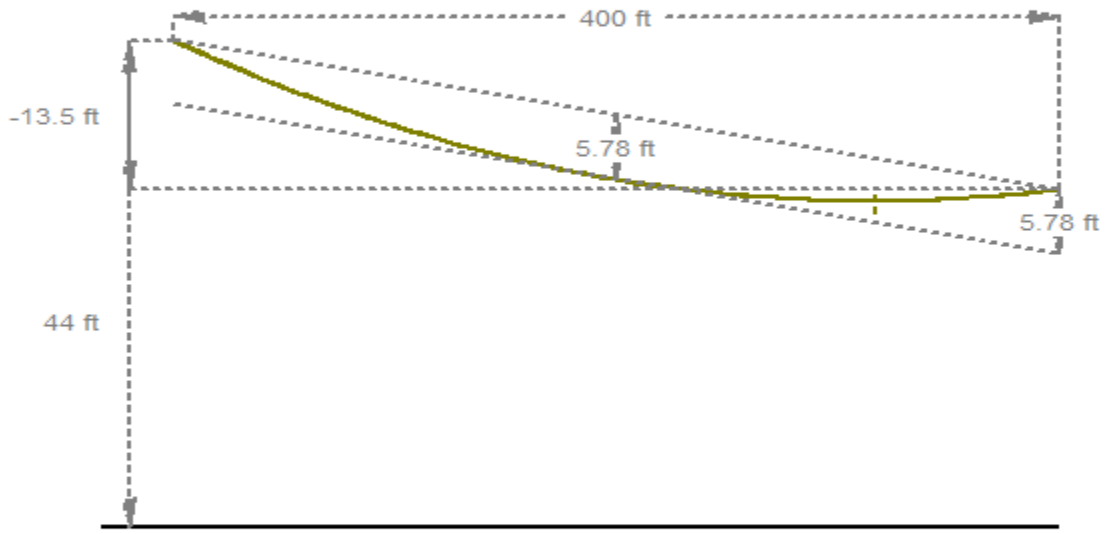
Profile View



Span Geometry and Properties
Project Name 'c:\users\public\documents\pls\pls_cadd\examples\projects\Untitled.ult'

Wire Properties 'https://www.powline.com/cables/generic/nonlinear/steel/3_4-19_strand_ehs_steel.wir'
Span Horizontal Projection 400 (ft)
Span Vertical Projection -13.5 (ft)
Average Attachment Height Above Ground 37.25 (ft)
Ground Elevation 0 (ft)
Ruling Span 400 (ft) (same as span horizontal projection)
Sagging Wire Temperature 60 (deg F)
Sagging Wire Condition 'Initial'
Sagging Method 'Horizontal-Tension'
Sagging Horizontal Component of Tension 4000 (lbs)
Sagging Catenary Constant 3463.2 (ft) (equivalent to input sagging tension)
Sagging Mid Span Sag 5.77989 (ft) (equivalent to input sagging tension)
Sagging Wire Slack 0.2222 (ft) (equivalent to input sagging tension)
Graphics above show wire displayed for sagging temperature/condition.
Graphics above have wire sag labeled for sagging temperature.

Cable Data Report
Name and description: //www.powline.com/cables/generic/nonlinear/steel/3_4-19_strand_ehs_steel.wir 3/4 inch EHS 19 Strands Steel - Adapted from 1970's Publicly Available Data
Cable model: Nonlinear cable model (separate polynomials for initial and creep behavior for inner and outer materials).
Cross section area 0.335800 (in^2)
Weight per unit length 1.155 (lbs/ft)
Outside diameter 0.75 (in)
Ultimate tension 58300 (lbs)
Outer strands modulus of elasticity 250000 (psi/100)
Outer strands thermal expansion coefficient 0.00064 (/100 deg)
Test temperature at which stress-strain and creep data below applies 70 (deg F)
Outer strands stress-strain polynomial coefficients: 1628.6 186131 285339 -640319 339881 (psi/100)
Outer strands creep polynomial coefficients: 1628.6 186131 285339 -640319 339881 (psi/100)

Criteria Notes:
Typical 2012 NESC C2-2012 Criteria File for PLS-CADD Created December 4, 2014 Version 13.20

Assumed NESC Heavy Combined Ice and Wind District Loading (Rule 250B)
Assumed 90 MPH Extreme Wind Loading (Rule 250C); To be verified by the Engineer of Record
Assumed 1" Extreme Ice with 40 MPH Concurrent Wind Loading (Rule 250D); To be verified by the Engineer of Record
Assumed Maximum Operating Temperature of 212 F; To be verified by the Engineer of Record
Assumed 1/2" Extreme Ice (Non-NESC); To be verified by the Engineer of Record
Assumed Grade B Construction by default. Grade C and Grade C Crossing can be assigned to structures manually using the
Structure Groups as discussed in section 7.3.12.9 of the PLS-CADD manual ; To be verified by the Engineer of Record

