

ARECIBO RADIO OBSERVATORY FEED ARM TRUSS MEMBER CAPACITY AND LOAD TABLE

FEED ARM TRUSS											Tension Limited Members					Compression Limited Members					Remarks
Member	Original Member	Area [in <sup>2</sup> ]	1992 Reinforcement	Area [in <sup>2</sup> ]	1963 Force Table [kip]	1992 Operational [kip]	1992 Survival [kip]	2010 STAAD Forces (no WL) [kip]	Length [ft]	Gross Area [in <sup>2</sup> ]	0.6FyAg	1963 Ratio	1992 Ratio	1992 Ratio	2010 Ratio	Capacity	1963 Ratio	1992 Ratio	1992 Ratio	2010 Ratio	
											[kip]	Operational	Operational	Survival	Operational	[kip]	Operational	Operational	Survival	Operational	
<b>Top Chords</b>																					
U1-U2	2-C8x11.5	6.74			33	53	12	25	15	6.74	202.20	16.32%	26.21%	5.93%	12.36%						
U2-U3	2-C8x11.5	6.74			71	107	46/-3	55	18.5	6.74	202.20	35.11%	52.92%	22.75%	27.20%						
U3-U4	2-C8x11.5	6.74			99	178	116/-12	97	20	6.74	202.20	48.96%	88.03%	57.37%	47.97%						
U4-U5	2-C8x11.5	6.74	2-6"x1/2"	6	129	239	194/-30	176	21.5	12.74	382.20	33.75%	62.53%	50.76%	46.05%						
U5-U6	2-C8x13.75	8.08	2-6"x3/4"	9	174	276	228/-21	182	21.425	17.08	512.40	33.96%	53.86%	44.50%	35.52%						
U6-U7	2-C8x13.75	8.08	2-6"x1/2"	6	155/-37	250	176	167	21.425	14.08	422.40	36.70%	59.19%	41.67%	39.54%						
U7-U8	2-C8x13.75	8.08	2-6"x1/2"	6	156/-91	185	106	106/-23	21.425	8.08	242.40	64.36%	76.32%	43.73%	43.73%						
<b>Bottom Chords</b>																					
L0-L1	2-C8x11.5	6.74			-34	-54	-13	-28	13.568	6.74						-165.05	20.60%	32.72%	7.88%	16.96%	
L1-L2	2-C8x11.5	6.74			-72	-106	-47	-49	15.798	6.74						-188.05	38.29%	56.37%	24.99%	26.06%	
L2-L3	2-C8x11.5	6.74			-97	-153	-107	-75	19.236	6.74						-181.76	53.37%	84.18%	58.87%	41.26%	
L3-L4	2-C8x13.75	8.08	2-6"x3/8"	4.5	-120	-231	-179	-167	10.27	12.58						-319.99	37.50%	72.19%	55.94%	52.19%	
L4-L5	2-C8x13.75	8.08	2-6"x3/4"	9	-149	-355	-296	-287	21.852	17.08						-379.13	39.30%	93.64%	78.07%	75.70%	
L5-L6	2-C8x13.75	8.08	2-6"x3/4"	9	-172	-336	3/-277	-267	21.601	17.08						-383.52	44.85%	87.61%	72.23%	69.62%	
L6-L7	2-C8x13.75	8.08	2-6"x3/8"	4.5	12/-134	-252	-179	-182	21.488	12.58	377.40	3.18%				-315.14	42.52%	79.96%	56.80%	57.75%	
L7-L8	2-C8x13.75	8.08	2-6"x3/8"	9	46/-113	-214	-122	26/-153	21.432	17.08	512.40	8.98%		5.07%		-428.23	26.39%	49.97%	28.49%	35.73%	
<b>Verticals</b>																					
U1-L1	2-L3.5x2.5x5/16	3.56			-35	-23	-11	-22	9.7357	3.56						-47.42	73.81%	48.51%	23.20%	46.40%	
