

Report Date: March 26, 2021

Client: Horizon Communications
41 Cedar Avenue
Hamilton Parish,
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Structure: Existing 250-ft Guyed Tower
Site Name: Warwick Camp
Site Reference #: 4
Site Address: Middle Road
City, County, State: Warwick Parish, Bermuda
Latitude, Longitude: 32.256333°, -64.833333°

PJF Project: A00021-0064.001.8700

Paul J. Ford and Company is pleased to submit this “**Structural Analysis Report**” to determine the tower stress level.

Analysis Criteria:

This analysis utilizes an ultimate 3-second gust wind speed of 172 mph (converted to an equivalent 133 mph nominal 3-second gust wind speed per Section 1609.3.1 for use with TIA-222 G) as required by the 2014 Bermuda Building Code and the 2012 International Building Code. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Proposed Appurtenance Loads:

The structure was analyzed with the proposed loading configuration shown in Table 1 combined with the other considered equipment shown in Table 2 of this report.

Summary of Analysis Results:

Existing Structure: Acceptable – 100.8%
Existing Foundation: Pass – 73.0%

We at Paul J. Ford and Company appreciate the opportunity of providing our continuing professional services to you and Horizon Communications. If you have any questions or need further assistance on this or any other projects, please give us a call.

Respectfully Submitted by:
Paul J. Ford and Company


Christina Hedges, PE
Project Manager
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3/26/2021

TABLE OF CONTENTS

1) INTRODUCTION

2) ANALYSIS CRITERIA

Table 1 - Proposed Equipment Configuration

Table 2 - Other Considered Equipment

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

3.1) Analysis Method

3.2) Assumptions

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Table 5 – Tower Component Stresses vs. Capacity

4.1) Recommendations

5) APPENDIX A

tnxTower Output

6) APPENDIX B

Base Level Drawing

7) APPENDIX C

Additional Calculations

1) INTRODUCTION

This tower is a 248.167 ft Guyed tower designed by Valmont in January 2009.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-G
Risk Category:	III
Wind Speed:	133.2 mph
Exposure Category:	D
Topographic Factor:	1
Service Wind Speed:	60 mph

Table 1 - Proposed Equipment Configuration

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
150.0	150.0	4	airspan	AIRHARMONY 4000	1	3/4" DC*
		1	kp performance antennas	KP-5PDN-2		
		2	kp performance antennas	KPP-2S3SX8-65 w/Mount Pipe		
		1	mimosa	B5C		
		1	siklu	EH-ANT-2ft-DL5 w/EH-8010FX-ODU		
		1	ubiquiti network	AF60-LR-US		
125.0	125.0	4	airspan	AIRHARMONY 4000		
		1	kp performance antennas	KP-5PDN-2		
		2	kp performance antennas	KPP-2S3SX8-65 w/Mount Pipe		
		1	mimosa	B5C		
		1	siklu	EH-ANT-2ft-DL5 w/EH-8010FX-ODU		
		1	ubiquiti network	AF60-LR-US		

*Coax feeds equipment at 125' also

**Equipment installed at 150' on leg B. Equipment at 125' on leg C. Coax run up Leg C.

Table 2 - Other Considered Equipment

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
244.0	248.0	1	generic	8 ft x 2" omni whip	2	1/4
	244.0	1	miscl	TMA (12" x 8" x 6")		
		1	tower mounts	Generic 3.5' x 6' sidearm		
231.0	235.0	1	generic	8 ft x 2" omni whip	1	1 1/4
	231.0	1	miscl	TMA (18" x 6" x 4")		
		1	tower mounts	Generic 3.5' x 6' sidearm		
230.0	230.0	-	-	-	1	1/2
220.0	220.0	3	comba telecom	ODI-065R16M18JJ-GQ w/	24	7/8

