CITY OF KNOXVILLE

STREET LIGHTING STANDARDS

CITY OF KNOXVILLE
ENGINEERING DEPARTMENT
TRAFFIC ENGINEERING DIVISION

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Introduction

1.1 Purpose

The City of Knoxville Street Lighting Standards Manual is itended to assist citizens, developers, designers, and other users of the City's street lights by summarizing design, construction, and maintenance of the City's infrastructure.

1.2 General Information

"Street lighting" is used as a general term to describe a variety of unmetered lighting services used to light the public right-of-way such as roadways, sidewalks, or parking lots. Lighting for private properties within the City of Knoxville remains within the jurisdiction of Knoxville Utilities Board.

The City purchased most of its existing street light infrastructure from Knoxville Utilities Board in January of 2018. The City immediately launched a light emitting diode (LED) retrofit project to upgrade the approximately 29,500 high pressure sodium (HPS) fixtures to a more modern and less energy intensive system. The street light infrastructure is constantly being expanded as new developments are completed within the City. A small portion of the City's lighting infrastructure is served by Lenoir City Utilities Board.

Proposed removals, relocations, replacements, or additions to the City's street lighting system must be reviewed and approved by the City prior to construction. Citizens, designers, and developers can minimize review time by adhering to the standard drawing and submittal requirements outlined in this manual. Photometric requirements have been selected to create effective but efficient lighting of critical areas, such as roads and sidewalks, while minimizing light trespass onto neighboring properties. Similarly, drawing submittal requirements are intended to assist the reviewer in locating critical information in a timely manner. Submittals that do not adhere to the standard requirements may be rejected until appropriate documentation is received.

1.2 Contact Information

For maintenance requests or general questions, please contact the City's 3-1-1 Center for Service Innovation so that you may be directed appropriately:

3-1-1 Center for Service Innovation
865-215-4311
311office@knoxvilletn.gov

For ***design and construction related questions or submittals only***, please contact the City of Knoxville Engineering Department:

Chevelle Lewis
865-215-6046
clewis@knoxvilletn.gov

Design Process for Lighting Installations

2.1 Proposed Developments

Option 1

1. Select City of Knoxville approved lighting hardware (See Chapter 3)
2. Submit a lighting plan to the City for review (See Chapter 4)
3. Install lighting (See Chapter 5)

The developer will be responsible for procuring, storing, and installing lighting materials. Ownership of the lighting facilities will be transferred to the City only after completion and subsequent approval of the lighting installation.

Option 2

1. Submit written request to the City for the installation of street lights. Requests should be accompanied with applicable site layout plans for the City's use.
2. The City selects lighting hardware and prepares a lighting design
3. The City installs lighting facilities after at least 85% of properties adjacent to proposed lights are constructed. Installations will be dependent on the City's available street lighting budget.

2.2 Existing Developments

1. Submit written request to the City for the installation of lighting facilities. Requests should include the following information:
    a. Map of the desired area
    b. Description of the lighting requested
    c. Contact information for discussion with the City
2. The City evaluates the request and, if granted, selects lighting hardware and prepares a lighting design
3. The City installs lighting facilities. Installations are dependent on the City's available street lighting budget.

2.3 Private Property

Citizens that wish to install lighting for private property (private streets, parking lots, driveways, etc.) should contact the utility board responsible for electric service at their property.

- Knoxville Utilities Board (865-558-2555)
- Lenoir City Utilities Board (1-844-687-5282)

Approved Lighting Hardware

3.1 Selection of Approved Lighting Hardware

The City of Knoxville has worked with suppliers to determine a selection of approved lighting hardware in an effort to standardize the purchase, maintenance, and storage of lighting materials. The use of alternative fixtures may be allowable at the City's discretion. Requests for the use of non-approved lighting hardware must be submitted in writing to the City of Knoxville and approved by the City prior to installation.

The City's approved lighting hardware is classified using the following categories:

High Mast Lighting

High mast fixtures are multi-lamp fixtures often used to illuminate large, un-obstructed areas such as interstate ramps or highway exchanges. They are often mounted 120 feet above the ground or more.

Roadway Lighting

Roadway fixtures are typically mounted 35 to 50 feet above the ground and are used to light rights-of-way that are subject to vehicle traffic. The City most often implements roadway lighting on roads classified as collectors or greater.

Pedestrian Lighting

Pedestrian lighting is typically mounted 15 feet above the ground and used to illuminate sidewalks or pedestrian ways subject to foot traffic after daylight hours. Pedestrian lighting is most often installed along local streets and downtown or commercial areas.

Decorative Lighting

Decorative lighting is typically mounted 15 feet above the ground and placed throughout neighborhoods or medians to illuminate driveways, mail centers, or similar features. They are generally used to illuminate a small, localized area rather than a length of sidewalk or roadway.

Special District Lighting

Certain areas within the City are subject to special aesthetic or lighting considerations. Examples include greenways, bridges, streetscapes, riverwalks, or historical areas. For designs within these or similar districts, lighting is often dictated by the landscape plan. Please contact the City of Knoxville during the design process to discuss lighting in special districts.

High Mast Lighting

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Roadway Lighting

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Pedestrian Lighting

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Decorative Lighting

(pg. 3-9)

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3.2 High Mast Lighting

Manufacturer	Holophane
Product Line	HMAO LED III
Typical Sizes (Catalog No.)	200W (HMLED3-PK1-30K-HVOLT-G-AW-P7) 300W (HMLED3-PK2-30K-HVOLT-G-AW-P7) 500W (HMLED3-PK3-30K-HVOLT-G-AW-P7)
Typical Poles	Structures must be designed and specified by a licensed professional
Typical Foundation	Foundation must be designed and specified by a licensed professional

3.3 Roadway Lighting (On-road style)

Manufacturer	American Electric Lighting
Product Line	Autobahn
Typical Sizes (Catalog No.)	30W (ATBX-P40-MVOLT-R2-3K-MP-NL-P7) 50W (ATBS-P20-MVOLT-R3-3K-MP-NL-P7) 100W (ATBM-P20-MVOLT-R3-3K-NL-P7) 200W (ATBL-C-MVOLT-R3-3K-NL-P7)
Pole Manufacturer	Hapco
Pole Description	Round, tapered aluminum pole with tenon or truss arm per Drawing B-15268 or 810983
Typical Pole Heights	27.5′, 35′, 40′, 45′, 50′
Arm Manufacturer	Hapco
Typical Arm Sizes (Catalog No.)	6′ – Metal Pole (MPB84-004) 10′ – Metal Pole (MPB84-010) 15′ – Metal Pole (MPB85-011) 6′ – Wood Pole (84-004) 10′ – Wood Pole (84-010) 15′ – Wood Pole (85-011)
Typical Foundation	See Details 8, 9 (Sec. 5.2) See TDOT Standard Drawing T-L-1 for work within TDOT right-of-way

Breakaway pole bases may be required depending on the proximity of the poles to the traveled away. Roadway lighting may also be mounted on 35 to 50-FT wooden poles, attached to utility-owned poles, or mounted on bridge and median barrier walls

3.4 Roadway Lighting (Off-road style)

Manufacturer	American Electric Lighting
Product Line	Autobahn
Typical Sizes (Catalog No.)	40W (ATBS-P20-MVOLT-R3-3K-MP-NL-P7)
Manufacturer	Holophane
Product Line	Mongoose LED
Typical Sizes (Catalog No.)	150W (MGLEDM-P3-30K-MVOLT-MG-VH-GRSD-NL-PR7) 200W (MGLEDM-P4-30K-MVOLT-MG-VH-GRSD-NL-PR7)
Pole Manufacturer	Hapco
Pole Description	Round, tapered aluminum pole with tenon or truss arm per Drawing B-15268 or 810983
Typical Pole Sizes	27.5', 35', 40', 45', 50'
Typical Foundation	See Details 8, 9 (Sec. 5.2) See TDOT Standard Drawing T-L-1 for work within TDOT right-of-way

Breakaway pole bases may be required depending on the proximity of the poles to the traveled away. Roadway lighting may also be mounted on 35 to 50-FT wooden poles, attached to utility-owned poles, or mounted on bridge and median barrier walls.

3.5 Roadway Lighting (Wall-mounted)

Manufacturer	Holophane
Product Line	Wallpack
Typical Sizes (Catalog No.)	40W (W4GLED-10C-1000-30K-T3M-MVOLT-SPED-P7-GYSDP) 70W (W4GLED-20C-1000-30K-T3M-MVOLT-SPED-P7-GYSDP) 100W (W4GLED-30C-1000-30K-T3M-MVOLT-SPED-P7-GYSDP)

3.6 Pedestrian Lighting (Acorn Style)

Manufacturer	Holophane
Product Line	Washington Postlite LED
Typical Sizes (Catalog No.)	40W (WAUE2-P20-30K-AS-BK-3-BK-2-P7-NL1X1) 60W (WAUE2-P30-30K-AS-BK-3-BK-2-P7-NL1X1)
Pole Manufacturer	Holophane
Pole Description	Columbia Decorative
Typical Mounting Height (Catalog No.)	14′ (CLA-14-L5J-20-P07-ABG-BK)
Typical Foundation	See Detail 9 (Sec. 5.2)

Receptacles and banner arms may be required at the City's discretion.

3.7 Pedestrian Lighting (Cobrahead Style)

Manufacturer	American Electric Lighting
Product Line	Autobahn
Typical Sizes (Catalog No.)	40W (ATB0-20BLEDE53-MVOLT-R2-3K-MP-NL-P7) 50W (ATB0-20BLEDE70-MVOLT-R2-3K-MP-NL-P7) 90W (ATB0-20BLEDE13-MVOLT-R2-3K-MP-NL-P7)
Pole Manufacturer	Hapco
Pole Description	Round, tapered aluminum pole with tenon
Typical Mounting Height	16′, 18.5′
Typical Foundation	See Details 8, 9 (Sec. 5.2)

3.8 Decorative Lighting (Arlington Style)

Manufacturer	Holophane
Product Line	Utility Arlington LED
Typical Sizes (Catalog No.)	60W (ARUE2-P20-30K-AS-AY3-BK-B-P7-NLX1)
Pole Manufacturer	Hapco
Pole Description	Decorative, round, black, aluminum per Drawings A-85093 or A-87731
Typical Mounting Height	14′
Typical Foundation	See Detail 9 (Sec. 5.2)

3.9 Decorative Lighting (Traditional Style)

Manufacturer	American Electric Lighting
Product Line	American Revolution Deluxe LED
Typical Sizes (Catalog No.)	50W (ARDL-P25-AS-30K-R2-AY-P7-NL-SS-TL-NL1X1)
Pole Manufacturer	Hapco
Pole Description	Decorative, round, black, aluminum per Drawings A-85093 or A-87731
Typical Mounting Height	14′
Typical Foundation	See Detail 9 (Sec. 5.2)

3.10 Decorative Lighting (Scroll Style)

Manufacturer	American Electric Lighting
Product Line	245L LED
Typical Sizes (Catalog No.)	50W (245L-20LEDE70-MVOLT-3K-R2-AY-BK-P7-SD-SS-NL-DD)
Pole Manufacturer	Hapco
Pole Description	Decorative, round, black, aluminum per Drawings A-85093 or A-87731
Typical Mounting Height	14′
Typical Foundation	See Detail 9 (Sec. 5.2)

Design Requirements

4.1 Design Considerations

The City of Knoxville Lighting Standards are intended to be in conformance with the latest edition of the American Association of State Highway and Transportation Officials (AASHTO) Roadway Lighting Design Guide. AASHTO guidelines will be used for areas not addressed within the City's Lighting Standards. Lighting installations along State Routes must also conform to the applicable sections of the Tennessee Department of Transportation Traffic Design Manual. Where a conflict exists between applicable codes, please contact the City of Knoxville for clarification.

Lighting components such as luminaires, poles, foundations, wiring, grounding, and controls must be properly specified to ensure and promote the safety of right-of-way users. Maintaining a reasonably consistent inventory of materials also helps control installation and maintenance costs that the City incurs. Consequently, the City requires that proposed lighting plans be submitted for review and approval prior to the removal, installation, or modification of City-owned lighting facilities. Lighting plans must be signed and sealed by a registered professional (architect, engineer, or landscape architect) licensed by the State.

TTo minimize potential review time, designers should adhere to the Lighting Plan Submittal Checklist, below.

Lighting Plan Submittal Checklist				
	Yes	No	N/A	Comments:
Name, phone, and address of owner and designer listed on design plans				
Vicinity map with adjacent streets shown and labeled				
Graphic scale and North arrow				
Sealed by licensed professional				
Property/ROW Lines shown and labeled				
Proper clearance of lighting facilities to roadway, sidewalk, and buildings				
Materials specified and concurrent with City standards				
Proposed system voltage and point of service are clearly indicated				
Photometric results indicated on design plans				
Maximum allowable voltage drop indicated on design plans				
Applicable construction details and specifications				

4.1.1. Photometric Requirements

The luminance or illuminance methods are required to evaluate lighting photometrics for the public right-of-way. Decorative lighting will not require photometric analysis. Designers should refer to the AASHTO Roadway and Design Lighting Guide for a summary of design values. Calculated values for the affected area should be summarized on the lighting plan for City reviewers. An example of an Illumination Results summary is shown in Figure 1, below.