U2-L2	2-L4x3x7/16	5.74			-35	-47	-41	-23	14.693	5.74						-59.72	58.60%	78.70%	68.65%	38.51%	
U3-L3	2-L5x3x1/2	7.5			-41	-67	-52	-48	19.963	7.5						-118.00	34.75%	56.78%	44.07%	40.68%	
U4-L4	2-C8x11.5	6.74			-48	-67	-50	-56	24.648	6.74						-103.96	46.17%	64.45%	48.10%	53.87%	
U5-M52	W10x60 + 2-9.25"x1/2"	26.85			88	-80	89/-160	-94	5.7764	26.85	579.96	15.17%		15.35%							
M52-M5	W10x60 + 2-9.25"x1/2"	26.85			88	-97	49/-134	-97	8.5322	26.85	579.96	15.17%		8.45%							
M5-M51	W10x39	11.5			27	-110	-155	-130	5.7764	11.5	248.40	10.87%				-208.00	-12.98%	52.88%	74.52%	62.50%	
M51-L5	W10x39	11.5	2-8"x1/2"	8	27	71	243/-196	62	19.5	488.40	5.53%	14.54%	49.75%	12.69%							
U6-M62	2-L4x3x3/8	4.96			31/-4	-12	25/-30	25/-9	5.7764	4.96	107.14	28.94%		23.33%	23.33%						
M62-M6	2-L4x3x3/8	4.96	2-L4x3x3/8	4.96	31/-4	33	44/-32	59	4.96	148.80	20.83%	22.18%	29.57%	39.65%							
M6-M61	2-L4x3x3/8	4.96	2-L4x3x3/8	4.96	-31	2/-26	91/-63	35/-49	5.7442	4.96	148.80			61.16%		-67.94	45.63%	38.27%	92.73%	72.13%	
M61-L6	2-L4x3x3/8	4.96	2-L4x3x3/8	4.96	-31	17	114/-71	50/-7	4.96	148.80				76.61%							
U7-M7	2-L4x3x3/8	4.96			17/-9	37	25/-18	44/-5	16.477	4.96	107.14	15.87%	34.54%	23.33%	41.07%	-30.00	30.00%		60.00%	16.67%	
M7-L7	2-L4x3x3/8	4.96			10/-19	13/-18	12/-20	48/-18	16.479	4.96	107.14	9.33%	12.13%	11.20%	44.80%	-30.00	63.33%	60.00%	66.67%	60.00%	
U78-M78	2-L3.5x2.5x5/16	3.56			-17	0	0	0	8.2383	3.56											
U8-L8	2-C8x11.5	6.74			7/-12	30	4/-5	19	33.5	6.74	202.20	3.46%	14.84%	1.98%	9.40%						
<b>Diagonals</b>																					
L0-U1	2-L3.5x2.5x5/16	3.56			35	67	14	32		3.56	76.90	45.52%	87.13%	18.21%	41.61%						
L1-U2	2-L4x3x5/16	4.18			51	89	39	47		4.18	90.29	56.49%	98.57%	43.20%	52.06%						
L2-U3	2-L4x3x5/16	4.18	2-4"x1/2"	4	55	117	80	98		4.18	210.29	26.15%	55.64%	38.04%	46.60%						
L3-U4	2-L5x3x5/16	4.8	2-L5x3x5/16	4.8	58	105	84	125		4.8	144.00	40.28%	72.92%	58.33%	86.81%						
L4-U5	2-L6x3.5x5/16	5.74	2-L6x3.5x5/16	5.74	65	116	108	123		5.74	172.20	37.75%	62.72%	71.43%							
L45-M5	2-C8x11.5	6.74			19	3	88/-29	33		6.74	202.20	9.40%	1.48%	43.52%	16.32%						
M5-L56	2-C8x11.5	6.74			20	44	76/-10	30		6.74	202.20	9.89%	21.76%	37.59%	14.84%						
M5-M562	2-C8x11.5	6.74			-66	29	26/-29	9/-36	15.328	6.74	202.20		14.34%	12.86%	4.45%	-156.14	42.27%		18.57%	23.06%	