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
				Mount Pipe		
		1	tower mounts	Pipe Mount [PM 601-3]		
219.0	223.0	1	generic	8 ft x 2" omni whip	1	1 1/4
	219.0	1	tower mounts	Generic 3.5' x 6' sidearm		
214.0	219.0	1	generic	10 ft x 2" omni whip	1	1 1/4
	214.0	1	tower mounts	Generic 1' x 2' sidearm		
210.0	210.0	1	andrew	VHLPX4-18		
		2	dragonwave	Airpair ODU	2	3/8
		1	tower mounts	Generic 3' x 4' sidearm		
206.0	208.5	1	generic	5 ft x 2" omni whip	1	1 1/4
	206.0	1	tower mounts	Generic 3.5' x 6' sidearm		
201.0	201.0	1	ericsson	ANT2 0.6 13 HP (TR)	1	cat5
		1	ericsson	RAU 2		
189.0	193.0	1	cobham	AFS-DBG-0360-01 w/ Mount Pipe		
	192.0	1	cobham	AFS-DBG-0360-01 w/ Mount Pipe	2	3/8
	189.0	2	redline	RDL-3000 ELLIPSE		
		2	tower mounts	Generic 1' x 2' sidearm		
183.0	183.0	-	-	-	6	7/8
174.0	178.0	1	amphenol	BCD-87010-NE-3-25	1	1 1/4
	174.0	1	tower mounts	Generic 1' x 2' sidearm		
165.0	165.0	1	andrew	VHLPX4-18	2	3/8
		2	dragonwave	Airpair ODU	6	7/8
		1	tower mounts	Generic 3' x 4' sidearm		
155.0	155.0	1	microwave dishes	3 ft standard	2 2	cat5 7/8
150.0	150.0	1	ericsson	ANT2 0.2 28 HP	2	1/4
		1	generic	TMA (8" x 6" x 4")		
146.0	146.0	1	kp performance antennas	KP-5HVX8-65		
		1	mimosa	A5c	2	3/8
		1	tower mounts	Generic 2' x 3' sidearm		
142.0	142.0	1	mimosa	B11	1	3/8
		1	radiowaves	MMS2-11V		
141.0	141.0	1	ericsson	ANT2 0.6 23HP	2	3/8
		1	mimosa	B5		
138.0	138.0	2	kp performance antennas	KPPA-5GHZHV4P65S-17		
		2	mimosa	A5c	2	3/8
		2	tower mounts	Generic 1' x 2' sidearm		
136.0	136.0	1	mimosa	B5	1	3/8
131.0	131.0	1	mimosa	B11	1	3/8

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
		1	radiowaves	MMS2-11V		
126.0	126.0	1	andrew	VHLPX2-11-6WH	1	1/2
121.0	121.0	3	comba telecom	ODI-065R16M18JJ-GQ w/ Mount Pipe	-	-
		1	tower mounts	Pipe Mount [PM 601-3]		
114.0	114.0	1	andrew	VHLPX4-18	2	3/8
		2	dragonwave	Airpair ODU		
		1	tower mounts	Generic 3' x 4' sidearm		
113.0	113.0	1	generic	48" x 6" x 6" Panel Antennas w/ mount pipe	2	7/8
110.0	110.0	1	microwave dishes	4 ft Grid	1	1 1/4
		1	tower mounts	Generic 1' x 2' sidearm		
108.0	108.0	1	microwave dishes	3 ft standard	2	1/2
		2	miscl	ODU (10" x 10" x 5")		
		1	kathrein	80010965 w/ Mount Pipe	1	1/2
		1	nokia	AHFIB		
		1	nokia	AHLOA		
106.0	106.0	1	tower mounts	Generic 1' x 2' sidearm	1	1/2
103.0	103.0	1	kathreinscala	Kathrein 800 250911 w/Mount Pipe	1	1/2
		1	nokia	AWHQF RRH 4T4R n78		
101.0	101.0	1	ericsson	ANT2 0.2 28 HP	2	3/8
		1	ericsson	ANT2 0.9 6 HPX		
		3	ericsson	RAU 2		
98.0	98.0	2	kathrein	80010965_TIA w/ Mount Pipe	2	1/2
		2	nokia	AHFIB		
		2	nokia	AHLOA		
95.5	95.5	1	amphenol	BXA-80090/8CF w/ Mount Pipe	2	7/8
93.0	93.0	2	kathreinscala	Kathrein 800 250911 w/Mount Pipe	2	1/2
		2	nokia	AWHQF RRH 4T4R n78		
91.0	94.0	1	generic	1' square panel	1	3/8
89.0	89.0	-	-	-	4	1/4
					1	3/8
80.0	80.0	1	ericsson	RAU1 N	2	3/8
		1	radiowaves	HP2-5.9		
80.0	80.0	1	andrew	VHLPX4-11W-4WH	1	1/2
75.0	75.0	2	amphenol	BXA-80090/8CF w/ Mount Pipe	4	7/8
74.0	74.0	1	andrew	VHLP2.5-11C81	2	3/8
		1	raycap	DC6-48-60-0-8F		
31.0	31.0	2	amphenol	BXA-70090-4CF-EDIN-X	2	3/8
		2	ericsson	RRUS 11 B12		

