

2026 PLS ATUG



Otto J. Lynch, P.E., Vice President Bentley Systems, Head of Power Line Systems
June 9th, 2026

POWER LINE[®]
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2026 PLS ATUG

Welcome to the 2026 Power Line Systems Advanced Training and User Group!

Otto J. Lynch, P.E., Vice President Bentley Systems, Head of Power Line Systems
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Chuck Norris and Transmission Lines

The grid doesn't carry power. It asks
Chuck Norris for permission to flow.

N-1 isn't a contingency. It's Chuck Norris warming up.

June 9th, 2026

**When a line trips, Chuck Norris recloses
it by staring at it.**

June 9th, 2026

**Storm hardening? The weather hardens
itself when Chuck Norris inspects the
line.**

June 9th, 2026

**The grid doesn't need redundancy. It has
Chuck Norris.**

June 9th, 2026

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**Load growth doesn't scare the grid.
Chuck Norris scares load growth.**

June 9th, 2026

Vegetation management? Trees trim themselves when Chuck Norris walks the ROW.

June 9th, 2026

The grid doesn't black out. It just pauses out of respect for Chuck Norris.

June 9th, 2026

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Dynamic line ratings? Chuck Norris rates the lines dynamically with a single roundhouse.

June 9th, 2026

When Chuck Norris does a thermal rating, the conductor cools itself down.

June 9th, 2026

Purpose of ATUG

Advanced Training – PLS Colleagues

Product Engineers

Software Engineers

User Group – PLS Users

Utilities

Consultants

Manufacturers

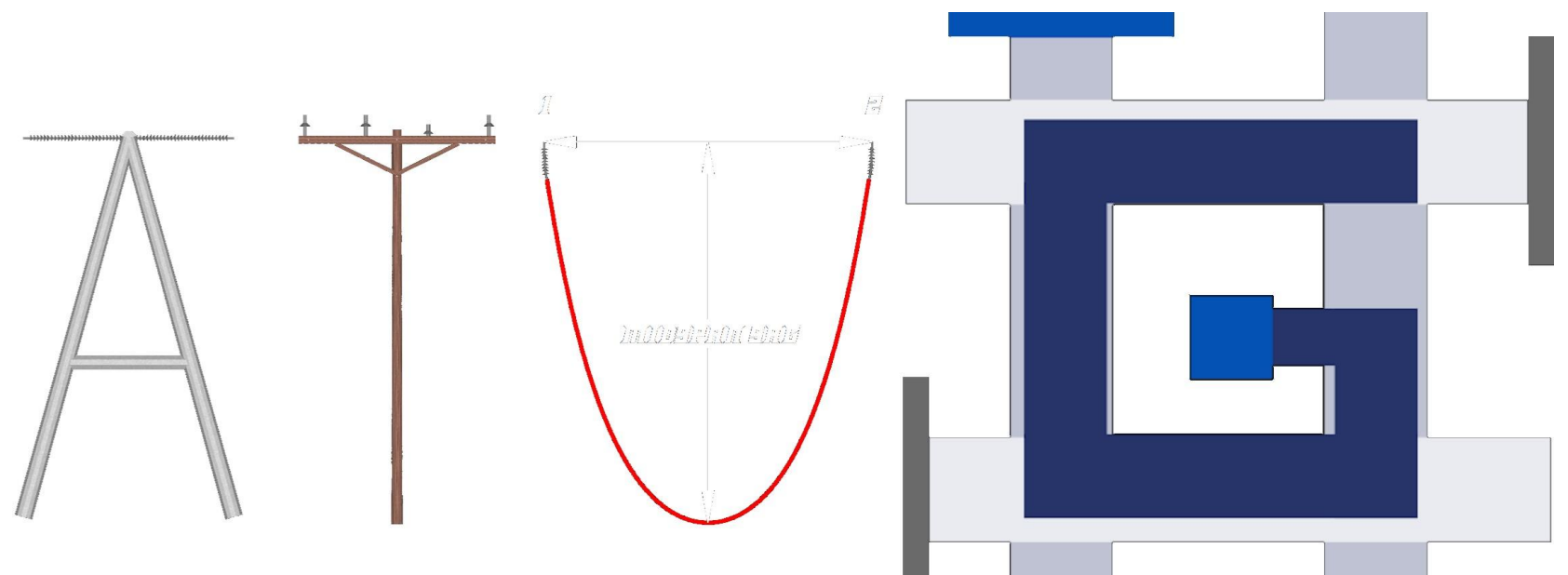
R&D Organizations

Data Providers

Exchange Ideas

Roundtable on Thursday

Networking



Purpose of ATUG

As Much for PLS (and Bentley) as It Is For You!

This is Our Gift to You!

2026 PLS ATUG Attendees

572 Registered Attendees

268 Companies

Utilities - 92

Consultants / Engineering / EPC / OEM / Service Firm - 176

20 Countries from All 6 Continents

Africa - Congo (DRC), Ethiopia, Kenya

Asia - India, Pakistan, Uzbekistan

Europe - Albania, Ireland, Norway, Spain, Switzerland, United Kingdom

North America - Canada, Mexico, Panama, United States

South America - Colombia, Peru

Oceania - Australia, New Zealand

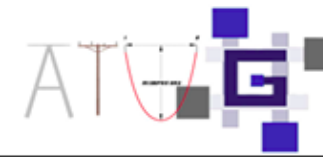
We Need A Power Line in Antarctica!



2026 ATUG Agenda



2026



FINAL AGENDA

Start	End	Tuesday	Wednesday	Thursday
7:30 AM	8:30 AM	Registration		
8:30 AM	8:50 AM	Welcome Address Otto Lynch P.E. - Power Line Systems (PLS)	Computer Hardware Recommendations Nathan Brazy - PLS	Roundtable Discussion Staff of Power Line Systems
8:50 AM	9:10 AM	PLS Surprise Presentation Erik Jacobsen - Bifrost Services	From Data & Incomplete Records to Digital Twin Jacob Kerley P.E. & Paulo Cortez - Westwood	
9:10 AM	9:30 AM	Ultralite to Understand Advanced Conductors Josh Sebolt P.E. & Jess Kurpius P.E. - Burns & McDonnell	Alignment Etiquette Kimberly Lowe & Dan McCormick P.E. - PLS	
9:30 AM	10:00 AM	What's New in TOWER Tim Cashman P.E. & Alex Beers - PLS		
10:00 AM	10:20 AM	Break	Break	
10:20 AM	10:40 AM	Exporting Data from PLS-GRID Kevin Brzys P.E. - PLS	From Proposal to Reality: A PLS-GRID Story Sarah Cuda P.E. - ITC	
10:40 AM	11:10 AM	500kV Tower Project Hartley Grimes P.E. - Leidos	Jesse Kohler P.E. - PLC Engineering	
11:10 AM	11:30 AM	AMBER Updates Graeme Louw P.E. & Dan McCormick P.E. - PLS	What's New in PLS-GRID Kevin Brzys P.E. & Isaac Wiersbinski - PLS	
11:30 AM	12:00 PM	Distribution Graphical Framing: Real life LEGOs Jesse Kohler P.E. - PLC Engineering		
12:00 PM	1:00 PM	Lunch Provided by PLS	Lunch Provided by PLS	
1:00 PM	1:20 PM	Multiple Surface and Ground TINs Dan McCormick P.E. & Jorge Ramirez - PLS	What's New in PLS-CADD Si Dudley P.E., Suzanne Brzoznowski, & Ryan Rickgauer - PLS	
1:20 PM	1:40 PM	Tower Load Test Plan Development using TOWER Daniel Clendenen P.E. - WSP		
1:40 PM	1:50 PM	James Lee Chief Operating Officer Bentley Systems		
1:50 PM	2:10 PM	Bentley Collaborations Graeme Louw P.E. & Alan Fritz - PLS		
2:10 PM	2:30 PM	Talon Collaboration Tim Cashman P.E. - PLS	Optimum Spotting Travis Bailey & Tim Knor - PLS	
2:30 PM	2:50 PM	Break	Break	
2:50 PM	3:10 PM	Section Updates Jorge Ramirez & Alex Beers - PLS	Strategic Fiber East - The wood pole line that won't quit Ralphie Adams - Consulting Eng APS	
3:10 PM	3:30 PM	Right of Way Checks for Foundations & Blowout Si Dudley P.E. & Isaac Wiersbinski - PLS	What's New in PLS-Pole Rob Scardino P.E. & Brian Davis - PLS	
3:30 PM	3:50 PM	PLS-GRID & P&PS Mitchel Mosher P.E. - East Kentucky Power Co-op	Ruling Span Vs. Finite Element: Real World Case Study Tyler Riddle - Oklahoma Gas & Electric	
3:50 PM	4:10 PM		Insulators & Energized Zones Suzanne Brzoznowski & Michaela Suski - PLS	
4:10 PM	4:30 PM	You Asked for it - You got it! Suzanne Brzoznowski & Tim Knor - PLS	Industry Codes & Standards Otto Lynch P.E. - PLS	
4:30 PM	4:40 PM	QISG Introduction	RDQ Introduction	
Receptions				
5:00 - 7:00 PM	Tuesday	Lakeside Reception at Monona Terrace sponsored by QISG		
5:00 - 7:00 PM	Wednesday	Lakeside Reception at Monona Terrace sponsored by RDQ		



