



# PRECISION DESIGN

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November 29, 2018

Suresite for AT&T  
36 Executive Park, Suite 210  
Irvine, CA 92614

Subj: CRAN\_RSFR\_LOSA0\_015

We have analyzed the wood pole at ROW adjacent to 14185 Miranda Road, Los Altos Hills, CA 94022 (37.383858, -122.128656) using O-Calc Pro 5.03 Utility Pole software.

Data for the wood pole was obtained from a previous site walk and photographs on May 25, 2018, as well as Google Earth images. Proposed equipment is provided by our client. Based on our analysis the pole with proposed loading is at 94.0% capacity and may be **considered adequate to support the proposed loads.**

Please contact me if you have any questions.

Sincerely,

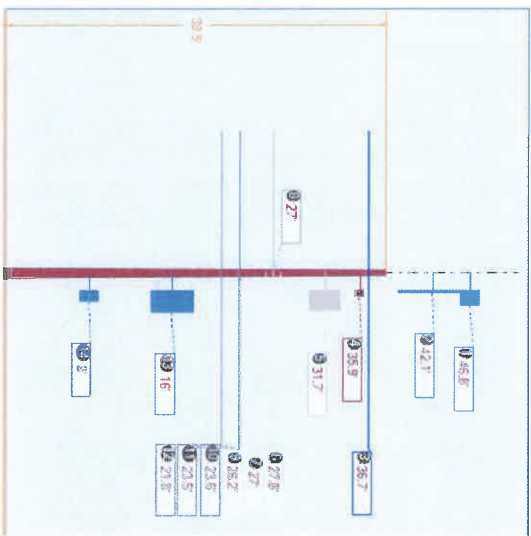
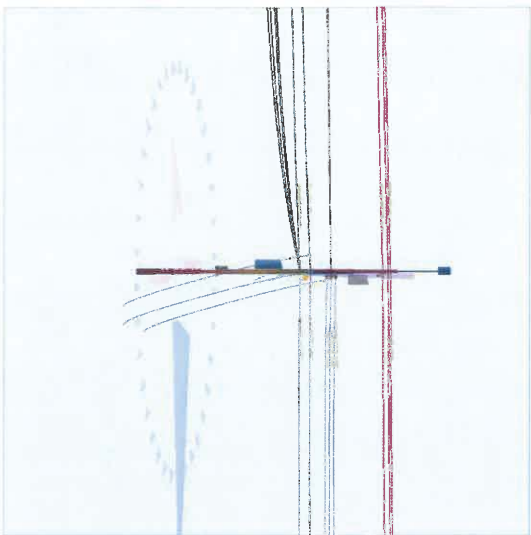
Bret McComb, P.E.



Attachments:

1. O-Calc Output: 4 pages
2. Pole Size Chart 1 Page

**Pole Num:** CRAN\_RSFR\_LOSA0\_15    **Pole Length / Class:** 45 / 4    **Code:** GO 95    **Structure Type:** Guyed Tangent  
**Aux Data 1:** Unset    **Species:** DOUGLAS FIR    **NESC Rule:** -    **Status:** B Pole Strength Factor: Guy Wires Adequate  
**Aux Data 2:** Unset    **Setting Depth (ft):** 6.50    **Construction Grade:** Light    **Transverse Wind LF:** 1.00  
**Aux Data 3:** Unset    **G/L Circumference (in):** 34.82    **Loading District:** 0.00    **Wire Tension LF:** 1.00  
**Aux Data 4:** Unset    **G/L Fiber Stress (psi):** 8,000    **Ice Thickness (in):** 3,892    **Wind Speed (mph):** 55.90    **Vertical LF:** 1.00  
**Aux Data 5:** Unset    **Allowable Stress (psi):** No    **Wind Pressure (psf):** 8.00  
**Aux Data 6:** Unset    **Fiber Stress Ht. Reduc:** 37.383858 Deg    **Longitude:** -122.128656 Deg    **Elevation:** 259.7 Feet  
**Latitude:**



Pole Capacity Utilization (%)	Height (ft)	Wind Angle (deg)
<b>Crossarm allowance 300 lbs</b>		
Maximum	94.0	0.0
Groundline	94.0	0.0
Vertical	2.3	23.6

