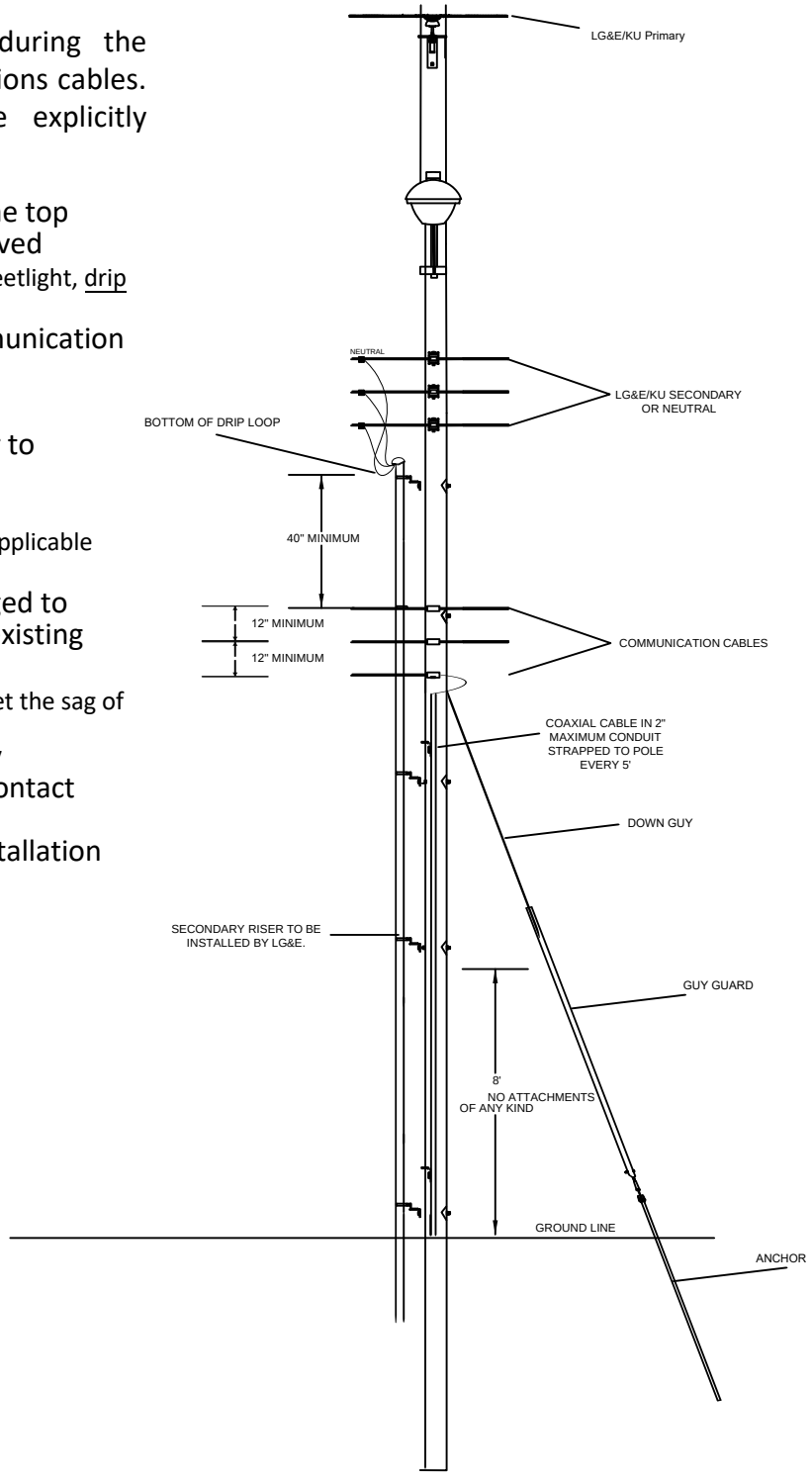
# Communication Cable Installation Requirements

The following requirements must be met during the installation and maintenance of all communications cables. Exceptions to these requirements must be explicitly granted on the approved design.

- Must have 48" between lowest power and the top communication cable unless otherwise approved
  - Lowest power includes neutral, secondary, streetlight, drip loops, transformers, other equipment, etc.
- Must have approximately 12" between communication cables
  - Bolt holes should not be closer than 4"
- All attachments must be properly guyed prior to installation
  - All guys must include guy guard
  - Ensure proper installation method is used for applicable anchor type
- Communication cables must be properly sagged to maintain mid-span clearances to power and existing communications cables
  - Communications cables must be sagged to meet the sag of the existing communications cables
- All communications cables must be tagged by Attachment Owner with name and 24-hour contact number
- Must notify LG&E/KU upon completion of installation of new communications cables



# VERTICAL CLEARANCE REQUIREMENTS BETWEEN LG&E/KU FACILITIES AND NON-LG&E/KU COMMUNICATION FACILITIES



**NESC SECTION 235 AND 238 REQUIREMENTS (NESC 2017)**

This standard details the clearance requirements at all locations between LG&E/KU's conductors and equipment and any non-LG&E/KU communication cables and equipment.

Two sections are shown below. Part I details the required clearances at the structure while Part II details the clearances at all other locations. Each part shows the typical clearances between facilities, the minimum clearances allowed by the NESC, and special clearance reductions which are allowed under certain circumstances.

All new facilities will be constructed using the "typical" clearances. New facilities placed on existing structures should also meet the "typical" clearance requirements wherever possible. However, clearances may be reduced to the minimum NESC clearances (including special clearance reductions) where necessary to prevent the need to replace the structure. Allowable special clearance reductions should only be used as the last option to replacing the structure.

## PART I - (VERTICAL CLEARANCES AT THE STRUCTURE - NESC RULE 235/238)

### TABLE A

| LG&E/KU FACILITIES | CLEARANCE TO COMMUNICATION FACILITIES | | |
|---|---|---|---|
| | TYPICAL | NESC MINIMUM | SPECIAL REDUCTION |
| NEUTRAL, GROUNDED GUYS AND SUPERVISORY CABLE | 48" | 40" | 30" * |
| SECONDARY (750V) & INSULATED GUYS | 48" | 40" | |
| 4.16 KV, 12.47 KV | 48" | 40" | |
| 13.8 KV | 48" | 43" | |
| 34.5 KV | 60" | 45" | |
| 69 KV | 120" | 54" | |
| 138 KV | 120" | 70" | |
| GROUNDED EQUIPMENT | 48" | 40" | 30" ** |
| UNGROUNDED EQUIPMENT | SAME AS PRIMARY CLEARANCE | | |
| STREET LIGHT | SEE PAGE 2 | | |

* NESC TABLE 235-5, NOTE 5 ** NESC TABLE 238-1, NOTE 1

**CLEARANCE REQUIREMENTS AT THE POLE ARE MEASURED BETWEEN:**

UPPER POSITION: Lowest supply conductor or metallic conductor support, including insulator pins, switch arms (in open position), aerial cable spacers and brackets, etc.

LOWER POSITION Upper most communication cable, messenger or the top of any communication equipment, including support brackets, equipment enclosures, splice packs, etc.

**SEE PAGE #2
TO DETERMINE HOW CLEARANCES AT THE STRUCTURE ARE MEASURED**

## PART II - (VERTICAL CLEARANCES AT ALL OTHER LOCATIONS - NESC RULE 235)

Clearances at all locations, other than at the structure, will be based on one of the following load cases (whichever results in the least amount of clearance). All sags are final sags.

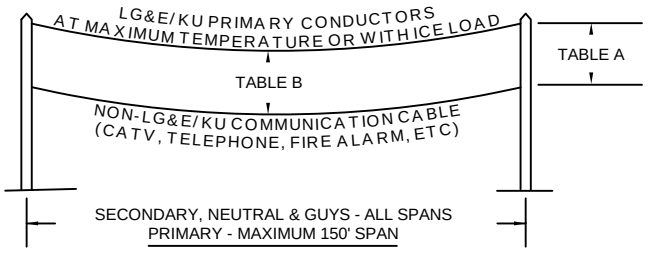
A) The upper supply conductor at its maximum operating temperature with the communication conductors at 120° F (maximum operating temperature is 120° F for voltages less than 69kV, and 212° F for voltages 69kV and above).

B) The upper supply conductor at 0° F with 1/2" ice and the communication conductor at 0° F with no ice.

### TABLE B

| LG&E/KU FACILITIES | TYPICAL CLEARANCE | NESC MINIMUM | SPECIAL CLEARANCE REDUCTION |
|---|---|---|---|
| SECONDARY, NEUTRALS & GUYS - ALL SPANS | | | |
| NEUTRAL,GROUNDED GUYS AND SUPERVISORY CABLE | 36" | 30" | 12" *** |
| SECONDARY (750V) & INSULATED GUYS | 36" | 30" | |
| PRIMARY CONDUCTORS - MAXIMUM OF 150' SPANS | | | |
| 4.16 KV, 12.47 KV | 36" | 30" | |
| 13.8 KV | 36" | 32" | |
| 34.5 KV | 48" | 34" | |
| 69 KV | 96" | 40" | |
| 138 KV | 96" | 55" | |

*** NESC RULE 235C2b(1)(a) EXCEPTION 1

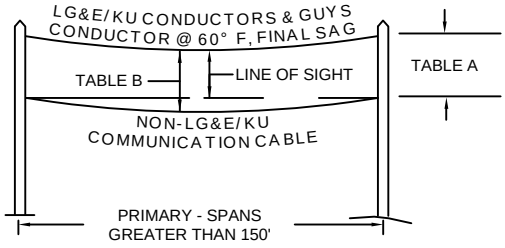



### CLEARANCES OF PRIMARY CONDUCTORS ON SPANS GREATER THAN 150'

When primary conductors (above 750V) are installed on spans longer than 150', a supplemental requirement must be met in addition to the NESC minimum clearances detailed in Table B. The clearances at the pole must be adjusted so that both the following conditions are met at any point in the span:

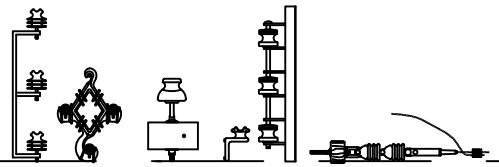
A) Clearances are not less than the values shown in Table B.

B) Clearance must be provided so that the supply conductor at 60 F, no wind displacement, final sag, will not sag below the line of sight between the attachment points of the highest communication conductor (NESC RULE 235C2b(3)).



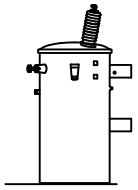
## REQUIREMENTS FOR DETERMINING VERTICAL CLEARANCES TO COMMUNICATION FACILITIES AT THE STRUCTURE (NESC RULE 238)

BOTTOM OF CONDUCTOR SUPPORTS AND BRACKETS

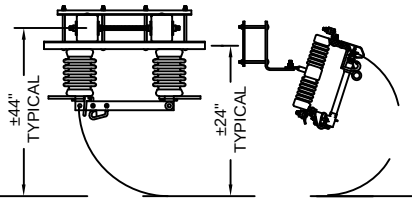


BOTTOM OF CONDUCTOR OR CONNECTOR

BOTTOM OF EQUIPMENT



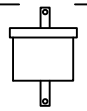
BOTTOM OF SWITCHES IN OPEN POSITION




**LOWEST LEVEL OF LG&E/KU CONDUCTORS, METAL CONDUCTOR SUPPORTS OR EQUIPMENT**

TABLE A

**TOP OF NON-UTILITY COMMUNICATION CABLE, CABLE SUPPORTS, EQUIPMENT & ENCLOSURES**

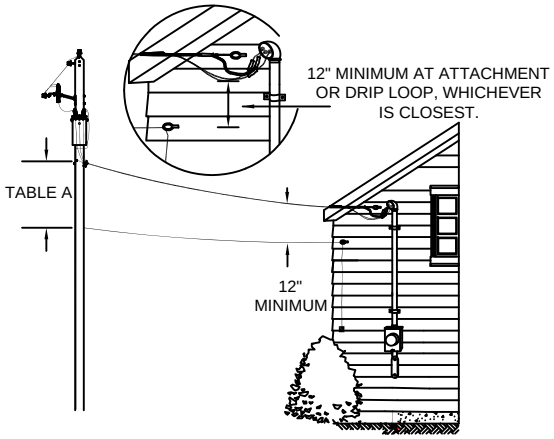


TOP OF COMMUNICATION BOX

TOP OF SPLICE CONNECTION

TOP OF CABLE CLAMP

Note: Communications service drops are no longer permitted on the service mast (above or below roof). NEC 230.28

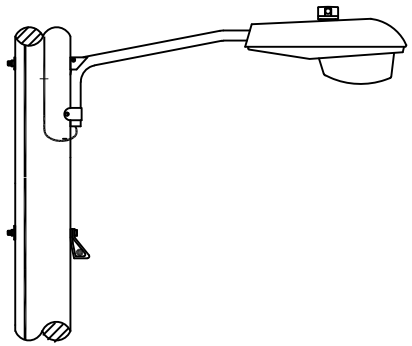



SERVICE DROPS ONLY

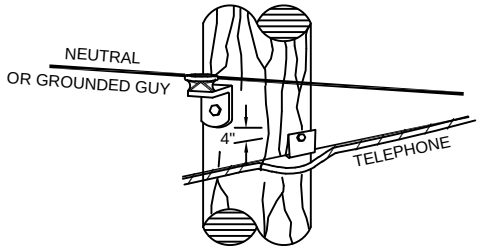
For secondary service drops only, clearance at any point within the span may be reduced to 12" if clearance at the pole is maintained to the values in Table B (NESC Rule 235C1 Exception 3)

## OTHER SPECIAL CLEARANCE REDUCTIONS

SEE STANDARD 021012



DRIP LOOP & LUMINAIRE TO COMMUNICATION CABLE/EQUIPMENT (NESC TABLE 238-2)




COMMUNICATION CROSSING

Where communication conductors cross under an effectively grounded neutral or grounded guy, clearances may be reduced to 4" provided clearance to energized conductors are maintained (NESC Rule 235C1 Exception 2).