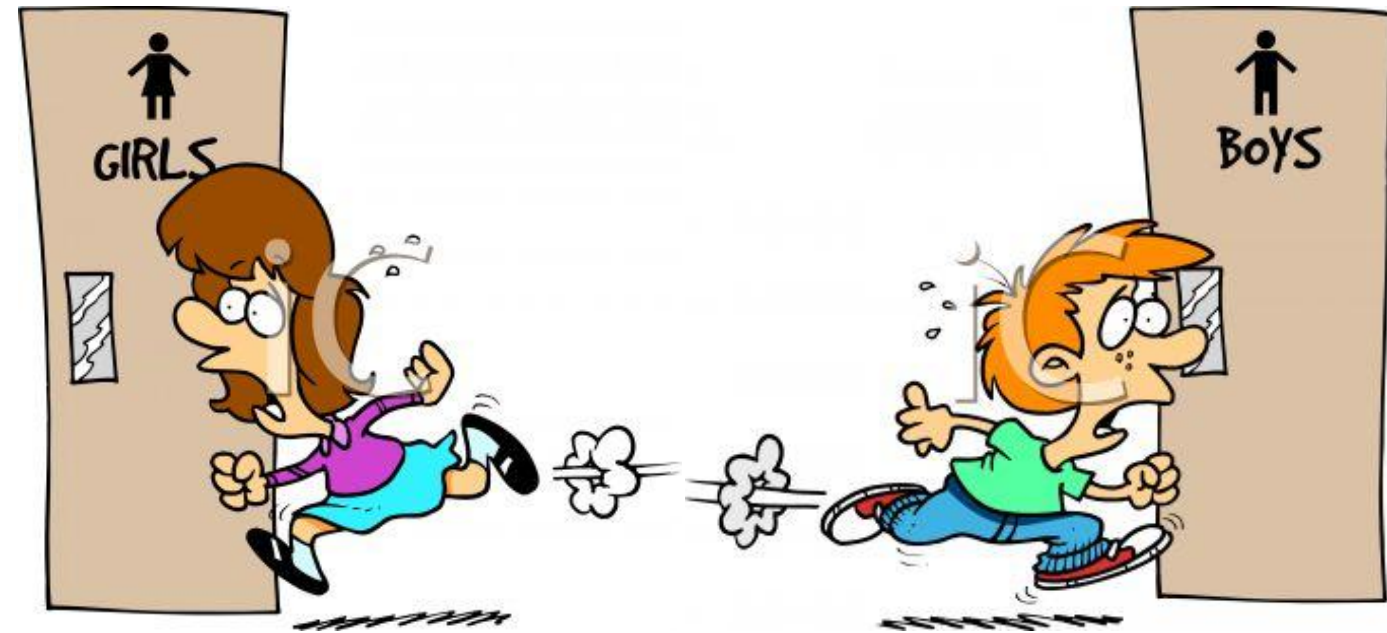
Housekeeping

Breaks

Lunches

Receptions

Facility Locations



Thank You Reception Sponsors!



A QUANTA SERVICES COMPANY



Informal Survey

How many Civil Engineers?

How many Electrical Engineers?

How many Mechanical Engineers?

How many of you are in a Production role?

How many of you are in a Supervisory role?

How many of you use AutoCAD?

How many of you use MicroStation?

Informal Survey

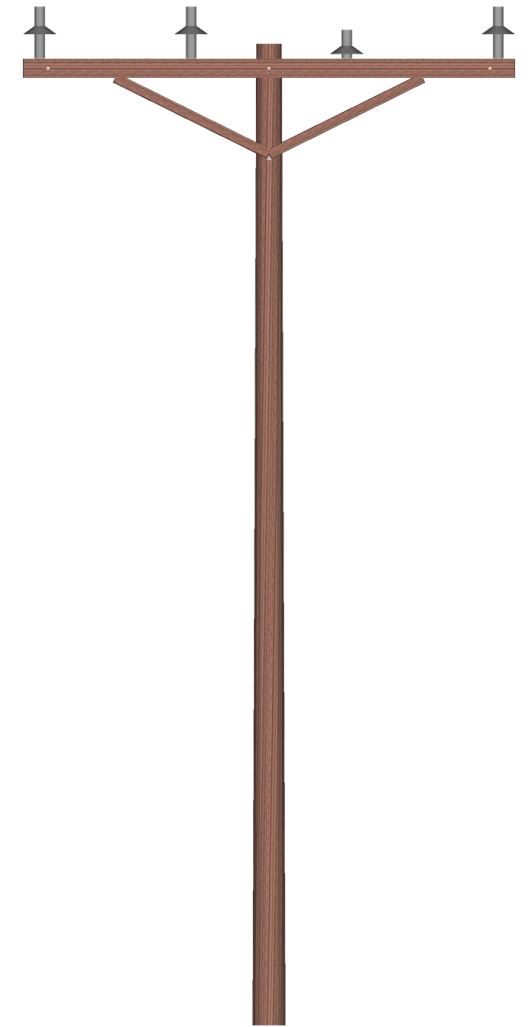
How many of you have used LiDAR in PLS-CADD?

How many of you modeled lines for NERC Compliance?

Thermal Rating?

Vegetation?

How many use PLS software for Distribution or Joint Use?



