Lighting
<table>
<thead>
<tr>
<th>NO.</th>
<th>DATE</th>
<th>TITLE</th>
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<td>10-21-14</td>
<td>Conduit and Precast Handholes</td>
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<td>LI-142</td>
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<td>Electrical Installation (Bases)</td>
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<td>LI-151</td>
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<td>LI-210</td>
<td>10-21-14</td>
<td>Transformer Base (Cast Aluminum)</td>
</tr>
<tr>
<td>LI-211</td>
<td>10-20-15</td>
<td>Slip-Base for Light Poles</td>
</tr>
</tbody>
</table>
Light Pole Location

**TYPICAL POLE INSTALLATION**

Mounting Height (MH) is the dimension measured vertically from the center of end of mastarm to the top of foundation as shown. Allowable tolerance on MH for final installation is from +3 inches to -3 inches.

Overhang (OH) is the horizontal dimension from the edge of traveled way to the Luminaire center. Unless specifically designated otherwise, design OH is zero, with an allowable tolerance of +6 inches.

Lateral clearance will be controlled by luminaire dimensions, and by specified overhang and mastarm dimensions. Unless directed otherwise by the Engineer, clearance of adjacent poles having identical mastarm lengths is not to vary by more than +3 inches.

Orientation: If not specified otherwise, angular orientation of mastarm is 90°± 2° to the respective centerlines or baselines, or to the respective edges of the pavement along acceleration and deceleration tapers.

Twin Mastarm Angles: Included angle is to provide required and deceleration tapers.

Orientation: If not specified otherwise, angular orientation of mastarm is 90°± 2° to the respective centerlines or baselines, or to the respective edges of the pavement along acceleration and deceleration tapers.

Edge of traveled way is considered to be the edge line.

1. Foundation offset (FO) is measured to the centerline of foundation. If the foreslope is steeper than 6:1, FO should be between 2 and 3 feet. If the foreslope is 6:1 or flatter, the FO will vary based on specified mastarm length.

2. Slip-base only. May be placed behind pole. Meet the requirements of Article 2623.03, O, of the Standard Specifications.

Possible Contact Item:
Lighting Poles

Possible Tabulation:
108-1
**Figure 8010.103**

**Conduit in Trench**
- Conduit Depth: 24" min. to 48" max.
- Trench: 4" min.

Ensure backfill material is free of cinders, concrete, or other rubble.

**Compact Backfill Material**

**Surface**
- Skid Resistant

**Conduit and Precast Handholes**

### Handhole Dimensions Table (Nominal)

<table>
<thead>
<tr>
<th>Type</th>
<th>L</th>
<th>W</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td>30&quot;</td>
<td>17&quot;</td>
<td>24&quot;</td>
</tr>
<tr>
<td>III</td>
<td>36&quot;</td>
<td>24&quot;</td>
<td>30&quot;</td>
</tr>
<tr>
<td>IV</td>
<td>48&quot;</td>
<td>30&quot;</td>
<td>36&quot;</td>
</tr>
</tbody>
</table>

**PreCast Concrete Handhole (Type I)**
- Lid (Type Il or III)
- One Piece
- Two Piece Lid (Type IV)
-2" dia.

**PreCast Concrete Composite Handhole**
- Stainless Steel Bolt
- Pull Slot
- Skid Resistant Surface
- Cable Hooks (4) Required
- Extend 8" granular base 6" beyond walls of handhole.

**Li-103**

**Revision**
- 10-21-14

**Sudas**
- Iowa Dot

**Li-103**
- Standard Road Plan

**Sheet 1 of 1**
- Rev: 10-21-14

**Handhole Dimensions Table**

**Type**
- II
- III
- IV

**Dimensions**
- L 30" 36"
- W 17" 24"
- D 24" 30"
Use slip holes only for junction box drains unless specified otherwise.

Alternate design may be submitted to the Engineer for approval.

Approved galvanized steel covers may be substituted for cast iron.

Fit grounding buttons with 3/8" x 3/4" brass screws unless specified otherwise.

Type, size and location of holes will be shown on the plans.

In locations subject to pedestrian traffic, install junction box covers with approved anti-skid pattern.

