plated Bare Solid Copper Wire To Ground Mounted Cabinet
- Exothermic Weld (Typ.)
- Primary Ground Rod
- Fiber Optic Communications Conduits (As Shown On Plans)
- **Steel CCTV Pole**
- #2 ARG Tin-Plated Bare Solid Copper Wire To Ground Mounted Cabinet
- Exothermic Weld (Typ.)
- Primary Ground Rod
- Fiber Optic Communications Conduits (As Shown On Plans)
### ARM AND BASE PLATE

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### POLE, BASE PLATE AND ARM CONNECTION

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### LUMINAIRE AND CONNECTION

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**NOTE:**
1. Work this index with Index 649-031.
GENERAL NOTES

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

2. Prior to Fabrication. Verify the installed foundation elevation will result in the required signal elevation and adjust the Pole height as needed.

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

4. Materials:
   A. Poles, Mast Arms and Backing Rings:
      a. Less than ½” : ASTM A1011 Grade 50, 55, 60 or 65
      b. Greater than or equal to ½” : ASTM A572 Grade 50, 55, 60 or 65
   B. ASTM A583 Grade A (55 ksi yield) or Grade B (60 ksi yield)
   C. Sheet Plates: ASTM A28
   D. Weld Metal: E70XX
   E. Bolts, Nuts and Washers:
      a. High Strength Bolts: ASTM F3125, Grade A325, Type 1
      b. Nuts: ASTM A563 Grade A Heavy Hex (per anchor bolt)
      c. Plate Washers: ASTM A36 (per bolt)
   F. Threaded Bars/Studs: ASTM A36 or ASTM A307
   G. Handhole Frame: ASTM A709 or ASTM A36, Grade 36
   H. Handhole Cover: ASTM A1011 Grade 50, 55, 60 or 65
   I. Aluminum Pole Caps and Nut Covers: ASTM B26 (319-F)
   J. Stainless Steel Screws: AISI Type 316
   K. Concrete: Class IV (Drilled Shaft) for all environmental classifications.
   L. Reinforcing Steel: Specification 415

5. Fabrication:
   A. Pole and Mast Arm Taper: Change diameter at a rate of 0.14 inches per foot.
   B. Upright splices are not allowed. Transverse welds are only permitted at the base.
   C. First and Second arm camber angle = 2°
   D. Provide bolt hole diameters as follows:
      a. Anchor Bolts: ASTM F1554 Grade 55
      b. Nuts: ASTM A563 DH Heavy-Hex
      c. Plate Washers: ASTM A595 Grade A (55 ksi yield) or Grade B (60 ksi yield)
   E. Face handhole perpendicular from arm on single arm poles, perpendicular from first arm of double arm poles facing away from traffic or see special details for approval.
   F. Seam weld on bottom side of arm. Seam weld under Arm 1 side of pole.
   G. Provide a ‘J’ or ‘C’ hook at the top of the pole for signal wiring support.
   H. Perform all welding in accordance with Specification 460-6.4.

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

7. Construction:
   A. Fabrication: Specification 655 Drilled Shaft, except that payment is included in the cost of the Mast Arm.
   B. Install Pole vertically.
   C. Place structural grout pad with drain between top of foundation and bottom of backplate in accordance with Specification 880-7.
   D. Attach Sign Panels and Signals centered on the elevation of the Mast Arm.
   E. Wire Access holes are ½” or less in diameter.

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ELEVATION AND NOTES

**MAST ARM ASSEMBLY**

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**SHEET NO.** 649-031

**SHEET** 1 of 6

**DESCRIPTION:** FY 2018-19

**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 an 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 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.
MAST ARM ASSEMBLY

SINGLE ARM CONNECTION

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. 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**

### SECTION E-E
- **Face Of Arm Base Plate At Arm Edge**
- **Second Arm Camber Angle**
- **Center Of First Mast Arm Extension**
- **See DETAIL 'D'**

### SECTION F-F
- **Side Connection Plate**
- **Opening**
- **Edge Of Top Plate**
- **See DETAIL 'E'**

### SECTION G-G
- **Full Penetration Weld (Typ.)**
- **Notch**
- **Full Penetration Weld (Typ.)**

**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 1/2" thick bent plate with the same flange width, height, and length as the MC 10x33.6 Channel section.
4. 'L' measure counter clockwise from First Mast Arm.