ILLUMINATION RESULTS					
SECTION	AVG.	MAX.	MIN.	MAX/MIN	AVG/MIN
SR 115 NORTHBOUND	0.9 fc	1.7 fc	0.3 fc	5.7 : 1	3.0 : 1
SR 115 SOUTHBOUND	0.9 fc	1.8 fc	0.3 fc	6.0 : 1	3.0 : 1
CHEROKEE TRAIL	1.0 fc	2.2 fc	0.4 fc	5.5 : 1	2.6 : 1
MARINE ROAD	0.9 fc	1.4 fc	0.4 fc	3.5 : 1	2.2 : 1
HOSPITAL ROAD	0.8 fc	2.5 fc	0.4 fc	6.3 : 1	2.0 : 1
HOSPITAL ROUNDABOUT	1.9 fc	3.3 fc	0.8 fc	4.1 : 1	2.4 : 1
WOODSON ROUNDABOUT	1.2 fc	1.6 fc	0.8 fc	2.0 : 1	1.5 : 1

ILLUMINATION RESULTS BASED ON LUMINAIRES SPECIFIED IN LUMINAIRE SCHEDULE (THIS SHEET) AND 45' MOUNTING HEIGHTS UNLESS OTHERWISE SPECIFIED.

Figure 1: Example Illumination Results Summary

4.1.2. Pole Placement

Special consideration should be given to pole placements so that the safety of right-of-way users is not hindered by the lighting facilities. Proposed lights should be placed on existing utility poles where practical to reduce the number of hazards in the right-of-way. Note that installation of City lighting on utility-owned poles (such Knoxville or Lenoir City Utilities Board) will require prior approval and permitting through the pole owner. Where City owned poles are needed to support the proposed lighting facilities, the following pole placement guidelines will be considered during lighting plans review:

- Poles should be set inside the public right-of-way or appropriately dedicated easement
- Pole setback should be no less than:
  - 2-FT from the back of curb or sidewalk
  - 5-FT from the back of guardrail
  - 5-FT from edge of pavement
- Pole placement should be coordinated with other utilities
- Provide adequate access and clearance for installation and maintenance

The final location of City lighting facilities is subject to approval by the City. Facilities located within TDOT right-of-way are also subject to TDOT approval.

4.1.3 Conduit and Conductor

The overhead conductor between the utility's point of service and proposed lights must be reflected on the plans. If the City's lighting is attached to utility-owned poles, the overhead service conductors will be owned by the utility. Conductor attachments for these installations must be coordinated with the utility.

If the City's lighting is attached to City-owned poles, the overhead service conductors will be owned and maintained by the City.

Electrical conductor for underground installations shall be concealed using conduit. The size and type of conduit and conductor shall adhere to the City of Knoxville Electrical Code.

The following guidelines will be considered during lighting plans review:

- Conductors should be sized appropriately to prevent greater than 5% voltage drop on lighting circuits
- Insulation for wiring concealed in conduit or placed in pullboxes shall be rated for wet locations such as type THWN or approved equal
- Conduit shall be a minimum of 2″ SCH 40 PVC or HDPE except where otherwise noted
- Conduit beneath traffic bearing areas, such as driveway crossings, shall be concrete encased
- A pullbox should be utilized for conduit runs longer than 250 feet or where cumulative changes in direction exceed 270 degrees
- A spare conduit shall be installed for lighting installations except where the City approves otherwise

4.1.4 Lighting Controls

City owned lighting should be controlled via photocell except where otherwise required. Additionally, the following guidelines will be considered during lighting plans review:

- Placement of control centers should allow reasonable access for operation and maintenance
- Control centers should not encroach on sidewalks or other paths of travel
- Proposed electrical service to the control center shall be coordinated with the utility and the proposed route reflected on the plans
- Utility meters are not required at control centers
- Proposed control centers or related equipment mounted to utility-owned poles require prior approval and permitting through the pole owner

Construction Requirements

5.1 General Information

The following will be required for City of Knoxville lighting installations:

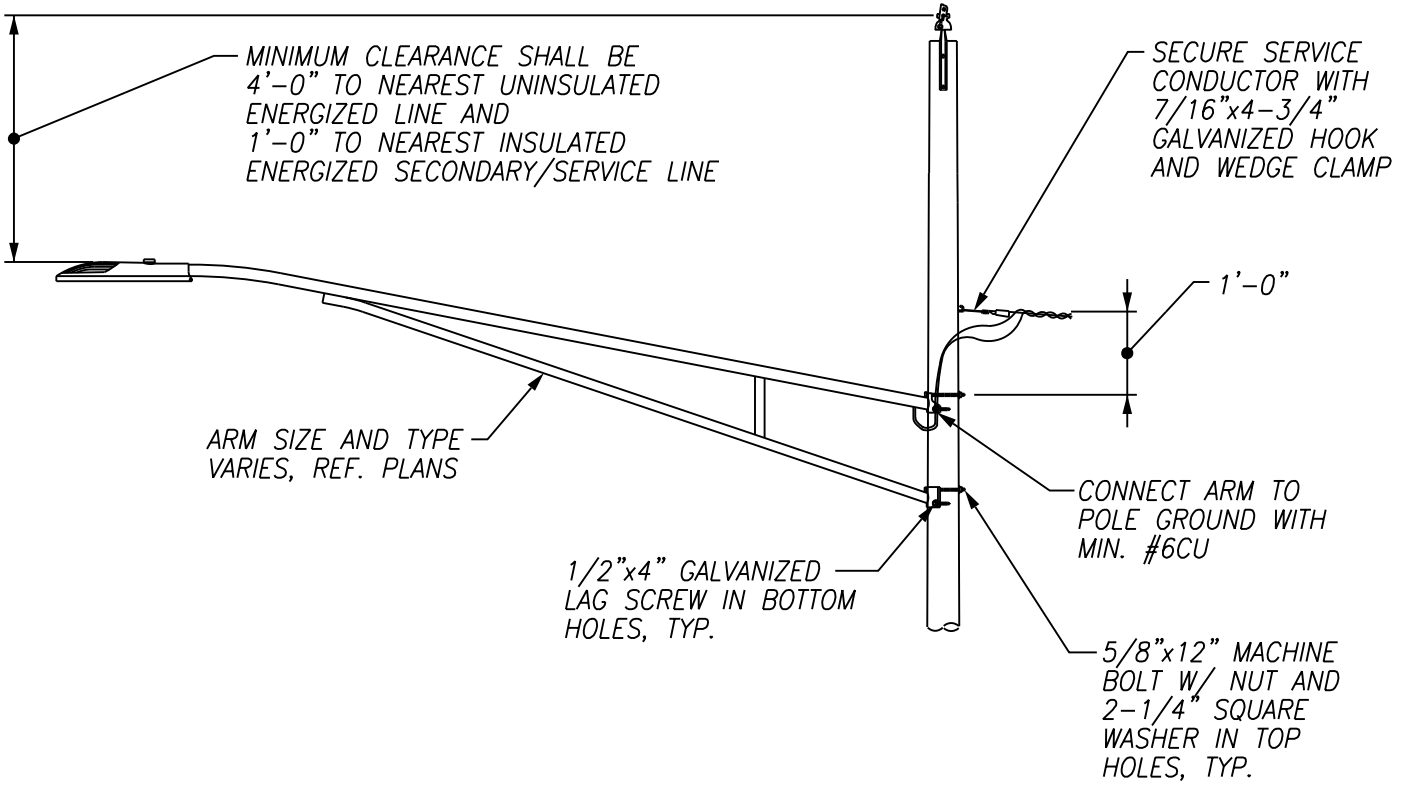
- Lighting installations shall conform to applicable construction codes as enforced by the City of Knoxville Inspections Bureau
- Lighting installations must be inspected by the City during construction and prior to service connections. Contact the Streetlight Systems Manager (865-215-6046) at least three working days prior to construction.
- Installations must be completed by a qualified contractor licensed to work within the State
- Lighting materials are subject to approval by the City. The City may require materials that are ordered or installed without prior review and approval of the applicable manufacturer's specification sheets be removed or replaced at no cost to the City.
- Lighting systems are subject to a performance test consisting of a 48-hour continuous burn-in of components without interruption or failure attributable to poor workmanship or defective material before the City accepts ownership of the installation. Additional tests may be required at the discretion of the City to ensure that the installation is functioning properly.
- The contractor shall provide a one-year warranty against installation defects for one year from the acceptance of ownership.

5.2 Construction Details

The following details summarize the City's construction requirements and will be enforced as applicable:

1. City Light Mounted to Wood Primary Pole
2. City Light Mounted to Wood Secondary Pole
3. Typical Lighting Trench
4. Typical Lighting Trench, Concrete Encased
5. Standard Handhole or Pullbox
6. Handhole Installation Detail
7. Typical Pullbox at Pole Foundation
8. Power-screw Foundation
9. Concrete Foundation
10. Shallow Concrete Foundation
11. Typical Roadway Light Structure
12. Typical High-Mast Structure
13. Typical Pole Wiring Detail
14. Typical Pole Wiring Schematic
15. Lighting Control Cabinet on Utility Pole
16. Lighting Control Cabinet on Service Pedestal
17. Service Pedestal Foundation

18. Service Riser for Single Lighting Conduit
19. Standard Control Cabinet
20. Typical Control Cabinet Schematic Detail



1 CITY LIGHT MOUNTED TO WOOD PRIMARY POLE

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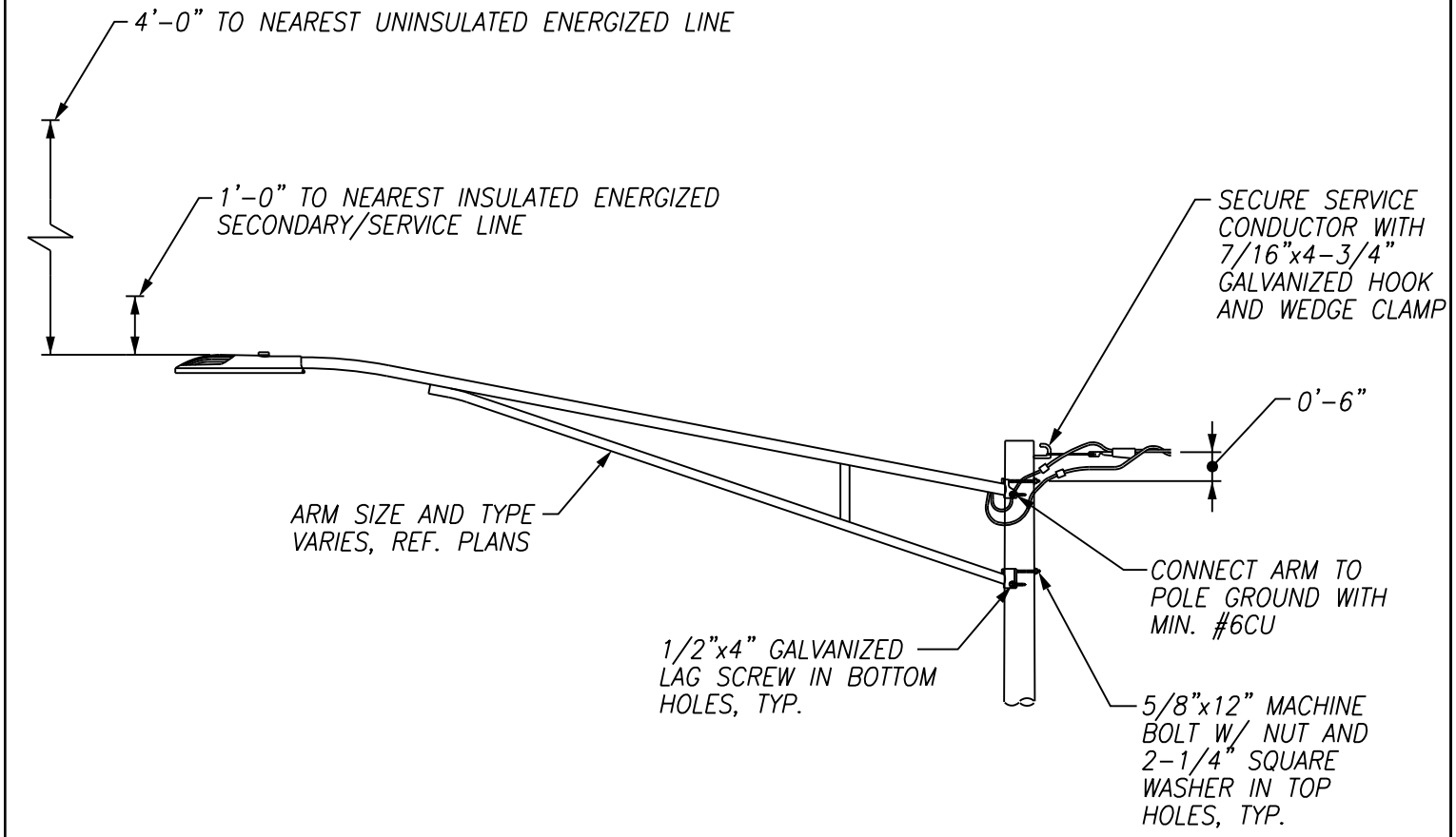

