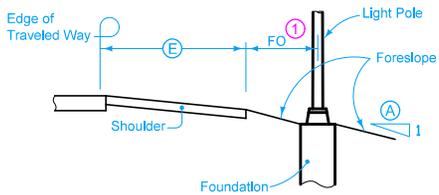


Lighting

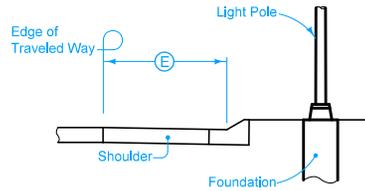
LI

Lighting

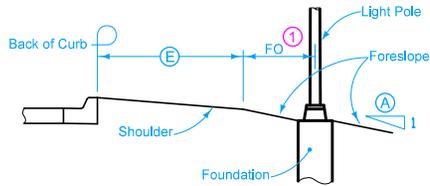
NO.	DATE	TITLE
LI-101	10-21-14	Light Pole Location
LI-103	10-21-14	Conduit and Precast Handholes
LI-104	10-21-14	Junction box (cast Iron)
LI-110	04-19-16	Lighting Tower
LI-120	10-21-14	Underdeck Lighting
LI-130	10-17-17	Temporary Floodlighting Luminaires
LI-141	10-21-14	Electrical Installation (Roadway Ducts)
LI-142	04-21-15	Electrical Installation (Bases)
LI-151	10-21-14	Control Cabinet (Pole-Mounted)
LI-152	10-21-14	Control Cabinet (Pad-Mounted)
LI-201	04-18-17	Light Pole Foundation
LI-210	10-21-14	Transformer Base (Cast Aluminum)
LI-211	10-20-15	Slip-Base for Light Poles



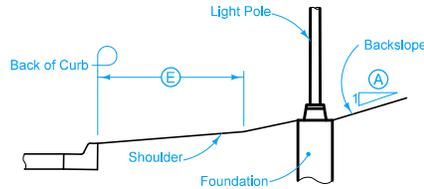
TYPE 1



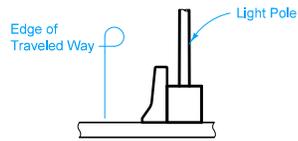
TYPE 2



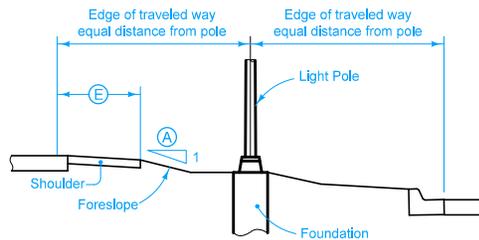
TYPE 3



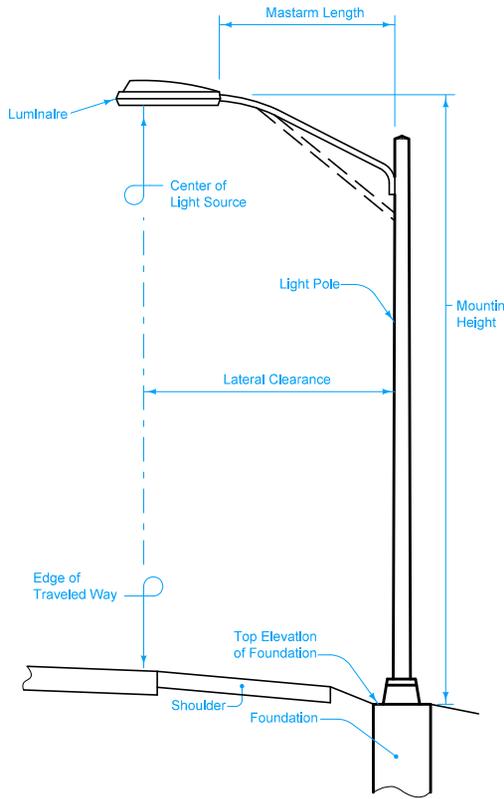
TYPE 4



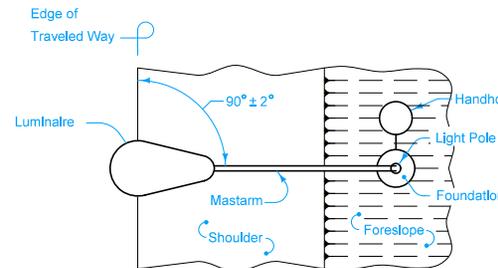
TYPE 5
Concrete Barrier Rail or Bridge Rail



TYPE 6



TYPICAL POLE INSTALLATION



ORIENTATION OF MASTARM

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 $90^\circ \pm 2^\circ$ to the respective centerlines or baselines, or to the respective edges of the pavement along acceleration and deceleration tapers.

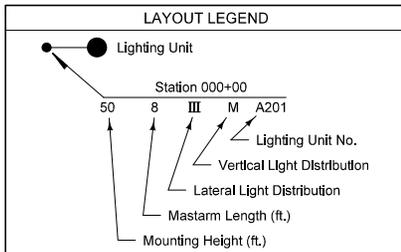
Twin-Mastarm Angles: Included angle is to provide required orientation within the nearest 5 degrees increment. Anticipated angle will be shown on the detail plans.

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

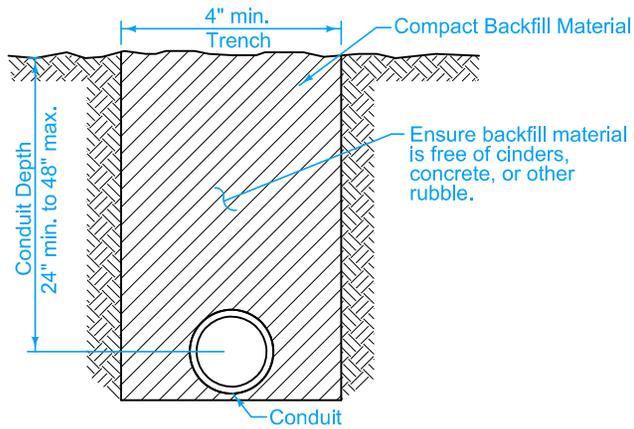
- ① Foundation offset (FO) is measured to the centerline of foundation. If the foreslope is steeper than 6:1, FO should be between 2 and 3 feet. If the foreslope is 6:1 or flatter, the FO will vary based on specified mastarm length.
- ② Slip-base only. May be placed behind pole. Meet the requirements of Article 2523.03, O, of the Standard Specifications.

Possible Contract Item:
Lighting Poles

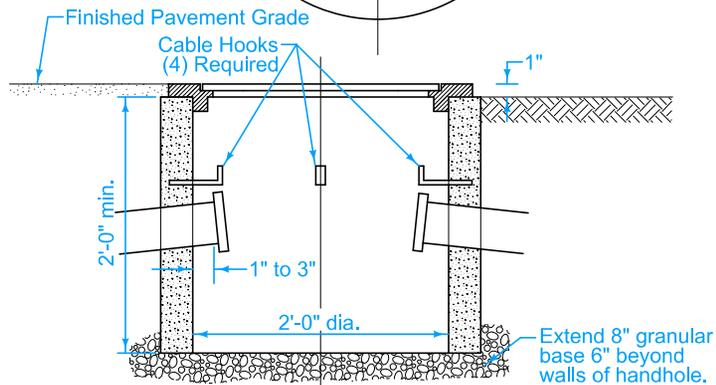
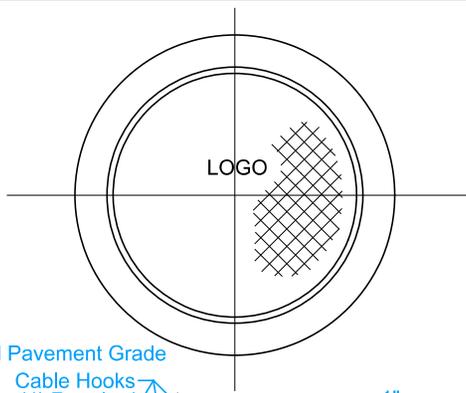
Possible Tabulation:
108-1