SECTION H-H

LUMINAIRE ORIENTATION

LUMINAIRE CONNECTION ELEVATION

LUMINAIRE ARM AND CONNECTION DETAILS

SECTION 1-1

DESCRIPTION:
FY 2018-19
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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**

- 11 Gage Mast Arm Handhole Cover
  - 3/16" Ø Hole (Typ.)
  - Tack Welded Cover Clip (Typ.)
  - Full Penetration Weld

**FRAME**

- 11 Gage Mast Arm Handhole Frame
  - 3/16" Ø Stainless Steel Hex Head Screw (Typ.)
  - Threaded Hole For 3/16" Ø Hex Head Screw (Typ.)
  - Partial Penetration Weld (Typ.)

**SECTION J-J**

- HANDHOLE (Thru Handhole)
  - Partial Penetration Weld (Typ.)

**SECTION K-K**

- POLE TOP
  - Partial Penetration Weld (Typ.)
  - Stainless Steel Screw (Typ.)
  - C Hook For Wiring And Lifting, 5/16" Commercial Grade Hot Rolled Bar Welded To Inside Of Pole

**COVER**

- Handhole Cover
  - 3/16" Ø Hole (Typ.)

**FRAME**

- Handhole Frame
  - Partial Penetration Weld (Typ.)

**SECTION K-K**

- TERMINAL COMPARTMENT
  - Partial Penetration Weld (Typ.)
  - Stainless Steel Hex Head Screw (Typ.)

**HANDHOLE AND POLE TOP DETAILS**

**M F D O T R E V I S I O N**

- HANDHOLE:
  - Flat Washer
  - 1/4" Min. Bolt

- POLE TOP:
  - Pole Cap Plate
  - 1/8" Thick

- WATERPROOF GAFFER:
  - Cover Installed With Terminal Compartment.
  - 11 Gage Waterproof Gasket.

- LIFTING BAR:
  - 1/4" x 2" Lifting Bar With (Bolt Size + 5/16") Hole And Matching Nut Tack Welded To Underside Of Bar

- POLE CAP PLATE:
  - Cast Aluminum
  - 3/8" Min. Thick.

- POLE:
  - 1/4" Min. Bolt

**DESCRIPTION:**

- FULL PENETRATION WELD
- PARTIAL PENETRATION WELD

**REV.:**

- REV 6 of 6
- MAST ARM ASSEMBLIES

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- FY 2018-19

**LAST REVISION:**

- 01/01/17
**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 9/16 height jam nut. Provide individual nut covers (not shown) for each bolt.

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**SECTION A-A**

**PLAN**

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**ELEVATION**

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**BASE PLATE CONNECTION**

---

**JOINT WELD DETAIL**

**DETAIL 'A'**

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**FOUNTION AND BASE PLATE DETAILS**

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**BASE PLATE AND ANCHORS**

---

**FOUNTION**

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**MAST ARM ASSEMBLY**

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**DESCRIPTION:**

**REV ISIO N**

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**LAST REVISION DATE**

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**MANUFACTURER**
**DESCRIPTION:**

MAST ARM ASSEMBLY

**REVISION**

10/23/17

**LAST REVENSION**

01/01/17

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**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 marks 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).

**SINGLE ARM CONNECTIONS & SPLICE DETAILS**

**SINGLE ARM CONNECTION**

**SECTION B-B**

**SECTION C-C**

**SECTION D-D**

**DETAIL 'B'**

**DETAIL 'C'**

**ARM SPLICE**

**MAST ARM CONNECTION**

**MAST ARM ASSEMBLY**

**Street Name**

**Facade Name**

**Wall Thickness**

**Center to Flat Inside Radius Measured**

**Seam Weld (Typ.)**

**= 5x Wall Thickness (1" Min.)**

**Minimum Internal Bend Radius**

**Provided Outside Diameter and Wall Thickness are not reduced.**

**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 marks 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

NOTE:
1. Install the ‘Slop 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.