<<Illustration of NESC provisions include>>
> Combined Ice and Wind District Loading NESC Heavy per Rule 250B, Page 191
> Extreme Wind Loading per Rule 250C, Page 191, Coefficients and Gust Response Factors per Equations in Tables 250-2 and 250-3
> Assumed 90 MPH Basic Wind Speed, 3 second Gust Wind Speed, Figure 250-2 Beginning on Page 195
> Grade B Construction "Method A" per Table 253-1, Page 212 and Table 261-1, Page 222
> Extreme Ice with Concurrent Wind Loading per Rule 250D, Page 193
> Assumed 1" Basic Ice Diameter with Concurrent 40 MPH Basic Wind Speed, Figure 250-3 Beginning on Page 199
> Cable Tension and Automatic Sagging Limits per Rule 261H1, Page 219
 **** PLEASE NOTE - Many experts consider these limits to be high and could lead to severe aeolian vibration ****
 **** PLS recommends checking with your cable manufacturer, damper manufacturer, and/or other standards for recommended values ****
> Insulator Mechanical Strengths per Rule 277, Page 228 - Important Note for Strength Check:
 **** NESC Rule 277 specifically excludes Rule 253 Load Factors for checking the mechanical strength of insulators ****
 **** This Criteria checks Insulators for ALL cases using a Strength Factor of 1.0 applied to insulator working load properties. This may be considered conservative by some. ****
 **** When specifying the insulator strength properties in Components/Insulators in TOWER and PLS-POLE,
      the manufacturer`s recommended load capacities shall be used per NESC Table 277-1. This is normally the RTL and RCL
      values published by the non-ceramic insulator manufacturers. See IEEE Std 1572-2004 IEEE Guide for Application of
      Composite Line Post Insulators for further clarification. ****
 **** Per Rule 277, the Engineer of Record should decide what "proper allowance" is for Rules 250C and 250D and modify load cases accordingly ****
 **** User may prefer to add other specific load cases utilizing alternative Strength Factors ****
 **** Coordination of Load Factors, Strength Factors, and Component strength properties is the responsibility of the Engineer of Record ****
 **** See Tech Note at http://www.powline.com/products/nesc_insulators.html for additional discussion ****
> Structure Loads criteria includes typical Full Structure DE cases
> Structure Loads criteria includes longitudinal extreme wind check per Rule 261A1c(Page 214), Rule 261A2e(Page 215), and Rule 261A3d(Page215)

POWER LINE SYSTEMS, INC. IS NOT RESPONSIBLE FOR THE ACCURACY OF THE CONTENT HEREIN OR RESULTS OBTAINED FROM ITS USE ON ANY PROJECT.
THIS FILE IS PROVIDED FOR ILLUSTRATION ONLY. CRITERIA SHOULD BE CHECKED AND MODIFIED AS NECESSARY BY THE AN ENGINEER IN RESPONSIBLE CHARGE,
FAMILIAR WITH THE NESC AND LOCAL REQUIREMENTS OF THE AREA IN WHICH THE PROJECT IS LOCATED, AND ITS APPLICATION.
ENGINEER OF RECORD MUST VERIFY EXTREME WIND, CONCURRENT ICE AND WIND, AND EXTREME ICE PARAMETERS FOR THEIR APPLICABLE REGION.
ENGINEER OF RECORD MUST VERIFY MAXIMUM OPERATING CONDITION FOR THEIR APPLICABLE PROJECT
ENGINEER OF RECORD MUST VERIFY CONDITIONS AND FACTORS USED FOR INSULATOR STRENGTH CHECKS
ENGINEER OF RECORD MUST ADD ANY ADDITIONAL CRITERIA THAT MAY BE REQUIRED BEYOND THE NESC
ENGINEER OF RECORD MUST REMOVE THIS DISCLAIMER AND MODIFY ALL NOTES ABOVE AS APPLICABLE WHEN ASSUMING CHARGE OF THIS CRITERIA

Weather Cases

WC #	Description	Wind Vel.	Wind Pres.	Wire Ice	Wire Ice	Wire Ice	Wire Temp	Ambient Temp	NESC Constant	Wire Wind Height	Wire Gust