Pole Moments (ft-lb)	Load Angle (deg)	Wind Angle (deg)
<b>Crossarm allowance 300 lbs</b>		
Max Cap Util	40,467	93.9
Groundline	40,467	93.9
GL Allowable	43,359	89.3

**Guy System Component Summary**

Description	Lead Length (ft)	Lead Angle (deg)	Height (ft)	Load From Worst Wind Angle on Pole		Individual Maximum Load	
				Nominal Capacity (%)	Wind Angle (deg)	Max Load Capacity (%)	Wind Angle (deg)
▶ Anchor • EHS 9/16 (Span/Head)	190.0	180.0	27.0	23.3	89.3	25.9	0.0
<b>System Capacity Summary:</b>				16.6	89.3	18.5	0.0
				<b>Adequate</b>			

Groundline Load Summary - Reporting Angle Mode: Load - Reporting Angle: 93.9°												
	Shear Load* (lbs)	Applied Load (%)	Bending Moment (ft-lb)	Applied Moment (%)	Pole Capacity (%)	Bending Stress (+/- psi)	Vertical Load (lbs)	Vertical Stress (psi)	Total Stress (psi)	Pole Capacity (%)		
Powers	89	5.3	3,292	8.1	7.6	291	22	0	292	7.5		
Comms	817	48.8	18,561	45.9	42.8	1,643	618	6	1,650	42.4		
GuyBraces	333	19.9	9,122	22.5	21.0	808	64	1	808	20.8		
PowerEquipments	48	2.8	1,490	3.7	3.4	132	365	4	136	3.5		
GenericEquipments	143	8.5	3,017	7.5	7.0	267	213	2	269	6.9		
Pole	227	13.6	4,442	11.0	10.3	393	1,015	11	404	10.4		
Crossarms	1	0.1	48	0.1	0.1	4	53	1	5	0.1		
Insulators	16	1.0	495	1.2	1.1	44	61	1	44	1.1		
Pole Load	1,674	100.0	40,467	100.0	93.3	3,583	2,411	25	3,608	92.7		
Pole Reserve Capacity			2,892		6.7	310			285	7.3		

Load Summary by Owner - Reporting Angle Mode: Load - Reporting Angle: 93.9°												
	Shear Load* (lbs)	Applied Load (%)	Bending Moment (ft-lb)	Applied Moment (%)	Pole Capacity (%)	Bending Stress (+/- psi)	Vertical Load (lbs)	Vertical Stress (psi)	Total Stress (psi)	Pole Capacity (%)		
<Undefined>	862	51.5	20,944	51.8	48.3	1,854	1,157	12	1,866	47.9		
Comm	245	14.6	5,714	14.1	13.2	506	157	2	508	13.0		
PG&E	340	20.3	9,366	23.1	21.6	829	82	1	830	21.3		
Pole	227	13.6	4,442	11.0	10.3	393	1,015	11	404	10.4		
<b>Totals:</b>	<b>1,674</b>	<b>100.0</b>	<b>40,467</b>	<b>100.0</b>	<b>93.3</b>	<b>3,583</b>	<b>2,411</b>	<b>25</b>	<b>3,608</b>	<b>92.7</b>		

Detailed Load Components:

Power	Owner	Height (ft)	Horiz. Offset (in)	Cable Diameter (in)	Sag at Max Temp (ft)	Cable Weight (lbs/ft)	Lead/Span Length (ft)	Span Angle (deg)	Wire Length (ft)	Tension (lbs)	Tension Moment* (ft-lb)	Offset Moment* (ft-lb)	Wind Moment* (ft-lb)	Moment at Gl.* (ft-lb)
Primary	AAC 4 AWG 7 STRAND ROSE	36.73	40.34	0.2320	0.54	0.039	178.0	0.0	178.0	529	-1,323	11	505	-807
Primary	AAC 4 AWG 7 STRAND ROSE	36.73	40.34	0.2320	0.71	0.039	205.0	180.0	205.0	529	1,323	13	581	1,918
Primary	AAC 4 AWG 7 STRAND ROSE	36.73	15.89	0.2320	0.54	0.039	178.0	0.0	178.0	529	-1,323	-4	505	-823
Primary	AAC 4 AWG 7 STRAND ROSE	36.73	15.89	0.2320	0.71	0.039	205.0	180.0	205.0	529	1,323	-5	581	1,899
Primary	AAC 4 AWG 7 STRAND ROSE	36.73	40.34	0.2320	0.54	0.039	178.0	0.0	178.0	529	-1,323	-12	505	-830