2 CITY LIGHT MOUNTED TO WOOD SECONDARY POLE

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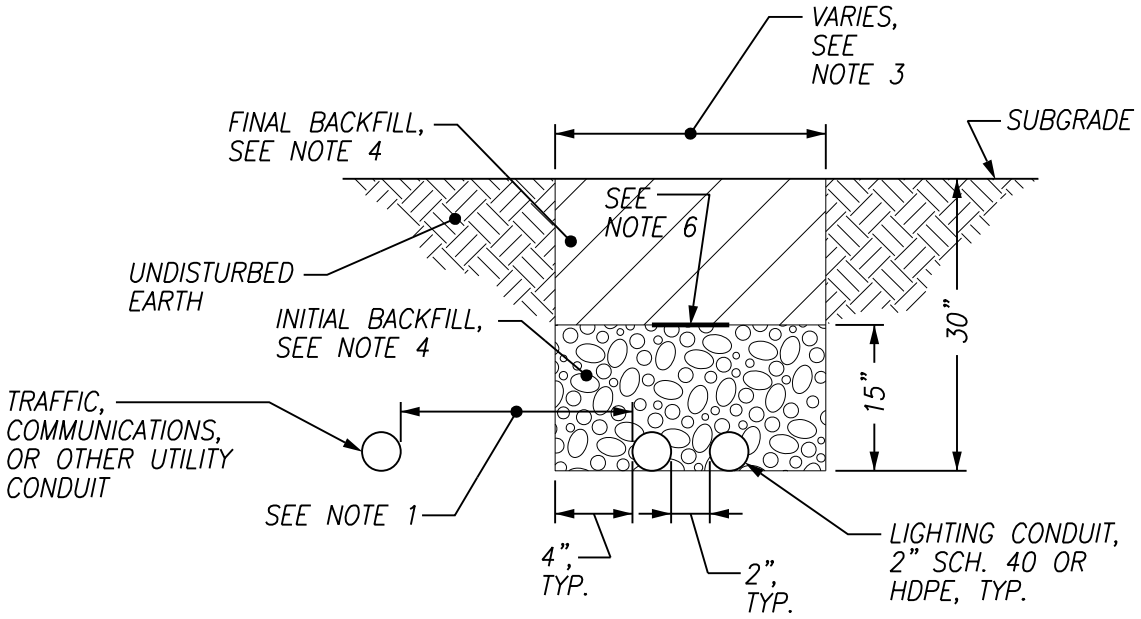
NOTES:

1. MAINTAIN 12" MINIMUM SPACING BETWEEN LIGHTING CONDUIT AND OTHER DUCTS EXCEPT WHERE ALL PARTIES INVOLVED AGREE THAT SPACING MAY BE REDUCED.
2. INSTALLATION MUST BE INSPECTED BY THE CITY OF KNOXVILLE AFTER CONDUIT IS PLACED BUT PRIOR TO BACKFILLING. COORDINATE WITH CITY OF KNOXVILLE INSPECTOR AT LEAST TWO WORKING DAYS IN ADVANCE.
3. TRENCH WIDTH WILL VARY DEPENDING ON NUMBER AND SIZE OF REQUIRED DUCTS. INSTALL ALL DUCTS HORIZONTALLY, AS SHOWN, UNLESS PLANS SPECIFY OTHERWISE.
4. INITIAL BACKFILL SHALL BE CLEAN, WELL-TAMPED EARTH OR GRAVEL FREE OF ANY HARD MATERIALS LARGER THAN 3/4" OR OTHER MATERIALS THAT COULD DAMAGE CONDUIT. FINAL BACKFILL TO SUBGRADE SHALL BE CLEAN, WELL-TAMPED EARTH OR GRAVEL FREE OF HARD MATERIALS LARGER THAN 3".
5. INSTALL SPACERS AS REQUIRED TO MAINTAIN DUCT SEPARATION IN CONDUIT BENDS. CONDUIT BEND RADIUS SHALL BE GREATER THAN OR EQUAL TO THE MINIMUM BEND RADIUS AS SPECIFIED BY THE CONDUIT MANUFACTURER.
6. INSTALL 4" WIDE, RED, UNDERGROUND WARNING TAPE ABOVE CONDUIT.
7. REFER TO TDOT STANDARD DRAWING T-L-4 FOR CONDUIT BURIED IN ROCK.



3 TYPICAL LIGHTING TRENCH

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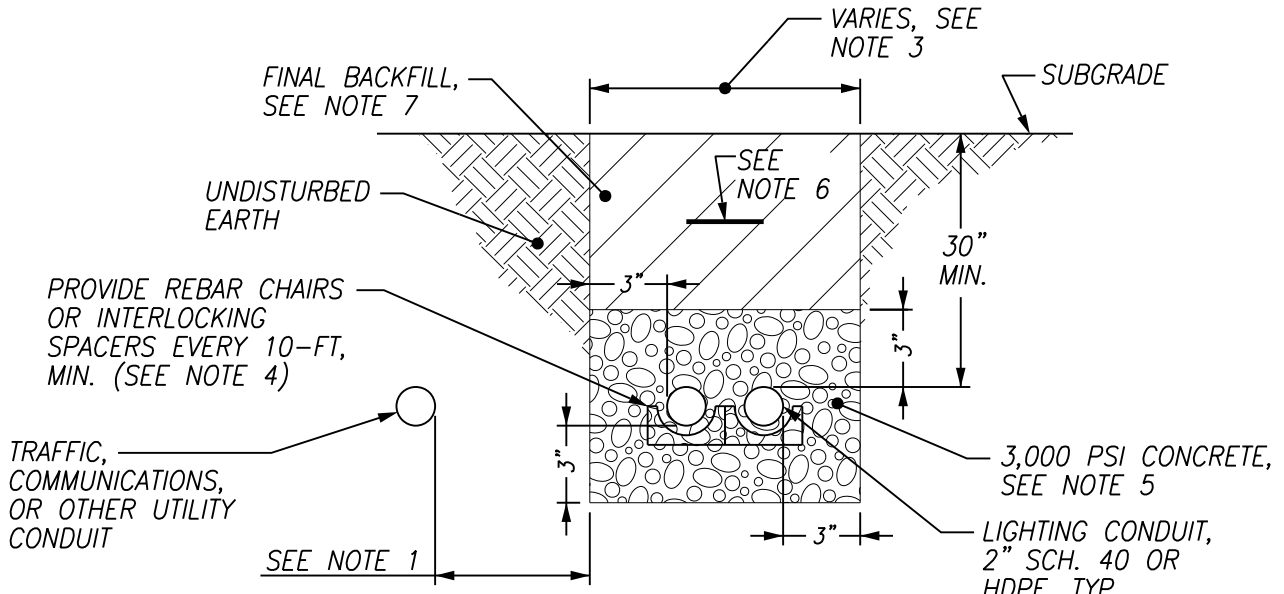
NOTES:

1. MAINTAIN 12" MINIMUM SPACING BETWEEN LIGHTING CONDUIT AND OTHER DUCTS EXCEPT WHERE ALL PARTIES INVOLVED AGREE THAT SPACING MAY BE REDUCED.
2. INSTALLATION MUST BE INSPECTED BY THE CITY OF KNOXVILLE AFTER CONDUIT IS PLACED BUT PRIOR TO BACKFILLING. COORDINATE WITH CITY OF KNOXVILLE INSPECTOR AT LEAST TWO WORKING DAYS IN ADVANCE.
3. TRENCH WIDTH WILL VARY DEPENDING ON NUMBER AND SIZE OF REQUIRED DUCTS. INSTALL ALL DUCTS HORIZONTALLY, AS SHOWN, UNLESS PLANS SPECIFY OTHERWISE.
4. INSTALL SPACERS AS REQUIRED TO MAINTAIN DUCT SEPARATION. CONDUIT BEND RADIUS SHALL BE GREATER THAN OR EQUAL TO THE MINIMUM BEND RADIUS AS SPECIFIED BY THE CONDUIT MANUFACTURER.
5. CONCRETE SHALL BE PROPERLY VIBRATED DURING INSTALLATION TO ENSURE COMPLETE FLOW UNDER AND AROUND CONDUIT. ALLOW CONCRETE TO SET FIRM BEFORE BACKFILLING REMAINDER OF TRENCH.
6. INSTALL 4" WIDE, RED, UNDERGROUND WARNING TAPE 12" ABOVE CONCRETE.
7. FINAL BACKFILL SHALL BE DENSE GRADED AGGREGATE STONE TYPE "A", GRADE "D". PLACE BACKFILL IN 8" LOOSE LIFTS AND COMPACT STONE TO 100% OF THE STANDARD PROCTOR DENSITY AT 2% LESS THAN THE OPTIMUM MOISTURE CONTENT AS DETERMINED BY ASSHTO T99 METHOD D.
8. REFER TO TDOT STANDARD DRAWING T-L-4 FOR CONDUIT BURIED IN ROCK.



4 TYPICAL LIGHTING TRENCH, CONCRETE ENCASED

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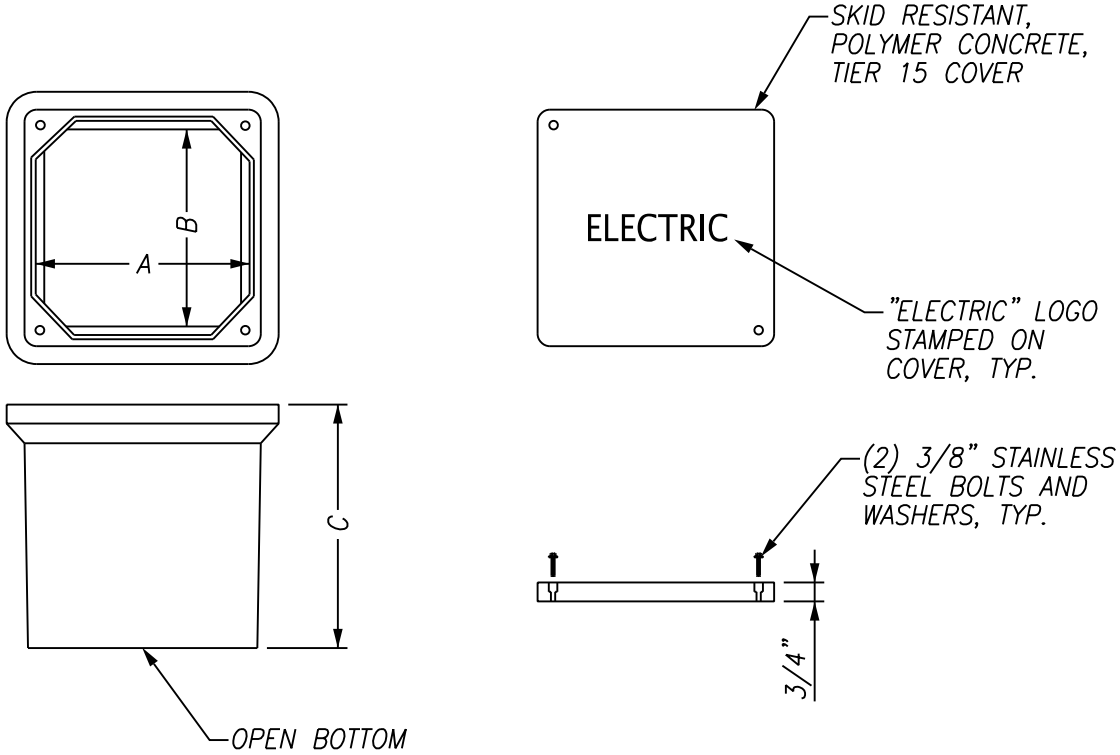
NOTES:

1. TIER 22 LOAD RATINGS SHALL BE REQUIRED WHERE BOXES ARE SET IN INTENTIONAL TRAFFIC-BEARING AREAS SUCH AS TRAVEL LANES, SHOULDERS, OR DRIVEWAYS.

MINIMUM BOX SCHEDULE					
NUMBER OF 2" CONDUITS	DIMENSION "A"	DIMENSION "B"	DIMENSION "C"	LOAD RATING	MATERIAL
1-4	12"	12"	12"	TIER 15	POLYMER CONCRETE
5-10	13"	24"	18"		
>10	17"	30"	18"		