Contract Items:
Handholes and Junction Boxes

<table>
<thead>
<tr>
<th>CONDUIT SIZE</th>
<th>MINIMUM CLEARANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&quot;</td>
<td>1&quot;</td>
</tr>
<tr>
<td>2&quot;</td>
<td>1 1/4&quot;</td>
</tr>
<tr>
<td>3&quot;</td>
<td>1 1/2&quot;</td>
</tr>
<tr>
<td>4&quot;</td>
<td>2&quot;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MINIMUM SPACING BETWEEN CONDUIT CENTERS - &quot;E&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>3/8&quot;</td>
</tr>
<tr>
<td>1/2&quot;</td>
</tr>
<tr>
<td>1&quot;</td>
</tr>
<tr>
<td>1 1/4&quot;</td>
</tr>
<tr>
<td>1 1/2&quot;</td>
</tr>
<tr>
<td>2&quot;</td>
</tr>
<tr>
<td>2 1/2&quot;</td>
</tr>
<tr>
<td>3&quot;</td>
</tr>
<tr>
<td>3 1/2&quot;</td>
</tr>
<tr>
<td>4&quot;</td>
</tr>
</tbody>
</table>
1. Place a minimum of eight anchor bolts for all towers. Place bolts as shown in Section C-C.
2. Tower may be fabricated with circular or polygonal cross-section.
3. Furnish wire fabric material complying with Materials I.M. 443.01. Place wire fabric around base plate and extended to the concrete foundation. Fit fabric right to the edge of the base plate and to the top surface of foundation to prevent rodent entry.
4. Provide two handles on cover plate. Project cover plate beyond the hole at least 1 inch in all directions.
5. Use Anchor Bolt material meeting the requirements of Materials I.M. 453.08.
6. Seal joints using a brown or colorless non-sag urethane caulking sealer marketed for outdoor use as approved by the Engineer.
7. Continuous backing ring or backing ring made continuous by a complete joint penetration weld.

SECTION A-A

SECTION B-B
(Anchor Bolts not shown for clarity)

SECTION C-C

Possible Contract Item:
Lighting Tower

ELEVATION

WIRE FABRIC CLOSURE

EIGHT ANCHOR BOLT PATTERN
FOR DODECAGON (12) TOWER SECTION

EIGHT ANCHOR BOLT PATTERN
FOR TETRADECAGON (14) TOWER SECTION

EIGHT ANCHOR BOLT PATTERN
FOR HEXADECAGON (16) TOWER SECTION

Natural Ground
Foundation
Anchor Bolts
Spilow (rip)

18" min. from outside wall to edge of hole

6" min. Lap

C.J.P.

Backimg Ring

6" max. radius

Wire fabric closure

Base Plate

Leveling Nut
Anchoring Nut

Cover Plate

Double Plate

30° Handhole Opening

6" min.

Handhole design shown is typical

(Anchor Bolts not shown for clarity)

ELEVATION

Pole Section

Base Plate

Bolt Circle

Access Hole

12'-0" Base Section

6" min. thickness

17'-0" Base Section

6" min. thickness

REVISIONS:

Removed venting and caulking requirements for Doubler Plate. Changed on-sag urethane caulking from light grey to brown or colorless.

APPROVED BY DESIGN METHODS ENGINEER

STANDARD ROAD PLAN

LI-110

SHEET 1 of 1

LI-110

REVISION

04-19-16

STANDARD ROAD PLAN

LI-110

SHEET 1 of 1

LIGHTING TOWER

APPROVED BY DESIGN METHODS ENGINEER
Alternate designs may be submitted to the Engineer for approval.

Furnish luminaires that provide ballast housings to be attached to, or integral with, luminaire housings.

SECTION A-A

CASE A
TOP MOUNTED

CASE B
STANCHION MOUNTED

CASE C
WALL MOUNTED

SIMPLIFIED BACK VIEW

HOLE DESCRIPTION

A  \( \frac{3}{4} \) (Min.) Mounting Hole

B Entry for \( \frac{1}{2} \) conduit

POSSIBLE CONTRACT ITEM: Underdeck Lighting

LI-120
REVISION 10-21-14
TEMPORARY FLOODLIGHTING LUMINAires

POLE MOUNTED LUMINAIRE

1. Direct luminaire axis to within the limits of the near traffic lane unless specified otherwise.
2. Direct luminaire axis to edge of pavement unless specified otherwise.
3. 17' Min. Mounting Height.
4. 35' Min. Mounting Height.
5. Offset
6. Possible Contract Item:
   Temporary Floodlighting Luminaire
7. Possible Tabulation:
   108-27

TRAILER MOUNTED LED LUMINAIRE

1. Center of Light Source
2. Luminaire Axis
3. 17' Min. Mounting Height.
4. Roadway Pavement
5. Roadway Pavement Elevation

POLE:
Wood, class 4 (typical)
LUMINAIRE:
250 Watt High Pressure Sodium
LAMP:
250 Watt High Pressure Sodium
For base - down to horizontal operation.
Attach to pole per manufacturer's recommendation
Center of Light Source
Luminaire Axis

Possible Contract Item:
Temporary Floodlighting Luminaire
Possible Tabulation:
108-27

Pole:
Height
Mounting
35' Min.

