1. Provide cable length to remove fuseholders from transformer, pole base or pullbox for maintenance. Remove slack from the luminaire cable to provide tension on the fuseholders if the pole breaks away. Pull excess cable into pull box tightening strain relief fittings or cable clamps at both ends of conduit to prevent cable from slipping.

2. Provide cable length to remove fuseholders from transformer, pole base or pullbox for maintenance. Remove slack from the luminaire cable to provide tension on the fuseholders if the pole breaks away. Pull excess cable into pull box tightening strain relief fittings or cable clamps at both ends of conduit to prevent cable from slipping.

NOTES:

1. Barrier wall or bridge mounted poles: The wiring shall be in accordance with Section 992 of the Standard Specifications.

2. Provide cable length to remove fuseholders from transformer, pole base or pullbox for maintenance. Remove slack from the luminaire cable to provide tension on the fuseholders if the pole breaks away. Pull excess cable into pull box tightening strain relief fittings or cable clamps at both ends of conduit to prevent cable from slipping.
NOTES:

1. Use compacted select material in accordance with Index 505.
2. Concrete shall be Class NS with a minimum strength at 28 days of f'c=2.5 ksi.
3. Outside edge of slab shall be cast against formwork.
4. The pull box shown is 13" x 24"; others approved under Section 635 of the Standard Specifications may be used.
5. Slabs to be placed around all Poles and Pull Boxes in rural locations.
   In urban areas or where space is limited slab dimensions may be adjusted as shown in the plans.
6. Concrete for slabs around pull boxes shall be included in the price of pull box.

SLAB DIMENSIONS

SLAB DETAILS FOR INTERMEDIATE PULLBOX LOCATIONS
NOTES:
1. Use compacted select material in accordance with Index 505.
2. Concrete shall be Class NS with a minimum strength at 28 days of f'c=2.5 ksi.
3. Outside edge of slab shall be cast against formwork.
4. The pull box shown is 1'7" x 2'4"; others approved under Section 635 of the Standard Specifications may be used.
5. Slabs to be placed around all Poles and Pull Boxes. In urban areas or where space is limited slab dimensions may be
   adjusted as shown in the plans.
6. Concrete for slabs around poles and pull boxes shall be included in the price of pole or pull box.
7. The expansion joint shall consist of ½" of closed-cell polyethylene foam expansion material. The top ½" of expansion material shall be removed after
   pouring the slab and sealed with an APL approved Type A sealant meeting the requirements of Section 932.

SLAB DETAILS
FOR POLE AND PULL BOX LOCATIONS
HIGHMAST LIGHTING NOTES:

1. Poles are designed to support the following:
   a. One (1) cylindrical head assembly with a maximum effective projected area of 6 sf and 340 lbs (Max.)
   b. Eight (8) cylindrical luminaires with a maximum effective projected area of 1.5 sf and 77 lbs each

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

3. High Mast Structure Materials:
   A. Poles and Bucking Rings:
      a. Less than 12"; ASTM A1011 Grade 50, 55, 60 or 65
      b. Greater than or equal to 12"; ASTM A572 Grade 50, 55, 60 or 65
   B. Steel Plates: ASTM A709 or ASTM A36
   C. Pole Caps: ASTM A1011 Grade 50, 55, 60, or 65 or ASTM B209
   D. Bolt Grade: C1038
   E. Stainless Steel Screws: AISI 316
   F. Anchor Bolts, Nuts and Washers:
      a. Anchor Bolts: ASTM F1554 Grade 35
      b. Nuts: ASTM A363 Grade A Heavy-Hex (5 per anchor bolt)
      c. Plate Washer: ASTM A36 (2 per anchor bolt)
   G. Nut Covers: ASTM B56 (319-F)
   H. Concrete: Class IV (Drilled Shaft)
   I. Reinforcing Steel: Specification Section 415

