COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

APPLICATION OF LOUISVILLE GAS AND	**)**	
ELECTRIC COMPANY FOR AN ADJUSTMENT	**)**	**CASE NO.**
OF ITS ELECTRIC AND GAS RATES AND FOR	**)**	**2016-00371**
CERTIFICATES OF PUBLIC CONVENIENCE	**)**	
AND NECESSITY	**)**	

RESPONSE OF LOUISVILLE GAS AND ELECTRIC COMPANY TO KENTUCKY CABLE TELECOMMUNICATIONS ASSOCIATION'S FIRST REQUESTS FOR INFORMATION DATED JANUARY 11, 2017

FILED: JANUARY 25, 2017

VERIFICATION

COMMONWEALTH OF KENTUCKY)
) SS:
COUNTY OF JEFFERSON)

The undersigned, **Robert M. Conroy**, being duly sworn, deposes and says that he is Vice President – State Regulation and Rates for Louisville Gas and Electric Company and Kentucky Utilities Company, an employee of LG&E and KU Services Company, and that he has personal knowledge of the matters set forth in the responses for which he is identified as the witness, and the answers contained therein are true and correct to the best of his information, knowledge and belief.

Robert M. Conroy

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 23rd day of January 2017.

(SEAL)
Notary Public

My Commission Expires:

SUSAN M. WATKINS
Notary Public, State at Large, KY
My Commission Expires Mar. 19, 2017
Notary ID # 485723

VERIFICATION

COMMONWEALTH OF KENTUCKY)
) **SS:**
COUNTY OF JEFFERSON)

The undersigned, **John K. Wolfe**, being duly sworn, deposes and says that he is Vice President - Electric Distribution for Kentucky Utilities Company and Louisville Gas and Electric Company and an employee of LG&E and KU Services Company, and that he has personal knowledge of the matters set forth in the responses for which he is identified as the witness, and the answers contained therein are true and correct to the best of his information, knowledge and belief.

John K. Wolfe

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 20th day of January 2017.

Notary Public (SEAL)

My Commission Expires:

JUDY SCHOOLER
Notary Public, State at Large, KY
My commission expires July 11, 2018
Notary ID # 512743

VERIFICATION

COMMONWEALTH OF KENTUCKY)
) SS:
COUNTY OF JEFFERSON)

The undersigned, **Christopher M. Garrett**, being duly sworn, deposes and says that he is Director – Rates for Kentucky Utilities Company and Louisville Gas and Electric Company and an employee of LG&E and KU Services Company, that he has personal knowledge of the matters set forth in the responses for which he is identified as the witness, and the answers contained therein are true and correct to the best of his information, knowledge and belief.

Christopher M. Garrett

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 25th day of January 2017.

Notary Public (SEAL)

My Commission Expires:

JUDY SCHOOLER
Notary Public, State at Large, KY
My commission expires July 11, 2018
Notary ID # 512743

VERIFICATION

COMMONWEALTH OF KENTUCKY)
) **SS:**
COUNTY OF JEFFERSON)

The undersigned, **William Steven Seelye**, being duly sworn, deposes and states that he is a Principal of The Prime Group, LLC, that he has personal knowledge of the matters set forth in the responses for which he is identified as the witness, and the answers contained therein are true and correct to the best of his information, knowledge and belief.

William Steven Seelye

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 20th day of January 2017.

Notary Public (SEAL)

My Commission Expires:

JUDY SCHOOLER
Notary Public, State at Large, KY
My commission expires July 11, 2018
Notary ID # 512743

VERIFICATION

COMMONWEALTH OF KENTUCKY)
) **SS:**
COUNTY OF JEFFERSON)

The undersigned, **John P. Malloy**, being duly sworn, deposes and says that he is Vice President – Gas Distribution for Louisville Gas and Electric Company and Kentucky Utilities Company, an employee of LG&E and KU Services Company, and that he has personal knowledge of the matters set forth in the responses for which he is identified as the witness, and the answers contained therein are true and correct to the best of his information, knowledge and belief.

John P. Malloy

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 25th day of January 2017.

(SEAL)
Notary Public

My Commission Expires:

JUDY SCHOOLER
Notary Public, State at Large, KY
My commission expires July 11, 2018
Notary ID # 512743

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Cable Telecommunications Association's
First Request for Information
Dated January 11, 2017

Case No. 2016-00371

Question No. 1-1

Responding Witness: Robert M. Conroy / John K. Wolfe

Q-1-1. Provide the basis for Your proposed exclusion of (a) incumbent local exchange carriers with joint use agreements, (b) facilities subject to a fiber exchange agreement, and (c) Macro Cell Facilities from Your Proposed Tariff.

a. Please provide all data related to the basis for different charges to these users of Your Poles.

b. Please provide all agreements with such users related to the rates, terms, and conditions of Attachment to Your Poles.

A-1-1.

a. See the response to PSC 2-77.

b. See attached. The agreements are confidential and are being provided pursuant to a petition for confidential protection.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Cable Telecommunications Association's
First Request for Information
Dated January 11, 2017

Case No. 2016-00371

Question No. 1-2

Responding Witness: John K. Wolfe

Q-1-2. Provide a copy of any internal construction standards and/or specification to determining the "Communications Space" on poles set forth under the Proposed Tariff.

A-1-2. See the response to Question No. 1-16.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Cable Telecommunications Association's
First Request for Information
Dated January 11, 2017

Case No. 2016-00371

Question No. 1-3

Responding Witness: Robert M. Conroy

Q-1-3. Explain the basis for excluding street light poles from the definition of Structure.

A-1-3. The definition of Structure does not exclude all street light poles, only street light poles that are neither a wood pole or located in a public right-of-way. LG&E does not permit any attachments to non-wood poles. Such poles are not built to support a wireline or wireless attachment. Wood light poles that are located in non-public easements are poles that are leased to a third party. Under the "leasing arrangement," the third party assumes the cost of construction of the pole. Reimbursement of the cost of the pole occurs over an extended period of time. LG&E receives a limited easement to locate the pole on the customer's property and to locate a street light on the pole. It is not granted an easement to permit other attachments and does not possess the legal authority to place or otherwise allow attachments to the pole other than the street light or to derive revenue from permitting such attachments on the pole.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Cable Telecommunications Association's
First Request for Information
Dated January 11, 2017

Case No. 2016-00371

Question No. 1-4

Responding Witness: Robert M. Conroy

Q-1-4. Explain the basis for excluding poles leased to a third party from the definition of Structure.

A-1-4. See the response to Question No. 1-3.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Cable Telecommunications Association's
First Request for Information
Dated January 11, 2017

Case No. 2016-00371

Question No. 1-5

Responding Witness: Robert M. Conroy

Q-1-5. Explain the meaning of a "third party" to whom You may lease poles.

A-1-5. A third party is a LG&E customer who requests lighting service at a location that is not on a public right-of-way and who grants an easement for the location of the utility pole and lighting equipment on its property.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Cable Telecommunications Association's
First Request for Information
Dated January 11, 2017

Case No. 2016-00371

Question No. 1-6

Responding Witness: Robert M. Conroy

Q-1-6. Explain the meaning of "wireless communications services," including whether the term is intended to apply to Wi-Fi.

A-1-6. Wireless communication services, as used in the proposed PSA Rate Schedule, refers to any communications service enabled by radio or antenna and would include Wi-Fi services, as well as service offered over small cell antennas or distributed antenna systems.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Cable Telecommunications Association's
First Request for Information
Dated January 11, 2017

Case No. 2016-00371

Question No. 1-7

Responding Witness: Robert M. Conroy

Q-1-7. Explain whether Wireless Facility in the Proposed Tariff includes only facilities attached directly to a Structure.

A-1-7. The definition of "wireless facility" set forth in the proposed PSA Rate Schedule does not require direct attachment to a Structure.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Cable Telecommunications Association's
First Request for Information
Dated January 11, 2017

Case No. 2016-00371

Question No. 1-8

Responding Witness: Robert M. Conroy

Q-1-8. Explain how Wireless Facilities attached to a Cable Television System Operator's messenger strand will be treated under the Proposed Tariff.

A-1-8. LG&E assumes that the reference to "wireless facilities attached to a Cable Television System Operator's messenger strand" is to strand mounted Wi-Fi access points. Such access points would be considered as an attachment and would be subject to the PSA Rate Schedule's provisions regarding construction and operation of attachments, including compliance with National Electric Safety Code clearance standards and prohibitions against interfering with the attachments of other Attachment Customers and impeding accessibility to LG&E's electrical facilities. However, as the strand mounted Wi-Fi access point would be considered as part of the wireline attachment, it would not be assessed a separate charge unless the strand itself required additional clearance as a result of the strand mounted Wi-Fi access point.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Cable Telecommunications Association's
First Request for Information
Dated January 11, 2017

Case No. 2016-00371

Question No. 1-9

Responding Witness: William S. Seelye

Q-1-9. Explain the basis for the Proposed Tariff's rate for Wireless Attachments, including the methodology, and all cost data relevant to calculating the Wireless Attachment Charge of $84.00 per year for each Wireless Facility. Please provide all source data for the charge and explain how You developed or obtained the source data.

A-1-9. The methodology used to develop the wireless facilities charge is the same as the wireline facilities except 11.585 feet of pole space is assumed. See response to Question No. 1-10.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Cable Telecommunications Association's
First Request for Information
Dated January 11, 2017

Case No. 2016-00371

Question No. 1-10

Responding Witness: William S. Seelye

Q-1-10. Please refer to Your Application, Tab 14, Testimony of William Steven Seelye, Managing Partner, The Prime Group, LLC, at p. 61. Explain and provide data related to Your conclusion that the Wireless Facilities on average use 11.585 feet of Pole space, including but not limited to how such average was determined, what Wireless Facilities were considered for determining such average, and identification of the "space" used by such attachments.

A-1-10. KPSC Administrative Case No. 251 sets forth the typical height, and usable and unusable space for a typical three-user pole. That is a height of 42.5 feet, less 6 feet buried, 20 feet to the lowest attachment, 3.33 feet required safety space, resulting in 13.17 feet of usable pole space. LG&E assumes a pole top wireless antenna attachment, as that is the preferred attachment location for Wireless Facility owners. As LG&E typically has electric facilities located at or near the top of the pole, a pole top antenna dictates a 5 foot taller pole in order to maintain a safe working distance of at least 48 inches (a long standing LG&E construction standard) between the electric facilities and the pole top antenna. Thus, the Wireless Facility owner is be responsible for the top 5 feet of the pole.

The Wireless Facility owner will have conduit running through the initial presumed 13.17 feet of usable space on the pole, which it shares with LG&E. Therefore, the Wireless Facility owner is responsible for half of the 13.17 feet of presumed usable space. 13.17 feet divided by 2 users (LG&E and the Wireless Facility owner) equals 6.585 feet. 6.585 feet of shared usable space plus 5 feet of additional pole height needed by the new pole top antenna equals 11.585 feet.

The Wireless Facility owner is permitted to place up to two radio units, needed for their pole top antenna, in the unusable space of the pole. This use of the unusable space is not factored into the above calculation. Further, although LG&E and the Commission assume a typical pole height of 42.5 feet, as shown by LG&E's response to AT&T 1-5, the average height of a LG&E pole with a Wireless Facility attached is 51.05 feet.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Cable Telecommunications Association's
First Request for Information
Dated January 11, 2017

Case No. 2016-00371

Question No. 1-11

Responding Witness: Christopher M. Garrett

Q-1-11.

A-1-11. The Kentucky Cable Telecommunications Association's Request for Information issued on January 11, 2017 did not include a Question No. 1-11.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Cable Telecommunications Association's
First Request for Information
Dated January 11, 2017

Case No. 2016-00371

Question No. 1-12

Responding Witness: William S. Seelye

Q-1-12. Provide the basis for, methodology to determine, and data used to develop Your Duct charge of $0.81 per linear foot, including all rate calculations.

A-1-12. The methodology used to develop the underground duct charge was based on the Federal Communication Commission ("FCC") methodology established in CS Docket 97-98 on April 3, 2000.

For more information and a copy of the FCC Order in question, see the response to PSC 2-104.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Cable Telecommunications Association's
First Request for Information
Dated January 11, 2017

Case No. 2016-00371

Question No. 1-13

Responding Witness: Robert M. Conroy

Q-1-13. Explain what You mean by the word "utilize" in proposed Terms and Conditions of Attachment No. 4.

A-1-13. To affix or attach a third party's cable or other device to an approved wireline attachment.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Cable Telecommunications Association's
First Request for Information
Dated January 11, 2017

Case No. 2016-00371

Question No. 1-14

Responding Witness: John K. Wolfe

Q-1-14. Please provide any reports, analysis, or studies concerning the impact on pole loading of overlashing by Cable Television System Operators, including data related to instances of overlashing by Cable Television System Operators overloading any distribution poles.

A-1-14. LG&E performs pole loading studies on individual poles as necessary but does not have any reports, analysis, or studies concerning the general impact on pole loading of overlashing readily available. Pole loading studies may be performed on an individual pole when new communications cables are overlashed to the existing communications facilities. Adding a new cable through overlashing adds additional weight and tension and increases the diameter of the existing cable. These factors increase loading on the pole and makes the performance of pole loading studies necessary to ensure the new overlashed cable does not "overload" the pole in excess of the applicable NESC loading case.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Cable Telecommunications Association's
First Request for Information
Dated January 11, 2017

Case No. 2016-00371

Question No. 1-15

Responding Witness: John K. Wolfe

Q-1-15. Please provide any reports, analysis, or studies concerning the impact of Cable Television System Operator drop or lift attachments on pole loading, including data related to instances of drop or lift attachments overloading any distribution or drop poles.

A-1-15. LG&E does not have any reports, analysis, or studies concerning the impact on pole loading of drop of lift attachments readily available. New Service Drops do not require pole loading studies.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Cable Telecommunications Association's
First Request for Information
Dated January 11, 2017

Case No. 2016-00371

Question No. 1-16

Responding Witness: John K. Wolfe

Q-1-16. Please provide a copy of all of Your standards and specification related to the design, installation, and maintenance of Attachments with which You propose Attachment Customers must comply.

A-1-16. See attached.

a PPL company

LG&E

THIRD PARTY POLE

ATTACHMENT

HANDBOOK

a PPL company

Table of Contents

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Introduction

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LG&E Third Party Pole Attachment Handbook

INTRODUCTION

The information contained in this document is intended to assist in facilitating attachment requests from companies which (a) have a valid Pole Attachment License Agreement with Louisville Gas and Electric Company (LG&E), (b) are in full compliance with any applicable insurance and bonding requirements, and (c) have the necessary authorization to operate within the State of Kentucky and the relevant local municipality. Strict adherence to LG&E's Third Party Pole Attachment Handbook will ensure a smooth application and approval process, and will allow completion of construction with minimal delay and conflict.

This Third Party Pole Attachment Handbook outlines the circumstances under which LG&E will review any requests to attach individual communications cables and equipment to its poles, LG&E's formal process for granting such access request, and the guidelines and requirements covering the physical design, installation, and maintenance of all such communications cables and equipment on LG&E's poles.

In all situations, it is the ongoing responsibility of attaching companies to be familiar with and adhere to the NESC and this Third Party Pole Attachment Handbook during installation, maintenance and related activities involving their facilities attached to LG&E's poles. Any attachment found to be in violation of the NESC, or any provision of this Handbook may be subject to removal by LG&E.

All required work above the Communication Space (as defined in the NESC) will be performed by LG&E or an LG&E qualified approved overhead electrical line contractor after the LG&E Design Team has completed a route and engineering analysis.

LG&E reserves the right to modify the requirements found in this handbook or any of its service policies, procedures and/or standards at any time. It is the responsibility of the Third Party Attacher or contractor to ensure that any referenced document is the version currently approved for use by LG&E. It is also the responsibility of the Third Party Attacher to notify LG&E of any changes to existing wiring, equipment, building structure, electrical loading and/or other service requirements that may affect safety or electric system performance.

a PPL company

LG&E Third Party Pole Attachment Guidelines

LG&E THIRD PARTY POLE ATTACHMENT HANDBOOK
Last updated March 23, 2016

a PPL company

1. An executed pole attachment agreement / contract is required, including but not limited to the following:
   a. Insurance certificates and any applicable bonding requirements.
   b. Applicable franchise agreements / certificates / licenses / permits (e.g., local, state, etc.)
2. A complete and accurate pole attachment proposal is required before engineering review will begin. The attachment proposal shall include, but is not limited to the following:
   a. Application for Third Party Attachment. Reference Appendix A (page 74) of this Third Party Pole Attachment Handbook.
   b. Pole/structure number and location, including complete address, county, GPS coordinates, pole height and pole class
   c. Applicant company name, key contacts, and approval signature
   d. Pole profile sheet indicating height and owner of all attachments including[1] all secondary/neutral, grounded equipment, streetlights, proposed attaching location, proposed make-ready construction (shall be identified in red), and lowest existing mid-span height.
   e. Telephone Company (i.e., ILEC) pole number (if available).
   f. Description of any other work such as anchor attachments, vertical runs, etc.
   g. Route map, displaying street names along with LG&E pole numbers and ILEC pole numbers (if available).
   h. Pole photographs including street view and adjacent spans, preferably annotated with all attachment heights. Preferred file format is a digital file such as GE Mapsight TM "true size", Osmose Digital Measurement Technology™ (DMT™) or equivalent. See "Figure 1."
   i. Pole Loading Analysis Report shall be performed on every pole unless identified by LG&E staff. Reports should include a summary of the loading data per pole.
   j. Wireless Attachment requests will include the additional requirements:
      i. Exhibit D – Wireless Attachment and Associated Equipment Description and Approval
      ii. MPE (Maximum Permissible Exposure) Report
      iii. Manufacturer's equipment specifications for antenna and bracket
      iv. Construction Plan & Material List.
   k. Attachment proposals shall be limited to ≤ 100 poles).
   l. Submit complete attachment proposal / application to LGEPoleAttachment@lge-ku.com
   m. Incomplete and inaccurate proposals will be returned to the applicant for correction and completion. The application approval deadline will restart when LG&E receives the corrected and completed proposal.
3. Transmission structure attachments (NOTE: only with distribution underbuild) will require additional approvals from the Transmission department. Reference Section V (page 30) of this Joint Use Handbook.
4. For Joint Use poles, attachment proposals shall be submitted to both LG&E and the ILEC.
5. Actual and reasonable engineering expenses are billable (e.g., review proposed routes, field attachment proposals, and post inspections), whether or not make-ready estimate is accepted with additional fees associated with reviewing requests for transmission structure attachments. (NOTE: only with distribution underbuild).
6. Outage/emergency events, including storm restoration, may delay scheduled work.
7. It may be necessary to deny access for reasons of lack of capacity, safety, reliability or engineering standards.
8. Additional equipment is not permitted on the pole (e.g. equipment cabinets, meter bases and other equipment large enough to impede accessibility).
9. The National Electrical Safety Code (NESC), regulations (i.e., local, state, federal), and LG&E policy and LG&E Construction Standards shall be adhered to at all times.
10. The attaching party is responsible for obtaining their own right-of-way (ROW) where attaching installations involve city, county and/or state rights-of-way, or private property owned by others.
11. As-builts shall be provided to LG&E Pole Attachment Group within seven (7) business days of the completion of construction. As-builts shall be in the form of the approved construction print with any changes made during construction redlined on the print. As-builts shall also include, where applicable, the asset number and serial number for any transformer removed or installed and the pole number on which the transformer was removed or installed. Further, any secondary removed or changed, including services rerouted due to the removal or installation of transformers, must be noted on the as-built. As required on the permit application, the company name of all existing attachers and the number of times each party is attached to a pole must be included on the as-built.
12. Temporary attachments are not permitted. No attachment is permitted until all necessary make- ready work is complete.
13. Communications cable service drops are not permitted to be attached to the LG&E service riser.
14. If you remove any of your attachments you must notify LG&E via the application for third party attachments. Pole attachment fees will continue until notification is received.

[1]Any breach of OSHA's minimum approach distance (including measurement) of electric facilities must be conducted by a qualified electrical worker and in accordance with good safety practices and OSHA guidelines.

Figure 1


Lowest Power
SEC 29'-0"
WIND 21'-8"
TWC 20'-4"
AT&T 19'-4"
AT&T 18'-6"
AT&T 17'-6"
LG&E POLE #
50248-90104
BASE 0'-0"

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LG&E & KU Conductor & Equipment Data

LG&E THIRD PARTY POLE ATTACHMENT HANDBOOK
Last updated March 23, 2016

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Primary / Secondary

The following comments address the preliminary pole loading analysis required for approval of new attachments and apply to distribution structures only. Transmission pole loading analysis is handled under a separate process, reference Section V (page 29) of this Third Party Pole Attachment Handbook.

It is acceptable to generalize conductor sizes for the purpose of performing a preliminary pole loading analysis (PLA). This analysis is required as part of the engineering submittal for approval of new attachments. To simplify loading studies, data on a reduced selection of conductors is provided in the attached files. Conductors in each category can be selected to reflect differences between LG&E and those of its sister utility, Kentucky Utilities Company. For builds that span both utilities a default (worst case) conductor can be used for either utility that span both utilities based on the larger of commonly used LG&E and KU conductors. Diameters, default tensions and sag information are provided in the attached files. Where the size of wire cannot be accurately quantified between two size ranges, the large conductor will be used. Final determination of acceptable loading will be made by LG&E and KU.

Generic conductor parameters required for PLA will be determined based on their type (bare, covered, spacer cable, etc.), application (primary, secondary, service, etc.) and the size of the conductor (very small – large). Parameters for requested attachments are to be provided by the engineering firm.

Conductor Category	Approximate Size	Application
Very small:	.25”	Old, small bare & covered copper
Small:	.5”	Small aluminum conductor used as neutrals and 1-phase primary
Medium:	.75”	Medium 3-phase primary and secondary
Large:	1”	Large 3-phase primary

	Utility Specific		
	LG&E	KU	Single Choice If Used For Both Utilities
Duplex	#4 AAC/ACSR KU LGE 086M 250B.txt	#4 AAC/ACSR KU LGE 086M 250B.txt	#4 AAC/ACSR KU LGE 086M 250B.txt
Small triplex service	#2 AAC KU LGE 093M 250B.txt	#2 AAC/ACSR KU LGE 096M 250B.txt	#2 AAC/ACSR KU LGE 096M 250B.txt
Medium triplex service	1/0 AAC KU LGE 094M 250B.txt	2/0 AAC/ACSR KU LGE 097M 250B.txt	2/0 AAC/ACSR KU LGE 097M 250B.txt
Large triplex commercial service	4/0 AAC KU LGE 095M 250B.txt	397 AAC/ACSR KU LGE 098M 250B.txt	397 AAC/ACSR KU LGE 098M 250B.txt
Small quadruplex secondary/service	#2 AAC KU LGE 101M 250B.txt	#2 AAC KU LGE 101M 250B.txt	#2 AAC KU LGE 101M 250B.txt
Medium quadruplex service	1/0 AAC KU LGE 102M 250B.txt	2/0 AAC/ACSR KU LGE 103M 250B.txt	2/0 AAC/ACSR KU LGE 103M 250B.txt
Large quadruplex service	4/0 AAC KU LGE 104M 250B.txt	397 AAC/ACSR KU LGE 106M 250B.txt	397 AAC/ACSR KU LGE 106M 250B.txt
Small triplex secondary	#2 AAC KU LGE 079M 250B.txt	#2 AAC/ACSR KU LGE 082M 250B.txt	#2 AAC/ACSR KU LGE 082M 250B.txt
Medium triplex secondary	1/0 PAR AAC KU LGE 077M 250B.txt	2/0 AAC/ACSR KU LGE 083M 250B.txt	2/0 AAC/ACSR KU LGE 083M 250B.txt
Large triplex secondary	4/0 PAR AAC KU LGE 078M 250B.txt	397 AAC/ACSR KU LGE 084M 250B.txt	397 AAC/ACSR KU LGE 084M 250B.txt

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Very small copper primary/secondary	#4 HD KU LGE 035M 250B.txt	#4 HD KU LGE 035M 250B.txt	#4 HD KU LGE 035M 250B.txt
Small bare primary/secondary	1/0 AAAC KU LGE 007M 250B.txt	#2 ACSR KU LGE 009M 250B.txt	1/0 AAAC KU LGE 007M 250B.txt
Medium bare primary/secondary	195 AAAC KU LGE 008M 250B.txt	195 AAAC KU LGE 008M 250B.txt	195 AAAC KU LGE 008M 250B.txt
Large bare primary/secondary	795 AAC (61) KU LGE 004M 250B.txt	795 AAC (37) KU LGE 003M 250B.txt	795 AAC (37) KU LGE 003M 250B.txt
Very small covered copper primary/secondary	#4 HD Poly KU LGE 041M 250B.txt	#4 HD KU LGE 041M 250B.txt	#4 HD KU LGE 041M 250B.txt
Small covered primary/secondary	1/0 AAC Poly KU LGE 026M 250B.txt	1/0 AAC Poly KU LGE 026M 250B.txt	1/0 AAC Poly KU LGE 026M 250B.txt
Medium covered primary/secondary	3/0 AAC Poly KU LGE 027M 250B.txt	3/0 AAC Poly KU LGE 027M 250B.txt	3/0 AAC Poly KU LGE 027M 250B.txt
Large covered primary/secondary	795 AAC Poly KU LGE 029M 250B.txt	N/A	795 AAC Poly KU LGE 029M 250B.txt
Small aerial cable	1/0 AAC/12.5M AW Mess. KU LGE 064M 250B.txt	2/0 AAC/7-#9 AW KU LGE 065M 250B.txt	2/0 AAC/7-#9 AW KU LGE 065M 250B.txt
Medium aerial cable	336 AAC/20M AW Mess. KU LGE 070M 250B.txt	397 AAC/7-#10 AW Mess. KU LGE 071M 250B.txt	397 AAC/7-#10 AW Mess. KU LGE 071M 250B.txt
Large aerial cable	795 AAC/20M AW Mess. KU LGE 072M 250B.txt	795 AAC/7-#10 AW Mess. KU LGE 072M 250B.txt	795 AAC/7-#10 AW Mess. KU LGE 072M 250B.txt

Pre-existing communication cable will be modeled based on the following parameters.

	Nominal Dia. (")	Messenger Nominal (")	Overall Bare Dia. (")	Overall Bare Weight (#/ft)	Final Design Tension (#)
ADSS	0.5		0.52	0.091	1000
Mess. Supported	0.5	1/4	0.731	0.29	600
Mess. Supported	1	1/4	1.373	0.85	2000
Mess. Supported	2	3/8	0.273	2.461	3600
Mess. Supported	3	1/2	3.317	5.165	8000

Small residential telephone drops can be neglected in the PLA. Reduced tensions can be used for slack span telecommunication construction.

Primary and Neutral Conductors

#		Conductor	Conductor Codeword	NESC Loading District	Max. Primary Operating Temp (F)	Max. Neutral Operating Temp (F)	Ruling Span (ft)	FileName	Sag Tension Limits					NESC MEDIUM LOAD F NAL TENSION AT 200' SPAN (LBS)
									Temp (°F)	Ice (in)	Wind (psf)	Limit	Condition	
3	LARGE BARE PR MARY/SECONDARY KU	795 AAC (37)	Arbutus	Medium	212	120	50-500 (50)	KU LGE 003M 250B txt	15	0 25	4	4500 lbs	Initial	3901
									15	0	0	25%	Final	
									15	0	0	33%	Initial	
4	LARGE BARE PRIMARY/SECONDARY LG&E	795 AAC (61)	Lilac	Medium	212	120	50-500 (50)	KU LGE 004M 250B txt	15	0 25	4	4500 lbs	Initial	4112
									15	0	0	25%	Final	
									15	0	0	33%	Initial	
7	SMALL BARE PRIMARY/SECONDARY LG&E	123.3 AAAC (7)	Azusa	Medium	212	120	50-500 (50)	KU LGE 007M 250B txt	15	0 25	4	50%	Initial	1402
									15	0	0	25%	Final	
									15	0	0	33%	Initial	
8	MEDIUM BARE PRIMARY/SECONDARY LG&E	195.7 AAAC (7)	Amherst	Medium	212	120	50-500 (50)	KU LGE 008M 250B txt	15	0 25	4	50%	Initial	1989
									15	0	0	25%	Final	
									15	0	0	33%	Initial	
9	SMALL BARE PR MARY/SECONDARY KU	2 ACSR (6/1)	Sparrow	Medium	212	120	50-500 (50)	KU LGE 009M 250B txt	15	0 25	4	50%	Initial	1052
									15	0	0	25%	Final	
									15	0	0	33%	Initial	
10	MEDIUM BARE PR MARY/SECONDARY KU	2/0 ACSR (6/1)	Quail	Medium	212	120	50-500 (50)	KU LGE 010M 250B txt	15	0 25	4	50%	Initial	1690
									15	0	0	25%	Final	
									15	0	0	33%	Initial	
26	SMALL COVERED PRIMARY/SECONDARY LG&E AND KU	1/0 AAC POLY (7)	Quince	Medium	212	120	50-500 (50)	KU LGE 026M 250B txt	15	0 25	4	50%	Initial	884
									15	0	0	25%	Final	
									15	0	0	33%	Initial	
27	MEDIUM COVERED PRIMARY/SECONDARY LG&E AND KU	3/0 AAC POLY (7)	Fig	Medium	212	120	50-500 (50)	KU LGE 027M 250B txt	15	0 25	4	50%	Initial	1246
									15	0	0	25%	Final	
									15	0	0	33%	Initial	
29	LARGE COVERED PRIMARY/SECONDARY LG&E	795 KCM AAC POLY (61)	Persimmon	Medium	212	120	50-500 (50)	KU LGE 029M 250B txt	15	0 25	4	4500 lbs	Initial	4033
									15	0	0	25%	Final	
									15	0	0	33%	Initial	
35	VERY SMALL COPPER PRIMARY/SECONDARY LG&E AND KU	4 CU HD (SOL D)		Medium	212	120	50-500 (50)	KU LGE 035M 250B txt	15	0 25	4	50%	Initial	839
									15	0	0	25%	Final	
									15	0	0	33%	Initial	
41	VERY SMALL COVERED COPPER PRIMARY/SECONDARY LG&E AND KU	4 CU SD POLY (SOLID)		Medium	212	120	50-500 (50)	KU LGE 041M 250B txt	15	0 25	4	50%	Initial	860
									15	0	0	25%	Final	
									15	0	0	33%	Initial	
65	SMALL AERIAL CABLE KU	12.5M (30-2/0 AERIAL)		Medium	212	120	50-300 (50)	KU LGE 065M 250B txt	15	0 25	4	50%	Initial	4100
									15	0	0	25%	Final	
									15	0	0	33%	Initial	
66	SMALL AERIAL CABLE LG&E	12.5M (30-3/0 AERIAL)		Medium	212	120	50-300 (50)	KU LGE 066M 250B txt	15	0 25	4	50%	Initial	4147
									15	0	0	25%	Final	
									15	0	0	33%	Initial	
70	MEDIUM AERIAL CABLE LG&E	20M (30-336 AERIAL)		Medium	212	120	50-300 (50)	KU LGE 070M 250B txt	15	0 25	4	50%	Initial	6163
									15	0	0	25%	Final	
									15	0	0	33%	Initial	

71	MEDIUM AERIAL CABLE KU	20M (30-397 AERIAL)		Medium	212	120	50-300 (50)	KU LGE 071M 250B txt	15	0 25	4	50%	Initial	6221
									15	0	0	25%	Final	
									15	0	0	33%	Initial	
72	LARGE AERIAL CABLE LG&E AND KU	20M (30-795 AERIAL)		Medium	212	120	50-300 (50)	KU LGE 072M 250B txt	15	0 25	4	50%	Initial	6445
									15	0	0	25%	Final	
									15	0	0	33%	Initial	

Secondary Conductors

#		Conductor	Conductor Codeword	NESC Loading District	Max. Operating Temp (F)	Ruling Span (ft)	FileName	Sag Tension Limits					NESC MEDIUM LOAD FINAL TENSION AT 150' SPAN (LBS)
								Temp (F)	Ice (in)	Wind (psf)	Limit	Condition	
77	MEDIUM TRIPLEX SECONDARY LG&E	1/0 AAC PAC (1/0 AAAC N)	Hot Springs	Medium	194	25-250 (25)	KU LGE 077M 250B.txt	15	0.25	4	50%	Initial	1564
								15	0	0	25%	Final	
								15	0	0	33%	Initial	
78	LARGE TRIPLEX SECONDARY LG&E	4/0 AAC PAC (4/0 AAAC N)	Tumacacori	Medium	194	25-250 (25)	KU LGE 078M 250B.txt	15	0.25	4	50%	Initial	2672
								15	0	0	25%	Final	
								15	0	0	33%	Initial	
79	SMALL TRIPLEX SECONDARY LG&E	2 AAC TPX (2 AAC N)	Clam	Medium	194	25-250 (25)	KU LGE 079M 250B.txt	15	0.25	4	50%	Initial	672
								15	0	0	25%	Final	
								15	0	0	33%	Initial	
82	SMALL TRIPLEX SECONDARY KU	2 AAC TPX (4 ACSR N)	Cockle	Medium	194	25-250 (25)	KU LGE 082M 250B.txt	15	0.25	4	50%	Initial	832
								15	0	0	25%	Final	
								15	0	0	33%	Initial	
83	MEDIUM TRIPLEX SECONDARY KU	2/0 AAC TPX (2 ACSR N)		Medium	194	25-250 (25)	KU LGE 083M 250B.txt	15	0.25	4	50%	Initial	1166
								15	0	0	25%	Final	
								15	0	0	33%	Initial	
84	LARGE TRIPLEX SECONDARY KU	397 AAC TPX (266 ACSR N)		Medium	194	25-250 (25)	KU LGE 084M 250B.txt	15	0.25	4	50%	Initial	2391
								15	0	0	25%	Final	
								15	0	0	33%	Initial	
86	DUPLEX LG&E/KU	4 AAC DPX (4 ACSR N)	Terrier	Medium	194	25-250 (25)	KU LGE 086M 250B.txt	15	0.25	4	50%	Initial	783
								15	0	0	25%	Final	
								15	0	0	33%	Initial	

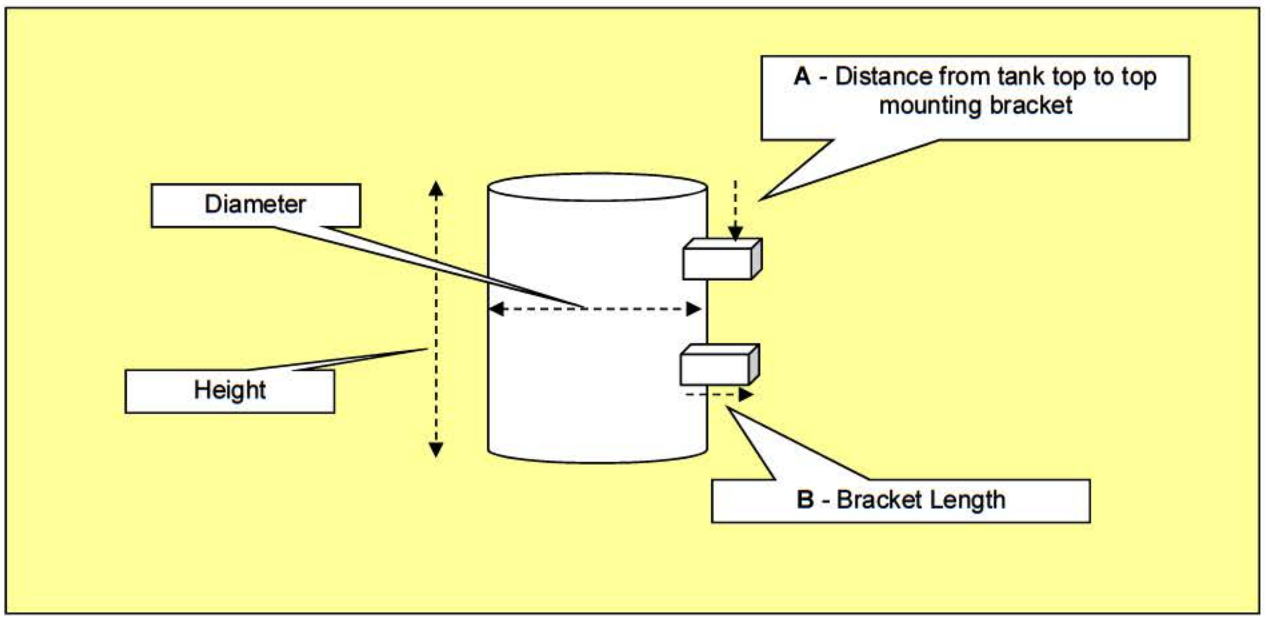
Service Conductors

#		Conductor	Conductor Codeword	NESC Loading District	Max. Operating Temp (F)	Ruling Span (ft)	FileName	Sag Tension Limits					NESC MEDIUM LOAD FINAL TENSION AT 80' SPAN (LBS)
								Temp (F)	Ice (in)	Wind (psf)	Limit	Condition	
93	SMALL TRIPLEX SERVICE LG&E	2 AAC TPX (2 AAC N) SRVC	Clam	Medium	194	20-140 (20)	KU LGE 093M 250B.txt	60	0	0	3' SAG	Initial	239
								15	0.25	0	500 lbs	Initial	
94	MEDIUM TRIPLEX SERVICE LG&E	1/0 AAC TPX (1/0 AAC N) SRVC	Murex	Medium	194	20-140 (20)	KU LGE 094M 250B.txt	60	0	0	3' SAG	Initial	300
								15	0.25	0	500 lbs	Initial	
95	LARGE TRIPLEX COMMERCIAL SERVICE LG&E	4/0 AAC TPX (4/0 AAC N) SRVC	Coquina	Medium	194	20-140 (20)	KU LGE 095M 250B.txt	60	0	0	3' SAG	Initial	425
								15	0.25	0	500 lbs	Initial	
96	SMALL TRIPLEX SERVICE KU	2 AAC TPX (4 ACSR N) SRVC	Cockle	Medium	194	20-140 (20)	KU LGE 096M 250B.txt	60	0	0	3' SAG	Initial	238
								15	0.25	0	500 lbs	Initial	
97	MEDIUM TRIPLEX SERVICE KU	2/0 AAC TPX (2 ACSR N) SRVC		Medium	194	20-140 (20)	KU LGE 097M 250B.txt	60	0	0	3' SAG	Initial	325
								15	0.25	0	500 lbs	Initial	
98	LARGE TRIPLEX COMMERCIAL SERVICE KU	397 AAC TPX (266 ACSR N) SRVC		Medium	194	20-140 (20)	KU LGE 098M 250B.txt	60	0	0	3' SAG	Initial	496
								15	0.25	0	500 lbs	Initial	
101	SMALL QUADRUPLEX SECONDARY/SERVICE LG&E AND KU	2 AAC QUAD (2 AAC N) SRVC	Mustang	Medium	194	20-140 (20)	KU LGE 101M 250B.txt	60	0	0	3' SAG	Initial	267
								15	0.25	0	500 lbs	Initial	
102	MEDIUM QUADRUPLEX SECONDARY/SERVICE LG&E	1/0 AAC QUAD (1/0 AAC N) SRVC	Libyan	Medium	194	20-140 (20)	KU LGE 102M 250B.txt	60	0	0	3' SAG	Initial	345
								15	0.25	0	500 lbs	Initial	
103	MEDIUM QUADRUPLEX SECONDARY/SERVICE KU	2/0 AAC QUAD (2 ACSR N) SRVC		Medium	194	20-140 (20)	KU LGE 103M 250B.txt	60	0	0	3' SAG	Initial	381
								15	0.25	0	500 lbs	Initial	
104	LARGE QUADRUPLEX SERVICE LG&E	4/0 AAC QUAD (4/0 AAC N) SRVC	Singlefoot	Medium	194	20-140 (20)	KU LGE 104M 250B.txt	60	0	0	3' SAG	Initial	485
								15	0.25	0	500 lbs	Initial	
106	LARGE QUADRUPLEX SERVICE KU	397 AAC QUAD (266 ACSR N) SRVC		Medium	194	20-140 (20)	KU LGE 106M 250B.txt	60	0	0	3' SAG	Initial	497
								15	0.25	0	500 lbs	Initial	

Typical Distribution Pole Weights and Dimensions

Pole Height (ft.)		Pole Class					IIN #
		H1	1	2	3	4	
30'	Bottom Dia. (")					10.07"	1196401
	Dia. Taper ("/ft.)					0.113"/ft	
	Weight (lbs.)					749#	
35'	Bottom Dia. (")					10.72"	7002369
	Dia. Taper ("/ft.)					0.115"/ft	
	Weight (lbs.)					947#	
40'	Bottom Dia. (")					11.37"	7002373
	Dia. Taper ("/ft.)					0.117"/ft	
	Weight (lbs.)					1170#	
45'	Bottom Dia. (")				12.65"		7002376
	Dia. Taper ("/ft.)				0.118"/ft		
	Weight (lbs.)				1613#		
50'	Bottom Dia. (")		14.47"				7002378
	Dia. Taper ("/ft.)		0.131"/ft				
	Weight (lbs.)		2528#				
55'	Bottom Dia. (")		15.56"				7002381
	Dia. Taper ("/ft.)		0.127"/ft				
	Weight (lbs.)		2896#				
60'	Bottom Dia. (")		16.02"				7002384
	Dia. Taper ("/ft.)		0.124"/ft				
	Weight (lbs.)		3289#				
65'	Bottom Dia. (")		16.48"				1196843
	Dia. Taper ("/ft.)		0.121"/ft				
	Weight (lbs.)		3708#				
70'	Bottom Dia. (")		16.95"				1247686
	Dia. Taper ("/ft.)		0.119"/ft				
	Weight (lbs.)		3708#				
75'	Bottom Dia. (")		17.42"				7002390
	Dia. Taper ("/ft.)		0.118"/ft				
	Weight (lbs.)		4154#				
80	Bottom Dia. (")	18.40"	17.89"				7002392 CL-1 7006589 H-1
	Dia. Taper ("/ft.)	0.120'/ft	0.116"/ft				
	Weight (lbs.)	5763#	5128#				
85'	Bottom Dia. (")	19.33"	18.18"				7002393 CL-1 7006590 H-1
	Dia. Taper ("/ft.)	0.119"/ft	0.113"/ft				
	Weight (lbs.)	6344#	5581#				

Transformers						
Description	Weight (lbs)	Height (in)	Diameter (in)	A (in)	B (in)	EPA (sq ft)
10 KVA	210	29	16	5.80	4.25	3.22
15 KVA	270	34	18	6.80	4.25	4.25
25 KVA	345	34	20	6.80	4.25	4.72
37.5 KVA	495	35	19	7.00	4.25	4.62
50 KVA	670	37	23	7.40	4.25	5.90
75 KVA	1015	44	26	8.80	4.25	7.94
100 KVA	1178	45	26	9.00	4.25	8.12
167 KVA	1441	49	26	9.80	4.25	8.84
250 KVA	1909	56	26	11.20	4.25	10.11
333 KVA	2586	62	29	12.40	4.25	12.48
500 KVA	3100	66	29	13.20	4.25	13.29



Regulators											
Voltage (kV)	Load Current (Amperes)	kVA	Figure	Dimensions (in.)					Oil (Gallons)	Untanking Weight (lbs.)	Total Weight (lbs.)
				A	B	C	D	E			
2.5 60kV B L	200	50	1	71	64	30	39	20	51	615	1200
	300	75	1	80	74	36	47	25	106	745	1810
	400	100	1	80	74	37	52	25	108	803	1938
	668	167	1	95	89	40	49	24	132	110	2560
	1000	250	3	110	110	28	61	26	179	2435	4345
	1332	333	3	103	103	37	61	26	183	2450	4755
	1665	416	Dimensions available at time of quotation/order								
7.62 95kV B L	50	38	1	71	64	24	34	20	50	505	1030
	75	57	1	75	68	30	39	20	55	635	1185
	100	76	1	75	68	31	41	20	56	665	1265
	150	114	1	75	68	35	49	22	71	785	1585
	219	167	2	78	72	36	49	22	81	995	1975
	328	250	2	84	78	44	56	25	100	1285	2530
	438	333	3	97	91	38	61	26	153	1725	3525
	548	416	3	102	96	44	61	27	210	2075	4485
	656	500	3	100	93	40	67	30	224	2222	4934
	875	667	3	100	97	48	68	31	247	3060	5995
	1093	833	3	123	119	63	73	35	448	5620	10620
19.92 150kV B L	200.8	400	3	96	87	46	62	28	171	2155	4110
	250	500	3	104	97	46	68	33	263	2610	5520
	502	1000	3	118	109	46	75	38	311	4115	8645