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
Tower Drawings	2/14/07	A-122584	Valmont
As-built Drawings	2/19/07	41706-442	PJF/Aero
Geotechnical Report	3/10/05	ING00141972a	Trow
Antenna Mapping	6/5/2019	-	Proventus

3.1) Analysis Method

tnxTower (version 8.0.7.4), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

- 1) Tower and structures were maintained in accordance with the TIA-222 Standard.
- 2) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.

This analysis may be affected if any assumptions are not valid or have been made in error. Paul J. Ford and Company should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T1	248.167 - 239.083	Leg	2 1/4" solid	3	-4.35	133.72	3.3	Pass
T2	239.083 - 230	Leg	2 1/4" solid	29	-45.56	133.72	34.1	Pass
T3	230 - 215	Leg	2 1/4" solid	55	-61.81	133.72	46.2	Pass
T4	215 - 200	Leg	2 1/4" solid	95	-62.33	133.72	46.6	Pass
T5	200 - 185	Leg	2 1/4" solid	135	-46.43	133.72	34.7	Pass
T6	185 - 170	Leg	2 1/4" solid	174	-54.84	133.72	41.0	Pass
T7	170 - 155	Leg	2 1/4" solid	214	-58.56	133.72	43.8	Pass
T8	155 - 140	Leg	2 1/2" solid	254	-56.84	174.48	32.6	Pass
T9	140 - 125	Leg	2 1/2" solid	295	-84.37	174.48	48.4	Pass
T10	125 - 110	Leg	2 1/2" solid	335	-91.83	174.48	52.6	Pass
T11	110 - 95	Leg	2 1/2" solid	375	-89.03	174.48	51.0	Pass
T12	95 - 80	Leg	2 1/2" solid	415	-111.71	174.48	64.0	Pass
T13	80 - 65	Leg	2 1/2" solid	455	-114.29	174.48	65.5	Pass
T14	65 - 50	Leg	2 1/2" solid	495	-126.19	174.48	72.3	Pass
T15	50 - 35	Leg	2 1/2" solid	535	-109.01	174.48	62.5	Pass
T16	35 - 20	Leg	2 1/2" solid	575	-116.61	174.48	66.8	Pass
T17	20 - 10.9167	Leg	2 1/2" solid	615	-113.51	174.48	65.1	Pass
T18	10.9167 - 7.95833	Leg	2 1/2" solid	641	-108.06	180.16	60.0	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T19	7.95833 - 5	Leg	2 1/2" solid	652	-103.15	180.16	57.3	Pass
T20	5 - 3.5625	Leg	2 1/2" solid	664	-109.45	208.79	52.4	Pass
T21	3.5625 - 2.25	Leg	2 1/2" solid	679	-107.10	208.79	51.3	Pass
T22	2.25 - 0	Leg	2 1/2" solid	688	-113.68	208.79	54.4	Pass
T1	248.167 - 239.083	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	12	1.85	18.35	10.1 24.9 (b)	Pass
T2	239.083 - 230	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	41	-3.73	14.11	26.4 44.2 (b)	Pass
T3	230 - 215	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	88	-3.99	14.11	28.3 38.5 (b)	Pass
T4	215 - 200	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	103	-4.85	14.11	34.4 60.2 (b)	Pass
T5	200 - 185	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	144	-6.15	14.11	43.6 78.9 (b)	Pass
T6	185 - 170	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	212	-6.79	14.11	48.1 89.4 (b)	Pass
