

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 using the NESC allowable stress methodology. 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
- ◆ contractors
- ◆ engineering technicians
- ◆ standards developers
- ◆ designers and staking 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:

- ◆ 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 – 2012 Edition (PCU Training Center can provide at extra cost)
- ◆ NESC Handbook – 7th Edition (optional; at extra cost)
- ◆ Scientific calculator trigonometry and power root functions

2.5-day Loading & Strengths Calculations for Wood Pole Lines

(one instructor unless over 35 people)

2.5-JU-3 [1.70 CEU; 17.0 PDH]

Day 1 (8:00 am – 5:00 pm)

Introduction

Organization of the NESC

Application of the Grandfather Clause

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

Lunch

Using sag and tension calculations

Strengths & loadings primer: loads, reactions

Pole loading and strength calculation primer: simplified force calcs; shear forces; overturning & bending moments; wind on poles & supported facilities; force, moments, & shear diagrams; stress calcs; pole weight; pole strength; reduced pole strength due to rot; buckling: tangent, angles, deadends; Calculating the strength of poles and crossarms: at groundline, at supply space, at bolt holes, and at intermediate points; Pole embedment depth.

Day 2 (8:00 am – 5:00 pm)

Required Grades of Construction, required loadings, and load factors

Assumed loads and design loads

Required strength factors

Example calculations: calculating required pole strength class for various configurations; Guying for deadends and angles, including: required guy strength, effects on poles

Lunch

Buckling strength for deadend, angle and transformer poles

Calculating maximum spans for various configurations

Adding cables or conductors to existing lines

- Effect of overlashed cables

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

Day 3 (8:00 am – 11:00 am)

Calculating bending stresses caused by conductor angles/deadends and guys on poles

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

Adjourn

3.5-day Tutorial on Joint-Use Wood Pole Line Design: Required Clearances, Loadings, & Strengths

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
- communication space
- worker safety zone

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— with O-Calc Pro Tutorial

(two instructors required)

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

Day 1 (8:00 am – 5:00 pm)

Introduction

NESC Organization

Application of the Grandfather Clause

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

Lunch

Using sag and tension calculations

Strengths & Loadings primer: loads and reactions

Pole loading & strength calculations primer:

- Simplified force calcs
- Shear forces
- Overturning & bending moments
- Wind on poles & supported facilities
- Force, moments, & shear diagrams
- Stress calculations
- Pole weigh and strength
- Reduced pole strength due to rot
- Buckling: tangent, angles, deadends
- Calculating the strength of poles and crossarms: at groundline, supply space, bolt holes, intermediate points

Pole embedment depth

Day 2 (8:00 am – 5:00 pm)

Required Grades of Construction, required loadings, and load factors

Assumed loads and design loads; Required strength factors

Example calculations

- Calculating req'd pole strength class for various configurations
- Guying for deadends and angles, including: req'd guy strength, effects on poles

Lunch

- Buckling strength for deadend, angle and transformer poles
- Calculating maximum spans for various configurations
- Adding cables or conductors to existing lines: effect of overlashed cables

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

Day 3 (8:00 am – 5:00 pm)

Calculating bending stresses caused by guys on poles

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

Lunch

O-Calc – Introduction, Program Overview

Program development history and newest features

Detailed discussion on program layout and menus

Basic pole modeling

Understanding analysis results

Day 4 (8:00 am – 11:00 am)

NESC Loading Districts & Grades of Construction

Advanced pole modeling

Joint use attachments and bundle editor

Digital measurement technology

Lunch

Creating pole templates

Advanced tips & tricks

Presentation on upcoming O-Calc Pro features

Adjourn

3.5-day Tutorial on Required Loadings, & Strengths for Joint-Use Wood Pole Lines—with SPIDAcalc Tutorial

(two instructors required) 3.5-JU-2-OC [2.4CEU; 24.0PDH]

Day 1 (8:00 am – 5:00 pm)

Introduction; NESC Organization

Application of the Grandfather Clause

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

Lunch

Using sag and tension calculations

Strengths & Loadings primer: loads and reactions

Pole loading & strength calculations primer:

- Simplified force calcs
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Day 2 (8:00 am – 5:00 pm)

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Lunch

- Buckling strength for deadend, angle and transformer poles
- Calculating maximum spans for various configurations
- Adding cables or conductors to existing lines: effect of overlashed cables

Determine appropriate clearance specs & loading limits in ju contracts

Day 3 (8:00 am – 5:00 pm)

Calculating bending stresses caused by guys on poles

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

Lunch

A general overview and introduction to SPIDAcalc

Screens, views, menu options, and operation

File creation, settings, and load cases

Creating a pole design

Analyzing designs and system outputs

Day 4 (8:00 am – 11:00 am)

Additional hands-on exercises

- Span/head guying and stub pole analysis, sidewalk analysis
 - Joint Use/pole attachment remediation
 - Use of a utility's construction standards in the framing planner
- Attendees work series of increasingly complex and challenging scenarios

Lunch

Using client editor to configure & maintain a SPIDAcalc client file

- How to input specific structural and engineering data to build your explicit materials and construction standards

- Structural analysis options and settings

- How to configure custom forms

Using SPIDAcalc to evaluate in-service pole damage and determine its serviceability

Using the SPIDAcalc photo measuring tool to obtain pole measurements

How to create data forms in SPIDAcalc

Adjourn