MAST ARM ASSEMBLY

DESCRIPTION:

REVISI...
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 1/2" 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.

DESCRIPTION:

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MAST ARM ASSEMBLIES

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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.
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 620.
3. Install grommets or bushings in each hole.
4. For Steel Strain Poles see Index 649-010.
5. Construct footing with Class I Concrete, footing may be Cast-In-Place (CIP) or Precast.
6. See APL for Department-approved Pedestrian Signal Assemblies and hardware.
7. For Prestressed Concrete Poles see Index 641-010.
8. Install 6 – 7/8" x 18" Anchor Bolts With Double Nuts (ASTM F1554 Grade 55)
9. Meet the requirements of Specifications 646 for aluminum poles and transformer bases.

PEDESTRIAN CONTROL SIGNAL
INSTALLATION DETAILS

PEDESTAL MOUNTED SIGNAL

CONCRETE POLE MOUNTED SIGNAL

STRAIN POLE MOUNTED SIGNAL
DESCRIPTION:

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OF

STANDARD PLANS

FY 2018-19

SPAN WIRE MOUNTED SIGN DETAILS

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11/01/17

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Notes:
1. Bottom edge of signs shall be approximately at the same elevation.
2. Type B & C attachments with one hanger shall have wind beams for signs wider than 3\'6". The beams shall extend to within 6" of the sign edge.
3. Type B & C attachments for signs 6' and wider shall have 2 hangers. Signs 7' and wider shall have wind beams that extend to within 6" of the sign edge.
4. Type D attachments shall be for signs 3'6" wide or less.
5. Sign panels shall meet the requirements of Index 700-020.
6. Refer to section 634 of the Standard Specifications For Road and Bridge Construction.
7. All bolts, nuts, and washers shall be passivated stainless steel, ASTM A-360 series, commercial grade, type 316.
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 1/2" 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 1/2" diameter PVC conduit.
8. All communication and power cables must be neatly bundled and secured.
10. Use a Camera Lowering Device listed on the Approved Product List (APL).

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

CAMERA LOWERING DEVICE DETAIL

CAMERA MOUNTING WITH LOWERING DEVICE
GENERAL NOTES:

1. Verify the pole type, the dimensions of the pole at the point of installation of the camera mount, and angle with respect to the roadway before manufacturing camera mount assembly.

2. Design camera mounting arm and connection to the pole according to FDOT Structures Manual (current edition).

3. No field welding shall be permitted.

4. Mounting bracket arm shall be level after installation.

5. The contractor shall submit shop drawings for the proposed fixed mounting arm, signed and sealed by a Professional Engineer registered in the State of Florida, to the Engineer for review and approval.


7. Galvanized pipe connections and conduit every joints shall be sealed in accordance with Section 630 of the Standard Specifications.

CAMERA MOUNTING DETAILS

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659-020

SHEET

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CAMERA MOUNTING WITH FIXED BRACKET

SECTION AA

A

A
**ALTERNATIVE 1**

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

**ALTERNATIVE 2**

Drill a hole 1" to 1.5" 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. Place a predetermined length of rigid conduit in the hole and drive the conduit into the trench or hole. Install a molded bushing (nonmetallic) on the roadway end of the rigid conduit. The top of the rigid conduit shall be approximately 2" below the roadway surface. Fill the hole with loop sealant to the level of the roadway surface. A nonmetallic material should be used to prevent excessive loop sealant from entering the rigid conduit.

**GENERAL NOTES**

1. If the loop lead-in is 15' 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 15' continue the twisted pair to the specified pull box, splice to shielded lead-in wire and continue to the controller cabinet.