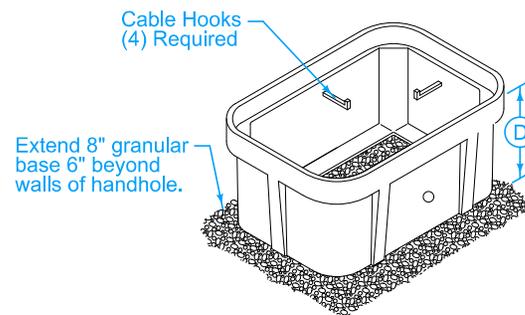
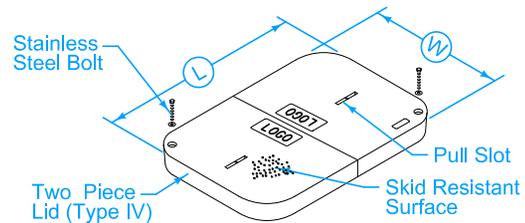
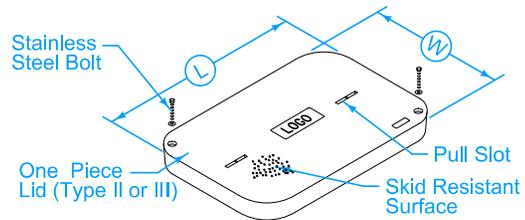
IOWA DOT	REVISION
	New 10-21-14
STANDARD ROAD PLAN	LI-101
REVISIONS: New. Replaces RM-31 and RM-32.	
<i>Brian Smith</i> APPROVED BY DESIGN METHODS ENGINEER	
LIGHT POLE LOCATION	



CONDUIT IN TRENCH



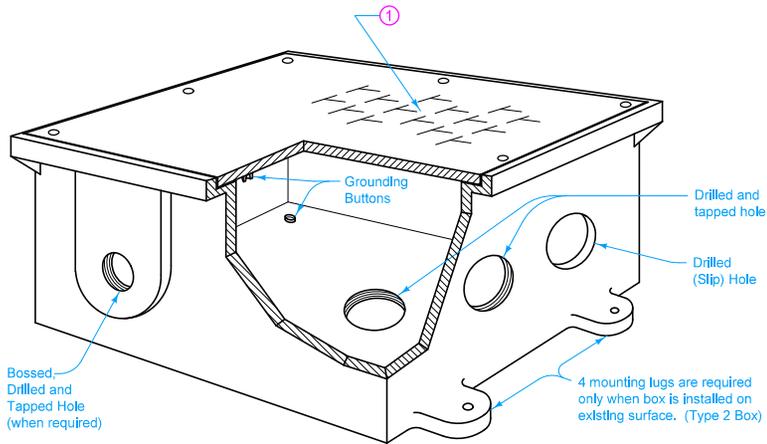
PRECAST CONCRETE HANDHOLE (TYPE I)



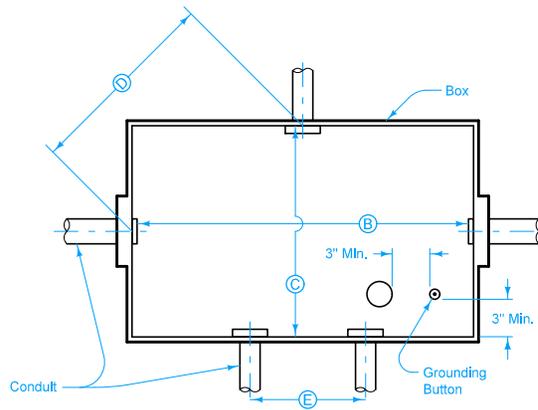
PRECAST CONCRETE COMPOSITE HANDHOLE

HANDHOLE DIMENSIONS TABLE (NOMINAL)			
TYPE	L	W	D
II	30"	17"	24"
III	36"	24"	30"
IV	48"	30"	36"

		REVISION
		New 10-21-14
FIGURE 8010.103	STANDARD ROAD PLAN	LI-103
REVISIONS: New.		SHEET 1 of 1
SUDAS DIRECTOR		DESIGN METHODS ENGINEER
CONDUIT AND PRECAST HANDHOLES		

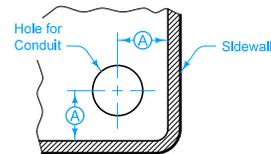


JUNCTION BOX



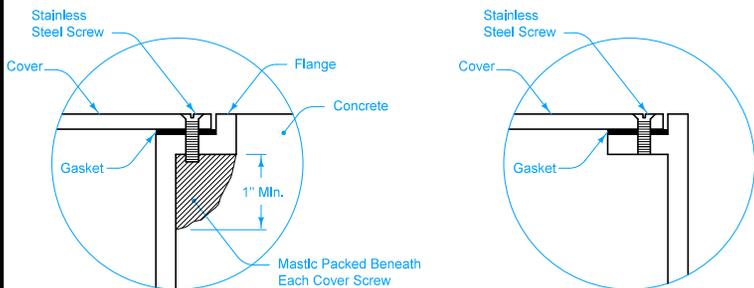
JUNCTION BOX REQUIREMENTS

For straight pulls Min. 'B' = 8 diameters of larger conduit
 For opposite wall Min. 'C' = 6 diameters of larger conduit
 For right angle turns Min. 'D' = 8 diameters of larger conduit



CONDUIT LOCATION FOR LOCK NUT AND BUSHING CLEARANCE - 'A'										
Conduit Size	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	3 1/2"	4"
Minimum Clearance	1"	1"	1 1/8"	1 3/8"	1 1/2"	1 3/4"	2 1/8"	2 1/2"	2 7/8"	3 1/8"

MINIMUM SPACING BETWEEN CONDUIT CENTERS - 'E'											
Size	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	3 1/2"	4"	
1/2"		1 1/4"	1 3/8"	1 5/8"	1 7/8"	2"	2 3/8"	2 5/8"	3"	3 1/4"	
3/4"			1 1/2"	1 3/4"	2"	2 1/4"	2 3/4"	3 1/8"	3 3/8"	3 3/4"	
1"				2"	2 1/4"	2 3/8"	2 3/4"	3"	3 3/8"	3 5/8"	
1 1/4"					2 1/2"	2 5/8"	3"	3 1/4"	3 5/8"	3 7/8"	
1 1/2"						2 3/4"	3 1/8"	3 3/8"	3 3/4"	4"	
2"							3 1/2"	3 3/4"	4 1/4"	4 3/8"	
2 1/2"								4"	4 3/8"	4 5/8"	
3"									4 3/4"	5"	
3 1/2"										5 3/8"	
4"											6"



TYPE 1

TYPE 2

CORNER DETAILS OF JUNCTION BOX

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.

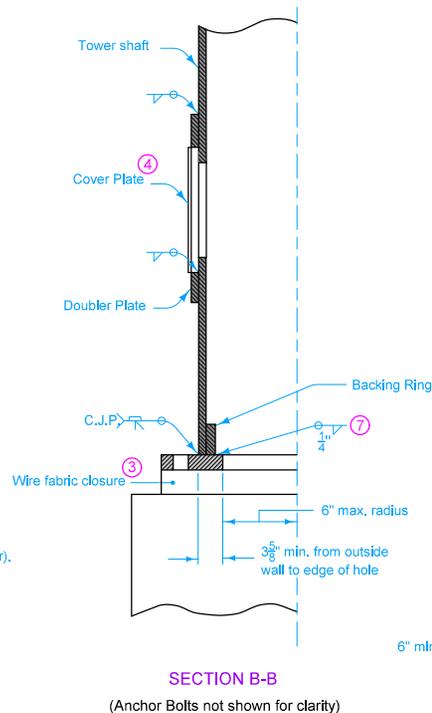
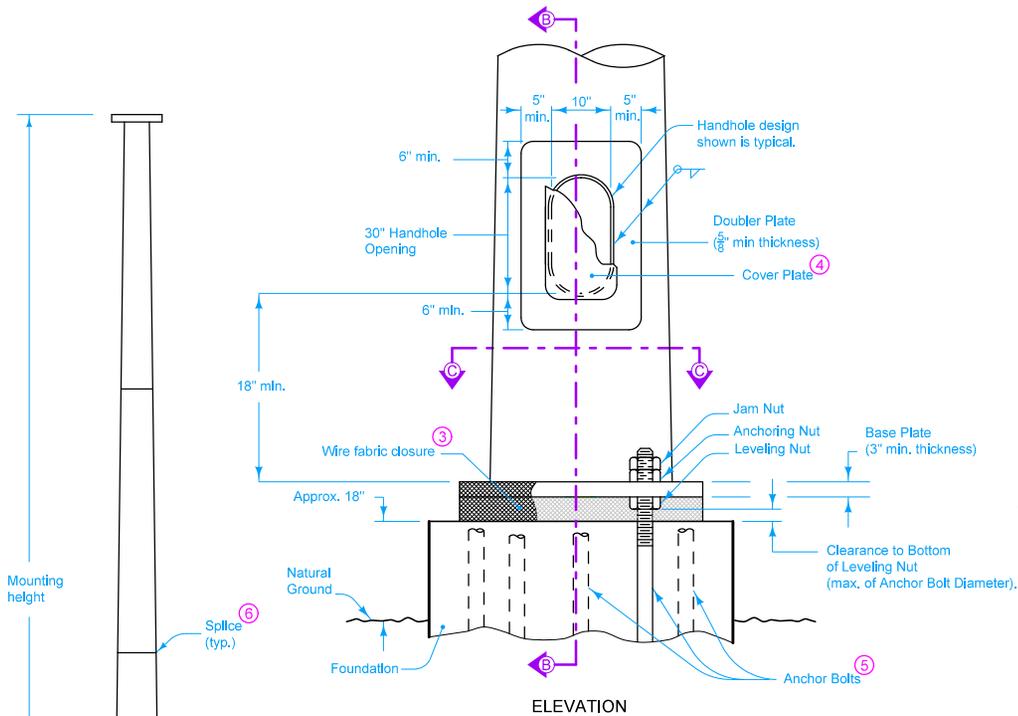
Type, size and location of holes will be shown on the plans.