5 STANDARD HANDHOLE OR PULLBOX

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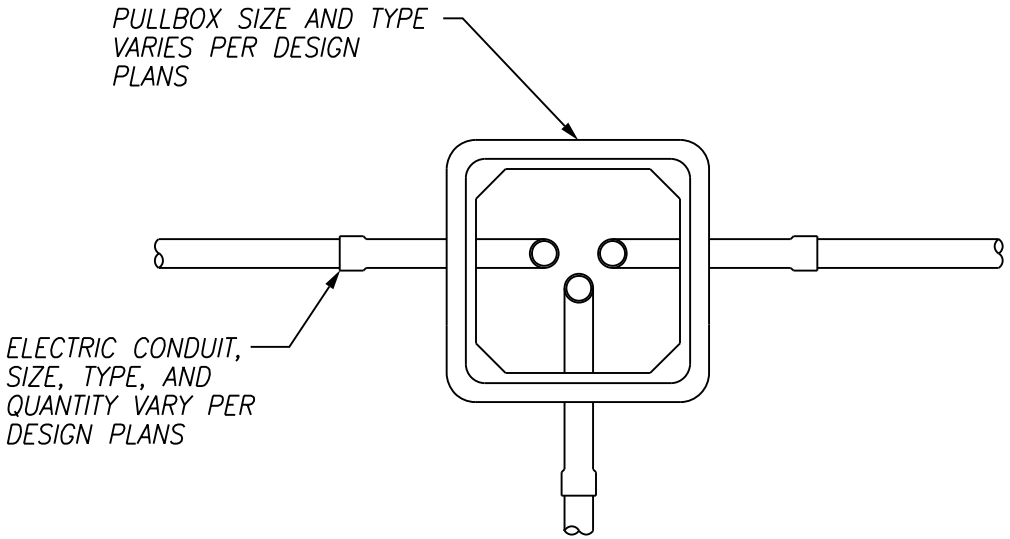
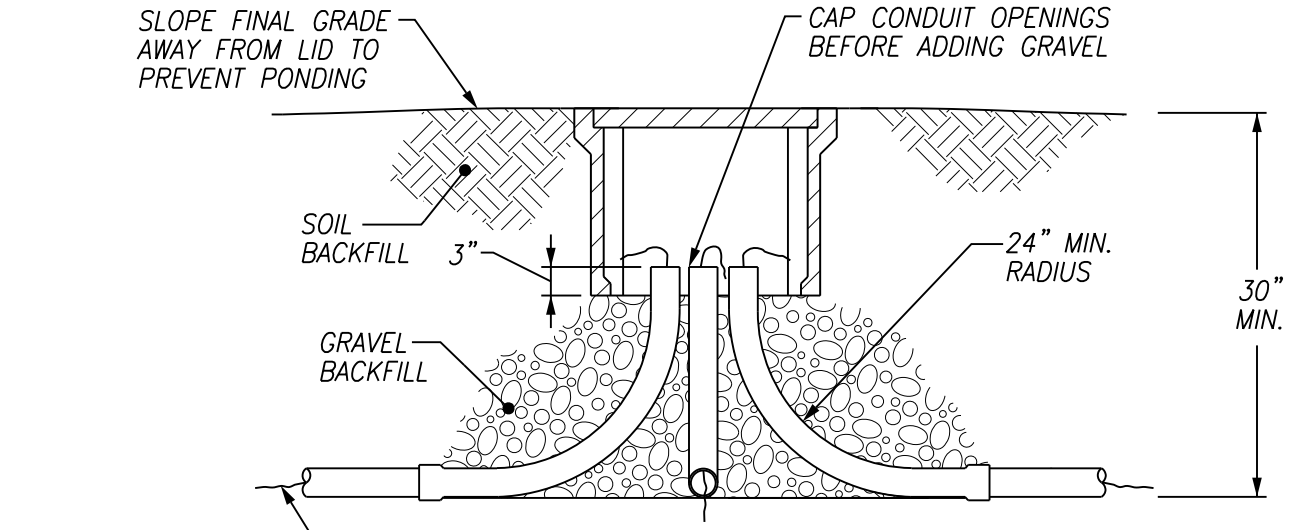


TOP VIEW



FRONT SECTION VIEW

6 TYPICAL HANDHOLE INSTALLATION

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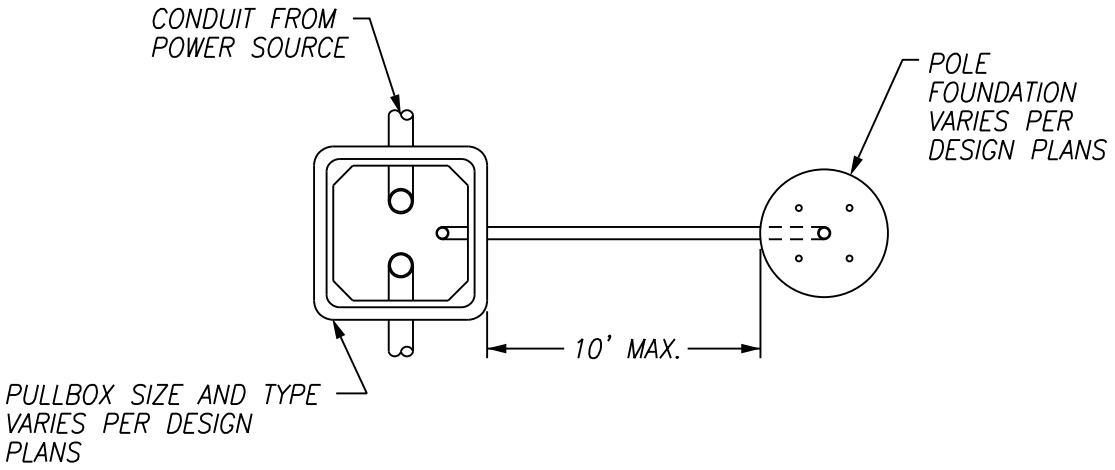
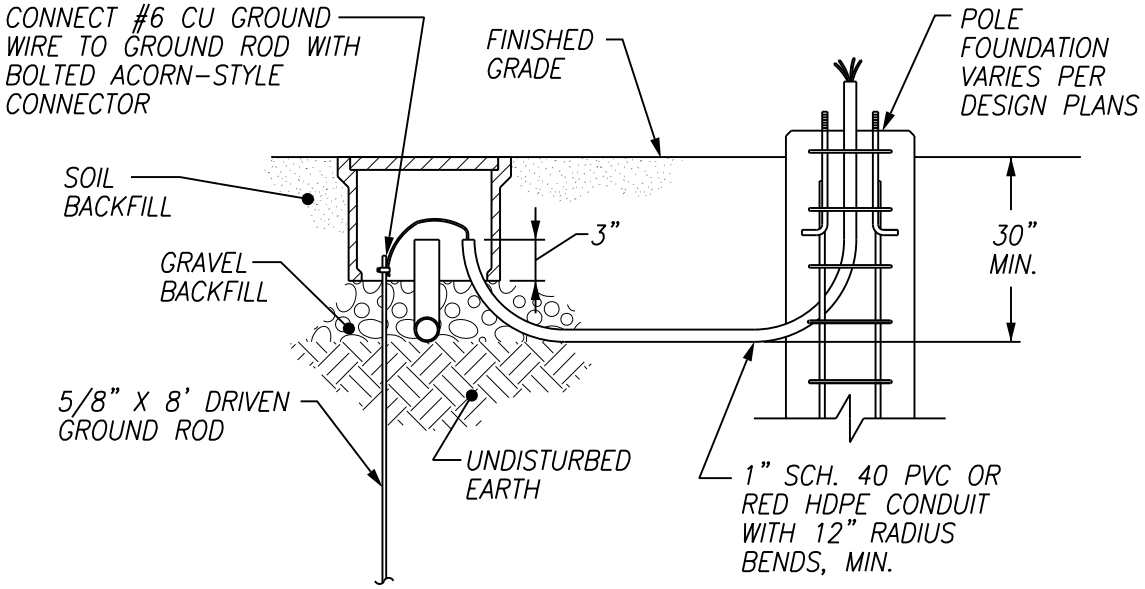


TOP VIEW



FRONT SECTION VIEW

7

TYPICAL PULLBOX AT POLE FOUNDATION

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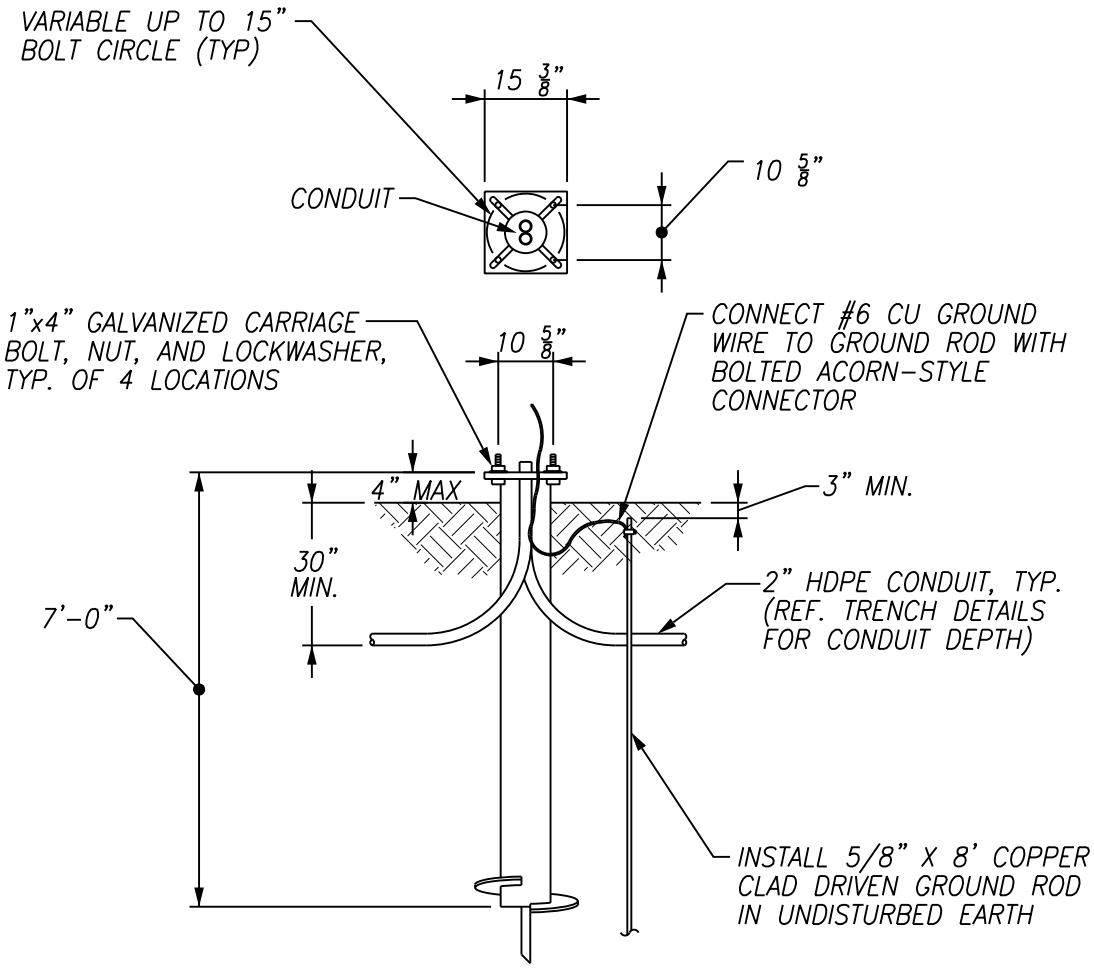

8 POWER-SCREW FOUNDATION

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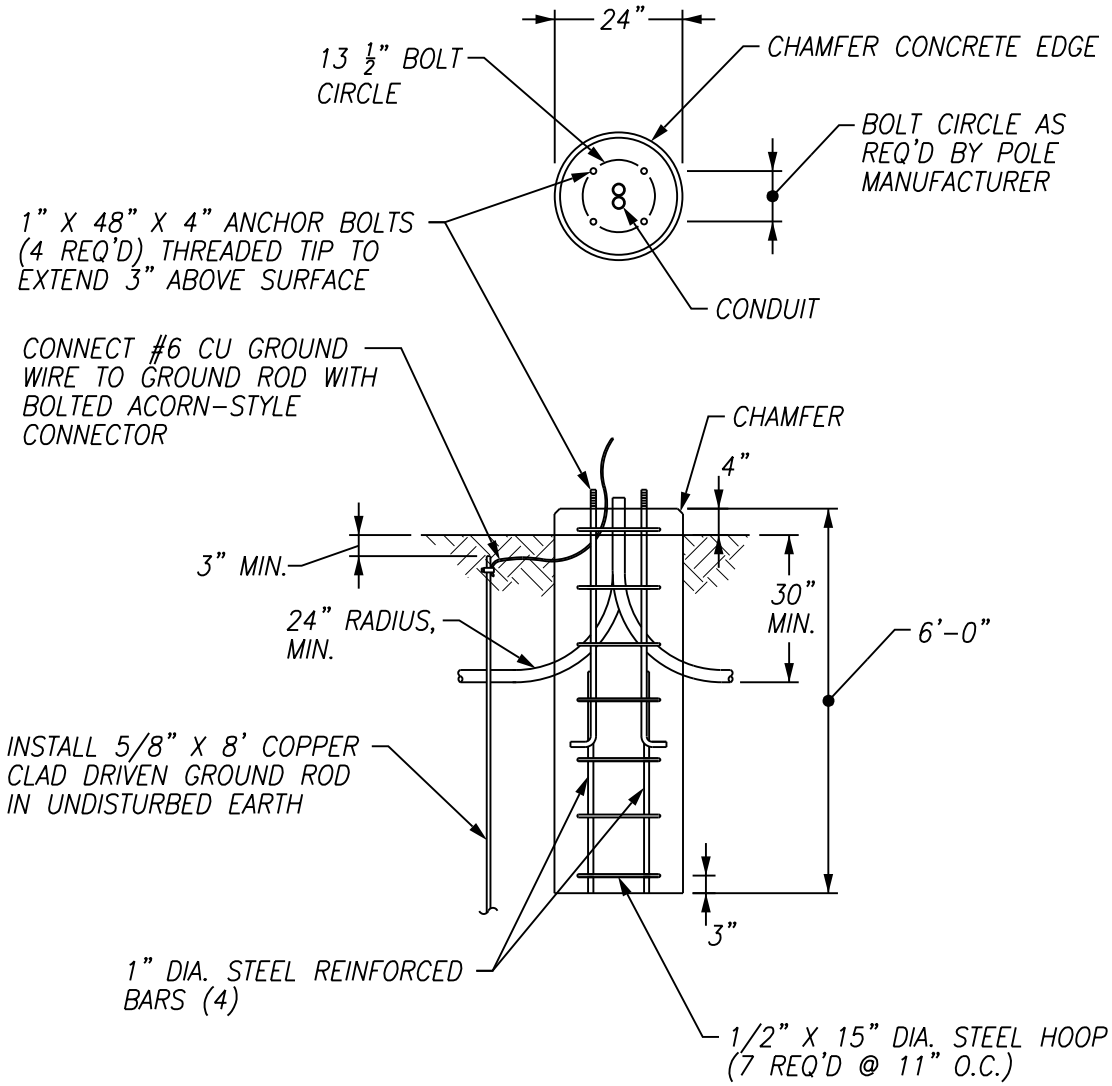