		(mph)	(psf)	Thick (in)	Density (lbs/ft^3)	Load (lbs/ft)	(deg F)	(deg F)	(lbs/ft)	Adjust Model	Response Factor
1	NESC Heavy District Loading (250B)	40	4.0	0.50	57.000	0.00	0	0	0.30	None	1
2	NESC Extreme Wind (250C)	90	20.7	0.00	0.000	0.00	60	60	0.00	NESC 2012	NESC 2012
3	NESC Concurrent Ice and Wind (250D)	40	4.1	1.00	57.000	0.00	15	15	0.00	None	1
4	Extreme Ice	0	0.0	0.50	57.000	0.00	30	30	0.00	None	1
5	Cold Uplift	0	0.0	0.00	0.000	0.00	-20	-20	0.00	None	1
6	Maximum Operating	0	0.0	0.00	0.000	0.00	212	90	0.00	None	1
7	NESC Tension Limit (261H1b)	0	0.0	0.00	0.000	0.00	0	0	0.00	None	1
8	NESC Blowout 6PSF	48	6.0	0.00	0.000	0.00	60	60	0.00	None	1
9	No Wind (SWING 1)	0	0.0	0.00	0.000	0.00	60	60	0.00	None	1
10	Moderate Wind (SWING 2)	48	6.0	0.00	0.000	0.00	32	32	0.00	None	1
11	Moderate Wind (SWING 3)	48	6.0	0.00	0.000	0.00	60	60	0.00	None	1
12	High Wind (SWING 4)	90	20.7	0.00	0.000	0.00	60	60	0.00	None	1
13	GALLOPING (SWING)	28	2.0	0.50	57.000	0.00	32	32	0.00	None	1
14	GALLOPING (SAG)	0	0.0	0.50	57.000	0.00	32	32	0.00	None	1
15	-20 Deg F	0	0.0	0.00	0.000	0.00	-20	-20	0.00	None	1
16	0 Deg F	0	0.0	0.00	0.000	0.00	0	0	0.00	None	1
17	30 Deg F	0	0.0	0.00	0.000	0.00	30	30	0.00	None	1
18	32 Deg F 1/2 Inch Ice	0	0.0	0.50	57.000	0.00	32	32	0.00	None	1
19	60 Deg F	0	0.0	0.00	0.000	0.00	60	60	0.00	None	1
20	90 Deg F	0	0.0	0.00	0.000	0.00	90	90	0.00	None	1
21	120 Deg F	0	0.0	0.00	0.000	0.00	120	90	0.00	None	1
22	167 Deg F	0	0.0	0.00	0.000	0.00	167	90	0.00	None	1
23	212 Deg F	0	0.0	0.00	0.000	0.00	212	90	0.00	None	1

Automatic Sagging Criteria

LC #	WC #	Description	Cable Condition	Allowable %Ultimate	Maximum Tension (lbs)	Maximum Catenary (ft)	Applicable Cable
1	1	NESC Heavy District Loading (250B)	Initial	60.000	0.000	0.000	ALL CABLES
2	2	NESC Extreme Wind (250C)	Initial	80.000	0.000	0.000	ALL CABLES
3	3	NESC Concurrent Ice and Wind (250D)	Initial	80.000	0.000	0.000	ALL CABLES
4	7	NESC Tension Limit (261H1b)	Initial	35.000	0.000	0.000	ALL CABLES
5	7	NESC Tension Limit (261H1b)	Creep	25.000	0.000	0.000	ALL CABLES

Weather case for final after creep 60 Deg F
Weather cases for final after load:
'NESC Heavy District Loading (250B)'
'NESC Extreme Wind (250C)'
'NESC Concurrent Ice and Wind (250D)' (controlling case)
'Extreme Ice'

Automatic Sagging Report

*** designates highest percent of allowable capacity.**

WC No.	Weather Case Description	Condition	Allowable % of Ultimate	Actual % of Ultimate	Allowable Tension (lbs)	Actual Tension (lbs)	Allowable Catenary (ft)	Actual Catenary (ft)	% of Allowable Capacity	OK or NG.
1	NESC Heavy District Loading (250B)	Initial	60.0	12.8		7490.7		3216.7	21.4	OK
2	NESC Extreme Wind (250C)	Initial	80.0	8.4		4883.1		3138.1	10.5	OK
3	NESC Concurrent Ice and Wind (250D)	Initial	80.0	15.7		9175.7		2635.8	19.7	OK
7	NESC Tension Limit (261H1b)	Initial	35.0	8.9		5181.7		4472.5	25.4	OK
7	NESC Tension Limit (261H1b)	Creep	25.0	8.9		5181.7		4472.5	35.6	OK *