Use slip holes only for junction box drains unless specified otherwise.

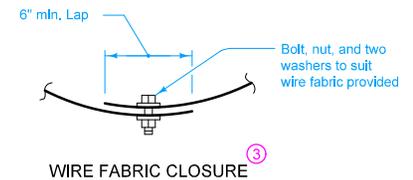
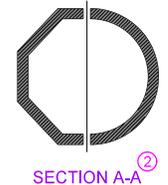
1 In locations subject to pedestrian traffic, install junction box covers with approved anti-skid pattern.

Contract Items:
 Handholes and Junction Boxes

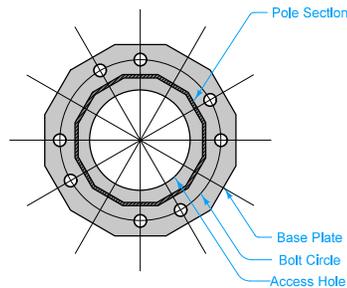
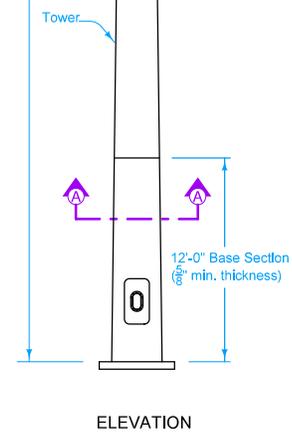
	REVISION
	New 10-21-14
STANDARD ROAD PLAN	LI-104
REVISIONS: New. Replaces RM-37.	SHEET 1 of 1
 APPROVED BY DESIGN METHODS ENGINEER	
JUNCTION BOX (CAST IRON)	



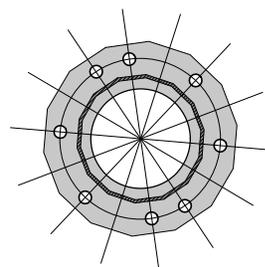
- ① Place a minimum of eight anchor bolts for all towers. Place bolts as shown in Section C-C.
- ② Tower may be fabricated with circular or polygonal cross-section.
- ③ Furnish wire fabric material to complying with Materials I.M. 443.01. Place wire fabric around base plate and extended to the concrete foundation. Fit fabric tight 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.



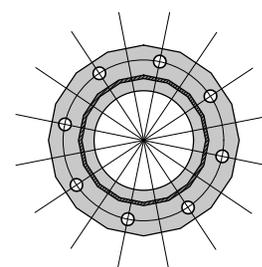
Possible Contract Item:
Lighting Tower



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

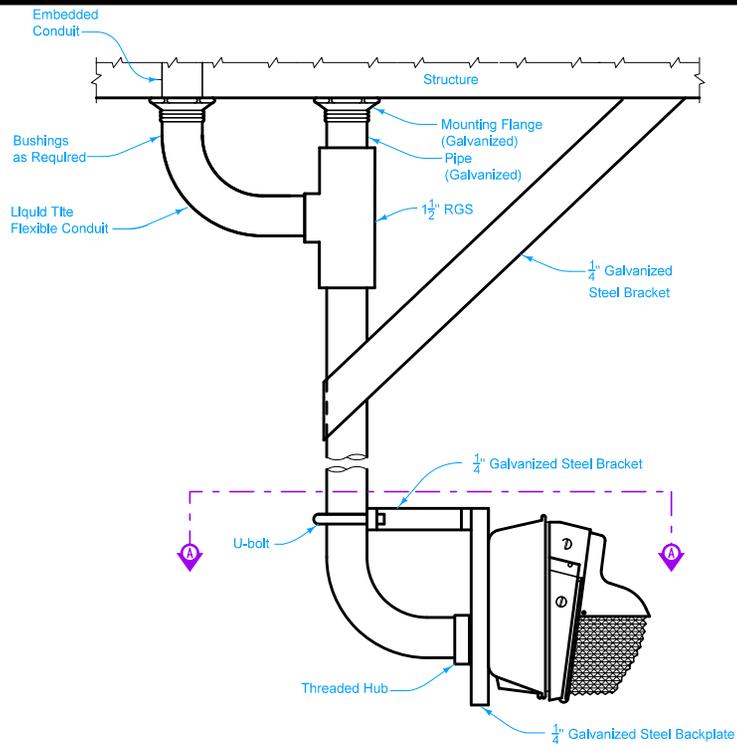
SECTION C-C ①

IOWA DOT	REVISION
	1 04-19-16
	STANDARD ROAD PLAN
LI-110	
SHEET 1 of 1	

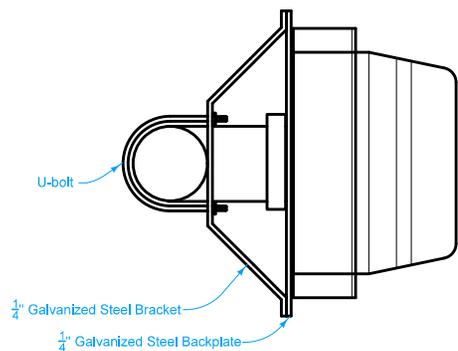
REVISIONS: Removed venting and caulking requirements for Doubler Plate. Changed on-sag urethane caulking from light grey to brown or colorless.

Brian Smith
APPROVED BY DESIGN METHODS ENGINEER

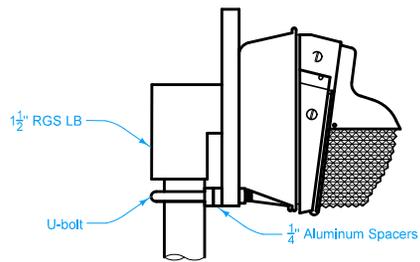
LIGHTING TOWER



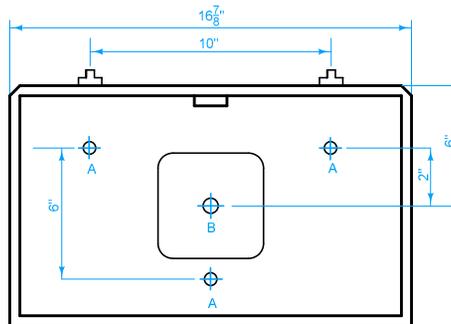
CASE A
TOP MOUNTED



SECTION A-A

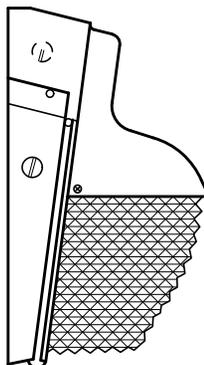


CASE B
STANCHION MOUNTED



HOLE	DESCRIPTION
A	7/16" (Min.) Mounting Hole
B	Entry for 1 1/2" conduit

SIMPLIFIED BACK VIEW



CASE C
WALL MOUNTED

Alternate designs may be submitted to the Engineer for approval.

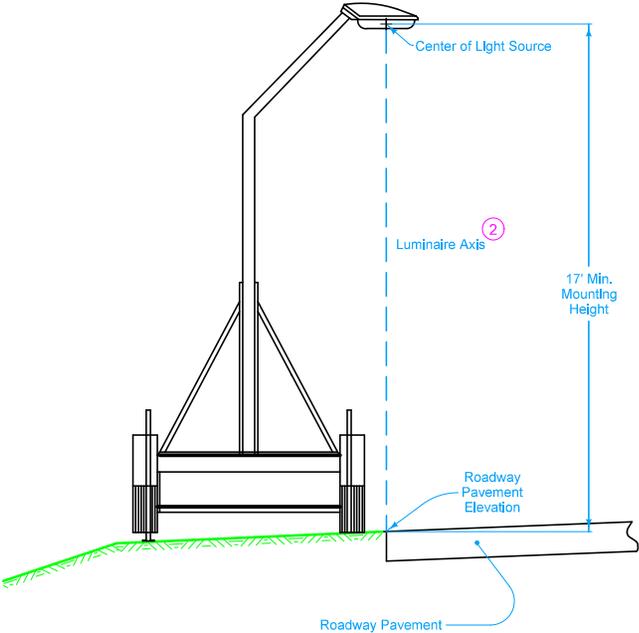
Furnish luminaires that provide ballast housings to be attached to, or integral with, luminaire housings.