4. Fabrication:
   A. Welding: Specification Section 460-6.4
   B. Poles:
      a. Round or 16-Sided (Min.)
      b. Pole Taper: Diameter changing at 0.14 inches per foot.
      c. Two longitudinal seam welds (Max.)
      d. Longitudinal seam welds within 6" of pole to base must be complete penetration welds.
      e. Longitudinal seam welds at telescopic field joints must be complete penetration welds for the splice length plus 6".
      f. Circumferentially welded pole shaft, bolt splices and laminated pole shafts are not permitted.
   C. Holes for Anchor Bolts, Anchor Bolt diameter plus 1/2" (Max.), prior to galvanizing.
   D. Hot Dip Galvanize after Fabrication
   E. Identification Tag (Submit details for approval)
      a. 3/4" x 4" (Max.) aluminum identification tag
      b. Locate on the inside of the pole and visible from the handhole.
      c. Secure to pole with 1/4" 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. Fe of Steel
         6. Base Wall Thickness
   F. Stainless Steel Screws: AISI 316
   G. Weld Metal: E70XX
   H. Concrete: Class IV (Drilled Shaft)
   I. Reinforcing Steel: Specification Section 415
   J. Nut Covers: ASTM B56 (319-F)
   K. Bolt Grade: C1038
   L. Steel Plates: ASTM A709 or ASTM A36
   M. Anchor Bolts, Nuts and Washers:
      a. Anchor Bolts: ASTM A363 Grade A Heavy-Hex (5 per anchor bolt)
      b. Plate Washer: ASTM A36 (2 per anchor bolt)
   N. Nut Covers: ASTM B56 (319-F)

5. Coating:
   A. Galvanize Anchor Bolts, Nuts and Washers; ASTM F2329
   B. Hot Dip Galvanize all other steel items; ASTM A123

6. Construction:
   A. Foundation: Specification Section 455 Drilled Shaft, except that payment is included in the cost of the Structure.
   B. After Installation: Place wire screen between top of foundation and bottom of baseplate in accordance with Specification Section 649-6.
NOTES:

1. At all pull boxes and pole bases, ends of conduit shall be sealed in accordance with Section 630 of the Standard Specifications For Road And Bridge Construction.

2. Slabs to be placed around all Poles and Pull Boxes.

3. For Pull Boxes between Poles refer to Index 17500.
The contractor's attention is directed to those plan sheets detailing the mounting of luminaires at the pole top. Particular attention is directed to alignment of luminaire light distributions. Special attention must be exercised in the physical alignment of these luminaires to ensure that the approved photometric layout is physically produced at each lighting standard in the field. A marking shall be placed on the external face of the refractor to allow visual inspection of alignment. The marking shall correspond to the 0° axis of the refractor.

Luminaire support ring

2" slip fitter

See legend for number of luminaires, lamp wattage, and light distribution.

Luminaire support ring

Positive drive reversible winch

A surge protector shall be located in the pole with the circuit breaker. This surge protector shall be mounted at the front near hand hole for easy access.

600 Volt rated Pole Cable. Size of conductors to be determined by luminaire load.

600 Volt rated Circuit Breaker Cable. Size of conductors to be determined by luminaire load.

SCHEMATIC OF REMOTE AUXILIARY POWER UNIT

All hardware for mounting heavy duty drill to pole shall be Stainless Steel.

1/2" heavy duty reversible or 1 HP Portable Motor(s) per project.

Step-down transformer provided with 120V grounded receptacle for electric drill & receptacle for supply cable (see schematics) 25' minimum remote control cable same as Pole Cable.

SCHEMATIC OF REMOTE AUXILIARY POWER UNIT

LOWERING DETAILS
NOTES:

1. Use compacted select material in accordance with Index 505.
2. Concrete shall be Class NS with a minimum strength at 28 days of f'c=2.5 ksi.
3. Outside edge of slab shall be cast against formwork.
4. The pull box shown is 13" x 24", others approved under Section 635 of the Standard Specifications may be used.
5. Slabs to be placed around all Poles and Pull Boxes. In urban areas or where space is limited slab dimensions may be adjusted as shown in the plans.
6. Concrete for slabs around poles and pull boxes shall be included in the price of pole or pull box.
7. The expansion joint shall consist of ½” of closed-cell polyethylene foam expansion material. The top ½” of expansion material shall be removed after pouring the slab and sealed with an APL approved Type A sealant meeting the requirements of Section 932.