9 CONCRETE FOUNDATION

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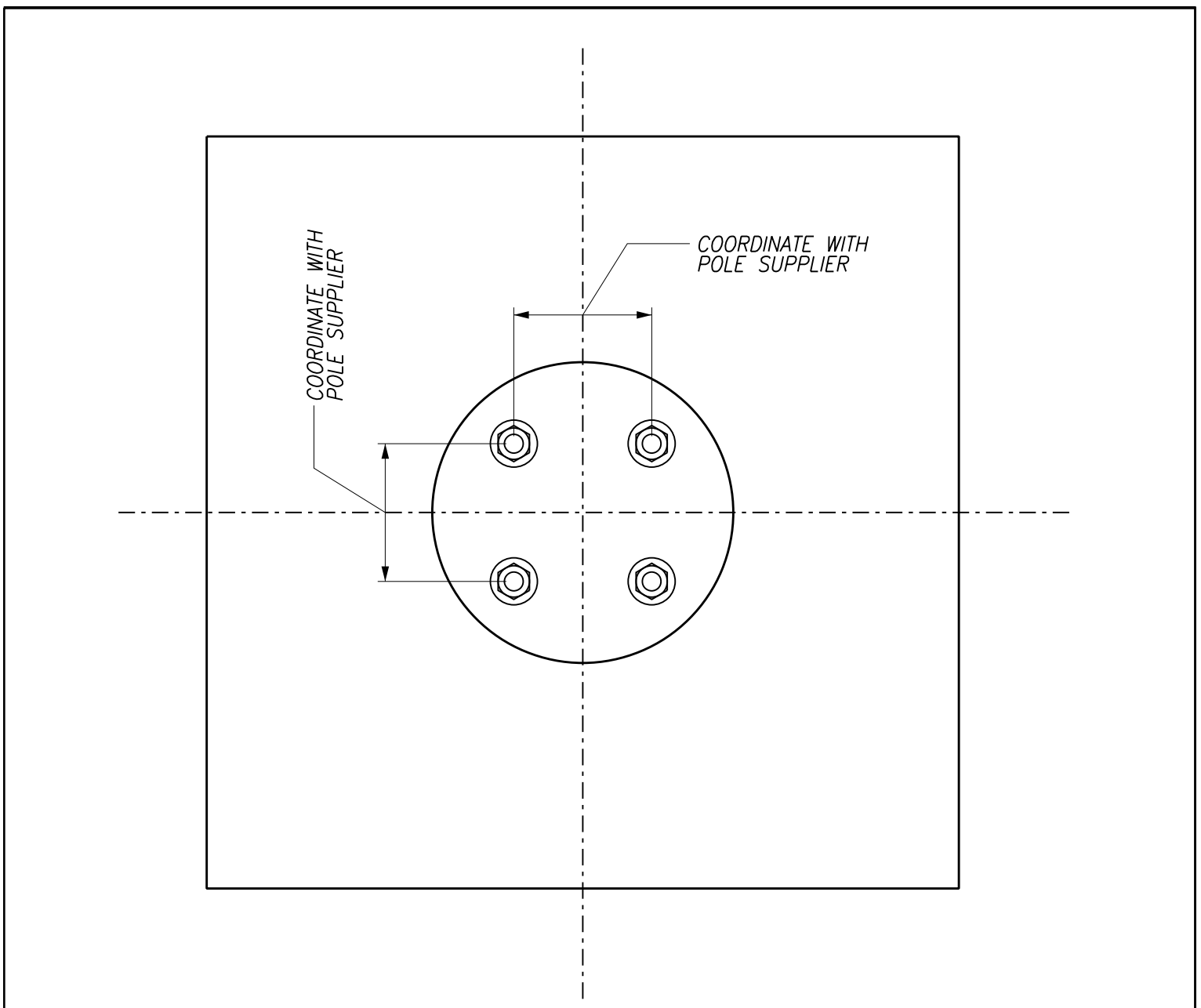
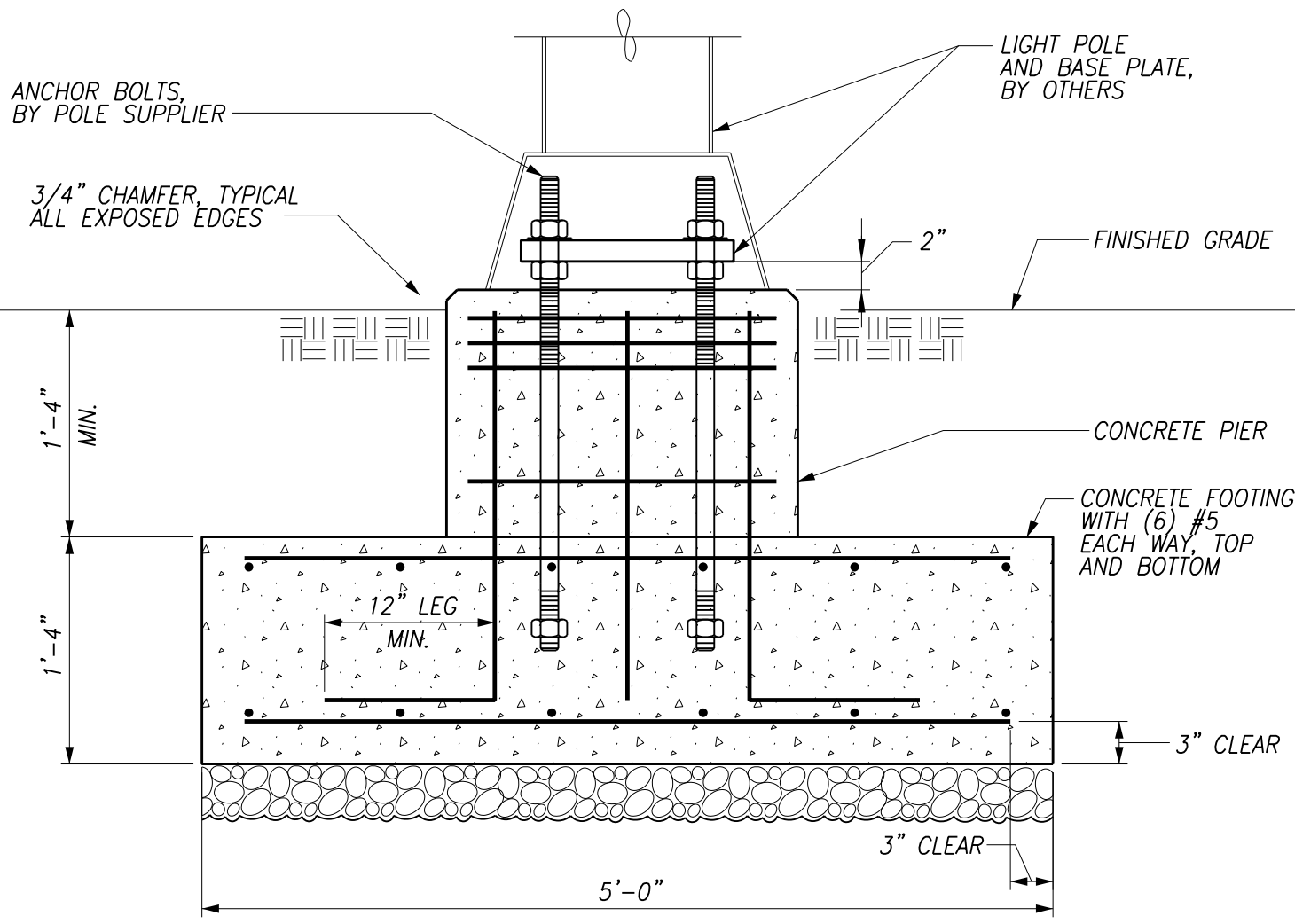


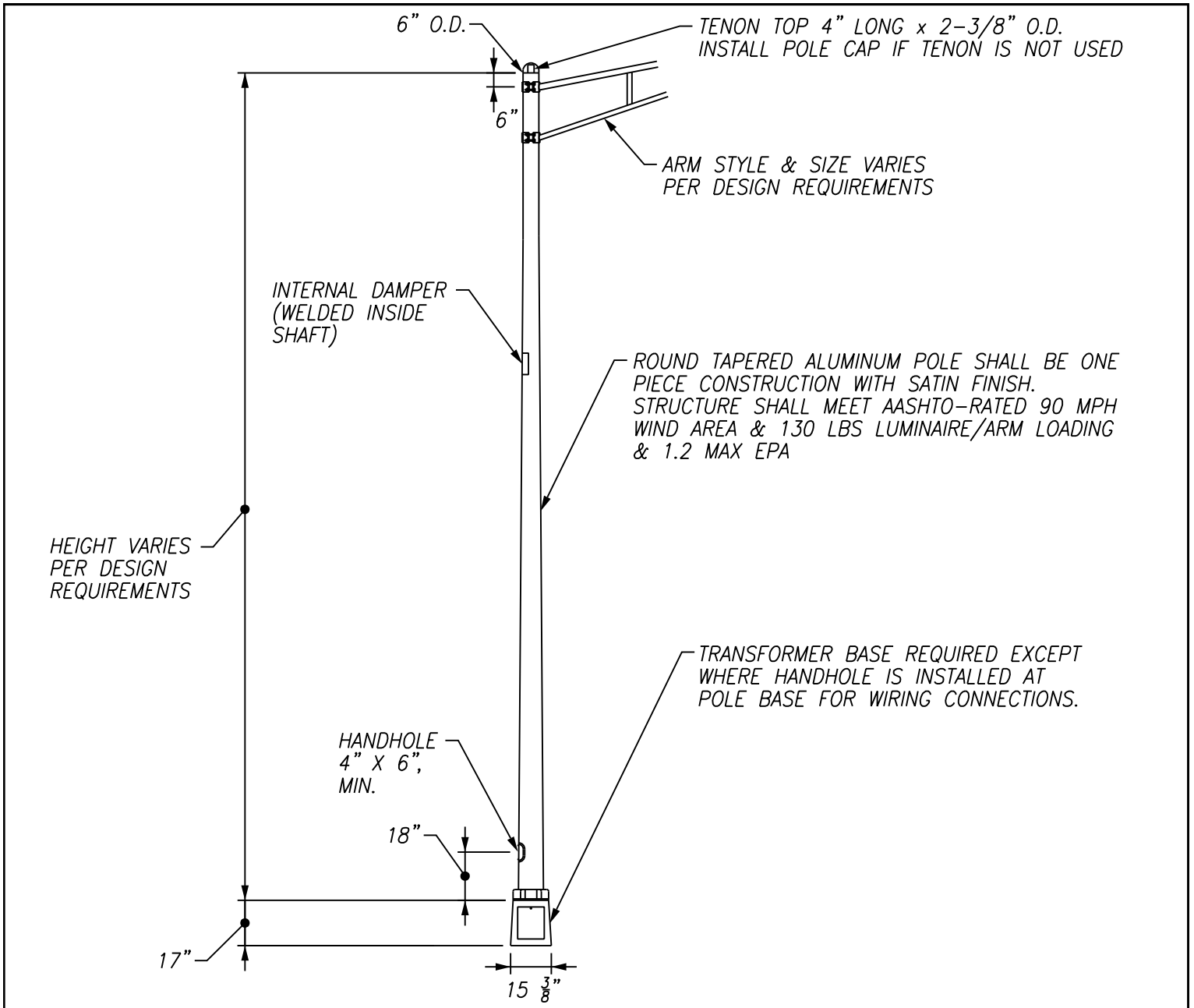
TOP VIEW



FRONT SECTION VIEW

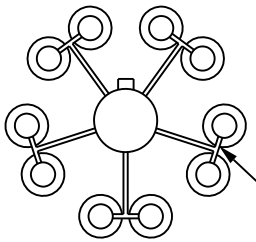
10 SHALLOW CONCRETE FOUNDATION

NTS



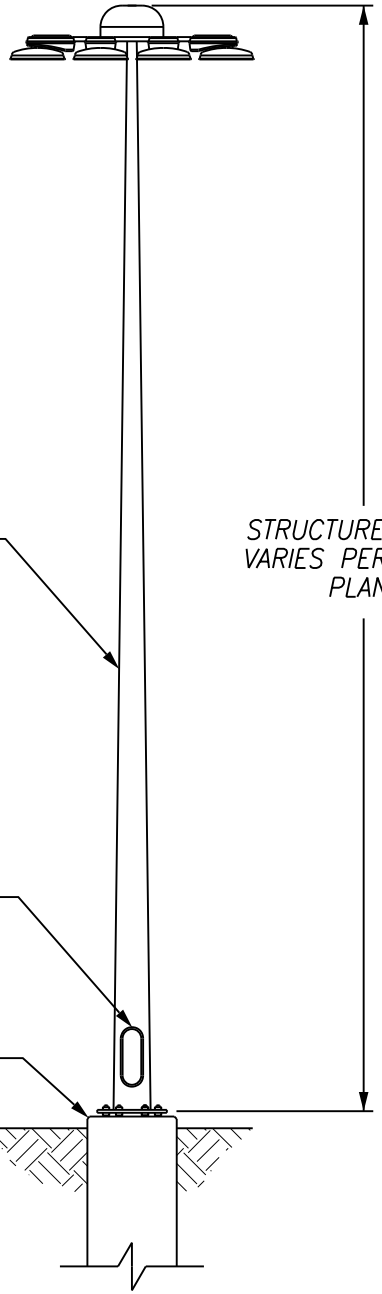
11 TYPICAL ROADWAY LIGHT STRUCTURE

NTS



TOP VIEW

CONFIGURATION MAY VARY DEPENDING ON NUMBER OF LUMINAIRES INSTALLED. NUMBER OF LUMINAIRES SHALL NOT EXCEED 10.