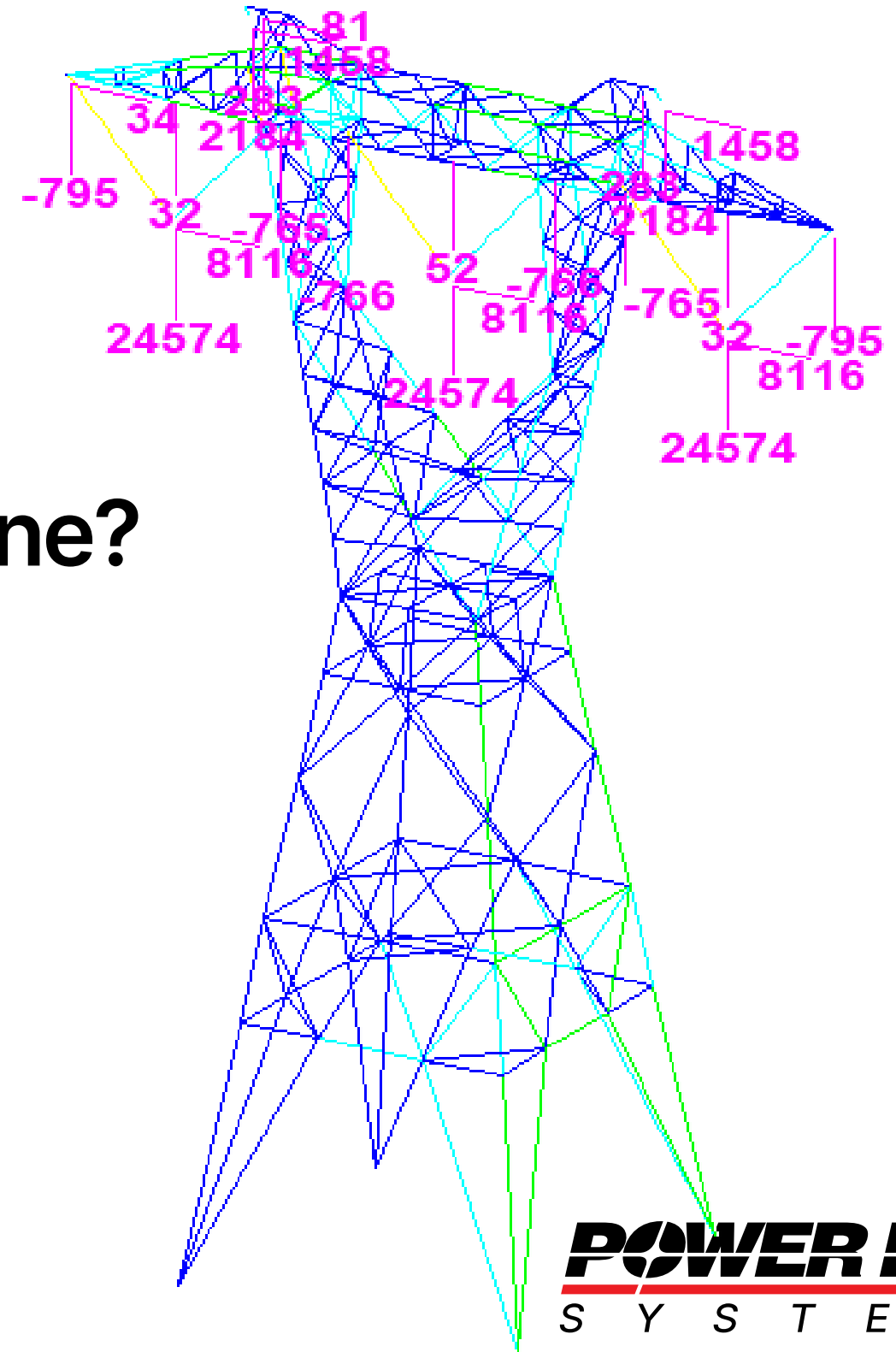
Informal Survey

How many use TOWER?

How many use PLS-POLE?

How many have optimized a new line?

How many use PLS-GRID?



Informal Survey

How many are here just for the free beer?



Anticipated Questions

Does PLS do Vegetation Management?

PLS Has Been Doing VM Since 2000!

PLS Does VM Right!

PLS Follows Industry Standards and Codes

Transmission & Distribution Line Vegetation Management in PLS-CADD TechNote

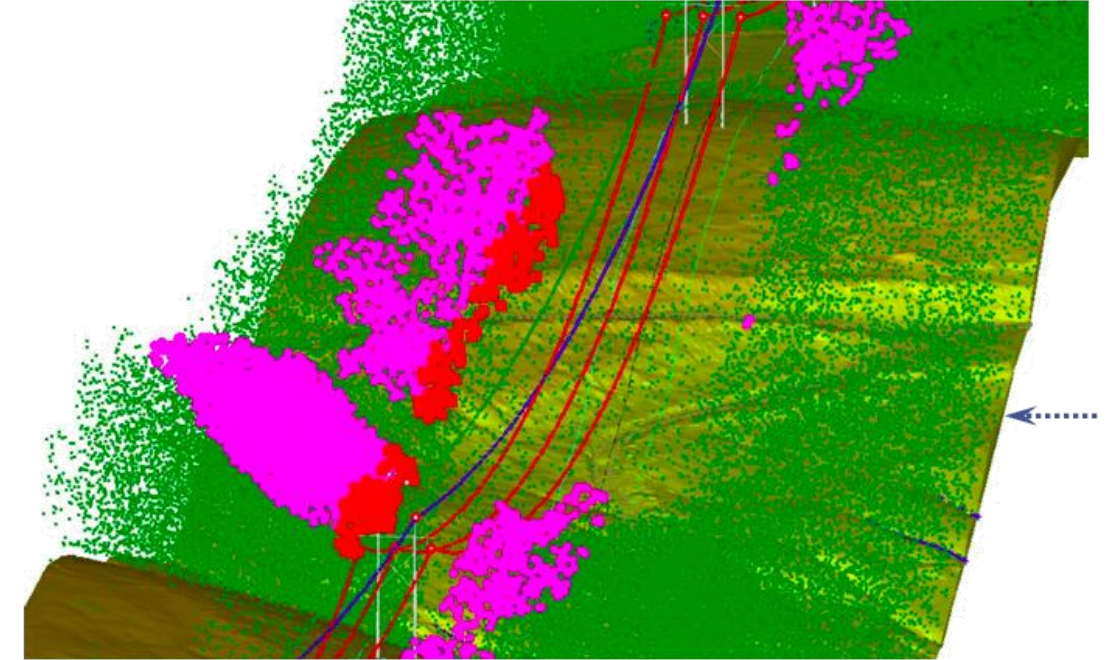


Figure 11: Grow-In and Falling Tree violations displayed in 3D view with rendered TIN