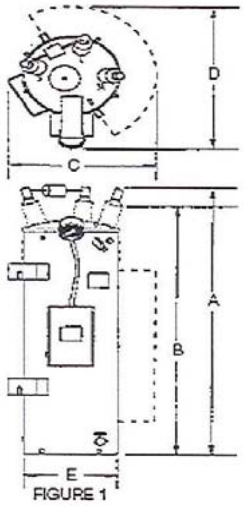


FIGURE 1

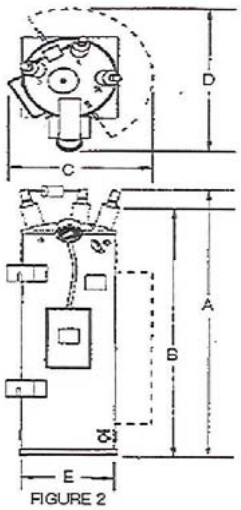


FIGURE 2

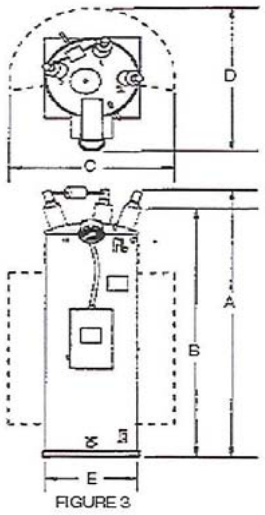
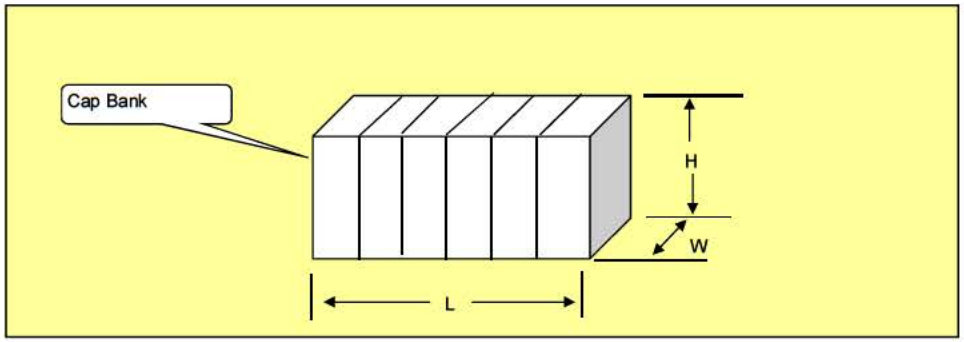
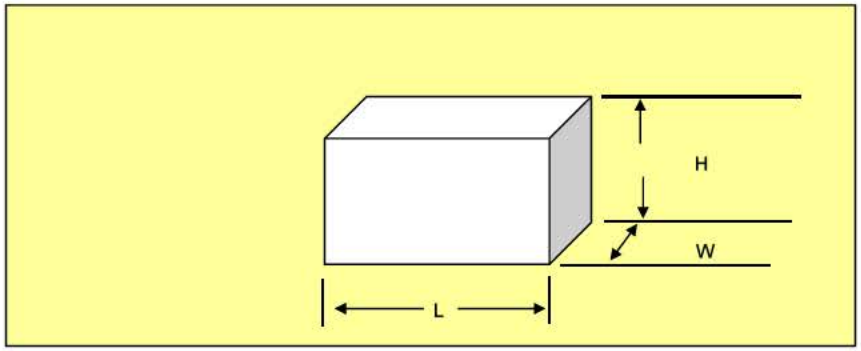


FIGURE 3

Capacitors								
Description	Length (L) (in)	Width (W) (in)	Height (H) (in)	Weight (lbs)	EPA (Sq ft)	IIN	Cooper Part #	
300 KVAR	55	37.00	40.00	282		7004767	OCBB27E01010001	Capacitor weights and sizes with switches attached
450 KVAR	55	37.00	40.00	290		3000031	OCCB27E01010001	
600 KVAR	55	37.00	40.00	315		7004770	OCDB27E01010001	
900 KVAR	55	37.00	40.00	363		7004773	OCEB27E01010001	
1200 KVAR	55	37.00	40.00	400		7004779	OCFB27E01010001	



Pole Mounted Equipment									
Description	Length (L) (in)	Width (W) (in)	Height (H) (in)	Weight (lbs)	EPA (sq ft)		Part #		Notes
STREET LIGHTS	31.81"	15.12"	14.41"	39	1.4	400W Cobra	MSRL40S1A22RMS3	6' Arm (12 LBS)	Common light type
FLOOD LIGHTS	25.13"	12.09"	29.50"	65	3.0	1000 W Flood	PF1K01M0A27X7DBLP		Max flood light size
RISERS									
Hubbell Hookstick Operated Gang-Op Switch	107"	60"	23"	300			AR113FHHL		
RECLOSERS	**See Appendix B**								



Insulators	Manufacturer	Catalog #	IIN
12KV PORCELAIN PIN-TYPE INSULATOR	Victor	5R	7001271
13.8KV PORCELAIN PIN-TYPE INSULATOR	Victor	9R	1163827
34.5KV PORCELAIN PIN-TYPE INSULATOR	Victor	145R	7001272
15KV POLY PIN-TYPE INSULATOR	Hendrix	HPI-15F	7001269
34KV POLY PIN-TYPE INSULATOR	Hendrix	HPI-35L	1164101
15KV POLYMER SUSPENSION INSULATOR	Hubbell	401015-0215	7001280
34.5KV POLYMER SUSPENSION INSULATOR	Hubbell	405004-1400	3000799
69KV VERTICAL POST INSULATOR	Hubbell	402069-0209	7005086
69KV HORIZONTAL POST INSULATOR	Hubbell	P250024S1020	7001248
POLE TOP PIN	Maclean	J1220Z	7006359
15KV CROSSARM PINS	Maclean	J203Z	7004088
34.5 KV CROSSARM PINS	Maclean	J608Z	1159043
SPOOL INSULATOR	Porcelain Products	5101-1	7001268
NEUTRAL DEADEND	Josyln	J9414	7000240

Wood Arms	Length (in)	Width (in)	Height (in)	Manufacturer	Catalog #	IIN
8FT WOOD CROSSARM	96	3 3/4	4 3/4	Brooks	LOKU-070602-08	7000101
10FT WOOD CROSSARM	120	3 3/4	4 3/4	Brooks	LOKU-070602-10	7000102
11FT WOOD CROSSARM	132	3 1/2	5 1/2	Brooks	LOGE-1233763	1233760
8FT WOOD ALLEY ARM	96	3 3/4	4 3/4	Brooks	LOKU-070602-08	7000101

Steel Arms & Brackets	Manufacturer	Catalog #	IIN
ANGLE BRACKETS (C BRACKET)	Hendrix	BA3-15	7002177
LONG E BRACKET	Hendrix	BV-35	7002182
SHORT E BRACKET	Fabricated Metals	B-2541	1156751
14" TANGENT BRACKET	Hendrix	BM-14	7002178
24" TANGENT BRACKET	Hendrix	BM-24	7002179
TRITAP DEADEND BRACKET	Hendrix	BD-35	

Composite Arms & Brackets	Manufacturer	Catalog #	IIN
3-EYE BRACKET (1Ø)	Maclean	GIMDA318ATB	7001703
3-EYE BRACKET (3Ø)	Maclean	G3MA023618DDB	7010214
SPACER CABLE BRACKET	Hendrix	RTL-15	7001274
8FT FIBERGLASS DEAD END ARM (5000 LBS)	Pupi	DE2000-96E3-KU2	0943086
8FT FIBERGLASS DEAD END ARM (10000 LBS)	Pupi	DE3000-96E3-SP2	7010711
10FT FIBERGLASS DEAD END ARM (10000 LBS)	Pupi	DA-3000-120E4-B92	3009123

Anchor Holding Strengths

Anchor Type	Soil Type								
	Class 0	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	
	Holding Strength (lbs)								IIN
8" Single Helix Socket	-	50,000	30,000	21,000	16,000	12,000	8,000	6,000	7010142
12" Single Helix Socket	-	50,000	40,000	32,000	27,000	23,000	18,000	15,000	7010141
Expanding Rock Anchor-LGE	36,000	-	-	-	-	-	-	-	3010452 one piece rod and anc
Expanding Rock Anchor-KU	23,000	-	-	-	-	-	-	-	7000792 one piece rod and anc
Standard Expanding Anchor	-	-	-	26,500	22,000	18,000	15,000	10,000	7000791
Concrete Anchor	depends on rod strength								
Log Anchor		100,000	88,500	75,000	62,500	50,000	40,000	30,000	7002481
H-Beam 14-1/8"x10-1/8"	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	1191760 no rod
H-Beam 14-3/8"x14-5/8"	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	1191778 no rod
H-Beam 14-3/4"x15-1/2"	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	1191786 no rod
H-Beam 15-3/4"x15-3/4" (25,000 bs)	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	1191794 no rod
H-Beam 15-3/4"x15-3/4" (30,000 bs)	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	1191794 no rod

Anchor Rods	Strength (lbs)
5/8"	16,000
3/4"	23,000
1"	36,000
1-1/4"	58,000

Soil Class	Class Description
Class 0	Sound hard rock, unweathered
Class 1	Very dense and/or cemented sands; coarse gravel and cobbles
Class 2	Dense fine sands; very hard silts and clays (may be preloaded)
Class 3	Dense sands and gravel; hard silts and clays
Class 4	Medium dense sand and gravel; very stiff to hard silts and clays
Class 5	Medium dense coarse sands and sandy gravels; stiff to very stiff silts and clays
Class 6	Loose to medium dense fine coarse sands to stiff clays and silts
Class 7	Loose fine sands; Alluvium; loess; medium - stiff and varied clays; fill

Note: The information contained above was taken from A.B. Chance's anchoring manual.

Guy Strands		
Strand	Strength Rating	**IIN**
8M AW	8,000	1197401
12.5M AW	12,500	1197435
20M AW	20,000	1197443
3/8" HS Galvanized	15,400	7000797
7/16" HS Galvanized	20,800	7000798

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Pole Loading Analysis

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Setup Parameters for Pole Loading Analysis

LG&E uses the parameters listed below to perform pole loading analyses. The analyses are performed using the finite element program called "***PoleForeman***" (see Section 960 for information on this program).

1. Load District: 2012 NESC Section 250B - Medium Load District, appropriate grade of construction (Grade B, C or C @ crossing). For structures and/or conductors that exceed 60' above ground at the pole or at any point in the span, NESC 250C and 250D also apply.

2. Load analysis performed per 2012 NESC Tables 253-1 and 261-1. Use Grade B construction per NESC Table 242-1 at railroad crossings, limited access highways, navigable waterways requiring waterway crossing permits and crossing other energized lines (not attached to the same pole).

3. Linear analysis is used on un-guyed single structures. Non-Linear analysis is used for guyed single structures. Questions and clarification may be directed to LG&E Engineering as situations arise.

4. Type of Pole Species used; Distribution: Southern Pine
Transmission: Douglas Fir

Pole Attachment Cases

Case 1: (2) 3 – phase w/ streetlight, secondary, and 3 attachments (See results at the end of this Section).

- Pole: 50' class 3 Southern Pine
- Top of pole @ 43'-0"
- Primary conductor: 3 – phase #795AAC on 10' crossarm @ 39'-0"
- Primary conductor: 3 – phase #795AAC on 10' crossarm @ 33'-0"
- Neural conductor: #1/0AAC Poly @ 28'-1"
- Secondary conductor: #1/0AAC Poly @ 27'-1"
- Secondary conductor: #1/0AAC Poly @ 26'-1"
- Streetlight @ 23'-2"
- Above conductors calculated using a ruling span = 200'
- CATV (2.00") @ 22'-0"
- TELE (2.00") @ 21'-2"
- Proposal: Install fiber optic @ 20'-6"

PoleForeman - Pole Loading Analysis Report

License: LGE-KU

POLE LOADING DATA

Pole: 50/3 Wood
Pole Loading
Horizontal: 69% (250B)
Vertical: 62% (250B)

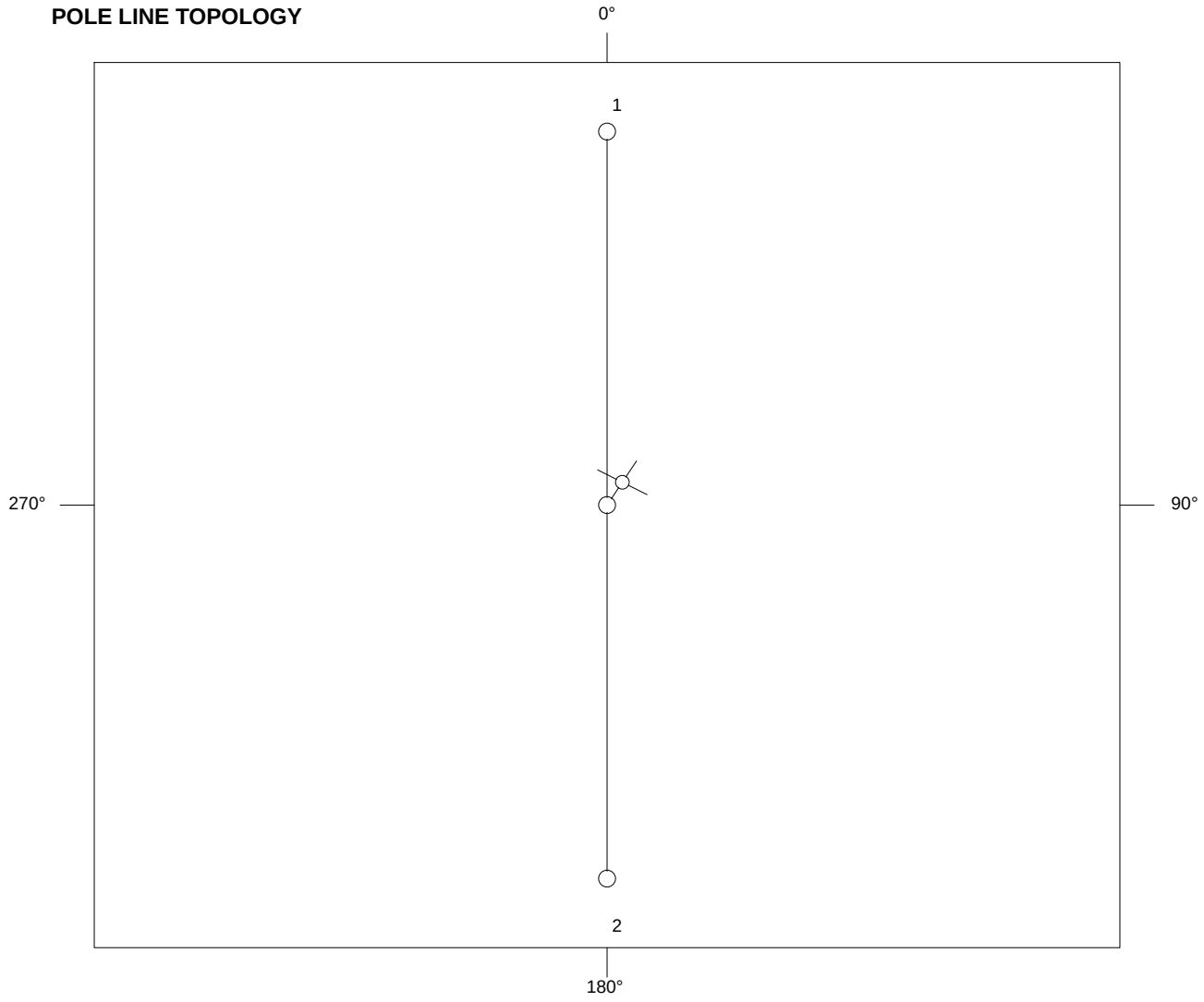
NESC Edition: 2012
Loading District: Medium
Construction: Grade C (Elsewhere)

Rule 250B Loading: Wind (psf): 4 Ice (in): 0.25

POLES

Pole #	Length (ft)	Depth (ft)	Elevation (ft)
0	50	7	0
1	50	7	0
2	50	7	0

POLE LINE TOPOLOGY



File: H:\Kentucky Wired Fiber\PoleForman\Case 1.pff

PoleForeman - Pole Loading Analysis Report

License: LGE-KU

INSULATORS

Insulator	Attach	Loading	Angle
13KV SNG Xarm Pin & Ins	48"	36%	0°
13KV SNG Xarm Pin & Ins	48"	36%	0°
13KV SNG Xarm Pin & Ins	48"	36%	0°
12KV SNG Xarm Pin & Ins	120"	36%	0°
12KV SNG Xarm Pin & Ins	120"	36%	0°
12KV SNG Xarm Pin & Ins	120"	36%	0°
Spool Ins Tangent	179"	9%	0°

ARM / BRACKET DATA

Arm/Bracket	Attach	Vert Loading	Horz Loading
10' SNG Xarm (3-3/4x4-3/4)	48"	42%	12%
10' SNG Xarm (3-3/4x4-3/4)	120"	41%	12%
1 Wire Rack	179"		

SPANS

Span: 1 Span Length (ft): 200 Direction: 0°

Circuit: 1

Primary	Ruling Span (ft)	Offset (in)	Attach A (in)	Attach B (in)	Tension
795 AAC (61)	200	56	38	38	4500
795 AAC (61)	200	20	38	38	4500
795 AAC (61)	200	-56	38	38	4500
Neutral					
1/0 AAC POLY (7)	200	1	179	179	895
Secondary					
1/0 AAC POLY (7)	200	0	191	191	895
1/0 AAC POLY (7)	200	0	203	203	895

Circuit: 2

Primary	Ruling Span (ft)	Offset (in)	Attach A (in)	Attach B (in)	Tension
795 AAC (61)	200	56	111	111	4500
795 AAC (61)	200	20	111	111	4500
795 AAC (61)	200	-56	111	111	4500

Joint Use Cable	Ruling Span(ft)	Diameter (in)	Weight (lbs/ft)	Attach A (in)	Attach B (in)	Tension	Sag	Description
2.00" CATV	200	2	0.759	252	252	3050	21	
2.00" TELCO	200	2	2.06	261.96	261.96	5630	26	
User Defined	0	0.5	0.207	270	270	1052	23	

Span: 2 Span Length (ft): 200 Direction: 180°

Circuit: 1

Primary	Ruling Span (ft)	Offset (in)	Attach A (in)	Attach B (in)	Tension
795 AAC (61)	200	56	38	38	4500
795 AAC (61)	200	20	38	38	4500
795 AAC (61)	200	-56	38	38	4500
Neutral					
1/0 AAC POLY (7)	200	1	179	179	895
Secondary					
1/0 AAC POLY (7)	200	0	191	191	895
1/0 AAC POLY (7)	200	0	203	203	895

Circuit: 2

Primary	Ruling Span (ft)	Offset (in)	Attach A (in)	Attach B (in)	Tension
795 AAC (61)	200	56	111	111	4500
795 AAC (61)	200	20	111	111	4500
795 AAC (61)	200	-56	111	111	4500

Joint Use Cable	Ruling Span(ft)	Diameter (in)	Weight (lbs/ft)	Attach A (in)	Attach B (in)	Tension	Sag	Description
2.00" CATV	200	2	0.759	252	252	3050	21	
2.00" TELCO	200	2	2.06	261.96	261.96	5630	26	
User Defined	0	0.5	0.207	270	270	1052	23	

LIGHTS

Light	Bracket	EPA	Weight	Attach	Direction
150-400W Cobra	8 FT Bracket	0.87	76	238	30°

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Transmission Requirements

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Third Party Transmission Pole Loading Analysis Criteria

1. The attachment method for communication cable facilities must first be reviewed by LG&E and KU Transmission Department or their representative in accordance with LG&E and KU's existing Encroachment Guideline. Only after this review has been completed and approval granted can the attachment request be permitted.

2. If there are no electric distribution line facilities attached to the transmission poles then the addition of communication cables will be prohibited.

3. Transmission lines are normally located within private R/W easements that do not permit LG&E and KU to grant attachment rights to other companies. Encroachment rights on this private R/W easement must first be granted by the property owner and presented to LG&E and KU before LG&E and KU can grant the right to attach to its transmission poles or structures.

4. The attachment of communication cable facilities will not be permitted on poles supporting transmission circuits operating at voltages greater than 138 kV.

5. No longitudinal third party owned fiber optic cable attachments are permitted on the overhead transmission system (69kV and above) unless it is in the communication space on an under built distribution circuit.

6. LG&E and KU plans to eventually replace its 69kV and 138kV wood poles with steel poles. Attachers must be prepared to change their method of attachment in this event.

7. The location/elevation of distribution primary and neutral on any transmission pole, or distribution pole within the transmission right of way may not be altered in any way.

8. Analysis of LG&E and KU transmission structures for the addition of new communication cables shall be done using a finite element computer program using non-linear analysis. The program will be capable of performing analysis on both guyed and unguyed Transmission pole structures. LG&E and KU recommends the use of the software program PLS-POLE by Power Line Systems, Inc.

9. Approved Engineering Consultants to perform analysis of LG&E and KU transmission structures are as follows:

    - Black and Veatch - 11401 Lamar Ave. Overland Park KS.
    - Burns and McDonnell - 9400 Ward Parkway Kansas City MO.
    - Sargent and Lundy-55 East Monroe Street Chicago, IL.
    - Power Engineers – P.O. Box 1066 Hailey, ID.

    Other Engineering Consultants may be considered by LG&E and KU upon written request.

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10. Criteria

The analysis shall be done using the following codes and standards:

National Electrical Safety Code 2012 or latest edition.
ANSI O5.1-2008 Specifications and Dimensions for Wood Poles or latest edition.
LG&E and KU Vertical Clearance Requirements between LG&E and KU facilities and non-LG&E and KU communication facilities Standards Codes and Standards revision D or latest edition.

The following load conditions shall be checked for all transmission poles:

NESC 250B-Heavy ½" radial ice, 4 PSF wind at 0 degrees F.
NESC 250C – 21 PSF Extreme wind at 60 degrees F.
NESC 250D- Concurrent Ice/Wind with ¾" radial ice, 2.30psf wind at 15 degrees F.

Grade B construction standards shall be used for all transmission structures.

Pole strength reductions shall be applied as follows:

5 – 12 years:	0 - 0.5%	
13 – 30 years:	0.5% - 2.0%	Note: Interpolation is allowed.
31 – 80 years:	2.0% - 6.0%	

Pole defects can be, but not limited to, woodpecker holes, shell rot, insect damage, excessive checking, and external pockets or split pole top.

Conductor/cable diameter and weights should be provided by the appropriate utility. Submittals shall include information and description of each wire used to check the Transmission structure.

Conductor/cable tension should be provided by the appropriate utility. If unavailable then maximum tension under heavy loading is not to exceed 60% RBS of conductor or messenger, whichever is appropriate.

11. Procedure

All Pole Loading Analysis and Reporting shall be developed and performed under the direction of a professional engineer licensed by the state where such facility is located, all of which shall be subject to LG&E and KU review and acceptance. The analysis shall be stamped by an engineer licensed in the appropriate state.

When a fix is required in the form of a new pole or other means, only LG&E and KU will schedule and supervise the construction work with Company approved contractors.

12. Reports

All analyses files and the field survey reports shall be sent to LG&E and KU or their representative for review.

The report shall include the following items:

- Structure type (tangent, angle, etc.) and number if available.
- County and or City pole is located.
- Pole length and class, (example 70 ft. class 2 wood pole)
- State Plan Coordinates at each structure considered.
- Digital photo of structure to be considered.
- Field survey used to determine locations of all existing and proposed cable attachments on pole.

The report shall include a description of all cables used in analysis of the transmission structure. The applicant shall also supply PLS-Cadd wire files for any proposed cables to be attached to the transmission structures.

For additional information reference Power Line Systems section 9.2 Creating or Editing cable files for more information.

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LG&E & KU Construction Standards

LG&E THIRD PARTY POLE ATTACHMENT HANDBOOK

Last updated March 23, 2016

Electric System Codes & Standards

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

02 10 02
Rev. E

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	TYPICAL CLEARANCE	NESC MINIMUM	SPECIAL CLEARANCE REDUCTION
SUPERVISORY CABLE	18"	12"	
NEUTRAL & GROUNDED GUYS	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.

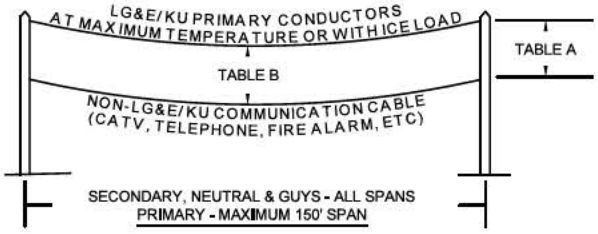
A) The upper supply conductor at its maximum operating temperature with the communication conductors at 120° F (maximum operating temperature is 120° F for voltages less than 69kV, and 212° F for voltages 69kV and above).

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			
SUPERVISORY CABLE	18"	12"	
NEUTRAL & GROUNDED GUYS	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

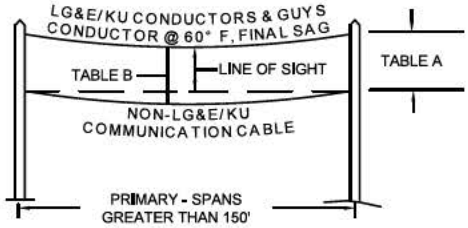


CLEARANCES OF PRIMARY CONDUCTORS ON SPANS GREATER THAN 150'

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, final sag, will not sag below the line of sight of the attachment points of the communication conductors (NESC RULE 235C2b(3)).

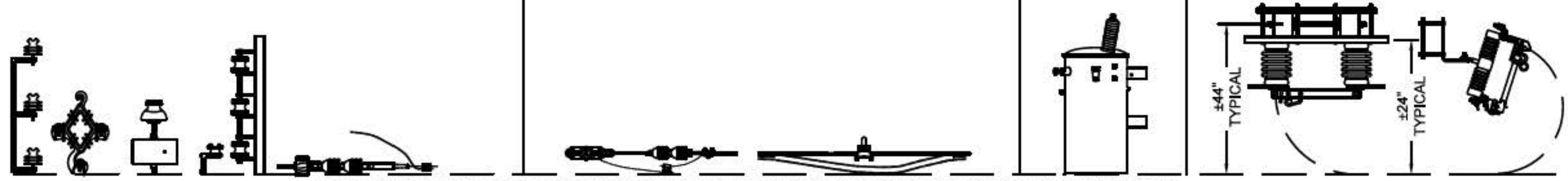


VERTICAL CLEARANCE REQUIREMENTS BETWEEN LG&E/KU FACILITIES AND NON-LG&E/KU COMMUNICATION FACILITIES

02 10 02 Rev. E

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

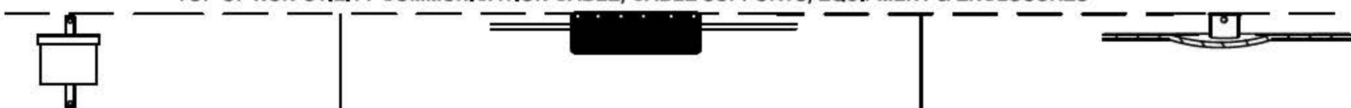
BOTTOM OF CONDUCTOR SUPPORTS AND BRACKETS | BOTTOM OF CONDUCTOR OR CONNECTOR | BOTTOM OF EQUIPMENT | BOTTOM OF SWITCHES IN OPEN POSITION



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

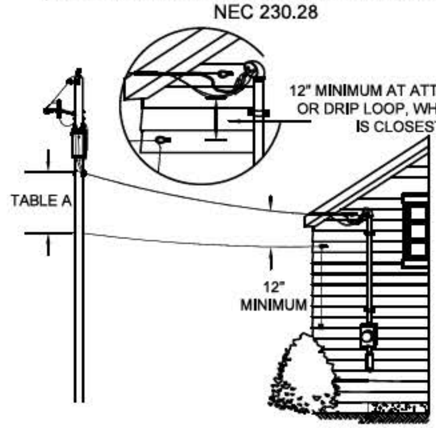
TABLE A

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

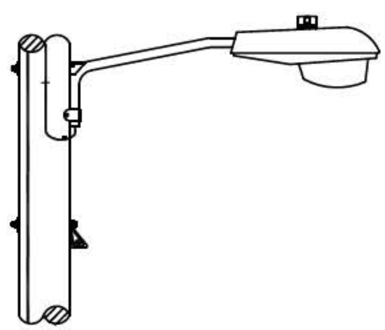


SERVICE DROPS ONLY

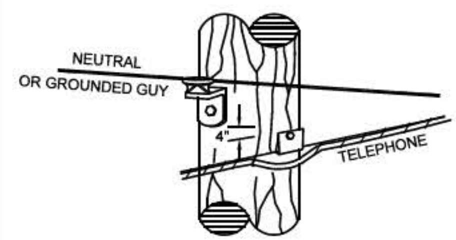
For secondary service drops only, clearance at any point within the span may be reduced to 12" if clearance at the pole is maintained to the values in Table B (NESC Rule 235C1 Exception 3)

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).

2007 NESC MINIMUM CLEARANCE OF CONDUCTORS
VERTICAL CLEARANCE OF WIRES, CONDUCTORS, AND CABLES ABOVE GROUND, ROADWAYS, RAILS, OR WATER SURFACES

02 10 06
Rev. D

(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. SEE THE DEFINITIONS SECTION AND RULES 232B1, 232C1A, AND 232D4 ON PAGE 2 OF THIS STANDARD.) (25)

CLEARANCE OVER ALL WATER AREAS:

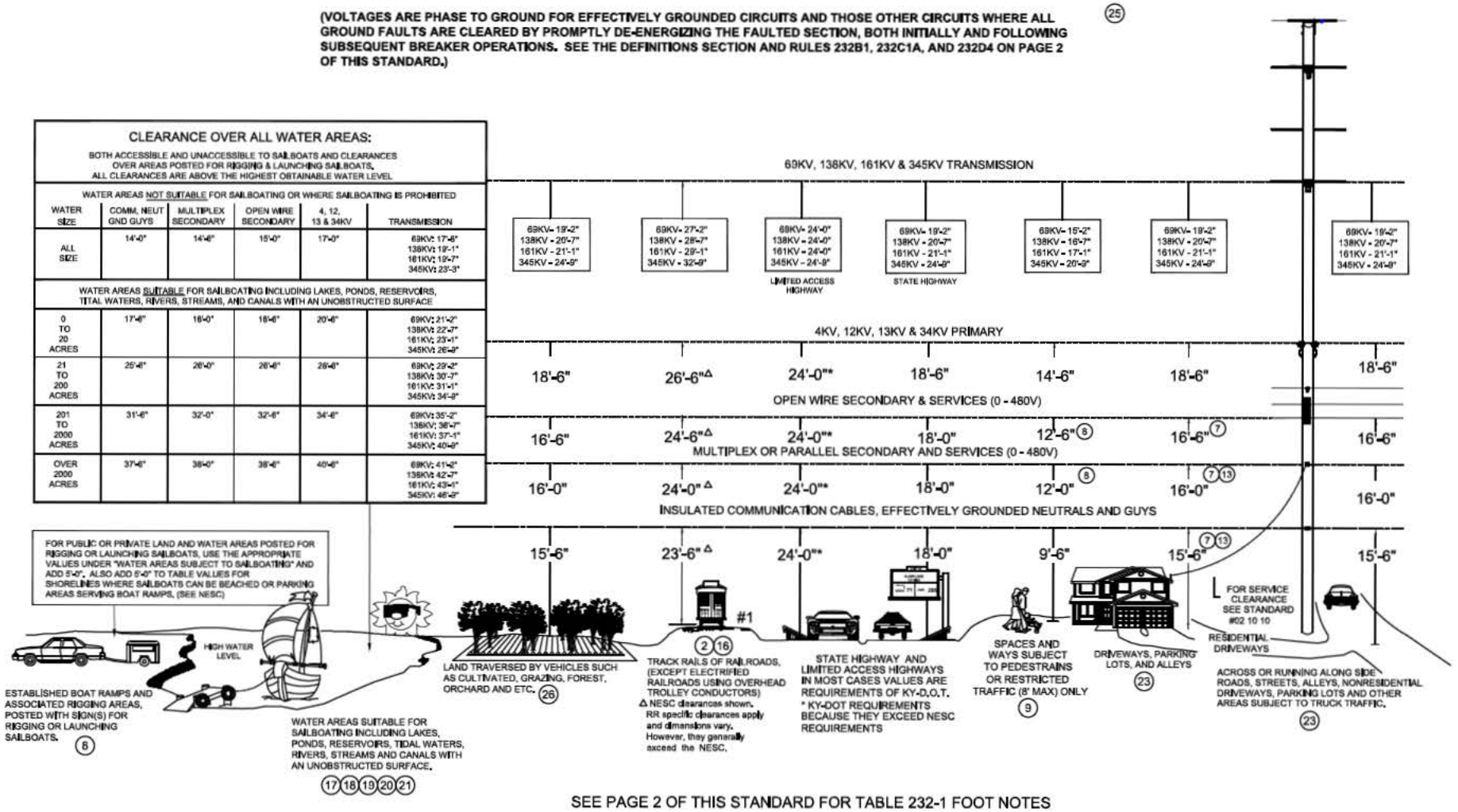
BOTH ACCESSIBLE AND UNACCESSIBLE TO SAILBOATS AND CLEARANCES OVER AREAS POSTED FOR RIGGING & LAUNCHING SAILBOATS. ALL CLEARANCES ARE ABOVE THE HIGHEST OBTAINABLE WATER LEVEL

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'-6" 138KV: 19'-1" 161KV: 19'-7" 345KV: 23'-3"

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

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



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

Attachment to Response to KCTA Question No. 1-16
37 of 97
Wolfe

(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.) (25)

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 the height of a building or other installation does not permit service drops to meet these values, the 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 23001 or 23003	12.0
(d)	Drip loops only of service drops limited to 150 V to ground and meeting Rules 23001 or 23003	10.0
(e)	Insulated communication service drops	11.5

8) Where the height of a building or other installation does not permit service drops to meet these values, the clearances may be reduced 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 23001 or 23003	10.0
(d)	Drip loops only of supply service drops limited to 150 V to ground and meeting Rules 23001 or 23003	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 alleys, driveways, or parking lots not subject to truck traffic 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 an over water 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 over water obstruction height, except that the reduced clearance shall be not less than that required for the surface area on the line-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.

25) The clearance values shown in this table are computed by adding the applicable Mechanical and Electrical (M & E) value of Table A-1 to the applicable Reference Component of Table A-2a of Appendix A.

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.

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.

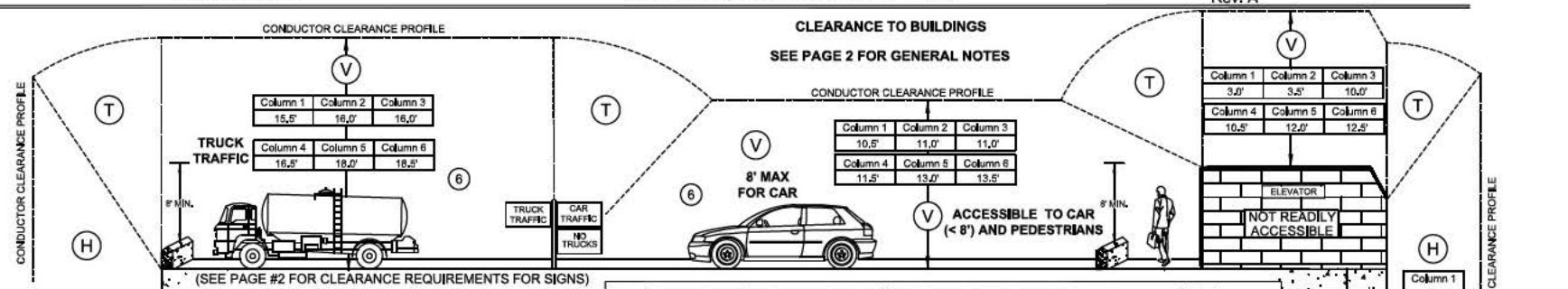
EXCEPTION: For voltages exceeding 98 kV ac to ground or 139 kV dc to ground, clearances less than those required above are permitted for systems with known maximum switching-surge factors (see Rule 232D).

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.

Attachment to Response to KCTA Question No. 1-16
38 of 97
Wolfe

2007 NESC TABLE 234-1 MINIMUM CLEARANCE OF CONDUCTORS TO BUILDINGS, SIGNS & OTHER INSTALLATIONS



(SEE PAGE #2 FOR CLEARANCE REQUIREMENTS FOR SIGNS)

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, 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:

1) Where building, sign, chimney, antenna, tank, or other installation does not require maintenance such as painting, washing, changing of sign letters, or other operations that would require persons to work or pass between wires, conductors, cables or unguarded rigid live parts and structure, the clearance may be reduced by 2 ft.
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 area is considered readily accessible to pedestrians if it can be casually accessed through a doorway, ramp, window, 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 is 8 ft or more from the ground or other permanently installed accessible surface.
4) The required clearances shall be to the closest approach of motorized signs or moving portions of installations covered by rule 234c.
5) Ungrounded guys and ungrounded portion of guys between guy insulators shall have clearances based on the highest voltage to which they may be exposed 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) Where available space will not permit this value, the clearance may be reduced to 7.0 ft for conductors limited to 8.7 kV to ground.
12) The clearance values shown in this table are computed by adding the applicable Mechanical and Electrical (M &E) value of Table A-1 to the applicable Reference Component of Table A-2b of Appendix A.
13) The anchor end of guys insulated in accordance with Rule 279 may have the same clearance as 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.

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 (12)

	Column 1	Column 2	Column 3	Column 4		Column 5	Column 6	
	Insulated Communications Cables, Messengers, Neutrals, Grounded Guys, Ungrounded Guys Exposed To Secondary 0-300V (13) Shelded Cables 230 C1	Duplex Triplex Quadraplex & Paralay Secondary 0-750V (ft)	Unguarded Secondary Rigid Live Parts 0-750V Ungrounded Secondary Equipment Cases 0-750V Guys Exposed To Secondary 300-750V (480V 3-Wire) (ft) (5)	Open Wire Secondary 0-750V (ft) (15)		Unguarded Primary Rigid Live Parts 750V-22KV Ungrounded Primary Equipment Cases 750V-22KV Ungrounded Guys Exposed To Primary 750V-22KV (ft) (5)	Open Wire Primary & Aerial Cable 750V-22KV (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	(1)(2)(7) 4.5'	(1)(2) 5.0'	(1)(2) 5.0'	(1)(2)(9) 5.5'	(9) 3.5'	(1)(2) 7.0	(1)(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 PEDESTRAINS (3)	3.0'	3.5'	10.0'	10.5'		12.0'	12.5'	
(2) OVER OR UNDER BALCONIES & ROOFS READILY ACCESSIBLE TO PEDESTRAINS (3)	10.5'	11.0'	11.0'	11.5'		13.0'	13.5'	
(3) OVER ROOFS 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 ACCESSIBLE TO TRUCK TRAFFIC (6)	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..... (69kv - 8", 138kv - 2'-1", 161kv - 2'-7", 345kv - 6'-3")

SEE STANDARD #02 10 06

Attachment to Response to KCTA Question No. 1-16
39 of 97
Wolfe

RULE 234C - Clearances Of Wires, Conductors, Cables, and Rigid Live Parts To Buildings, Signs, Billboards, Chimneys, Radio And Television Antennas, Tanks, 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

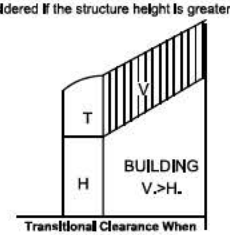
Horizontal
5) 60° F, Final Sag, 6 lb/ft^2 Wind (This can be reduced to 4 lbs/ft^2 In sheltered areas

Vertical Clearance Notes

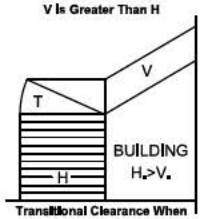
(V) Vertical clearances should be checked for Load Cases. 1 - 4, each with no wind displacement.

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

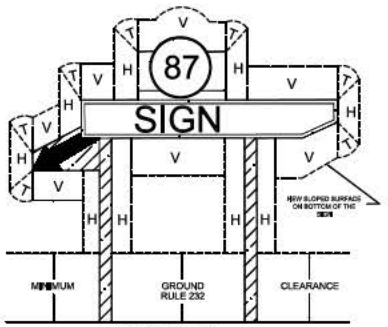
Horizontal and vertical clearances must be increased by the following amount for voltages greater than 22kv phase to ground. Adders are based on 5% over nominal system voltage with the adder being .4" per kv for phase to ground voltages greater than 22kv.

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, and other installations not classified as buildings (12)

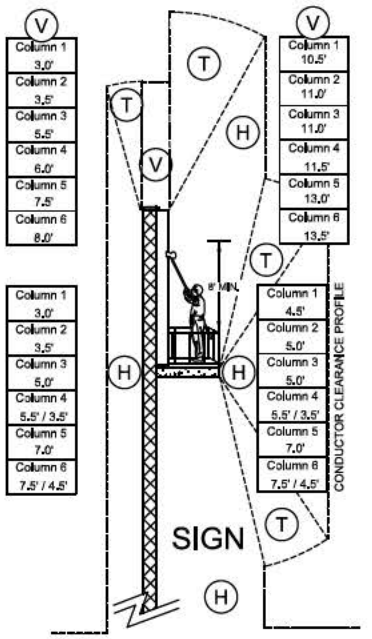
	Column 1	Column 2	Column 3	Column 4		Column 5	Column 6	
	Insulated Communications Cables, Messengers, Neutrals, Grounded Guys, Ungrounded Guys Exposed To Secondary 0-300V (13) Shielded Cables 280C1	Duplex Triplex Quadraplex & Paralay Secondary 0-750V (ft)	Unguarded Secondary Rigid Live Parts 0-750V Ungrounded Secondary Equipment Cases 0-750V Guys Exposed To Secondary 300-750V (480V 3-Wire) (ft) (5)	Open Wire Secondary 0-750V (ft) (15)		Unguarded Primary Rigid Live Parts 750V-22KV Ungrounded Primary Equipment Cases 750V-22KV Ungrounded Guys Exposed To Primary 750V-22KV (ft) (5)	Open Wire Primary & Aerial Cable 750V-22KV (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'	(1)(2) 5.0'	(9) 5.5'	(9) 3.5'	(1)(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'	(1)(2) 5.0'	(1)(2)(9) 5.5'	(9) 3.5'	(1)(2) 7.0	(1)(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' (1)		7.5'	8.0'	

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



SIGNS

NOT ACCESSIBLE TO PEDESTRIANS — ACCESSIBLE TO PEDESTRIANS



MINIMUM GROUND CLEARANCE RULE 232

Attachment to Response to KCTA Question No. 1-16
40 of 97
Wolfe

Electric System Codes & Standards

NESC MINIMUM REQUIRED CLEARANCES & POINTS OF ATTACHMENTS FOR SERVICES AND METERS

02 10 10
Rev.

NESC MINIMUM REQUIRED CLEARANCES FROM RULE 232 AND RULE 234

OVER GROUND (FOR OPEN WIRE SERVICES ADD ADDITIONAL 6" TO HEIGHTS SHOWN FOR GROUND CLEARANCES.)

A - 12 FEET OVER AREAS AND WAYS ACCESSIBLE TO PEDESTRIANS ONLY. INCLUDING EQUIPMENT OR STRUCTURES. (SEE NOTE F)
EXCEPTION:
CLEARANCES AT THE SERVICE DROP AND/OR DRIP LOOP OF SERVICES MAY BE REDUCED TO 10 FEET WHEN VOLTAGE DOES NOT EXCEED 150 VOLTS TO GROUND AND THE HEIGHT OF THE BUILDING DOES NOT PERMIT THE FULL 12'-0" CLEARANCE.

B - 16 FEET OVER RESIDENTIAL DRIVEWAYS.
EXCEPTION:
CLEARANCES AT THE SERVICE DROP MAY BE REDUCED TO 12 FEET, AND CLEARANCES AT THE DRIP LOOP MAY BE REDUCED TO 10 FEET WHEN VOLTAGE DOES NOT EXCEED 150 VOLTS TO GROUND AND THE HEIGHT OF THE BUILDING DOES NOT PERMIT THE FULL 16'-0" CLEARANCE.

C - 16 FEET OVER COMMERCIAL AREAS, PARKING LOTS, AGRICULTURAL OR OTHER AREAS SUBJECT TO TRUCK TRAFFIC.

D - 16 FEET OVER ANY PORTION OF PUBLIC STREETS, ALLEYS, ROADS OR DRIVEWAYS ON OTHER THAN RESIDENTIAL PROPERTY.