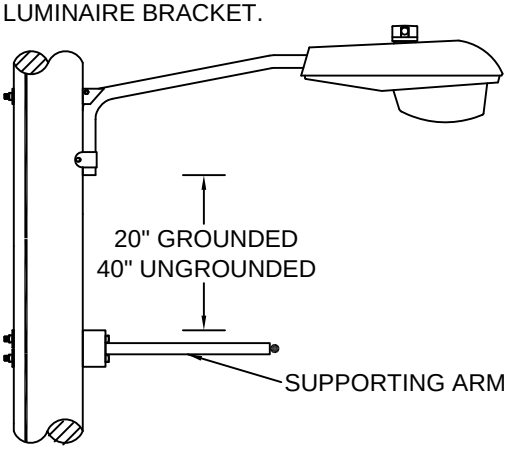
# NESC MINIMUM CLEARANCE REQUIREMENTS FROM STREETLIGHTS TO COMMUNICATION FACILITIES



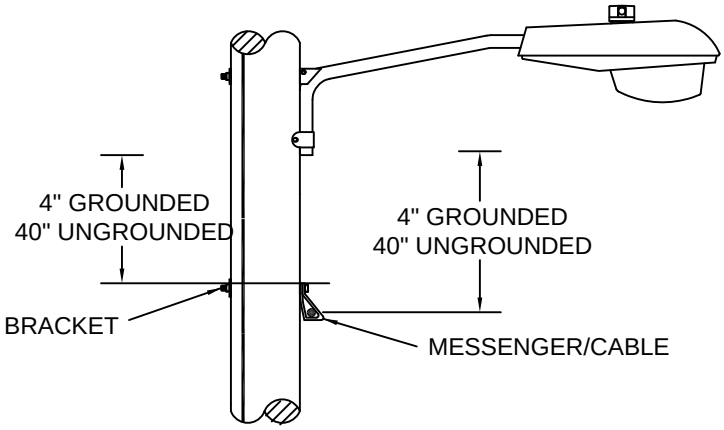
**NESC SECTION 238 REQUIREMENTS (NESC 2017)**

NOTE:

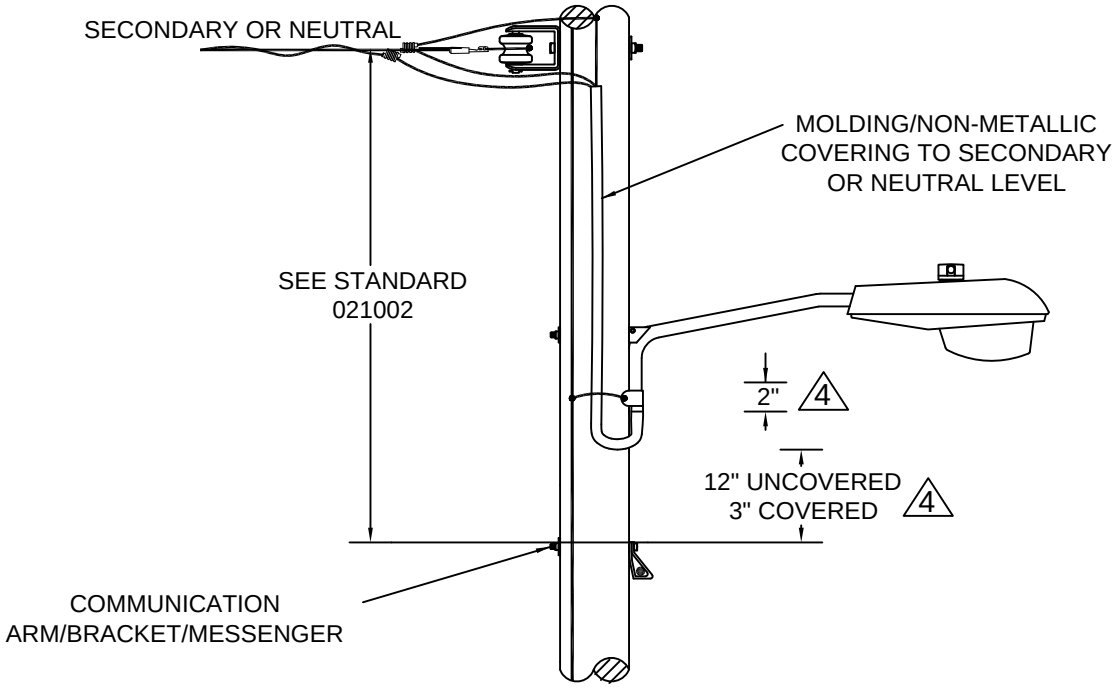
1. ALL NEW STREET LIGHT FIXTURES MUST BE EFFECTIVELY GROUNDED. IF UNABLE TO VERIFY GROUND, EITHER USE UNGROUNDED CLEARANCES OR FIXTURE MUST BE GROUNDED.
2. 40" MIN. CLEARANCE MUST BE MET BETWEEN NEUTRAL AND SECONDARY CABLE HARDWARE AND COMMUNICATIONS EQUIPMENT.
3. THE 12" AND 3" CLEARANCE ONLY APPLIES TO THE DRIP LOOP FEEDING THE LUMINAIRE.
4. THE REDUCED 3" CLEARANCE MAY BE USED IF NON-METALLIC COVERING IS PROVIDED AND EXTENDS 2" INTO LUMINAIRE BRACKET.




**CLEARANCE FROM LUMINAIRE BRACKET TO TOP OF COMMUNICATION SUPPORTING ARM**




**CLEARANCE FROM LUMINAIRE BRACKET TO TOP OF COMMUNICATION BRACKET OR CABLE/MESSENGER MOUNTED TO POLE (BOTH REQUIREMENTS APPLY)**




**CLEARANCE FROM DRIP LOOP TO TOP OF COMMUNICATION ARM/BRACKET/MESSENGER**

# NESC MINIMUM VERTICAL CLEARANCE OF WIRES, CONDUCTORS AND CABLES ABOVE GROUND, ROADWAYS, RAILS OR WATER SURFACES



**NESC SECTION 232 REQUIREMENTS (NESC 2017)**

## CLEARANCE OVER ALL WATER AREAS:

BOTH ACCESSIBLE AND UNACCESSIBLE TO SAILBOATS AND CLEARANCES OVER AREAS POSTED FOR RIGGING & LAUNCHING SAILBOATS. ALL CLEARANCES ARE ABOVE THE HIGHEST OBTAINABLE WATER LEVEL

WATER AREAS NOT SUITABLE FOR SAILBOATING OR WHERE SAILBOATING IS PROHIBITED

| WATER SIZE | COMM, NEUT GND GUYS | MULTIPLEX SECONDARY | OPEN WIRE SECONDARY | 4, 12, 13 & 34KV | TRANSMISSION |
|---|---|---|---|---|---|
| ALL SIZE | 14'-0" | 14'-6" | 15'-0" | 17'-0" | 69KV: 17'-8"<br>138KV: 19'-1"<br>161KV: 19'-7"<br>345KV: 23'-3" |

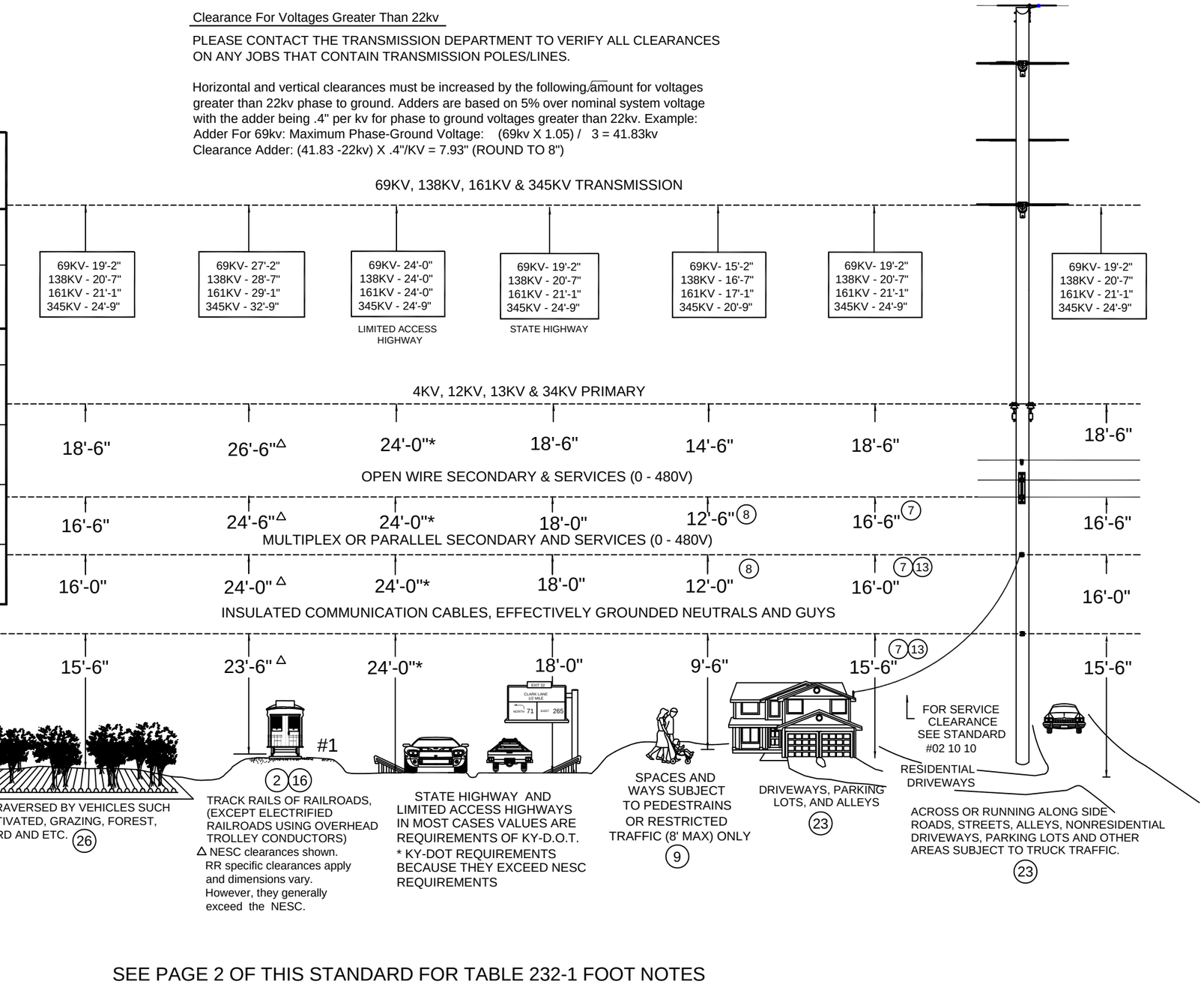
WATER AREAS SUITABLE FOR SAILBOATING INCLUDING LAKES, PONDS, RESERVOIRS, TITAL WATERS, RIVERS, STREAMS, AND CANALS WITH AN UNOBSTRUCTED SURFACE

| | | | | | |
|---|---|---|---|---|---|
| 0 TO 20 ACRES | 17'-6" | 18'-0" | 18'-6" | 20'-6" | 69KV: 21'-2"<br>138KV: 22'-7"<br>161KV: 23'-1"<br>345KV: 26'-9" |
| 21 TO 200 ACRES | 25'-6" | 26'-0" | 26'-6" | 28'-6" | 69KV: 29'-2"<br>138KV: 30'-7"<br>161KV: 31'-1"<br>345KV: 34'-9" |
| 201 TO 2000 ACRES | 31'-6" | 32'-0" | 32'-6" | 34'-6" | 69KV: 35'-2"<br>138KV: 36'-7"<br>161KV: 37'-1"<br>345KV: 40'-9" |
| OVER 2000 ACRES | 37'-6" | 38'-0" | 38'-6" | 40'-6" | 69KV: 41'-2"<br>138KV: 42'-7"<br>161KV: 43'-1"<br>345KV: 46'-9" |

Clearance For Voltages Greater Than 22kv

PLEASE CONTACT THE TRANSMISSION DEPARTMENT TO VERIFY ALL CLEARANCES ON ANY JOBS THAT CONTAIN TRANSMISSION POLES/LINES.

Horizontal and vertical clearances must be increased by the following amount for voltages greater than 22kv phase to ground. Adders are based on 5% over nominal system voltage with the adder being .4" per kv for phase to ground voltages greater than 22kv. Example:
Adder For 69kv: Maximum Phase-Ground Voltage: (69kv X 1.05) / 3 = 41.83kv
Clearance Adder: (41.83 -22kv) X .4"/KV = 7.93" (ROUND TO 8")




SEE PAGE 2 OF THIS STANDARD FOR TABLE 232-1 FOOT NOTES

**(VOLTAGES ARE PHASE TO GROUND FOR EFFECTIVELY GROUNDED CIRCUITS AND THOSE OTHER CIRCUITS WHERE ALL GROUND FAULTS ARE CLEARED BY PROMPTLY DE-ENERGIZING THE FAULTED SECTION, BOTH INITIALLY AND FOLLOWING SUBSEQUENT BREAKER OPERATIONS.)**

2) For wires, conductors, or cables crossing over mine, logging, and similar railways that handle only cars lower than standard freight cars, the clearance may be reduced by an amount equal to the difference in height between the highest loaded car handled and 20 ft, but the clearance shall not be reduced below that required for street crossings.