GALVANIZED STEEL POLE STRUCTURE SHALL MEET AASHTO 90 MPH WIND LOADING REQUIREMENTS ASSUMING 10 LUMINAIRES WITH 1.38 SF AREA WEIGHING 73 POUNDS EACH AND A MOUNTING HEAD WITH 4.0 SF AREA WEIGHING 250 POUNDS ARE ATTACHED

STRUCTURE HEIGHT VARIES PER DESIGN PLANS

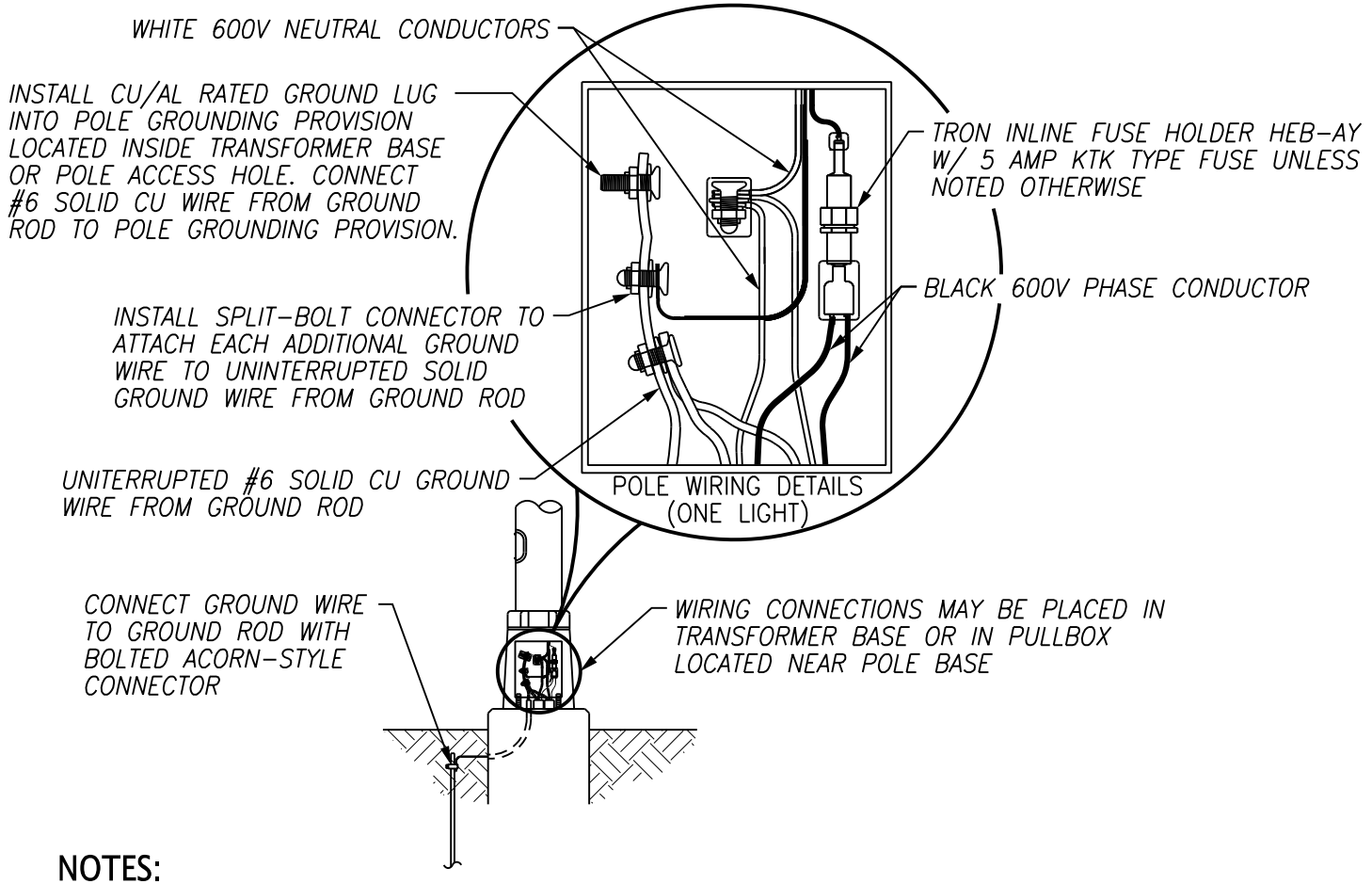
MINIMUM 10" X 30" HANDHOLE WITH COVER FOR MOTOR AND WINCH ACCESS

FOUNDATION SHALL BE DESIGNED, SPECIFIED, AND SEALED BY A LICENSED PROFESSIONAL

12

TYPICAL HIGH-MAST STRUCTURE

NTS

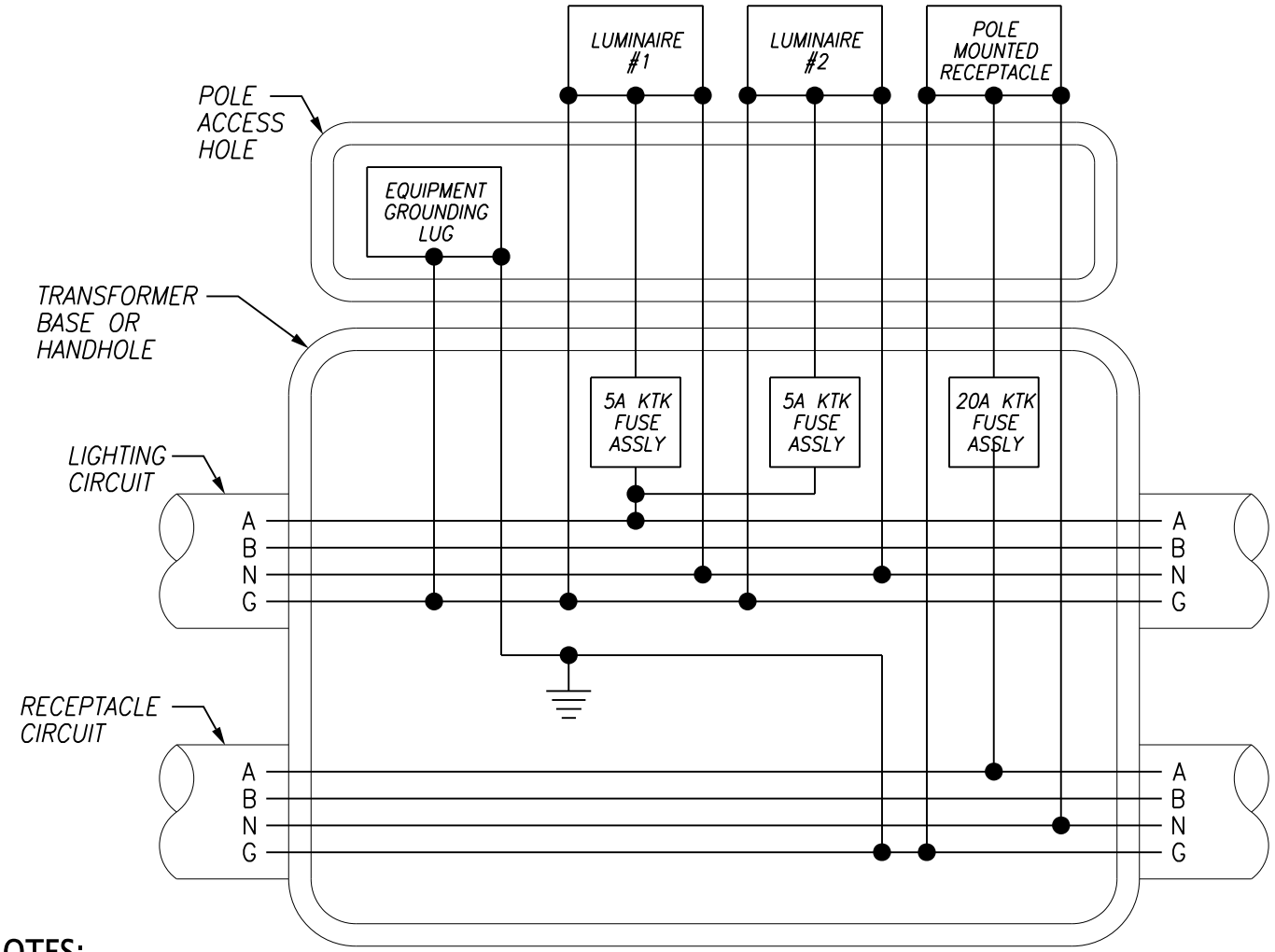


NOTES:

1. CONNECTIONS SHALL BE MADE WITH SPLIT-BOLT CONNECTORS WRAPPED IN SELF-VULCANIZING RUBBER TAPE APPLIED IN HALF-LAP LAYERS TO GIVE A SMOOTH COVERING OF NOT LESS THAN 2 TIMES THE THICKNESS OF THE WIRE INSULATION. OVER THIS, APPLY TWO LAYERS OF HALF-LAPPED 7-MIL VINYL PLASTIC TAP.
2. MULTIPLE LIGHTS/RECEPTACLES ON SAME POLE ARE TO BE WIRED & FUSED INDEPENDENTLY.
3. WIRING SHALL BE 600V INSULATED COPPER RATED FOR DIRECT-BURIAL APPLICATIONS, TYPE THWN OR EQUIVALENT. SIZE PER LIGHTING PLAN.
4. MULTIPLE CIRCUITS IN SAME POLE BASE OR PULLBOX SHALL BE COLOR-CODED WITH CIRCUIT IDENTIFICATION.

13 — TYPICAL POLE WIRING DETAIL

NTS



NOTES:

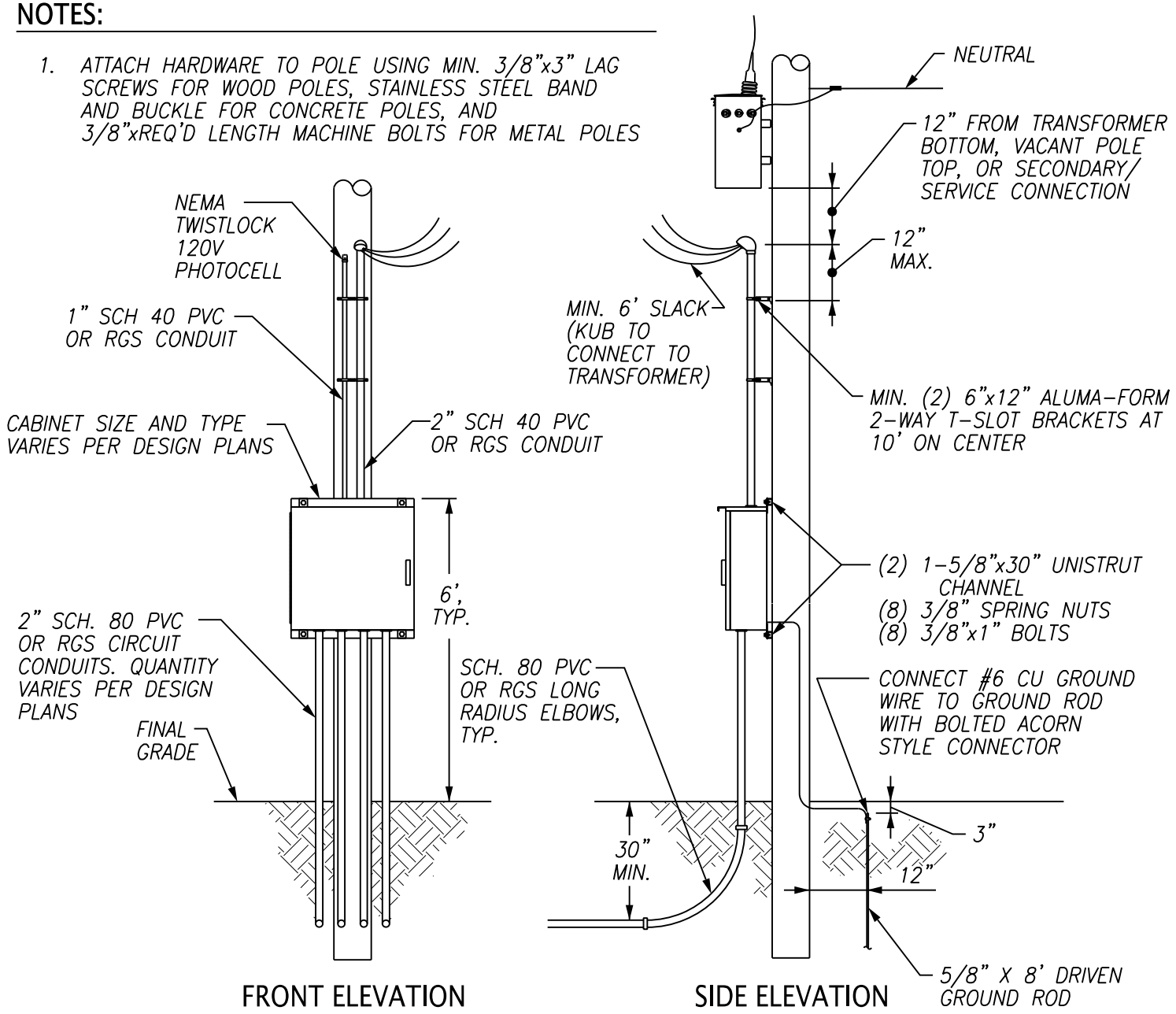
1. SCHEMATIC RELECTS 120/240 VAC, SINGLE PHASE, ISOLATED NEUTRAL SYSTEM WITH 120V TO EACH LUMINAIRE.
2. ALTERNATE PHASES IN ADJACENT POLES TO BALANCE LOADS EXCEPT WHERE OTHERWISE NOTED.
3. DO NOT INSTALL WIRING FOR OPTIONAL EQUIPMENT (I.E. RECEPTACLES) THAT IS NOT UTILIZED.
4. GROUND ROD SHALL BE LOCATED OUTSIDE OF TRANSFORMER BASE IN UNDISTURBED EARTH.