Ruling Span Sag Tension Report

#	Description	Cable Load Hor. (lbs/ft)	Cable Load Vert (lbs/ft)	Cable Load Res. (lbs/ft)	R.S. Initial Cond. Max. Tens. (lbs)	R.S. Initial Cond. Hori. Tens. (lbs)	R.S. Initial Cond. Max Ten %UL	R.S. Initial Cond. C (ft)	R.S. Initial Cond. Sag (ft)	R.S. Final Cond. After Creep Max. Tens. (lbs)	R.S. Final Cond. After Creep Hori. Tens. (lbs)	R.S. Final Cond. After Creep Max Ten %UL	R.S. Final Cond. After Creep C (ft)	R.S. Final Cond. After Creep Sag (ft)	R.S. Final Cond. After Load Max. Tens. (lbs)	R.S. Final Cond. After Load Hori. Tens. (lbs)	R.S. Final Cond. After Load Max Ten %UL	R.S. Final Cond. After Load C (ft)	R.S. Final Cond. After Load Sag (ft)
1	NESC Heavy District Loading (250B)	0.58	1.93	2.32	7491	7457	13	3217	6.22	7491	7457	13	3217	6.22	7428	7395	13	3190	6.27
2	NESC Extreme Wind (250C)	1.03	1.16	1.55	4883	4864	8	3138	6.38	4883	4864	8	3138	6.38	4732	4712	8	3040	6.58
3	NESC Concurrent Ice and Wind (250D)	0.94	3.33	3.46	9176	9122	16	2636	7.59	9176	9122	16	2636	7.59	9176	9122	16	2636	7.59
4	Extreme Ice	0.00	1.93	1.93	6172	6143	11	3179	6.29	6172	6143	11	3179	6.29	6057	6028	10	3120	6.41
5	Cold Uplift	0.00	1.16	1.16	5693	5677	10	4915	4.07	5693	5677	10	4915	4.07	5484	5468	9	4734	4.23
6	Maximum Operating	0.00	1.16	1.16	2609	2589	4	2242	8.93	2578	2559	4	2215	9.03	2513	2494	4	2159	9.27
7	NESC Tension Limit (261H1b)	0.00	1.16	1.16	5182	5166	9	4473	4.47	5182	5166	9	4473	4.47	4961	4945	9	4281	4.67

8	NESC Blowout 6PSF	0.37	1.16	1.21	4151	4134	7	3404	5.88	4151	4134	7	3404	5.88	3971	3954	7	3256	6.14
9	No Wind (SWING 1)	0.00	1.16	1.16	4017	4000	7	3463	5.78	4017	4000	7	3463	5.78	3828	3811	7	3300	6.06
10	Moderate Wind (SWING 2)	0.37	1.16	1.21	4630	4613	8	3799	5.27	4630	4613	8	3799	5.27	4430	4413	8	3634	5.50
11	Moderate Wind (SWING 3)	0.37	1.16	1.21	4151	4134	7	3404	5.88	4151	4134	7	3404	5.88	3971	3954	7	3256	6.14
12	High Wind (SWING 4)	1.30	1.16	1.74	5265	5244	9	3021	6.62	5265	5244	9	3021	6.62	5135	5114	9	2946	6.79
13	GALLOPING (SWING)	0.29	1.93	1.95	6174	6145	11	3145	6.36	6174	6145	11	3145	6.36	6063	6034	10	3088	6.48
14	GALLOPING (SAG)	0.00	1.93	1.93	6134	6106	11	3160	6.33	6134	6106	11	3160	6.33	6017	5988	10	3099	6.46
15	-20 Deg F	0.00	1.16	1.16	5693	5677	10	4915	4.07	5693	5677	10	4915	4.07	5484	5468	9	4734	4.23
16	0 Deg F	0.00	1.16	1.16	5182	5166	9	4473	4.47	5182	5166	9	4473	4.47	4961	4945	9	4281	4.67
17	30 Deg F	0.00	1.16	1.16	4533	4517	8	3910	5.12	4533	4517	8	3910	5.12	4323	4307	7	3729	5.36
18	32 Deg F 1/2 Inch Ice	0.00	1.93	1.93	6134	6106	11	3160	6.33	6134	6106	11	3160	6.33	6017	5988	10	3099	6.46
19	60 Deg F	0.00	1.16	1.16	4017	4000	7	3463	5.78	4017	4000	7	3463	5.78	3828	3811	7	3300	6.06
20	90 Deg F	0.00	1.16	1.16	3607	3590	6	3108	6.44	3590	3573	6	3093	6.47	3441	3423	6	2964	6.75
21	120 Deg F	0.00	1.16	1.16	3280	3263	6	2825	7.08	3254	3237	6	2802	7.14	3138	3119	5	2701	7.41
22	167 Deg F	0.00	1.16	1.16	2890	2871	5	2486	8.05	2858	2839	5	2458	8.14	2773	2754	5	2385	8.39
23	212 Deg F	0.00	1.16	1.16	2609	2589	4	2242	8.93	2578	2559	4	2215	9.03	2513	2494	4	2159	9.27