4) In communities where 21 ft has been established, this clearance may be continued if carefully maintained. The elevation of the contact conductor should be the same in the crossing and next adjacent spans. (See Rule 225D2 for conditions that must be met where uniform height above rail is impractical.)

5) In communities where 16 ft has been established for trolley and electrified railroad contact conductors 0 to 750 V to ground, or 18 ft for trolley and electrified railroad contact conductors exceeding 750 V, or where local conditions make it impractical to obtain the clearance given in the table, these reduced clearances may be used if carefully maintained.

7) Where vehicles exceeding 8 ft in height are not normally encountered nor reasonably anticipated, service drop(s) clearances over residential driveways only may be reduced to the following:

| | | (feet) |
|---|---|---|
| (a) | Insulated supply service drops limited to 300 V to ground | 12.5 |
| (b) | Insulated drip loops of supply service drops limited to 300 V to ground | 10.5 |
| (c) | Supply service drops limited to 150 V to ground and meeting Rules 230C1 or 230C3 | 12.0 |
| (d) | Drip loops only of service drops limited to 150 V to ground and meeting Rule 230C1 or 230C3 | 10.0 |
| (e) | Insulated communication service drops | 11.5 |

8) These clearances values for service drops to residential buildings only may be reduce to the following:

| | | (feet) |
|---|---|---|
| (a) | Insulated supply service drops limited to 300 V to ground | 10.5 |
| (b) | Insulated drip loops of supply service drops limited to 300 V to ground | 10.5 |
| (c) | Supply service drops limited to 150 V to ground and meeting Rules 230C3 | 10.0 |
| (d) | Drip loops only of supply service drops limited to 150 V to ground and meeting Rule 230C3 | 10.0 |

9) Spaces and ways subject to pedestrians or restricted traffic only are those areas where riders on horses or other large animals, vehicles, or other mobile units exceeding a total height of 8 ft are prohibited by regulation or permanent terrain configurations, or are otherwise not normally encountered nor reasonably anticipated.

13) Where this construction crosses over or runs along (a) alleys, non-residential driveways, or parking lots not subject to truck traffic, or (b) residential driveways, this clearance may be reduced to 15 ft.
16) Adjacent to tunnels and overhead bridges that restrict the height of loaded rail cars to less than 20 ft, these clearances may be reduced by the difference between the highest loaded rail car handled and 20 ft, if mutually agreed to by the parties at interest.

17) For controlled impoundments, the surface area and corresponding clearances shall be based upon the design high-water level.

18) For uncontrolled water flow areas, the surface area shall be that enclosed by its annual high-water mark. Clearances shall be based on the normal flood level; if available, the 10-year flood level may be assumed as the normal flood level.

19) The clearance over rivers, streams, and canals shall be based upon the largest surface area of any 1-mi- segment that includes the crossing. The clearance over a canal, river, or stream normally used to provide access for sailboats to a larger body of water shall be the same as that required for the larger body of water.

20) Where a bridge or other overwater obstruction restricts vessel height to less than the applicable reference height given in Table 232-3, the required clearance may be reduced by the difference between the reference height and the overwater obstruction height for the area of the body of water over which the line crosses, except that the reduced clearance shall be not less than that required for the surface area on the lin-crossing side of the obstruction.

21) Where the US Army Corps of Engineers, or the state, or surrogate thereof has issued a crossing permit, clearances of that permit shall govern.

23) For the purpose of this Rule, trucks are defined as any vehicle exceeding 8 ft in height. Areas not subject to truck traffic are areas where truck traffic is not normally encountered nor reasonably anticipated.

26) When designing a line to accommodate oversized vehicles, these clearance values shall be increased by the difference between the known height of the oversized vehicle and 14 ft.

**SEE RULES 232B1, 232C1A, AND 232D4.)**

***Rule 232B***. Clearance of Wires, Conductors, Cables, Equipment, and Support Arms Mounted on Supporting Structures

***1***. Clearance to Wires, Conductors, and Cables - The vertical clearance of wires, conductors, and cables above ground in generally accessible places, roadway, rail, or water surface. Shall be not less than that shown in Table 232-1.

**NOTE: The printed copy of NESC 2017 incorrectly references Table 230-1 in Rule 232B1. It has been confirmed with the NESC that the table referenced should have been Table 232-1.**

***Rule 232C***. Additional Clearances for Wires, Conductors, Cables, and Unguarded Rigid Live Parts of Equipment Greater clearances than specified by Rule 232B shall be provided where required by Rule 232C1.

***1***. Voltages Exceeding 22 kV

***a***. For voltages between 22 and 470 kV, the clearance specified in Rule 232B1 1(Table 232-1) or Rule 232B2 (Table 232-2) shall be increased at the rate of 10 mm (0.4 in) per kilovolt in excess of 22 kV. For voltages exceeding 470 kV, the clearance shall be determined by the method given in Rule 232D. All clearances for lines over 50 kV shall be based on the maximum operating voltage.

*EXCEPTION:* For voltages exceeding 98 kV ac to ground or 139 kV dc to ground, clearances less than those required above are permitted for systems with known maximum switching-surge factors (see Rule 232D).

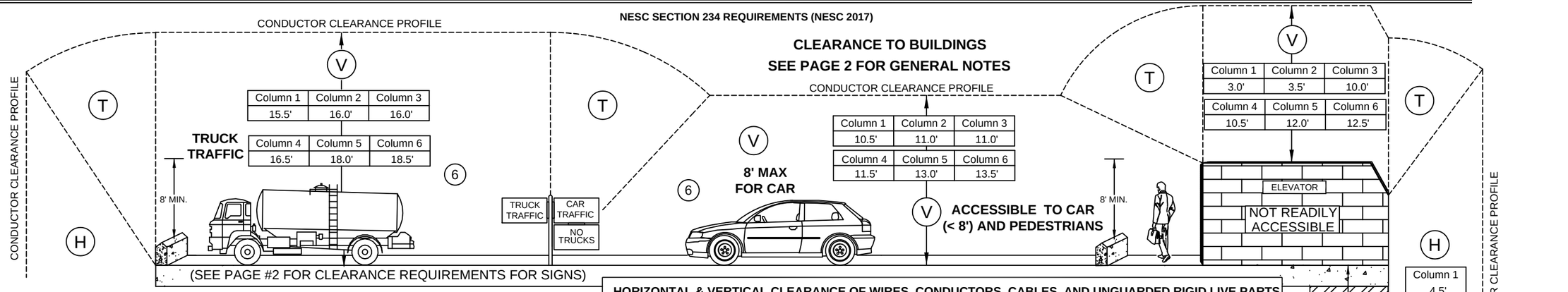
***Rule 232D.*** Alternate Clearances for Voltages Exceeding 98 kV AC to Ground or 139 kV DC to Ground.

***4.*** Limit .
The alternate clearance shall be not less than the clearance given in Tables 232-1 or 232-2 computed for 98 kV ac to ground in accordance with Rule 232C.

# MINIMUM NESC CLEARANCE OF CONDUCTORS TO BUILDINGS, SIGNS & OTHER INSTALLATIONS EXCEPT BRIDGES



**NESC SECTION 234 REQUIREMENTS (NESC 2017)**




SEE STANDARD #02 10 06

NOTE :

THIS STANDARD DETAILS THE MINIMUM N.E.S.C. ALLOWABLE CLEARANCES BETWEEN LG&E CONDUCTORS, CABLES, AND RIGID LIVE PARTS TO BUILDINGS, SIGNS BILLBOARDS,CHIMNEYS, RADIO AND TELEVISION ANTENNAS, FLAGPOLES, FLAGS, BANNERS, AND ANY PROJECTIONS THEREFROM, TANKS & OTHER INSTALLATIONS
THIS STANDARD DOES NOT COVER CLEARANCES TO THE SUPPORTING STRUCTURE, TO OTHER SUPPORTING STRUCTURES, TO BRIDGES, POOLS, GRAIN BINS OR ABOVE GROUND.

**APPLICABLE NESC FOOT NOTES FROM TABLE 234-1:**

2) Where available space will not permit this value, the clearance may be reduced by 2 ft provided the wires, conductors, or cables, including splices and taps, and unguarded rigid live parts have a covering that provides sufficient dielectric strength to limit the likelihood of a short circuit in case of momentary contact with a structure or building.
3) A roof, balcony, or similar structure is considered readily accessible to pedestrians if it can be casually accessed through a doorway, window, ramp, stairway, or permanently mounted ladder by a person, on foot, who neither exerts extraordinary physical effort nor employs tools or devices to gain entry. A permanently mounted ladder is not considered a means of access if its bottom rung us 8 ft or more from the ground or other permanently installed accessible surface or is otherwise equipped with barriers to inhibit climbing by unauthorized persons.
4) The required clearances shall be to the closest approach of motorized signs or moving portions of installations covered by rule 234c.
5) The portion(s) of span guys between guy insulators and the portion(s) of anchor guys above guy insulators that are not effectively grounded shall have clearances based on the highest voltage to which they may be exposed due to a slack conductor or guy.
6) For the purpose of this rule, trucks are defined as any vehicle exceeding 8 ft in height.
7) This clearance may be reduced to 3 in for the grounded portions of guys.
8) Windows not designed to open may have the clearances permitted for walls and projections.
9) The clearance at rest shall be not less than the value shown in this table. Also, when the conductor or cable is displaced by wind, the clearance shall be not less than 3.5 ft; see Rule 234C1b.
10) The clearance at rest shall be not less than the value shown in this table. Also, when the conductor or cable is displaced by wind, the clearance shall be not less than 4.5 ft; see Rule 234C1b.
11) The portion of anchor guys below the lowest insulator meeting Rules 279A1 and 215C2a may have the same clearance as effectively grounded guys.
14) For clearances above railings, walls, or parapets around balconies or roofs, use the clearances required for row 1b(1). For such clearances where an outside stairway exists, use the clearances required for row 2b(2).
15) Does not include neutral conductors meeting Rule 230E1.
16) These clearance values also apply to guy insulators.
17) It is presumed that a flag or banner is fully extended but that there is no deflection or displacement of the flagpole or other supporting structure due to wind and that the conductors, cables, or rigid live parts are not displaced by the wind. The specified clearance is measured to the point of maximum displacement of the banner or flag towards the overhead utility facility.
18) When designing a line to accommodate oversized vehicles, these clearance values shall be increased by the difference between the known height of the oversized vehicle and 14 ft.

**HORIZONTAL & VERTICAL CLEARANCE OF WIRES, CONDUCTORS, CABLES, AND UNGUARDED RIGID LIVE PARTS ADJACENT BUT NOT ATTACHED TO BUILDINGS, UNGUARDED RIGID LIVE PARTS ADJACENT BUT NOT ATTACHED TO BUILDINGS AND OTHER INSTALLATIONS EXCEPT BRIDGES AND SIGNS (12)**

| | Column 1 | Column 2 | Column 3 | Column 4 | | Column 5 | Column 6 | |
|---|---|---|---|---|---|---|---|---|
| | Insulated communication conductors and cables; messengers; overhead shield/surge-protection wires; effectively grounded guys; ungrounded portions of guys meeting Rules 215C2 and 279A1 exposed to 0 to 300 V (11)(16); neutral conductors meeting Rule 230E1; supply cables meeting Rule 230C1 (ft) | Supply cables of 0 to 750 V meeting Rule 230C2 or 230C3 (ft) | Unguarded Secondary Rigid Live Parts 0-750 V; noninsulated communication conductors; ungrounded equipment cases, 0 to 750 V; and ungrounded portions of guys meeting Rules 215C2 and 279A1 exposed to open supply conductors of over 300 V to 750 V (5)(14) (ft) | Supply cables over 750 V meeting Rule 230C2 or 230C3; open supply conductors, 0 to 750 V (15) (ft) | | Unguarded rigid live parts, over 750 V to 22 kV; ungrounded equipment cases, 750 V to 22 kV; ungrounded portions of guys meeting Rules 215C2 and 279A1 exposed to over 750 V to 22 kV (5)(16) (ft) | Open supply conductors, over 750 V to 22 kV (ft) | |
| **A. HORIZONTAL** | **All Conditions** | **All Conditions** | **All Conditions** | **At Rest** | **W / Wind** | **All Conditions** | **At Rest** | **W / Wind** |
| (1) TO WALLS, PROJECTIONS, AND GUARDED WINDOWS | (2)(7) 4.5' | (2) 5.0' | (2) 5.0' | (2)(9) 5.5' | (9) 3.5' | (2) 7.0 | (2)(10)(11) 7.5' | (10) 4.5' |
| (2) TO UNGUARDED WINDOWS (8) | 4.5' | 5.0' | 5.0' | (9) 5.5' | (9) 3.5' | 7.0 | (10)(11) 7.5' | (10) 4.5' |
| (3) TO BALCONIES AND AREAS READILY ACCESSIBLE TO PEDESTRIANS (3) | 4.5' | 5.0' | 5.0' | (9) 5.5' | (9) 3.5' | 7.0 | (10)(11) 7.5' | (10) 4.5' |
| **B. VERTICAL (14)** | **WITHOUT WIND** | **WITHOUT WIND** | **WITHOUT WIND** | **WITHOUT WIND** | | **WITHOUT WIND** | **WITHOUT WIND** | |
| (1) OVER OR UNDER ROOFS NOT READILY ACCESSIBLE TO PEDESTRIANS (3) | 3.0' | 3.5' | 10.0' | 10.5' | | 12.0' | 12.5' | |
| (2) OVER OR UNDER ROOFS, BALCONIES, DECKS, OR SIMILAR STRUCTURES READILY ACCESSIBLE TO PEDESTRIANS (3) | 10.5' | 11.0' | 11.0' | 11.5' | | 13.0' | 13.5' | |
| (3) OVER ROOFS, RAMPS, DECKS AND LOADING DOCKS ACCESSIBLE TO VEHICLES BUT NOT SUBJECT TO TRUCK TRAFFIC (6) | 10.5' | 11.0' | 11.0' | 11.5' | | 13.0' | 13.5' | |
| (4) OVER ROOFS, RAMPS, DECKS AND LOADING DOCKS ACCESSIBLE TO TRUCK TRAFFIC (6)(18) | 15.5' | 16.0' | 16.0' | 16.5' | | 18.0' | 18.5' | |

**H = HORIZONTAL, V= VERTICAL and T= TRANSITIONAL VERTICAL**
**Clearance Adders for Voltages greater than 22kv Phase to Ground, (Measured Line to Line)( 69kv - 8", 138kv - 2'-1", 161kv - 2'-7", 345kv - 6'-3" )**

## RULE 234C - Clearances Of Wires, Conductors, Cables, and Rigid Live Parts To Buildings, Signs, Billboards, Chimneys, Radio And Television Antennas, Tanks, Flagpoles, Flags, Banners, And Other Installations Except Bridges

### General

This standard details the minimum National Electrical Safety Code (N.E.S.C.) clearance requirements of wires, conductors, cables, and rigid live parts to buildings, signs, billboards, chimneys, radio and television antennas, tanks, and other installations. It does not cover clearances to the supporting structure, to other supporting structures (poles), over pools, to bridges, or to grain bins.