LAYOUT LEGEND	
Underdeck Lighting	■

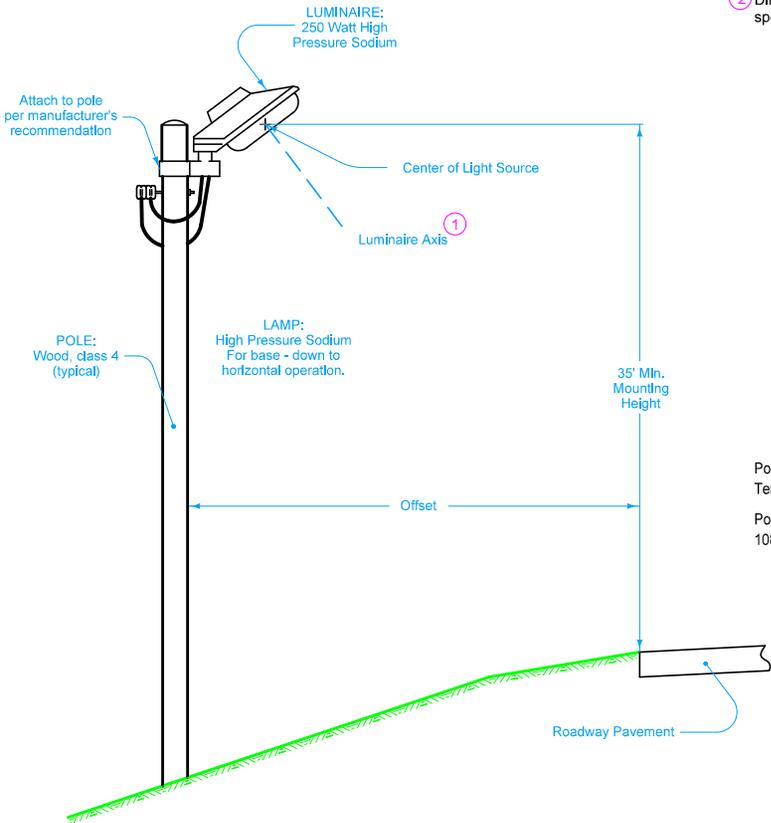
Possible Contract Item:
Underdeck Lighting

	REVISION
	New 10-21-14
STANDARD ROAD PLAN	LI-120
REVISIONS: New. Replaces RM-41.	SHEET 1 of 1
 APPROVED BY DESIGN METHODS ENGINEER	
UNDERDECK LIGHTING	

TRAILER MOUNTED LED LUMINAIRE



POLE MOUNTED LUMINAIRE

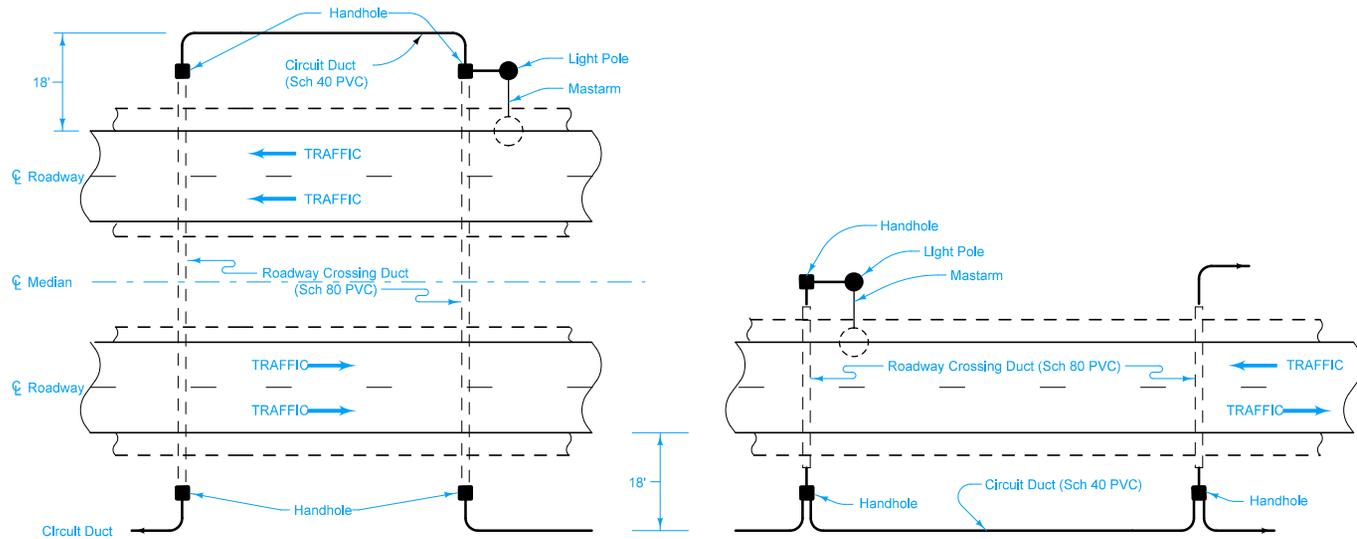


- ① Direct luminaire axis to within the limits of the near traffic lane unless specified otherwise.
- ② Direct luminaire axis to edge of pavement unless specified otherwise.

Possible Contract Item:
Temporary Floodlighting Luminaire

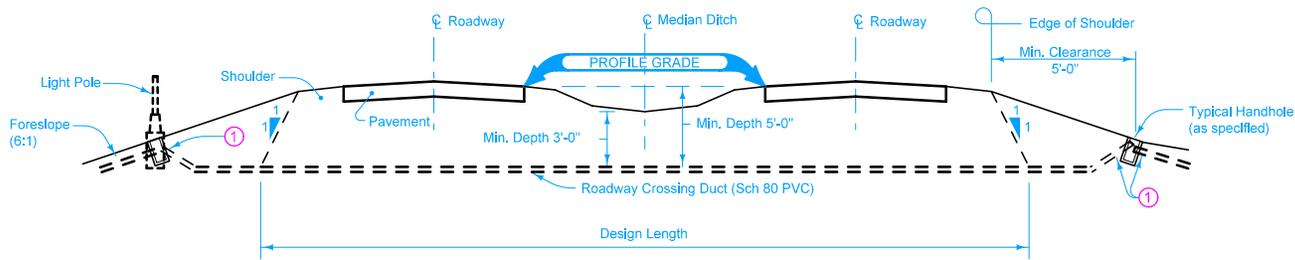
Possible Tabulation:
108-27

	REVISION
	1 10-17-17
STANDARD ROAD PLAN	LI-130
SHEET 1 of 1	
REVISIONS: Added Designer Info Button.	
 APPROVED BY DESIGN METHODS ENGINEER	
TEMPORARY FLOODLIGHTING LUMINAIRES	

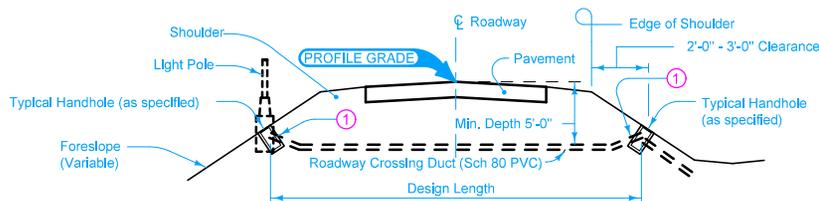


① Connect to light pole foundation, handhole, or circuit duct as shown on project plans.