Primary	AAC 4 AWG 7 STRAND ROSE	36.73	40.34	0.2320	0.71	0.039	205.0	180.0	205.0	529	1,323	-13	581	1,891
<b>Totals:</b>											<b>0</b>	<b>-10</b>	<b>3,257</b>	<b>3,247</b>

Comm	Owner	Height (ft)	Horiz. Offset (in)	Cable Diameter (in)	Sag at Max Temp (ft)	Cable Weight (lbs/ft)	Lead/Span Length (ft)	Span Angle (deg)	Wire Length (ft)	Tension (lbs)	Tension Moment* (ft-lb)	Offset Moment* (ft-lb)	Wind Moment* (ft-lb)	Moment at GL* (ft-lb)
Overlashed Bundle		27.75	15.46	0.5000	1.76	0.517	178.0	0.0	178.0	2,000	-3,782	-1	867	-2,916
Overlashed Bundle		27.00	15.50	0.5000	1.76	0.517	178.0	0.0	178.0	2,000	-3,680	-1	843	-2,837
Telco		27.00	15.50	1.0000	3.54	0.400	115.0	90.0	115.4	200	5,367	-1	-1	5,365
Overlashed Bundle		26.25	15.54	0.5000	1.76	0.517	178.0	0.0	178.0	2,000	-3,577	-1	820	-2,758
Telco	Comm	23.58	6.69	1.0000	2.53	0.400	178.0	0.0	178.0	2,000	-3,214	20	1,396	-1,798
Telco	Comm	23.58	6.69	1.0000	2.74	0.400	190.0	180.0	190.0	2,000	3,214	21	1,490	4,725
Telco		23.58	6.70	1.0000	3.54	0.400	115.0	90.0	115.4	200	4,688	13	-1	4,701
Telco		23.49	36.62	1.0000	3.54	0.400	115.0	90.0	115.4	200	4,596	3	-1	4,598
Telco	Comm	21.75	6.80	1.0000	2.53	0.400	178.0	0.0	178.0	2,000	-2,964	20	1,287	-1,657
Telco	Comm	21.75	6.80	1.0000	2.74	0.400	190.0	180.0	190.0	2,000	2,964	21	1,374	4,360
CATV		21.75	6.80	0.5700	6.01	0.600	190.0	180.0	190.6	500	741	32	783	1,557
CATV		21.75	6.80	0.5700	5.19	0.600	190.0	180.0	190.4	600	889	32	783	1,705
CATV		21.75	6.80	0.5700	4.89	0.600	190.0	180.0	190.3	650	963	32	783	1,779
CATV		21.75	6.80	0.5700	6.56	0.600	190.0	180.0	190.7	450	667	32	783	1,482
<b>Totals:</b>											<b>6,873</b>	<b>224</b>	<b>11,209</b>	<b>18,305</b>

Power Equipment	Owner	Height (ft)	Horiz. Offset (in)	Offset Angle (deg)	Rotate Angle (deg)	Unit Weight (lbs)	Unit Height (in)	Unit Depth (in)	Unit Diameter (in)	Unit Length (in)	Offset Moment* (ft-lb)	Wind Moment* (ft-lb)	Moment at GL* (ft-lb)
Transformer		31.67	16.73	0.0	0.0	365.00	39.00	--	22.00	--	-35	1,505	1,470
<b>Totals:</b>											<b>-35</b>	<b>1,505</b>	<b>1,470</b>

