PRECISION DESIGN

November 29, 2018

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

Subj: CRAN_RSFR_LOSA0_013

We have analyzed the wood pole at ROW adjacent to 499 West Edith Avenue, Los Altos Hills, CA 94022 (37.3810, -122.1237) 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 40.1% 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

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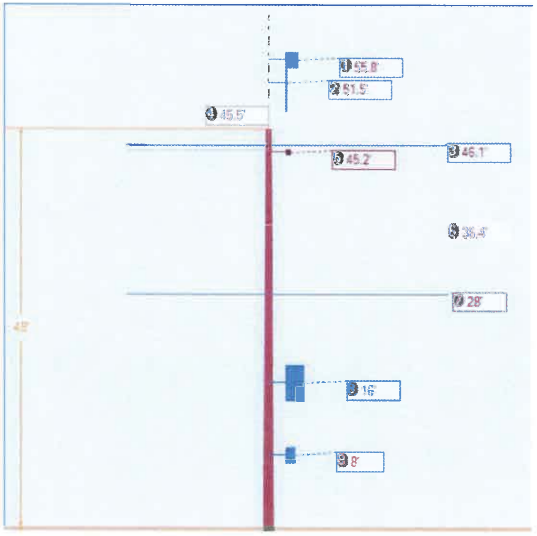
Pole Num:	**CRAN_RSFR_LOSA0_13**	Pole Length / Class:	**55 / 3**	Code:	**GO 95**	Structure Type:	**Guyed Tangent**
Aux Data 1	**Unset**	Species:	**DOUGLAS FIR**	NESC Rule:	**-**	Status	**Guy Wires Adequate**
Aux Data 2	**Unset**	Setting Depth (ft):	**7.00**	Construction Grade:	**B**	Pole Strength Factor:	**0.50**
Aux Data 3	**Unset**	G/L Circumference (in):	**40.14**	Loading District:	**Light**	Transverse Wind LF:	**1.00**
Aux Data 4	**Unset**	G/L Fiber Stress (psi):	**8,000**	Ice Thickness (in):	**0.00**	Wire Tension LF:	**1.00**
Aux Data 5	**Unset**	Allowable Stress (psi):	**3,930**	Wind Speed (mph):	**55.90**	Vertical LF:	**1.00**
Aux Data 6	**Unset**	Fiber Stress Ht. Reduc:	**No**	Wind Pressure (psf):	**8.00**		
Latitude:	**37.381000 Deg**	Longitude:		**-122.123700 Deg**		Elevation:	**175.9 Feet**



Pole Capacity Utilization (%) Crossarm allowance 300 lbs		Height (ft)	Wind Angle (deg)
Maximum	**40.1**	0.0	310.7
Groundline	**40.1**	0.0	310.7
Vertical	**1.3**	25.4	135.0

Pole Moments (ft-lb) Crossarm allowance 300 lbs		Load Angle (deg)	Wind Angle (deg)
Max Cap Util	**26,614**	308.2	310.7
Groundline	**26,614**	308.2	310.7
GL Allowable	**67,074**		

Guy System Component Summary				Load From Worst Wind Angle on Pole		Individual Maximum Load	
Description	**Lead Length (ft)**	**Lead Angle (deg)**	**Height (ft)**	**Nominal Capacity (%)**	**Wind Angle (deg)**	**Max Load Capacity (%)**	**Wind Angle (deg)**
▸ Anchor	50.0	315.0		**0.0**	310.7	**3.3**	130.0
• EHS 3/8 (Span/Head)			45.5	**0.0**	310.7	**4.3**	130.0
			System Capacity Summary:	**Adequate**		**Adequate**	

Groundline Load Summary - Reporting Angle Mode: Load - Reporting Angle: 308.2°

	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	46	4.6	**2,200**	8.3	**3.3**	**125**	96	1	**126**	**3.2**
Comms	493	49.7	**13,065**	49.1	**19.5**	**744**	145	1	**745**	**19.0**
GuyBraces	1	0.1	**49**	0.2	**0.1**	**3**	7	0	**3**	**0.1**
GenericEquipments	121	12.2	**3,179**	12.0	**4.7**	**181**	213	2	**183**	**4.6**
Pole	321	32.4	**7,718**	29.0	**11.5**	**439**	1,625	13	**452**	**11.5**
Crossarms	2	0.2	**77**	0.3	**0.1**	**4**	53	0	**5**	**0.1**
Insulators	7	0.7	**325**	1.2	**0.5**	**19**	28	0	**19**	**0.5**
Pole Load	991	100.0	**26,614**	100.0	**39.7**	**1,515**	2,167	17	**1,532**	**39.0**
Pole Reserve Capacity			**40,460**		**60.3**	**2,415**			**2,398**	**61.0**