LUMINAIRE:
250 Watt High Pressure Sodium
PROFILE GRADE
(Sch 40 PVC)
Circuit Duct
Handhole
18'
Roadway
TRAFFIC
TRAFFIC

Median
Roadway Crossing Duct (Sch 80 PVC)
Handhole
Mastarm
Median

Roadway
TRAFFIC
TRAFFIC

Circuit Duct (Sch 40 PVC)
Handhole
18'
Handhole
Circuit Duct

TYPICAL PLANS
CIRCUIT AND ROADWAY CROSSING DUCTS

TYPICAL SECTION
WHERE FORESLOPES ARE 6:1 OR FLATTER

TYPICAL SECTION
WHERE FORESLOPES ARE STEEPER THAN 6:1

LAYOUT LEGEND
Crossing
Handhole
Lighting Unit

Connect to light pole foundation, handhole, or circuit duct as shown on project plans.
Alternate designs may be submitted to the Engineer for approval.

Lighting circuits consist of single conductor phase lines with bare ground wires installed in continuous underground ducts.

Locate standard trenches for lighting distribution circuits 3 feet outside the line of the light pole foundations, except for roadway crossings, access to connection points, or other conditions, or other special cases. Where rock is encountered, a minimum trench depth of 2 feet is required.

Ducts installed under pavement slabs, drives, and other similar locations detailed in the project plans are designated as crossings and distinguished from other underground circuit ductwork. Refer to LI-141 for additional details.

Use Y-1 connectors for all load taps in phase lines and use Y-3 connectors for all circuit branch taps, unless specified or detailed otherwise. When the method of in-line splicing is not specified on the project plans, the Engineer may approve the use of connector assemblies or field molded splices.

Provide 600 volt fuses as specified, 5 amperes for each Type Y-1 connector.

Seal all unused connector openings against entry of moisture as directed by the Engineer.

1. Use a separate access duct for each connection to pole foundation.
2. Refer to NEC requirements for trench depth.
Duct Access connectors

- **Type Y-1**
- **Type L-1**

**Duct (As Required)**

**Typical Additional**

1/C cable

**No.10 AWG**

**Traffic**

**Normal Trench Location**

**Handhole**

**Foundation**

**CONNECTIONS TO FOUNDATIONS**

**Typical Ground Rod**

**Circuit Duct**

**Trench**

**Ground Lug**

**2'-0'' Min.**

**Handhole**

**Typical Ground Rod**

**Typical Additional Duct (As Required)**

**PLAN VIEW**

**2**

**3**

1. Use a separate access duct for each connection to pole foundation.
2. Refer to NEC requirements for trench depth.
3. Handhole may be placed behind pole. Meet the requirements of Article 2523.03, D, of the Standard Specifications.

**WIRING DIAGRAM**

**Foundation**

**Access Duct**

**Type Y-1 connectors**

**No.10 AWG 1/C Cable**

**Ground Lug**

**2'-0'' Min.**

**Handhole**

**Typical Ground Rod**

**Typical Additional Duct (As Required)**

**PLAN VIEW**

**Foundation**

**Handhole**

**Typical Ground Rod**

**Typical Additional Duct (As Required)**

**PLAN VIEW**

**Foundation**

**Handhole**

**Typical Ground Rod**

**Typical Additional Duct (As Required)**

**PLAN VIEW**

**Foundation**

**Handhole**

**Typical Ground Rod**

**Typical Additional Duct (As Required)**
Alternate designs may be submitted to the Engineer for approval.

Locate handholes where shown on plans, as well as where control cabinets are at low points in the conduit system, which could result in the low points becoming flooded with water entering at other points in the conduit system.

Possible Contract Item:
Control Cabinet
The Type A Foundation is the normally required foundation construction. Where rock, shale, sandstone, broken or shattered rock, or other similar material is encountered, the Engineer may approve the use of the Type B or C Foundation. Dispose of all excavations in the area adjacent to the foundation and shape to the natural contour unless directed otherwise by the Engineer.

Minimum diameter of foundation is determined by the Anchor Bolt Circle required for the diameter of the pole being installed. Where dimensional requirements indicated cannot be met with normal foundations, enlarge the foundation as necessary to accommodate the required diameter at no additional cost to the Contracting Authority.

Provide minimum 2" clear for all reinforcement.

Cap open ends of conduit during construction to prevent infiltration of foreign material. After the cable is installed, seal the upper end of the ducts against entry of moisture by a method approved by the Engineer.

For access ducts, use a 2" nominal inside diameter duct.

For Transformer Base foundations, install a minimum of two access ducts, unless specified otherwise. Also install a 1" nominal inside diameter duct for the ground wire duct.

For access ducts, use a 2" nominal inside diameter duct.

