

2. Tutorials on the Physical Design of Joint-Use Wood Pole Distribution Lines

About these seminars

The 3.5 day (3.5-JU-1) *Tutorial on Joint-Use Wood Pole Line Designs: Require Clearance, Loading & Strengths* addresses the increasing problem of accommodating larger numbers and sizes of cables, conductors and equipment on wood pole utility lines. Unfortunately, line failures and clearance problems have increased in recent years due to overloading poles. Attendees will calculate attachment heights for conductors and cables for various span lengths. Attendees will also calculate individual loads and strengths by hand. Computer computations will be briefly discussed. This course is particularly designed for engineers, technicians and inspectors who want to add or increase expertise in facility placement and structural engineering of wood pole lines. Students will work practical exercises in teams. Written answers are given for each question, including rule references. Additional exercises and answers are provided for later use by students.

The Special Edition (3.5-JU-2-OC) concentrates only on Required Loadings & Strengths. It includes all the discussions and exercises on loadings and strengths from JU-1 plus a full day tutorial on using O-Calc pole loading software.

Who should attend

- ◆ electrical engineers
- ◆ standards developers
- ◆ contractors
- ◆ designers and staking technicians
- ◆ engineering technicians
- ◆ make-ready and final inspectors

Learn from the experts

- ◆ Determine required attachment spacings to meet required clearances at the poles and midspan*
- ◆ Determine required wood pole height and class*
- ◆ Determine if available clearances allow new facilities to be added to existing wood poles*
- ◆ Determine required clearances between wires and cables at the pole and required pole height*
- ◆ Determine required Grade of Construction
- ◆ Calculate wind and ice loadings on structures and supported facilities
- ◆ Calculate stress on poles and cross arms
- ◆ Calculate strength of poles and cross arms
- ◆ Determine required pole class
- ◆ Determine if available strengths allows new facilities to be added to existing wood poles
- ◆ Properly use the NESC to develop standards and joint-use contracts for new construction or check compliance of existing construction
- ◆ Increase pole life and reliability
- ◆ Responsibilities for meeting NESC requirements
- ◆ Rationale behind NESC requirements
- ◆ 1 day tutorial on using O-Calc pole loading software**

* Included in JU-1 seminars only

** Included in JU-2-OC seminars only

In addition

PCU Training Center will provide the following for both seminars:

- ◆ Bound Participant Workbook
- ◆ Bound Appendix Book of helpful charts, tables and technical discussions
- ◆ Excerpts from Practical Utility Safety
- ◆ Exercise/Answer sets
- ◆ CEUs and NC or FL PDHs awarded upon successful completion of workshop
- ◆ Demo copy of O-Calc pole loading software

Each participant will need access to:

- ◆ National Electrical Safety Code – 2007 Edition (PCU Training Center can provide at extra cost)
- ◆ NESC Handbook – 6th Edition (optional; at extra cost)
- ◆ Scientific calculator trigonometry and power root functions

3.5-day Tutorial on Joint-Use Wood Pole Line Design: Required Clearances, Loadings, & Strengths (one instructor unless over 35 people)

3.5-JU-1 [2.40CEU; 24.0PDH]

Day 1 (8:00 am – 5:00 pm)

Introduction
 Organization of the NESC
 Utility responsibilities: How to use the code: Grandfather Clause
 Definitions and References
 Development of Overhead Clearances
 Vertical clearances of lowest wires or cables above ground, rails, and water

Lunch

Vertical and horizontal clearances between wires, conductors, and cables

- At the pole
- In the span

Using sag and tension calculations

Effects of differences in sags and tensions on clearances and loads

Day 2 (8:00 am – 5:00 pm)

Calculations of required clearances at poles for various spans, types, and sizes of power conductors and cables and telephone and CATV cables

- supply space
- communication worker safety zone
- communication

Special considerations for fiber-optic cables

Selection of pole heights for various spans and configurations

Lunch

Required Grades of Construction

Calculation of wind, ice and weight loads on poles and supported facilities

Overload factors

Calculation of overturning moments from wind loads, weight loads, and transformer loads for various configurations

Effect of leaning poles and pole deflection

Day 3 (8:00 am – 5:00 pm)

Calculating the strength of poles and crossarms

- At groundline
- At bolt holes
- At intermediate points

Required strength factors

Calculating required pole strength class for various configurations

Lunch

Guying for deadends and angles

- Required guy strength
- Effects on poles

Buckling strength for deadend, angle, and transformer poles

Calculating maximum spans for various configurations

Day 4 (8:00 am – 11:00 am)

Adding cables or conductors to existing lines

- Effect of overlashed cables

Determining appropriate clearance specifications and loading limits in joint-use contracts

Practical consideration of: effects of difficulties in obtaining desired sag/tensions and guying tensions, long spans next to short spans, etc.

Roundtable discussion of related problems and issues

Adjourn

3.5-day Tutorial on Required Loadings, & Strengths for Joint-Use Wood Pole Lines for power, telephone, CATV and railroad utilities (one instructor unless over 35 people)

3.5-JU-2-OC [2.40CEU; 24.0PDH]

Day 1 (8:00 am – 5:00 pm)

Introduction
 Organization of the NESC
 Utility Responsibilities: How and when to use the code: Grandfather Clause
 Definitions and References
 Practical consideration of: effects of difficulties in obtaining desired sag/tensions and guying tensions, long spans next to short spans, etc.
 Using sag and tension calculations

Lunch

Brief review of pole clearances

Required Grades of Construction

Calculations of required clearances at poles for various spans, types and sizes of power conductors, cables, telephone & CATV cables

- supply space
- communication worker safety zone
- communication space

Day 2 (8:00 am – 5:00 pm)

Calculating the strength of poles and crossarms at groundline

- At groundline
- At bolt holes
- At supply space
- At intermediate points

Required strength factors

Lunch

Calculating required pole strength class for various configurations

Guying for deadends and angles, including

- required guy strength
- effects on poles

Buckling strength for deadend, angle and transformer poles

Calculating maximum spans for various configurations

Day 3 (8:00 am – 5:00 pm)

Adding cables or conductors to existing lines

- effect of overlashed cables

Determining appropriate clearance specifications and loading limits in joint-use contracts

Calculating bending stresses caused by guys on poles

Calculating the limitations on use of sidewalk street guys & pole push braces

Lunch

O-Calc - Fundamentals

Program overview

Review functions and features

Create Groups and Poles

Basic design inputs

How to model a pole

Adding wires and attachments

Guying

Understanding loading results

Compare results using a variety of pole classes, NESC loading districts and grade of constructions

Day 4 (8:00 am – 11:00 am)

O-Calc - Advanced

Exercise: Angle pole

Exercise: Deadend pole

Exercise: Joint-use pole

Use O-Calc to demonstrate & understand the impact of joint use attachments

Advanced tips & tricks

How to setup pole templates

How to share pole loading results

Adjourn