The clearance requirements detailed in this standard must be evaluated in addition to the minimum allowable conductor clearance above ground, N.E.S.C. Rule 232 as detailed on Standard 02 10 06. Clearance requirements for billboards and signs are detailed on this page. Clearance requirements for buildings are detailed on page 1 of this standard.

### Clearance Requirements

Clearances to buildings and signs must be checked under all of the following conductor load cases.

Horizontal And Vertical
1) 120° F, No Wind, Final Sag
2) Maximum Operating Temperature (if greater than 120° F), Final Sag, No Wind
3) 32° F, No Wind, 1/2" Ice, Final Sag
4) -20° F, No Wind, Initial Sag

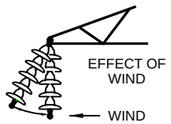
Horizontal
5) 60° F, Final Sag, 6 lb/ft$^2$ Wind (This can be reduced to 4 lbs/ft$^2$ in sheltered areas

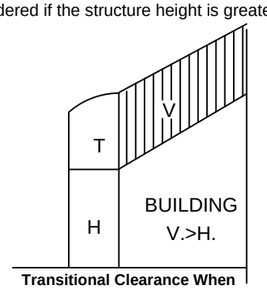
### Vertical Clearance Notes

(V) Vertical clearances should be checked for Load Cases. 1 - 4, each with no wind displacement.

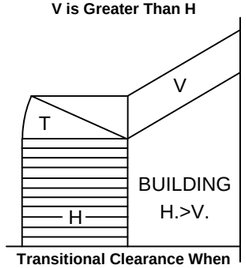
### Horizontal Clearance Notes

(H) Clearances must be considered for all 5 load cases shown above. The clearance requirements for some of the conductors are different when loaded with and without wind. All cases must be checked for compliance. When accessing the clearances of the load case with wind, the movement of insulators and other flexible supports must also be considered. Deflection of the structure must also be considered if the structure height is greater than 60'.




**Transitional Clearance When V is Greater Than H**




**Transitional Clearance When H is Greater Than V**

NOTE:
The requirements in this standard detail the absolute minimum allowable clearances and should not be used as design guidelines. Values used for design purposes should generally exceed the values detailed in this standard to allow for unknown or unexpected changes in the field during construction and over the life of the installation.

### Clearances General

Clearances must be evaluated in three distinct areas, as shown on the diagrams on this standard. (H)-Horizontal and (V)-Vertical requirements are taken from the table. The (T)-Transition between (H) and (V) requirements is a means of connecting the (H) and (V) requirements together. This Transitional radius = (V) when V>H, and based on (H) when H>V.

Clearance requirements are shown in the tables on this standard. Each table details the requirements by the type/voltage of the conductor and the nature of the building or sign nearby (ie roof, wall, window, etc.)

### Clearance For Voltages Greater Than 22kv

Horizontal and vertical clearances must be increased by the following amount for voltages greater than 22kv phase to ground. Adders are based on 5% over nominal system voltage with the adder being .4" per kv for phase to ground voltages greater than 22kv.

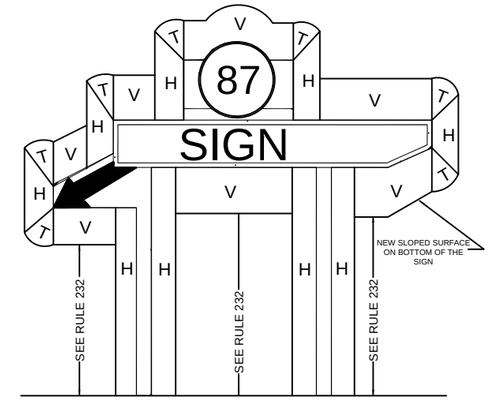
Example: Adder For 69kv: Maximum Phase-Ground Voltage: (69kv X 1.05) / $\sqrt{3}$ = 41.83kv
Clearance Adder: (41.83 -22kv) X .4"/KV = 7.93" (ROUND TO 8")

**Table 234-1 - Signs, chimneys, billboards, radio and television antennas, tanks, antennas, tanks, flagpoles, flags, banners and other installations not classified as bridges or buildings (12)**

| Column 1 | Column 2 | Column 3 | Column 4 | Column 5 | Column 6 |
|---|---|---|---|---|---|
| Insulated communication conductors and cables; messengers; overhead shield/surge-protection wires; effectively grounded guys; ungrounded portions of guys meeting Rules 215C2 and 279A1 exposed to 0 to 300 V (11)(16) neutral conductors meeting Rule 230E1; supply cables meeting Rule 230C1 (ft) | Supply cables of 0 to 750 V meeting Rule 230C2 or 230C3 (ft) | Unguarded Secondary Rigid Live Parts 0-750 V; noninsulated communication conductors; ungrounded equipment cases, 0 to 750 V; and ungrounded portions of guys meeting Rules 215C2 and 279A1 exposed to open supply conductors of over 300 V to 750 V (5)(14) (ft) | Supply cables over 750 V meeting Rule 230C2 or 230C3; open supply conductors, 0 to 750 V (15) (ft) | Unguarded rigid live parts, over 750 V to 22 kV; ungrounded equipment cases, 750 V to 22 kV; ungrounded portions of guys meeting Rules 215C2 and 279A1 exposed to over 750 V to 22 kV (5)(16) (ft) | Open supply conductors, over 750 V to 22 kV (ft) |

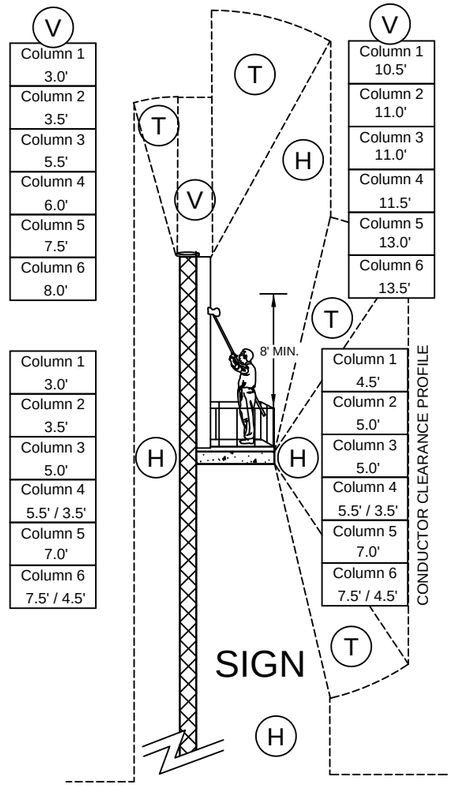
| A. HORIZONTAL (4) | All Conditions | All Conditions | All Conditions | At Rest | W / Wind | All Conditions | At Rest | W / Wind |
|---|---|---|---|---|---|---|---|---|
| (1) To portions that are readily accessible to pedestrians (3) | 4.5' | 5.0' | (2) 5.0' | (9) 5.5' | (9) 3.5' | (2) 7.0 | (10)(11) 7.5' | (10) 4.5' |
| (2) To portions that are not readily accessible to pedestrians (3) | 3.0' | 3.5' | (2) 5.0' | (2)(9) 5.5' | (9) 3.5' | (2) 7.0 | (2)(10)(11) 7.5' | (10) 4.5' |
| **B. VERTICAL** | | | | | | | | |
| (1) Over or under catwalks and other surfaces upon which personnel walk | 10.5' | 11.0' | 11.0' | 11.5' | | 13.0' | 13.5' | |
| (2) Over or under other portions of such installations (4) | 3.0' | 3.5' | 5.5' | 6.0' | | 7.5' | 8.0' | |

**H = HORIZONTAL, V= VERTICAL and T= TRANSITIONAL VERTICAL**
**Clearance Adders for Voltages greater than 22kv Phase to Ground, (Measured Line to Line)( 69kv - 8", 138kv - 2'-1", 161kv - 2'-7", 345kv - 6'-3" )**




**SIGNS**

**NOT ACCESSIBLE TO PEDESTRIANS** + **ACCESSIBLE TO PEDESTRIANS**




MINIMUM GROUND CLEARANCE RULE 232

# NESC CONDUCTOR CLEARANCES TO OTHER SUPPORTING STRUCTURES



**NESC SECTION 234 REQUIREMENTS (NESC 2017)**

This standard details the minimum National Electrical Safety Code (NESC) Rule 234B clearances for wires, conductors, or cables of one line passing over, under or beside a lighting support, traffic signal support or a supporting structure of a second line or intermediate poles in skip-span construction (including other LG&E AND KU structures), without being attached thereto. Also shown are Table 233-1 values for vertical clearance of conductors and cables to effectively grounded support guys passing over/under lines used for supporting traffic lights or other communications cables. All values represent absolute minimum clearances and should not be used as design values.

Horizontal and Vertical clearances must be checked under at rest conditions at the sag that produces the minimum clearance. Horizontal clearances must also be checked under wind conditions. The following conditions apply.

| | |
|---|---|
| Horizontal And Vertical (No Wind) | 120º F, no wind, final sag<br>Maximum operating temperature (if greater than 120º), no wind, final sag<br>32º F, no wind, 1/2" ice, final sag<br>-20º F, no wind, initial sag |
| Horizontal (with Wind) | 60º F, 6#/ft$^2$ wind (reduced to 4#/ft$^2$ in sheltered areas), final sag |

Rule 234 B clearances are based on standard values for Horizontal (5 ft for voltages up to 22 kV, no wind) and Vertical (4.5 ft for voltages up to 22 kV. For voltages between 22 kV and 50 kV, add 0.4 inches per kV above 22 kV) as modified by exceptions. Other requirements apply to Horizontal clearances with wind. The table below shows minimum values with allowable exceptions (H-1) and (V-1).

| Clearance By Conductor Or Cable Type<br><br>All Voltages Are Phase-Ground For Effectively Grounded Systems<br><br>**SEE PAGE 2 FOR EXAMPLES** | Insulated Communications Cables Messengers Neutrals Grounded Guys Duplex, Triplex Quadruplex & Paralay Secondary 0-300V (ft) | 480V 3-wire (Delta) Quadruplex (ft) | Open Wire Secondary 0-750V (ft) | | Open Wire Primary & Aerial Cable 750V-<22KV (ft) | | Open Wire Primary & Aerial Cable 22KV-50KV See NESC Rule 234G (ft) | |
|---|---|---|---|---|---|---|---|---|
| **Rule 234 B - Horizontal And Vertical Clearance Of Wires, Conductors And Cables To Other Supporting Structures** | | | | | | | | |
| **Horizontal Clearance**<br>**At Rest All Sag Conditions (H)**<br>**At 60ºF Final Sag With 6#/ft$^2$ Wind (HW)** | **H**<br>**At Rest** | **H**<br>**At Rest** | **H**<br>**At Rest** | **HW**<br>**With Wind** | **H**<br>**At Rest** | **HW**<br>**With Wind** | **H**<br>**At Rest** | **HW**<br>**With Wind** |
| | 5'<br>3' By Exception H-1 | 5' | 5' | 3.5 | 5' | 4.5' | 5'<br>+.4"/KV>22KV | 4.5'<br>+4"/KV>22KV |
| **Vertical Clearance (V)**<br>**At Rest All Sag Conditions** | **V**<br>**All Sags** | **V**<br>**All Sags** | **V**<br>**All Sags** | | **V**<br>**All Sags** | | **V**<br>**All Sags** | |
| | 4.5'<br>2' By Exception V-1 | 4.5'<br>2.5' By Exception V-2 | 4.5'<br>2.5' By Exception V-2 | | 4.5'<br>2.5' By Exception V-2 | | 4.5'<br>2.5' By Exception V-2<br>+4"/KV>22KV | |
| **Vertical Clearance To Traffic Signal Support Messengers And Other Support Guys (VG) - All Conditions (From Table 233-1)** | | | | | | | | |
| **Vertical Clearance (VG)**<br>To Traffic Signal Messengers And Other Guys Crossing Over/Under Conductors At Rest All Sag Conditions | **V**<br>**All Sags** | **V**<br>**All Sags** | **V**<br>**All Sags** | | **V**<br>**All Sags** | | **V**<br>**All Sags** | |
| | 2' | 2' | 4' | | 5' | | 5'<br>+.4"/KV>22KV | |

Horizontal Exception
(H-1) EXCEPTION: For effectively grounded guys and messengers, insulated communication conductors and cables, neutrals meeting Rule 230E1, and cables of 300 V or less to ground meeting the requirements of Rule 230C1, 230C2, or 230C3, the horizontal clearance may be reduced to 900 mm (3 ft) per NESC 234B1a.