Concrete for slabs around poles and pull boxes shall be included in the price of pole or pull box.

Concrete shall be Class NS with a minimum strength at 28 days of f'c=2.5 ksi.

Use compacted select material in accordance with Index 505.

The expansion joint shall consist of ½” of closed-cell polyethylene foam expansion material. The top ½” of expansion material shall be removed after pouring the slab and sealed with an APL approved Type A sealant meeting the requirements of Section 932.

SLab DIMENSIONS

SLAB DETAILS
GENERAL NOTES:
1. It shall be the contractors responsibility to provide a complete service assembly as per the plans and service specifications.
2. The service installation shall meet the requirements of the national electric code and applicable local codes.
3. Shop drawings are not required for service equipment, unless noted in the plans.
4. A Pull Box is required at each service point, see Index 17700.
PHOTO ELECTRIC CONTROLLER DETAIL

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. 1/2" 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. Lighting 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.

ONE LINE DIAGRAM DISTRIBUTION POINT

PHOTO ELECTRIC CONTROLLER DETAIL

Keyed Notes:
1. Cut a 2" hole in the side of the Lighting Control Panel enclosure for the operation and mounting of the Photo Electric controller. Use interglass and a clear silicone sealant to cover hole, install Photo Electric Controller.
1. This Index details a bottom luminaire support structure. For signs requiring top luminaire support structures, the detail can be reversed.

2. Luminaire spacing and arm length is shown on Guide Sign Worksheet.

3. The Guide Sign Worksheet indicates the sign luminaire used for basis of design. The contractor may propose a different luminaire by submitting photometric calculations for each lighted sign for review by the Engineer.

**SIGN LIGHTING INSTALLATION**

Roadway Lighting included in contract:

1. Power for the sign lighting provided from the roadway lighting circuit.

2. Indicate sign location and a pull box location for connection to the sign lights in the lighting plans.

3. Lighting contractor installs pull box and loop 2' of lighting circuit conductors in the pull box for connection by the signing contractor.

4. Signing contractor furnishes and installs the luminaires, Nema 3R enclosure, 30 amp breaker, conduit, conductors and all other electrical equipment necessary for connection to the lighting circuit.

Roadway Lighting not included in contract:

1. Signing plans include the pay item numbers to furnish and install conduit, conductors, ground rods, pull boxes and service point equipment.

2. Signing plans indicate the location of the service point equipment and circuit runs.

3. Signing contractor provides all electrical equipment necessary for connection of the sign lights.

**PLACEMENT OF SIGN LIGHTS**

1. Signing contractor provides all electrical equipment necessary for connection of the sign lights.

2. Indicate sign location and a pull box location for connection to the sign lights in the lighting plans.

3. Lighting contractor installs pull box and loop 2' of lighting circuit conductors in the pull box for connection by the signing contractor.

4. Signing contractor furnishes and installs the luminaires, Nema 3R enclosure, 30 amp breaker, conduit, conductors and all other electrical equipment necessary for connection to the lighting circuit.
NOTES

1. Install hanger pipe to each vertical beam crossed with a 3/8"-U-Bolt, lock washers and hex nuts. Cap both ends of the horizontal pipe.

2. Materials:
   A. Steel Pipe: ASTM A53 (Grade A or B)
   B. Steel Plate: ASTM A36
   C. Bolts: ASTM A325
   D. Hex Nuts: ASTM A563
   E. Washers: ASTM F436


4. All pipe dimensions are NPS.

5. Hanger pipe shall be 3'-0" to 4'-0" (unless otherwise shown in Plans) (6'-0" Max.).

SECTION B-B

SECTION A-A

DETAIL 'A'

1. Install hanger pipe to each vertical beam crossed with a 3/8"-U-Bolt, lock washers and hex nuts. Cap both ends of the horizontal pipe.