Generic Equipment	Owner	Height (ft)	Horiz. Offset (in)	Offset Angle (deg)	Rotate Angle (deg)	Unit Weight (lbs)	Unit Height (in)	Unit Depth (in)	Unit Diameter (in)	Unit Length (in)	Offset Moment* (ft-lb)	Wind Moment* (ft-lb)	Moment at GL* (ft-lb)
Box	Housing For RRUs	16.00	12.63	225.0	0.0	130.00	53.00	16.00	--	23.00	-90	1,450	1,360
Box	100amp Meter	8.00	7.40	225.0	0.0	10.00	24.00	4.63	--	12.00	-4	138	134
Cylinder	3" Dia 7' Steel Pipe	42.05	0.14	0.0	0.0	53.06	84.00	--	3.00	--	0	587	587
Cylinder	Antenna-KIMW FX-OM2LL OH2	46.76	0.36	180.0	0.0	20.00	24.00	--	16.00	--	0	894	894
<b>Totals:</b>											<b>-94</b>	<b>3,069</b>	<b>2,975</b>

Crossarm	Owner	Height (ft)	Horiz. Offset (in)	Offset Angle (deg)	Rotate Angle (deg)	Unit Weight (lbs)	Unit Height (in)	Unit Depth (in)	Unit Length (in)	Offset Moment* (ft-lb)	Wind Moment* (ft-lb)	Moment at GL* (ft-lb)	
Normal	CROSSARM 3-1/2 X 4-1/2 X 8	35.92	5.24	0.0	0.0	53.00	4.50	3.50	96.00	-2	49	47	
<b>Totals:</b>											<b>-2</b>	<b>49</b>	<b>47</b>

Insulator	Owner	Height (ft)	Horiz. Offset (in)	Offset Angle (deg)	Rotate Angle (deg)	Unit Weight (lbs)	Unit Diameter (in)	Unit Length (in)	Offset Moment* (ft-lb)	Wind Moment** (ft-lb)	Moment at GL* (ft-lb)	
Pin	Insulator	36.10	40.00	82.5	0.0	6.00	5.50	7.50	20	83	103	
Pin	Insulator	36.10	-15.00	289.2	0.0	6.00	5.50	7.50	-8	83	75	
Pin	Insulator	36.10	-40.00	277.5	0.0	6.00	5.50	7.50	-20	83	63	
Suspension	Suspension 11.50"	27.75	0.00	0.0	0.0	11.00	4.75	11.50	-1	84	83	
Suspension	Suspension 11.50"	27.00	0.00	0.0	0.0	11.00	4.75	11.50	-1	82	81	
Suspension	Suspension 11.50"	26.25	0.00	0.0	0.0	11.00	4.75	11.50	-1	79	81	
Bolt	Communication-Single Bolt	23.58	0.00	90.0	0.0	5.00	3.00	3.00	3	0	3	
Bolt	Communication-Single Bolt	21.75	0.00	90.0	0.0	5.00	3.00	3.00	3	0	3	
<b>Totals:</b>										<b>-5</b>	<b>493</b>	<b>488</b>

Guy Wire and Brace	Owner	Attach Height (ft)	End Height (ft)	Lead/Span Length (ft)	Wire Diameter (in)	Percent Solid (%)	Lead Angle (deg)	Incline Angle (deg)	Wire Weight (lbs/ft)	Rest Length (ft)	Stretch Length (in)
EHS 9/16	PG&E	27.00	27.00	190.00	0.562	75.00	180.0	0.0	0.67	189.28	2.32
Span/Head		PG&E		27.00		190.00					

Guy Wire and Brace (Loads and Reactions)	Elastic Modulus (psi)	Rated Tensile Strength (lbs)	Guy Strength Factor	Allowable Tension (lbs)	Initial Tension (lbs)	Loaded Tension*2 (lbs)	Maximum Tension*2 (lbs)	Applied Tension*3 (lbs)	Vertical Load (lbs)	Shear Load In Guy Dir (lbs)	Shear Load At Report Angle (lbs)	Moment at GL*3 (ft-lb)		
EHS 9/16		2.30e+7	35.000	0.75	26,250	700	4,851	4,368	0	4,368	298	8,997		
Span/Head			35.000	0.75	26,250	700	4,851	4,368	0	4,368	298	8,997		
<b>Totals:</b>											<b>0</b>	<b>4,368</b>	<b>298</b>	<b>8,997</b>