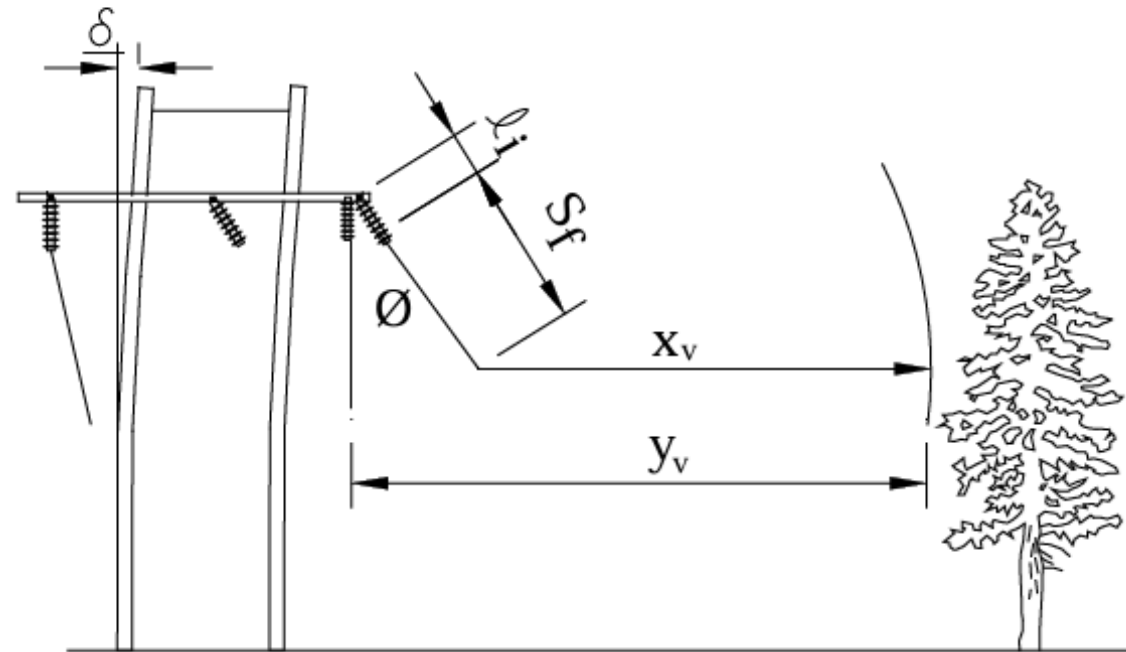


FIGURE 5-2: RADIAL CLEARANCE REQUIREMENT TO VEGETATION

where:

- ϕ = conductor swing out angle in degrees under all rated operating conditions
- S_f = conductor final sag at all rated operating conditions
- x_v = radial clearance (include altitude correction if necessary)
- ℓ_i = insulator string length ($\ell_i = 0$ for post insulators or restrained suspension insulators).
- y_v = horizontal clearance at the time of vegetation management work
- δ = structure deflection at all rated operating conditions

TABLE 5-2
 RADIAL OPERATING CLEARANCES (in feet) FROM IEEE 516 FOR USE IN
 DETERMINING CLEARANCES TO VEGETATION FROM CONDUCTORS
 (NERC Standard FAC-003.2 Transmission Vegetation Management Program, IEEE 516,
 Guideline For Maintenance Methods Of Energized Power Lines)

<u>Conditions under which clearances apply:</u>						
Displaced by Wind: Radial operating clearances are to be applied at all rated operating conditions. The designer should determine applicable conductor temperature and wind conditions for all rated operating conditions. The displacement of the conductor is to include deflection of suspension insulators and deflection of flexible structures.						
The operating clearances shown are for the displaced conductors and do not provide for the horizontal distance required to account for blowout of the conductor and the insulator string. This distance is to be added to the required clearance. See Equation 5-1.						
Clearances are based on the Maximum Operating Voltage.						
Nominal voltage, Phase to Phase, kV _{L-L}	34.5 & 46 ¹	69 ¹	115 ¹	138 ¹	161 ¹	230 ^{1,2}
Max. Operating Voltage, Phase to Phase, kV _{L-L}	----	72.5	120.8	144.9	169.1	241.5
Max. Operating Voltage, Phase to Ground, kV _{L-G}	----	41.8	69.7	83.7	97.6	139.4
<u>Radial Table 5 IEEE Standard 516 Operating Clearances</u>			Clearances in feet			
Operating clearance at all rated operating conditions	1.8	1.8	1.9	2.3	2.5	2.7
Design adder for survey and installation tolerance		1.5 feet for all voltages				
Design adder for vegetation		Determined by designer (see Note 3 below)				
<u>ALTITUDE CORRECTION TO BE ADDED TO VALUES ABOVE 3300 feet</u>						
Additional feet of clearance per 1000 feet of altitude above 3300 feet	.02	.02	.05	.07	.08	.12
<i>Notes:</i>						
1. These clearances apply to all transmission lines operated at 200 kV phase-to-phase and above and to any lower voltage lines designated as critical (refer to NERC FAC 003).						
2. The 230 kV clearance is based on 3.0 Per Unit switching surge.						
3. The design adder for vegetation, applied to conductors displaced by wind, should account for reasonably anticipated tree movement, species types and growth rates, species failure characteristics, and local climate and rainfall patterns. The design adder for vegetation, applied to conductors at rest, should account for worker approach distances in addition to the aforementioned factors.						

NERC FAC-003-5 Transmission Vegetation Management

🏠 > Standards > ... > FAC > FAC-003-5

FAC-003-5

Transmission Vegetation Management

Mandatory Subject to Enforcement 04/01/2024

NERC FAC-003-5

Transmission Vegetation Management

FAC-003 — TABLE 2 — Minimum Vegetation Clearance Distances (MVCD)¹²
For Alternating Current Voltages (feet)

(AC) Nominal System Voltage (KV) ⁺	(AC) Maximum System Voltage (kV) ¹³	MVCD (feet) Over sea level up to 500 ft	MVCD feet Over 500 ft up to 1000 ft	MVCD feet Over 1000 ft up to 2000 ft	MVCD feet Over 2000 ft up to 3000 ft	MVCD feet Over 3000 ft up to 4000 ft	MVCD feet Over 4000 ft up to 5000 ft	MVCD feet Over 5000 ft up to 6000 ft	MVCD feet Over 6000 ft up to 7000 ft	MVCD feet Over 7000 ft up to 8000 ft	MVCD feet Over 8000 ft up to 9000 ft	MVCD feet Over 9000 ft up to 10000 ft	MVCD feet Over 10000 ft up to 11000 ft	MVCD feet Over 11000 ft up to 12000 ft	MVCD feet Over 12000 ft up to 13000 ft	MVCD feet Over 13000 ft up to 14000 ft	MVCD feet Over 14000 ft up to 15000 ft
765	800	11.6ft	11.7ft	11.9ft	12.1ft	12.2ft	12.4ft	12.6ft	12.8ft	13.0ft	13.1ft	13.3ft	13.5ft	13.7ft	13.9ft	14.1ft	14.3ft
500	550	7.0ft	7.1ft	7.2ft	7.4ft	7.5ft	7.6ft	7.8ft	7.9ft	8.1ft	8.2ft	8.3ft	8.5ft	8.6ft	8.8ft	8.9ft	9.1ft
345	362 ¹⁴	4.3ft	4.3ft	4.4ft	4.5ft	4.6ft	4.7ft	4.8ft	4.9ft	5.0ft	5.1ft	5.2ft	5.3ft	5.4ft	5.5ft	5.6ft	5.7ft
287	302	5.2ft	5.3ft	5.4ft	5.5ft	5.6ft	5.7ft	5.8ft	5.9ft	6.1ft	6.2ft	6.3ft	6.4ft	6.5ft	6.6ft	6.8ft	6.9ft
230	242	4.0ft	4.1ft	4.2ft	4.3ft	4.3ft	4.4ft	4.5ft	4.6ft	4.7ft	4.8ft	4.9ft	5.0ft	5.1ft	5.2ft	5.3ft	5.4ft
161	169	2.7ft	2.7ft	2.8ft	2.9ft	2.9ft	3.0ft	3.0ft	3.1ft	3.2ft	3.3ft	3.3ft	3.4ft	3.5ft	3.6ft	3.7ft	3.8ft
138	145	2.3ft	2.3ft	2.4ft	2.4ft	2.5ft	2.5ft	2.6ft	2.7ft	2.7ft	2.8ft	2.8ft	2.9ft	3.0ft	3.0ft	3.1ft	3.2ft
115	121	1.9ft	1.9ft	1.9ft	2.0ft	2.0ft	2.1ft	2.1ft	2.2ft	2.2ft	2.3ft	2.3ft	2.4ft	2.5ft	2.5ft	2.6ft	2.7ft
88	100	1.5ft	1.5ft	1.6ft	1.6ft	1.7ft	1.7ft	1.8ft	1.8ft	1.8ft	1.9ft	1.9ft	2.0ft	2.0ft	2.1ft	2.2ft	2.2ft
69	72	1.1ft	1.1ft	1.1ft	1.2ft	1.2ft	1.2ft	1.2ft	1.3ft	1.3ft	1.3ft	1.4ft	1.4ft	1.4ft	1.5ft	1.6ft	1.6ft

