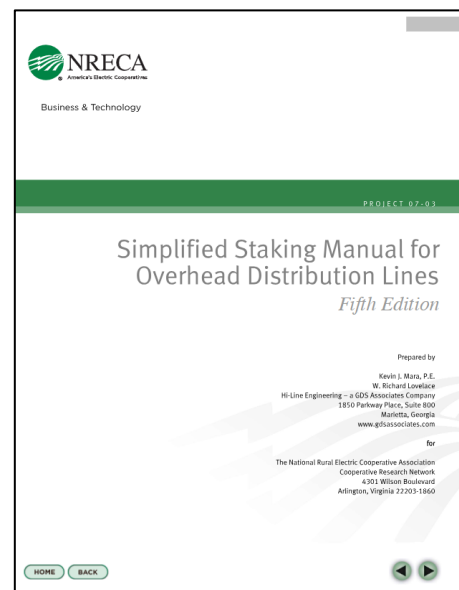


Updated Simplified Staking Manual for Overhead Distribution Lines

The Fifth Edition of NRECA's Simplified Staking Manual for Overhead Distribution Lines (the *Staking Manual*) is available to members. Released in late 2023, this latest edition has been updated to comply with the 2023 National Electrical Safety Code ([NESC](#)). Developed for NRECA members by Hi-Line Engineering, a GDS Associates Company, the fifth edition builds on three decades of continual development to provide an overview of basic overhead distribution line staking practices based on the current release of the NESC. Since the release of the first edition in 1993, there have been significant changes to the Code, as well as numerous additions and updates to the rural Utilities Service ([RUS](#)) specifications and bulletins. This latest edition of the Staking Manual has been updated to reflect those changes, and this advisory aims to raise awareness of its availability for the benefit of our members.



Purpose & Overview (Section 1 of the Manual)

Distribution lines are the major asset of a distribution cooperative, and the process of staking is a core skill. The *Staking Manual* was developed to simplify the staking of overhead distribution lines, to provide a reference tool for staking technicians, and to help these technicians acquire basic working knowledge of the principles and practices of distribution line staking. While the target audience is the novice staking technician, experienced technicians and engineers will find the information useful as a reference. The manual includes the necessary foundation for successful line staking, including:

- Selection of physical components – poles, conductors, pole-top assemblies, guys, and anchors – that make up a distribution structure.
- Proper positioning of stakes to mark the location of structures.
- Staking to enable safe, reliable, and efficient construction of distribution lines.
- Basic knowledge essential to those new to line design and provide a foundation for further learning.
- Tables, illustrations, photographs, and calculations are provided throughout.
- Simplified calculations and “rules-of-thumb” are provided for ease in understanding.
- References to the 2023 NESC rules, tables, figures, and footnotes and current RUS specifications and drawings.

Content (Sections 2 – 12 of the Manual)

The *Staking Manual* follows the process of line staking with applicable references for efficient distribution line design. The layout is by section, with detailed descriptions, pictures, graphics, and references.

- **Section 2: Filed Staking Practices and Procedures**

This introductory section includes the basics of examining local conditions, structure location and selection, staking mechanics, document preparation, and an overview of the equipment necessary for effective line staking.

- **Section 3: Applicable Codes and Specifications**

Section 3 includes essential references to the NESC, RUS specifications and drawings, and the approved RUS List of Materials.

- **Section 4: Conductor Characteristics**

Tables and formulas for computing conductor tension and sag, maximum allowable spans based on conductor separation, and span selection are included in this section.

- **Section 5: Pole Strength**

This section includes references to NESC strength and loading requirements, pole class selection, and maximum wind span calculation methods. Also included are calculations and tables associated with extreme wind loading and extreme ice with concurrent wind loading on unguyed poles.

- **Section 6: Strength of Pole-Top Assemblies**

Proper pole-top assembly selection, and the limiting conditions for various assemblies and the methods to determine those limits are included in Section 6. Crossarm assemblies and crossarm strength, and maximum permissible line angles are covered.

- **Section 7: Guying Practices and Procedures**

Section 7 includes a review of situations where guying is required. Reference drawings, tables, and calculations for various guying conditions, and how to deal with limited guying options are covered. Anchor types, impact of soil conditions, and proper anchor selection and installation are included.

- **Section 8: Joint Use**

This section covers the strength and clearance requirements associated with joint use of structures. Tables, calculations, and applicable references to the NESC sections and tables are included.

- **Section 9: Staking for Unit Price Contracts**

Distribution line staking for inclusion in construction contracts requires greater detail and precision than staking performed for routine construction by in-house crews. Section 9 covers the units and contract specifications essential for successful construction by contract crews.

- **Section 10: Sizing Transformer and Service**

In addition to the mechanical requirements of staking, the staking technician is often responsible for

providing service to a new customer or group of customers. This involves sizing of transformers, secondaries, and services. This section provides the basics of calculating loading and voltage drop necessary to properly size transformers and service conductors. Rule-of-thumb lookup tables are provided for easy reference.

- **Section 11: Application**

This section pulls everything together and leads the staking technician through the design process to create a complete design package for a single-phase line extension for residential service and a three-phase line extension for an industrial service. Actual staking examples, along with the applicable tables and references, are provided to affect a complete design. The section takes the staking technician through the process and design considerations necessary for safe, reliable, and efficient distribution line design.

- **Section 12: Designing for Large Conductors**

When a design requires extra large conductors, it is necessary to understand the limitations of distribution grade assemblies. This section addresses the design limitations and methodologies that can be applied in these special circumstances. Hardware limitations, conductor sags and tension limits are covered.

Appendices and Glossary

The latter portion of the *Staking Manual* includes numerous references and tables essential to successful distribution line design. These are found in three appendices and a glossary of terms. There is also a bibliography provided.

- Appendix A: Assembly Numbering, RUS Bulletin 1728F-804, 12.47/7.2 kV Specs
- Appendix B: Sag and Tension Tables
- Appendix C: Horizontal Pull and Total Guy Load and Angles for 30- to 55-Foot Poles using Grade C Construction
- Glossary: Over 140 definitions and acronyms that staking technicians need to know.
- Bibliography: References to NESC and RUS publications, and other miscellaneous references are included.

We encourage cooperative technical staff and their consultants involved in distribution line staking to download a copy of the Simplified Staking Manual and provide suggestions for continual improvement.

Simplified Staking Manual
([click here to access and download](#))

Contact for Questions

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