14 TYPICAL POLE WIRING SCHEMATIC

NTS

NOTES:

1. ATTACH HARDWARE TO POLE USING MIN. 3/8"x3" LAG SCREWS FOR WOOD POLES, STAINLESS STEEL BAND AND BUCKLE FOR CONCRETE POLES, AND 3/8"xREQ'D LENGTH MACHINE BOLTS FOR METAL POLES

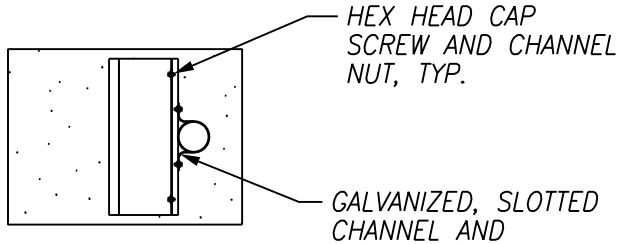


15 LIGHTING CONTROL CABINET ON UTILITY POLE

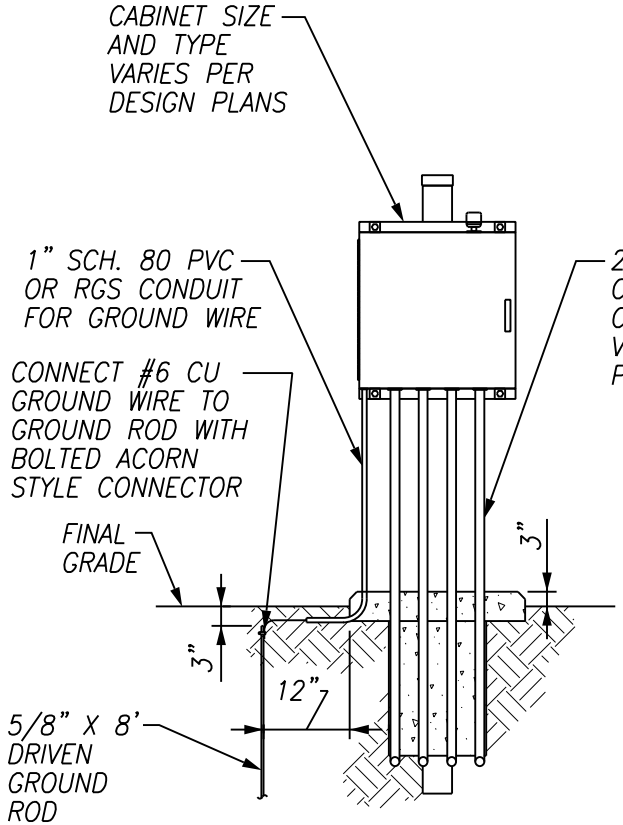
NTS

NOTES:

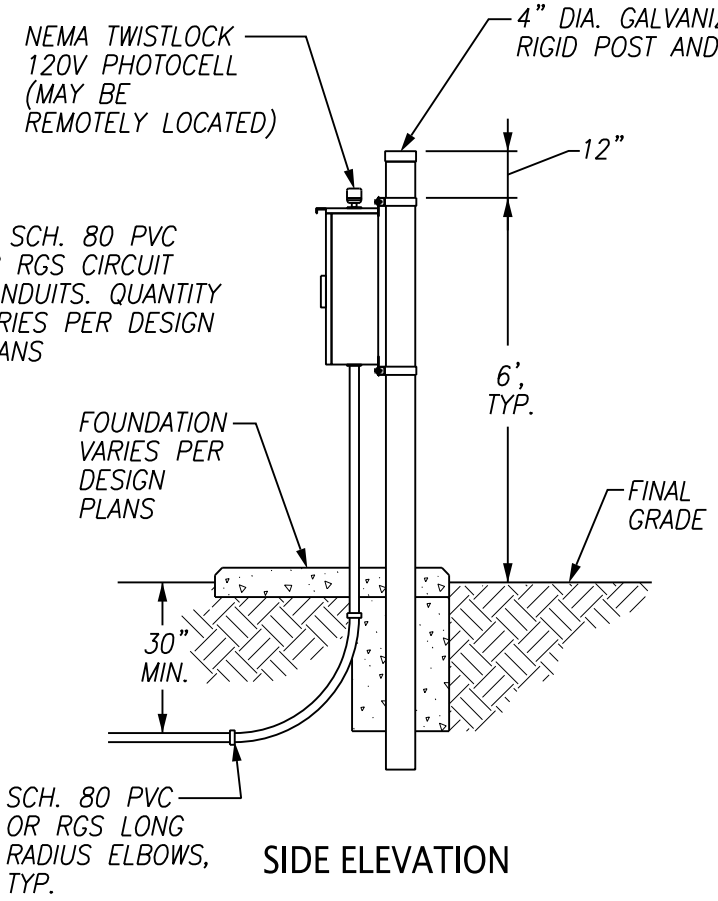
1. HARDWARE EXPOSED TO WEATHER SHALL BE STAINLESS STEEL OR GALVANIZED.
2. CIRCUIT CONDUITS NOT UTILIZED FOR ACTIVE CIRCUITS SHALL BE STUBBED AND CAPPED 1–FT BEYOND FOUNDATION.



TOP VIEW



FRONT ELEVATION

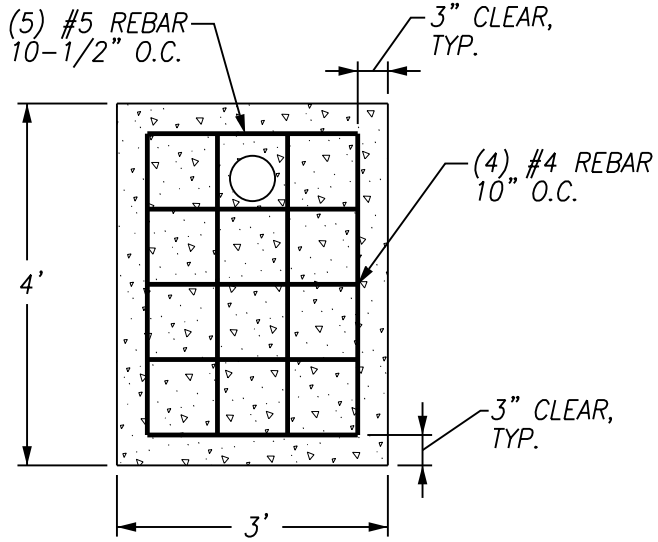


SIDE ELEVATION

16

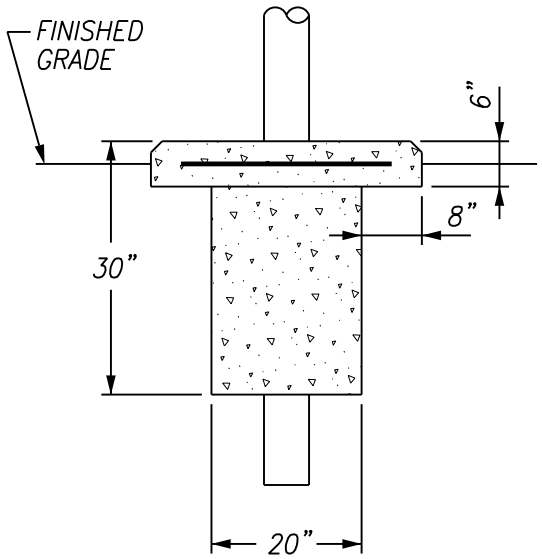
LIGHTING CONTROL CABINET ON SERVICE PEDESTAL

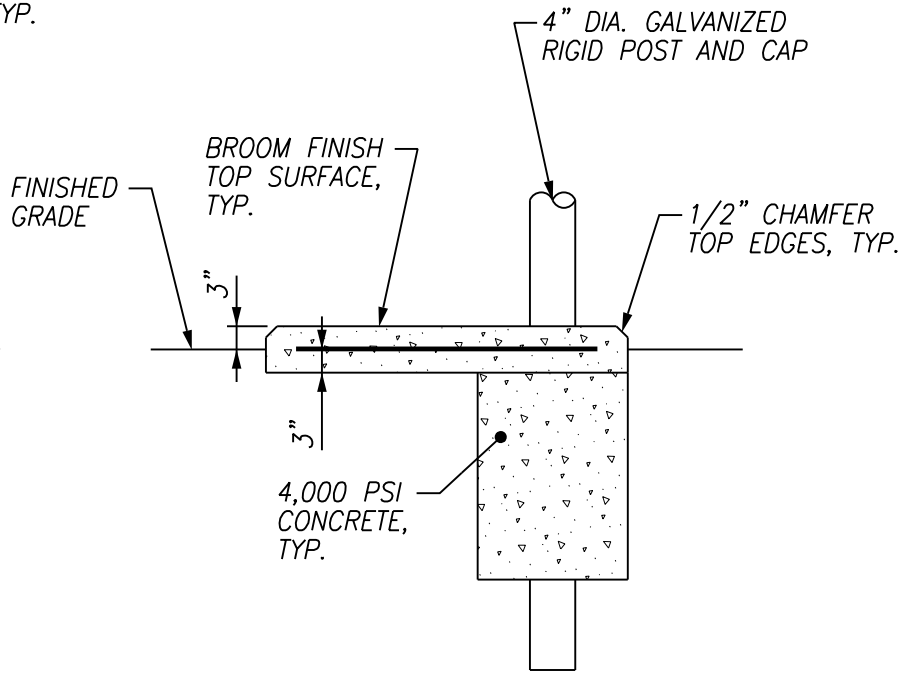
NTS



NOTES:

1. STRUCTURE MUST BE FORMED WITH CONDUIT, GROUND ROD, AND REBAR IN PLACE AND APPROVED BY CITY OF KNOXVILLE PRIOR TO POURING CONCRETE.