Vertical Exceptions (May not be used cumulatively)
(V-1) EXCEPTION 1: For effectively grounded guys and messengers, insulated communication conductors and cables, and neutrals meeting Rule 230E1 and for cables of 300 V or less to ground meeting the requirements of Rule 230C1, 230C2, or 230C3, the vertical clearance may be reduced to 600 mm (2 ft).
(V-2) EXCEPTION 2: The vertical clearances may be reduced by 600 mm (2 ft) if both of the following conditions are met:
a. The wires, conductors, or cables above and the supporting structure of another line below are operated and maintained by the same utility.
b. Employees do not work above the top of the supporting structure unless:
1. The upper circuit is de-energized and grounded per Rule 444D or temporarily insulated or repositioned, or
2. Other equivalent measures are taken

This standard covers minimum clearance requirements to other structures. It does not cover clearances to other conductors carried on adjacent structures. Those clearances are specified under NESC Rule 233. When nearby structures also support conductors or cables, both clearance to the structure and conductor-to-conductor clearances to the lines on the other structure must be checked to determine minimum clearance requirements.

This standard also does not apply to clearances to signs or building under Rule 234 (See Standard 02 10 08) or other objects not classified as supporting structures.

**FIGURE 1 - TYPICAL STRUCTURE CLEARANCE ENVELOPE**

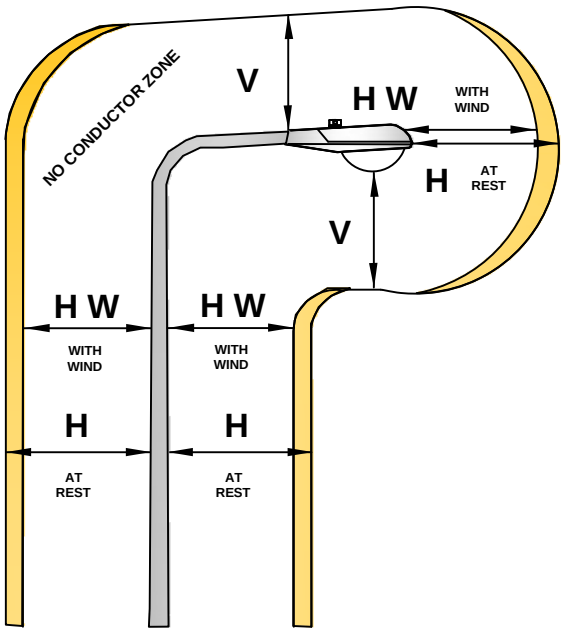



**FIGURE 2**
**CLEARANCE APPLICATION**

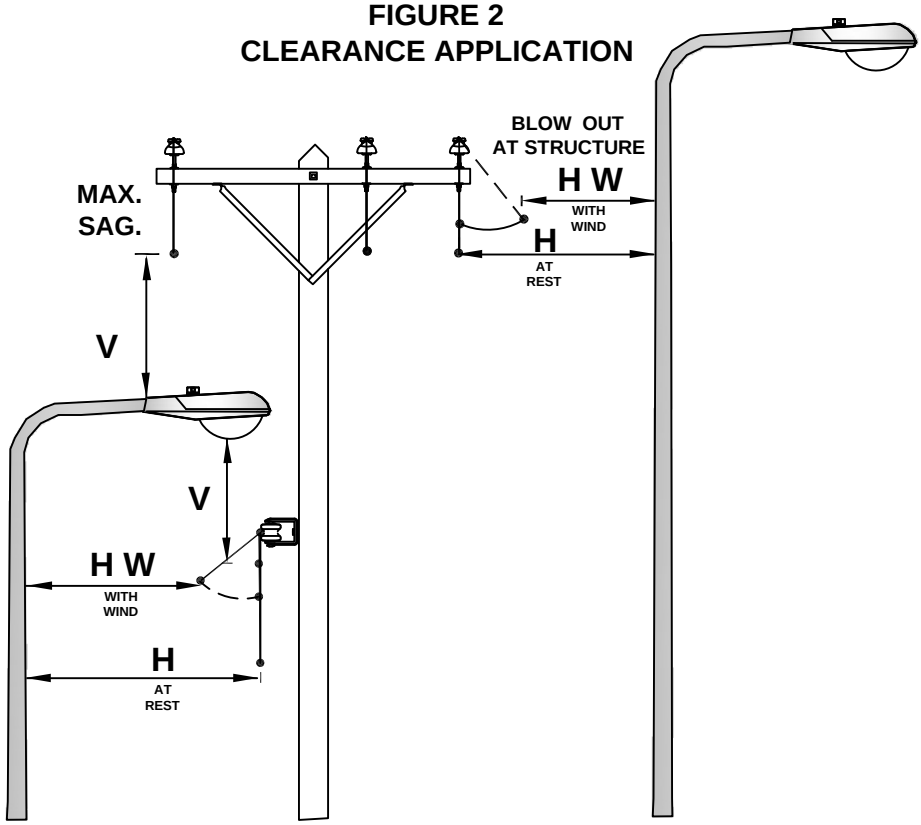
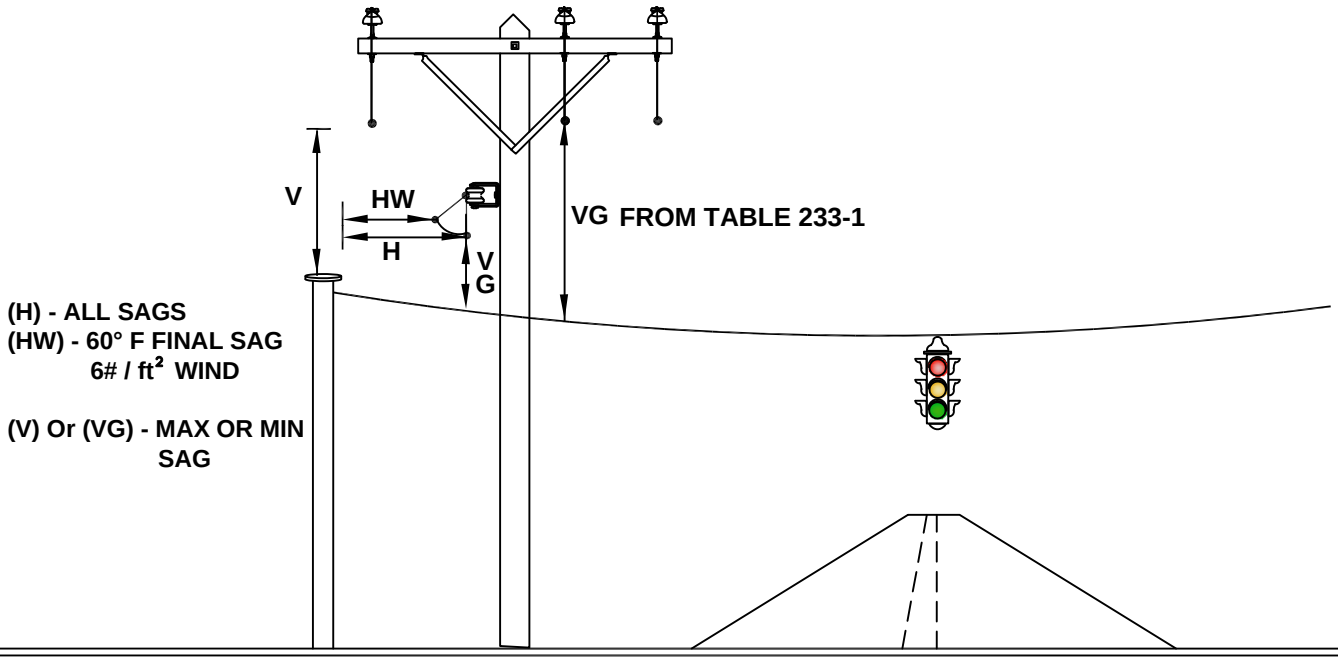