M562-U6	2-C8x11.5	6.74			-66	11/-22	39/-31	14/-55	10.417	6.74	202.20		5.44%	19.29%	6.92%	-179.25	36.82%	12.27%	17.29%	30.68%	
M5-M561	2-C8x11.5	6.74			70	-40	40/-40	30/-7	9.2824	6.74	202.20	34.62%		19.78%	14.84%	-183.68		21.78%	21.78%	3.81%	
M561-L6	2-C8x11.5	6.74			70	33	50/-40	65/-2	18.088	6.74	202.20	34.62%	16.32%	24.73%	32.15%	-141.18			28.33%	1.42%	
M6-U7	2-C8x11.5	6.74			-49	-79	26/-58	-90	26.53	6.74	202.20			12.86%		-93.58	52.36%	84.42%	61.98%	96.17%	215k/180k Gregorian (Gregorian @ 19.8°, CH1 @ 0°)
M6-L7	2-C8x11.5	6.74			52	81	60/-15	94/-24	27.536	6.74	202.20	25.72%	40.06%	29.67%	46.49%	-88.19			17.01%	27.22%	
U7-M78	2-L3.5x2.5x5/16	3.56			15	2	2	5		3.56	76.90	19.51%	2.60%	2.60%	6.50%						
M7-U8	2-C8x11.5	6.74			6/-30	4/-38	32/-41	34/-53	27.028	6.74	202.20	2.97%	1.98%	15.83%	16.82%	-90.90	33.00%	41.81%	45.11%	58.31%	
M7-L8	2-C8x11.5	6.74			30	38	41/-31	53/-48	27.365	6.74	202.20	14.84%	18.79%	20.28%	26.21%	-89.10			34.79%	53.87%	
<b>Outriggers</b>																					
O5-M52	2-C10x25	14.68				-199	-291	-218		14.68						-362.60		54.88%	80.25%	60.12%	
M52-M52'	2-C10x20	11.74				-190	-248	-177		11.74						-331.66		57.29%	74.78%	53.37%	
O5-M51	2-C10x20 + 2-C10x15.3	20.7				296	413	336		20.7	621.00		47.67%	66.51%	54.11%						
M51-M51'	2-C10x25	14.68				212	285	239		14.68	440.40		48.14%	64.71%	54.27%						
M52-M51'	2-C10x15.3	8.96				-17	45/-85	-28		8.96	268.80			16.74%		-177.00		9.60%	48.02%	15.82%	
M51-M52'	2-C10x15.3	8.96				-17	45/-85	-28		8.96	268.80			16.74%		-177.00		9.60%	48.02%	15.82%	
M52-M562	2-C8x11.5	6.74				16/-9	34/-10	28		6.74	202.20		7.91%	16.82%	13.85%						
M562-M62	2-C8x11.5	6.74				60	60	48		6.74	202.20		29.67%	29.67%	23.74%						
M51-M561	2-C8x11.5	6.74				15	15/-31	-18		6.74	202.20		7.42%	7.42%							
M561-M61	2-C8x11.5	6.74				-44	-50	-46	14.159	6.74						-162.13		27.14%	30.84%	28.37%	
M51-M62	2-C8x11.5	6.74				-65	-73	-63	25.746	6.74						-97.87		66.42%	74.59%	64.37%	
M61-M52	2-C8x11.5	6.74				53	60	54		6.74	202.20		26.21%	29.67%	26.71%						
U5-M562	2-L4x3x1/4	3.38				46	38/-4	20		3.38	101.40		45.36%	37.48%	19.72%						
L5-M561	2-L4x3x1/4	3.38				-35	37/-5	-29		3.38	101.40			36.49%							
A	2-L4x3x1/4	3.38						-6		3.38						-35.05				17.12%	
B	2-L4x3x1/4	3.38						7		3.38	101.40				6.90%						
C	2-L3x2x1/4	2.38						3		2.38											
D	2-L3x2x1/4	2.38						-2		2.38											

90%-100% Stressed Over 100% Stressed