2. The width of all saw cuts shall be sufficient to allow unforced placement of loop wires or lead-in cables into the saw cut. The depth of all saw cuts, except across expansion joints, shall be 3' with a maximum of 4'.

3. On resurfacing or new roadway construction projects, the loop wires and lead-in cables will be installed in the asphalt structural course prior to the placement of the final asphalt wearing course. The loop wires and lead-in cables shall be placed in a saw cut in the structural course. The depth of the cables below the top of the final surface shall comply with note 2.

4. A nonmetallic, hold-down material shall be used to secure loop wires and lead-ins to the bottom of saw cuts. Hold down material shall be placed at approximately 12" intervals around loops and 24" intervals on lead-ins.

5. The maximum distance between the twisted pairs of loop lead-in wire is 6' from the loop to 12' from the pavement edge of 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.

7. As an alternate, a larger diameter enclosure that will accommodate both the shielded conductors and the exposed end of the shielded cable may be used.

8. The maximum area of asphalt to be disturbed shall be 6'x6'. This area shall be restored as directed by the Engineer.
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. The leading edge of Loop Types A, C, D, & F may extend past the stop line a maximum of 20'. The length of these loops may be extended to a maximum of 60'. Each intersection should be individually designed and if the modifications noted above is required it must be noted or detailed in the plans.
7. Loop lead-in wires should not be installed in the same pull box with signal power cable.

Loop lead-in wires should not be installed in the same pull box with signal power cable.
NOTES:

1. Mount Signs above the detectors. See Index 700-102 or MUTCD for sign details.
2. Position the pedestrian pushbutton to clearly indicate which crosswalk signal is actuated by each pushbutton.
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**

Notes:
1. The number, size and orientation of conduit sweep will vary according to site condition or locations. Two spare 2" PVC conduits shall be provided in all bases. The spares shall exit in the direction of the center rear of the cabinet base, into a pullbox and capped with a weatherproof fitting. If obstructions prevent the spare conduit from exiting to the rear, or the rear of the cabinet is located on the R/W line, a side exit of the spare conduits will have to be approved by the project engineer. All spare conduit sweeps shall be capped with a weatherproof fitting.
2. Meet all grounding requirements of the Standard Specifications 620.
3. New Controller Cabinet installation shall meet the requirements of the Standard Specifications 676.

**EXISTING CONTROLLER CABINET**

Notes:
1. Existing controller cabinets to be retrofitted shall meet the requirements of the Standard Specifications 676.
2. The signalized intersection controller cabinet retrofit installation procedures are located at:
   For Generator Power for Signalized Intersection

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**POLE MOUNTED CABINET**

Metal Pole

- Conduit
- Pole Plate With Steel Band or Load Anchors and Bolts
- Pulling Elbow Type LB
- When a pole mounted cabinet is specified the 2½" hole for the cabinet shall be field drilled.

Concrete Pole

- Conduit
- Grounding Electrode 6" Min.
- Pulling Elbow Type LB
- When a pole mounted cabinet is specified the 2½" hole for the cabinet shall be field drilled.

Wood Pole

- Conduit
- Grounding Electrode 6" Min.
- Pulling Elbow Type LB
- When a pole mounted cabinet is specified the 2½" hole for the cabinet shall be field drilled.

**BASE MOUNTED CABINET**

**POLE MOUNTED INTERCONNECT JUNCTION BOX**

**SIDE VIEW**

- Service Slab (Slope ½"
  To 1" For Drainage) Not Required If Sidewalk Or Pavement Areas Or Where R/W Line IsRestricted
- 1" Chamfer
- 4" Max.
- 30" Max.
- Conduit
- Pull Box
- Ground Line Or Grade

**FRONT VIEW**

- Generator Panel
- Conduit
- Ground Line Or Grade
- 1" Chamfer
- 4" Min.
- 12" Min.

**SIDE VIEW**

- Transfer Switch
- Conduit
- Ground Line Or Grade
- 4" Min.
- 18" Min.