**FIGURE 3**
**CLEARANCE TO COMMUNICATIONS GUYS AND MESSENGERS**



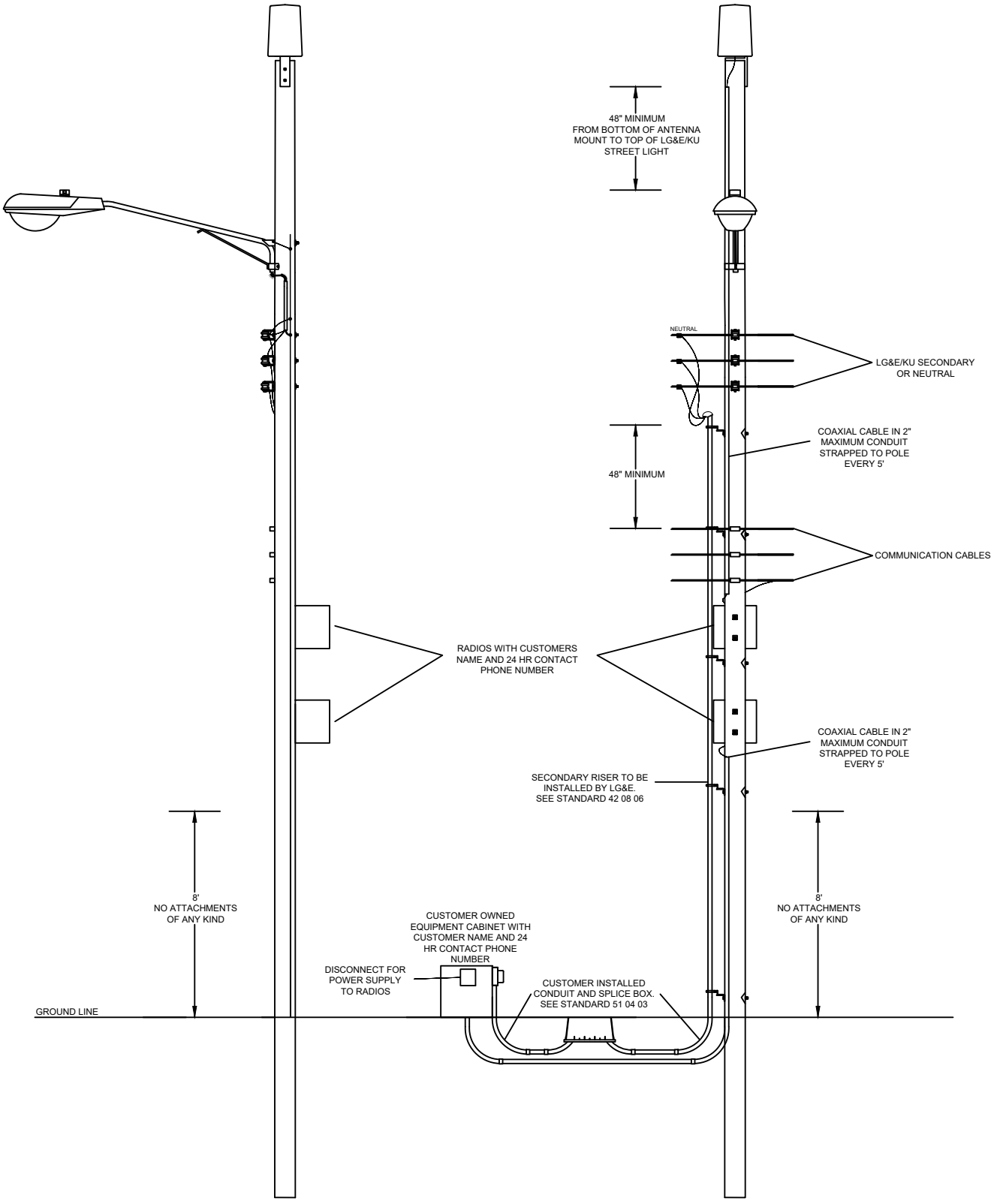
GUIDELINES FOR DESIGN AND INSTALLATION

- When requesting wireless antenna attachment on LG&E/KU poles, the Attachment Customer must first look at attaching to secondary, service, drop or guy poles. Only when no such pole is available may an Attachment Customer request attachment to a single phase primary pole.
- All clearance dimensions are a minimum distance.
- Installations will be allowed on bucket truck accessible poles only, where bucket truck poses no risk of damage to public or private property.
- Consult Distribution Operations Design Group to ensure that 120/240 volt service is available on the pole in question.
- All installations must conform to all applicable electrical codes and LG&E/KU requirements for clearances, climbing space and working space.
- All communications equipment shall be furnished and installed by the facility owner. Refer to Standard 510403 for service related equipment.
- Only qualified personnel approved by LG&E/KU shall be allowed to work above the communications space. They shall be trained in and knowledgeable of the clearance requirements and working rules of OSHA and the NESC.
- A driven ground is required at each equipment location. Grounding shall be in accordance with all applicable electrical codes. Bond the antenna bracket and radio/equipment box(s) to ground lead.
- Only one antenna unit shall be installed per pole.
- The height of all poles used to mount antennas must be increased by a minimum of five feet above the existing pole's height unless otherwise approved by LG&E/KU Distribution Operations staff. Pole heights not to exceed 10' taller than the existing pole unless otherwise approved by LG&E/KU. The cost of the taller pole is the responsibility of the Attachment Customer.
- Minimum Class 3 pole is required unless approved by LG&E/KU Distribution Operations staff.
- If a pole is topped for installation the untreated pole top must be treated and covered.
- Unit may not be mounted to any pole on which there are transformers, risers, vertical supply conductors to aerial services, switch handles, capacitor banks or similar fixtures.
- The service riser shall be installed by LG&E/KU unless otherwise approved by LG&E/KU staff.
- Wireless attachment installations must be metered unless un-metered service is specifically directed by LG&E/KU. No third-party meters will be allowed on LG&E/KU poles.
- The meter socket shall be a minimum of 100 amp, ringless style, with bypass horns. The service will be three wire 120/240 volt. Two wire 120 volt service is not acceptable.
- The antenna power source must have an additional lockable disconnect installed to allow the antenna and radio/equipment boxes to be disconnected from the battery backup before work is performed within the area designated by the RF Warning signs. Each disconnect must provide a visible break, a test point, or similar means for utility workers to ensure circuit has been de-energized. Each attaching company may provide and install a lockbox with a key to their disconnect switch inside. LG&E/KU will padlock the lockbox to enable access to the attacher's key for the disconnect switch.
- All antennas are required to have two RF warning signs installed. A sign shall be installed near the pole top at the level where the safe approach distance ends for the FCC General Population/Uncontrolled Power Levels and read at minimum “Warning - Antenna Approach distance is ___ Feet.” The second sign shall be installed near the base of the pole at eye-level and shall read “Radio frequency fields at pole top may exceed FCC limits for utility work on structure within the safe antenna approach distance designated above. Disconnect RF power using disconnect located on ground mounted equipment cabinet before working within the safe antenna approach distance. Call _____ (800-XXX-XXX) for disconnect instructions or more information.” The sign shall include the antenna owners name and phone number or attachee number. When LGE/KU work is required within the antenna approach distance, workers will disconnect the RF source.
- All antennas and ancillary equipment shall be labeled with the owner's name and contact information, including an emergency contact number.
- It is the antenna owner's responsibility to inform all pole attachers on the pole of the RF exposure hazards and mitigation techniques.
- The antenna cables shall be run in non-metallic conduit. Schedule 80 will be used for the first 8' from the ground and Schedule 40 or 80 can be used for the rest of the riser. Conduit is to extend at least 48” above and below any supply conductors.
- All cabinets must be installed with thru-bolts on same side of pole to maintain ability to climb pole when required. Band-type attachments shall not be used.
- Maximum weight for radio/equipment boxes will be determined during permitting process.
- Antenna owner may have their equipment mounted to the pole contained within no more than two separate boxes unless approved by LG&E/KU Distribution Operations staff.
- Antenna cable(s) shall be installed in maximum 2” non-metallic conduit strapped every 5' unless approved by LG&E/KU Distribution Operations staff.
- Customer's equipment may not occupy more than two adjacent quadrants.
- The weatherhead and antenna unit must be mounted on the same quadrant of the pole unless approved by LG&E/KU Distribution Operations staff.
- The unit cannot prevent other communication companies from accessing their facilities.
- LG&E/KU is not responsible for any damages caused by weather events, other's actions, or when the pole and associated fixtures are maintained or replaced.
- LG&E/KU must approve the final design prior to any installations.

NOTE:

1. ALL EQUIPMENT ASSOCIATED WITH WIRELESS ATTACHMENTS (I.E. RADIOS, DISCONNECTS, ETC.) THAT IS LOCATED BELOW THE POWER SPACE SHALL BE INSTALLED IN-LINE WITH THE OVERHEAD ROUTE AND/OR ON THE SAME SIDE OF THE POLE AS WIRELINE COMMUNICATIONS FACILITIES.

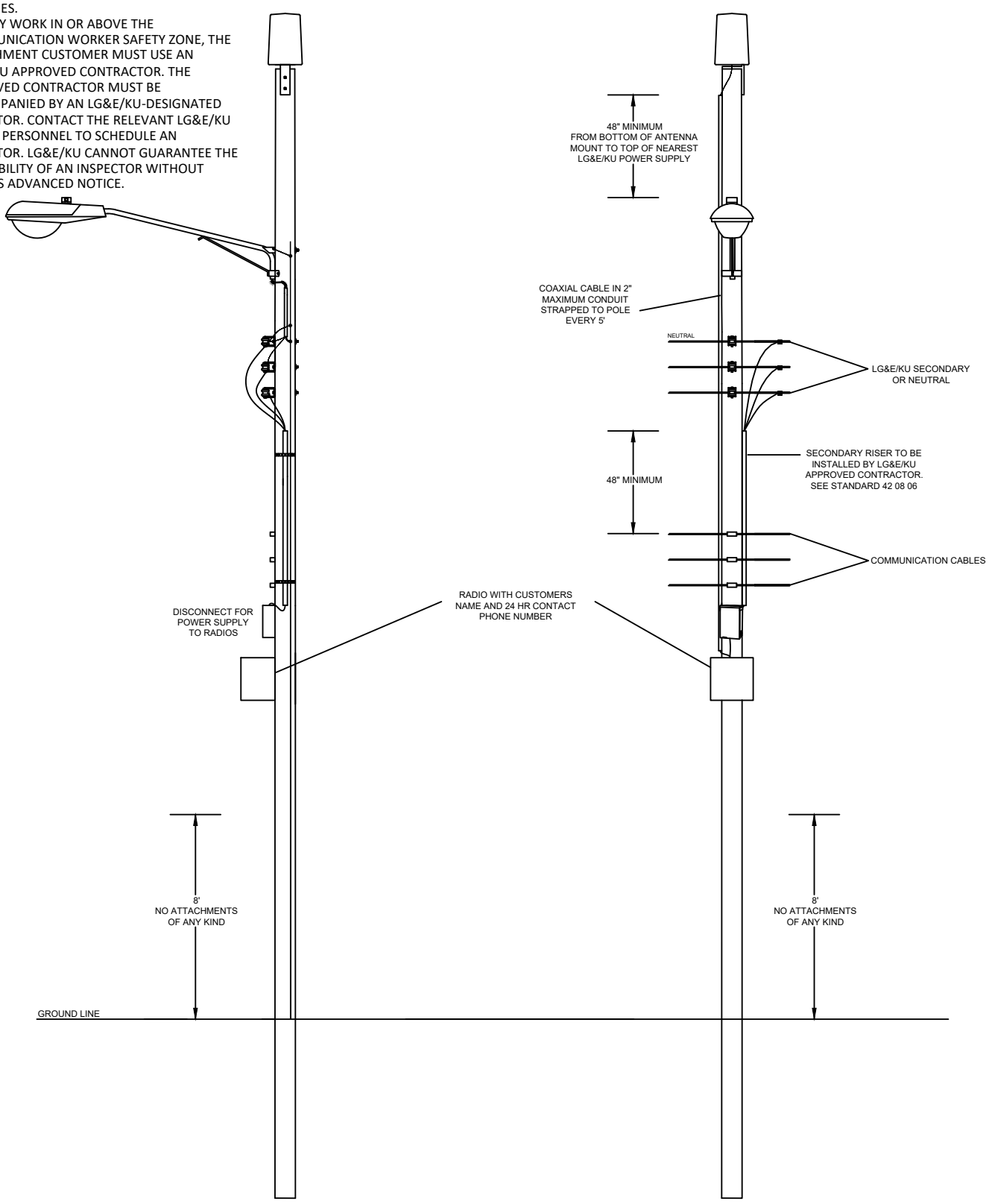
SECONDARY POLE WITH ANTENNA ABOVE SECONDARY



NOTE:

1. LG&E/KU WILL PROVIDE UNMETERED SERVICE FOR WIRELESS ATTACHMENTS IN ITS DISCRETION. ALL CUSTOMER-OWNED POLES WILL HAVE METERED SERVICE.
2. ALL EQUIPMENT ASSOCIATED WITH WIRELESS ATTACHMENTS (I.E. RADIOS, DISCONNECTS, ETC.) THAT IS LOCATED BELOW THE POWER SPACE SHALL BE INSTALLED IN-LINE WITH THE OVERHEAD ROUTE AND/OR ON THE SAME SIDE OF THE POLE AS WIRELINE COMMUNICATIONS FACILITIES.
3. FOR ANY WORK IN OR ABOVE THE COMMUNICATION WORKER SAFETY ZONE, THE ATTACHMENT CUSTOMER MUST USE AN LG&E/KU APPROVED CONTRACTOR. THE APPROVED CONTRACTOR MUST BE ACCOMPANIED BY AN LG&E/KU-DESIGNATED INSPECTOR. CONTACT THE RELEVANT LG&E/KU DESIGN PERSONNEL TO SCHEDULE AN INSPECTOR. LG&E/KU CANNOT GUARANTEE THE AVAILABILITY OF AN INSPECTOR WITHOUT 15-DAYS ADVANCED NOTICE.

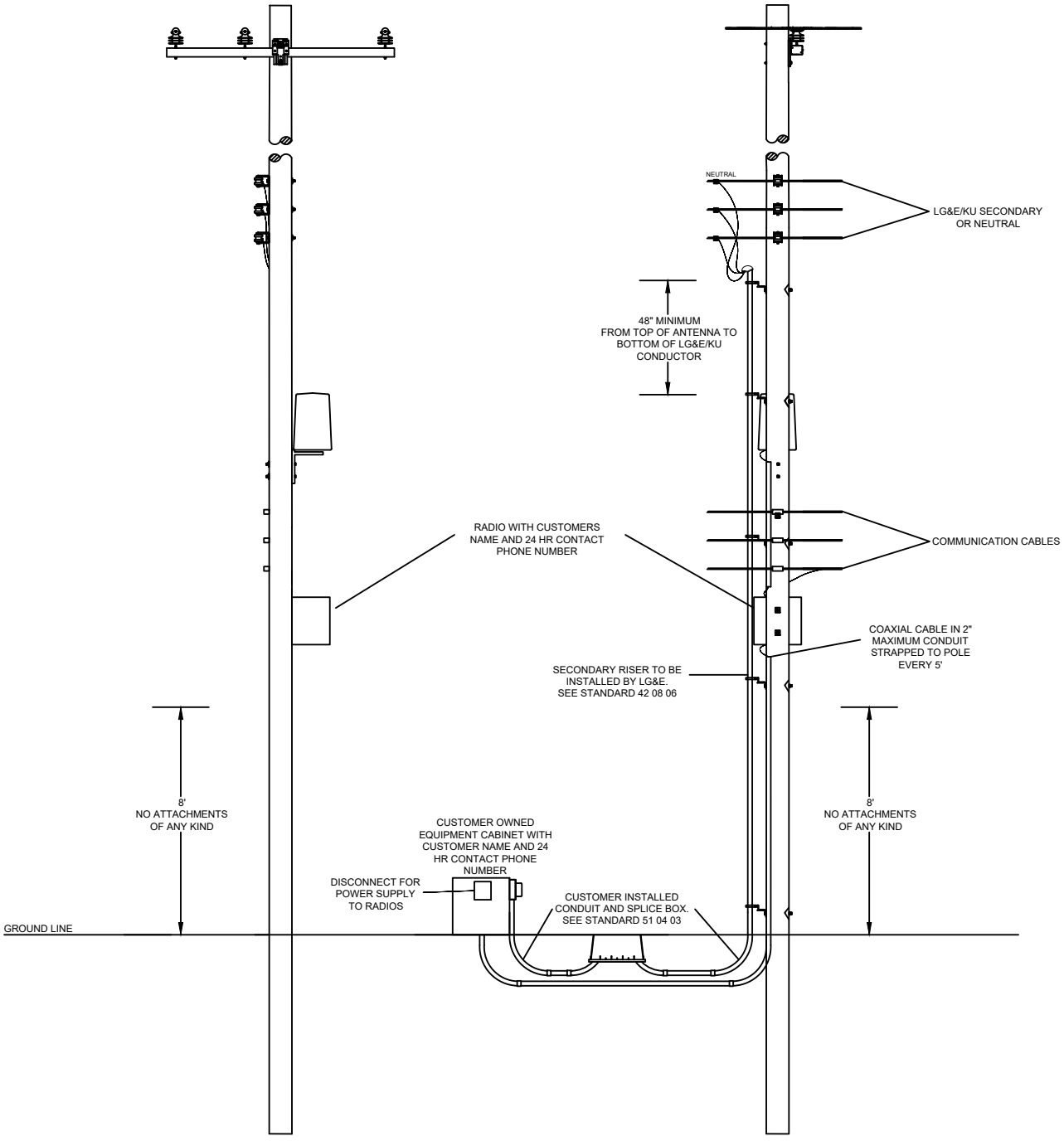
SECONDARY POLE WITH ANTENNA ABOVE SECONDARY
FED FROM OVERHEAD WITHOUT METER



NOTE:

1. ALL EQUIPMENT ASSOCIATED WITH WIRELESS ATTACHMENTS (I.E. RADIOS, DISCONNECTS, ETC.) THAT IS LOCATED BELOW THE POWER SPACE SHALL BE INSTALLED IN-LINE WITH THE OVERHEAD ROUTE AND/OR ON THE SAME SIDE OF THE POLE AS WIRELINE COMMUNICATIONS FACILITIES.