TYPICAL PLANS
CIRCUIT AND ROADWAY CROSSING DUCTS



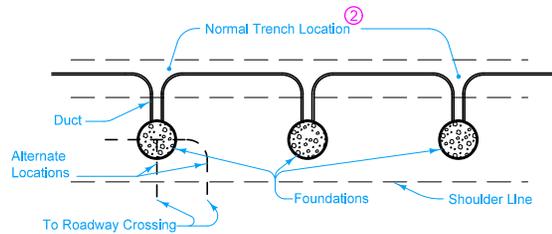
TYPICAL SECTION
WHERE FORESLOPES ARE 6:1 OR FLATTER



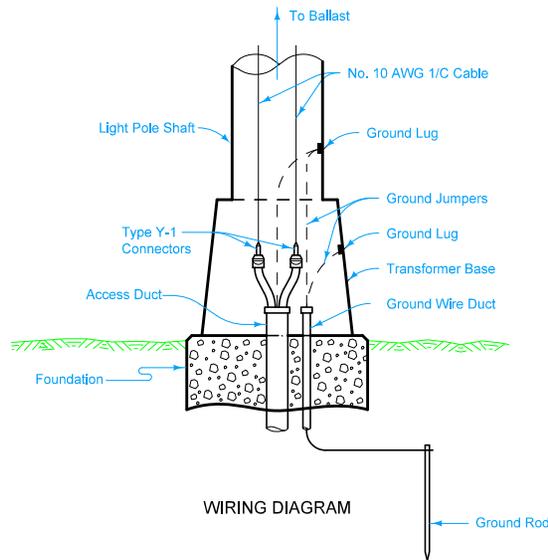
TYPICAL SECTION
WHERE FORESLOPES ARE STEEPER THAN 6:1

LAYOUT LEGEND	
Crossing	---
Handhole	■
Lighting Unit	●—○

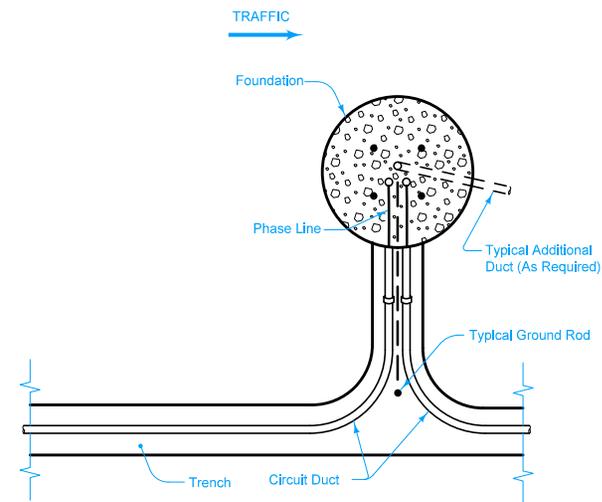
	REVISION
	New 10-21-14
	LI-141
STANDARD ROAD PLAN	SHEET 1 of 1
REVISIONS: New. Replaces RM-33.	
 APPROVED BY DESIGN METHODS ENGINEER	
ELECTRICAL INSTALLATION (ROADWAY DUCTS)	



TYPICAL LAYOUTS ①
CONNECTIONS TO FOUNDATIONS



WIRING DIAGRAM



PLAN VIEW

TRANSFORMER BASE

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 crossing, access to connection points, or other cases detailed on the project plans or approved by the Engineer.

The Engineer may allow variation from minimum depths for roadway crossings, access to connection points, soil 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.

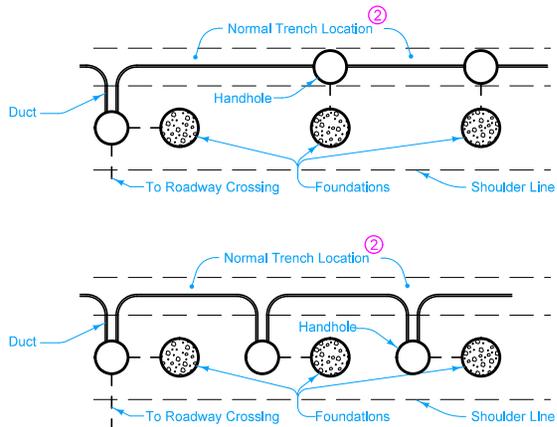
Use Y-1 connectors for all load taps in phase lines and use Y-3 connectors for all circuit branch taps, unless specified or detailed otherwise. When the method of in-line splicing is not specified on the project plans, the Engineer may approve the use of connector assemblies or field molded splices.

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

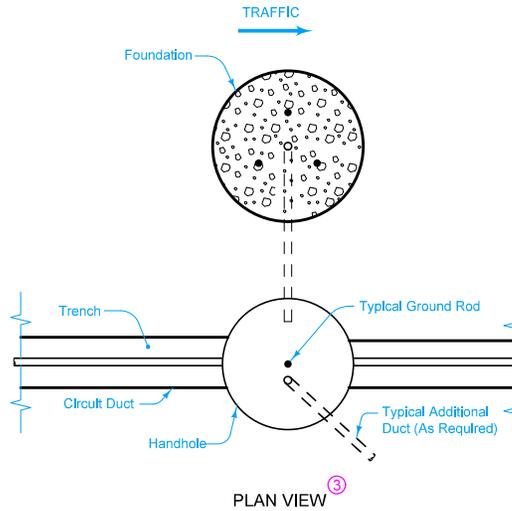
Seal all unused connector openings against entry of moisture as directed by the Engineer.

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

IOWA DOT	REVISION	
	1	04-21-15
STANDARD ROAD PLAN		LI-142
		SHEET 1 of 2
REVISIONS: Changed reference from LS-401 to LI-141 in the General Notes.		
<i>Brian Smith</i> APPROVED BY DESIGN METHODS ENGINEER		
ELECTRICAL INSTALLATION (BASES)		

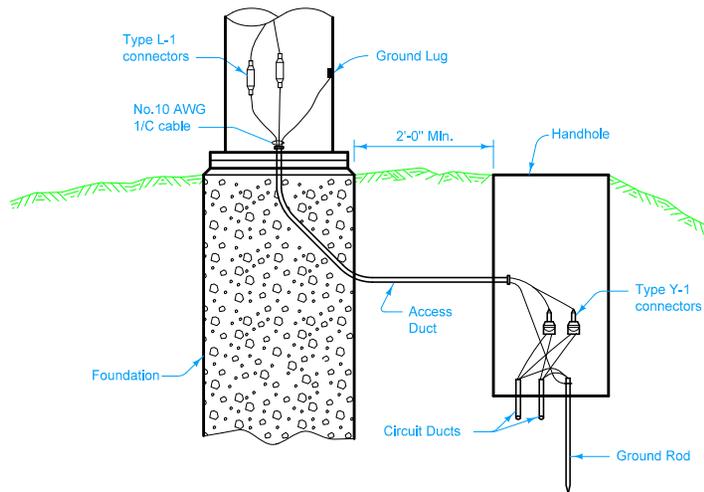


TYPICAL LAYOUTS ①③
CONNECTIONS TO FOUNDATIONS

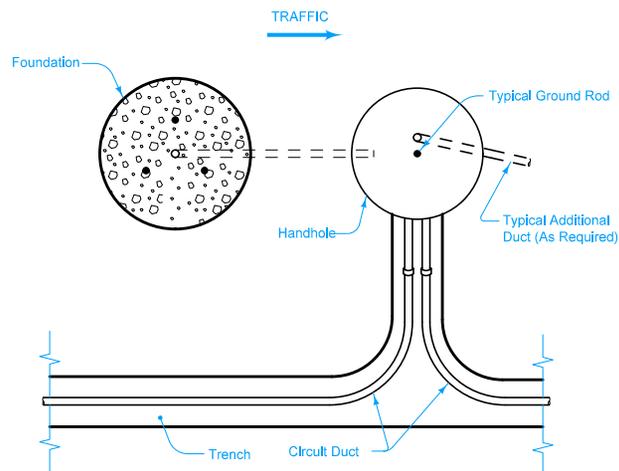


PLAN VIEW ③

- 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, O, of the Standard Specifications.



WIRING DIAGRAM

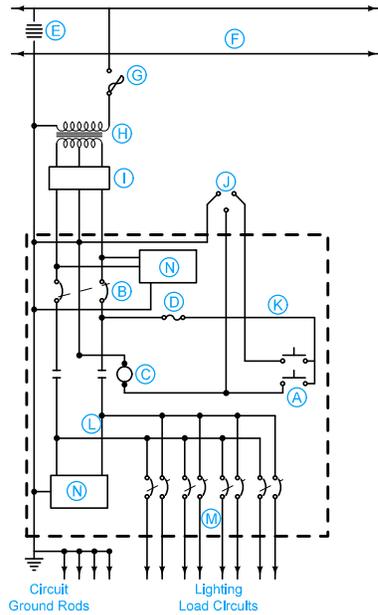


PLAN VIEW

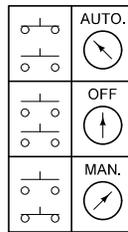
SLIP BASE

IOWA DOT	REVISION	
	1	04-21-15
	STANDARD ROAD PLAN	
LI-142		SHEET 2 of 2
REVISIONS: Changed reference from LS-401 to LI-141 in the general notes.		
<i>Brian Smith</i>		
APPROVED BY DESIGN METHODS ENGINEER		
ELECTRICAL INSTALLATION		
(BASES)		

- A. Test Switch
- B. Line Breaker
- C. Contactor
- D. Control Fuse
- E. Lightning Arrestor
- F. Primary Line
- G. Primary Fused Cutout
- H. Distribution Transformer
- I. Meter
- J. Photoelectric Control
- K. Control Circuits
- L. Line Circuits
- M. Branch Circuit Breakers
- N. Surge Protection Device