⁺ Table 2 – Table of MVCD values at a 1.0 gap factor (in U.S. customary units), which is located in the EPRI report filed with FERC on August 12, 2015. (The 14000-15000 foot values were subsequently provided by EPRI in an updated Table 2 on December 1, 2015, filed with the FAC-003-4 Petition at FERC)



NERC FAC-003-5

Transmission Vegetation Management

4. an annual work plan

The conductor's position in space at any point in time is continuously changing in reaction to a number of different loading variables. Changes in vertical and horizontal conductor positioning are the result of thermal and physical loads applied to the line. Thermal loading is a function of line current and the combination of numerous variables influencing ambient heat dissipation including wind velocity/direction, ambient air temperature and precipitation. Physical loading applied to the conductor affects sag and sway by combining physical factors such as ice and wind loading. The movement of the transmission line conductor and the MVCD is illustrated in Figure 1 below.

NERC FAC-003-5 Transmission Vegetation Management

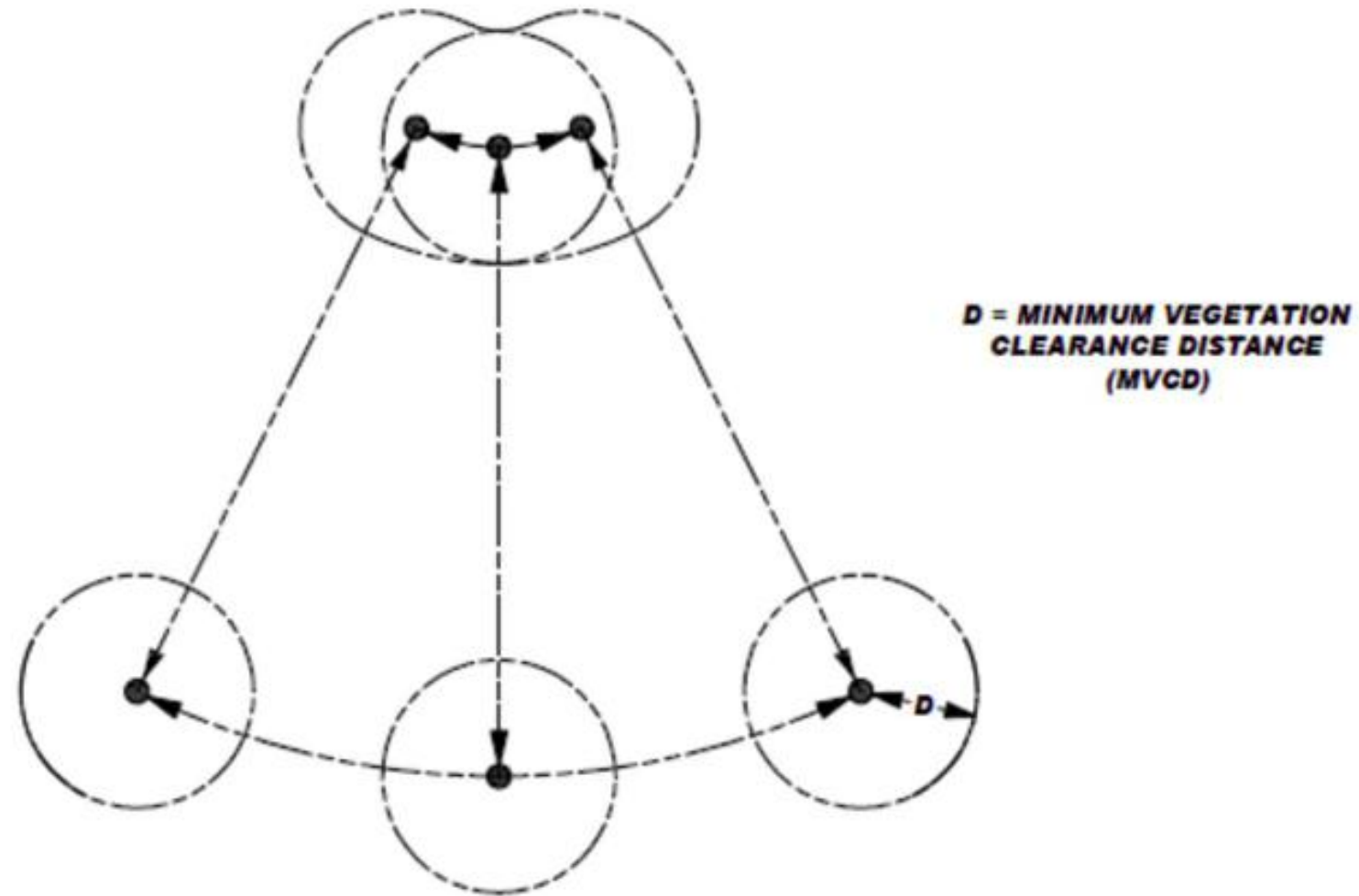


Figure 1

NESC Vegetation Management

218. Vegetation management

A. General

1. Vegetation management should be performed around supply and communication lines as experience has shown to be necessary. Vegetation that may damage ungrounded supply conductors should be pruned or removed.

NOTE 1: Factors to consider in determining the extent of vegetation management required include, but are not limited to: line voltage class, species' growth rates and failure characteristics, right-of-way limitations, the vegetation's location in relation to the conductors, the potential combined movement of vegetation and conductors during routine winds, and sagging of conductors due to elevated temperatures or icing.

NOTE 2: It is not practical to prevent all tree-conductor contacts on overhead lines.

2. Where pruning or removal is not practical, the conductor should be separated from the tree with suitable materials or devices to avoid conductor damage by abrasion and grounding of the circuit through the tree.

GO 95 (California) – Table 1

General Order 95

Section III

Requirements for All Lines

Table 1: Basic Minimum Allowable Vertical Clearance of Wires above Railroads, Thoroughfares, Ground or Water Surfaces; Also Clearances from Poles, Buildings, Structures or Other Objects (nn) (Letter References Denote Modifications of Minimum Clearances as Referred to in Notes Following This Table)