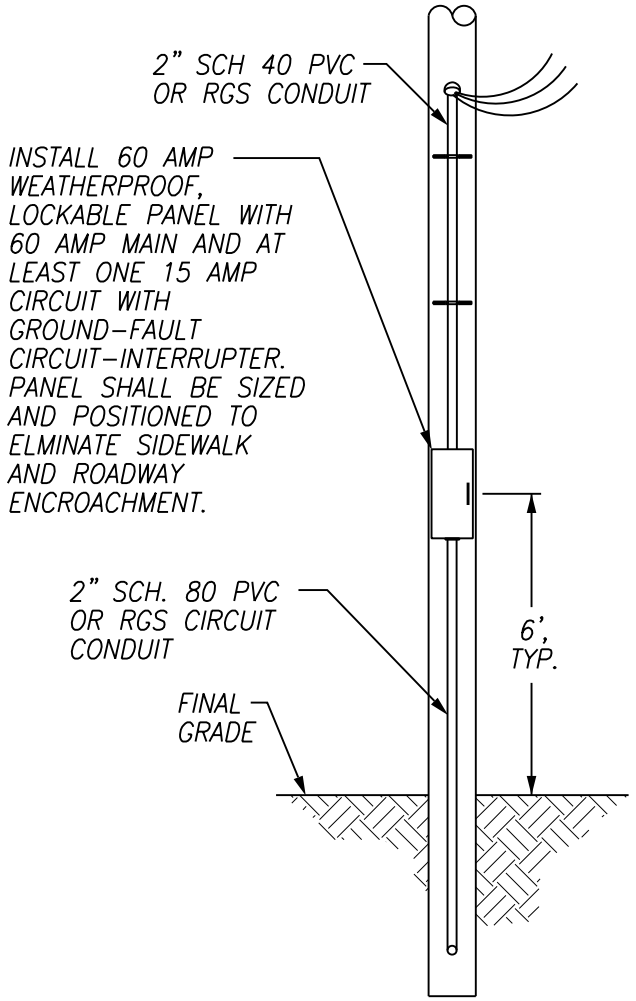
17

SERVICE PEDESTAL FOUNDATION

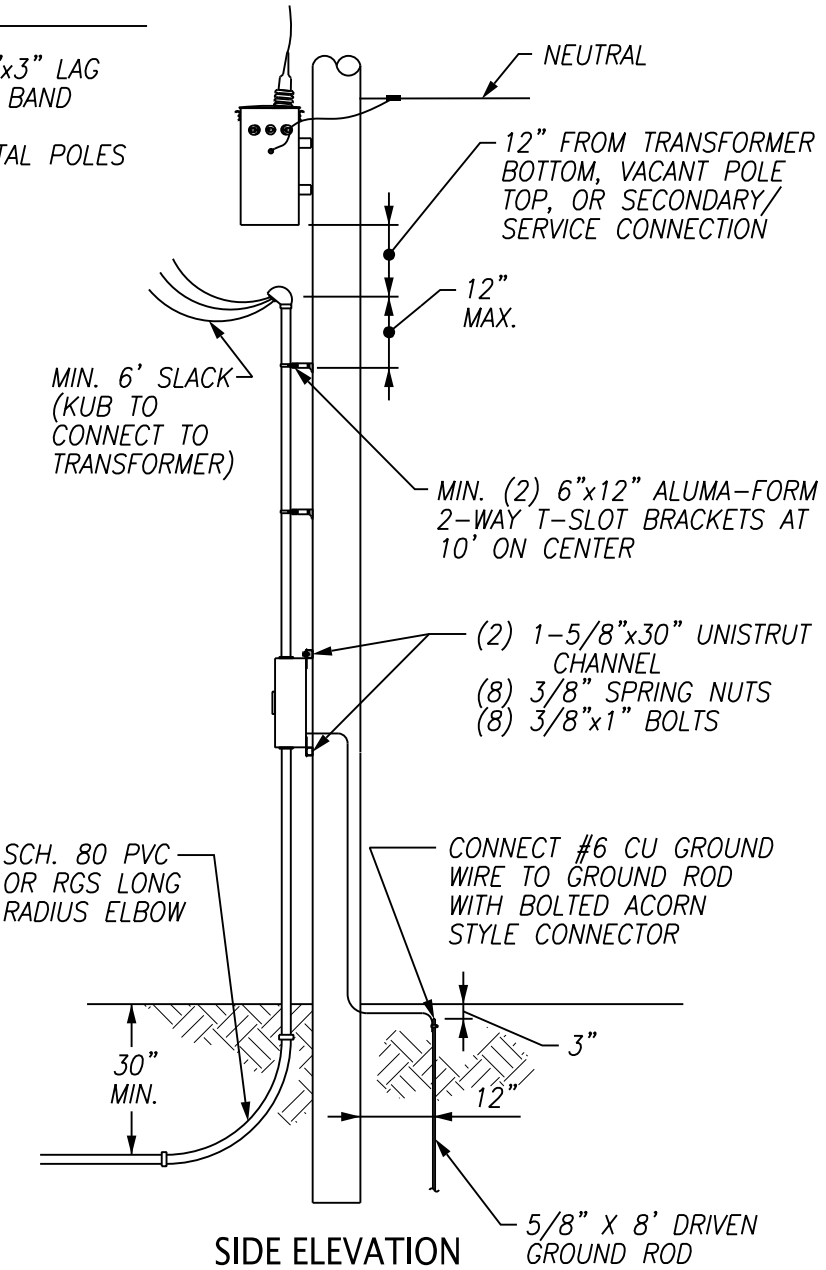
NTS

NOTES:

1. ATTACH HARDWARE TO POLE USING MIN. 3/8"x3" LAG SCREWS FOR WOOD POLES, STAINLESS STEEL BAND AND BUCKLE FOR CONCRETE POLES, AND 3/8"xREQ'D LENGTH MACHINE BOLTS FOR METAL POLES



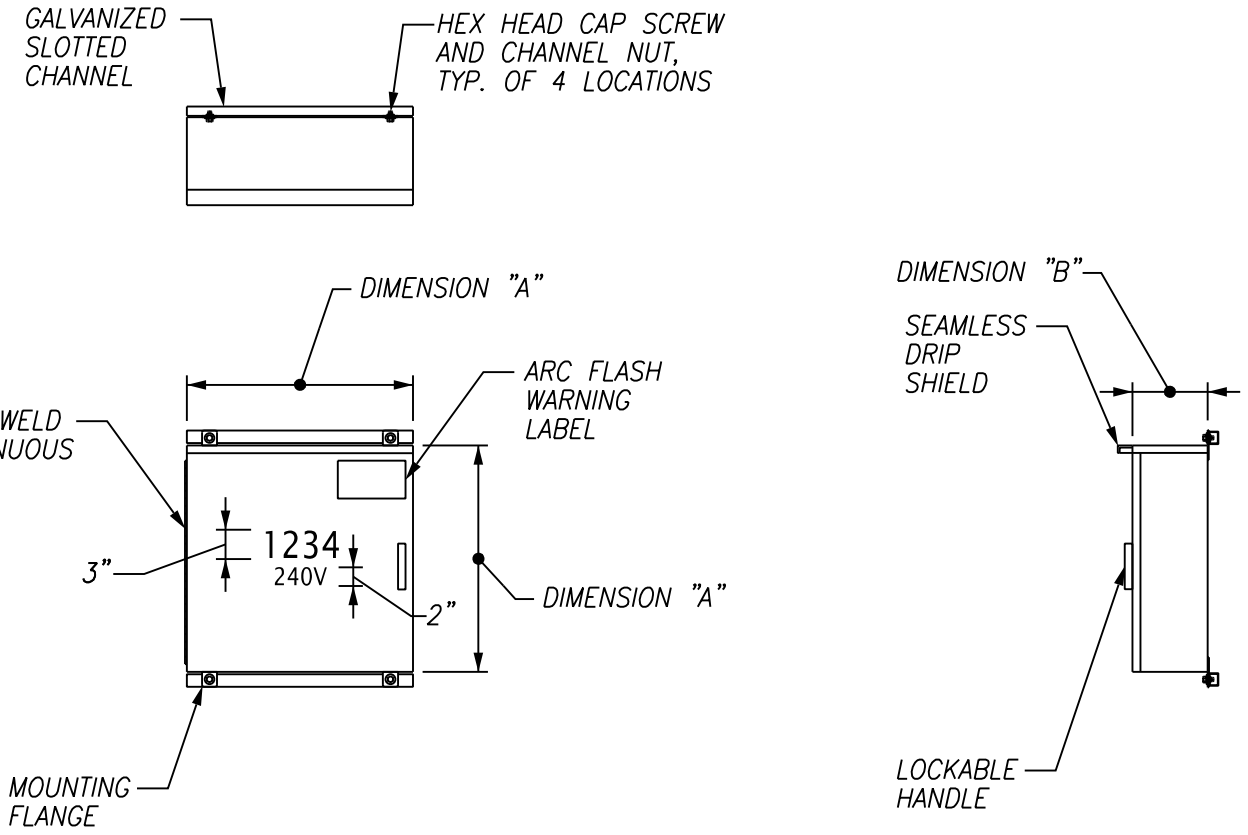
FRONT ELEVATION



SIDE ELEVATION

18 SERVICE RISER FOR SINGLE LIGHTING CIRCUIT

NTS



PANEL SCHEDULE				
QTY OF BRANCH CIRCUITS	DIMENSION "A"	DIMENSION "B"	NEMA RATING	MATERIAL
1-4	24"	8"	3R	TYPE 304 STAINLESS STEEL
5-8	30"	12"		

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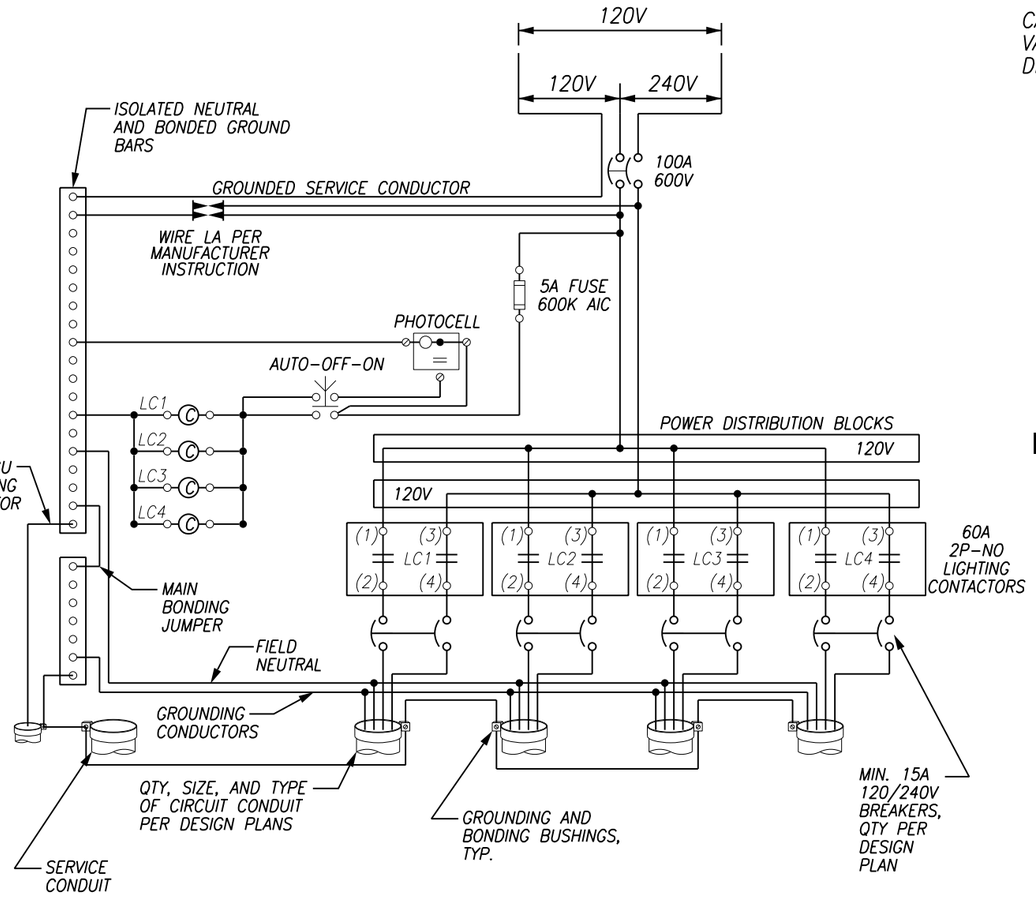
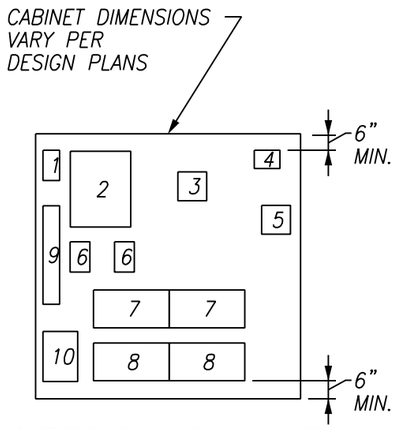
STANDARD CONTROL CABINET

NTS



WIRING SCHEMATIC



INTERIOR PANEL LAYOUT

NOTES:

1. PANEL WIRING SHALL BE COPPER WITH APPROPRIATELY RATED INSULATION.
2. WIRE BENDING RADIUS SHALL CONFORM TO THE NEC AND MANUFACTURER REQUIREMENTS.
3. COORDINATE WITH CITY OF KNOXVILLE TO OBTAIN CONTROL CABINET NUMBER.
4. GROUND BAR SHALL BE BONDED DIRECTLY TO THE PANEL WITH DEDICATED BONDING SCREW.
5. SUBPANEL SHALL BE SECURED TO THE BACK PANEL USING MANUFACTURER SUPPLIED MOUNTING BRACKETS FOR SCREW STUDS PERMANENTLY ATTACHED TO THE BACK PANEL FOR MOUNTING COMPONENTS.
6. CABINET MUST PASS A CONTINUITY TEST AND A LOW VOLTAGE, OPERATIONAL BENCH TEST PRIOR TO DELIVERY. QUALITY ASSURANCE TEST REPORT SHALL BE PROVIDED.

INTERIOR PANEL SCHEDULE

ITEM NO.	QTY	DESCRIPTION	MATERIAL SPECIFICATIONS
1	1	SURGE SUPPRESSOR	IEEE C62.41 CATEGORY C, 100KA PER PHASE, 20KV/10KA SURGE CURRENT, NEMA LS-1, LED MONITORING EACH PHASE
2	1	MAIN CIRCUIT BREAKER	100 AMP, 2 POLE, 120/240VAC, MOLDED CASE, THERMAL-MAGNETIC, BOLT ON, FACTORY SEALED, 25KA IR @ 277V
3A	1	FUSE	5 AMP KTK, 600VAC, 100K AIC RMS SYMMETRICAL, NON-RENEWABLE
3B	1	FUSEHOLDER	30 AMP, 1 POLE, 600VAC, BOX LUG, FOR KTK TYPE FUSE
4	1	TERMINAL BLOCK	600VAC, 3 POSITION MIN., SCREW TERMINALS
5	1	SELECTOR SWITCH	10 AMP, 2 N.O. CONTACT BLOCKS, 3-POSITION MAINTAINED, 30 MM, NEMA 1 SURFACE MOUNTING, HAND-OFF-AUTO LEGEND PLATE, STANDARD KNOB, BLACK
6	2	POWER DISTRIBUTION BLOCKS	2/0-12 MAIN SIDE, 4-14 SECONDARY SIDE, RATED FOR USE WITH COPPER WIRE
7	4	CONTACTOR	2 POLE, N.O. CONTACTS, 120/240VAC, 60A, 120V COIL
8	6	FEEDER CIRCUIT BREAKER	2 POLE, N.O. 120/240VAC, MOLDED CASE, THERMAL-MAGNETIC, BOLT-ON, FACTORY SEALED, 14KA IR @ 277V, #4 CU SIDE LUGS
9	1	NEUTRAL BAR (BONDED)	24 PLACES MIN: #14-1/0 STRANDED COPPER CONDUCTORS
10	1	GROUND BAR	12 PLACES MIN: #14-1/0 STRANDED COPPER CONDUCTORS

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TYPICAL CONTROL CABINET SCHEMATIC DETAIL

NTS