Load Summary by Owner - Reporting Angle Mode: Load - Reporting Angle: 308.2°

	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>	663	66.9	**18,571**	69.8	**27.7**	**1,057**	524	4	**1,061**	**27.0**
Pole	321	32.4	**7,718**	29.0	**11.5**	**439**	1,625	13	**452**	**11.5**
PG&E	7	0.7	**325**	1.2	**0.5**	**19**	18	0	**19**	**0.5**
Totals:	991	100.0	**26,614**	100.0	**39.7**	**1,515**	2,167	17	**1,532**	**39.0**

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 4/0 AWG 7 STRAND OXLIP		46.06	42.37	0.5220	1.82	0.198	164.0	47.0	164.0	1,149	-8,124	-57	1,292	-6,889
Primary	AAC 4/0 AWG 7 STRAND OXLIP		46.06	42.37	0.5220	1.72	0.198	157.0	225.0	157.0	1,149	6,292	-55	1,246	7,484
Primary	AAC 4/0 AWG 7 STRAND OXLIP		46.06	42.37	0.5220	1.82	0.198	164.0	47.0	164.0	1,149	-8,124	56	1,292	-6,776
Primary	AAC 4/0 AWG 7 STRAND OXLIP		46.06	42.37	0.5220	1.72	0.198	157.0	225.0	157.0	1,149	6,292	53	1,246	7,592
Primary	AAC 4/0 AWG 7 STRAND OXLIP		46.06	9.75	0.5220	1.82	0.198	164.0	47.0	164.0	1,149	-8,124	10	1,292	-6,822
Primary	AAC 4/0 AWG 7 STRAND OXLIP		46.06	9.75	0.5220	1.72	0.198	157.0	225.0	157.0	1,149	6,292	9	1,246	7,548
											Totals:	**-5,493**	**16**	**7,614**	**2,137**

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)
Telco	TELE 1.0		28.00	7.30	1.0000	2.10	0.400	152.0	30.0	152.0	2,000	7,963	18	1,380	9,361
Telco	TELE 1.0		28.00	7.30	1.0000	2.18	0.400	157.0	225.0	157.0	2,000	6,655	19	1,451	8,125
Overlashed Bundle	1/2" EHS		36.42	6.82	0.5000	0.39	0.517	157.0	225.0	157.0	5,380	23,283	-23	996	24,256
Overlashed Bundle	1/2" EHS		36.42	6.82	0.5000	0.42	0.517	164.0	47.0	164.0	5,380	-30,058	-24	1,032	-29,050
											Totals:	**7,843**	**-10**	**4,858**	**12,692**

GenericEquipment		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)
Cylinder	3" Dia 7' Steel Pipe		51.50	0.04	0.0	0.0	53.06	84.00	--	3.00	--	0	720	720
Cylinder	Antenna-KMW FX-OM2LI OH2		55.75	0.54	180.0	0.0	20.00	24.00	--	16.00	--	-1	1,098	1,097
Box	Housing For RRUs		16.00	13.48	45.0	0.0	130.00	53.00	16.00	--	23.00	-17	1,210	1,192
Box	100amp Meter		8.00	8.25	45.0	0.0	10.00	24.00	4.63	--	12.00	-1	80	79
											Totals:	**-19**	**3,107**	**3,089**

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		45.25	5.57	45.0	45.0	53.00	4.50	3.50	96.00	-3	78	75
										Totals:	**-3**	**78**	**75**

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	PG&E	45.44	42.00	127.4	0.0	6.00	5.50	7.50	-21	104	83
Pin	Insulator	PG&E	45.44	-42.00	322.6	0.0	6.00	5.50	7.50	21	104	125
Pin	Insulator	PG&E	45.44	-8.00	349.8	0.0	6.00	5.50	7.50	4	104	108
Bolt	Single Bolt		28.00	0.00	315.0	315.0	5.00	3.00	0.00	3	0	3
Bolt	Single Bolt		36.42	0.00	135.0	135.0	5.00	3.00	0.00	-3	0	-3
									Totals:	**3**	**313**	**316**

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 3/8	Span/Head		45.50	35.50	50.00	0.375	75.00	315.0	11.3	0.273	50.01	0.00

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 3/8	Span/Head	2.30e+7	15,400	0.75	11,550	700	491	491	0	0	0	0	48
									Totals:	**0**	**0**	**0**	**48**

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		30.00	50.00	315.0	20,000	0.75	15,000	491	0	3.3

Pole Buckling

Buckling Constant	Buckling Column Height* (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	25.37	33.39	11.81	8.40	7.32	12.78	1.60e+6	60.00	57.00	48.00	162,482	**1666.84**	**76.92**

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 Top (Inches)	39	37	35	33	31	29	27	25	23	21	19	17
Length of Pole (Feet)	**Minimum Circumference at 6 feet from Butt (Inches)**											
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	41.5	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	-	-	-	-
	H-6	**H-5**	**H-4**	**H-3**	**H-2**	**H-1**	**1**	**2**	**3**	**4**	**5**	**6**

* 125' Availability: Untreated Only