#4 bars lapped a minimum of 1'-6" as indicated. Ties may be welded to vertical bars.

Use full length galvanized anchor bolts: four for Transformer Base, three for Slip Base. Refer to the light pole manufacturer's requirements for anchor bolt, nut, and plate dimensions. Obtain a template from the light pole manufacturer for anchor bolt placement. Do not weld anchor bolts.

Place 12 equally spaced bars. Use #6 bars for 27 inch diameter drilled shaft. Use #7 bars for 30 inch diameter drilled shaft. Use #8 bars for 36 inch diameter drilled shaft.

Refer to light pole manufacturer's recommendations for Anchor Bolt dimensions.
If the excavation for a Type B Foundation is left open for more than 1 calendar day, install temporary barrier rail if any part of the excavation is located within the clear zone. Temporary barrier rail layout requires the Engineer's approval. Temporary barrier rail is incidental to the Type B Foundation and will not be paid for separately.

1. #4 bars lapped a minimum of 1'-6" as indicated. Ties may be welded to vertical bars.
2. Use full length galvanized anchor bolts: four for Transformer Base, three for Slip Base. Refer to the light pole manufacturer's requirements for anchor bolt, nut, and plate dimensions. Obtain a template from the light pole manufacturer for anchor bolt placement. Do not weld anchor bolts.
3. Place 12 equally spaced bars. Use #6 bars for 27 inch diameter drilled shaft. Use #7 bars for 30 inch diameter drilled shaft. Use #8 bars for 36 inch diameter drilled shaft.
4. Foundation base may be thickened and pedestal omitted at the contractor's option.
Furnish hardware fabricated using stainless steel.

When the design of the base flanges requires the use of tapered, mating washers, use washers of the design and material recommended by the manufacturer of the base.

1. Use double thickness flat washers only when tapered washer is not required.
2. Refer to LI-201 for foundation details.

Pole attachment bolt diameter is the same as footing anchor bolt.

Impervious Non Metallic Spacer

Located weep hole at narrow flange section

Bolt Circle 1'-3'' Min. (unless specified otherwise)
Ensure the top Slip-Base Plate clears all Anchor Bolts.

Ensure the top Slip-Base Plate clears all Anchor Bolts.

Furnish wire fabric material complying with Materials I.M. 443.01. Place wire fabric around anchor bolt circle between concrete foundation and base plate. Fill the fabric tight to the bottom surface of the baseplate and the top surface of the foundation to prevent rodent entry.

Refer to LI-201 for foundation details.

Torque to 1000 in. lbs.

LIST OF FASTENER HARDWARE

1" anchor bolts: 3 total.

1" x 4" bolts for slip-base: 3 total.

Plate washers: 6 total; 3 top plate and 3 bottom plate.

Circular washers: 9 total; 3 middle washers, 3 washers for leveling nuts, and 3 washers for anchor bolt nuts.

Lock washers: 3 total.

Nuts: 9 total; 3 leveling nuts, 3 nuts for anchor bolts, and 3 nuts for slip-base bolts.

1. Ensure the top Slip-Base Plate clears all Anchor Bolts.

2. Furnish wire fabric material complying with Materials I.M. 443.01. Place wire fabric around anchor bolt circle between concrete foundation and base plate. Fill the fabric tight to the bottom surface of the baseplate and the top surface of the foundation to prevent rodent entry.

3. Refer to LI-201 for foundation details.

4. Torque to 1000 in. lbs.

5. Ensure tops of Anchor Bolts are below the Top Slip-Base Plate so they will not interfere with the operation of the Top Slip-Base Plate.

6. Place wire fabric around anchor bolt circle.
**Anchor Plate (galvanized)**

- Plate welded to Bottom Slip-Base Plate.
- Diameter of middle Circular Washer.
- Keeper Plate; place on top galvanized sheet steel 28 gage thickness Slip-Base Plate.
- Hole in Bottom 5'' dia. Center Hole
- Bolt Circle 1'-2'' dia. Center Hole 6'' dia.
- Holes (3 required) 1'-4'' dia. Hole
- Drill 1-δ Dia. Hole 2-" Dia. Hole
- Field
- 30°
- 1'-4'' dia.
- 5'' dia. Center Hole in Top Slip-Base Plate.
- Sold at Light Pole Shaft 1'-2'' dia.
- Light Pole Shaft
- Top Slip-Base Plate
- Bolt Circle 1'-2'' dia.
- Plate Washer
- Drill 1-δ Dia. Hole
- High strength not required

**Typical Half Section 'A'**

- Top Slip-Base Plate
- Drill 1-δ Dia. Hole
- High strength not required
- Plate Washer
- Drill 1-δ Dia. Hole
- High strength not required