Anchor/Rod Load Summary	Owner	Rod Length AGL (in)	Lead Length (ft)	Lead Angle (deg)	Strength of Assembly (lbs)	Anchor/Rod Strength Factor	Allowable Load (lbs)	Max Load*2 (lbs)	Load at Pole MCU*3 (lbs)	Max Required Capacity*2 (%)
Anchor	PG&E	6.00	190.00	180.0	25,000	0.75	18,750	4,851	4,368	25.9

Pole Buckling	Buckling Constant	Buckling Column Height*2 (ft)	Buckling Section Height (% Buckling Col. Hgt.)	Buckling Section Diameter (in)	Minimum Buckling Diameter at GL (in)	Diameter at Tip (in)	Diameter at GL (in)	Modulus of Elasticity (psi)	Pole Density (pcf)	Ice Density (pcf)	Pole Tip Height (ft)	Buckling Load Capacity at Height (lbs)	Buckling Load Applied at Height (lbs)	Buckling Load Factor of Safety
	0.71	23.57	33.65	10.18	8.28	6.69	11.09	1.60e+6	60.00	57.00	38.50	103,483	1048.21	43.48

**DOUGLAS FIR POLE SIZING CHART**

Class	H-6	H-5	H-4	H-3	H-2	H-1	1	2	3	4	5	6	
	Minimum Circumference at 6 feet from Butt (Inches)												
Minimum Circumference at Top (Inches)	39	37	35	33	31	29	27	25	23	21	19	17	
Length of Pole (Feet)	20	-	-	-	-	-	31.0	29.0	27.0	25.0	23.0	21.0	
	25	-	-	-	-	-	33.5	31.5	29.5	27.5	25.5	23.0	
	30	-	-	-	-	-	36.5	34.0	32.0	29.5	27.5	25.0	
	35	-	-	-	-	43.5	39.0	36.5	34.0	31.5	29.0	27.0	
	40	-	-	51.0	48.5	46.0	43.5	41.0	38.5	36.0	33.5	31.0	28.5
	45	58.5	56.0	53.5	51.0	48.5	45.5	43.0	40.5	37.5	35.0	32.5	30.0
	50	61.0	58.5	55.5	53.0	50.5	47.5	45.0	42.0	39.0	36.5	34.0	-
	55	63.5	60.5	58.0	55.0	52.0	49.5	46.5	43.5	40.5	38.0	-	-
	60	65.5	62.5	59.5	57.0	54.0	51.0	48.0	45.0	42.0	39.0	-	-
	65	67.5	64.5	61.5	58.5	55.5	52.5	49.5	46.5	43.5	40.5	-	-
	70	69.0	66.5	63.5	60.5	57.0	54.0	51.0	48.0	45.0	41.5	-	-
	75	71.0	68.0	65.0	62.0	59.0	55.5	52.5	49.0	46.0	-	-	-
	80	72.5	69.5	66.5	63.5	60.0	57.0	54.0	50.5	47.0	-	-	-
	85	74.5	71.5	68.0	65.0	61.5	58.5	55.0	51.5	48.0	-	-	-
	90	76.0	73.0	69.5	66.5	63.0	59.5	56.0	53.0	49.0	-	-	-
95	77.5	74.5	71.0	67.5	64.5	61.0	57.0	54.0	-	-	-	-	
100	79.0	76.0	72.5	69.0	65.5	62.0	58.5	55.0	-	-	-	-	
105	80.5	77.0	74.0	70.5	67.0	63.0	59.5	56.0	-	-	-	-	
110	82.0	78.5	75.0	71.5	68.0	64.5	60.5	57.0	-	-	-	-	
115	83.5	80.0	76.5	72.5	69.0	65.5	61.5	58.0	-	-	-	-	
120	85.0	81.0	77.5	74.0	70.0	66.5	62.5	59.0	-	-	-	-	
125*	86.0	82.5	78.5	75.0	71.0	67.5	63.5	59.5	-	-	-	-	

\* 125' Availability: Untreated Only