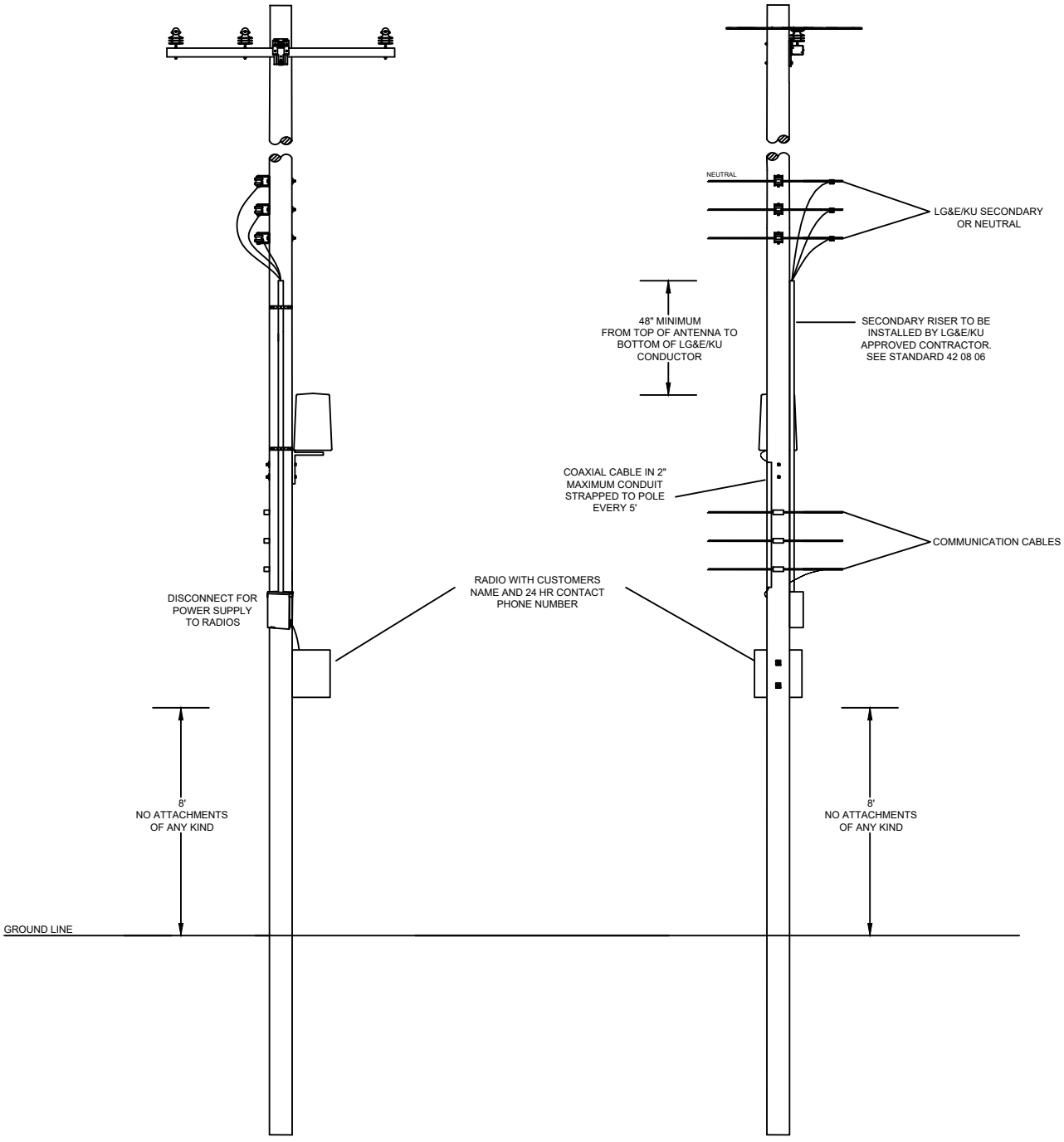
3Ø POLE WITH ANTENNA BELOW SECONDARY



NOTE:

1. ALL EQUIPMENT ASSOCIATED WITH WIRELESS ATTACHMENTS (I.E. RADIOS, DISCONNECTS, ETC.) THAT IS LOCATED BELOW THE POWER SPACE SHALL BE INSTALLED IN-LINE WITH THE OVERHEAD ROUTE AND/OR ON THE SAME SIDE OF THE POLE AS WIRELINE COMMUNICATIONS FACILITIES.

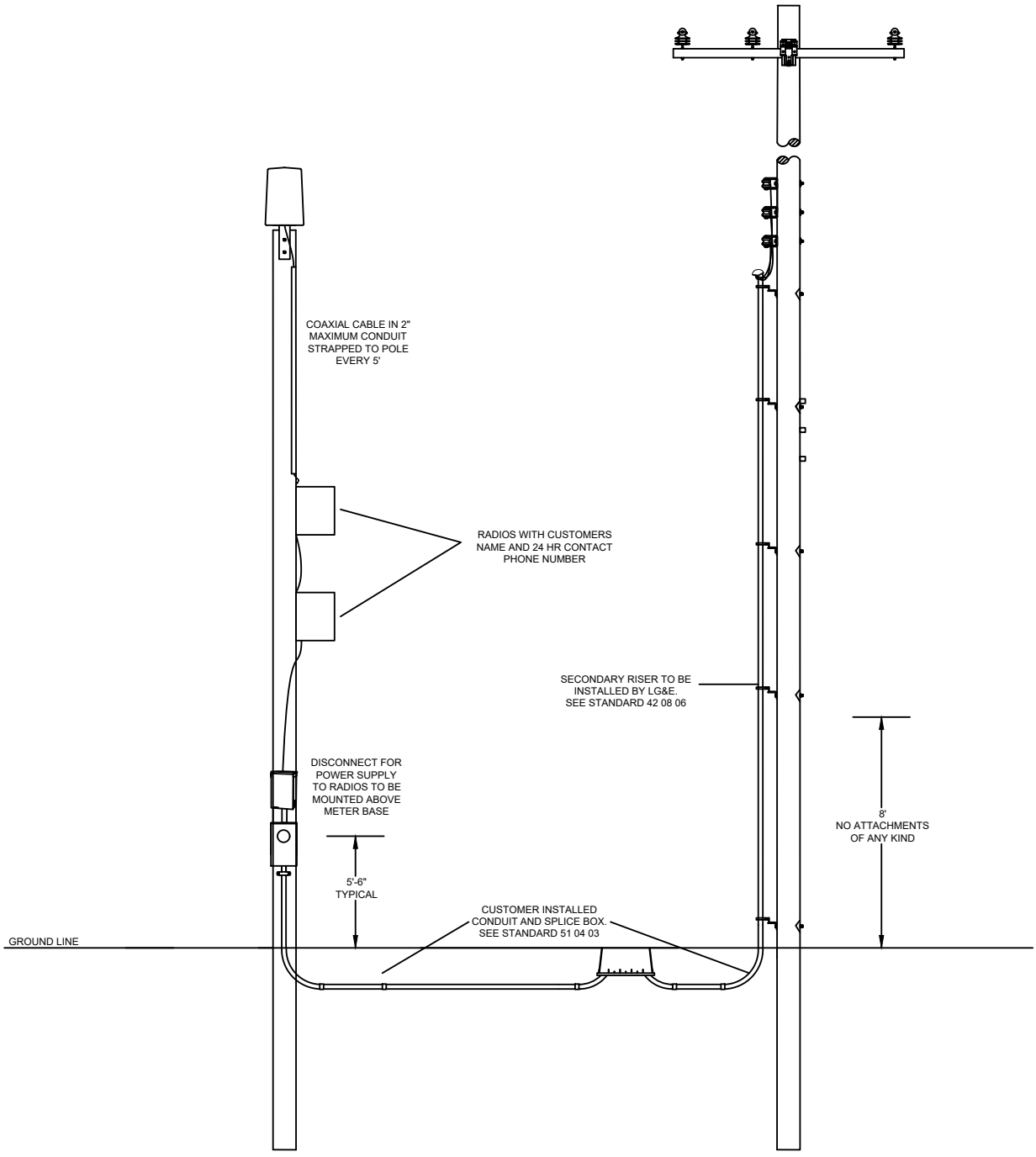
3Ø POLE WITH ANTENNA BELOW SECONDARY
FED FROM OVERHEAD WITHOUT METER



NOTE:

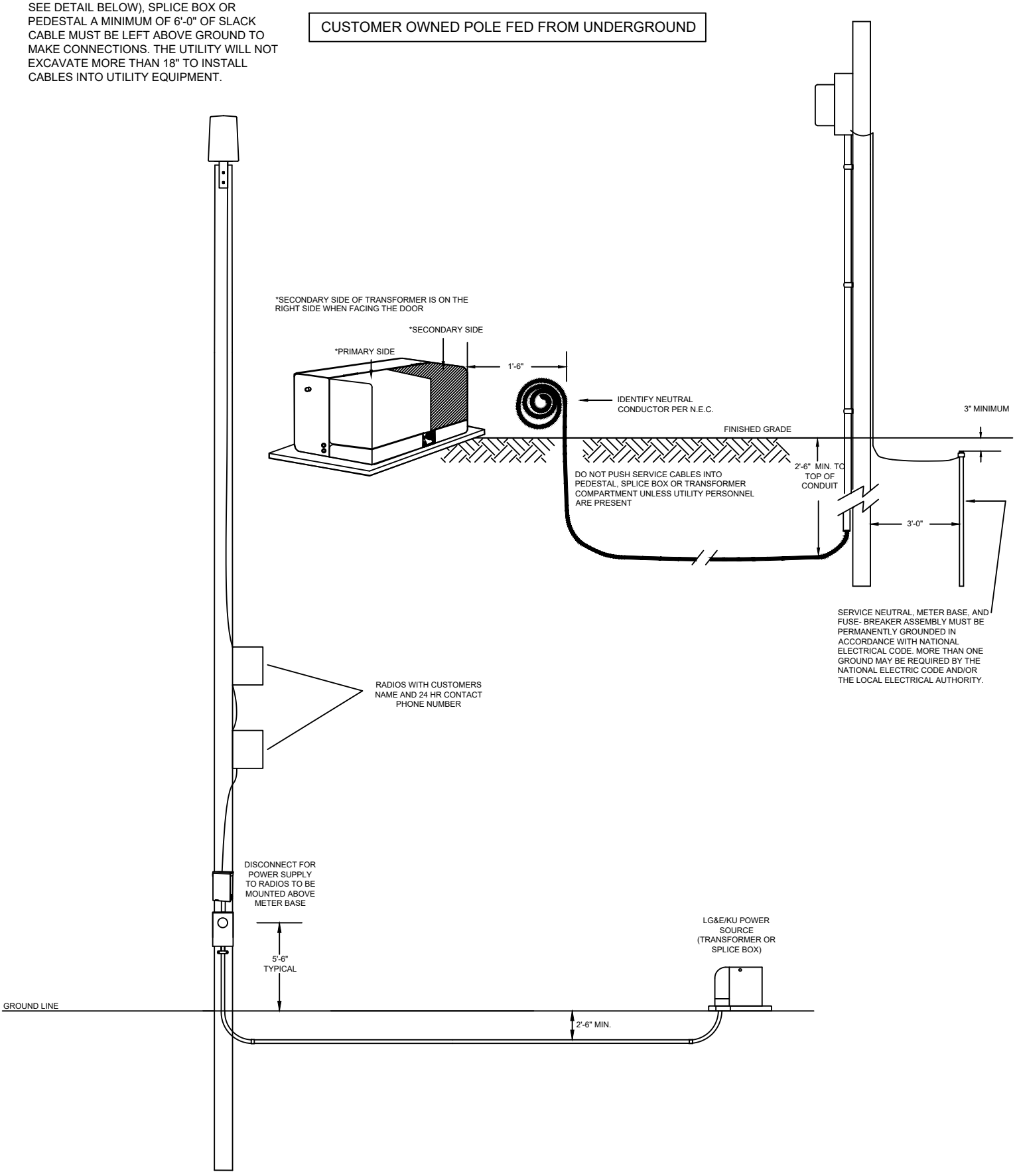
1. ALL EQUIPMENT ASSOCIATED WITH WIRELESS ATTACHMENTS (I.E. RADIOS, DISCONNECTS, ETC.) THAT IS LOCATED BELOW THE POWER SPACE SHALL BE INSTALLED IN-LINE WITH THE OVERHEAD ROUTE AND/OR ON THE SAME SIDE OF THE POLE AS WIRELINE COMMUNICATIONS FACILITIES.

ANTENNA INSTALLATION ON NON LG&E/KU POLE



NOTE:
1. CUSTOMER TO INSTALL CABLE TO WITHIN 18" OF THE TRANSFORMER (SECONDARY SIDE - SEE DETAIL BELOW), SPLICE BOX OR PEDESTAL A MINIMUM OF 6'-0" OF SLACK CABLE MUST BE LEFT ABOVE GROUND TO MAKE CONNECTIONS. THE UTILITY WILL NOT EXCAVATE MORE THAN 18" TO INSTALL CABLES INTO UTILITY EQUIPMENT.