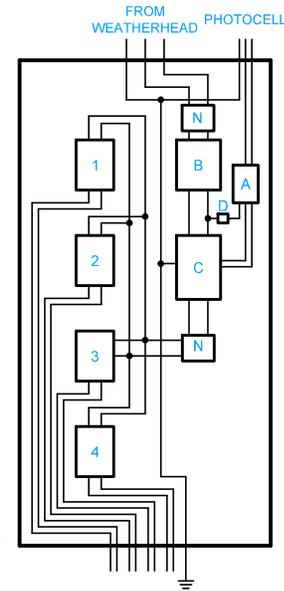


SCHMATIC DIAGRAM



SWITCH OPERATION

- A. Test Switch
- B. Line Breaker (2P.)
- C. Contactor (2P.)
- D. Control Fuse
- 1 thru 4. Branch Circuit Breakers (2P.)
- N Surge Protection Device

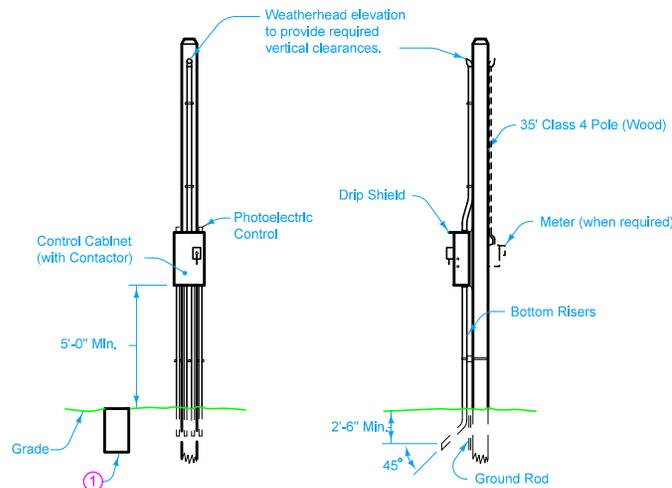


TO LIGHTING CIRCUITS AND GROUND RODS
CONTROL PANEL WIRING DIAGRAM

Alternate designs may be submitted to the Engineer for approval.

① 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.

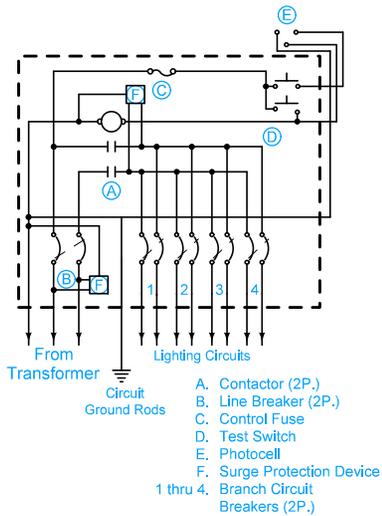
Possible Contract Item:
Control Cabinet



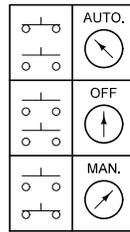
TYPICAL INSTALLATION



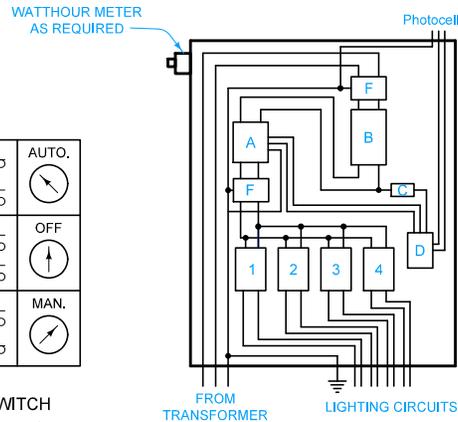
IOWA DOT	REVISION
	New 10-21-14
	STANDARD ROAD PLAN
LI-151	
SHEET 1 of 1	
REVISIONS: New. Replaces RM-35.	
<i>Brian Smith</i> APPROVED BY DESIGN METHODS ENGINEER	
CONTROL CABINET (POLE-MOUNTED)	



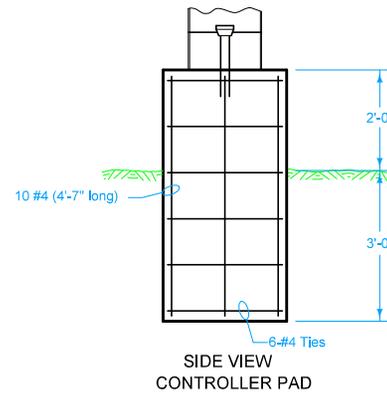
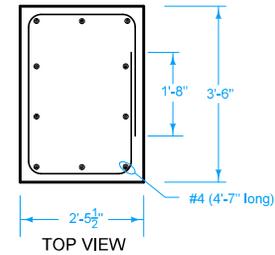
SCHMATIC DIAGRAM



SWITCH OPERATION



CONTROL PANEL WIRING DIAGRAM



Alternate design may be submitted to the Engineer for approval.

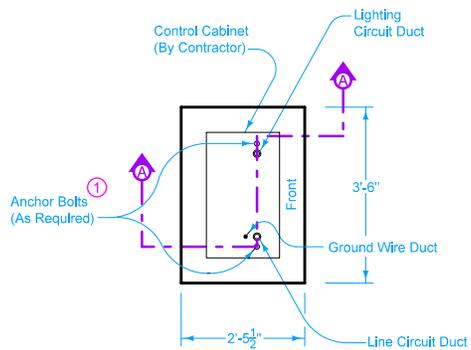
All circuit ducts shown, including ground wire duct, are included in the estimated quantities for plastic conduit contained in the tabulations.

The estimated quantities for wire and cable contained in the tabulations include connections to the loadside terminals of the branch circuit breakers.

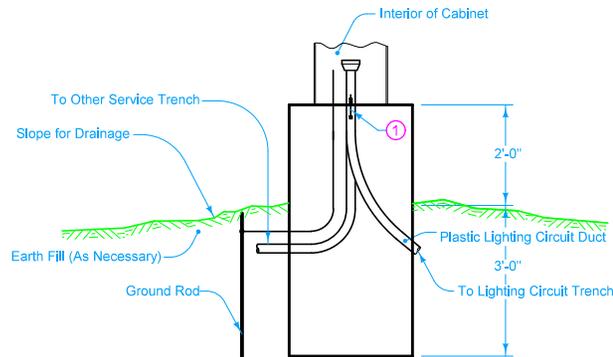
The No. 12, AWG grounding jumper for the photoelectric control is incidental to the length of ground wire.

① 1/2" x 4" long Bolts (2 required)

Possible Contract Item:
Control Cabinet



INSTALLATION DETAILS

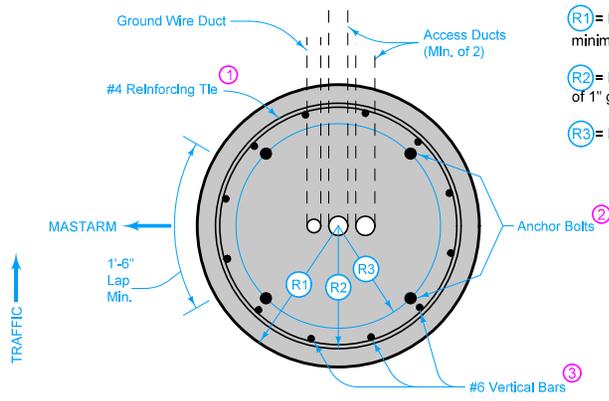


ESTIMATED QUANTITIES (One Pad)	
Reinforcing Steel	79.5 lbs.
Structural Concrete	1.6 yd 3

LAYOUT LEGEND	
Control Cabinet (Pad-Mounted)	

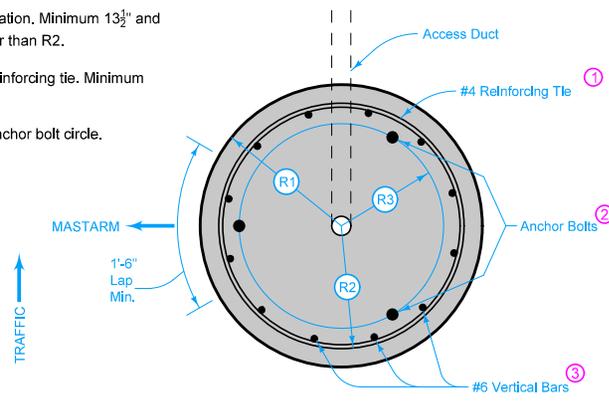
 STANDARD ROAD PLAN	REVISION
	New 10-21-14
REVISIONS: New. Replaces RM-36. APPROVED BY DESIGN METHODS ENGINEER <i>Brian Smith</i>	LI-152
	SHEET 1 of 1