OVER ROOFS

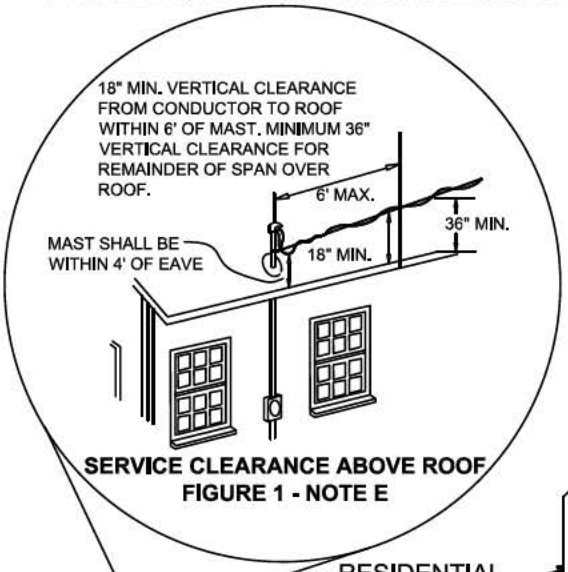
E - 10 FEET - CONDUCTORS SHALL HAVE CLEARANCE OF NOT LESS THAN 10 FEET FROM THE HIGHEST POINT OF ROOFS OVER WHICH THEY PASS.
EXCEPTIONS:
CLEARANCES FOR SERVICE CONDUCTORS AND DRIP LOOPS ON INACCESSIBLE ROOFS WHERE VOLTAGE DOES NOT EXCEED 750V BETWEEN MULTIPLEXED CONDUCTORS OR 300V FOR SINGLE CONDUCTORS (I.E. LESS THAN 480V SERVICES FOR COVERED CONDUCTORS)
1. CLEARANCE MAY BE REDUCED TO 3' OVER THE ROOF TO WHICH A SERVICE IS ATTACHED. FOR DISTANCES GREATER THAN 6' ACROSS THE ROOF, UTILITY APPROVAL IS REQUIRED.
2. CLEARANCE WITHIN 6' OF A MAST THAT IS LOCATED NOT MORE THAN 4' FROM THE EDGE OF A ROOF MAY BE REDUCED TO 18". (SEE FIGURE 1)

NOTES:

F - ANY EQUIPMENT HOUSING INCLUDING AIR CONDITIONING, PLATFORM OR PROJECTION WHICH A PERSON MIGHT STAND ON.

G - SERVICE MAST OR BRACKET ATTACHMENT OR UPRIGHT OF ADEQUATE SIZE & HEIGHT TO SUPPORT SERVICES REQUIRED.

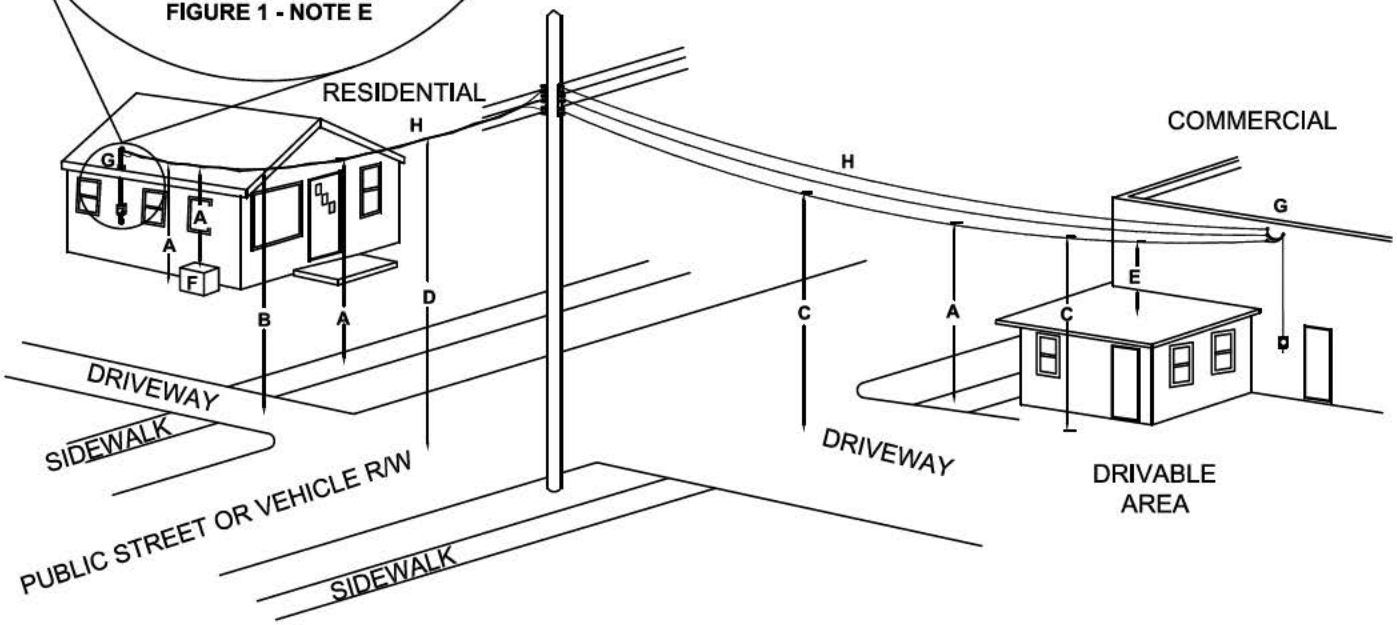
H - NORMALLY TRIPLEX SERVICE DROP, BUT MAY ALSO BE SEPARATE CONDUCTORS AS SHOWN FOR COMMERCIAL.



SERVICE CLEARANCE ABOVE ROOF
FIGURE 1 - NOTE E

ENERGIZED SERVICE DROP CONDUCTORS, INCLUDING SPLICES AND TAPS, SHALL BE INSULATED OR COVERED. FOR SERVICES UP TO 750V, SERVICE CAN CONSIST OF COVERED OR INSULATED SINGLE CONDUCTORS OR MULTIPLEX SERVICE CABLES.

GROUND CLEARANCE SHOULD EXCEED NESC MINIMUMS TO THE EXTENT PRACTICAL TO ENSURE COMPLIANCE UNDER ALL LOADING CONDITIONS THROUGHOUT THE LIFE OF THE INSTALLATION. SERVICE LINES NOT ENGINEERED AND SAGGED DURING INSTALLATION SHOULD NOT EXCEED 100' IN LENGTH AND MEASURED GROUND CLEARANCE SHOULD EXCEED NESC REQUIREMENTS AT ALL LOCATIONS IN THE SPAN BY A MINIMUM OF 12 INCHES.



NESC MINIMUM REQUIRED CLEARANCES & POINTS OF ATTACHMENTS FOR SERVICES AND METERS

ADDITIONAL CLEARANCE INFORMATION FOR SERVICES OVER BALCONIES, PORCHES AND DECKS.

ABOVE RAILING - 3 FT
THE RAILING IS CONSIDERED INACCESSIBLE BECAUSE IT WOULD BE EXPECTED TO BE SO THIN THAT IT WOULD REQUIRE EXTRAORDINARY EFFORT TO STAND ON. SEE RULE 234C3D1 EXCEPTION A.

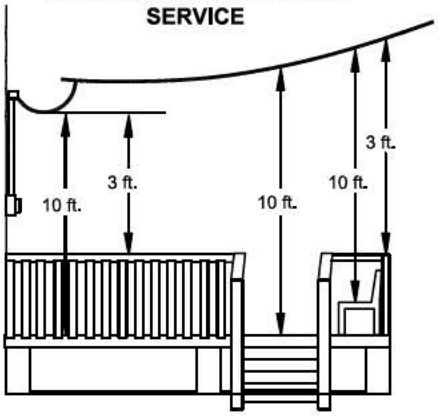
ABOVE BUILT-IN BENCH SEAT - 10 FT
THE BENCH IS WIDE ENOUGH TO EASILY ACCOMMODATE SOMEONE STANDING ON IT SO IT IS CONSIDERED ACCESSIBLE. SEE BASIC CLEARANCE REQUIREMENT UNDER RULE 234C3D1.

ABOVE DECK - 10 FT
BASIC CLEARANCE REQUIREMENT UNDER RULE 234C3D1 FOR ACCESSIBLE AREAS.

DRIP LOOP ABOVE RAILING - 3 FT
ALL CLEARANCES ARE TO THE CLOSEST CONDUCTOR POSITION, IN THIS CASE THE DRIP LOOP. SAME AS ABOVE RAILING.

DRIP LOOP ABOVE DECK - 10 FT
ALL CLEARANCES ARE TO THE CLOSEST CONDUCTOR POSITION, IN THIS CASE THE DRIP LOOP. SAME AS ABOVE DECK.

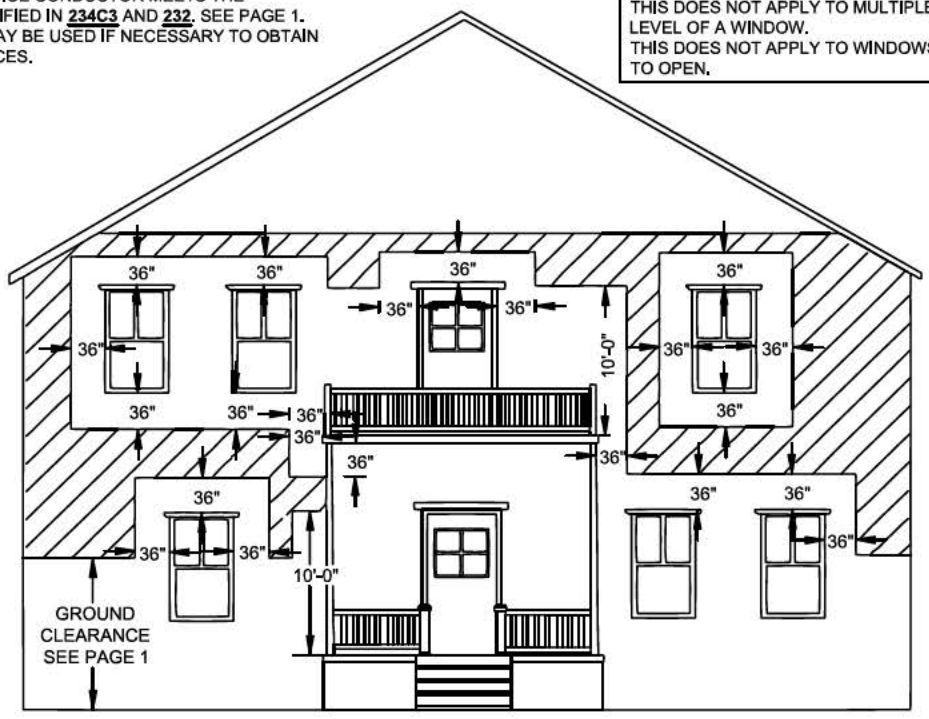
OPEN WIRE OR MULTIPLEX SERVICE



ADDITIONAL CLEARANCE INFORMATION FOR SERVICE ATTACHMENTS BELOW ROOF

ATTACHMENT POINT FOR SERVICE CONDUCTOR AND DRIP LOOP FOR SERVICE WIRES SHALL BE IN THE SHADED SPACES OR HIGHER. THE MINIMUM HEIGHT OF ATTACHMENT SHALL BE ADJUSTED SO THAT THE LOWEST POINT OF THE SERVICE CONDUCTOR MEETS THE CLEARANCES SPECIFIED IN 234C3 AND 232. SEE PAGE 1. A SERVICE MAST MAY BE USED IF NECESSARY TO OBTAIN MINIMUM CLEARANCES.

SERVICE ATTACHMENT TO BUILDINGS, INCLUDING DRIP LOOPS MUST PROVIDE 3' OF CLEAR SPACE TO WINDOWS, DOORS, PORCHES, FIRE ESCAPES OR SIMILAR IN ADDITION TO VERTICAL CLEARANCE REQUIREMENTS.
EXCEPTIONS:
THIS DOES NOT APPLY TO MULTIPLEX SERVICES ABOVE THE TOP LEVEL OF A WINDOW.
THIS DOES NOT APPLY TO WINDOWS THAT ARE NOT DESIGNED TO OPEN.



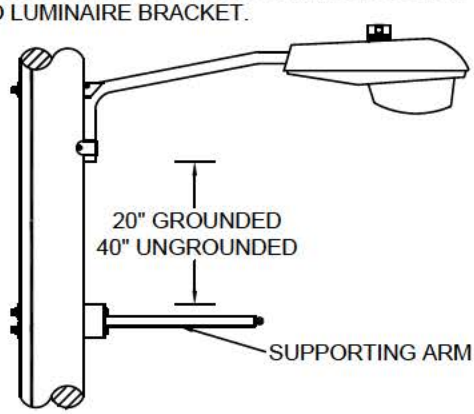
Electric System Codes & Standards

NESC MINIMUM CLEARANCE REQUIREMENTS FROM STREETLIGHTS TO COMMUNICATION FACILITIES

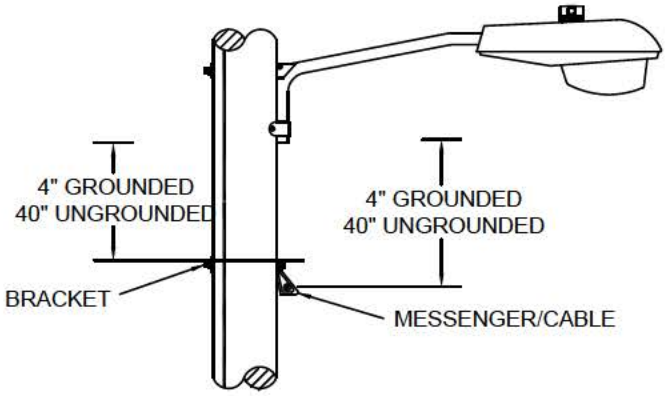
02 10 12
Rev. A

NESC SECTION 238 REQUIREMENTS (NESC 2017)

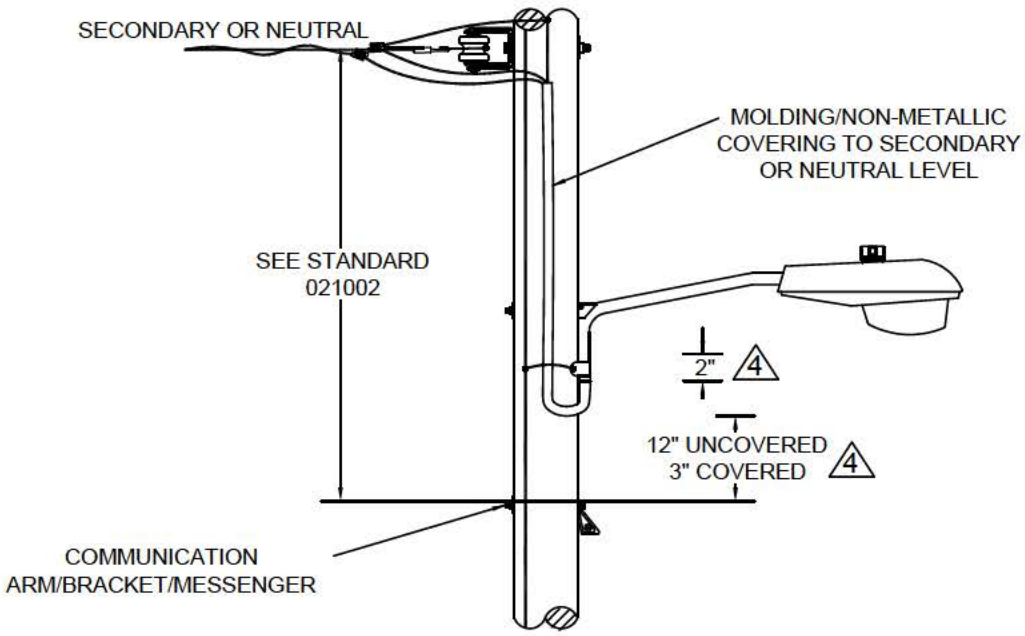
NOTE:
1. ALL NEW STREET LIGHT FIXTURES MUST BE EFFECTIVELY GROUNDED. IF UNABLE TO VERIFY GROUND, EITHER USE UNGROUNDED CLEARANCES OR FIXTURE MUST BE GROUNDED.
2. 40" MIN. CLEARANCE MUST BE MET BETWEEN NEUTRAL AND SECONDARY CABLE HARDWARE AND COMMUNICATIONS EQUIPMENT.
3. THE 12" AND 3" CLEARANCE ONLY 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)

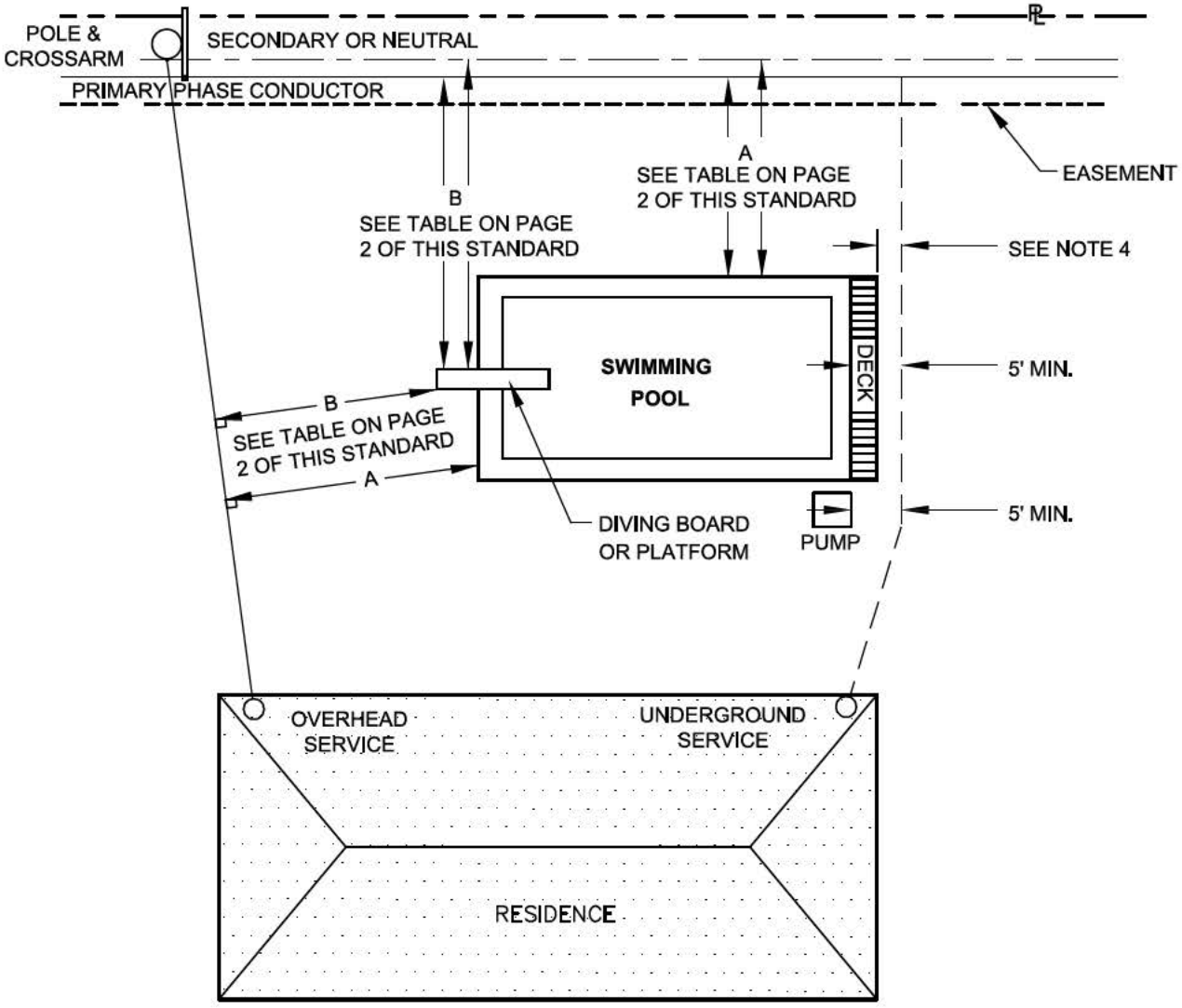


CLEARANCE FROM DRIP LOOP TO TOP OF COMMUNICATION ARM/BRACKET/MESSENGER

Electric System
Codes & Standards

CLEARANCES OF WIRES, CONDUCTORS AND CABLES PASSING OVER OR NEAR SWIMMING POOLS

02 10 20
Rev. B



APPLICATION:

These clearance requirements apply to all pools and also to supervised swimming areas including beaches, waterways, etc. where swimming is allowed and rescue poles are used. For unsupervised swimming in other water areas, Rule 232 (standard 02 10 06) applies. Contact the Standards Group for clearances to lines greater than 22kV phase-to-ground. Exception: These clearances do not apply to pools that are enclosed by a solid or screened non-retractable permanent structure.

NOTES:

1. Clearance to each conductor in the pool area must be checked. The clearances listed in this standard are **minimums**. Additional clearance may be required for future changes in grade, leaning poles, etc. Vertical clearances to overhead lines apply under whichever conditions of conductor temperature and,loading produce the closest approach:
   A) 120°F, no wind, final sag; B) Maximum operating temperature, no wind, final sag; C) 32°F, with 1/4" ice, no wind, final sag.
2. Installation of new conductors over existing pools should be avoided wherever possible, even when NESC clearance is obtainable. Pools installed under existing lines which result in a code violation must be brought in compliance by relocation of the pool or line or, if necessary, ensuring adequate clearance over the pool. It is normally the customer's responsibility to correct code violations caused by placing a pool under existing utility lines.
3. Multiplex service drops (triplex) less than 750 V are allowed lesser clearances under the NESC but must not be less than 10' horizontally from the edge of pools or diving platforms (234-1 Exception 2).
4. The swimming pool and auxiliary equipment must have a 5' minimum separation from underground cables. Pool decking and other structures must allow safe access to underground facilities for construction, inspection, and maintenance.

Electric System Codes & Standards

CLEARANCES OF WIRES, CONDUCTORS AND CABLES PASSING OVER OR NEAR SWIMMING POOLS

02 10 20
Rev. B

234E1. Clearance of wires, conductors, cables, or unguarded rigid live parts installed over or near swimming areas with no wind displacement.

OVERHEAD REQUIREMENTS

1. Swimming Pools

Where wires, conductors, cables, or unguarded rigid live parts are over a swimming pool or the surrounding area, the clearances in any direction shall be not less than those shown in Table 234-3 and illustrated in Figure 234-3.

EXCEPTION 1: This rule does not apply to a pool fully enclosed by a solid or screened permanent structure.

EXCEPTION 2: This rule does not apply to communication conductors and cables, effectively grounded surge-protection wires, neutral conductors meeting Rule 230E1, guys and messengers, supply cables meeting Rule 230C1, and supply cables of 0 to 750 V meeting Rule 230C2 or 230C3 when these facilities are 3m (10ft) or more horizontally from the edge of the pool, diving platform, diving tower,water slide, or other fixed, pool-related structures.

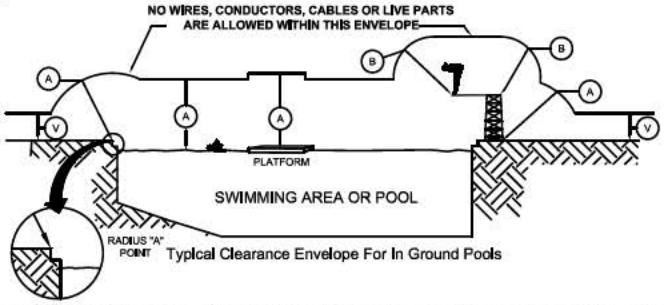
351C. Other conditions 1. Swimming pools (in-ground)

UNDERGROUND REQUIREMENTS

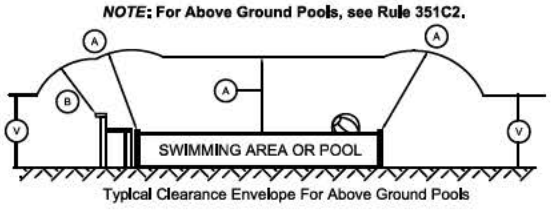
Supply cable should not be installed within 1.5m (5ft) horizontally of a swimming pool or its auxiliary equipment. If 1.5m (5ft) is not attainable, supplemental mechanical protection shall be provided.

2. Buildings and other structures

Cable should not be installed directly under the foundations of buildings or other structures. Where a cable must be installed under such a structure, the foundation shall be suitably supported to limit the likelihood of transfer of a detrimental load onto the cable.



Typical Clearance Envelope For In Ground Pools



Typical Clearance Envelope For Above Ground Pools

NESC Table 234-3—Clearance of wires, conductors, cables, or unguarded rigid live parts over or near swimming pools (1)
(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. See the definitions section for voltages of other systems. Clearances are with no wind displacement. See Rules 234E1, 234E2, and 234H4.)

Note: A, B, and V are shown in associated figures.	Insulated communication conductors and cables; messengers; surge protection wires; grounded guys; ungrounded guys exposed to 0 to 300 V (3); neutral conductors meeting Rule 230E1; supply cab es meeting Rule 230C1 (ft)	Unguarded rigid live parts, 0 to 750 V; noninsu ated communication conductors; supply cables of 0 to 750 V meeting Rule 230C2 or 230C3; ungrounded guys exposed to open supply conductors of over 300 V to 750 V (2) (ft)	Supply cables over 750 V meeting Rule 230C2 or 230C3; open supply conductors, 0 to 750 V (4) (ft)	Unguarded rigid live parts over 750 V to 22 kV; ungrounded guys exposed to over 750V to 22 kV (2) (ft)	Open supply conductors, over 750 V to 22 kV (ft)
A. Clearance in any direction from the water level, edge of pool, base of diving platform or anchored raft	**22.0**	**22.5**	**23.0**	**24.5**	**25.0**
B. Clearance in any direction to the diving platform, tower, water slide, or other fixed, pool-related structures	**14.0**	**14.5**	**15.0**	**16.5**	**17.0**
V. Vertical clearances over adjacent land	Clearance shall be as required by Rule 232. See standard# 02 10 06				

1. The clearance values shown in this table are computed by adding the applicable Mechanical and Electrical (M&E) value of Table A-1 to the applicable Reference Component of Table A-2B of Appendix A.
2. Ungrounded guys and ungrounded portions of guys between insulators shall have clearances based on the highest voltage to which they may be exposed due to a slack conductor or guy.
3. Anchor guys insulated in accordance with Rule 279 may have the same clearance as grounded guys.
4. Does not include neutral conductors meeting Rule 230E1.

Electric System Codes & Standards

NESC CLEARANCES OF WIRES, CONDUCTORS, CABLES, AND RIGID LIVE PARTS FROM GRAIN BINS

02 10 22
Rev.

General Notes

Clearances for conductors and equipment near grain bins are governed by NESC Rule 234F. The clear zone near grain bins is determined by a clearance envelope that is based on many factors including the shape and physical dimensions of the grain bin, location of filling and probing ports, slope of the ground, ground line clearance of the LG&E/KU line and the method used for filling (fixed or portable loading system). On grain bins loaded by a portable loader the sides are classified as either a loading or non-loading side. All sides are considered to be loading sides unless there is a physical obstruction such as a ditch, structure, public road, etc. that would prohibit setting up a portable loader on one or more sides.

It is not necessary to use a clearance envelope to determine NESC compliance if there is sufficient Horizontal clearance to the nearest conductor, including neutrals and communication lines. The safe horizontal clearance is the distance where the clearance envelope intersects minimum ground clearance requirement for the line. At that point, as long as the line has adequate ground clearance, it will be compliant with the NESC. However for taller grain bins, these distances may be unrealistic and the use of the clearance envelope may be required.

Minimum Safe Horizontal Clearances (H) For Not Checking With A Clearance Envelope

Fixed Loading Grain Bins:

All Sides: H = 15' (or 18' to the nearest rooftop probe or fill port, whichever is greater)

Portable Loading Grain Bins:

Loading Side: H =2.5 (Grain Bin Height +18') - 1.5(Ground Clearance of Line Std. 02-10-06)

Non-Loading Side: H = 15' (or 18' to the nearest rooftop probe or fill port, whichever is greater)

If conductors or equipment on the line is less that the safe horizontal distances outlined above it will require checking against the conductor clearance envelope. A table of safe horizontal clearances is shown below.

Safe Horizontal Clearances From Conductors to Grain Bins					
Grain Bin Height	Fixed Loading Bin (FT)	Portable Loading Bin (FT) [2]			
	All Conductors and Equipment	Non-Loading Side to All Conductors	Loading Side to Neutral or Triplex	Loading Side to Open Wire Secondary	Loading Side to Primary
20	15[1]	15[1]	71.00	70.25	67.25
25	15[1]	15[1]	83.50	82.75	79.75
30	15[1]	15[1]	96.00	95.25	92.25
35	15[1]	15[1]	108.50	107.75	104.75
40	15[1]	15[1]	121.00	120.25	117.25
45	15[1]	15[1]	133.50	132.75	129.75
50	15[1]	15[1]	146.00	145.25	142.25

1. 15' or 18' to the edge of the nearest filling or probe port
2. All sides are considered Loading sides unless restricted by a physical obstruction. Clearances based on ground clearances of 16' neutral, 16.5' open wire secondary and 18.5' for primary per NESC Rule 232

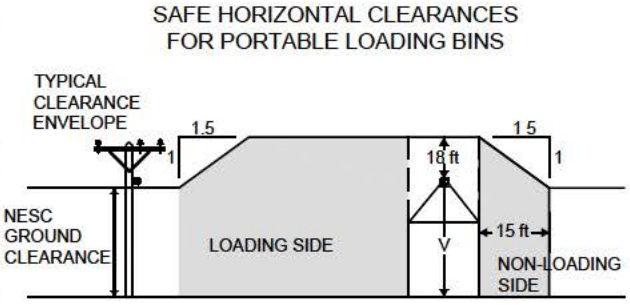


FIGURE 1

Clearance Envelope for Fix Loading Grain Bins

Fixed loaded grain bins are treated as buildings when determining minimum vertical clearances. See Page 4 or Standard 02-10-08 for clearances to buildings (using clearance over buildings readily accessible to pedestrians). A minimum of 18' must be maintained above and in all directions from any fill or probe ports. The clearance envelope follows the outline of the grain bin and loading facilities (Figure 2). A minimum horizontal clearance of 15' is required to conductors (or 18' to the nearest probe or fill port if greater).

Clearance Envelope for Portable Loading Grain Bins

Vertical clearance is 18' minimum above the grain bin. On loading sides, the vertical clearance remains parallel to the ground line for a distance equal to the height of the grain bin + 18' and tappers down to the conductor's ground clearance requirement at the rate of 1' drop for every 1.5' of horizontal distance (Figure 3). Non-loading sides require the same vertical clearance requirement over the bin but begin the same sloped reduction starting at the edge of the grain bin out to a distance of 15' (or 18' to the nearest probe or fill port if greater). See page 4 or Standard 021006 for ground clearances.

NESC Rule 234F - Clearances of wires, conductors, cables, and rigid live parts from grain bins

1. Grain bins loaded by permanently installed augers, conveyers, or elevator systems

   All portions of grain bins that are expected to be loaded by the use of permanently installed auger, conveyer, or elevator system shall be considered as a building or other installation under Rule 234C for the purpose of determining appropriate clearances of wires, conductors, cables, and rigid live parts. In addition, the following clearances shall also apply without wind displacement.

   a. A clearance of not less than 5.5 m (18 ft) in all directions above the grain bin shall be maintained from each probe port in the grain bin roof for all wires, conductors, and cables.

   b. A horizontal clearance of not less than 4.6 m (15 ft) shall be maintained between grain bins and open supply conductors, 0 to 22 kV. This clearance does not apply to a neutral conductor meeting Rule 230E1.

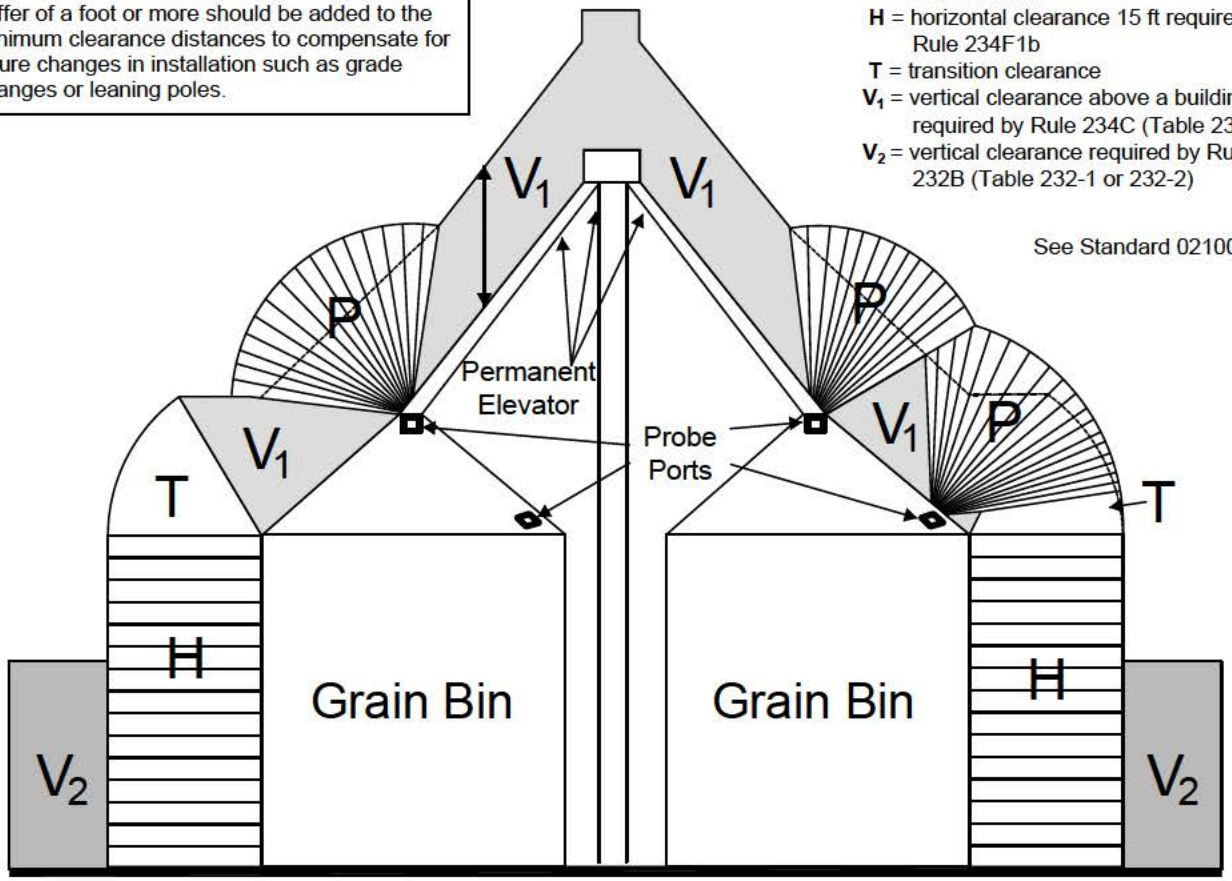
FIGURE 2

Note:
The clearances listed are minimum distances. A buffer of a foot or more should be added to the minimum clearance distances to compensate for future changes in installation such as grade changes or leaning poles.

LEGEND

P = probe clearance 18 ft required by Rule 234F1a
H = horizontal clearance 15 ft required by Rule 234F1b
T = transition clearance
V_1 = vertical clearance above a building required by Rule 234C (Table 234-1)
V_2 = vertical clearance required by Rule 232B (Table 232-1 or 232-2)

See Standard 021008



Clearance envelope for grain bins filled by permanently installed augers, conveyors, or elevators

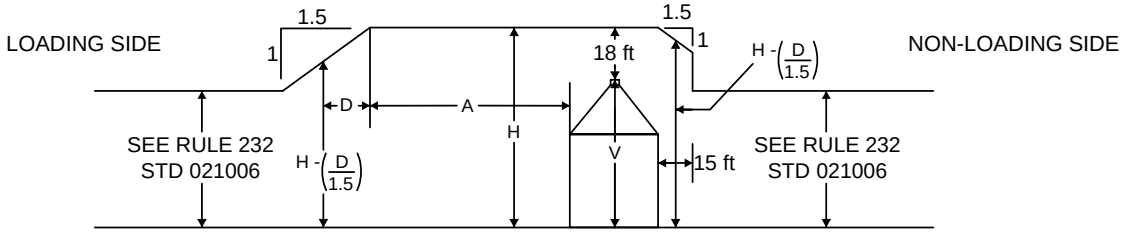
2. Grain bins loaded by portable augers, conveyers, or elevators (with no wind displacement)

a. The clearance of wires, conductors, cables, and rigid live parts from grain bins that are expected to be loaded by the use of a portable auger, conveyer, or elevator shall be not less than the values illustrated in figure on page 2.

EXCEPTION: Clearances of the following items on the nonloading side of grain bins shall be not less than those required by Rule 234C for clearances from buildings:
(a) Support arms; effectively grounded equipment cases.
(b) Insulated communication conductors and cables, messengers, surge-protection wires, grounded guys, neutral conductors meeting Rule 230E1, and supply cables meeting Rule 230C1.
(c) Supply cables of 0 to 750 V meeting Rule 230C2 or 230C3.

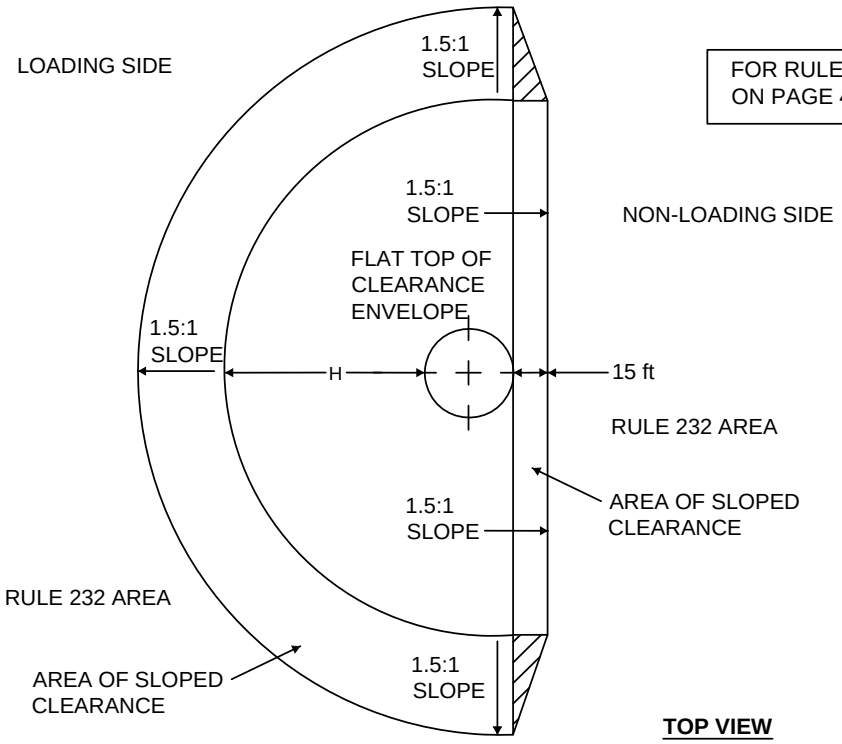
b. Any side of a grain bin is considered to be a nonloading side if it is so designated, or if it is so closely abutting another structure or obstruction, or so close to a public road or other right-of-way that a portable auger, conveyor, or elevator is not reasonably anticipated to be used over that side or portion to fill the grain bin.

c. Where an agreement excludes the use of portable augers, conveyors, or elevators from a designated portion of a grain bin, such portion is considered to be a nonloading side.



V = GRAIN BIN HEIGHT
H = CLEARANCE OVER GRAIN BIN = V + 18 ft
A = H = V + 18 ft

SIDE VIEW



FOR RULE 232, SEE TABLE 232-1 ON PAGE 4 OF THIS STANDARD

TOP VIEW

FIGURE 3

Key Parts of Table 234-1. See Standard 021008 for full table.

Clearance of	Insulated communication conductors and cables; messengers; overhead shield/surge-protection wires; grounded guys; ungrounded portions of guys meeting rules 215C4, 215C5, and 279A1 exposed to 0 to 300 V ⑪⑬ 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 rigid live parts, 0 to 750 V; noninsulated communication conductors; ungrounded equipment cases, 0 to 750 V; and ungrounded portions of guys meeting Rules 215C4, 215C5, and 279A1 exposed to open supply conductors of over 300 V to 750 V ⑤⑭ (ft)	Supply cables over 750 V meeting Rule 230C2 or 230C3; open supply conductors, 0 to 750 V ⑤ (ft)	Unguarded rigid live parts, over 750 V to 22 kV; ungrounded portions of guys meeting Rules 215C4, 215C5, and 279A1 exposed to over 750 V to 22 kV ⑤⑭ (ft)	Open supply conductors, over 750 V to 22 kV (ft)
Vertical ⑫						
(2) Over or under balconies, porches, decks and roofs readily accessible to pedestrians ③	10.5	11.0	11.0	11.5	13.0	13.5

③ A roof, balcony, or area is considered readily accessible to pedestrians if it can be casually accessed through a doorway, ramp, window, 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 is 8 ft or more from the ground or other permanently installed accessible surface.
⑤ The portion(s) of span guys between guy insulators and the portion(s) of anchor guys above the guy insulators that are not grounded shall have clearances based on the highest voltage to which they may be exposed due to a slack conductor or guy.
⑪ The portion of anchor guys below the lowest insulator meeting Rules 279A1 and 215C5 may have the same clearance as grounded guys.
⑫ For clearances above railings, walls, or parapets around balconies, decks, or roofs, use the clearances required for row 1b(1). For such clearances where an outside stairway exists to provide access to such balconies, decks, or roofs, use the clearances required for row 2b(2).
⑬ Does not include neutral conductors meeting Rule 230E1.
⑭ These clearance values also apply to guy insulators.

Key Parts of Table 232-1 For Conductors. See Standard 021006 for full table. See also Table 232-2 for Equipment.

Nature of surface underneath wires, conductors, or cables	Insulated communication conductors and cable; messengers; overhead shield/surge-protection wires; grounded guys; ungrounded portions of guys meeting Rules 215C4, 215C5, and 279 A1 exposed to 0 to 300 V ⑥⑪⑮ ; neutral conductors meeting Rule 230E1; supply cables meeting Rule 230C1 (ft)	Noninsulated communication conductors; supply cables of 0 to 750 V meeting Rule 230C2 or 230C3 (ft)	Supply cables over 750 V meeting Rule 230C2 or 230C3; open supply conductors, 0 to 750 V ⑤; ungrounded portions of guys meeting Rules 215C4, 215C5, and 279A1 exposed to over 300 V to 750V ⑥⑭⑮ (ft)	Open supply conductors over 750 V to 22 kV; ungrounded portions of guys meeting Rules 215C4, 215C5, and 279A1 exposed to 750 V to 22 kV ⑥⑭⑮ (ft)
(4) Other areas traversed by vehicles, such as cultivated, grazing, forest, and orchard lands, industrial sites, commercial sites, etc. ㉕	15.5	16.0	16.5	18.5

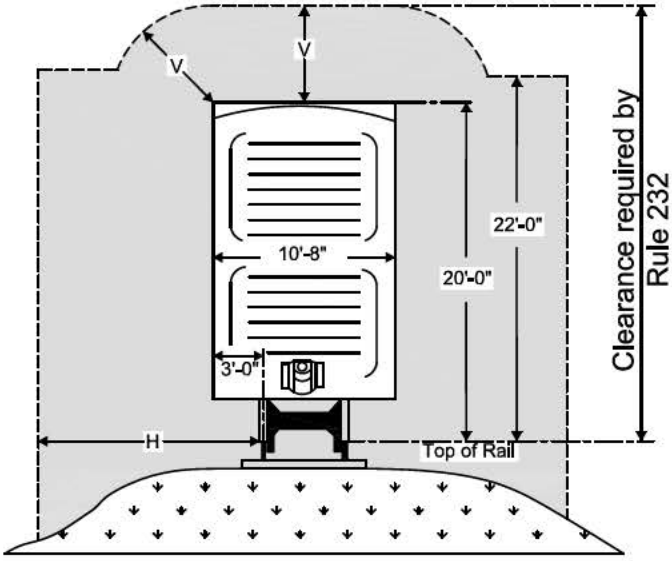
③ Does not include neutral conductors meeting Rule 230E1.
⑤ These clearance values also apply to guy insulators.
⑪ No clearance from ground is required for anchor guys not crossing tracks, rails, streets, driveways, roads, or pathways.
⑭ The portion(s) of span guys between guy insulators and the portion(s) of anchor guys above guy insulators that are not grounded shall have clearances based on the highest voltage to which they may be exposed due to a slack conductor or guy.
⑮ The portion of anchor guys below the lowest insulator meeting Rules 279A1 and 215C5 may have the same clearance as grounded guys.
㉕ 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.

Electric System Codes & Standards

NESC CLEARANCE OF CONDUCTORS AND SUPPORTING STRUCTURES TO RAIL CARS

02 10 24
Rev.

CLEARANCES FOR CONDUCTORS, WIRES AND CABLES



NESC Rule 234I - Clearance of wires, conductors, and cables to rail cars

General: The information on this standard defines NESC minimum clearance requirements for conductors running beside or over railroad tracks. No conductor may violate the clearance envelope under any of the following loading conditions:

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
5) 60° F, Final Sag, 6 lb/sq-ft Wind

Actual clearance requirements may exceed NESC minimum requirements as determined by individual railroad permits or agreements but shall in no case be less than NESC requirements.