T7	170 - 155	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	248	-5.08	14.11	36.0 37.1 (b)	Pass
T8	155 - 140	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	263	-4.78	14.19	33.7 57.8 (b)	Pass
T9	140 - 125	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	306	-5.96	14.19	42.0 80.9 (b)	Pass
T10	125 - 110	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	369	-4.66	14.19	32.8 46.4 (b)	Pass
T11	110 - 95	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	384	-7.18	14.19	50.6 79.9 (b)	Pass
T12	95 - 80	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	452	-7.66	14.19	53.9 100.8 (b)	Okay
T13	80 - 65	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	464	-4.17	14.19	29.4 45.9 (b)	Pass
T14	65 - 50	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	507	-7.21	14.19	50.8 66.0 (b)	Pass
T15	50 - 35	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	568	-6.65	14.19	46.8 48.7 (b)	Pass
T16	35 - 20	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	608	-4.67	14.19	32.9 33.5 (b)	Pass
T17	20 - 10.9167	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	620	-3.71	14.19	26.1 41.6 (b)	Pass
T18	10.9167 - 7.95833	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	647	-3.09	16.58	18.6 40.7 (b)	Pass
T19	7.95833 - 5	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	661	-3.80	16.58	22.9 50.7 (b)	Pass
T20	5 - 3.5625	Diagonal	3/4" solid	673	-4.97	9.49	52.4	Pass
T21	3.5625 - 2.25	Diagonal	3/4" solid	682	-5.62	10.97	51.3	Pass
T1	248.167 - 239.083	Horizontal	7/8" solid	13	-0.68	3.11	21.9	Pass
T2	239.083 - 230	Horizontal	7/8" solid	39	1.57	27.06	5.8 16.1 (b)	Pass
T3	230 - 215	Horizontal	7/8" solid	72	-0.30	3.11	9.7 23.6 (b)	Pass
T4	215 - 200	Horizontal	7/8" solid	119	2.27	27.06	8.4 23.3 (b)	Pass
T5	200 - 185	Horizontal	7/8" solid	166	1.83	27.06	6.8 18.8 (b)	Pass
T6	185 - 170	Horizontal	7/8" solid	185	2.46	27.06	9.1 25.3 (b)	Pass
T7	170 - 155	Horizontal	7/8" solid	239	2.69	27.06	9.9	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
							27.7 (b)	
T8	155 - 140	Horizontal	7/8" solid	279	2.12	27.06	7.8 21.8 (b)	Pass
T9	140 - 125	Horizontal	7/8" solid	305	2.91	27.06	10.8 30.0 (b)	Pass
T10	125 - 110	Horizontal	7/8" solid	345	3.34	27.06	12.4 34.4 (b)	Pass
T11	110 - 95	Horizontal	7/8" solid	406	3.28	27.06	12.1 33.8 (b)	Pass
T12	95 - 80	Horizontal	7/8" solid	425	3.33	27.06	12.3 34.3 (b)	Pass
T13	80 - 65	Horizontal	7/8" solid	465	3.37	27.06	12.5 34.7 (b)	Pass
T14	65 - 50	Horizontal	7/8" solid	505	3.66	27.06	13.5 37.6 (b)	Pass
T15	50 - 35	Horizontal	7/8" solid	545	3.93	27.06	14.5 40.5 (b)	Pass
T16	35 - 20	Horizontal	7/8" solid	606	4.20	27.06	15.5 43.2 (b)	Pass
T17	20 - 10.9167	Horizontal	7/8" solid	625	4.38	27.06	16.2 45.0 (b)	Pass