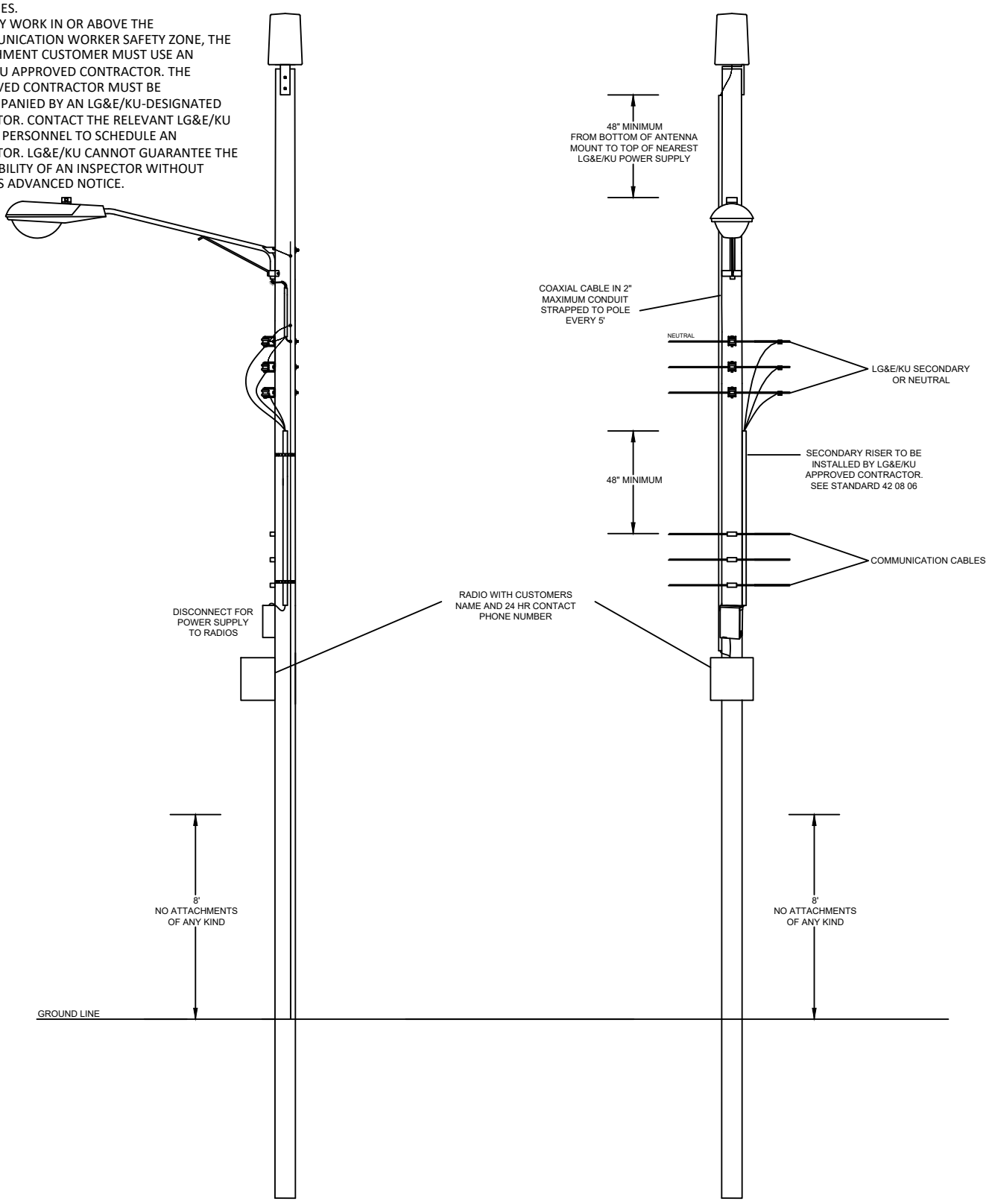
CUSTOMER OWNED POLE FED FROM UNDERGROUND



NOTE:

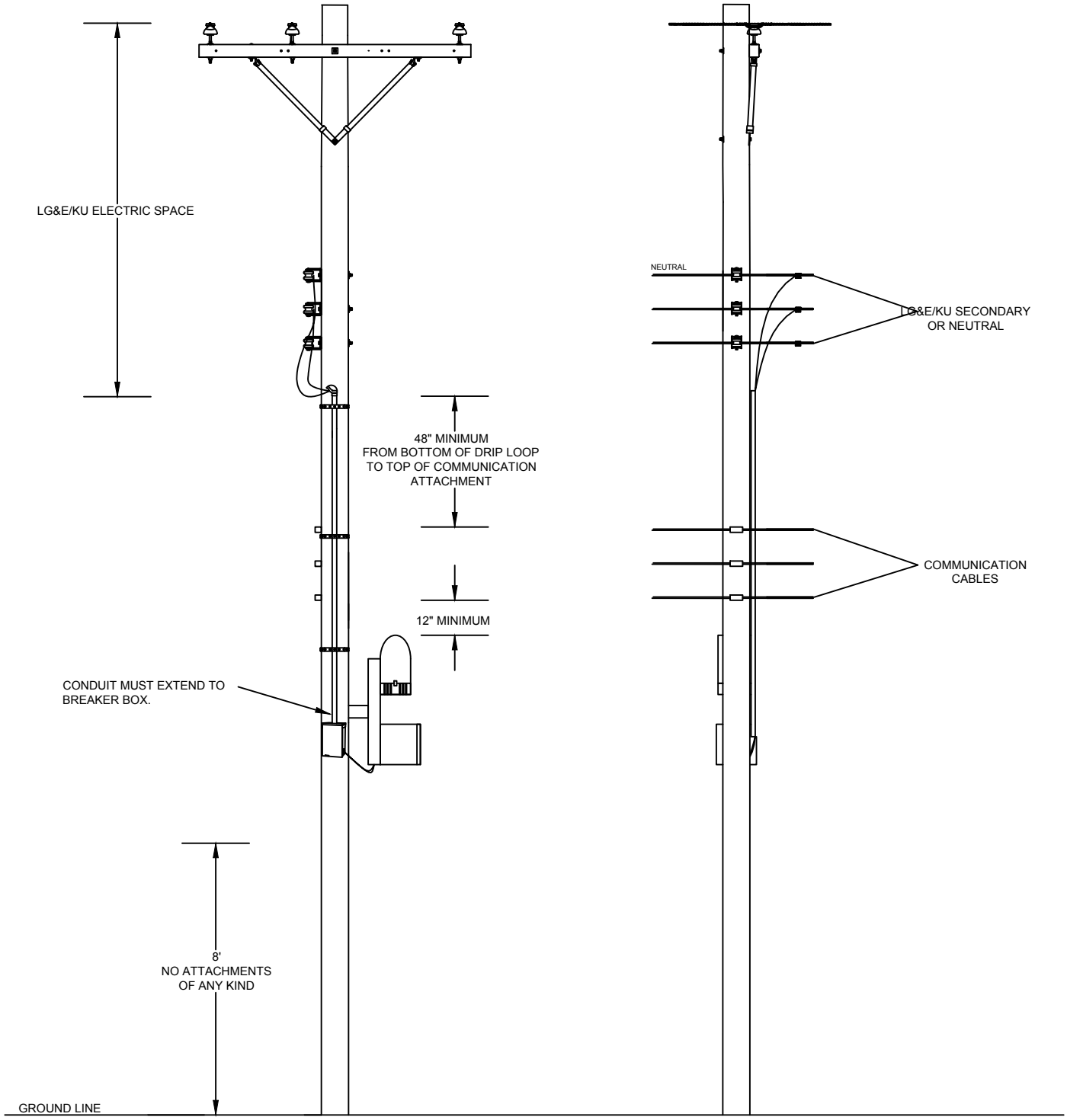
1. LG&E/KU WILL PROVIDE UNMETERED SERVICE FOR WIRELESS ATTACHMENTS IN ITS DISCRETION. ALL CUSTOMER-OWNED POLES WILL HAVE METERED SERVICE.
2. ALL EQUIPMENT ASSOCIATED WITH WIRELESS ATTACHMENTS (I.E. RADIOS, DISCONNECTS, ETC.) THAT IS LOCATED BELOW THE POWER SPACE SHALL BE INSTALLED IN-LINE WITH THE OVERHEAD ROUTE AND/OR ON THE SAME SIDE OF THE POLE AS WIRELINE COMMUNICATIONS FACILITIES.
3. FOR ANY WORK IN OR ABOVE THE COMMUNICATION WORKER SAFETY ZONE, THE ATTACHMENT CUSTOMER MUST USE AN LG&E/KU APPROVED CONTRACTOR. THE APPROVED CONTRACTOR MUST BE ACCOMPANIED BY AN LG&E/KU-DESIGNATED INSPECTOR. CONTACT THE RELEVANT LG&E/KU DESIGN PERSONNEL TO SCHEDULE AN INSPECTOR. LG&E/KU CANNOT GUARANTEE THE AVAILABILITY OF AN INSPECTOR WITHOUT 15-DAYS ADVANCED NOTICE.

SECONDARY POLE WITH ANTENNA ABOVE SECONDARY
FED FROM OVERHEAD WITHOUT METER



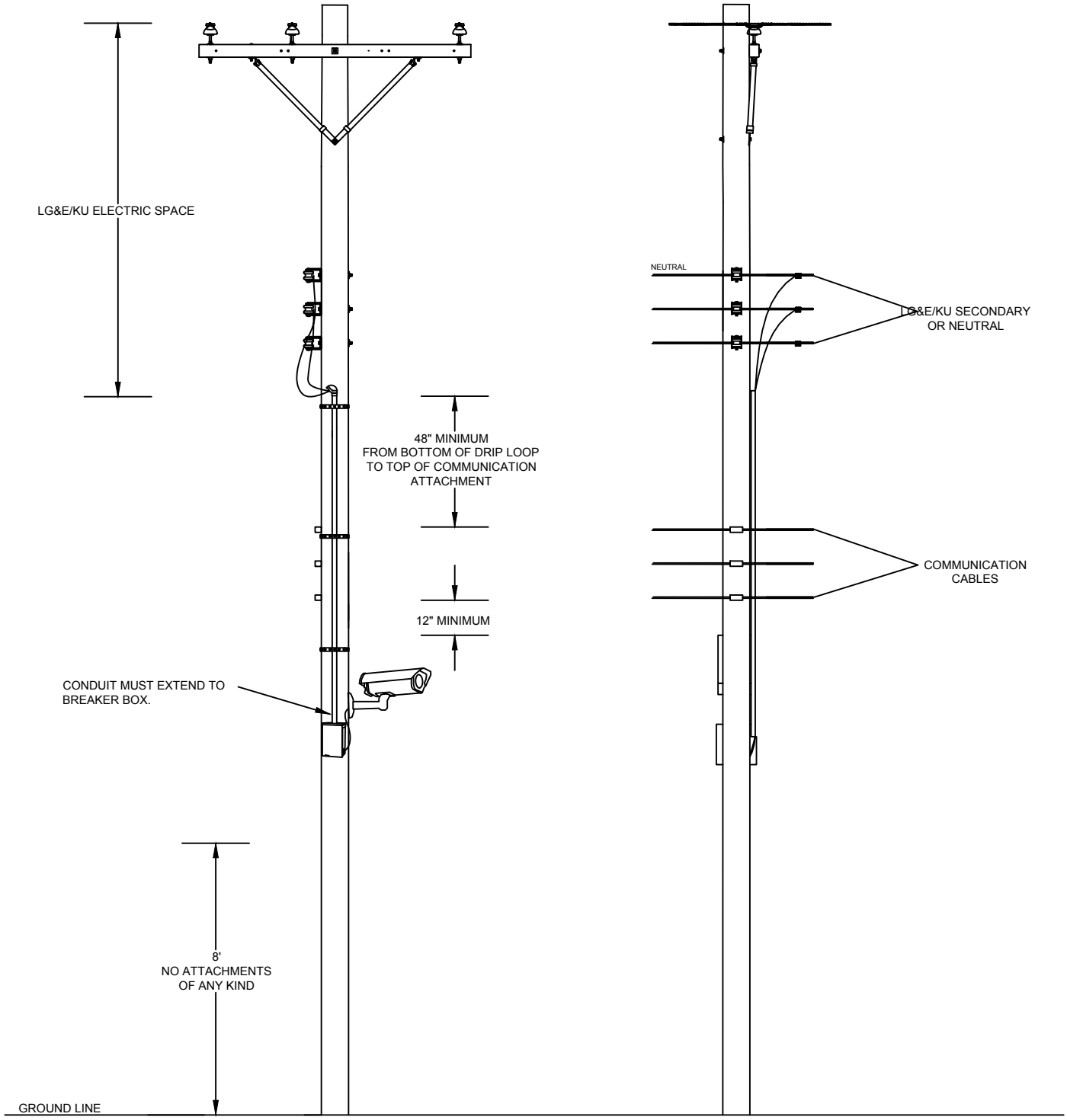
| IIN | DESCRIPTION |
|---|---|
| 0530694 | BOX,BREAKER,KIT,70A,120/240V,2 POSITION WITH/WEATHERPROOF BOX |
| 0530719 | BREAKER,CIRCUIT,20 AMP,1-POLE,SNAP IN |

**SHOTSPOTTER DETAIL**



| IIN | DESCRIPTION |
|---|---|
| 0530694 | BOX,BREAKER,KIT,70A,120/240V,2 POSITION WITH/WEATHERPROOF BOX |
| 0530719 | BREAKER,CIRCUIT,20 AMP,1-POLE,SNAP IN |

**CAMERA DETAIL**



NOTE:

1. EACH PROPOSED BANNER LOCATION MUST BE APPROVED BY LG&E OR KU TO ENSURE THE POLE IS IN SAFE CONDITION FOR ATTACHMENT.
2. BANNERS ARE NOT PERMITTED ON NON-WOOD LIGHTING POLES.
3. BANNERS ARE NOT PERMITTED ON POLES SUPPORTING UNDERGROUND RISERS.
4. BANNER MUST BE SUPPORTED AT BOTH ENDS - TOP AND BOTTOM.
5. BANNER MUST BE BAND-MOUNTED; NO SCREWS OR BOLTS ARE PERMITTED.
6. BANNER MAY NOT BE ATTACHED OVERHANGING THE STREET.
7. BANNER MUST COMPLY WITH ANY DESIGN REQUIREMENTS IMPOSED BY MUNICIPAL GOVERNMENTS OR THE THE RELEVANT RIGHT-OF-WAY-OWNER.
8. BANNER OWNER MUST RECEIVE APPROVAL FROM THE MUNICIPAL GOVERNMENT OR THE RELEVANT RIGHT-OF-WAY OWNER PRIOR TO ATTACHMENT.
9. BANNER OWNER IS RESPONSIBLE FOR ATTACHING THE BANNER TO THE POLE, MAINTAINING THE BANNER, AND REMOVING THE BANNER.
10. ITEMS NOT PERMITTED TO BE ATTACHED UNDER ANY CIRCUMSTANCES INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
    - 10.1. BASKETBALL GOALS
    - 10.2. CAMERAS (PRIVATELY OWNED)
    - 10.3. FLAGS
    - 10.4. HANGING FLOWER POTS
    - 10.5. LIGHTS (PRIVATELY OWNED)
    - 10.6. MAILBOXES