Where overhead wires, conductors, or cables run along or over railroad tracks, the clearance in any direction shall not be less than that shown in the illustration. The values of V and H are defined as follows:

V = vertical clearance from the wire, conductor, or cable above the top of the rail as specified in Table 232-1 minus 20'-0", the assumed height of the rail car.

H = horizontal clearance from the wire, conductor, or cable to the nearest rail, which is equal to the required vertical clearance above the rail as specified in Table 232-1 minus 15'-0".

NOTE: For clearances involving voltages of 22kV phase-to-ground and above, contact the Standards Group.

NESC Table 232-1- Vertical clearance of wires, conductors, and cables above ground, roadway, rail, or water surfaces

Nature of surface underneath wires, conductors, or cables	Insulated communication conductors and cable; messengers; overhead shield/surge-protection wires; grounded guys; ungrounded guys exposed to 0 to 300 V⑪⑮; neutral conductors, messenger supported shielded primary supply cables up to 22kV (ft)	Noninsulated communication conductors; multiplex secondary conductors (ft)	Open wire secondary, 0 to 750 V③; ungrounded guys exposed to over 300 V to 750 V⑭ (ft)	Open primary supply conductors, over 750 V to 22 kV; ungrounded guys exposed to 750 V to 22 kV⑭ (ft)
Where wires, conductors, or cables cross over or overhang				
1. Track rails of railroads (except electrified railroads using overhead trolley conductors) ②⑯㉒	23.5	24	24.5	26.5

*SEE PAGE 2 OF THIS STANDARD FOR FOOTNOTES.

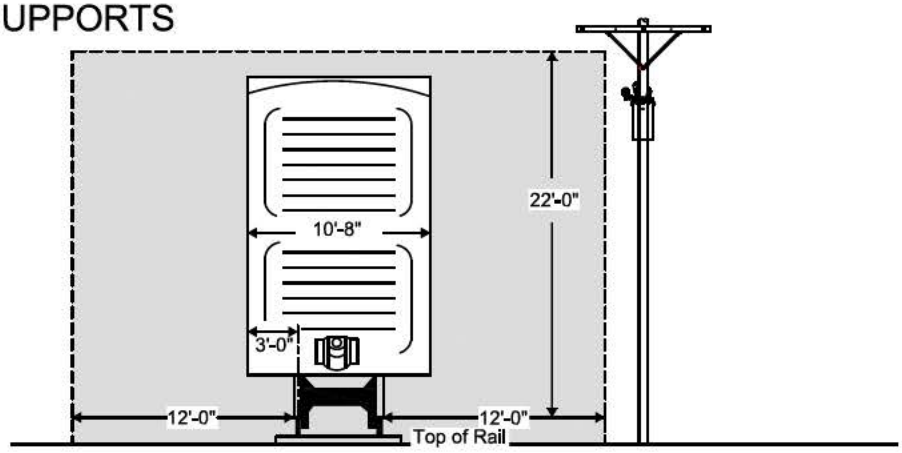
Note: These clearances are computed for railroads handling standard rail cars as common carriers in interchange service with other railroads. Where wires, conductors, or cables run along mine, logging, and similar railways that handle only cars smaller than standard freight cars, the value of H may be reduced by one-half the difference between the width of a standard rail car (10'-8") and the width of the narrower car.

Applicable Footnotes:

②For 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'-0", but the clearance shall not be reduced below that required for street crossings.
③Does not include neutral conductors meeting Rule 230E1.
⑪No clearance from ground is required for anchor guys not crossing tracks, rails, streets, driveways, roads, or pathways.
⑭Ungrounded guys and ungrounded portions of span guys between guy insulators shall have clearances based on the highest voltage to which they may be exposed due to a slack conductor or guy.
⑮Anchor guys insulated in accordance with Rule 279 may have the same clearance as grounded guys.
⑯Adjacent to tunnels and overhead bridges that restrict the height of loaded rail cars to less than 20'-0", these clearances may be reduced by the difference between the highest loaded rail car handled and 20'-0", if mutually agreed to by the parties at interest.
㉒See Rule 234I for the required horizontal and diagonal clearances to rail cars.

CLEARANCES FOR STRUCTURES, EQUIPMENT AND SUPPORTS

Note:
No structure, equipment or support may be inside clearance envelope.



NESC Rule 231C - Clearances of supporting structures from railroad tracks

Where railroad tracks are parallel to or crossed by overhead lines, all portions of the supporting structures, support arms, anchor guys, and equipment attached thereto less than 22'-0" above the nearest track rail shall have horizontal clearances not less than the values required by Rule 231C1 or 231C2 for the situation concerned.

NOTE: See Rule 234I

1. Not less than 12'-0" in from the nearest track rail.

EXCEPTION 1: A clearance of not less than 7'-0" may be allowed where the supporting structure is not the controlling obstruction, provided sufficient space for a driveway is left where cars are loaded or unloaded.
EXCEPTION 2: Supports for overhead trolley-contact conductors may be located as near their own track rail as conditions require. If very close, however, permanent screens on cars will be necessary to protect passengers.
EXCEPTION 3: Where necessary to provide safe operating conditions that require an uninterrupted view of signals, signs, etc., along tracks, the parties concerned shall cooperate in locating structures to provide the necessary clearance.
EXCEPTION 4: At industrial sidings, a clearance of not less than 7'-0" shall be permitted, provided sufficient space is left where cars can be loaded or unloaded.

2. The clearances of Rule 231C1 may be reduced by agreement with the railroad(s).

Electric System Codes & Standards

Conductor Clearances To Other Supporting Structures

02 10 30
Rev.

NESC Rule 234 B - Clearances of Wires, Conductors, and Cables From Other Supporting Structures

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 (including other E.ON U.S. 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 Maximum operating temperature (if greater than 120º), no wind, final sag 32º F, no wind, 1/2" ice, final sag -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 50 kV, no wind) and Vertical (4.5 ft for voltages below 22 kV and 5.5 ft for voltages between 22 kV and 50 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 All Voltages Are Phase-Ground For Effectively Grounded Systems **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 (ft)	
Rule 234 B - Horizontal And Vertical Clearance Of Wires, Conductors And Cables To Other Supporting Structures								
Horizontal Clearance **At Rest All Sag Conditions (H)** **At 60ºF Final Sag With 6#/ft^2 Wind (HW)**	**H** **At Rest**	**H** **At Rest**	**H** **At Rest**	**HW** **With Wind**	**H** **At Rest**	**HW** **With Wind**	**H** **At Rest**	**HW** **With Wind**
	5' 3' By Exception H-1	5'	5'	3.5	5'	4.5'	5'	4.5'
Vertical Clearance (V) **At Rest All Sag Conditions**	**V** **All Sags**	**V** **All Sags**	**V** **All Sags**		**V** **All Sags**		**V** **All Sags**	
	4.5' 2' By Exception V-1	4.5'	4.5'		4.5'		5.5'	
Vertical Clearance To Traffic Signal Support Messengers And Other Support Guys (VG) - All Conditions (From Table 233-1)								
Vertical Clearance (VG) To Traffic Signal Messengers And Other Guys Crossing Over/Under Conductors At Rest All Sag Conditions	**V** **All Sags**	**V** **All Sags**	**V** **All Sags**		**V** **All Sags**		**V** **All Sags**	
	2'	2'	4'		5'		5' +.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).

Vertical Exceptions

(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

Electric System Codes & Standards

Conductor Clearances To Other Supporting Structures

02 10 30
Rev.

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

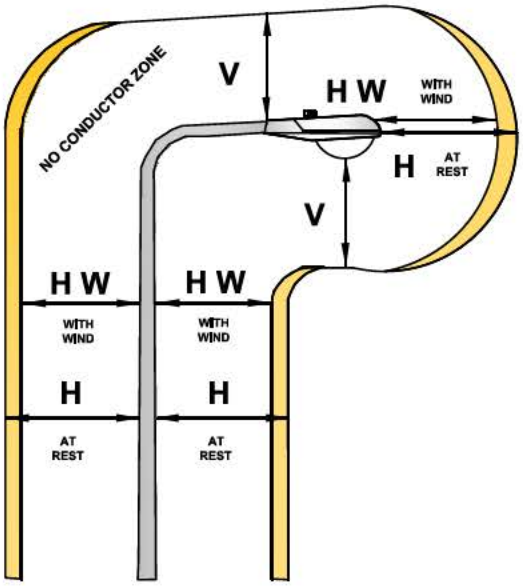


FIGURE 2 CLEARANCE APPLICATION

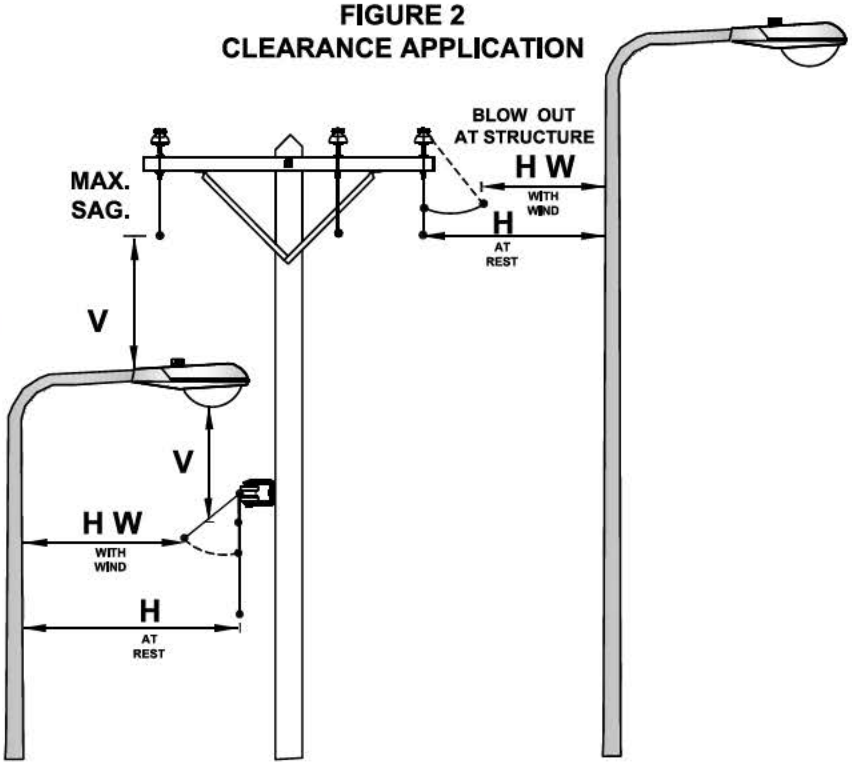
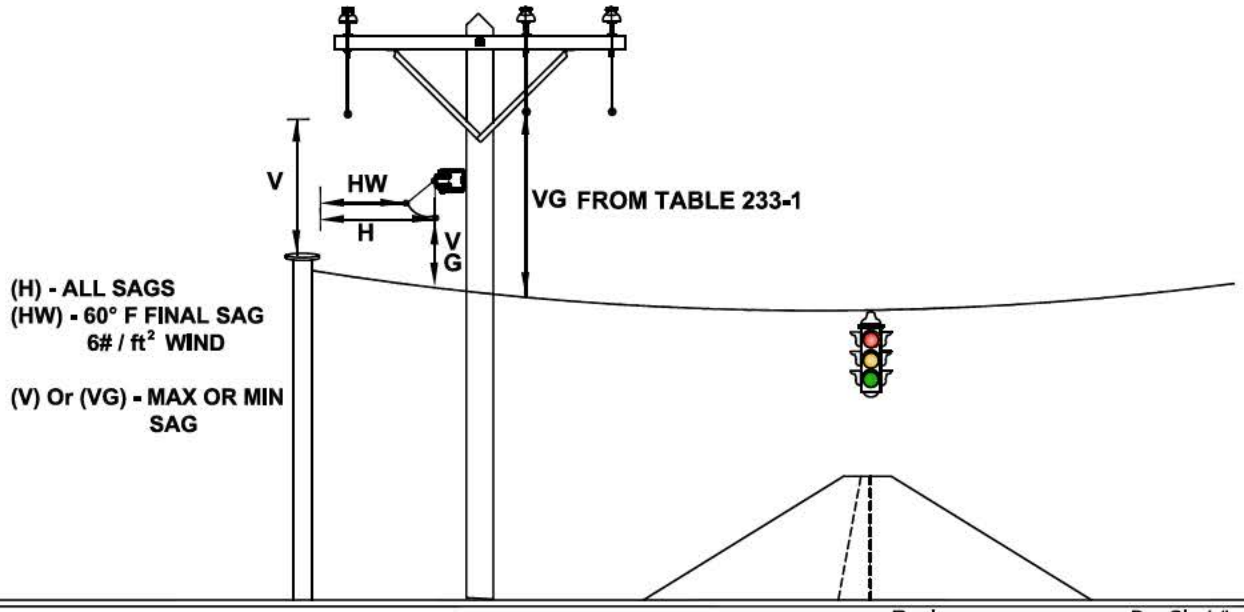


FIGURE 3 CLEARANCE TO COMMUNICATIONS GUYS AND MESSENGERS



Electric System
Codes & Standards

CONDUCTOR BLOWOUT

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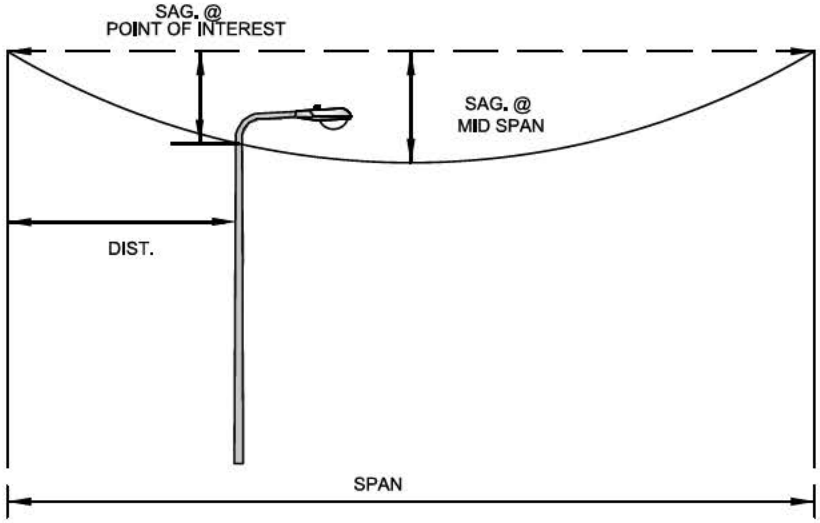


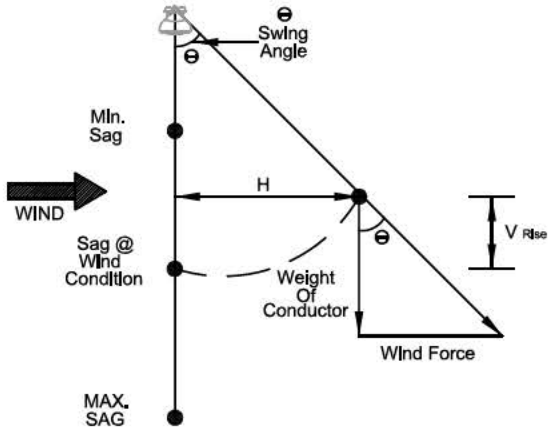


Table 1 - HBOF and VBOF at 6#/ft² Wind By Conductor

Conductor Size/Strand	Conductor Dia. (in.)	Nominal Weight (#./1000')	(HBOF) Horizontal Blow Out Factor @6lb/ft2 Wind)	(VBOF) Vertical Blow Out Factor @6lb/ft2 Wind)
#6 Solid Cu. Bare	0.162	79	0.7159	0.3018
#4 Solid Cu. Bare	0.204	126	0.6298	0.2232
#2 Solid Cu. Bare	0.258	201	0.5395	0.158
1/0 Solid Cu. Bare	0.325	320	0.4527	0.1083
2/0 Solid Cu. Bare	0.365	403	0.4123	0.089
3/0 Solid Cu. Bare	0.41	508	0.3739	0.0725
4/0 Solid Cu. Bare	0.46	641	0.3377	0.0588
#6 3-Strand Cu. Bare	0.201	80.3	0.7812	0.3758
#4 3-Strand Cu. Bare	0.254	127.6	0.7059	0.2916
#2 7-Strand Cu. Bare	0.292	204.9	0.5806	0.1858
1/0 7-Strand Cu. Bare	0.368	325.9	0.492	0.1294
2/0 7-Strand Cu. Bare	0.414	411	0.4496	0.1067
3/0 7-Strand Cu. Bare	0.464	517.9	0.4091	0.0875
4/0 7-Strand Cu. Bare	0.522	653.6	0.3707	0.0712
500 37-Strand Cu. Bare	0.813	1542.5	0.2549	0.033
#6 7-Strand Cu. Poly	0.244	91.5	0.8	0.4
#4 7-Strand Cu. Poly	0.292	128.9	0.7496	0.3382
#2 7-Strand Cu. Poly	0.382	204.9	0.6819	0.2685
1/0 7-Strand Cu. Poly	0.488	357.5	0.5637	0.174
2/0 7-Strand Cu. Poly	0.534	446.1	0.5136	0.1419
3/0 7-Strand Cu. Poly	0.584	556.9	0.4644	0.1144
4/0 7-Strand Cu. Poly	0.642	696.4	0.4186	0.0918
250 19-Strand Cu. Poly	0.694	818.8	0.3902	0.0793
350 19-Strand Cu. Poly	0.799	1136.1	0.3317	0.0566
500 37-Strand Cu. Poly	0.974	1626.2	0.2869	0.042

Conductor Size/Strand	Conductor Dia. (in.)	Nominal Weight (#./1000')	(HBOF) Horizontal Blow Out Factor @6lb/ft2 Wind)	(VBOF) Vertical Blow Out Factor @6lb/ft2 Wind)
1/0-7st AAC	0.368	98.9	0.8808	0.5266
336.4-19st AAC	0.666	315.5	0.7259	0.3122
795-61st AAC	1.028	745.7	0.5675	0.1766
1/0 AAAC or 123.3 ACAR	0.398	114.9	0.866	0.5
3/0 AAAC or 195.7 ACAR	0.502	182.5	0.8088	0.4119
6 A CW-CU	0.23	101.52	0.7497	0.3382
4 A CW-CU	0.29	161.55	0.668	0.2558
2 A CW-CU	0.366	256.82	0.5803	0.1856
1/0 F CW-CU	0.388	354.17	0.4804	0.123
392.5 ACAR	0.721	368	0.6998	0.2857
840.2 ACAR	1.055	788.7	0.5559	0.1688

Maximum Blowout is at mid span. If the sag at mid span is known, then the NESC blow out is:

$H_{MID\ SPAN}$= $SAG_{MID\ SPAN}$ *HBOF and $V_{RISE\ MID\ SPAN}$= $SAG_{MID\ SPAN}$ *VBOF

Where **HBOF** and **VBOF** are blowout factors taken from table one. Blowout at any other point of interest in the span is based on the sag at that location.

$$SAG_{POI} = \frac{(4)(DIST)(Sag_{MID\ SPAN})(Span - Dist)}{Span^2}$$

H_{POI} = Sag_{POI} *HBOF and V_{POI} = SAG_{POI} *VBOF

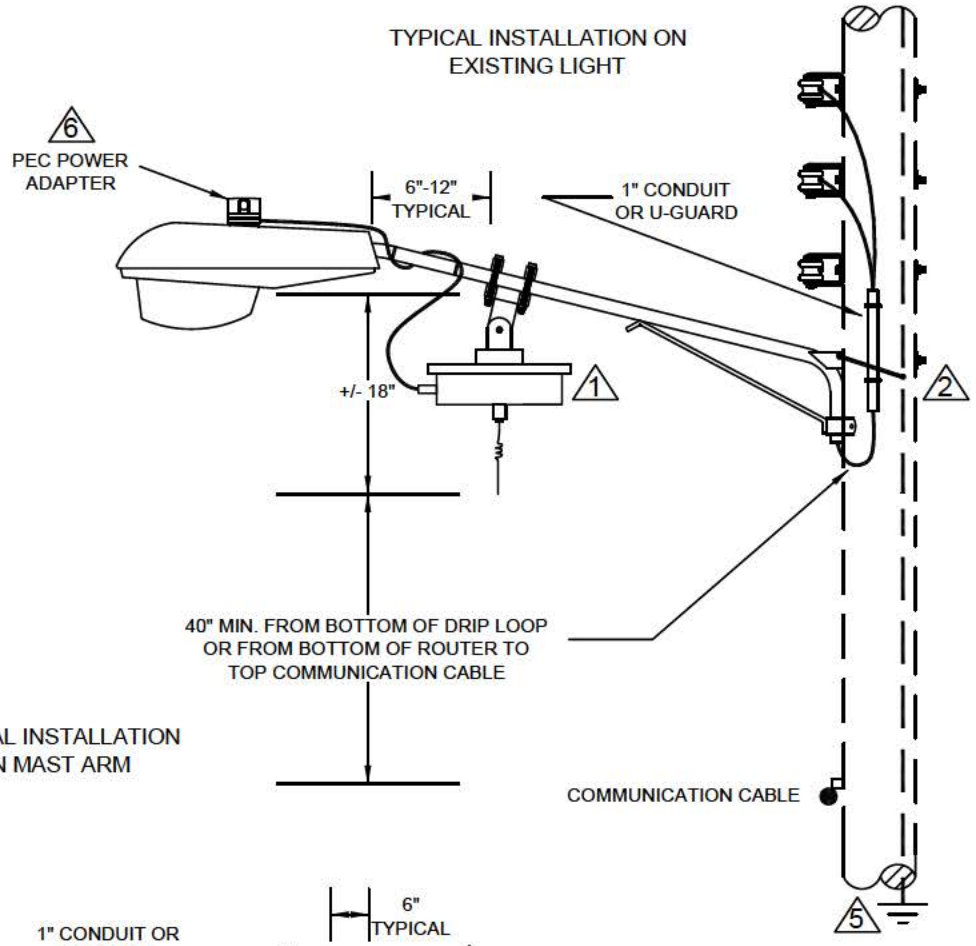
Electric System
Codes & Standards

WIRELESS ROUTER INSTALLATION

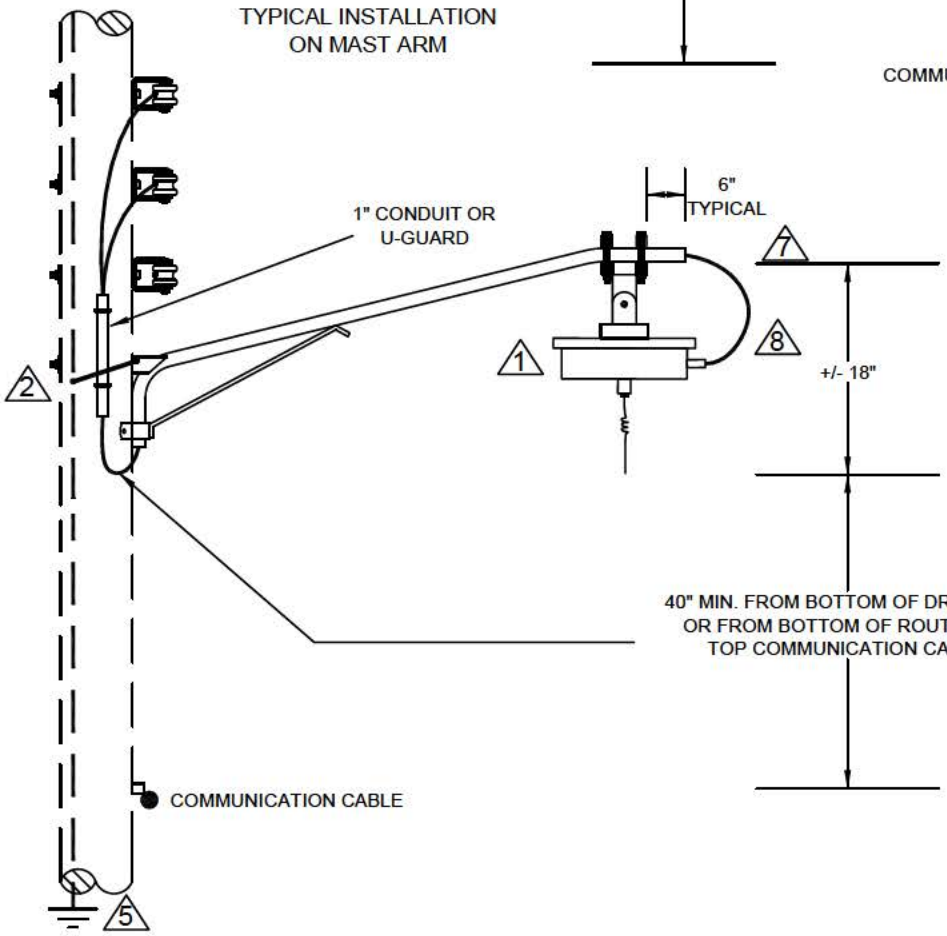
07 12 02
Rev.

NOTES:
1. ROUTER MUST BE INSTALLED LEVEL WITH THE GROUND.
2. MAST ARM SHALL BE BONDED TO POLE GROUND.
3. ONLY ONE (1) ROUTER SHALL BE MOUNTED ON THE MAST ARM.
4. ROUTER SHALL BE INSTALLED ON STREET SIDE OF POLE WHERE POSSIBLE.
5. DRIVEN POLE GROUND REQUIRED AT EACH ROUTER POLE.
6. ON EXISTING LIGHT INSTALLATIONS, POWER SUPPLY IS TO BE RUN TO PEC POWER ADAPTER.
7. FOR INSTALLATION ON NEW MAST ARM WITHOUT STREET LIGHT, POWER SUPPLY IS TO BE RUN INSIDE THE MAST ARM.
8. SUPPLY WIRE SHALL BE MULTI-CONDUCTOR CABLE PROVIDED WITH ROUTER WHEN INSTALLING ON NEW MAST ARM.

TYPICAL INSTALLATION ON EXISTING LIGHT



TYPICAL INSTALLATION ON MAST ARM



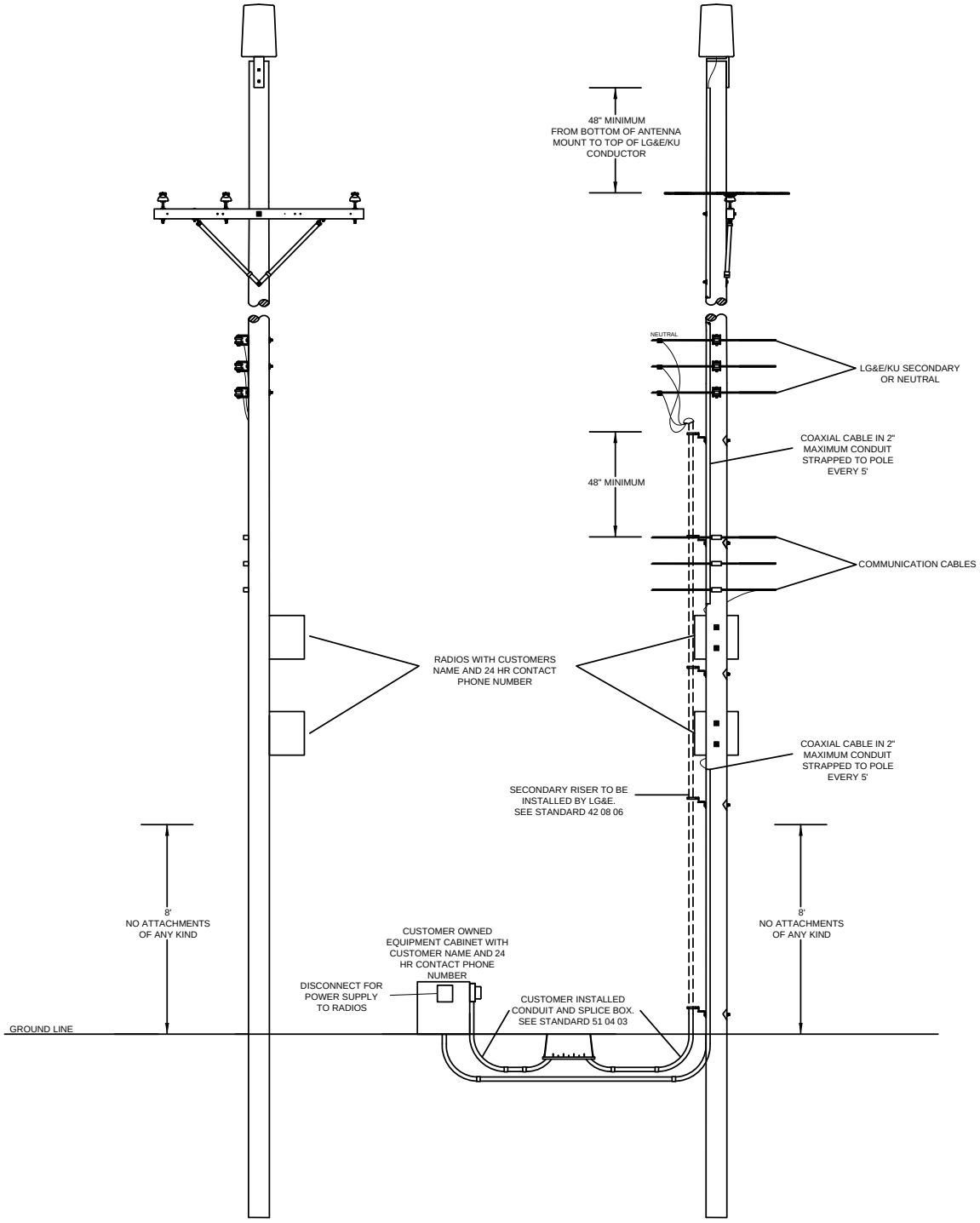
MAST ARMS		
LENGTHS	IIN	STOCKED
2'	1185735	NO
4'	7002216	NO
6'	7001369	YES
8'	7001370	YES

Electric System
Codes & Standards

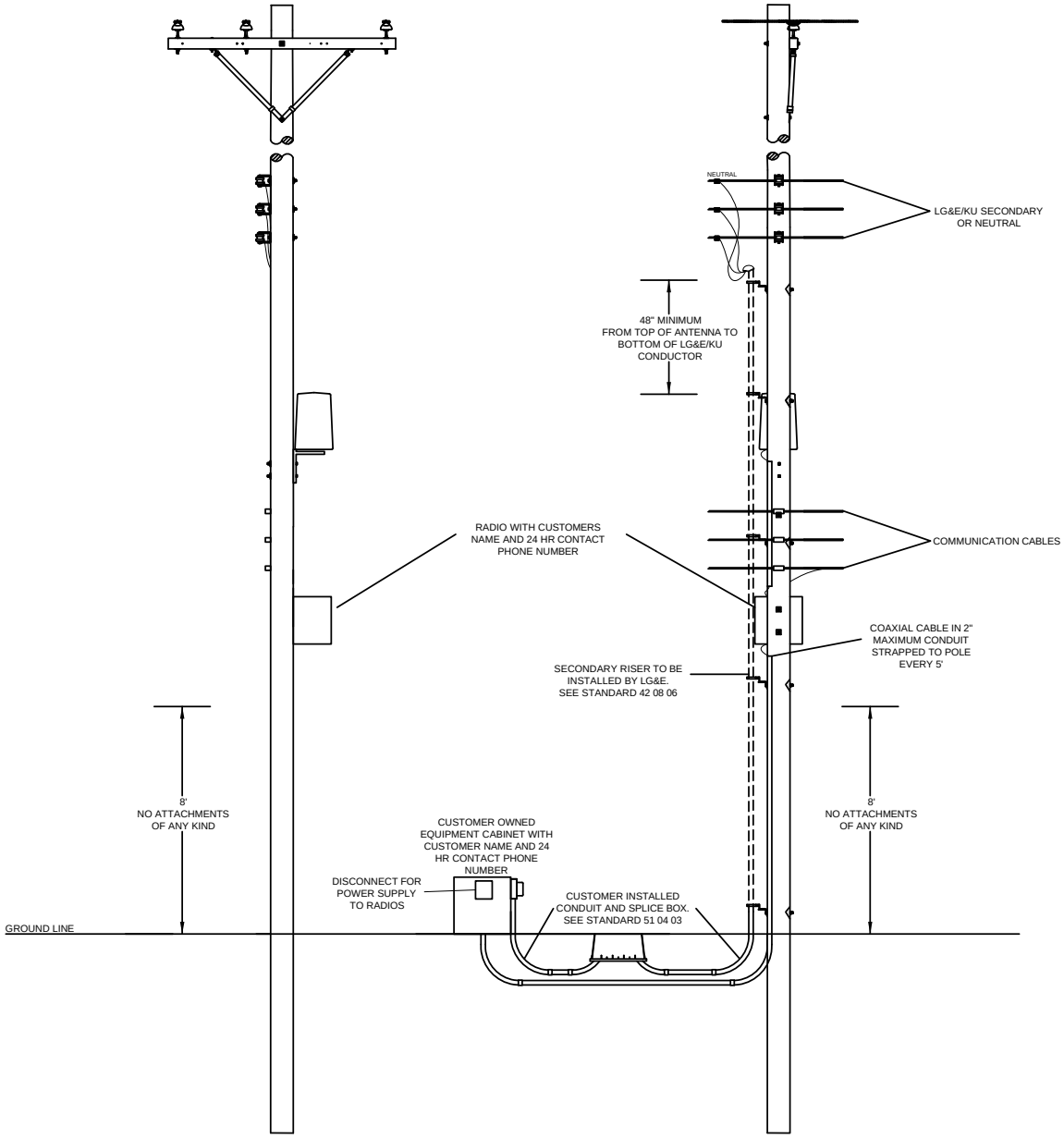
WIRELESS ANTENNA ATTACHMENTS ON WOOD POLES

07 14 02
Rev.

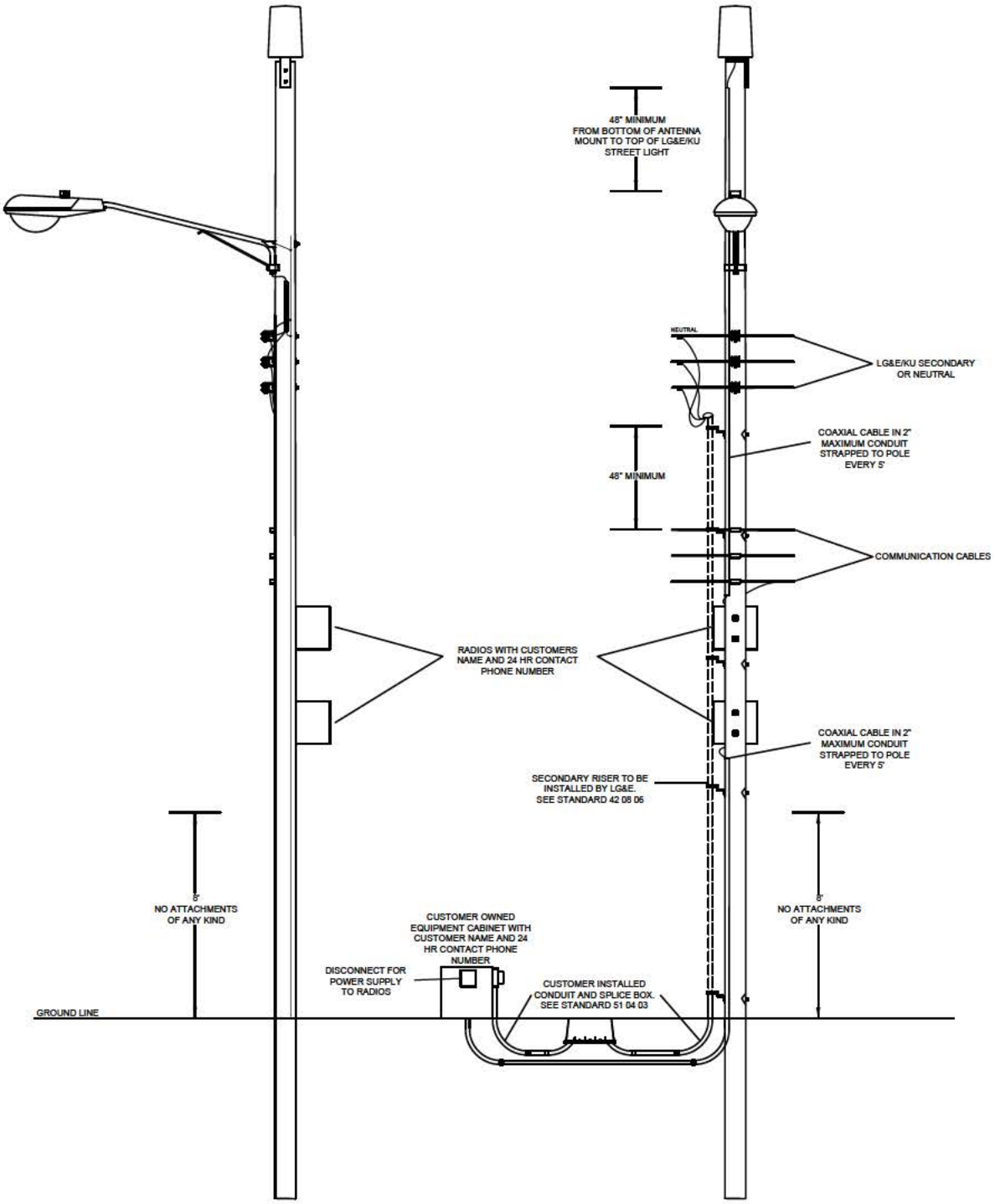
3Ø POLE WITH ANTENNA ABOVE PRIMARY



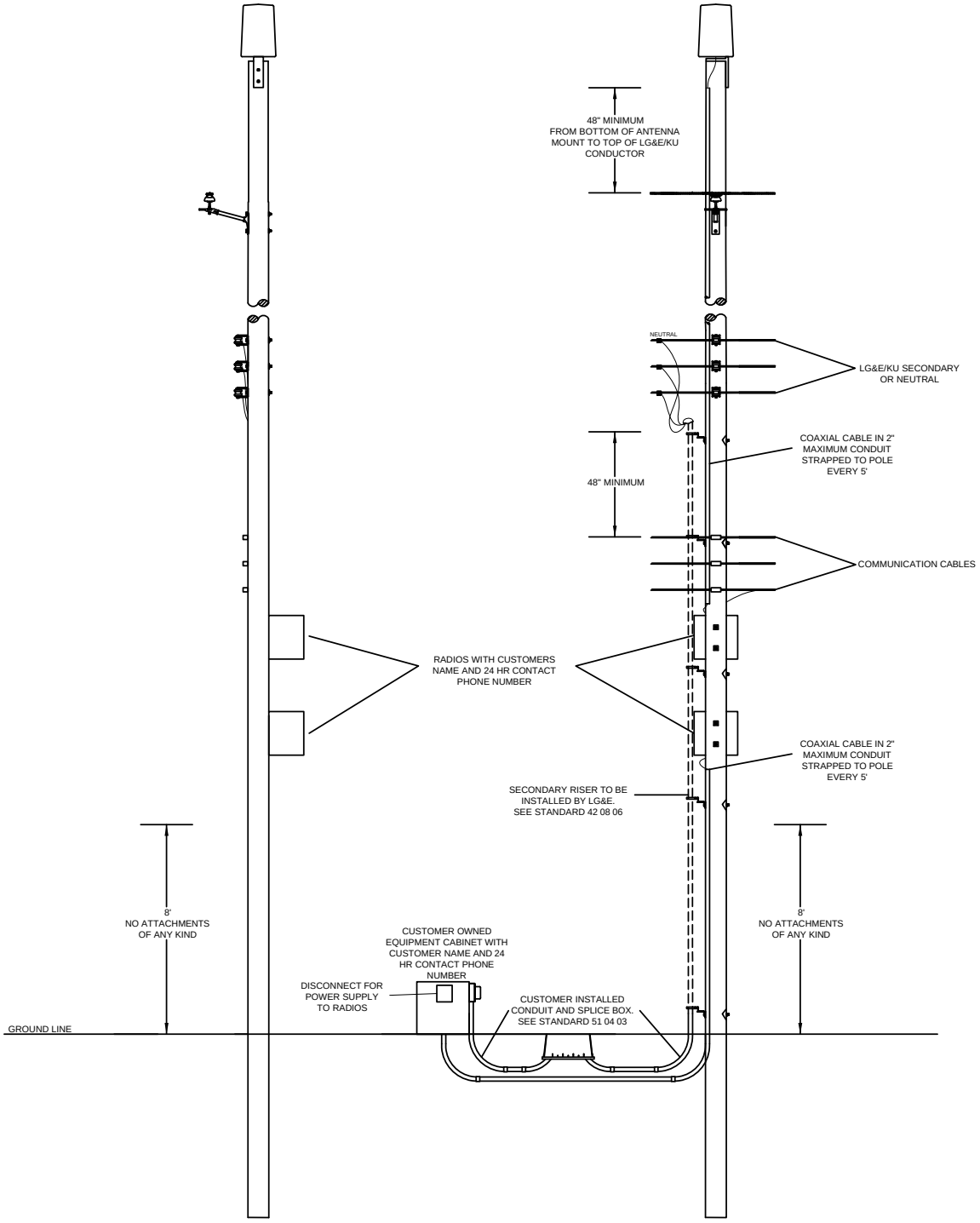
3Ø POLE WITH ANTENNA BELOW SECONDARY



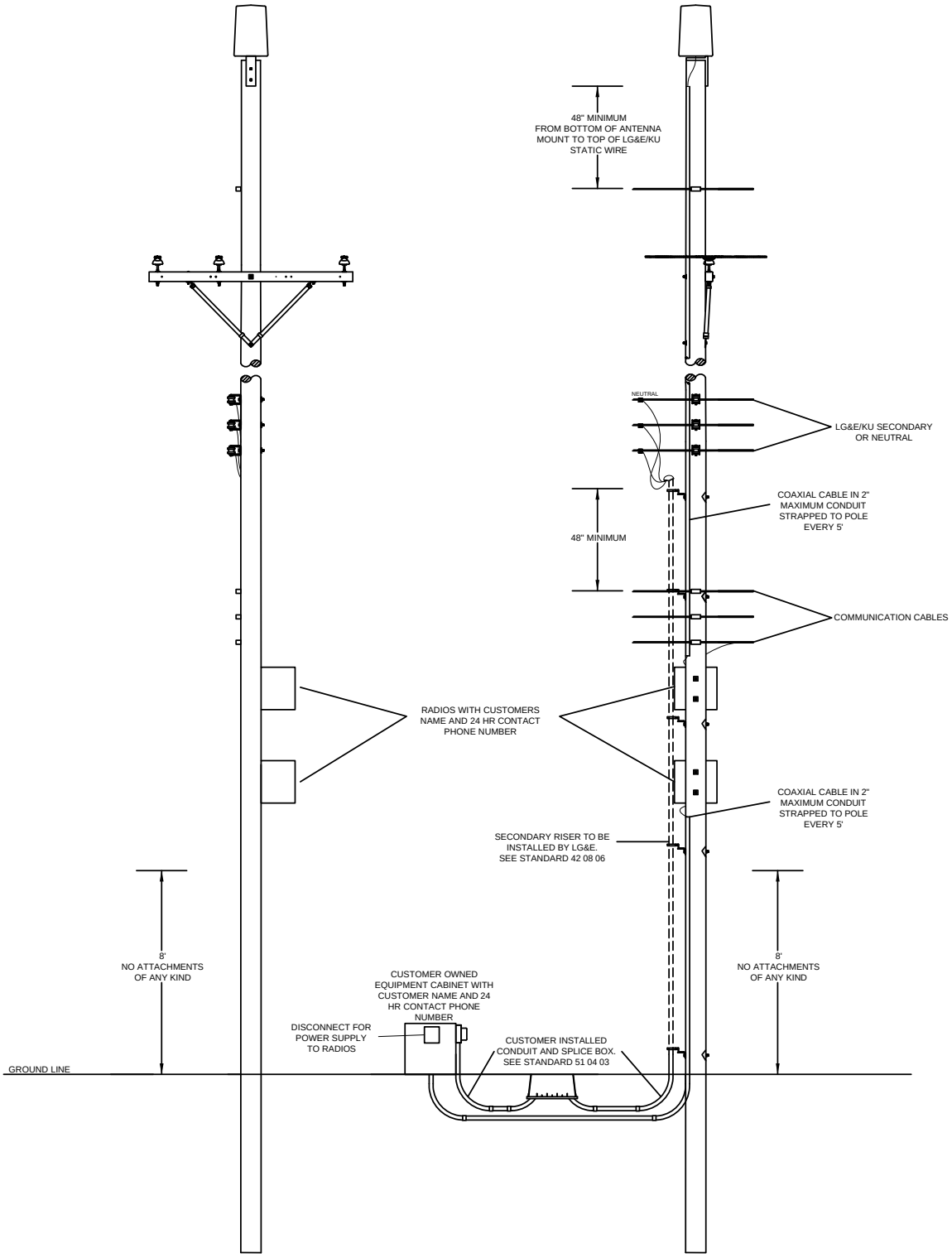
SECONDARY POLE WITH ANTENNA ABOVE SECONDARY



1Ø POLE WITH ANTENNA ABOVE PRIMARY



3Ø POLE WITH STATIC WIRE WITH ANTENNA ABOVE PRIMARY



GUIDELINES FOR DESIGN AND INSTALLATION

- 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. The cost of the taller pole is the responsibility of the attacher. Pole height not to exceed 60' above ground.
- 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.
- All wireless attachment sites must be metered. 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 shall 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 owners responsibility to inform all pole attachee's 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.
- Atachee may have their equipment mounted to the pole contained within no more than two separate boxes unless approved from LG&E/KU Distribution Operations staff.
- Antenna cable(s) shall be installed in maximum 2” non-metallic conduit strapped every 5' unless approved from LG&E/KU Distribution Operations staff.
- Customer's equipment may not occupy more than two adjacent quadrants.
- The weatherhead and Wi-Fi 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.