Case No.	Nature of Clearance	Wire or Conductor Concerned						
		A Span Wires (Other than TrolleySpan Wires) Overhead Guys and Messengers	B Communication Conductors (Including Open Wire, Cables and Service Drops), Supply Service Drops of 0 - 750 Volts	C Trolley Contact, Feeder and Span Wires, 0 - 5,000 Volts	D Supply Conductors of 0 - 750 Volts and Supply Cables Treated as in Rule 57.8	E Supply Conductors and Supply Cables, 750 - 22,500 Volts	F Supply Conductors and Supply Cables, 22.5 - 300 kV	G Supply Conductors and Supply Cables, 300 - 550 kV(mm)
1	Crossing above tracks of railroads which transport or propose to transport freight cars (maximum height 15 feet, 6 inches) where not operated by overhead contact wires. (a) (b) (c) (d)	25 Feet	25 Feet	22.5 Feet	25 Feet	28 Feet	34 Feet	34 Feet (kk)
2	Crossing or paralleling above tracks of railroads operated by overhead trolleys. (b) (c) (d)	26 Feet (e)	26 Feet (e) (f) (g)	22.5 Feet (h) (i) (eee)	20 Feet (ii)	25 Feet (o) (ii)	30 Feet (o) (ii)	30 Feet (o) (ii) (kk)
3	Crossing or along thoroughfares in urban districts or crossing thoroughfares in rural districts. (c) (d)	18 Feet (j) (k) (ii)	18 Feet (j) (l) (m) (ii) (kkk)	19 Feet (hh) (eee)	20 Feet (ii)	25 Feet (o) (ii)	30 Feet (o) (ii)	30 Feet (o) (ii) (kk)
4	Above ground along thoroughfares in rural districts or across other areas capable of being traversed by vehicles or agricultural equipment.	15 Feet (k)	15 Feet (m) (n) (p)	19 Feet (eee)	19 Feet	25 Feet (o)	30 Feet (o) (p)	30 Feet (o) (kk)
5	Above ground in areas accessible to pedestrians only	8 Feet	10 Feet (m) (q)	19 Feet (eee)	12 Feet	17 Feet	25 Feet (o)	25 Feet (o) (kk)
6	Vertical clearance above walkable surfaces on buildings, (except generating plants or substations) bridges or other structures which do not ordinarily support conductors, whether attached or unattached.	8 Feet (r)	8 Feet (r)	8 Feet	8 Feet	12 Feet	12 Feet	20 Feet (ll)
6a	Vertical clearance above non-walkable surfaces on buildings, (except generating plants or substations) bridges or other structures, which do not ordinarily support conductors, whether attached or unattached	2 Feet	8 Feet (yy)	8 Feet	8 Feet (zz)	8 Feet	8 Feet	20 Feet
7	Horizontal clearance of conductor at rest from buildings (except generating plants and substations), bridges or other structures (upon which men may work) where such conductor is not attached thereto (s) (t)	-	3 Feet (u)	3 Feet	3 Feet (u) (v)	6 Feet (v)	6 Feet (v)	15 Feet (v)
8	Distance of conductor from center line of pole, whether attached or unattached (w) (x) (y)	-	15 inches (s) (aa)	15 inches (aa) (bb) (cc)	15 inches (o) (aa) (dd)	15 or 18 inches (o) (dd) (ee) (jj)	18 inches (dd) (ee)	Not Applicable
9	Distance of conductor from surface of pole, crossarm or other overhead line structure upon which it is supported, providing it complies with case 8 above (x) (ee)	-	3 inches (aa) (ff)	3 inches (aa) (cc) (gg)	3 inches (aa) (dd) (gg)	3 inches (dd) (gg) (jj)	1/4 Pin Spacing Shown in Table 2 Case 15 (dd)	1/2 Pin Spacing Shown in Table 2 Case 15 (dd)
10	Radial centerline clearance of conductor or cable (unattached) from non-climbable street lighting or traffic signal poles or standards, including mastarms, brackets and lighting fixtures, and from antennas that are not part of the overhead line system.	-	1 Foot (u) (rr) (ss)	15 inches (bb) (cc)	3 Feet (oo)	6 Feet (pp)	10 Feet (qq)	10 Feet (ll)
11	Water areas not suitable for sailboating (tt) (uu) (ww) (xx)	15 Feet	15 Feet	-	15 Feet	17 Feet	25 Feet	25 Feet (kk)
12	Water areas suitable for sailboating, surface area of: (tt) (vv) (ww) (xx) (A) Less than 20 acres (B) 20 to 200 acres (C) Over 200 to 2,000 acres (D) Over 2,000 acres	18 Feet 26 Feet 32 Feet 38 Feet	18 Feet 26 Feet 32 Feet 38 Feet	- - - -	18 Feet 26 Feet 32 Feet 38 Feet	20 Feet 28 Feet 34 Feet 40 Feet	27 Feet 35 Feet 41 Feet 47 Feet	27 Feet (kk) 35 Feet (kk) 41 Feet (kk) 47 Feet (kk)
13	Radial clearance of bare line conductors from tree branches or foliage (aaa) (ddd)	-	-	18 inches (bbb)	-	18 inches (bbb)	1/4 pin spacing shown in Table 2, Case 15 (bbb) (ccc)	1/2 pin spacing shown in Table 2, Case 15
14	Radial clearance of bare line conductors from vegetation in Extreme and Very High Fire Threat Zones in Southern California (aaa) (ddd) (hhh) (jjj)	-	-	18 inches (bbb)	-	48 inches (bbb) (iii)	48 inches (fff)	120 inches (ggg)



GO 95 (California) – Table 1

18” for 22.5kV lines and lower

Transmission Voltages are higher, but still low

There are no adjustments for altitude

G.O. 95 makes no mention of any wire movements to be considered for vegetation clearance measurements.

CSA 22.3 No.1 / CSA 60826 (Canada)

5.2.10 Vegetation management for supply-line conductors under swing — Lines operating at >70 kV phase-to-phase

Vegetation shall maintain the flashover distances specified in Tables [35](#) and [36](#) for the following cases:

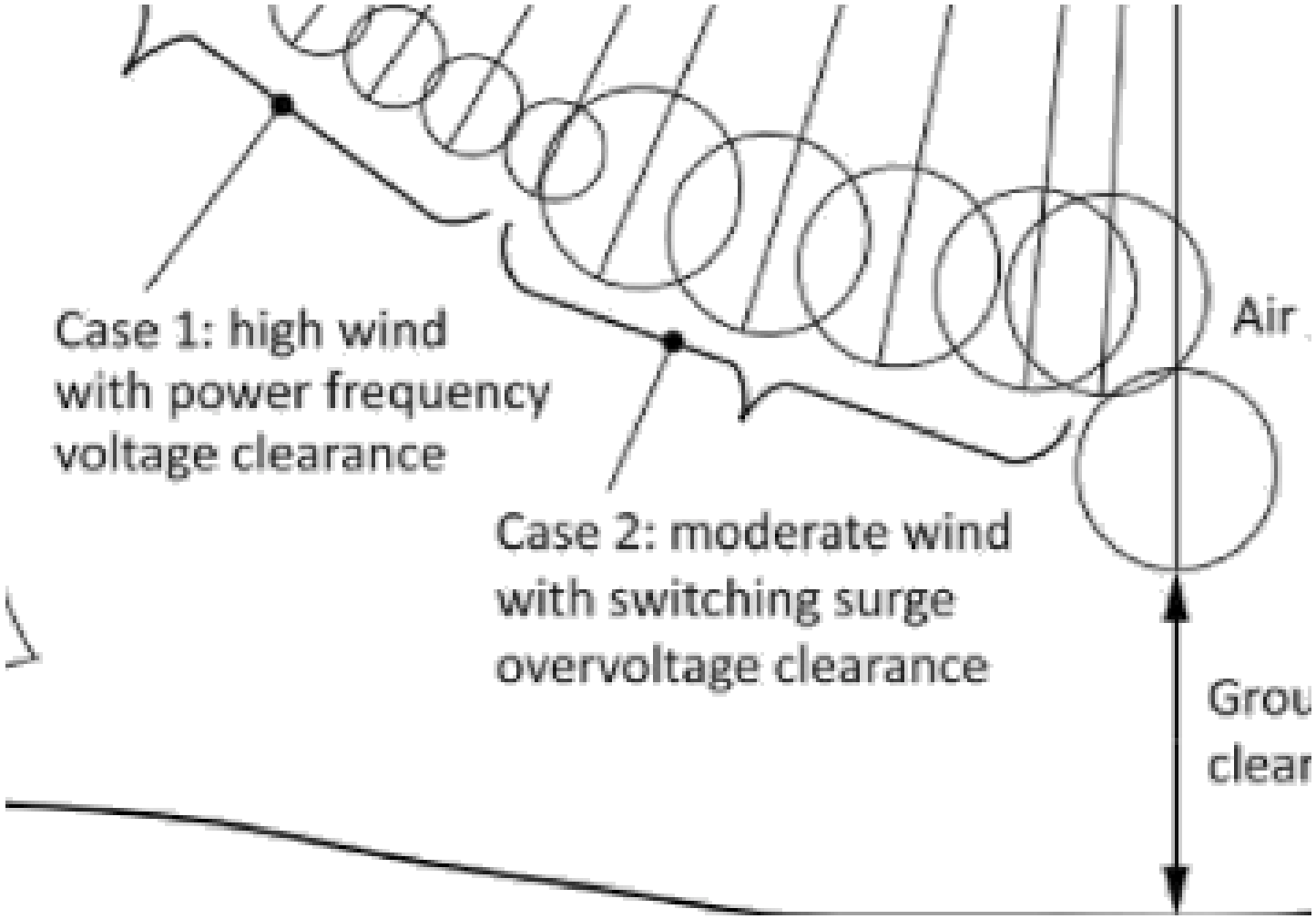
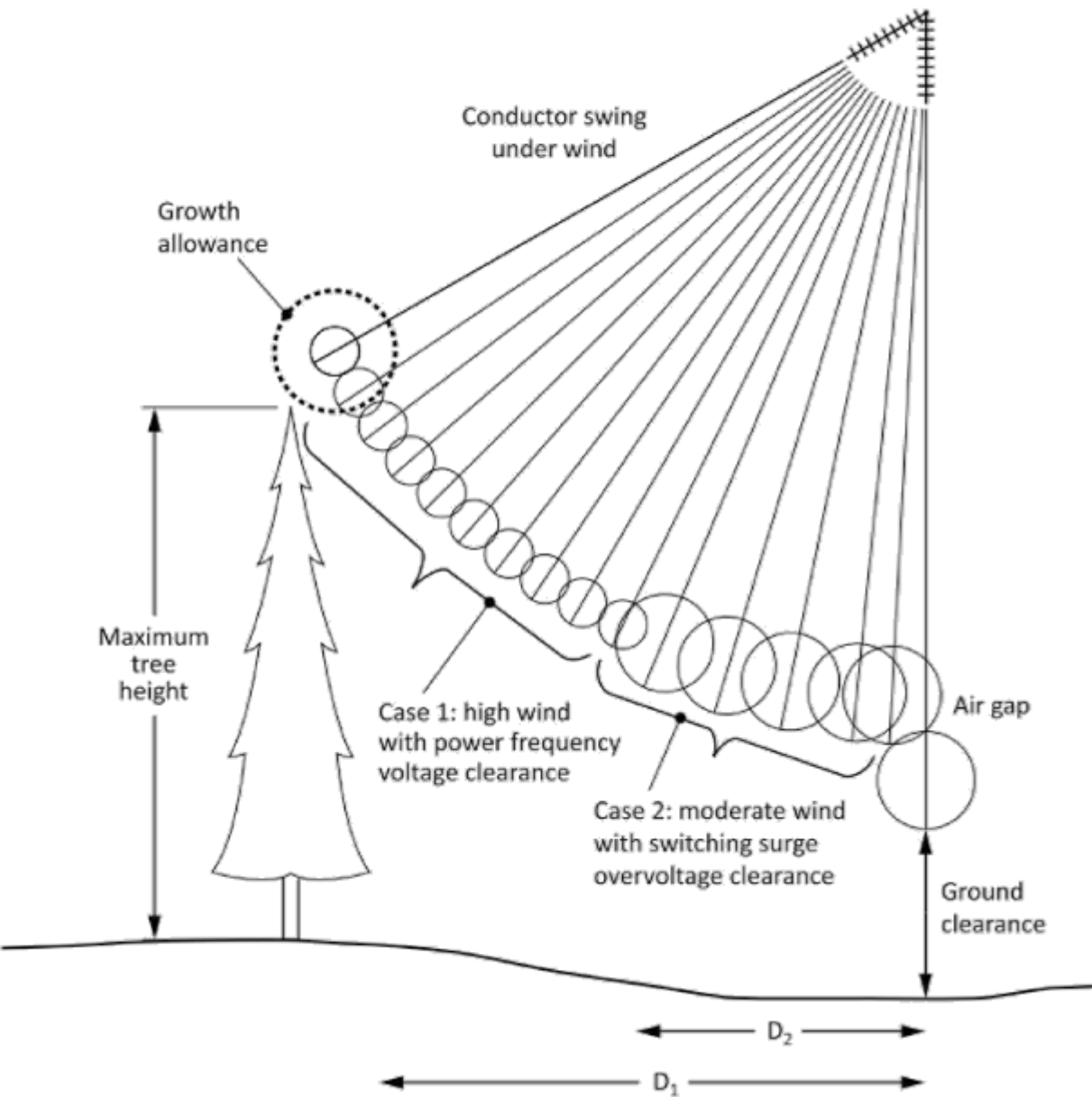
- a) Case 1: High wind with power frequency voltage (maximum voltage for dc), where high wind is defined as the 5-year or 75% of the 50-year return design wind. Wind speed height factor (CH) shall be applied to wind speed and GL factor shall be applied to the wind pressure. This condition shall be used in rural areas, wooded areas, and/or areas where the risk of wildfires is high. Refer to CSA C22.3 No. 60826 for guidance.
- b) Case 2: Moderate wind at switching surge overvoltage, where moderate wind is defined as the daily maximum wind averaged over a number of years of data available. If wind statistics are not available, 230 Pa (18 m/s) wind value may be used in calculations. This condition shall be used for all supply-line conductors, including urban areas or areas where the risk of wildfires is low. (See Clause [5.2.8](#).)

The continuous arc formed by the conductor for each case shall be considered.