CONTROL CABINET (PAD-MOUNTED)

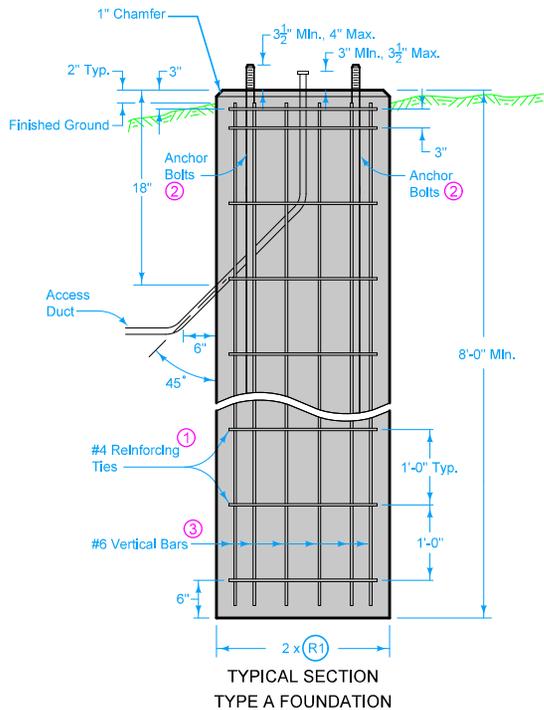


PLAN (TRANSFORMER BASE)

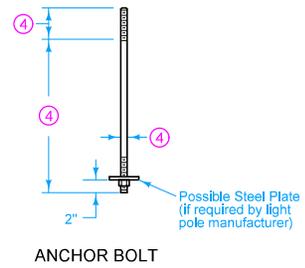
R1 = Radius of foundation. Minimum 13½" and minimum of 2" greater than R2.
 R2 = Radius of the reinforcing tie. Minimum of 1" greater than R3.
 R3 = Radius of the anchor bolt circle.



PLAN (SLIP BASE)



TYPICAL SECTION TYPE A FOUNDATION



ANCHOR BOLT

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.

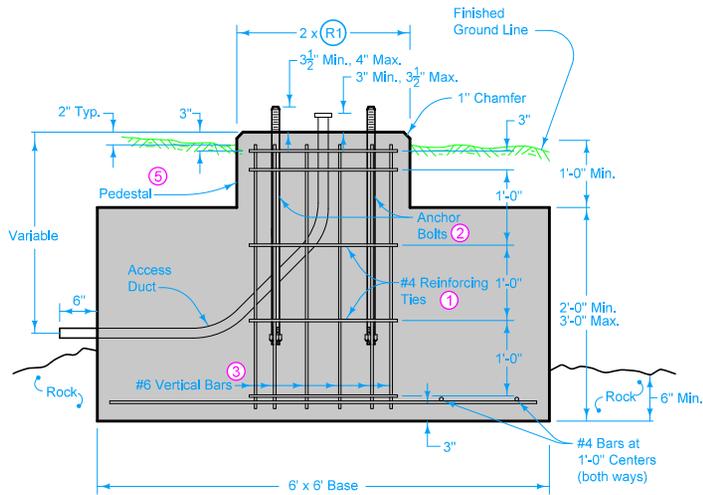
For access ducts, use a 2" nominal inside diameter duct.

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.

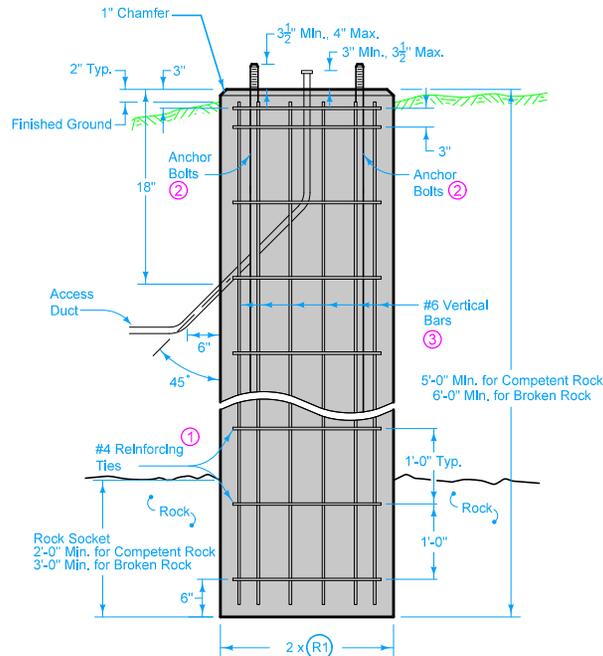
- ① #4 bars lapped a minimum of 1'-6" as indicated. Ties may be welded to vertical bars.
- ② Use full length galvanized anchor bolts: four for Transformer Base, three for Slip Base. Refer to the light pole manufacturer's requirements for anchor bolt, nut, and plate dimensions. Obtain a template from 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 Refer to light pole manufacturer's recommendations for Anchor Bolt dimensions.

IOWA DOT	REVISION	
	2	04-18-17
	STANDARD ROAD PLAN	
LI-201		SHEET 1 of 2
<small>REVISIONS: Revised number and size of vertical bars. Eliminated hooked anchor bolts. Added new Type C foundation.</small>		
 <small>APPROVED BY DESIGN METHODS ENGINEER</small>		
LIGHT POLE FOUNDATION		

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.



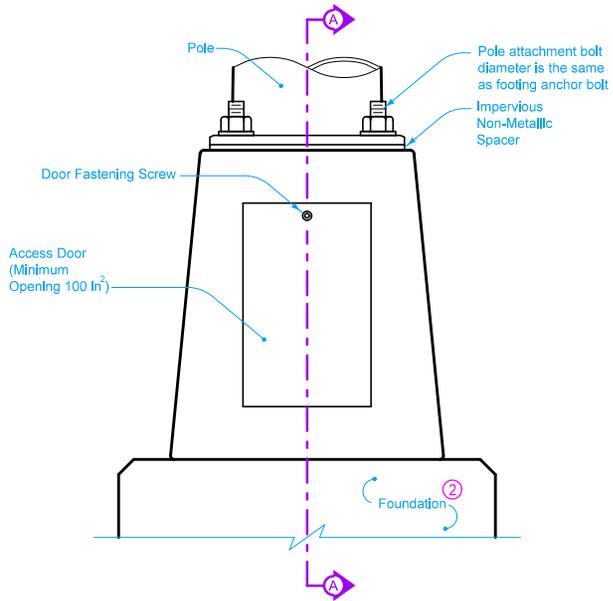
TYPICAL SECTION
TYPE B FOUNDATION



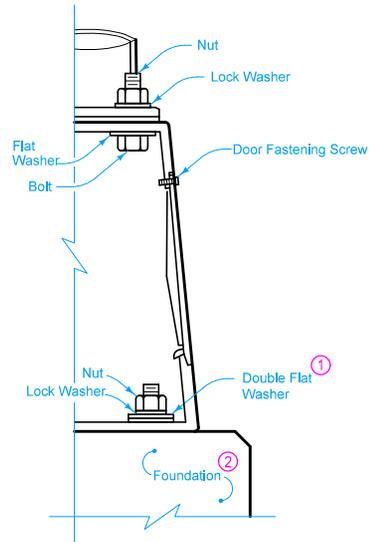
TYPICAL SECTION
TYPE C FOUNDATION

- 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.
- ⑤ Foundation base may be thickened and pedestal omitted at the contractor's option.