Electric System
Codes & Standards

SINGLE PHASE TRANSFORMER INSTALLATION FROM POLE TOP AND CROSSARM CONSTRUCTION

20 05 02
Rev. D

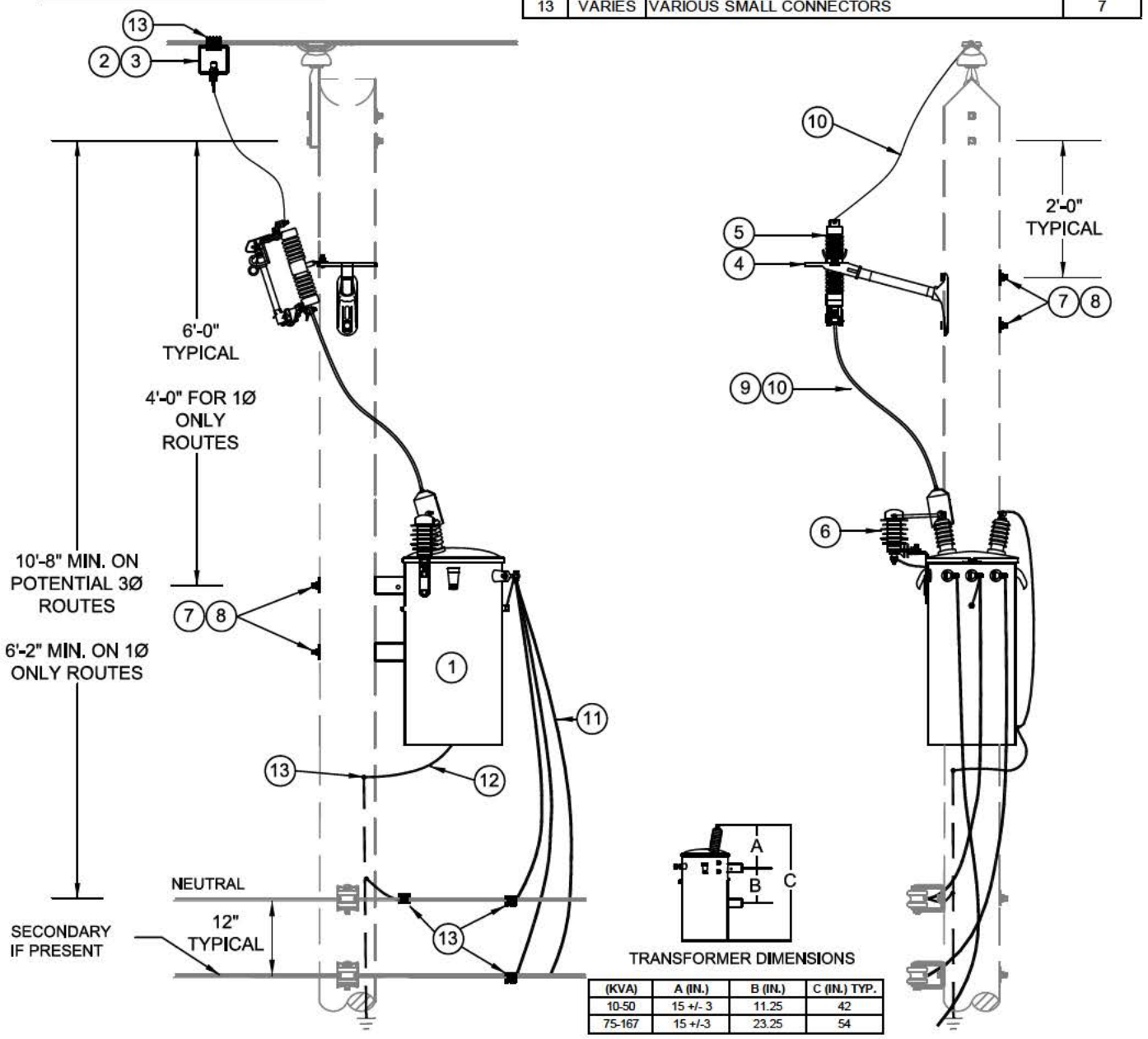
NOTES:

1. POLE GROUND MUST BE CONNECTED TO SYSTEM NEUTRAL, TRANSFORMER TANK, PRIMARY BUSHING, AND LIGHTNING ARRESTER GROUND, DIRECTLY OR INDIRECTLY. TYPICAL GROUNDING SHOWN. OTHER METHODS ALSO ACCEPTABLE.
2. CUTOUT TO BE MOUNTED ON SIDE OF EQUIPMENT BRACKET FARTHEST AWAY FROM TRANSFORMER. (SEE STANDARD 07 08 02)
3. TRANSFORMER SHOULD BE LOCATED IN MOST CONVENIENT QUADRANT. WHEN POSSIBLE, THE TRANSFORMER SHOULD BE PLACED IN LINE WITH THE CONDUCTORS AND ON THE SIDE OF THE POLE WHICH IS LEAST DESIRABLE FOR CLIMBING.
4. WILDLIFE PROTECTOR SHOULD ALWAYS BE INSTALLED AROUND "HOT" PRIMARY BUSHING. (SEE STANDARD 20 25 02)
5. MIN. POLE HEIGHT OF 45' TO BE USED WHEN COMMUNICATIONS CABLES ARE PRESENT.

MATERIAL LIST

ITEM	IIN	DESCRIPTION	QTY
1	VARIES	TRANSFORMER, 1Ø	1
2	VARIES	STIRRUP,BAIL,HOT LINE,COPPER	1
3	7000591	CLAMP,HOT LINE,8-2/0,CU	1
4	7001703	BRACKET,INSULATOR/ARRESTER,18",SINGLE	1
5	7001957	CUTOUT,FUSED,15KV,NON-LOADBREAK	1
6	VARIES	ARRESTER,SURGE,DIST. CLASS (INCL. W/TRANSF.)	1
7	7000339	WASHER,CURVED,SQUARE,3"X3"X1/4"	4
8	VARIES	5/8" MACHINE BOLTS W/NUTS	4
9	7001924	GUARD,WILDLIFE,STINGER COVER (IF REQ.)	10
10	1199378	WIRE,#4,7-STR,SOFT DRAWN COPPER POLY	10
11	VARIES	WIRE, XFMR SECONDARY LEGS, POLY	20
12	7005817	CONDUCTOR,OH WIRE,4,CU,BARE,SD,SOLID	6
13	VARIES	VARIOUS SMALL CONNECTORS	7

POLE TOP CONSTRUCTION



TRANSFORMER DIMENSIONS

(KVA)	A (IN.)	B (IN.)	C (IN.) TYP.
10-50	15 +/- 3	11.25	42
75-167	15 +/-3	23.25	54

Electric System
Codes & Standards

SINGLE PHASE TRANSFORMER INSTALLATION FROM POLE TOP AND CROSSARM CONSTRUCTION

20 05 02
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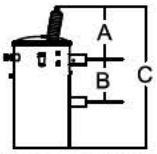
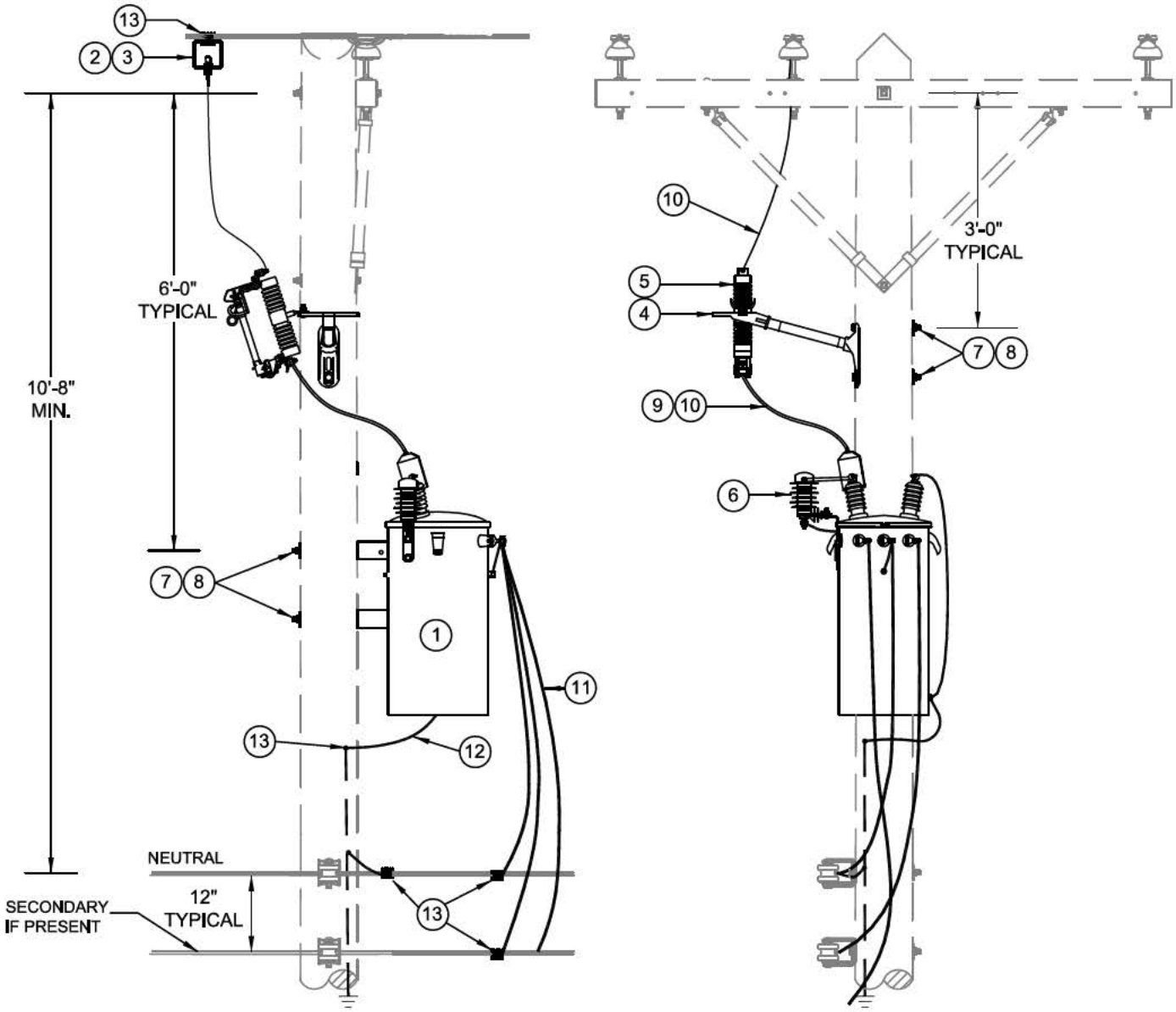


TRANSFORMER DIMENSIONS

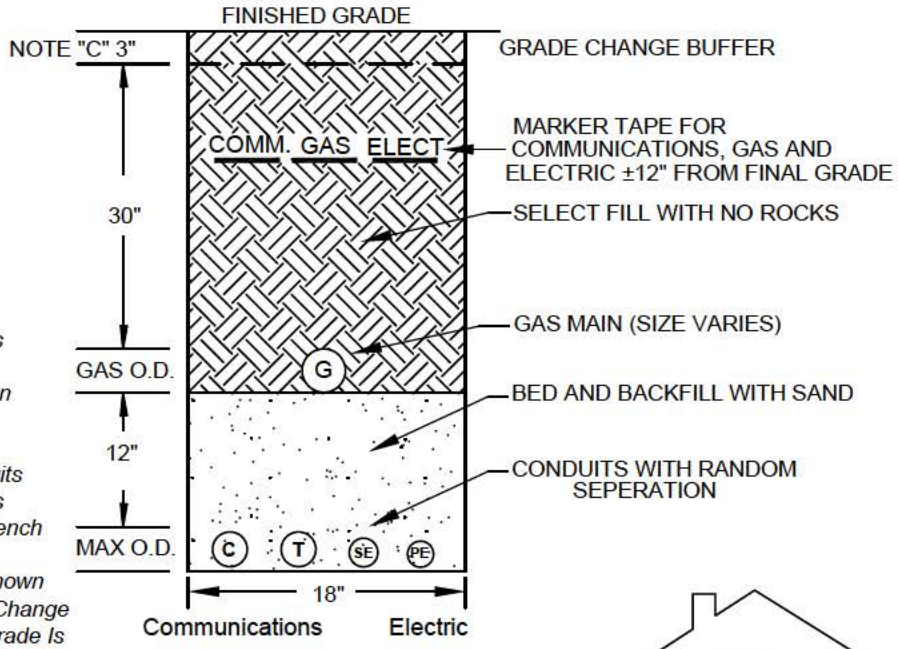
(KVA)	A (IN.)	B (IN.)	C (IN.) TYP.
10-50	15 +/- 3	11.25	42
75-167	15 +/-3	23.25	54

CROSSARM CONSTRUCTION



RECOMMENDED JOINT GAS & ELECTRIC TRENCH

Conduit Size	O.D.
1"	1.315"
1-1/2"	1.900"
2"	2.375"
2-1/2"	2.875"
3"	3.500"
3-1/2"	4.000"
4"	4.500"
5"	5.563"
6"	6.625"
8"	8.625"



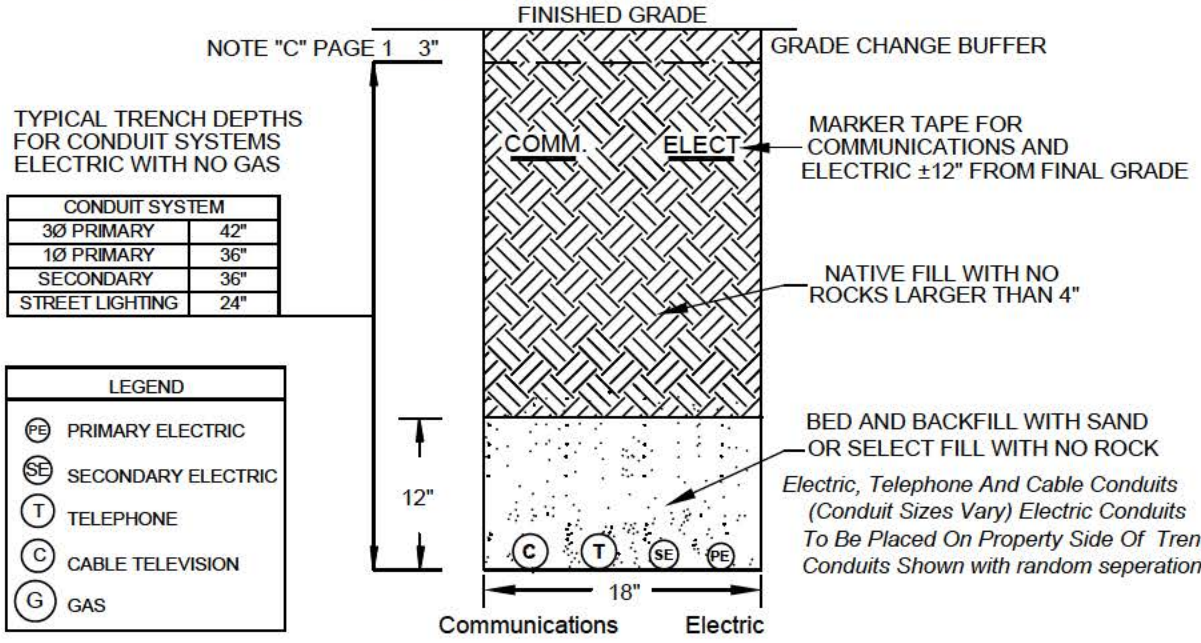
A. Trench Depth Depends on OD of Gas Pipe and Conduit. Actual Trench Depth To Be Specified on Construction Drawings.

B. Electric, Telephone And Cable Conduits (Conduit Sizes Vary) Electric Conduits To Be Placed On Property Side Of Trench

C. If Trench Line Is Well Defined And Known To Be At Final Grade, The 3" Grade Change Buffer May Be Omitted. If Existing Grade Is Not Believed To Be Within 3" Of Final Grade, Additional Depth Will Be Required.

D. Trench Depths Less Than Values Shown In The Table Below May Be Allowed If Significant Rock Is Encountered. Reductions May Only Be Made With Approval Of Center Engineer or Construction Team Leader. Supplemental Protection, Such As Heavier Wall Conduit And/Or Concrete Encasement, Etc. May Be Required.

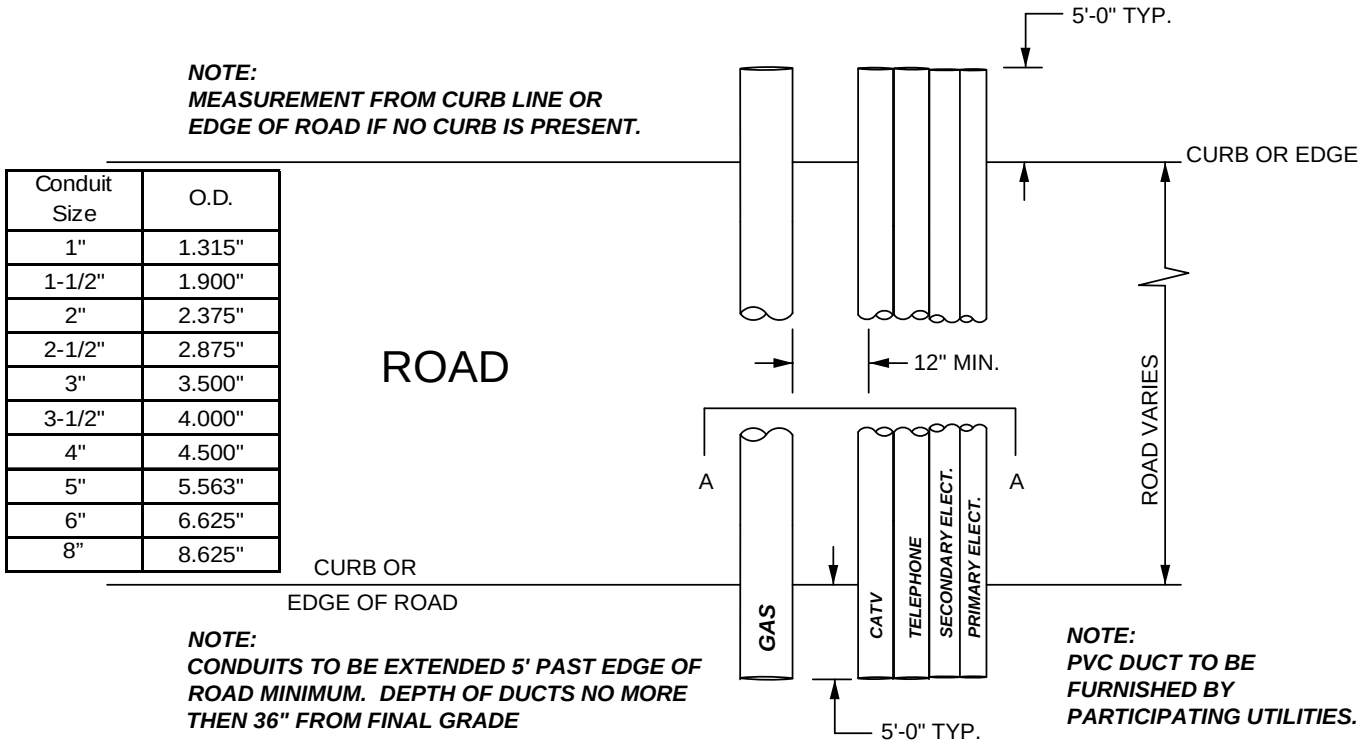
RECOMMENDED JOINT ELECTRIC TRENCH

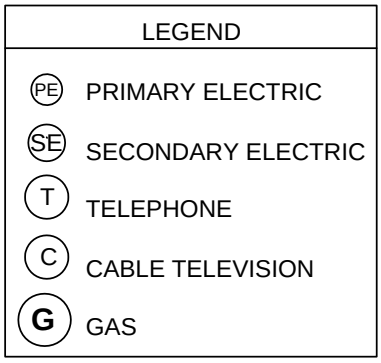


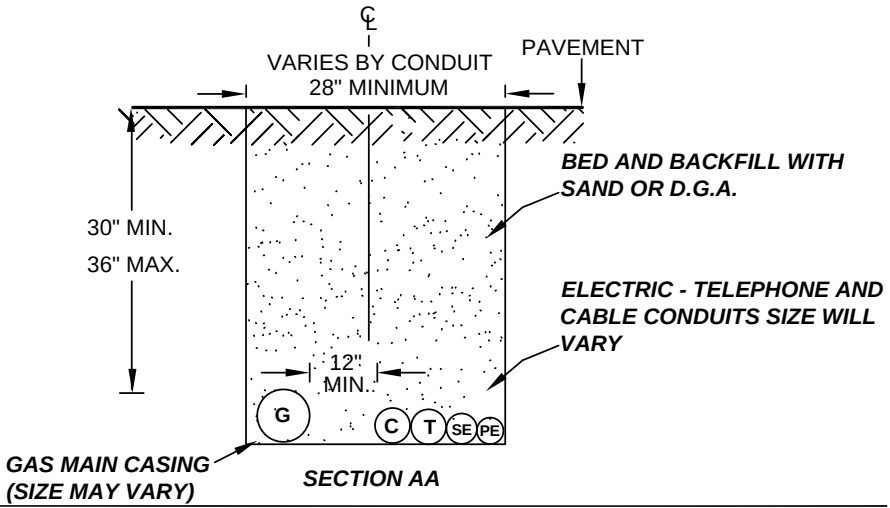
DEVELOPER INSTALLED DUCT FOR JOINT GAS & ELECTRIC TRENCH

NOTE:
END OF DUCTS TO BE CAPPED, TAPED OVER OR PLUGGED. ENDS OF DUCT MUST BE MARKED WITH UPRIGHT 2"X4" WOOD STUD STAKE, OR OTHER SUITABLE MARKER AND PLACE PAINT MARKER ON CURB (IF PRESENT) PRIOR TO START OF CONSTRUCTION. TRACER WIRE FOR GAS SERVICES MUST EXTEND THROUGH THE ENTIRE DUCT INCLUDING TO THE END OF THE STUB AND TAPED IN PLACE.

Conduit Size	O.D.
1"	1.315"
1-1/2"	1.900"
2"	2.375"
2-1/2"	2.875"
3"	3.500"
3-1/2"	4.000"
4"	4.500"
5"	5.563"
6"	6.625"
8"	8.625"







DEVELOPER INSTALLED DUCT FOR JOINT ELECTRIC TRENCH

NOTE:
END OF DUCTS TO BE CAPPED, TAPED OVER OR PLUGGED. ENDS OF DUCT MUST BE MARKED WITH UPRIGHT 2"X4" WOOD STUD STAKE, OR OTHER SUITABLE MARKER AND PLACE PAINT MARKER ON CURB (IF PRESENT) PRIOR TO START OF CONSTRUCTION

Conduit Size	O.D.
1"	1.315"
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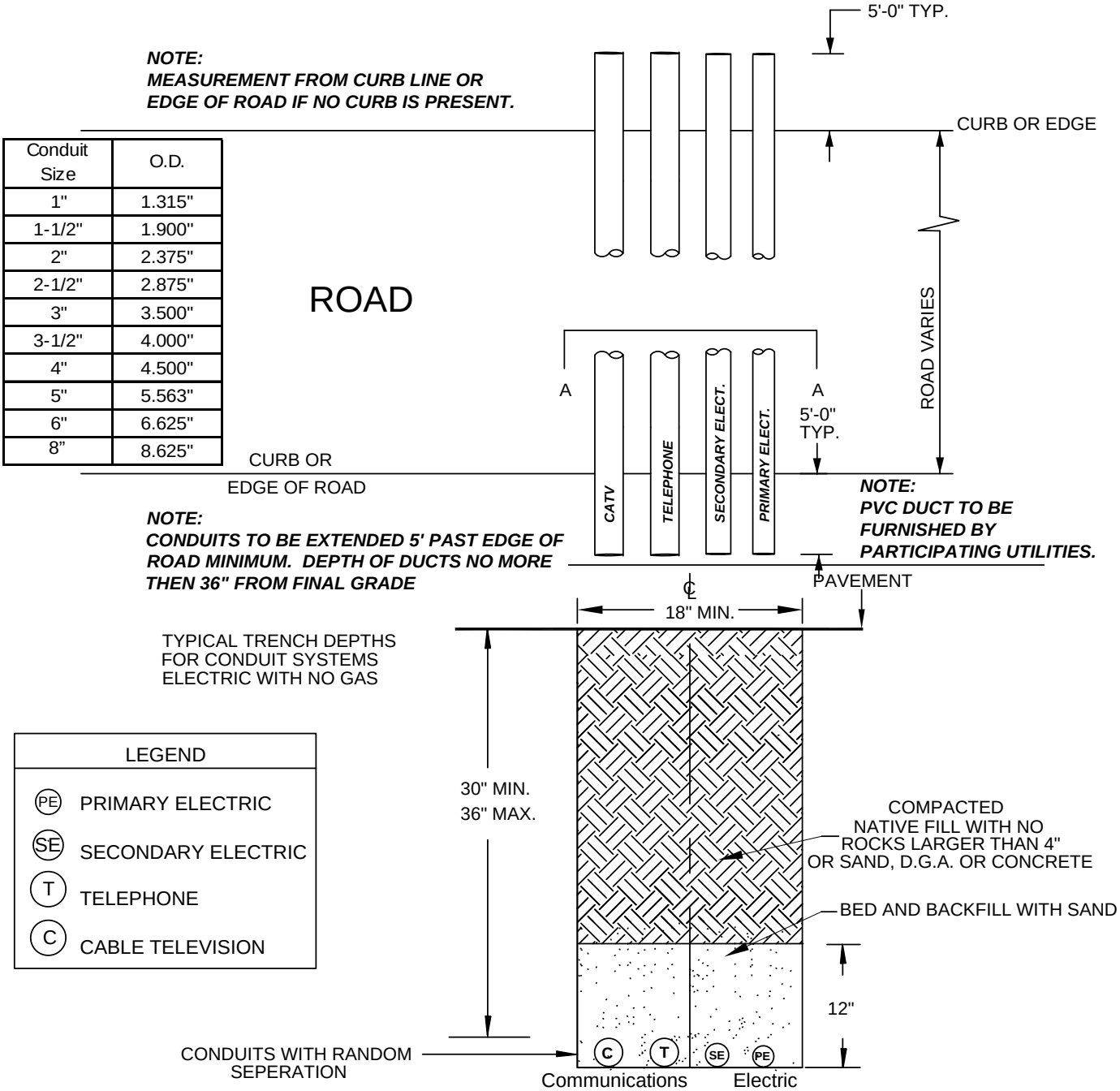
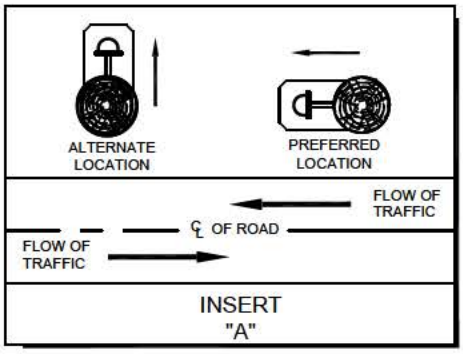


Electric System
Codes & Standards

TYPICAL CONCRETE HUB-BAND FOR RISER PROTECTION

42 08 02
Rev. F

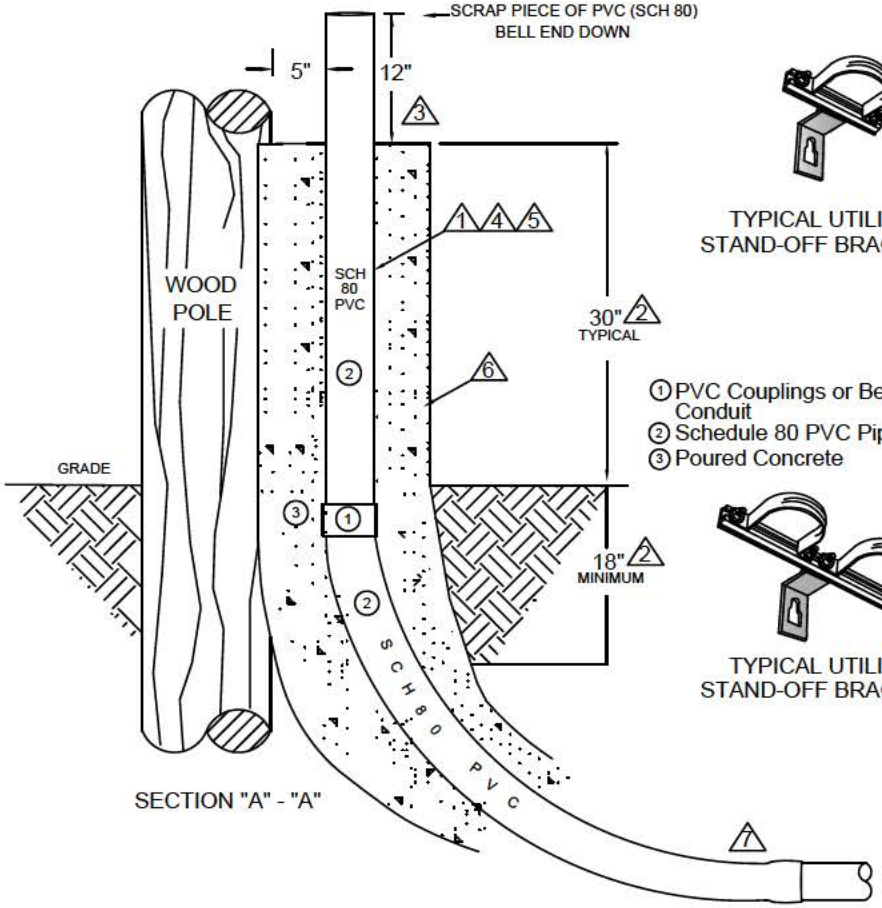


Informational Notes:

1. Schedule 80 PVC and elbow (size varies). Install ended pipe bell end down or use coupling.
2. Concrete to extend a minimum of 18" below grade, additional concrete may be required to strengthen riser for pulling cable. Utility may require height above ground to exceed 30".
3. A minimum of 12" of conduit must extend above top of hub-band.
4. Number and sizes of conduit specified by utility.
5. Surface of the hub band should be smoothly finished with all corners chamfered at 45 degrees.
6. Concrete to be a minimum of 3,500 PSI. Reinforcing may be required In high risk areas.
7. Elbow installed with bell end down. Elbow to be SCH. 80 min. with a 36" long radius.

General Notes:

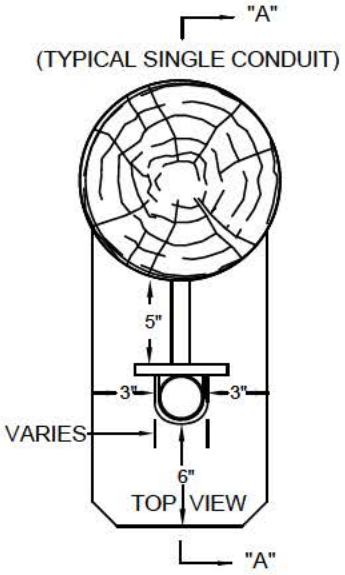
1. This standard covers guidelines for utility required protection of 3Ø secondary, and 1Ø and 3Ø primary underground riser installations.
2. Hub bands are required in areas subjected to vehicular traffic and/or the use of large equipment including, but not limited to, farm equipment, large tractor mowing, construction equipment, etc. and at other locations where required by the utility.
3. Conduit and hub band location to be specified by the utility and located on the side of the pole opposite normal traffic flow whenever possible. When necessary, conduit can be located on the side of the pole opposite the driving surface (see Insert A)
4. Typical risers are shown in detail. Some installations may require specially designed hub bands or additional protection.
5. Customers are responsible for removing forming material and restoring grade for customer installed installations.

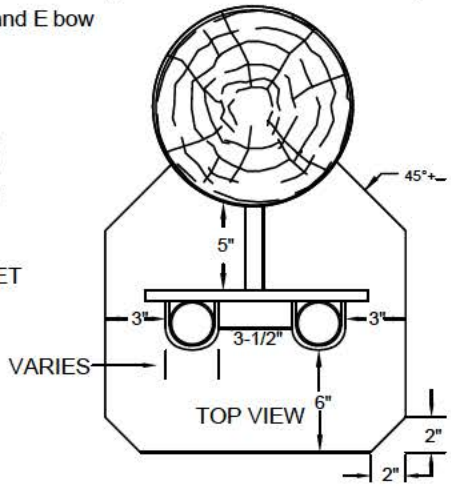


TYPICAL UTILITY
STAND-OFF BRACKET

① PVC Couplings or Bell End of Conduit
② Schedule 80 PVC Pipe and E bow
③ Poured Concrete

TYPICAL UTILITY
STAND-OFF BRACKET





Electric System
Codes & Standards

TYPICAL UNDERGROUND PRIMARY RISER

42 08 04
Rev.C

UNDERGROUND PRIMARY RISER

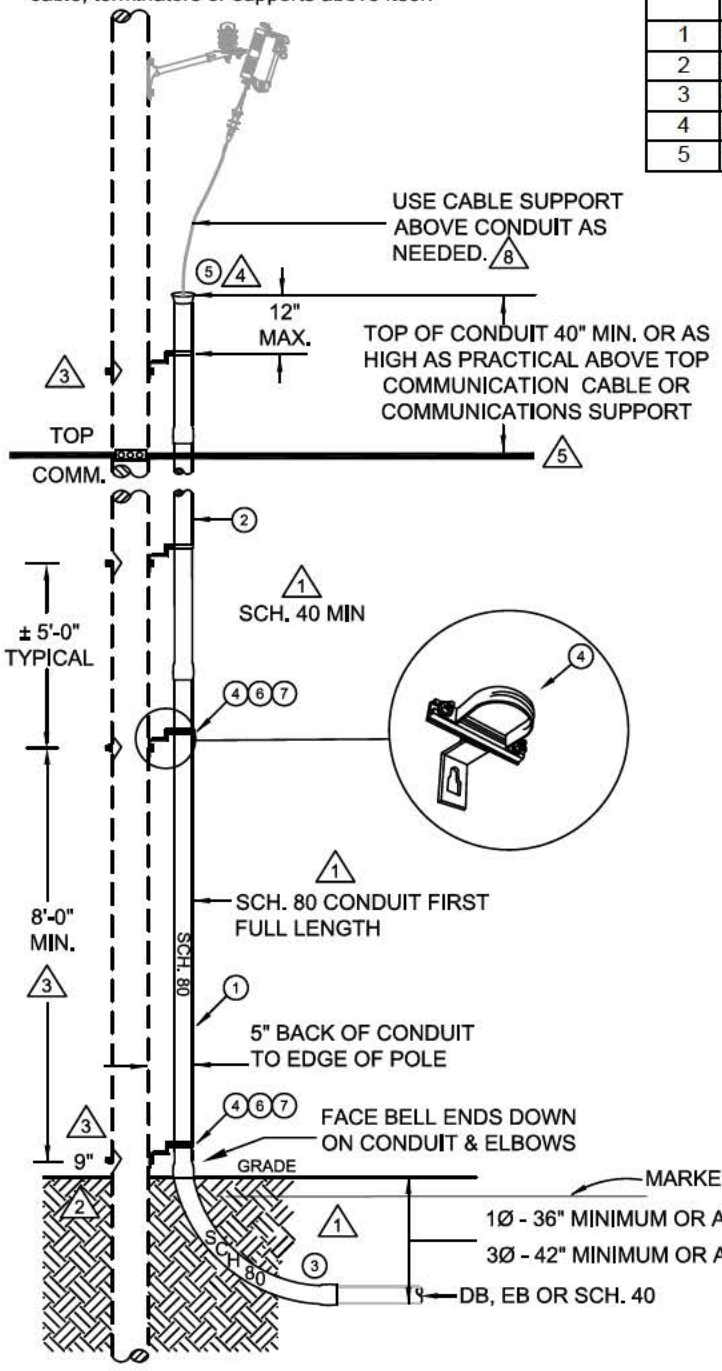
MINIMUM RISER SIZE

42 08 04 . 01	**2" (#2, 1/0,& 2/0 15KV 1Ø)**
42 08 04 . 02	**4" (#2, 1/0, 2/0 & 4/0 15KV 3Ø)**
42 08 04 . 03	**5" (350KCM & 500KCM 15KV 3Ø)**
42 08 04 . 04	**6" (750KCM & 1000KCM 15KV 3Ø)**

Application:
This standard details 1 phase and 3 phase primary riser installations up to 6" conduit. This standard does not cover cable, terminators or supports above riser.

ITEM	IIN	COMMON MATERIAL DESCRIPTION	QUAN
1	SEE TABLE	Conduit,PVC,10',Sch. 80,Grey (See Table)	1
2		Conduit,PVC,10',Sch. 40,Grey (See Table)	2
3		Elbow ,PVC,90 Deg.,36" R,Sch. 80 (See Table)	1
4		Bracket, Conduit Standoff, 1-Conduit (See Table)	6
5		Bell End, Conduit (See Table)	1
6	VARIES	Bolt,Machine,Galv.	6
7	7000339	Washer,Curved,5/8" Bolt,3"	6

Item	Description	01	02	03	04
		2"	4"	5"	6"
1	Sch. 40 Conduit 10'	7000671	7000668	7000667	7000666
2	Sch. 80 Conduit 10'	7000663	7000660	7000659	7000658
3	36"R Sch. 80 Elbow	7002452	7002455	7002456	70002457
4	Standoff Bracket	7004572	7005755	0514643	7005920
5	Bell End	7004406	7003419	1191894	7003467



Notes:

1. Riser elbow and first 10' of conduit to be Schedule 80 grade. Conduit above this level can be either Schedule 40 or 80.
2. Soil to be well compacted by hand or mechanical tamped within 5' of pole. Optionally, conduit can be encased in concrete fill within 5' of pole.
3. Bracket Placement:
   Bottom bracket +/- 9" above ground.
   Second bracket a **minimum** of 8'-0" above first bracket
   Top bracket to be within 12" of top of riser.
   Other brackets equally spaced on 5'-0" to 8'-0" spacing.
4. Conduit bell end used at top of riser to minimize damage from sharp edge of conduit.
5. Conduit to extend to a **minimum** of 40" or as high as practical above top communication attachment.
6. Number, size and length of conduit vary.
7. Riser locations on pole to be specified on construction drawings to maximize climbing space and minimize potential damage from vehicles. High risk areas near roadways, in parking lots, etc. require conduit hub band. See standard 42 08 02.
8. Use cable support above conduit as needed.

See Standard 42 04 02 For Optional Brackets For Multi-Conduit Applications

Electric System
Codes & Standards

TYPICAL UNDERGROUND SECONDARY RISER

42 08 06
Rev. C

UNDERGROUND SECONDARY RISER

MINIMUM RISER SIZE

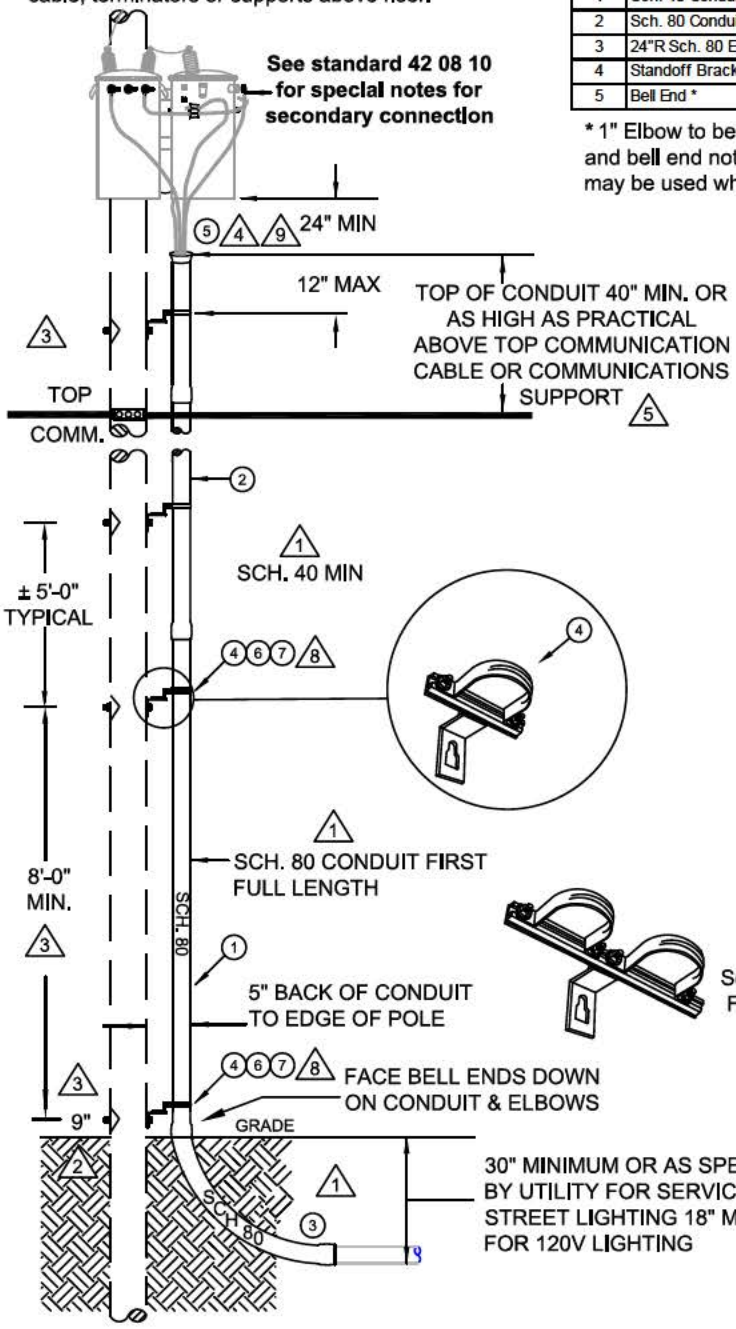
42 08 06 . 01	**1"**	**#12-2C and #6 Duplex**
42 08 06 . 02	**2"**	**#2 Triplex**
42 08 06 . 03	**2-1/2"**	**2/0 and 4/0 Triplex**
42 08 06 . 04	**3"**	**350 Tplx, 2/0, 4/0 and 350 Quad**
42 08 06 . 05	**4"**	**500 Quadruplex**
42 08 06 . 06	**5"**	**As Required**

Application: This standard details 1 phase and 3 phase secondary riser installations up to 5" (including street lighting risers). This standard does not cover cable, terminators or supports above riser.

ITEM	IIN	COMMON MATERIAL DESCRIPTION	QUAN
1	See Table	Conduit,PVC,10',Sch. 80,Grey (See Table)	1*
2		Conduit,PVC,10',Sch. 40,Grey (See Table)	2
3		Elbow ,PVC,90 Deg.,24" R,Sch. 80 (See Table)	1
4		Bracket, Conduit Standoff, 1-Conduit (See Table)	6
5		Bell End, Conduit (See Table)	1
6	VARIES	Bolt,Machine,Galv.	6*
7	7000339	Washer,Curved,5/8" Bolt,3"	6*

Item	Description	01	02	03	04	05	06
		1"	2"	2-1/2"	3"	4"	5"
1	Sch. 40 Conduit 10'	7000674	7000671	7000670	7000669	7000668	7000667
2	Sch. 80 Conduit 10'	7000665	7000663	7000662	7000661	7000660	7000659
3	24"R Sch. 80 Elbow *	7002422	7001222	7001223	7001224	7002447	7002456
4	Standoff Bracket *	7001246	7004572	7004573	7004574	7005755	0514643
5	Bell End *	N/A	7004406	7003558	7004407	7003419	1191894

* 1" Elbow to be Sch. 40. Conduit strap to be used in place of standoff bracket and bell end not required. 5" conduit requires 36" Sch. 80 elbow. Larger elbows may be used where necessary.