**FRONT VIEW**

- Transfer Switch
- Conduit
- Ground Line Or Grade
- 4" Min.
- 18" Min.
CABINET LAYOUT DETAILS (Four Lanes or Less)

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 No. 4);
   E. All associated wiring and wiring harnesses.

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

3. The contractor is responsible for contacting the TMS Manager at the Transportation Statics 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 No. 4).

NOTE:
Fabricate bracket out of 1/8" - 1/4" 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.

NOTE:

Fabricate bracket out of 1/8" - 1/4" 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 LAYOUT DETAILS (Five to Eight Lanes)

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 No. 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
   E. One solar power suppression box
   F. Ten 12 volt storage batteries
   G. One aluminum backplane

3. The contractor is responsible for contacting the TMS manager in the Transportation Statics 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 No. 4 for pinout charts, receptacle and plug details.)

NOTES:

OPTION A

- Aluminum bracket for J1 receptacle (Reference Detail, Sheet No. 3; attach to shelf mounting rail in cabinet)
- Equipment cable plug
- J1 equipment cable plug (lanes 1 through 4)
- J1 equipment cable plug (lanes 5 through 8)
- J1 receptacle

OPTION B

- Aluminum bracket for J1 receptacle (Reference Detail, Sheet No. 3; attach to shelf mounting rail in cabinet)
- Equipment cable plug
- J1 equipment cable plug (lanes 1 through 4)
- J1 equipment cable plug (lanes 5 through 8)
- J1 receptacle

EQUIPMENT CABLE ASSEMBLY

- Solar terminal
- Battery terminal
- Loop terminal strip
- Loop terminal strip
- Loop terminal strip
- Loop terminal strip
- Solar power suppression
- Surge suppressors (furnished separately)
- Cabinet cable
- 3 ft. long equipment cable (See Note #5)
- J1 receptacle with alum. Mtg. Bracket for lanes 1 to 4 (See Note #3)
DESCRIPTION:

NOTES:
1. The contractor is responsible for contacting the EMS Manager in the Transportation Statics 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 No. 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. Second 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 wires into the bottom of the slot. First turn of #14 AWG, place the INS 51-5 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 INS 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 and a second round of a contrasting colored tape for the lead loop in the lane. The trailing loop would not have a second contrasting colored band of tape.

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

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

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

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:**

- Install Exit Windows at least 2' apart.
- 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.
- Install Exit Windows at least 2' apart.

**LANE LAYOUT FOR TMS INDUCTIVE LOOP AND AXLE SENSOR**

**TYPICAL FOR UP TO 4 LANES OF SENSOR LEADS PULLED TO ONE SIDE OF THE ROADWAY**

**EXTRA INFORMATION**

- Pull Box w/ Concrete Apron
- Exit Windows
- Sensor Lead
- Pull Box to Pull Box
- Connector and a housing with sufficient sealant to fully encapsulate the spliced connections. Taped splices are not permitted.
- 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 permitted.
- 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.
- Install Exit Windows at least 2' apart.

**INDEX 695-001**

**FY 2018-19 STANDARD PLANS**

**TRAFFIC MONITORING SITE**

**REVISED**: 11/01/17

**REVIEW**: 10/23/2017

**DESCRIPTION**: LANE LAYOUT FOR TMS INDUCTIVE LOOP AND AXLE SENSOR

**INDEX**: 695-001

**SHEET**: 5 of 7
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.

Coverage Area

Non-Intrusive Vehicle Sensor Mounting Height Must Be Adjusted To Optimize The Unit's Coverage Area

4" Nominal Aluminium Pole (See Std. Spec. 646)

Offset of pole must be greater than or equal to minimum clear zone requirements.

Non-Intrusive Vehicle Sensor

Traffic Monitoring Site
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. 20' or 35' poles: 3'-0" X 3'-0" wide, a depth of 4'-0"

TRAFFIC MONITORING SITE

SOLAR POWER POLE
WITH POLE MOUNTED CABINET
(Telemeter Sites)

PEDESTAL MOUNTED CABINET
(Portable Traffic Monitoring Sites)