2. Materials:
   A. Steel Pipe: ASTM A53 (Grade A or B)
   B. Steel Plate: ASTM A36
   C. Bolts: ASTM A325
   D. Hex Nuts: ASTM A563
   E. Washers: ASTM F436


4. All pipe dimensions are NPS.

5. Hanger pipe shall be 3'-0" to 4'-0" (unless otherwise shown in Plans) (6'-0" Max.).
GENERAL NOTES

1. Poles are designed to support the following:
   A. Luminaire Effective Projected Area (EPA) 1.55 SF
   B. Weight: 73 lb

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

3. Materials:
   A. Pole, Pole Connection Extrusions and Arm Extrusions: ASTM B221, Alloy 6063-T6
   B. Bars, Plates, Sheetmetal and Backer Ring ASTM B221, Alloy 6063-T6
   C. Caps and Covers: ASTM B-26, Alloy 312-5
   D. Steel Bearing Plates: ASTM A53 or ASTM A36 Grade 36
   E. Aluminum Weld Material: SR 4043
   G. Bolts, Nuts and Washers:
      a. Shoe Base Bolts: ASTM F1325, Grade A325, Type 1
      b. Nuts: ASTM A463 Grade DM Heavy-Hex
      c. Washer: ASTM F436 Type 1
   H. Anchor Bolts, Nuts, and Washers:
      a. Anchor Bolts: ASTM F1554 Grade 55
      b. Nuts: ASTM A65 Grade A Heavy-Hex
      c. Plate Washer: ASTM A46
   J. Stainless Steel Fasteners: ASTM F193 Alloy Group 2, Combilam A, CKM or SH1
   K. Nut Covers: ASTM B26 (T69-1)
   L. Concrete: Class I

4. Fabrication:
   A. Weld Arm and Pole (Alloy 6063) in the T6 temper using 4043 filler. Age the Arm and Pole artificially to the T6 temper after welding.
   B. Upright Extrusions not Bolstered. Transformer units are only allowed at the base
   C. Roadway Light Pole Taper: Taper as required to provide a round top O.D. of 6" and a base O.D. of 10". Portions of the pole near the base shall and at the arm connections may be held constant at 10" and 8" respectively to simplify fabrication.
   D. Median Barrier Mounted Light Pole Taper: Taper as required to provide a 6" O.D. round top with an 11" x 7" O.D. oblong base. Portions of the pole near the base and at the arm connections may be held constant at 11" x 7" allowing and 6" round respectively to simplify fabrication.
   E. Provide 1", 5", or 10" cover at top of pole for electrical wires.
   F. Epoxy poles located on bridges, walls and concrete median barriers/Traffic Railings with a vibration damper.
   G. Perform all welding in accordance with AWS D1.2.
   H. Embedded Junction Boxes (EJB):
      a. Weld all seams continuously and grind smooth.
      b. Hot Dip Galvanize after Fabrication.
      c. Provide a watertight cover with neoprene gasket and secure cover with galvanized screws.
   I. For Median Barrier Mounted Aluminum Light Poles, the fabricator must demonstrate the ability to produce a crack free pole. The fabricator’s Department-approved QC Plan must contain the following information prior to fabrication:
      a. Tests demonstrating a pole with a 0.06" wall thickness achieves the ultimate moment capacity of 36 kipft in the strong axis and 30 kipft in the weak axis.
      b. Tests demonstrating a pole with a 0.07" wall thickness achieves an ultimate moment capacity of 44 kipft in the strong axis and 37 kipft in the weak axis.
      c. Test results showing the pole does not buckle at the shape transition area under the ultimate moment capacity loads.
      d. Complete details and calculations for the reinforced 4" x 6" (Min) handhole located 1'-6" above the base plate.
   J. Identification Tag: (Submit details for approval)
      a. 2" x 4" (Max) aluminum identification tag.
      b. Locate on the inside of the transformer base and visible from the door opening.
      c. Secure to transformer base with 5/16" wall thickness stainless steel rivets or screws.
      d. Include the following information on the ID Tag:
         1. Financial Project ID
         2. Pole Height
         3. Manufacturer’s Name
   K. Reinforcing Steel: Specification Section 415
   L. Concrete: Class 1
   M.Nut Covers: ASTM B26 (T69-1)
   N. Nuts: ASTM A563 Grade A Heavy-Hex
   O. Washer: ASTM F436 Type 1