See Standard 42 04 02 For Optional Brackets For Multi-Conduit Applications

8 1" CONDUIT DETAIL

1" CONDUIT TO BE PLACED DIRECTLY ON POLE. CONDUIT STRAPS TO BE USED IN LIEU OF STANDOFF BRACKETS

Notes: 1

1. Riser elbow and first 10' of conduit to be Schedule 80 grade. Conduit above this level can be either Schedule 40 or 80 (1" elbow to be schedule 40).
2. Soil to be well compacted by hand or mechanical tamped within 5' of pole.
3. Bracket Placement:
   Bottom bracket +/- 9" above ground.
   Second bracket a **minimum** of 8'-0" above first bracket
   Top bracket to be within 12" of top of riser.
   Other brackets equally spaced on 5'-0" to 8'-0" spacing.
4. Conduit bell end used at top of riser to minimize damage from sharp edge of conduit.
5. Conduit to extend to a **minimum** of 40" or as high as practical above top communication attachment. **Minimum** of 40" must be kept between top of communication cable (or bracket whichever is highest) and lowest point of secondary (including drip loop) and/or top of conduit per NESC.
6. Number, size and length of conduit vary.
7. Riser locations to be specified on construction drawings to maximize climbing space and minimize potential damage from vehicles. High risk areas near roadways, in parking lots, etc. require conduit hub band. See standard 42 08 02.
8. 1" conduit to be strapped directly on pole without brackets.
9. Use cable support above conduit as needed.

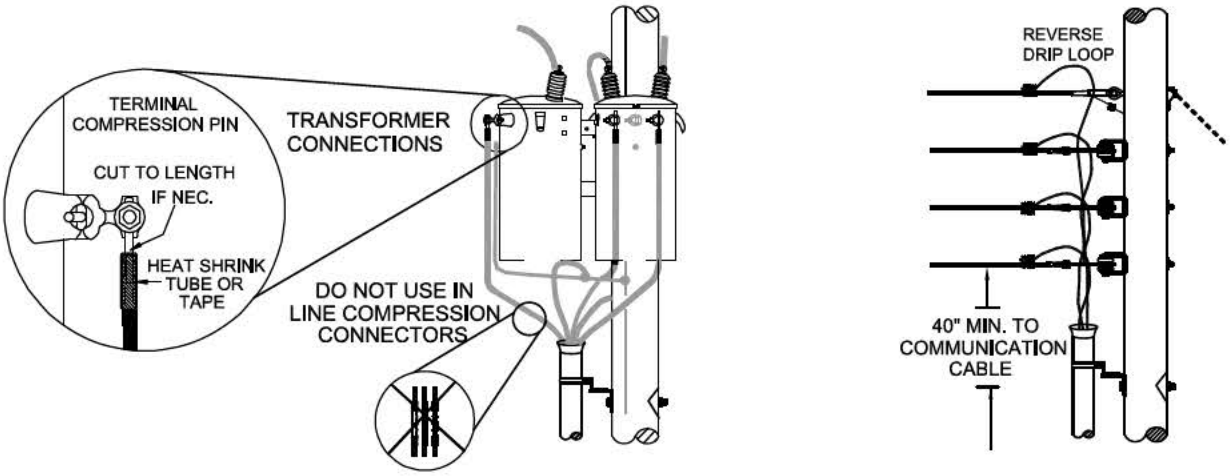
TYPICAL UNDERGROUND SECONDARY RISER

CONSTRUCTION NOTES:

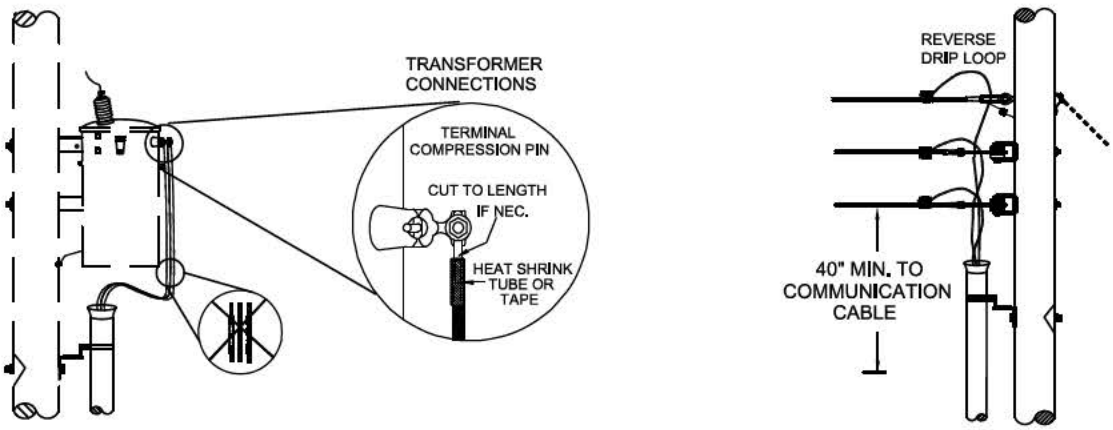
A) Connections between underground secondary and transformers or overhead secondary must be made in a manner that prohibits water from entering the underground secondary conductors.

- Vertical connections directly to transformers, etc. must be made with pin connectors that are sealed with silicon rubber tape or a heat shrink tube. Use of an unblocked compression splice to transition from aluminum to copper above the riser is not a water tight connection and is subject to damage from freezing.
- Horizontal connections to conductors can be made with pin connectors or conventional connectors with a reverse drip loop (loops up) in the underground cable to eliminate the possibility of water entering the cable.

B) Conduit location can be in any quadrant if climbing space can be preserved and conflicts with other equipment (including telecommunications) are avoided. When necessary, top of conduct can be above the bottom of transformers or secondary when placed in an open quadrant.



Underground Secondary to 3Ø Transformer Bank Or Secondary



Underground Secondary to 1Ø Transformer Or Secondary

Electric System
Codes & Standards

1Ø OVERHEAD TO UNDERGROUND SERVICE 400A MAX

51 04 03
Rev. F

Location/Address		Contact Phone #		Overhead Job Necessary ☐ Yes ☐ No
Service Size	**Classification**	**Pole-Splice Box Duct**	**Box Size**	**Secondary Voltage**
_____A	☐ <400 Amp	1 - 2-1/2" Duct	12" X 20" X 12"	☐ 120/240V - 1Ø - 3W
	☐ 400 Amp	1 - 5" Duct	13" X 24" X 15"	☐ 240/480V - 1Ø - 3W
	☐ Special	_____	_____	

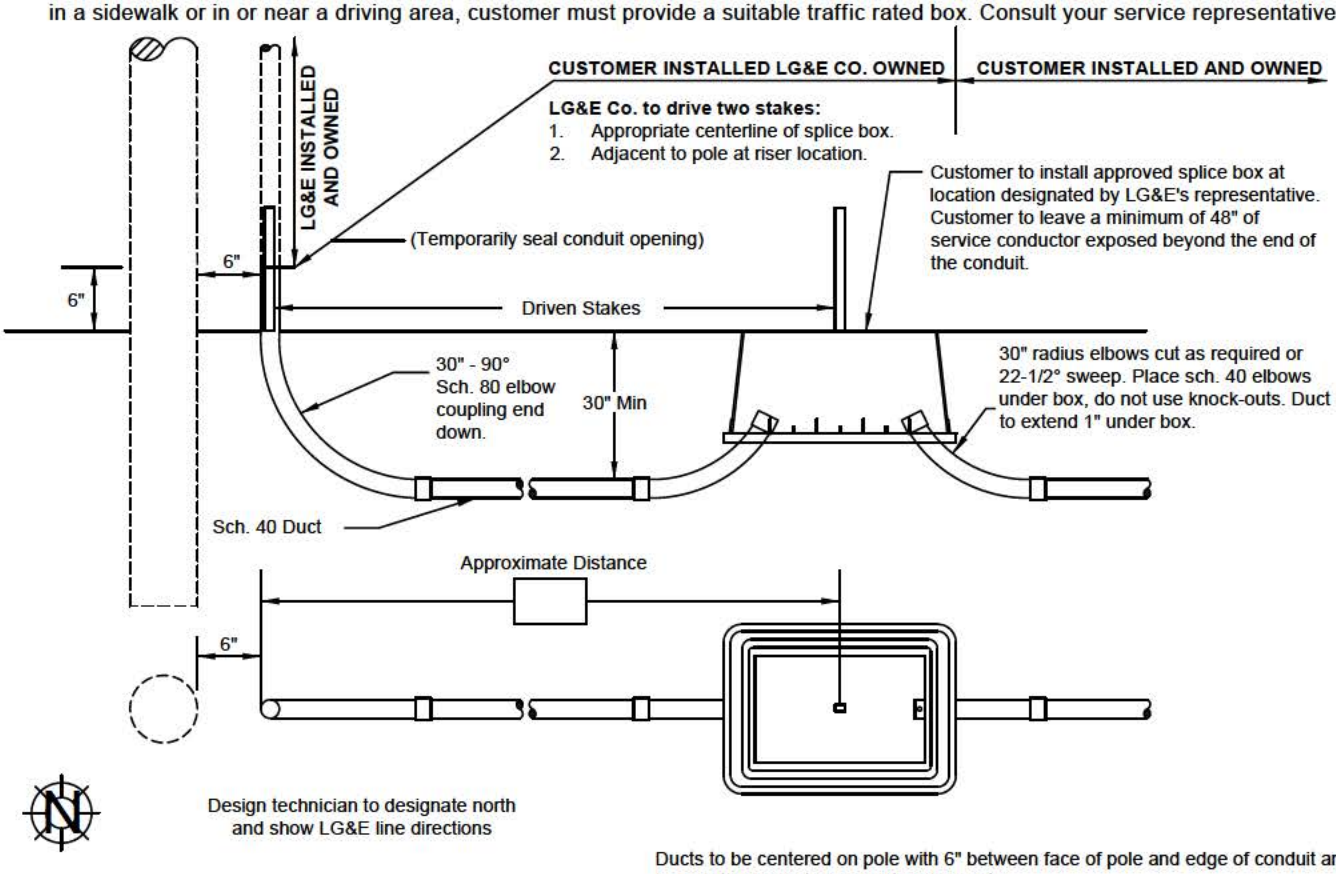
Approved Splice Box Vendor/Catalog Number Information

General: Splice boxes to be high density polyethylene supplied with non-metallic cover, captive stainless steel Penta-Head bolts and electric logo.

12" X 20" X 12" Splice Box (IIN 1243827)		13" X 24" X 15" Splice Box (IIN 7003714)	
Newbasis	SGA142012TGRN-ELEC	**Newbasis**	SGA132415TGRN-ELEC
Highline	1320-1G2G-HDE1NH	**Highline**	1324-15P2P-HDE1
Old Castle	12201010	**Old Castle**	13241011
		Pencell Plastics	DT-1324X-EWB

Notice: It is the responsibility of the contractor to ensure the installation is built according to the latest revision of this document. The contractor should request a current version of this document from LG&E's representative before beginning construction.

Notes: Customer is responsible for the installation of the splice box and conduit system from the pole designated by LG&E to the service entrance. The customer is also responsible for the service cable from the splice box to the service entrance. LG&E will take ownership of the splice box and conduit between the pole and the splice box. All other facilities will remain the responsibility of the customer. The splice box and conduit to the designated pole must be installed to the specifications, dimensions, location and orientation specified by LG&E and this standard. For any questions concerning this information, contact your service representative. All material as well as installation of material must be approved by LG&E prior to LG&E energizing service. If splice box must be installed in a sidewalk or in or near a driving area, customer must provide a suitable traffic rated box. Consult your service representative.



Design technician to designate north and show LG&E line directions

Ducts to be centered on pole with 6" between face of pole and edge of conduit and 3" face to face between multiple conduits.

*For special designs above 400A, 1Ø, contact your Design Technician.

1 Duct

2 Duct Special Application

*Always Call Before You Dig (BUD) 1-800-752-6007 to locate underground utilities (Kentucky Underground)

Electric System
Codes & Standards

3Ø OVERHEAD TO UNDERGROUND SERVICE 800A MAX

51 04 05
Rev. D

Location/Address		Contact Phone #		Overhead Job Necessary ☐ Yes ☐ No
Service Size	**Classification**	**Pole-Splice Box Duct**	**Box Size**	**Secondary Voltage**
_____A	☐ ≤ 400 Amp	1 - 5" Duct	24" X 36" X 24"	☐ 120/208V - 3Ø - 4W
	☐ 401/800 Amp	2 - 5" Ducts	24" X 36" X 24"	☐ 240V - 3Ø - 3W
	☐ Special	3 to 4 - 5" Ducts	36" X 60" X 24"	☐ 480V - 3Ø - 3W

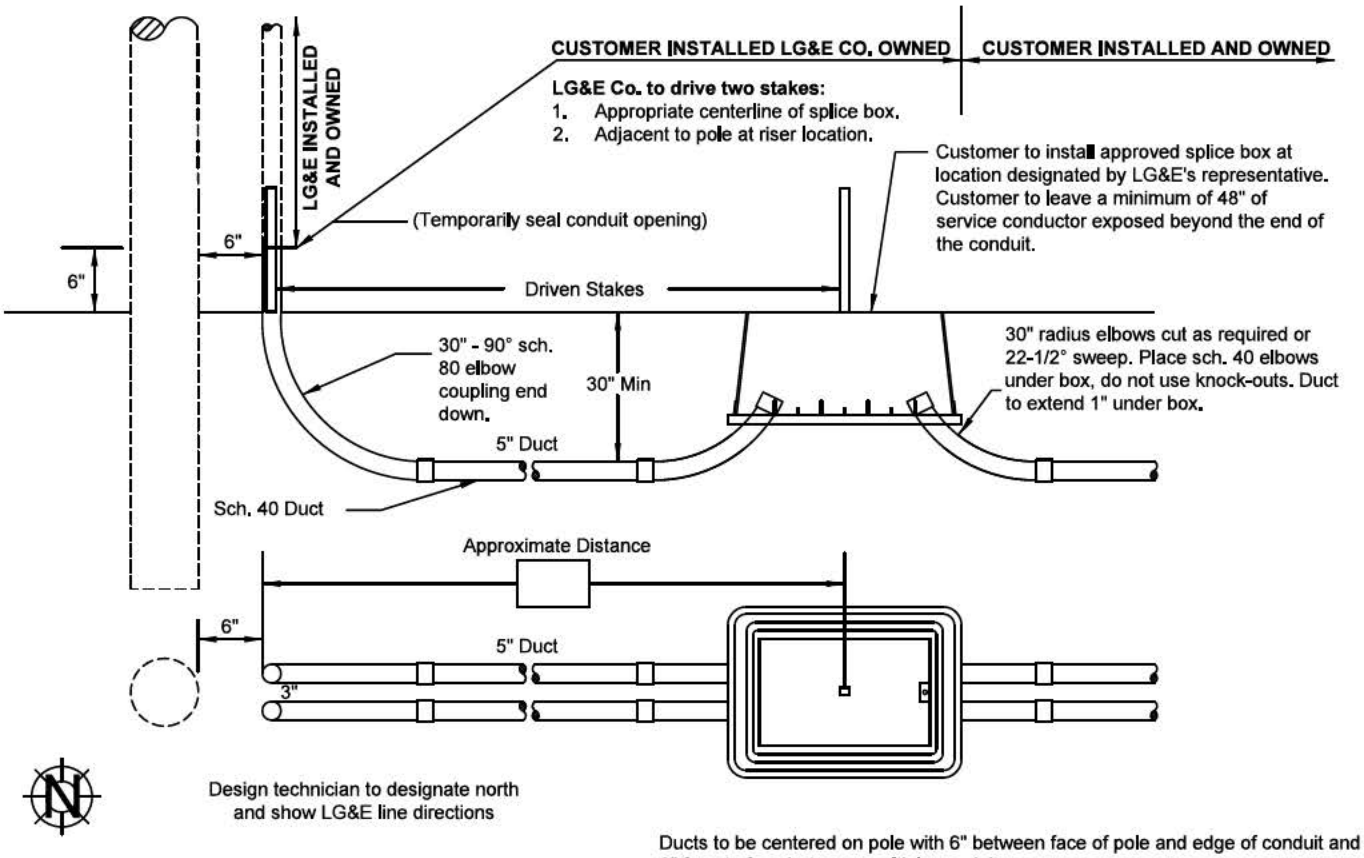
Approved Splice Box Vendor/Catalog Number Information

General: Splice boxes to be high density polyethylene supplied with non-metallic cover, captive stainless steel Penta-Head bolts and electric logo. *Use 24" X 36" X 24" for 2 conduits max. Use 36" X 60" X 24" for 3 or 4 conduits.

24" X 36" X 24" Splice Box (1191901)		36" X 60" X 24" Splice Box (0939227)	
Pencell Plastics	PEM-2436X-EWB	**Pencell Plastics**	PEM-3660X-EWB
Carson Industries	2431268	**Carson Industries**	36601002

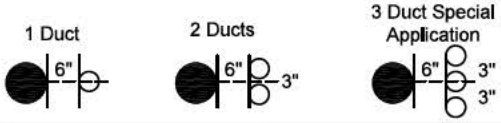
Notice: It is the responsibility of the contractor to ensure the installation is built according to the latest revision of this document. The contractor should request a current version of this document from LG&E's representative before beginning construction.

Notes: Customer is responsible for the installation of the splice box and conduit system from the pole designated by LG&E to the service entrance. The customer is also responsible for the service cable from the splice box to the service entrance. LG&E will take ownership of the splice box and conduit between the pole and the splice box. All other facilities will remain the responsibility of the customer. The splice box and conduit to the designated pole must be installed to the specifications, dimensions, location and orientation specified by LG&E and this standard. For any questions concerning this information, contact your service representative. All material as well as installation of material must be approved by LG&E prior to LG&E energizing service. If splice box must be installed in a sidewalk or in or near a driving area, customer must provide a suitable traffic rated box. Consult your service representative.



Design technician to designate north and show LG&E line directions

Ducts to be centered on pole with 6" between face of pole and edge of conduit and 3" face to face between multiple conduits.



*Services above 800A may be permitted where space is not available to install a padmount transformer.

*Always Call Before You Dig (BUD) 1-800-752-6007 to locate underground utilities (Kentucky Underground)

a PPL company

Appendix A

Rev. 10/08/14

Louisville Gas & Electric Company

(Date)

Upon Completion of Application, EMAIL to LGEPoleAttachment@lge-ku.com

Application for Third Party Attachment

Type of Attachment: ☐ CATV ☐ TELECOM ☐ OTHER **Applicant** _____
(Company Name)

Location _____
(City, County and State)

Application will not be accepted without applicable drawings.

Make-Ready Work Required: ☐ YES ☐ NO

Pole Number	Number of Attachments: Cables	Services	Miscellaneous	Pole Locations & Remarks

Make-Ready Work Requested Completion Date: _____

Applicant's Contact Information for Contracts

By _____
Title _____
Phone _____

Applicant's Engineering Representative

_____
(Company Name)

By _____
Title _____
Phone _____

All Third Party Pole Attachment inquiries shall be directed to Karmen Martin (Group Leader, Third Party Pole Attachment) at 502-333-1873.

Applicant is responsible for notifying LG&E Representative upon completion of work such that a job audit may be performed.

TO BE COMPLETED BY LG&E ONLY

Application granted for _____ attachment(s), subject to applicant approval of changes and rearrangements at an estimated cost to the applicant of $_____ ("Make-Ready Costs")

Total Attachments Requested on this Application _____ (No of Att)

LG&E Representative

By _____

Title _____

Date _____

a PPL company

Appendix B

DIMENSIONS AND WEIGHTS

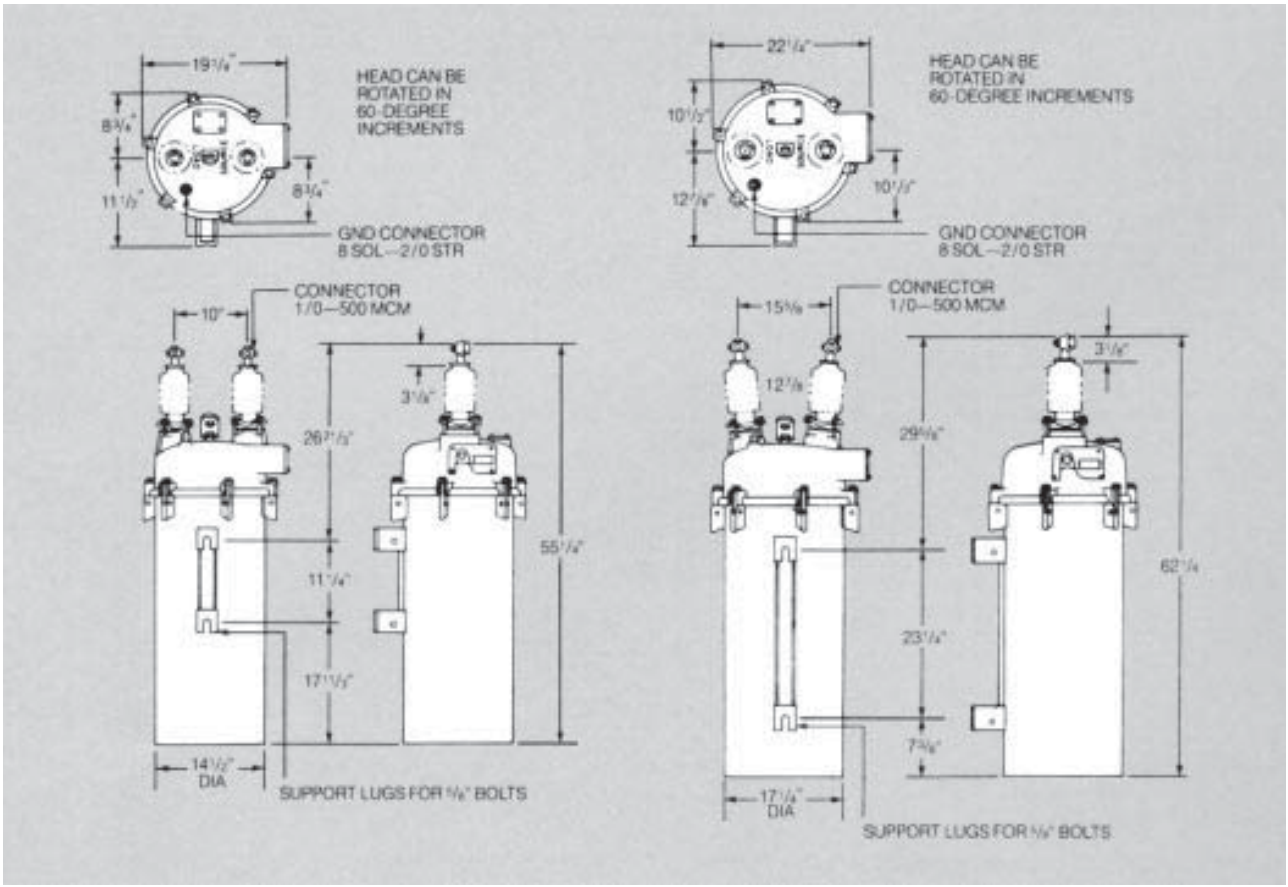


Figure 11.
Dimensions of Type D (left) and Type DV (right) reclosers.

TABLE 9
Weights and Oil Capacities

Type	Weight with Oil (lb)	Oil Capacity (gal)
D	430	20
DV	556	30

COOPER Power Systems

P.O. Box 1640
Waukesha, WI 53187

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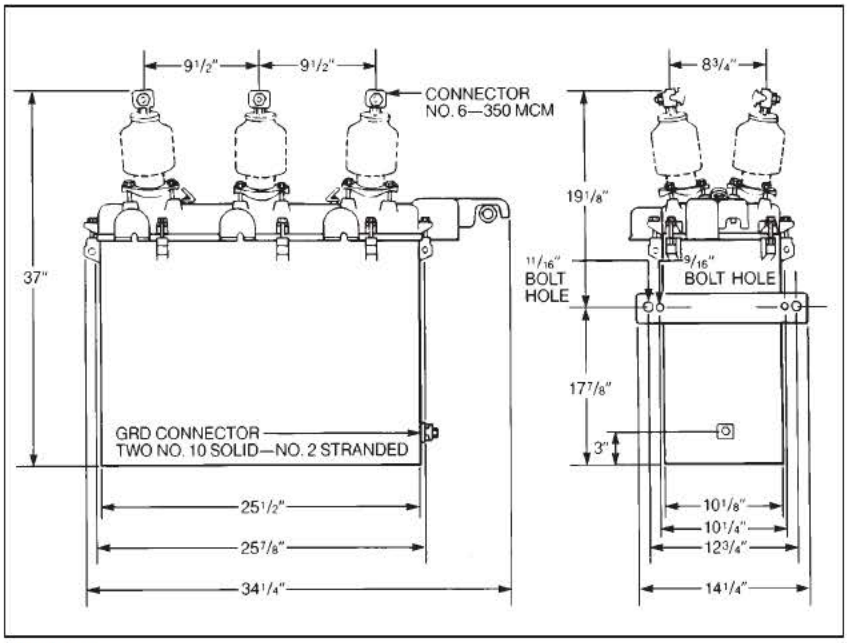
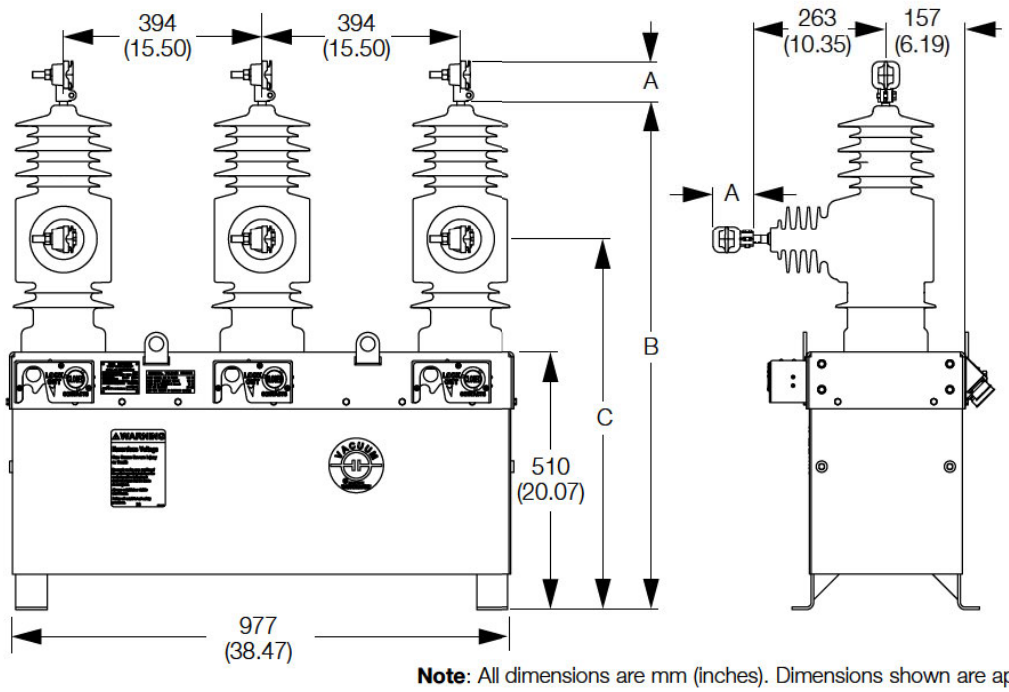


Figure 8.
Dimensions of Types 6H and V6H reclosers.

TABLE 17
Weights and Oil Capacity

	Recloser Type							
	H	4H, V4H	6H, V6H	L	V4L	E	4E	V4E
Weight; dry (lb)	55	76	236	106	142	107	142	147
Weight, with oil (lb)..	85	114	394	159	205	169	205	210
Oil capacity (gal).....	4	5	21	7	9½	8¼	9½	9½

RECLOSER DIMENSIONS



Note: All dimensions are mm (inches). Dimensions shown are approximate.

Terminal Options	A
Eyebolt, 1/0 - 500 mcm Cable Range (630 A maximum)	80 (3.25)
Eyebolt, 4/0 - 1000 mcm Cable Range (800 A maximum)	108 (4.25)
Flat Pad, 2-hole (630 A maximum)	114 (4.5)
Flat Pad, 4-hole (800 A maximum)	121 (4.75)
Stud Type, 1.125 - 12 threads (800 A maximum)	82 (3.25)

	B	C
NOVA STS 15 110 kV BIL	1008 (39.75)	733 (29)
NOVA STS 15 125 kV BIL	1064 (42)	789 (31)
NOVA STS 27 125 kV BIL	1064 (42)	789 (31)
NOVA STS 27 150 kV BIL	1163 (45.75)	888 (35)
NOVA STS 38 170 kV BIL	1163 (45.75)	888 (35)

Creepage Distances

Description	15 kV 110 kV BIL	15 kV 125 kV BIL	27 kV 125 kV BIL	27 kV 150 kV BIL	38 kV 170 kV BIL
Terminal to terminal	1052 (41.5)	1052 (41.5)	1052 (41.5)	1052 (41.5)	1052 (41.5)
Lower terminal to ground/earth	673 (26.5)	772 (30.5)	772 (30.5)	950 (37.5)	950 (37.5)

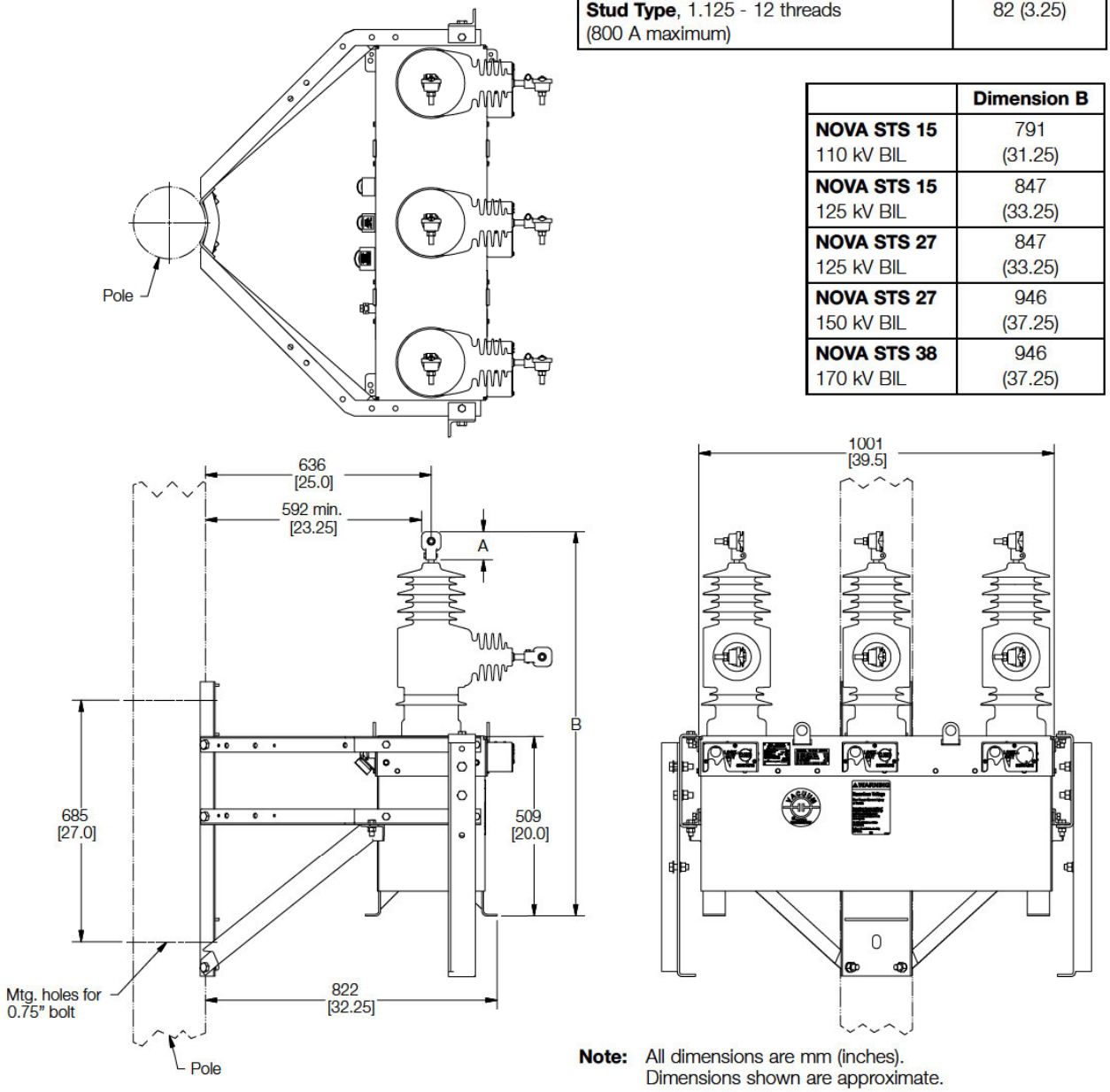
Figure 2.
Type NOVA STS recloser dimensions, NOVA STS 15 shown.

Site-Ready Pole-Mounting Hanger

A pre-assembled site-ready pole-mounting hanger, which bolts directly to the recloser frame, is available for pole-mounting installation. Refer to Figure 13.

Terminal Options	A
Eyebolt, 1/0 - 500 mcm Cable Range (630 A maximum)	80 (3.25)
Eyebolt, 4/0 - 1000 mcm Cable Range (800 A maximum)	108 (4.25)
Flat Pad, 2-hole (630 A maximum)	114 (4.5)
Flat Pad, 4-hole (800 A maximum)	121 (4.75)
Stud Type, 1.125 - 12 threads (800 A maximum)	82 (3.25)

	Dimension B
NOVA STS 15 110 kV BIL	791 (31.25)
NOVA STS 15 125 kV BIL	847 (33.25)
NOVA STS 27 125 kV BIL	847 (33.25)
NOVA STS 27 150 kV BIL	946 (37.25)
NOVA STS 38 170 kV BIL	946 (37.25)



Note: All dimensions are mm (inches).
Dimensions shown are approximate.

Figure 13.
Dimensions of NOVA STS recloser with site-ready pole mounting hanger accessory.

Arrester-Mounting Brackets

The arrester-mounting bracket accessory can be bolted to the recloser frame and pole-mounting hanger for the addition of inboard and outboard arresters. The arresters are not included with the brackets. Refer to Figure 14.

Note: All dimensions are mm (inches). Dimensions shown are approximate.

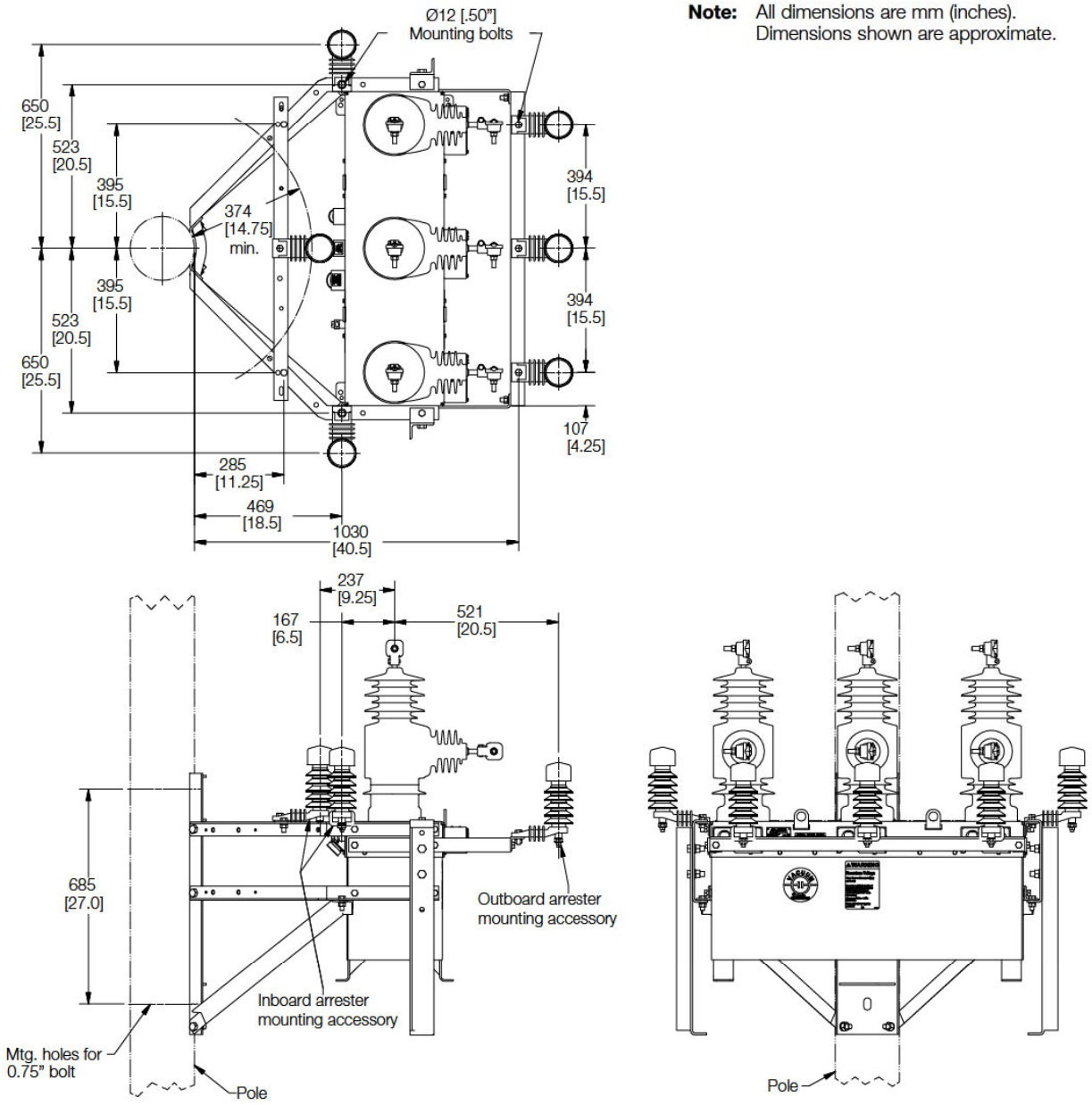


Figure 14.
Dimensions of NOVA STS recloser with site-ready pole-mounting hanger and arrester-mounting bracket accessories.

RATINGS AND SPECIFICATIONS

TABLE 1
Voltage Ratings (kV)

Description	15 kV	15 kV	27 kV	27 kV	38 kV
Maximum Voltage	15.5 kV	15.5 kV	29.2 kV	29.2 kV	38.0 kV
Rated Basic Impulse Level	110.0 kV	125.0 kV	125.0 kV	150.0 kV	170.0 kV
Radio Noise Limit (μV)	100 @ 9.4 kV	100 @ 9.4 kV	100 @ 16.4 kV	100 @ 16.4 kV	100 @ 23.0 kV
Power Frequency Withstand, Dry	50 kV	50 kV	60 kV	60 kV	70 kV
Power Frequency Withstand, Wet	45 kV	45 kV	50 kV	50 kV	60 kV

TABLE 2
Current Ratings (Amperes)

Description	15 kV	15 kV	27 kV	27 kV	38 kV
Rated Continuous Current	630 A*	630 A*	630 A*	630 A*	630 A*
Short Circuit Current, Symmetrical	12.5 kA**	12.5 kA**	12.5 kA**	12.5 kA**	12.5 kA
Making Current, Asymmetrical Peak	31.0 kA	31.0 kA	31.0 kA	31.0 kA	31.0 kA
Cable Charging Current	10 A	10 A	25 A	25 A	40A

*800 amp accessory is also available.
**16.0 kA option is also available. (Making Current is 40.0 kA Asymmetrical Peak.)

TABLE 3
Mechanical Ratings

Description	15 kV	15 kV	27 kV	27 kV	38 kV
Min. Mechanical/Electrical Operations Without Maintenance (C-O)	10,000	10,000	10,000	10,000	10,000
Mass (Weight) - kg (lbs)	86 (190)	91 (200)	91 (200)	101 (223)	101 (223)

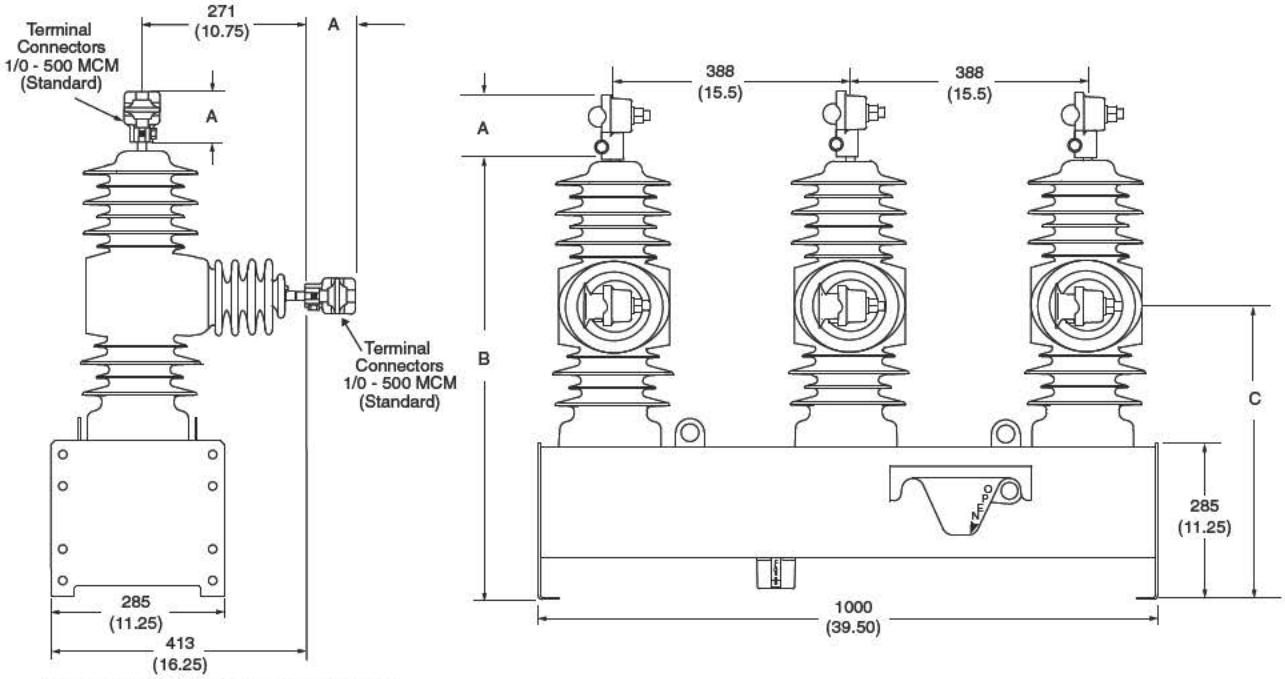
TABLE 4
Duty Cycle

Type	Percentage of Interrupting Rating	Number of Unit Operations	Minimum Circuit X/R Value
NOVA	15-20	88	4
	45-55	112	8
	90-100	32	15
		Total 232	

TABLE 5
Auxiliary Switch Interrupting Ratings

Volts	Inductive AC (amps)	Non-Inductive AC (amps)	Inductive DC (amps)	Non-Inductive DC (amps)
24	–	–	15.0	20.0
48	–	–	7.5	10.0
120	60	80	–	–
125	–	–	1.5	2.0
240	30	60	–	–
250	–	–	0.45	0.5

DIMENSIONS



Note: All dimensions are mm (inches).
Dimensions shown are approximate.