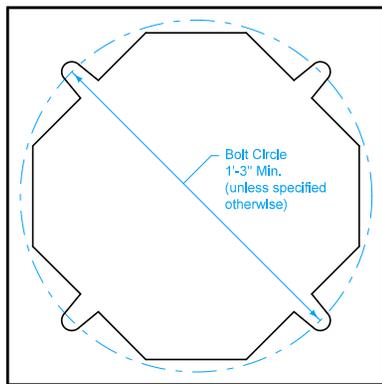
IOWA DOT	REVISION	
	2	04-18-17
STANDARD ROAD PLAN		LI-201
		SHEET 2 of 2
<small>REVISIONS: Revised number and size of vertical bars. Eliminated hooked anchor bolts. Added new Type C foundation.</small>		
<i>Brian Smith</i> <small>APPROVED BY DESIGN METHODS ENGINEER</small>		
LIGHT POLE FOUNDATION		



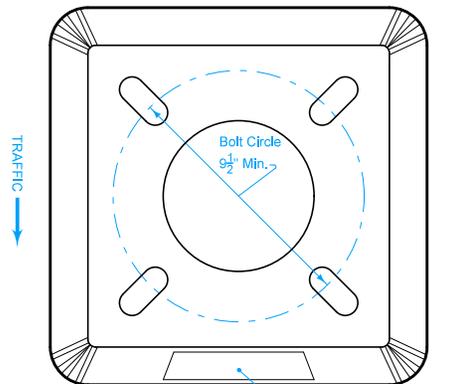
ELEVATION



SECTION A-A



BOTTOM VIEW



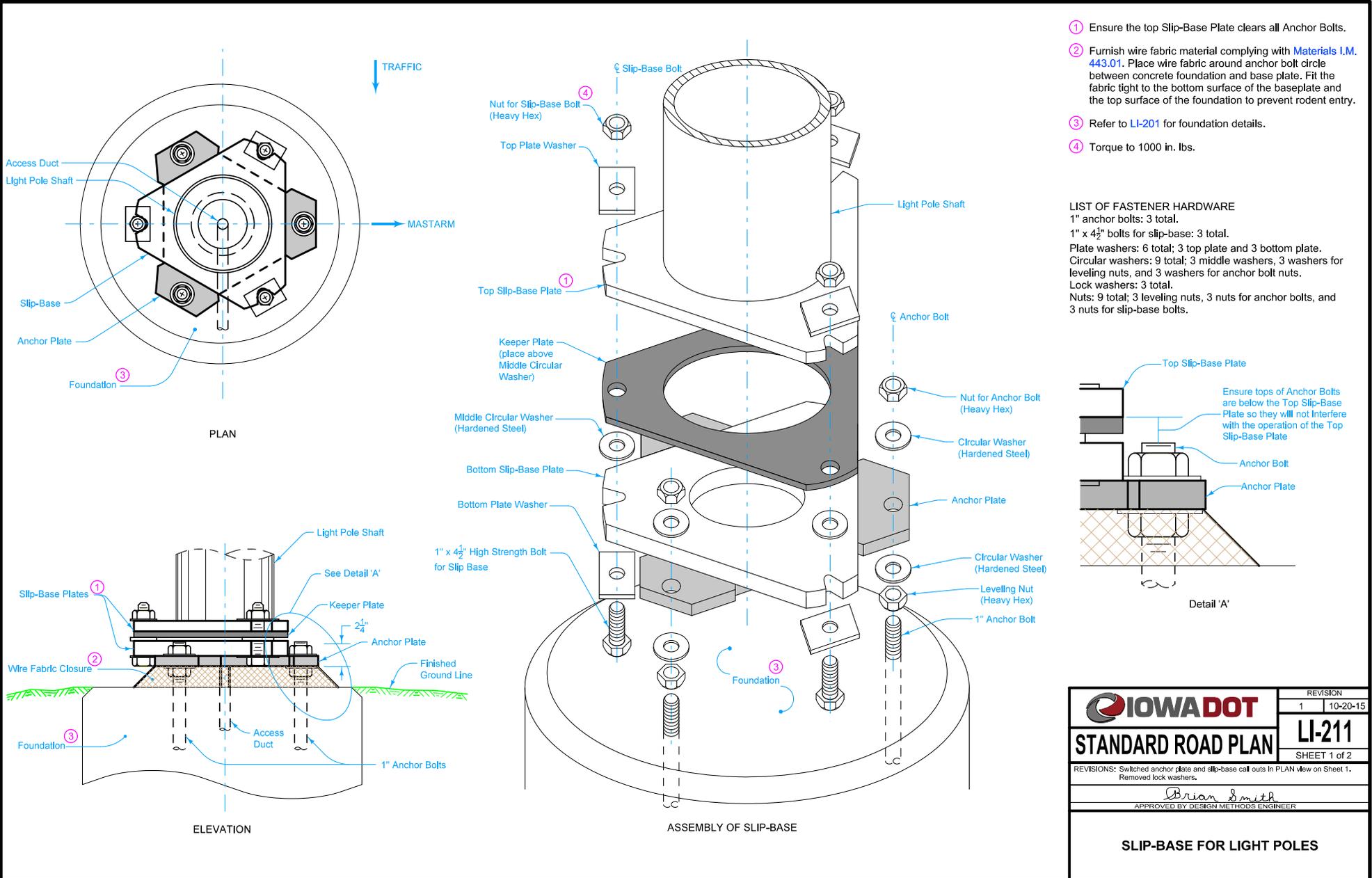
TOP VIEW

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.

IOWA DOT	REVISION	
	New	10-21-14
STANDARD ROAD PLAN		LI-210
		SHEET 1 of 1
REVISIONS: New. Replaces RM-43.		
<i>Brian Smith</i> APPROVED BY DESIGN METHODS ENGINEER		
TRANSFORMER BASE (CAST ALUMINUM)		



- 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. Fit 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.

LIST OF FASTENER HARDWARE

1" anchor bolts: 3 total.

1" x 4 1/2" bolts for slip-base: 3 total.

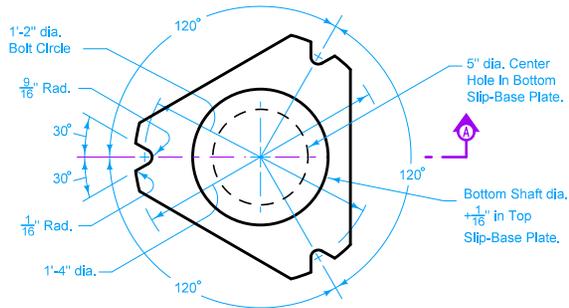
Plate washers: 6 total; 3 top plate and 3 bottom plate.

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

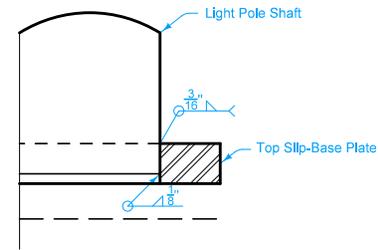
Lock washers: 3 total.

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

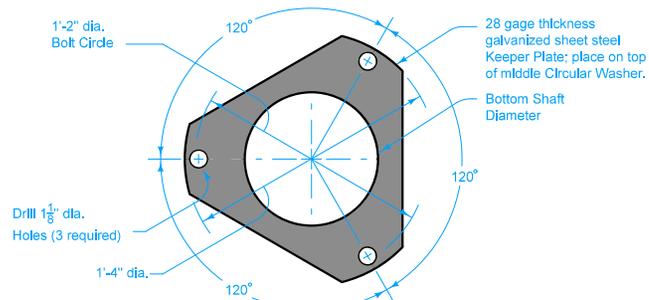
 STANDARD ROAD PLAN	REVISION
	1 10-20-15
	LI-211
SHEET 1 of 2	
REVISIONS: Switched anchor plate and slip-base call outs in PLAN view on Sheet 1. Removed lock washers.	
 APPROVED BY DESIGN METHODS ENGINEER	
SLIP-BASE FOR LIGHT POLES	



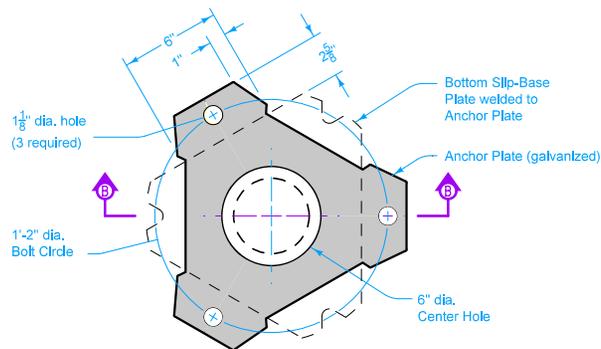
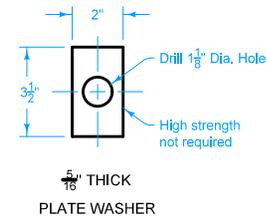
SLIP-BASE PLATE



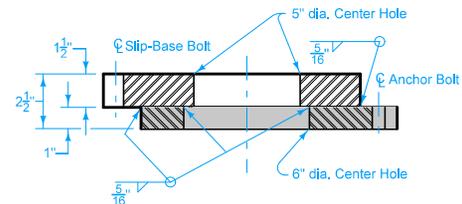
TYPICAL HALF SECTION 'A'
 (Top Slip-Base Plate)



KEEPER PLATE



ANCHOR PLATE



SECTION B-B
 ANCHOR PLATE

 STANDARD ROAD PLAN	REVISION	10-20-15
	1	LI-211
	SHEET 2 of 2	

REVISIONS: Switched anchor plate and slip-base call outs in PLAN view on Sheet 1. Removed lock washers.

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 APPROVED BY DESIGN METHODS ENGINEER

SLIP-BASE FOR LIGHT POLES