5. Coatings/Finish:
   A. Pole and Arm Finish: 50 grit satin rubbed.
   B. Galvanized Steel Bolts, Screws, Nuts and Washers: ASTM A36
   C. Hot Dip Galvanize EJB and other steel items including poles: ASTM A123

6. Construction:
   A. Foundation: Specification Section 455, except payment for the foundation is included in the cost of the pole.
   B. Frangible Base, Base Shoe, and Clamps:
      a. Certify that the clamp, Frangible Transformer Base, and Base Shoe Design are capable of providing the required capacity.
      b. Certify that the Base conforms to the current FMRA required AASHTO Frangibility Requirements, tested under VCHRP Report 350 Guidelines (e.g. Akron Foundry TBI-17).
      c. Do not erect pole without Luminaire attached.

7. Payment Note: Include the cost of the EJB in the cost of the median barrier or Traffic Railing it is embedded in.
130° (Typ.)

Thicker walls are permitted and tapered walls may be used and shall be within the Aluminum Association Tolerances.

NOTE:

1. For locations of Bearing Plates, Base Plates and Details 'A' see Sheets 6 & 7.
2. Double Nuts: The bottom hex nut may be substituted by a half height 'Jam' nut.
3. Provide individual nut covers (not shown) for each bolt.

See Note 2

Double Nuts

Permitted (Typ.)

Galv. Coupler

Leveling Nut

NOTE:

Pole wall thicknesses shown in the POLE TABLE are nominals and shall be within the Aluminum Association Tolerances. Thicker walls are permitted and tapered walls may be used provided the minimum Aluminum Association thicknesses are not violated.

NOTE:

POLE TABLE

<table>
<thead>
<tr>
<th>WIND SPEED (MPH)</th>
<th>ARM LENGTH (FT)</th>
<th>MOUNTING HEIGHT (FT)</th>
<th>POLE WALL (IN)</th>
<th>FILL HEIGHT (IN)</th>
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<tbody>
<tr>
<td>120</td>
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<td>140</td>
<td>8, 10, 12</td>
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<td>0.25</td>
<td>Up to 70</td>
</tr>
<tr>
<td>160</td>
<td>8, 10, 12</td>
<td>40</td>
<td>0.313</td>
<td>Up to 70</td>
</tr>
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</table>
NOTE: For roadway concrete barrier wall see Index 410

PLAN
(Reinforcing steel not shown)
Provide dowel bars @ construction joint

NOTE: For reinforcing steel position details, see Index 421

SECTION C-C

END VIEW

FOUNDATION TABLE

<table>
<thead>
<tr>
<th>WIND SPEED (MPH)</th>
<th>DESIGN MOUNTING HEIGHT (FT)</th>
<th>FOUNDATION DEPTH (FT)</th>
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</thead>
<tbody>
<tr>
<td>170</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
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<td>9</td>
</tr>
<tr>
<td>110</td>
<td>9</td>
<td>9</td>
</tr>
</tbody>
</table>

CYLINDRICAL FOUNDATION DETAILS FOR MEDIAN BARRIER MOUNTED ALUMINUM LIGHT POLE

NOTE:

1. For Base Plate Details, Bearing Plate, and Detail "A", see Sheet 5.
2. Dowel Construction Joint per Index 410
3. For adjacent Concrete Barrier Details, see Index 410.
NOTES:
1. For Base Plate Details, Bearing Plate Details, and Detail 'A', see Sheet 5.
2. See Index 421 for details of adjacent Traffic Railing (Median 32" F-Shape) and for angles CA and CB.

Details for Traffic Railing (Median 32" F-Shape) Mounted Aluminum Light Pole

(Reinforcing steel not shown)