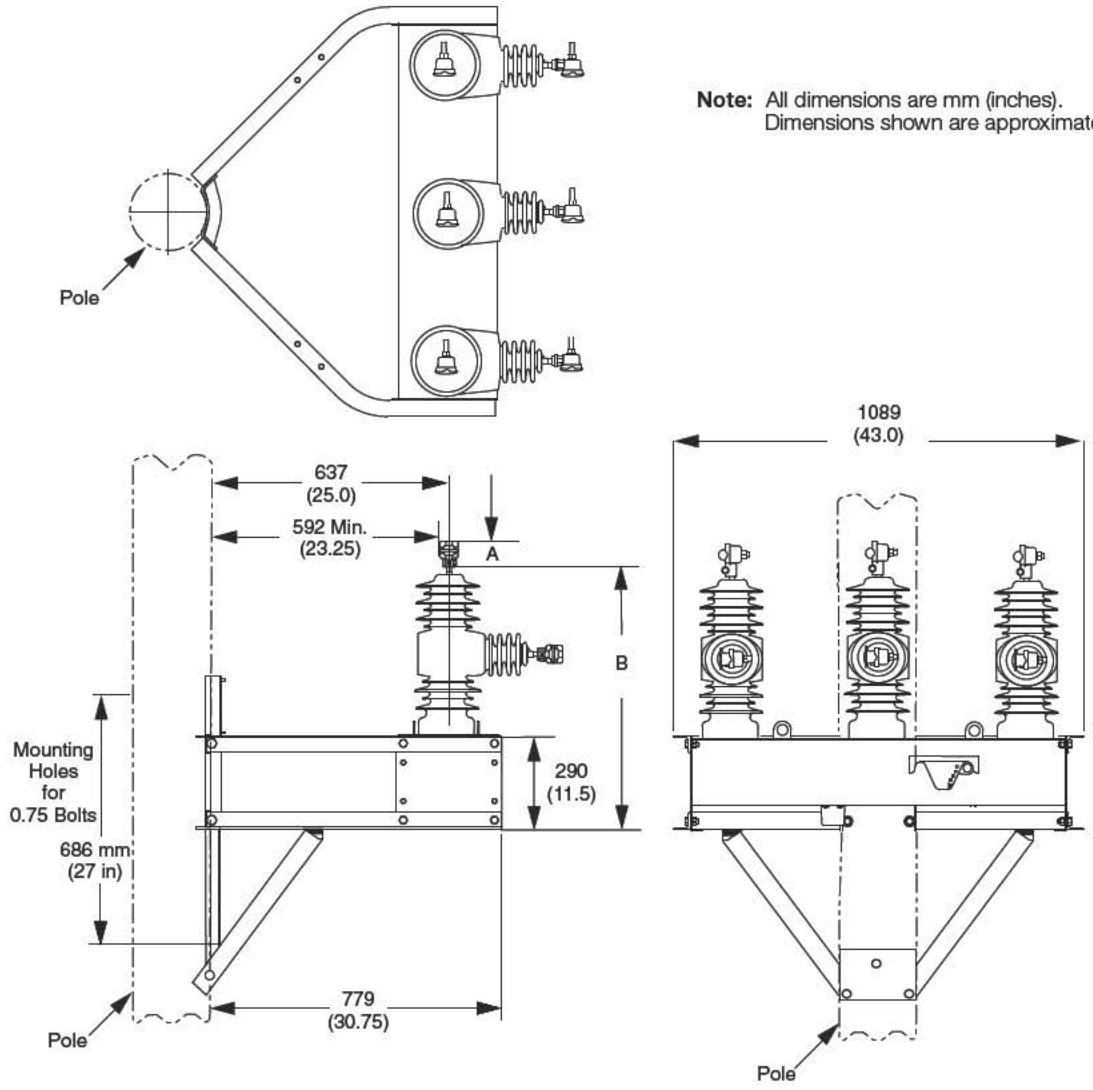
Terminal Options	A
Eyebolt, 1/0 - 500 mcm Cable Range (630 A maximum)	80 (3.25)
Eyebolt, 4/0 - 1000 mcm Cable Range (800 A maximum)	108 (4.25)
Flat Pad, 2-hole (630 A maximum)	114 (4.5)
Flat Pad, 4-hole (800 A maximum)	121 (4.75)
Stud Type, 1.125 - 12 threads (800 A maximum)	82 (3.25)

	B	C
NOVA15 110 kV BIL	791 (31.25)	508 (20)
NOVA15 125 kV BIL	847 (33.25)	564 (22.25)
NOVA27 125 kV BIL	847 (33.25)	564 (22.25)
NOVA27 150 kV BIL	946 (37.25)	663 (26.0)
NOVA38 170 kV BIL	946 (37.25)	663 (26.0)

Creepage Distances

Description	15 kV 110 kV BIL	15 kV 125 kV BIL	27 kV 125 kV BIL	27 kV 150 kV BIL	38 kV 170 kV BIL
Terminal to terminal	1052 (41.5)	1052 (41.5)	1052 (41.5)	1052 (41.5)	1052 (41.5)
Lower terminal to ground/earth	673 (26.5)	772 (30.5)	772 (30.5)	950 (37.5)	950 (37.5)

Figure 7.
Type NOVA recloser dimensions, NOVA27 shown.

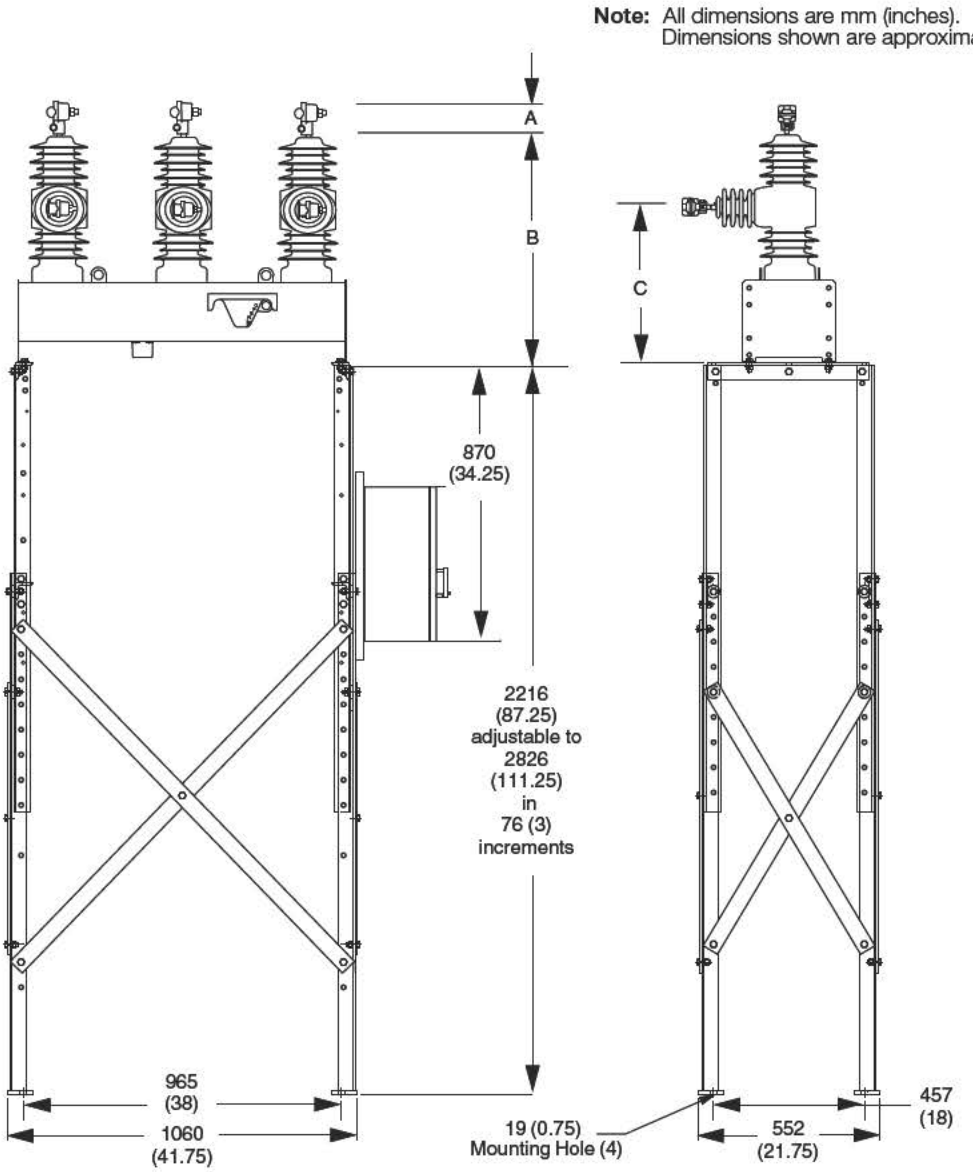


Note: All dimensions are mm (inches). Dimensions shown are approximate.

Terminal Options	A
Eyebolt, 1/0 - 500 mcm Cable Range (630 A maximum)	80 (3.25)
Eyebolt, 4/0 - 1000 mcm Cable Range (800 A maximum)	108 (4.25)
Flat Pad, 2-hole (630 A maximum)	114 (4.5)
Flat Pad, 4-hole (800 A maximum)	121 (4.75)
Stud Type, 1.125 - 12 threads (800 A maximum)	82 (3.25)

	Dimension B
NOVA15 110 kV BIL	791 (31.25)
NOVA15 125 kV BIL	847 (33.25)
NOVA27 125 kV BIL	847 (33.25)
NOVA27 150 kV BIL	946 (37.25)
NOVA38 170 kV BIL	946 (37.25)

Figure 8.
Dimensions of Type NOVA recloser with pole-mounting hanger and arrester-mounting bracket accessories.



Terminal Options	A
Eyebolt, 1/0 - 500 mcm Cable Range (630 A maximum)	80 (3.25)
Eyebolt, 4/0 - 1000 mcm Cable Range (800 A maximum)	108 (4.25)
Flat Pad, 2-hole (630 A maximum)	114 (4.5)
Flat Pad, 4-hole (800 A maximum)	121 (4.75)
Stud Type, 1.125 - 12 threads (800 A maximum)	82 (3.25)

	B	C
NOVA15 110 kV BIL	791 (31.25)	508 (20)
NOVA15 125 kV BIL	847 (33.25)	564 (22.25)
NOVA27 125 kV BIL	847 (33.25)	564 (22.25)
NOVA27 150 kV BIL	946 (37.25)	663 (26.0)
NOVA38 170 kV BIL	946 (37.25)	663 (26.0)

Figure 9.
Dimensions of Type NOVA recloser with substation-mounting frame accessory.

RATINGS AND SPECIFICATIONS

Check Recloser Ratings Prior to Installation

The recloser must be applied within its specified ratings. Check data plate ratings and compare with the system characteristics at the point of application prior to installation. Tables 1–5 list the ratings and specifications for the Type NOVA-TS triple-single recloser.

TABLE 1
Voltage and Current Ratings

Rating	15-8-400	15-12-630	15-12-800	27-8-400	27-12-630	27-12-800	38-8-400	38-12-630	38-12-800
Maximum Design Voltage (kV)	15.5	15.5	15.5	29.2	29.2	29.2	38.0	38.0	38.0
Nominal Operating Voltage (kV)	14.4	14.4	14.4	24.9	24.9	24.9	34.5	34.5	34.5
Basic Insulation Level (BIL) (kV)	110	110	110	125	125	125	150	150	150
60 Hertz Withstand Voltage (kV)									
Dry, one minute	50	50	50	60	60	60	70	70	70
Wet, ten seconds	45	45	45	50	50	50	60	60	60
Max RIV at 1.0 MHz									
9.4 kV (µV)	100	100	100						
16.4 kV (µV)				100	100	100			
23.0 kV (µV)							100	100	100
Continuous Current Ratings (A)	400	630	800	400	630	800	400	630	800
Sym. Interrupting Current (A)	8,000	12,500	12,500	8,000	12,500	12,500	8,000	12,500	12,500
Overload Capability									
125% - 8 Hours (A)	500	788	None	500	788	None	500	788	None
150% - 4 Hours (A)	600	945	-	600	945	-	600	945	-
Cable Charging Current (A)	10	10	10	25	25	25	40	40	40
Line Charging Current (A)	2	2	2	5	5	5	5	5	5
Three-Second Current, Sym. (A)	8,000	12,500	12,500	8,000	12,500	12,500	8,000	12,500	12,500

TABLE 2
Mechanical Life

Minimum Operations	2,500

TABLE 3
Duty Cycle

Percent of Maximum Circuit Interrupting Rating	Minimum X/R Ratio	Number of Unit Operations
15-20	4	88
45-55	8	112
90-100	16	32
		Total 232

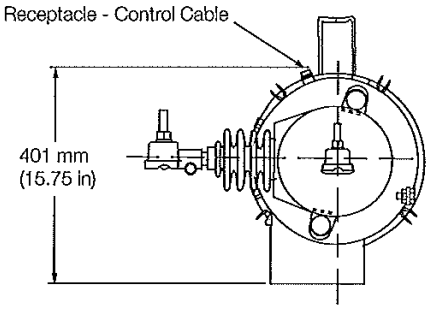
TABLE 4
Mass (Weight) per Mounted Triple-Single Cluster with Pole-Mounting Hanger

Recloser	NOVA-TS-15	NOVA-TS-27	NOVA-TS-38
kg (lbs)	188 (413)	194 (428)	208 (458)

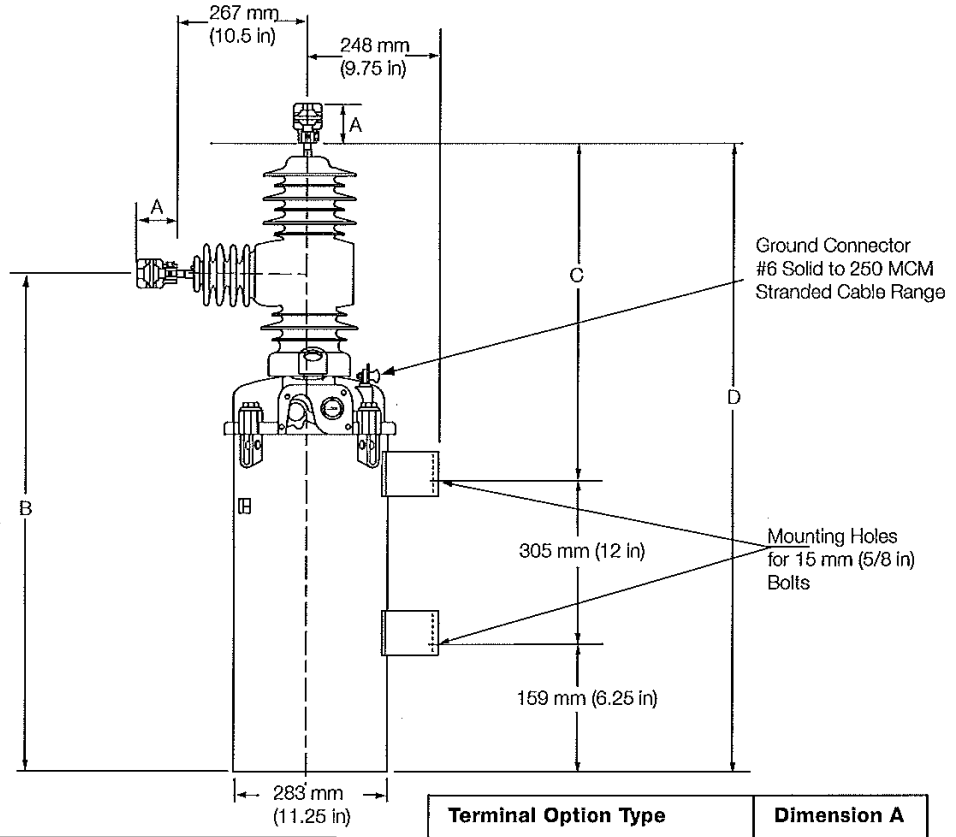
TABLE 5
Mass (Weight) per Single-Phase Recloser

Recloser	NOVA-TS-15	NOVA-TS-27	NOVA-TS-38
kg (lbs)	48 (105)	50 (110)	55 (120)

RECLOSER DIMENSIONS



Creepage Distances			
Description	NOVA-TS-15	NOVA-TS-27	NOVA-TS-38
Terminal to Terminal	1052 mm 41.5 in	1052 mm 41.5 in	1052 mm 41.5 in
Lower Terminal to Ground	673 mm 26.5 in	772 mm 30.5 in	950 mm 37.5 in

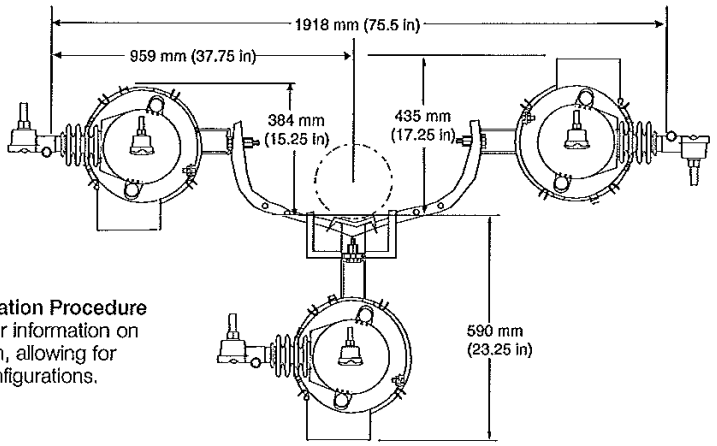


NOVA-TS Dimensions			
	B	C	D
NOVA-TS-15	878 mm 34.5 in	693 mm 27.5 in	1157 mm 45.5 in
NOVA-TS-27	933 mm 36.75 in	749 mm 29.5 in	1213 mm 47.75 in
NOVA-TS-38	1033 mm 40.5 in	848 mm 33.5 in	1312 mm 51.5 in

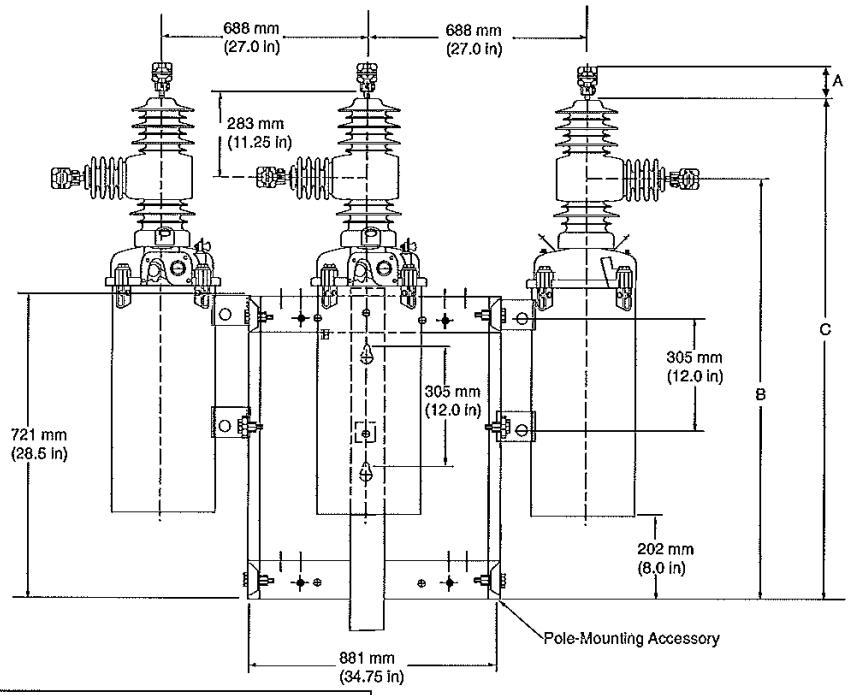
Terminal Option Type	Dimension A
Eyebolt - (630 A) 1/0 to 500 MCM Cable Range	80 mm/3.25 in
Eyebolt - (800 A) 4/0 to 1000 MCM Cable Range	108 mm/4.25 in
Flat Pad - 2 Hole (630 A max)	114 mm/4.5 in
Flat Pad - 4 Hole (800 A max)	121 mm/4.75 in
Stud Type - (800 A max) 1.125 - 12 threads	82 mm/3.25 in

Figure 2.
Kyle Type NOVA-TS triple-single recloser dimensions.

DIMENSIONS WITH POLE-MOUNTING ACCESSORY



Note: See the **Installation Procedure** and Figure 5 for information on module rotation, allowing for various line configurations.



NOVA-TS Dimensions with Pole-Mounting Accessory		
	Dimension B	Dimension C
NOVA-TS-15	1079 mm (42.5 in)	1361 mm (53.5 in)
NOVA-TS-27	1140 mm (45.0 in)	1422 mm (56.0 in)
NOVA-TS-38	1235 mm (48.5 in)	1514 mm (59.5 in)

Terminal Option Type	Dimension A
Eyebolt - (630 A) 1/0 to 500 MCM Cable Range	80 mm/3.25 in
Eyebolt - (800 A) 4/0 to 1000 MCM Cable Range	108 mm/4.25 in
Flat Pad - 2 Hole (630 A max)	114 mm/4.5 in
Flat Pad - 4 Hole (800 A max)	121 mm/4.75 in
Stud Type - (800 A max) 1.125 - 12 threads	82 mm/3.25 in

Figure 3.
Kyle Type NOVA-TS triple-single recloser dimensions with pole-mounting accessory.

Product Review

OVR-3 and OVR-3SP Technical Data

Nom. operating voltage:	2.4 14.4	24.9	34.5	kV
Rated Max. voltage:	15.5	27	38	kV
Rated power frequency	50/60	50/60	50/60	Hz
Rated continuous current:	630/800/1000/1200*	630/800/1000/1200*	630/800/1200	A
Rated symmetrical interrupting current:	8/10/12.5/16*	10/12.5/16*	12.5/16	kA
Rated lightning impulse withstand (BIL):	110/125	125/150*	150/170	kV
Dry withstand 60 Hz 1 Min.:	50	60	70	kV
Wet withstand 60 Hz 10 Sec.:	45	50	60	kV
Phase spacing:	15.50 (394)	15.50 (394)	15.50 (394)	inches (mm)
External creep distance, H2 ground:	38.00 (960)	38.00 (960)	50.70 (1288)	inches (mm)
External creep distance, H1 H2:	45.00 (1160)	45.00 (1160)	49.80 (1260)	inches (mm)
Min. external strike distance:	9.50 (240)	9.50 (240)	14.40 (367)	inches (mm)
Max. interrupting time:	0.030	0.030	0.030	sec max
Max. closing time:	0.055	0.055	0.044	sec max
Materials: Vacuum interrupter encapsulated in hydrophobic cycloaliphatic epoxy with cast aluminum/stainless steel construction				
Current sensors:	One per phase encapsulated into the pole			
Operating temperature:	40° C to +70° C (40° F to +158° F)			
Control voltage:	90 265 VAC / 125 VDC			
OVR 3 high voltage unit weight:	333 (150)	333 (150)	430 (195)	lbs (kg)
OVR 3SP high voltage unit weight (each):	100 (45)	100 (45)	130 (60)	lbs (kg)
Standard control cabinet weight:	165 (75)	165 (75)	175 (80)	lbs (kg)

Battery (contact factory for other options)

- 48 VDC, 12 AH battery bank (Std. Cabinet) or 48 VDC, 7.2 AH battery bank (LPCC)
- Sealed lead acid rechargeable battery pack
- Monitor locally and remotely
- Easily accessible in low voltage control cabinet
- Allows up to 48 hours (15 27 kV) / 24 hours (38 kV or with LPCC) carryover and multiple operations upon loss of power
- Includes capacitor backup in case of discharged or disconnected battery

Summary Specifications

Accuracy:	±5% accuracy (with voltage sensing), contact factory for accuracy down to ±1% Voltage: ±1% accuracy (with PT voltage input) Current: ±1% accuracy

Load profile data (requires voltage input): kWh and kVARh (±2% accuracy) (with PT voltage input); Power Factor; Demand Watts and VARs; Frequency

OVR Testing

ANSI: Meets all applicable recloser standards (ANSI 37.60 2003, IEEE, and IEC)

Life test: 10,000 mechanical operations without degradation

PCD Testing

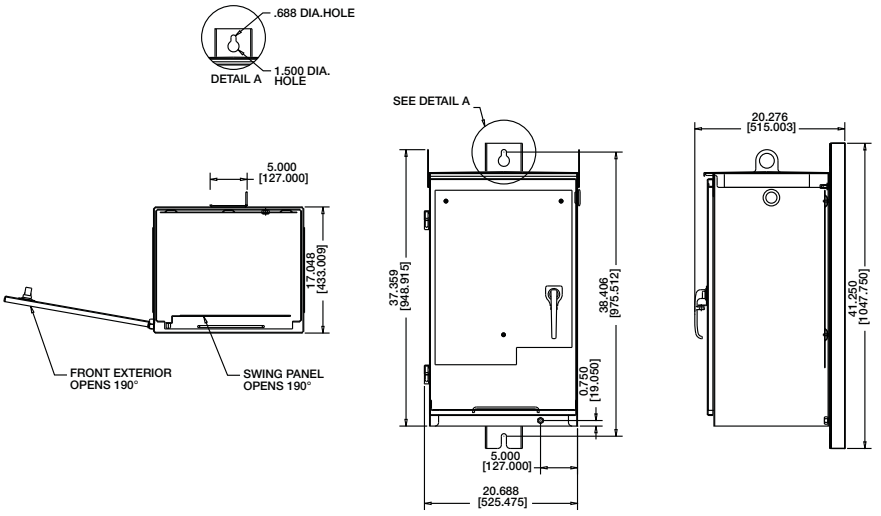
- Surge Withstand Capability: SWC and fast transient tests per ANSI C37.90.1 and IEC 255 22 1 class III and 255 22 4 class IV for all connections except comm ports
- Isolated comm ports per ANSI 37.90.1 using oscillatory SWC Test Wave only, & per IEC 255 22 1 class III
- EMI test per ANSI C37.90.2

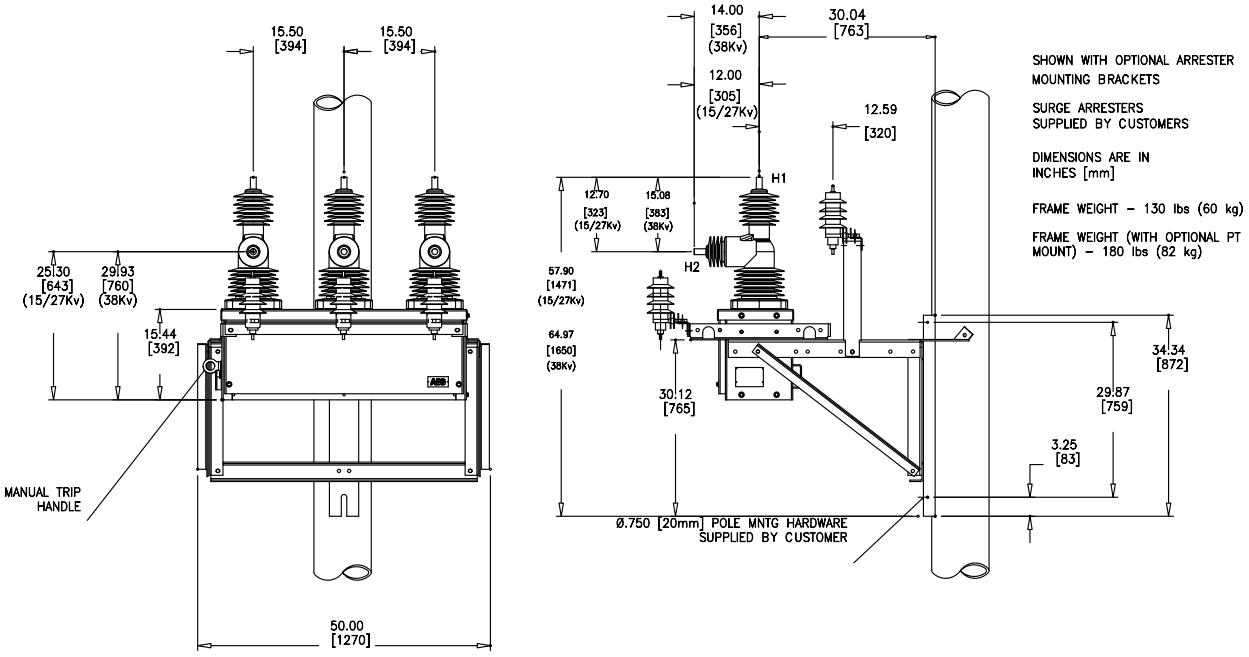
* Refer to 38 kV specifications for OVRs with 1200 A continuous current rating, 16 kA interrupting rating or BILs of 150 kV or greater.

Product Review

OVR-3 Dimensional Drawings

Pole Mount

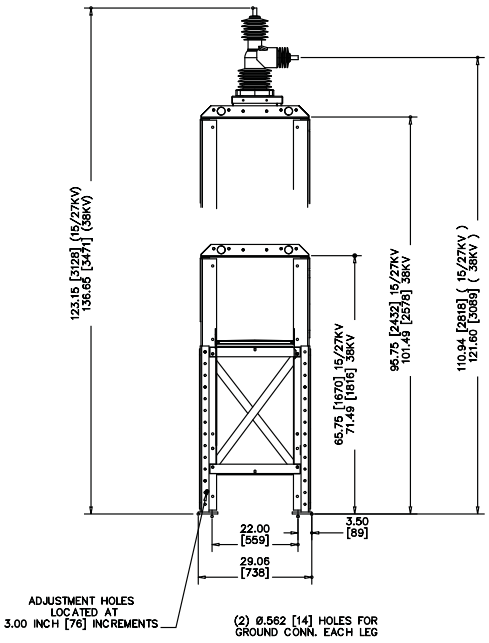


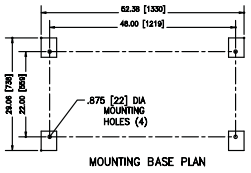


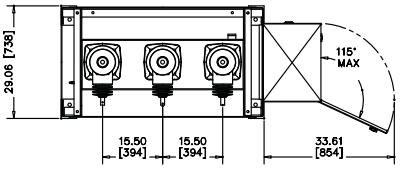
Product Review

OVR-3 Dimensional Drawings

Substation Mount



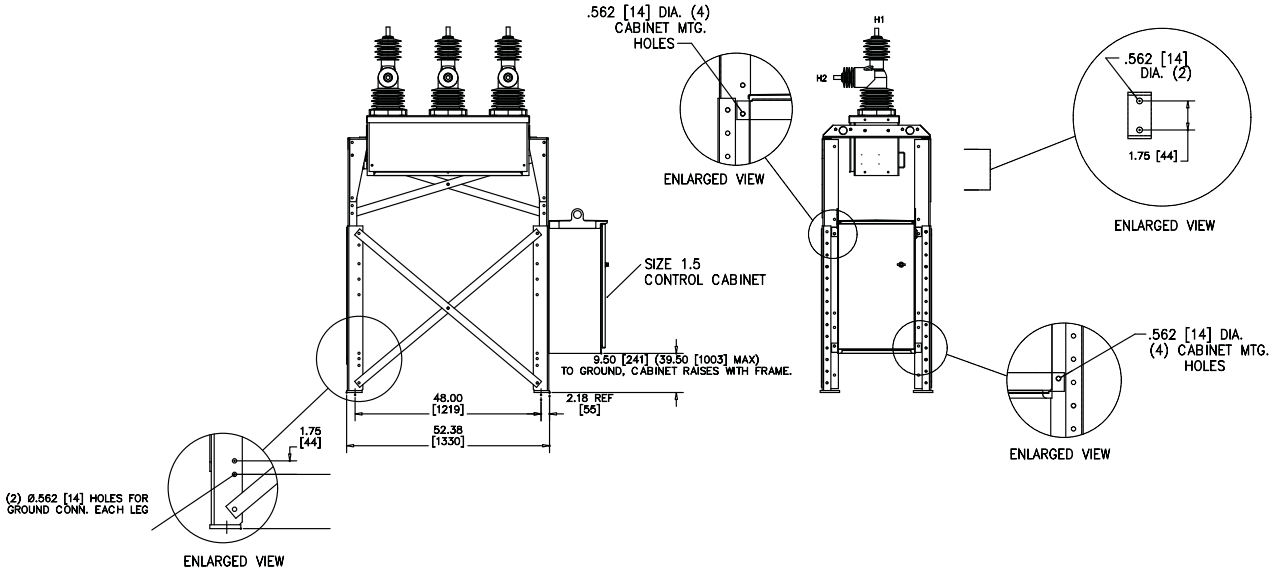




AVAILABLE WITH OPTIONAL ARRESTER MOUNTING BRACKETS

DIMENSIONS ARE IN INCHES [mm]

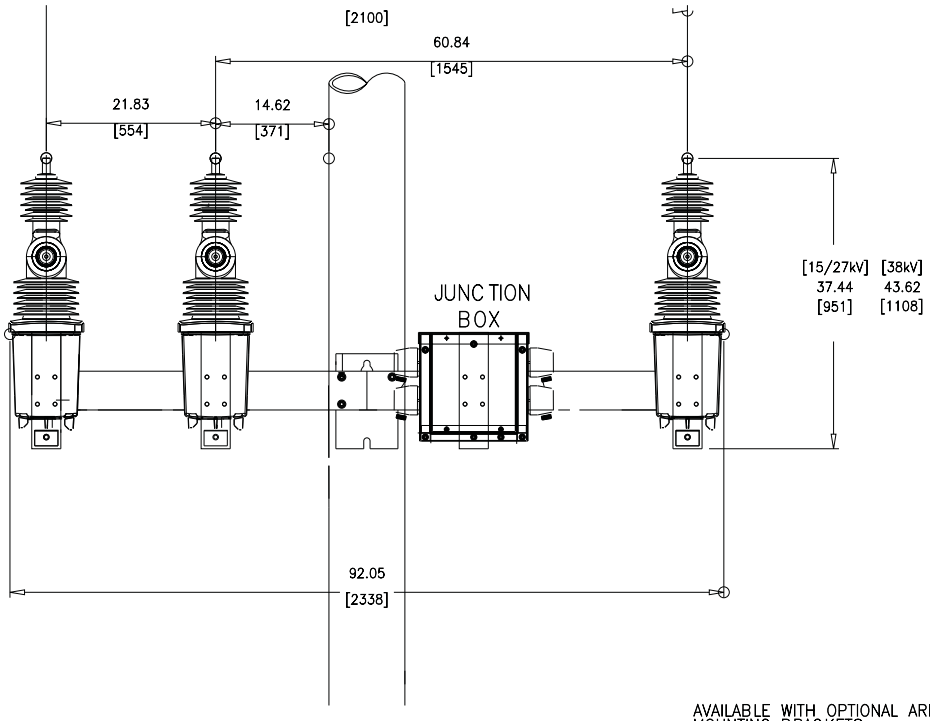
FRAME WEIGHT – 225 lbs (100 kg)



Product Review

OVR-3SP Dimensional Drawings

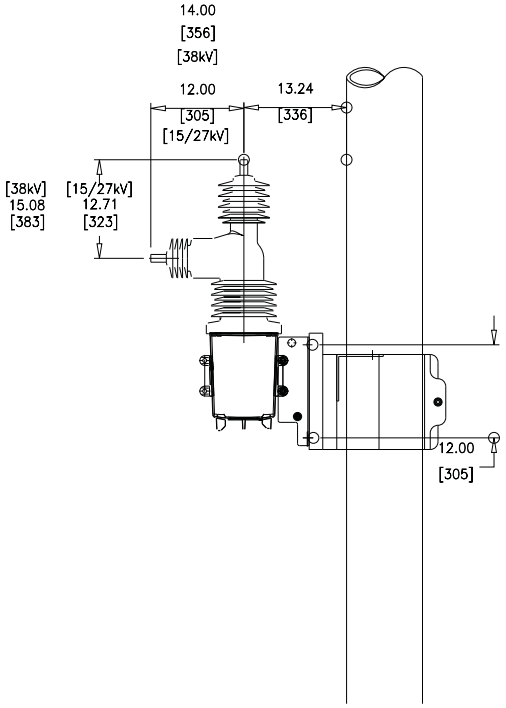
Cross Arm Mount (15 38 kV)



AVAILABLE WITH OPTIONAL ARRESTER MOUNTING BRACKETS

DIMENSIONS ARE IN INCHES [mm]

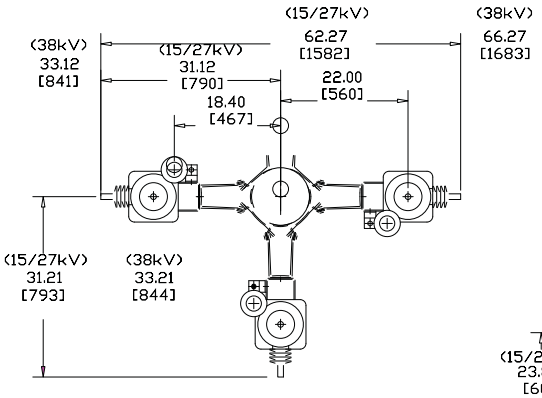
FRAME WEIGHT (WITH JUNCTION BOX) – 65 lbs (30 kg)

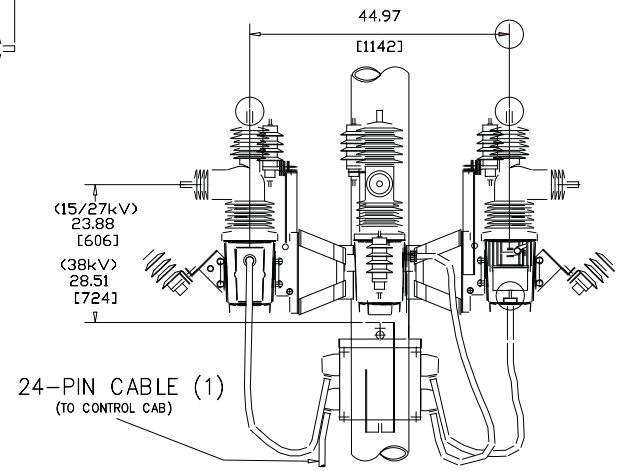


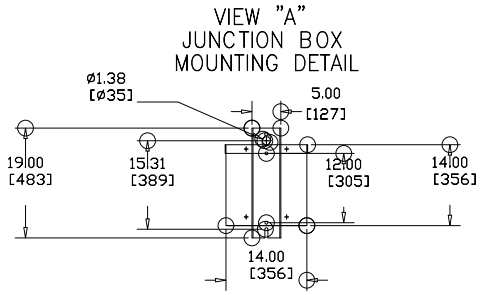
Product Review

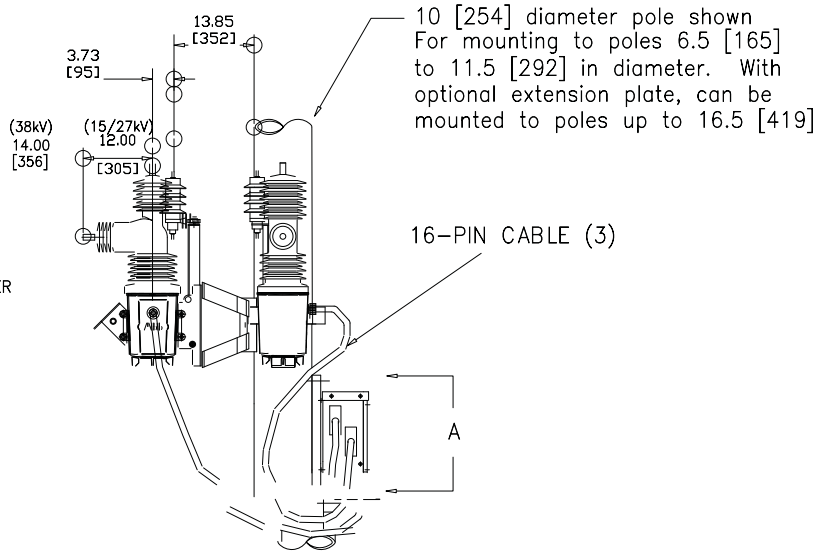
OVR-3SP Dimensional Drawings

Wrap Around Mount (15 38 kV)









SHOWN WITH OPTIONAL ARRESTER MOUNTING BRACKETS

SURGE ARRESTERS SUPPLIED BY CUSTOMERS

DIMENSIONS ARE IN INCHES [mm]

FRAME WEIGHT (WITH JUNCTION BOX) – 30 lbs (14 kg)

DIMENSIONS AND WEIGHTS

TABLE 19
Dimensions of Recloser Without BCT Accessory*

Type	Bushing Type	A (In.)	B (In.)	C (In.)	D (In.)
WE VWE	13 in. standard creepage or 17 in. extra creepage	41 5/8 43 7/8	11 1/8 11 1/8	26 5/8 28 7/8	15 15
WVE27 VWVE27	26 1/2 in. creepage 26 1/2 in. creepage	47 3/4 50	11 3/4 11 3/4	26 5/8 28 7/8	21 1/8 21 1/8

*Dimensions configured to the nearest 1/8 in.

TABLE 20
Dimensions of Recloser With BCT Accessory*

Type	Bushing Type	A (In.)	B (In.)	C (In.)	D (In.)
WE VWE	13 in. standard creepage or 17 in. extra creepage	46 3/8 48 5/8	11 7/8 11 7/8	26 5/8 28 7/8	19 3/4 19 3/4
WVE27 VWVE27	26 1/2 in. creepage 26 1/2 in. creepage	52 1/2 54 3/4	12 5/8 12 5/8	26 5/8 28 7/8	25 7/8 25 7/8

*Dimensions configured to the nearest 1/8 in.

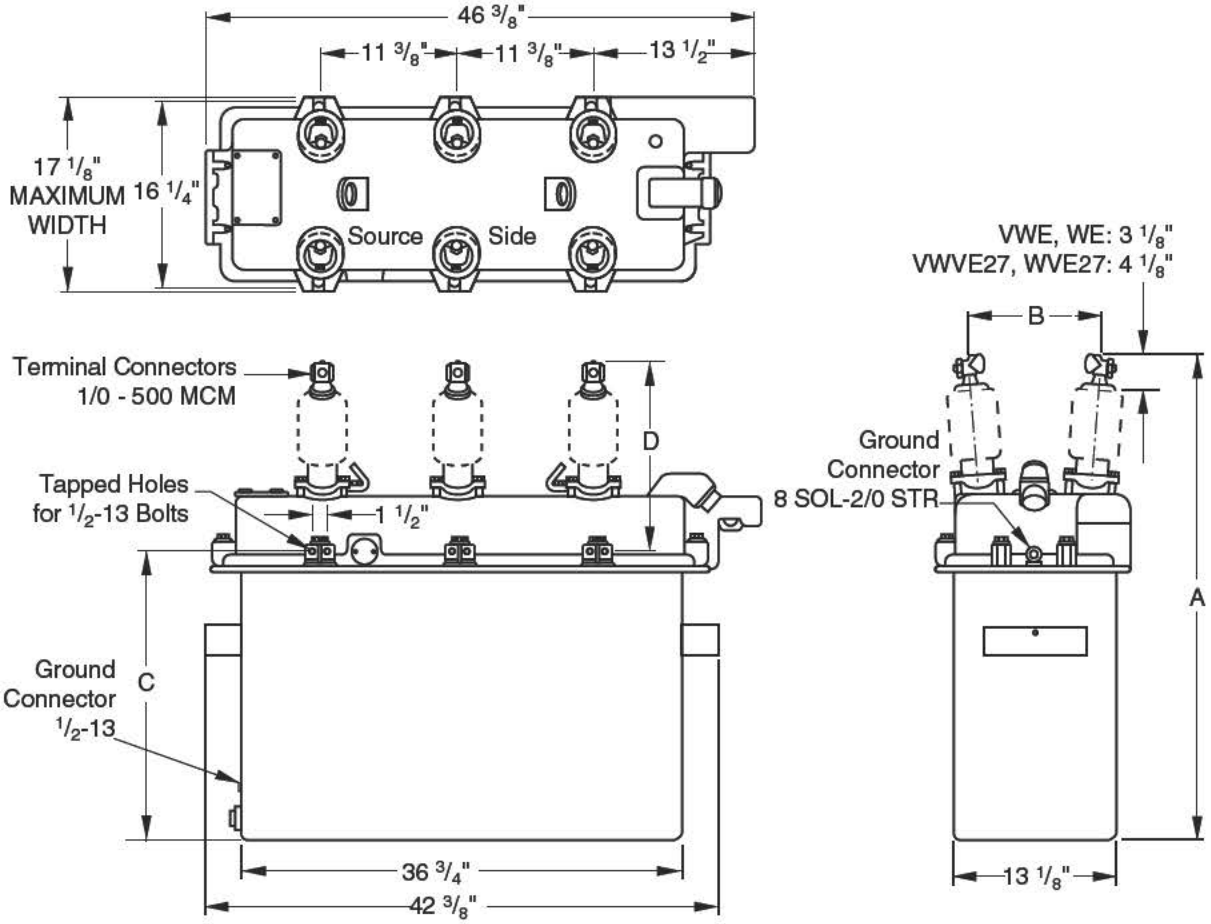


Figure 11.
Dimensions of W-group 15 kV and 27 kV three-phase electronically controlled reclosers.