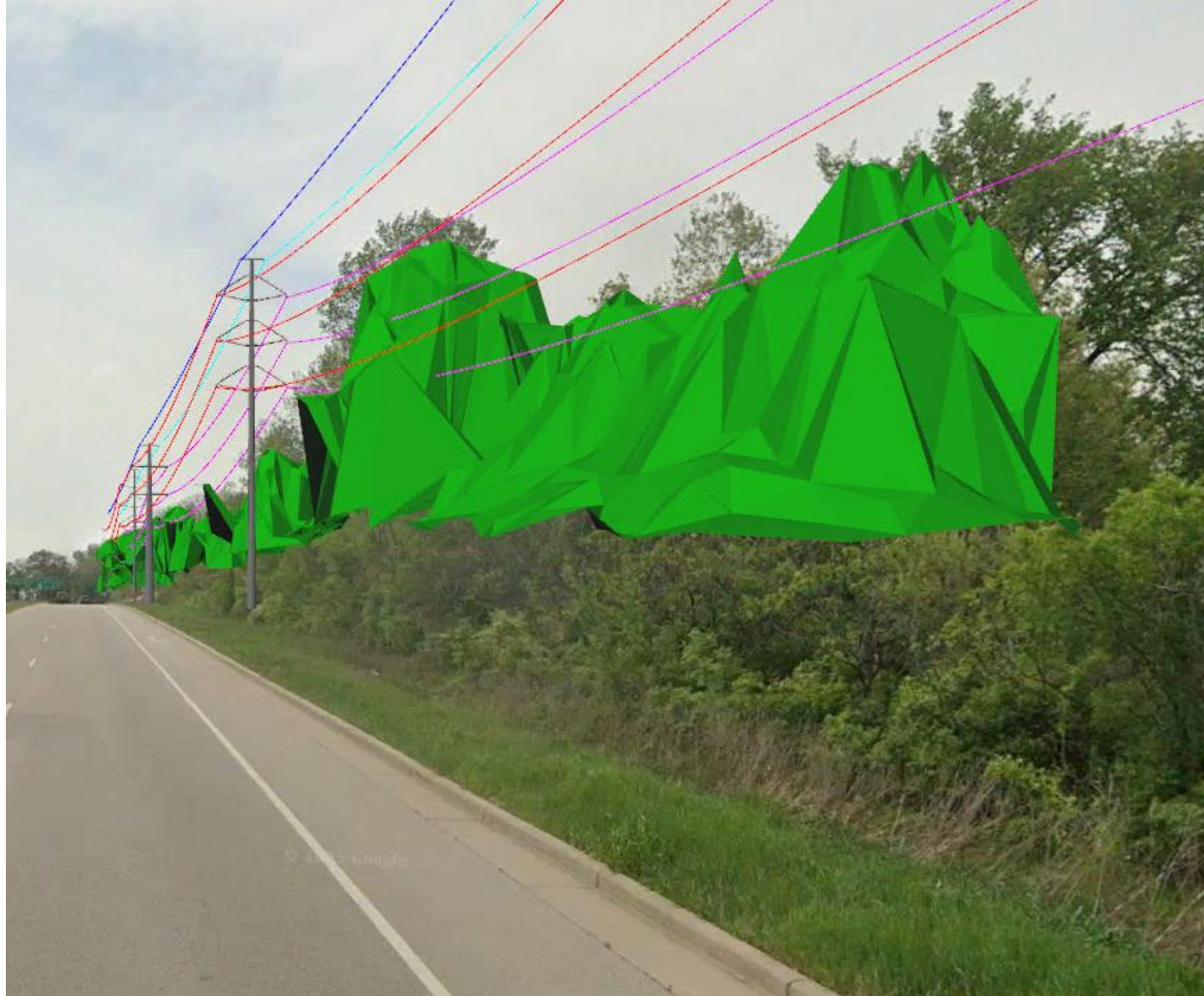
CSA 22.3 No.1 / CSA 60826 (Canada)

Figure A.5A

Vegetation management for supply-line conductors under swing
 (See Clause [A.5.2.10.](#))



Does PLS do Vegetation Management?



What about PLS and SPIDA?

PLS Will Import SPIDA Projects

Developing New PLA Program

When will PLS use AI?



*Riverwood
Properties*
LLC
CUSTOM HOME BUILDING
Call Roger 417-840-0134
B25-477


**RIVERWOOD
PROPERTIES LLC**
Custom Homes by Roger Richardson
(417) 840-0134
DYKE LUMBER & MILLWORK
Material Supplied By
 **417-887-2806**
www.dykelumberandmillworks.com







When will PLS use AI?

When will PLS use AI?

PLS Already Uses AI!

PLS Questions – When will PLS use AI?

[Optimum Spotting](#)

[Optimum Body and Leg Extensions](#)

and [Optimum Body and Leg Extensions Video](#)

[Automatic Pole Embedment Optimization for Multi-Pole Structures](#)

[Project Templates in PLS-GRID](#)

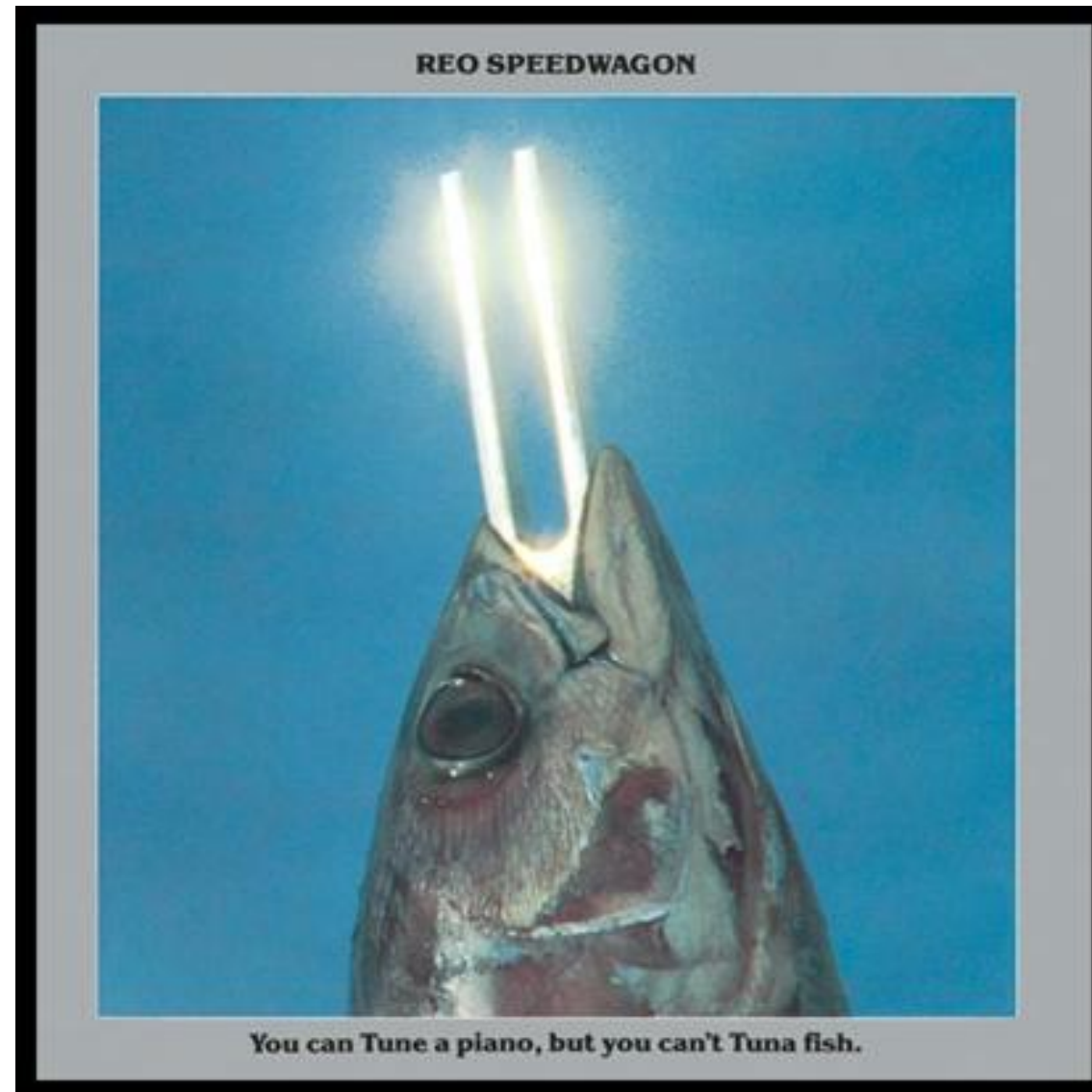
[Steel Pole and Tubular Davit Arm Optimization](#)

[TOWER Optimization Methods](#)

[PLS-GRID Analytics, and Automatic Model Builder](#)

PLS Questions – When will PLS use AI?

Stay tuned!



THANK YOU FOR ATTENDING!