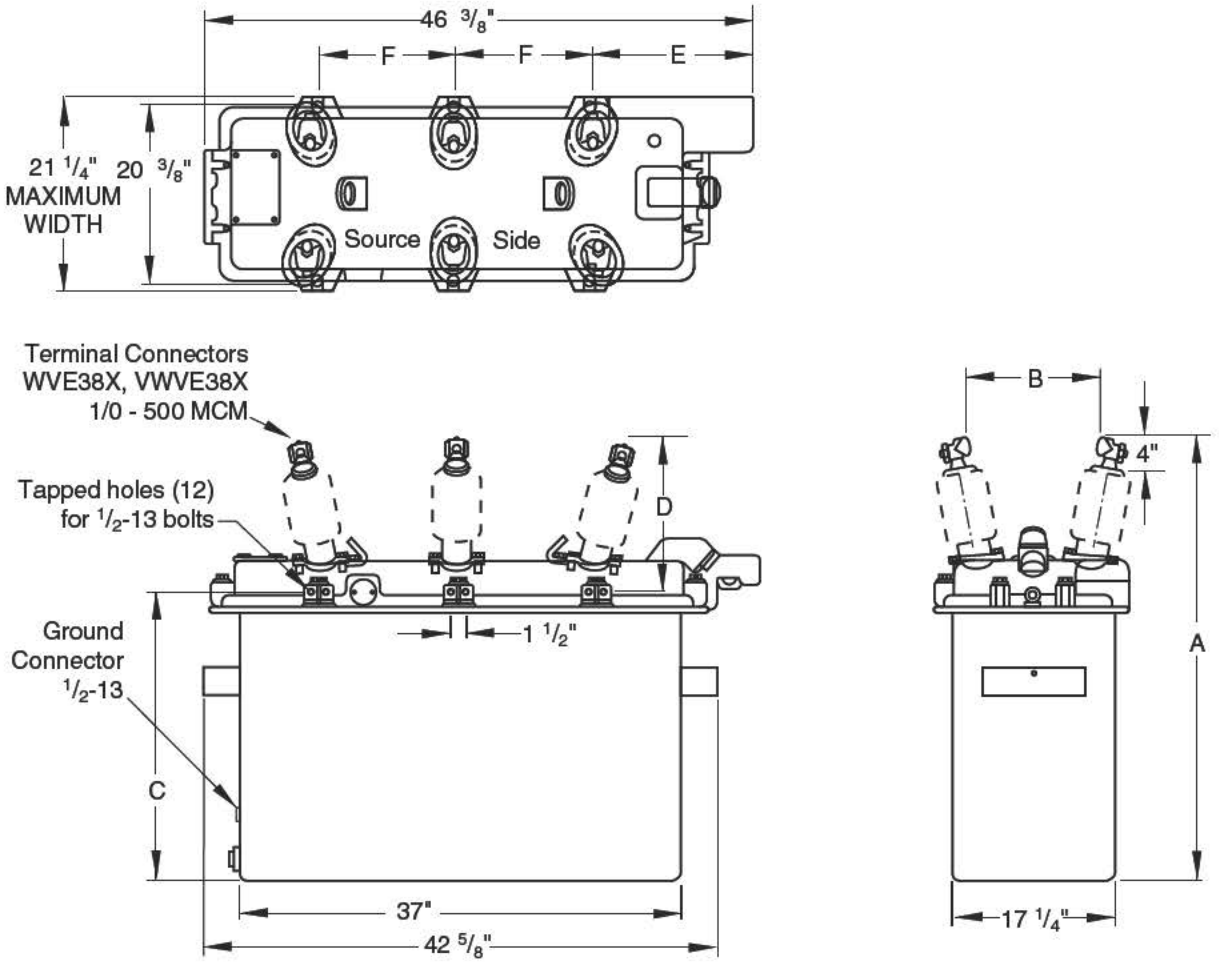


Figure 12.
Dimensions of W-group 38 kV three-phase electronically controlled reclosers.

TABLE 21
Weights and Oil Capacity

Recloser Type	Weight with Oil*(lb)	Oil Capacity (gal)
WE	790	38
WVE27	840	38
WVE38X	990	52
VWE	790	45
VWVE27	830	45
VWVE38X	990	61

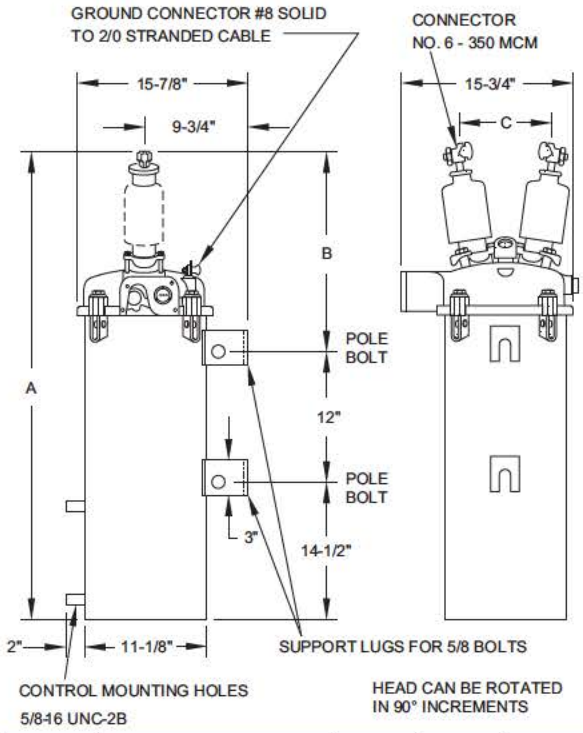
* Add 25 lbs. for each bushing current transformer.

TABLE 22
Dimensions of W-group 38 kV Recloser With and Without BCT Accessory*

Type	Bushing Type	A (In.)	B (In.)	C (In.)	D (In.)	E (In.)	F (In.)
WVE38X	26 1/2 in. creepage	47 1/8	15	26 5/8	20 1/2	10	15 1/8
VWVE38X	26 1/2 in. creepage	49 3/8	15	28 7/8	20 1/2	10	15 1/8
WVE38X	26 1/2 in. w/ BCT	51 3/4	15 7/8	26 5/8	25 1/8	9 1/2	15 5/8
VWVE38X	26 1/2 in. w/ BCT	54	15 7/8	28 7/8	25 1/8	9 1/2	15 5/8

*Dimensions configured to the nearest 1/8 in.

Recloser Dimensions



Type	Bushing Type	A (In.)	B (In.)	C (In.)
VXE15	11⅝ std.	45½	19	10⅝
VXE15	17 in. extra creepage	48 1/16	22 3/16	11⅛
VXE27	17 in. std.	48 1/16	22 3/16	11⅛
VXE27	26½ in. extra creepage	48 1/16	22 3/16	11⅛

Control Mounting Dimensions

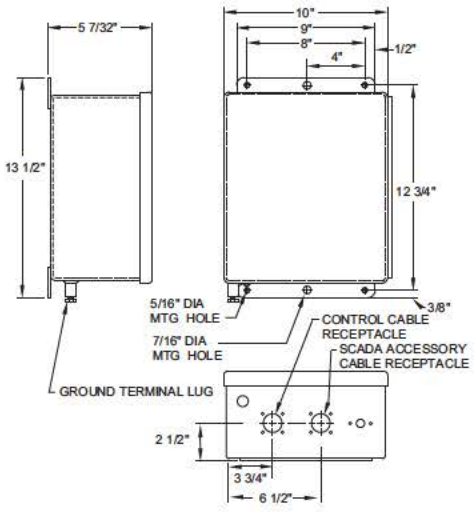


Table 5
Weights and Oil Capacity of VXE15 and VXE27

Weight, without oil (lb)	149
Weight, with oil (lb)	198
Oil capacity (gal)	9½

ORDERING INFORMATION

Constructing a Catalog Number

To order a Type VXE recloser:

1. Use the chart below and Table 10 to construct a catalog number that describes the required recloser.
2. Specify the control plug-ins and control cable from Tables 6 and 7.
3. Specify, by catalog number and description, the required recloser and control accessories from Tables 8 and 9.

KVXE Basic letters for VXE-group reclosers.

15 Recloser maximum operating voltage.
15 for 15 kV or
27 for 27 kV

23 Closing coil code number selected from Table 10 for the system on which the recloser is to be used.

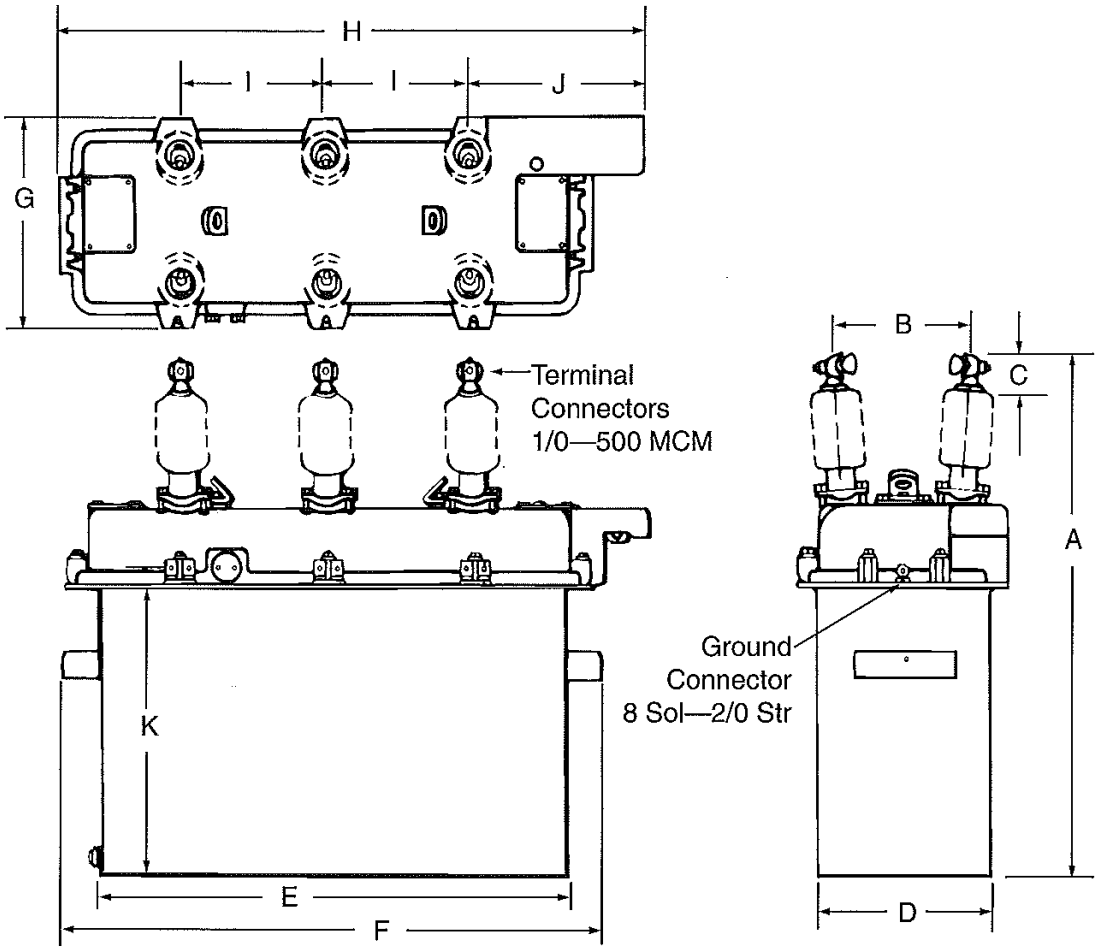
KVXE 15 23

KVXE1523 is the catalog number that represents a Type VXE15 recloser rated for use on a 12.47 kV system, with a 7.2 - 7.62 kV closing coil.

Table 6
Basic VXE Electronic Recloser Control and Plug-In TCC Cards

Description	Catalog Number
VXE Electronic Control	KVXE2
Phase trip Timing Characteristics *Select phase trip curve A, B, C, D, E, F, N or R.*	
Phase Trip timing plug-in card __ for TCC 1	KSEC101_-1
Phase Trip timing plug-in card __ for TCC 2	KSEC101_-2

DIMENSIONS AND WEIGHTS



Note: For dimensions of reclosers with mountings, see *Service Information S 280-85-2 Recloser Mountings.*

Figure 25.
Dimensions of W-group reclosers.

TABLE 15
Overall Dimensions mm (in)

Recloser Type	Without bushing current transformer accessory	Dim A	Dim B	Dim C	Dim D	Dim E	Dim F	Dim G	Dim H	Dim I*	Dim J	Dim K
W	Standard 13 in. creepage or 17-in. extra-creepage bushings	1057 41 5/8	283 11 1/8	79 3 1/8	333 13 1/8	933 36 3/4	1076 42 3/8	435 17 1/8	1172 46 1/8	289 11 3/8	343 13 1/2	676 26 5/8
VW		1114 43 7/8	283 11 1/8	79 3 1/8	333 13 1/8	933 36 3/4	1076 42 3/8	435 17 1/8	1172 46 1/8	289 11 3/8	343 13 1/2	733 28 7/8
WV27	Standard 26 1/2-in. creepage bushings	1213 47 3/4	302 11 7/8	105 4 1/8	333 13 1/8	933 36 3/4	1076 42 3/8	435 17 1/8	1172 46 1/8	289 11 3/8	343 13 1/2	676 26 5/8
VWV27		1270 50	302 11 7/8	105 4 1/8	333 13 1/8	933 36 3/4	1076 42 3/8	435 17 1/8	1172 46 1/8	289 11 3/8	343 13 1/2	733 28 7/8
WV38X		1197 47 1/8	381 15	105 4 1/8	438 17 1/4	940 37	1083 42 5/8	540 21 1/4	1178 46 3/8	384 15 1/8	254 10	676 26 5/8
VWV38X		1254 49 3/8	381 15	105 4 1/8	438 17 1/4	940 37	1083 42 5/8	540 21 1/4	1178 46 3/8	384 15 1/8	254 10	733 28 7/8
Recloser Type	**With bushing current transformer accessory**	**Dim A**	**Dim B**	**Dim C**	**Dim D**	**Dim E**	**Dim F**	**Dim G**	**Dim H**	**Dim I***	**Dim J**	**Dim K**
W	Standard 13 in. creepage or 17-in. extra-creepage bushings	1178 46 3/8	302 11 7/8	79 3 1/8	333 13 1/8	933 36 3/4	1076 42 3/8	435 17 1/8	1172 46 1/8	289 11 3/8	343 13 1/2	676 26 5/8
VW		1235 48 5/8	302 11 7/8	79 3 1/8	333 13 1/8	933 36 3/4	1076 42 3/8	435 17 1/8	1172 46 1/8	289 11 3/8	343 13 1/2	733 28 7/8
WV27	Standard 26 1/2-in. creepage bushings	1334 52 1/2	321 12 5/8	105 4 1/8	333 13 1/8	933 36 3/4	1076 42 3/8	435 17 1/8	1172 46 1/8	289 11 3/8	343 13 1/2	676 26 5/8
VWV27		1391 54 3/4	321 12 5/8	105 4 1/8	333 13 1/8	933 36 3/4	1076 42 3/8	435 17 1/8	1172 46 1/8	289 11 3/8	343 13 1/2	733 28 7/8
WV38X		1314 51 3/4	403 15 7/8	105 4 1/8	438 17 1/4	940 37	1083 42 5/8	540 21 1/4	1178 46 3/8	397 15 5/8	241 9 1/2	676 26 5/8
VWV38X		1375 54 1/8	403 15 7/8	105 4 1/8	438 17 1/4	940 37	1083 42 5/8	540 21 1/4	1178 46 3/8	397 15 5/8	241 9 1/2	733 28 7/8

* Dim. I is the distance between bushings (centerline-to-centerline.)

TABLE 16
Weights and Oil Capacity

Recloser Type	Weight With Oil* kg (lb)	Oil Capacity L (gal)
W	356 (785)	144 (38)
WV27	359 (790)	156 (41)
WV38X	459 (1012)	201 (53)
VW	384 (845)	156 (41)
VWV27	384 (845)	171 (45)
VWV38X	422 (930)	224 (59)

* Add 11 kg (25 lb) for each bushing current transformer.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Cable Telecommunications Association's
First Request for Information
Dated January 11, 2017

Case No. 2016-00371

Question No. 1-17

Responding Witness: Robert M. Conroy

Q-1-17. Explain the basis for and data related to the proposed requirement of Terms and Conditions of Attachment No. 8(j) to impose a 50 percent surcharge on Attachment Customers that do not adequately make adjustments upon 30 days' notice.

A-1-17. The proposed surcharge is intended to serve as an incentive for Attachment Customers to promptly correct deficient construction and maintenance practices. The Commission has previously authorized the use of such surcharges for such purposes. *See, e.g., The CATV Pole Attachment Tariff of Blue Grass Rural Electric Cooperative*, Administrative Case No. 251-29 (Ky. PSC May 12, 1983); *The CATV Pole Attachment Tariff of Grayson Rural Electric Cooperative*, Administrative Case No. 251-35 (Ky. PSC May 23, 1983); *The CATV Pole Attachment Tariff of Farmers Rural Electric Cooperative*, Administrative Case No. 251-32 (Ky. PSC May 27, 1983); *The CATV Pole Attachment Tariff of Fox Creek Rural Electric Cooperative*, Administrative Case No. 251-34 (Ky. PSC May 27, 1983); 251-35

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Cable Telecommunications Association's
First Request for Information
Dated January 11, 2017

Case No. 2016-00371

Question No. 1-18

Responding Witness: John K. Wolfe

Q-1-18. Explain the basis for and provide any data related to the proposal to require an on- off switch for each and every Wireless Facility installation.

a. Do You intend to apply Your proposal to require an on-off switch to Wi- Fi access points?

A-1-18. LG&E personnel are required to ensure that the antenna is not energized while work on the pole is in progress. A disconnect switch at the pole allows the worker to ensure the antenna has been powered-down prior to commencing work on the pole, without having to rely on the efficacy of remote disconnection.

a. No, LG&E does not intend to require an on-off switch to strand mounted Wi-Fi access points.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Cable Telecommunications Association's
First Request for Information
Dated January 11, 2017

Case No. 2016-00371

Question No. 1-19

Responding Witness: John K. Wolfe

Q-1-19. Explain the basis for and provide all data related to Your proposed requirement that no bundle of cables shall exceed two inches in diameter, including any safety or engineering reports or analyses on which this proposal is based.

A-1-19. The requirement that no bundle of cables shall exceed two inches in diameter is a long-standing LG&E construction standard that has been present in the Cable Television Attachment Charges schedule for many years. As cables grow in diameter, they put additional strain on the utility poles to which they are attached. This is particularly problematic when considering ice and wind loading, as larger cables gather significantly more ice and are more heavily affected by wind than smaller cables.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Cable Telecommunications Association's
First Request for Information
Dated January 11, 2017

Case No. 2016-00371

Question No. 1-20

Responding Witness: John K. Wolfe

Q-1-20. Explain the procedures and processes You will use to "verify the number, location, and type of Attachment Customer's Attachments" under proposed Terms and Conditions of Attachment No. 13.

A-1-20. From time to time LG&E may engage internal or contractor resources to visually inspect Attachment Customer's Attachments to verify the number, location and type of attachments.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Cable Telecommunications Association's
First Request for Information
Dated January 11, 2017

Case No. 2016-00371

Question No. 1-21

Responding Witness: Robert M. Conroy

Q-1-21. Explain the basis for and provide data related to how You will determine whether an Attachment is "unauthorized."

A-1-21. LG&E intends to rely upon voluntary reporting of Attachment Customers, as well as spot inspections, and periodic inspections to detect any unauthorized attachments.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Cable Telecommunications Association's
First Request for Information
Dated January 11, 2017

Case No. 2016-00371

Question No. 1-22

Responding Witness: Robert M. Conroy

Q-1-22. Explain the basis for and provide data related to the penalty You propose for Unauthorized Attachments, including data related to the cost basis of such proposed penalty.

A-1-22. Longstanding Commission precedent has permitted a pole owner to assess double the established attachment charge for an Attachment Customer's unauthorized placement of attachments on a utility's structures. Approving such charges, the Commission has stated:

> Similarly, since some CATV operators have made attachments to utility poles without prior authorization, and the utility must rely, between inspections, on voluntary reporting by such operators, it is reasonable for the utility to charge a penalty for unauthorized attachments. **We will allow tariff provisions which provide for a charge of not greater than twice the amount equal to the rate that would have been due had the installation been made the day after the last previous required inspection.**

The Adoption of A Standard Methodology for Establishing Rates For CATV Pole Attachments, Administrative Case No. 251 (Ky. PSC Sept. 17, 1982) at 5 (emphasis added).

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Cable Telecommunications Association's
First Request for Information
Dated January 11, 2017

Case No. 2016-00371

Question No. 1-23

Responding Witness: John P. Malloy / John K. Wolfe

Q-1-23. Please provide data identifying the design and purpose of the Your proposed Advanced Metering System ("AMS") and Distribution Automation Project ("DA"), including the nature of any wireline facilities necessary to provide AMS and DA.

A-1-23. See the Testimony of John P. Malloy, Exhibit JPM-1, Sections 4 and 5 for an overview of the design and purpose of the proposed AMS project and Appendix A-3 for data sheets related to the various system components. Some AMS field devices will utilize private fiber optic cable for communications. AMS and DA field devices on the public cellular networks will utilize leased wireline services (MPLS) that connect LG&E/KU data centers to the cellular carriers.

See the Testimony of Paul W. Thompson, Exhibit PWT-5 for an overview of the design and purpose of the proposed DA project and Exhibit PWT-4 for relevant equipment schematics and diagrams.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Cable Telecommunications Association's
First Request for Information
Dated January 11, 2017

Case No. 2016-00371

Question No. 1-24

Responding Witness: John P. Malloy / John K. Wolfe

Q-1-24. Please explain how the AMS and DA systems will make use of distribution poles, including the extent and nature of and attachment of wires and facilities to Poles, the Pole space to be used, and the location on the Poles to be used by any such wires and facilities.

a. Provide data related to any proposed installation of meters and/or equipment necessary to support the meters on Your Poles. Please include data showing where the equipment will be located and changes to existing pole facilities and Attachments that may be required to accommodate proposed AMS and DA systems as well as the basis for any such changes.

A-1-24. The AMS system will require the installation of radio-frequency (RF) communications infrastructure on distribution poles. This infrastructure facilitates the transmission of the meter data from the advanced meters to Company back-office systems.

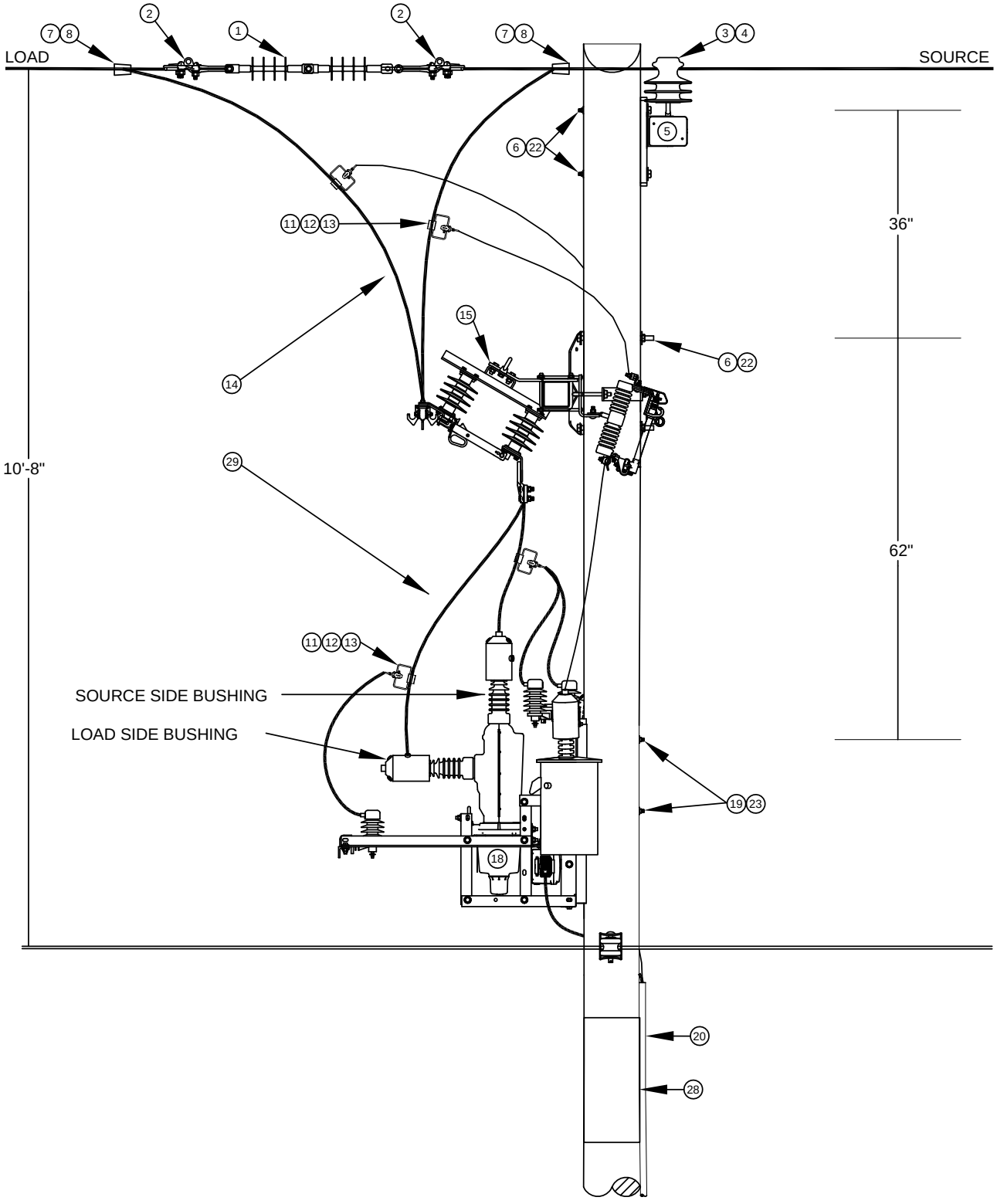
The DA program will require the installation of electronic sectionalizing devices on distribution poles. The current company standard provides adequate clearance for the electronic sectionalizing devices between primary and neutral conductors. Poles with legacy construction standards may require the installation of a taller pole or the lowering of the system neutral. A control box will be mounted at the base of the pole 5 feet from ground level. All cabling required from the control box to the electronic sectionalizing device will be protected by armoring the cable and installing the unarmored sections of cable in conduit or other acceptable means of protection. See the attached for an illustration of the Company's standard installation of a SCADA capable recloser.

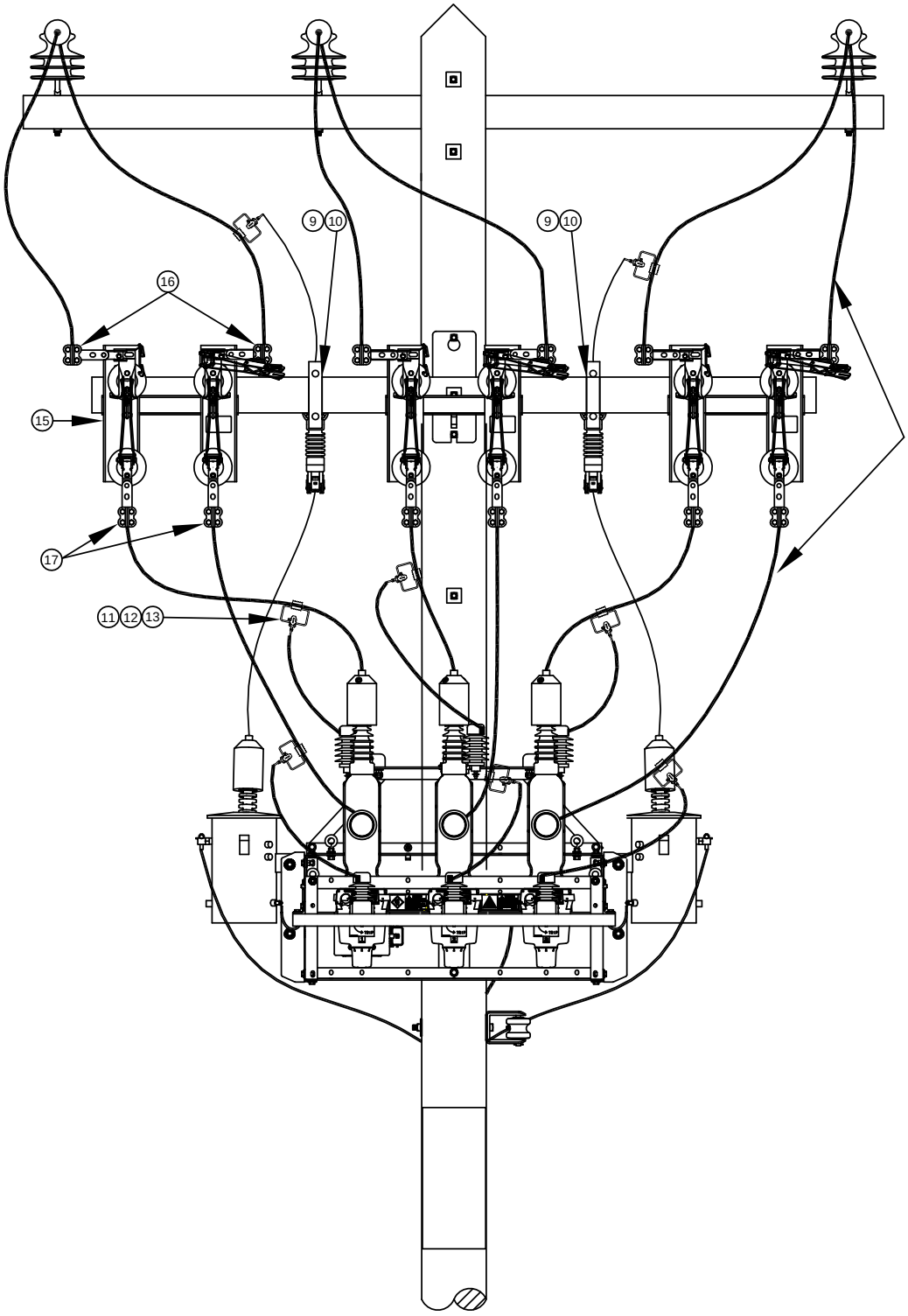
a. See attached for data illustrating the Company's standard related to the installation of AMS router infrastructure.

Electric System
Codes & Standards

12KV ELECTRONIC 3 PHASE RECLOSER INSTALLATION
CROSSARM CONSTRUCTION D.A.

21 12 12
Rev.





SOURCE SIDE AND LOAD SIDE MUST BE CONNECTED THE SAME ON ALL SWITCHES, TOP SIDE AND BOTTOM SIDE

Electric System
Codes & Standards

12KV ELECTRONIC 3 PHASE RECLOSER INSTALLATION
CROSSARM CONSTRUCTION D.A.

21 12 12
Rev.

Notes:
1. BOTH THE TANK AND HEAD OF THE RECLOSER IS TO BE GROUNDED.

2. 12KV RECLOSERS SHOULD BE SET TO SINGLE PHASE TRIP SINGLE PHASE LOCKOUT.

3. 12KV TRANSFORMERS ARE TO BE CONNECTED TO A AND C PHASES. CONNECT ONE TRANSFORMER TO THE SOURCE SIDE AND THE OTHER TRANSFORMER TO THE LOAD SIDE.

4. ENSURE THAT THE BACKUP BATTERY IS CONNECTED.

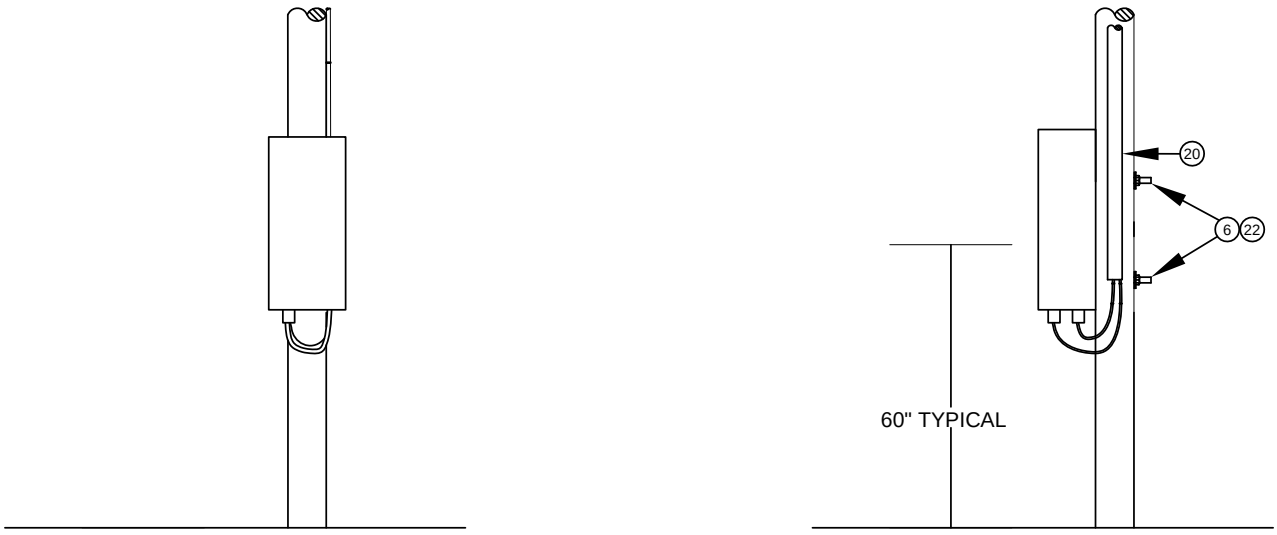
5. CONTROL SHALL BE MOUNTED TYPICALLY AT 60" AT CENTER OF CONTROL ABOVE GROUND LINE TO ALLOW EASE OF ACCESS.

6. THE FIRST 10' OF CONTROL AND POWER CABLE IS ARMORED. U-GUARD MUST BE INSTALLED TO COVER THE NON-ARMORED SECTION OF CABLE AND SHALL EXTEND A MINIMUM OF 40" PAST THE HIGHEST COMMUNICATION ATTACHMENT.

MATERIAL LIST

ITEM	IIN	DESCRIPTION	QTY
1	7001280	INSULATOR,SUSPENSION,15 KV,POLYMER	6
2	VARIES	DEADEND-VARIOUS SIZES	6
3	7001269	INSULATOR,PIN TYPE,15KV,POLYMER	3
4	7004088	PIN,INSULATOR,STRAIGHT,5/8"X6"	3
5	3015303	CROSSARM,FG,TANGENT,3-5/8"X4-5/8"X8'	1
6	VARIES	5/8" BOLT-VARIOUS SIZES	8
7	VARIES	FARGO CONNECTOR-VARIOUS SIZES	6
8	VARIES	FARGO COVER-VARIOUS SIZES	6
9	7000879	BRACKET,CUTOUT/ARRESTER,X-ARM	2
10	7001957	CUTOUT,FUSED,15KV,NON-LOADBREAK,W100A TUBE	2
11	1157894	CONNECTOR,PARALLEL,AL,336.4-795 MCM TO 8 SLD-2/0 STR COPPER	8
12	1159527	STIRRUP,BAIL,HOT LINE,COPPER,TIN PLATED	8
13	7000591	CLAMP,HOT LINE,8-2/0,CU	8
14	VARIES	POLY WIRE FOR JUMPERS-SIZED TO PRIMARY	20
15	3014901	SWITCH,RECLOSER BYPASS,14.4KV,900A,110KVBIL,3 PULL	1
16	3016577	LUG.TERMINAL.ALUMINUM.BOLTED.TEE CONNECTOR 336/795	6
17	3015376	500MCM BRONZE BOLTED CONNECTOR-SIZES VARY	6
18	3021740	RECLOSER,THREE SINGLE PHASE MODULES WITH SINGLE CONTROL	1
19	VARIES	3/4" SPACER BOLT-SIZES VARY	2
20	1160519	GUARD,CABLE,10'-2",U-SHAPED,PVC	3
21	1181001	LOCK,PAD,WITH 1-1/2" SHANK,BRASS	1
22	7000337	WASHER,FLAT,SQUARE,2-1/4" X 2-1/4" X 3/16",FOR 5/8" BOLT	8
23	1243701	WASHER,CURVED,SQUARE,4" X 4" X 3/4",GALV,FOR 3/4" BOLT	2
24	7000602	CLAMP,GROUND,TRANSFORMER TANK,BRZ,#8SLD TO 2/0 STR	1
25	7000303	BOLT,MACHINE,1/2",2",SS,SILICON BRONZE NUT,2 FLAT & 1 BELLVL W/	6
26	1159243	SCREW,LAG,1/2"X 4",GIMLET POINT,GALV STD PKG=250	8
27	7000302	BOLT,MACHINE,1/2",1-1/2",SS,SILICON BRONZE NUT,2 FLAT & 1 BELLVL	12
28	3000347	SLIDE,ANIMAL,25" X 48",POLYETHYLENE,POLE PROTECTION	1
29	7000401	CONDUCTOR,OH WIRE,500,CU-SD,XLPE,80 MIL,90-DEG C RATED,37 STR	20

CONTROL INSTALLATION DETAIL

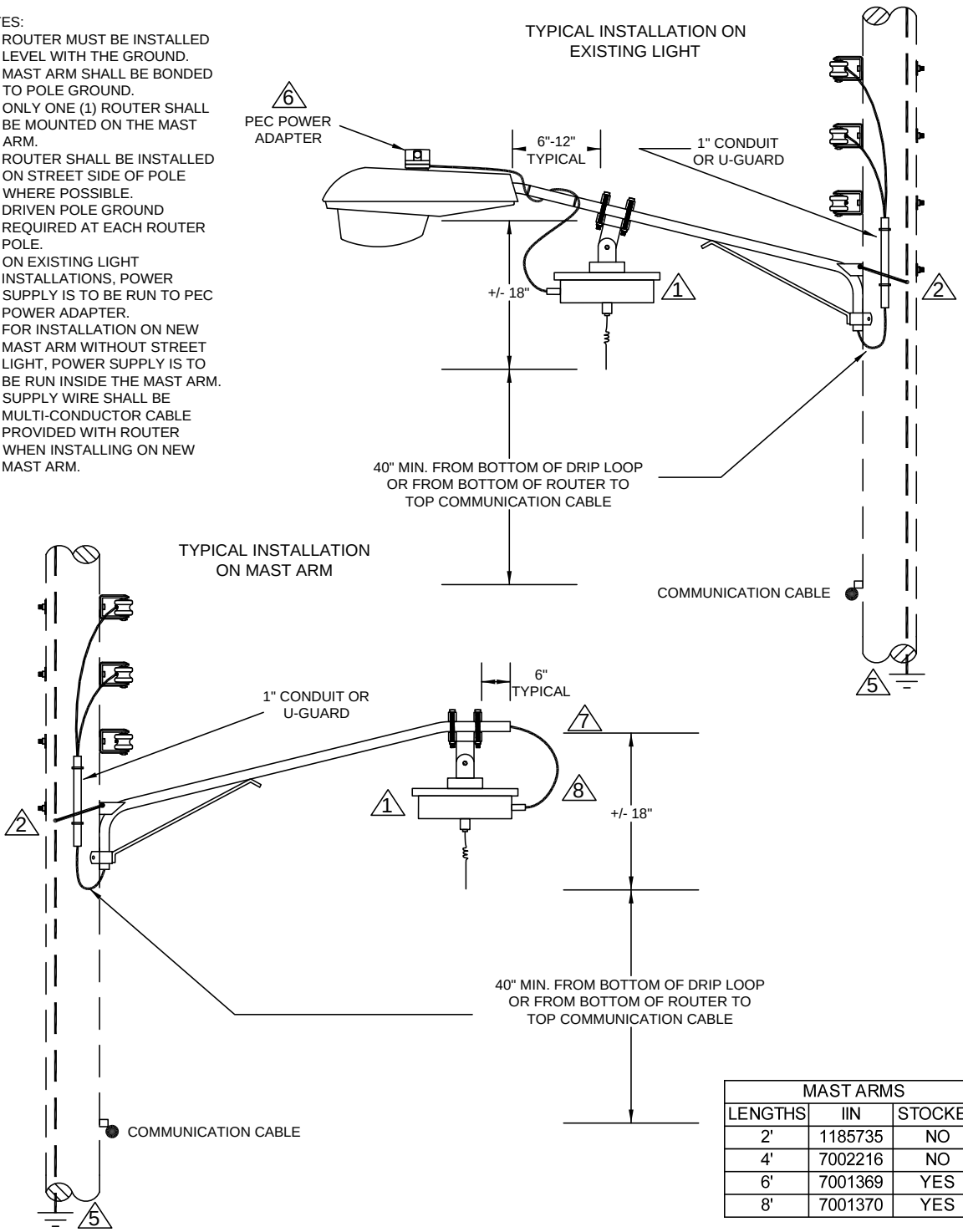


Electric System
Codes & Standards

WIRELESS ROUTER INSTALLATION

XX XX XX
Rev.

NOTES:
1. ROUTER MUST BE INSTALLED LEVEL WITH THE GROUND.
2. MAST ARM SHALL BE BONDED TO POLE GROUND.
3. ONLY ONE (1) ROUTER SHALL BE MOUNTED ON THE MAST ARM.
4. ROUTER SHALL BE INSTALLED ON STREET SIDE OF POLE WHERE POSSIBLE.
5. DRIVEN POLE GROUND REQUIRED AT EACH ROUTER POLE.
6. ON EXISTING LIGHT INSTALLATIONS, POWER SUPPLY IS TO BE RUN TO PEC POWER ADAPTER.
7. FOR INSTALLATION ON NEW MAST ARM WITHOUT STREET LIGHT, POWER SUPPLY IS TO BE RUN INSIDE THE MAST ARM.
8. SUPPLY WIRE SHALL BE MULTI-CONDUCTOR CABLE PROVIDED WITH ROUTER WHEN INSTALLING ON NEW MAST ARM.



MAST ARMS		
LENGTHS	IIN	STOCKED
2'	1185735	NO
4'	7002216	NO
6'	7001369	YES
8'	7001370	YES

LGE KU

Electric Design And Construction Standards

Replaces
LGE None
KU None

By: Hethcox/Leake
04/08/15
Page 1 of 1

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Cable Telecommunications Association's
First Request for Information
Dated January 11, 2017

Case No. 2016-00371

Question No. 1-25

Responding Witness: John P. Malloy / John K. Wolfe

Q-1-25. Please identify all communications services that the proposed AMS and DA could be used to provide.

A-1-25. There will be no communications services provided by the AMS and DA systems.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Cable Telecommunications Association's
First Request for Information
Dated January 11, 2017

Case No. 2016-00371

Question No. 1-26

Responding Witness: John P. Malloy

Q-1-26. Please provide data related to the radiofrequencies that the meters will use, the meters' abilities to communicate with other equipment and facilities, and any analysis of interference with other Attachments on the Poles.

A-1-26. The information is contained on pages 103-128 of 169 in the Testimony of John P. Malloy, Exhibit JPM-1, Appendix 3. The advanced meters utilize the 902 to 928 MHz FHSS unlicensed frequency for communication transmissions. Communications by the meters are encrypted so communication with other equipment requires a number of safeguards including, but not limited to, proper configuration by Company to enable communications. The Company has not performed any analysis of interference with other Attachments on Poles.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Cable Telecommunications Association's
First Request for Information
Dated January 11, 2017

Case No. 2016-00371

Question No. 1-27

Responding Witness: John K. Wolfe

Q-1-27. Please explain the impact of the proposed AMS and DA on existing wireline and wireless attachments of Attachment Customers, including whether rearrangement of the existing Attachment Customers' facilities or other make ready will be required to accommodate deployment of AMS and DA. If rearrangement of the existing Attachment Customers' facilities or other make ready work is required, please explain the allocation of costs of such work and whether Term and Condition No. 15 of the Proposed Tariff will apply.

A-1-27. The installation of DA equipment will be in the power space on poles and clearance will be governed by the National Electrical Safety Code and Company standards. No equipment installation is anticipated in the communications space. It is anticipated that AMS equipment will be installed in both the power space and the communications space. Where adequate pole height or adequate pole capacity is not available on an existing pole for new facilities or equipment, the pole will be replaced to provide the necessary space and/or capacity. Third party attachments will be transferred to the new pole at the attachment owner's expense. In limited cases, and where possible, attaching parties will occasionally be required to rearrange attached facilities on an existing pole to create additional space. Third party attachments will be rearranged on an existing pole when requested at the attachment owner's expense. Provisions in the proposed tariff in section 15(b) are consistent with a long-standing provision present in the Cable Television Attachment Charges schedule.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Cable Telecommunications Association's
First Request for Information
Dated January 11, 2017

Case No. 2016-00371

Question No. 1-28

Responding Witness: John K. Wolfe

Q-1-28. Please provide a copy of the "strategic network design study" referenced at Your Response to Commission Staff's First Requests for Information (filed Dec. 8, 2016) Response to Request No. 12 at p. 3.

A-1-28. See attached. The study contains confidential information and is being provided pursuant to a petition for confidential protection.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Cable Telecommunications Association's
First Request for Information
Dated January 11, 2017

Case No. 2016-00371

Question No. 1-29

Responding Witness: Robert M. Conroy

Q-1-29. Explain the authority you are seeking through your application for a Public Convenience and Necessity ("CPCN"), including whether such authority will authorize You to provide communications services to any third party.

A-1-29. The CPCN authority requested is to deploy AMS and DA across LG&E's electric distribution system as described in the testimony of Mr. Thompson concerning DA and the testimony of Mr. Malloy concerning AMS. The CPCN authority requested will not authorize LG&E to provide communications services to any third party.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Cable Telecommunications Association's
First Request for Information
Dated January 11, 2017

Case No. 2016-00371

Question No. 1-30

Responding Witness: Robert M. Conroy

Q-1-30. Please explain whether You intend to increase the electric rate(s) charged to Cable Television System Operators and Telecommunications Carriers and, if so, the percentage increase(s) of the rate(s).

A-1-30. The current rate is $7.25 per year for each attachment to pole. The proposed rates are as follows:

$ 7.25 per year for each wireline pole attachment.
$ 0.81 per year for each linear foot of duct.
$ 84.00 per year for each Wireless Facility.

See also Schedule M-2.1-E at Tab 66 of the filing requirements for proposed increases in electric rates generally, including those charged to Cable Television System Operators and Telecommunications Carriers who take electric service from LG&E.