T18	10.9167 - 7.95833	Horizontal	2L 1.5 x 1.5 x 1/8 (3/8)	642	3.35	18.35	18.3 45.0 (b)	Pass
T19	7.95833 - 5	Horizontal	2L 1.5 x 1.5 x 1/8 (3/8)	657	10.07	23.29	43.2	Pass
T21	3.5625 - 2.25	Horizontal	6 x 1/2	669	-2.03	24.98	8.1	Pass
T22	2.25 - 0	Horizontal	6 x 1/2	690	3.19	97.20	3.3	Pass
T1	248.167 - 239.083	Top Girt	7/8" solid	5	-0.26	3.11	8.4	Pass
T3	230 - 215	Top Girt	7/8" solid	56	1.56	27.06	5.8 16.1 (b)	Pass
T4	215 - 200	Top Girt	7/8" solid	96	2.01	27.06	7.4 20.7 (b)	Pass
T5	200 - 185	Top Girt	7/8" solid	136	1.95	27.06	7.2 20.1 (b)	Pass
T6	185 - 170	Top Girt	7/8" solid	176	1.42	27.06	5.3 14.6 (b)	Pass
T7	170 - 155	Top Girt	7/8" solid	216	2.21	27.06	8.2 22.8 (b)	Pass
T8	155 - 140	Top Girt	7/8" solid	256	2.20	27.06	8.1 22.6 (b)	Pass
T9	140 - 125	Top Girt	7/8" solid	296	1.82	27.06	6.7 18.7 (b)	Pass
T10	125 - 110	Top Girt	7/8" solid	336	2.87	27.06	10.6 29.5 (b)	Pass
T11	110 - 95	Top Girt	7/8" solid	376	3.09	27.06	11.4 31.8 (b)	Pass
T12	95 - 80	Top Girt	7/8" solid	416	2.73	27.06	10.1 28.1 (b)	Pass
T13	80 - 65	Top Girt	7/8" solid	456	3.04	27.06	11.2 31.2 (b)	Pass
T14	65 - 50	Top Girt	7/8" solid	496	3.20	27.06	11.8 32.9 (b)	Pass
T15	50 - 35	Top Girt	7/8" solid	536	3.34	27.06	12.4 34.4 (b)	Pass
T16	35 - 20	Top Girt	7/8" solid	576	3.73	27.06	13.8 38.3 (b)	Pass
T17	20 - 10.9167	Top Girt	7/8" solid	616	3.92	27.06	14.5 40.3 (b)	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail	
T20	5 - 3.5625	Top Girt	6 x 1/2	666	21.77	97.20	22.4	Pass	
T22	2.25 - 0	Bottom Girt	6 x 1/2	694	-0.51	87.36	13.8	Pass	
T2	239.083 - 230	Guy A@238.875	1	698	36.69	73.20	50.1	Pass	
T6	185 - 170	Guy A@178.875	1	703	42.32	73.20	57.8	Pass	
T9	140 - 125	Guy A@133.875	1	708	43.51	73.20	59.4	Pass	
T12	95 - 80	Guy A@88.875	7/8	713	30.94	55.20	56.0	Pass	
T14	65 - 50	Guy A@58.875	7/8	718	26.46	55.20	47.9	Pass	
T2	239.083 - 230	Guy B@238.875	1	697	37.23	73.20	50.9	Pass	
T6	185 - 170	Guy B@178.875	1	702	41.89	73.20	57.2	Pass	
T9	140 - 125	Guy B@133.875	1	707	42.42	73.20	58.0	Pass	
T12	95 - 80	Guy B@88.875	7/8	712	29.70	55.20	53.8	Pass	
T14	65 - 50	Guy B@58.875	7/8	717	25.47	55.20	46.1	Pass	
T2	239.083 - 230	Guy C@238.875	1	696	36.84	73.20	50.3	Pass	
T6	185 - 170	Guy C@178.875	1	699	42.49	73.20	58.0	Pass	
T9	140 - 125	Guy C@133.875	1	704	43.80	73.20	59.8	Pass	
T12	95 - 80	Guy C@88.875	7/8	709	30.77	55.20	55.7	Pass	
T14	65 - 50	Guy C@58.875	7/8	714	26.18	55.20	47.4	Pass	
T2	239.083 - 230	Top Guy Pull-Off@238.875	Double 7/8 SR	31	8.82	38.96	23.6 45.4 (b)	Pass	
T6	185 - 170	Top Guy Pull-Off@178.875	Double 7/8 SR	199	12.23	38.96	31.4 62.9 (b)	Pass	
T9	140 - 125	Top Guy Pull-Off@133.875	Double 7/8 SR	319	14.64	38.96	37.6 75.3 (b)	Pass	
T12	95 - 80	Top Guy Pull-Off@88.875	Double 7/8 SR	439	13.02	38.96	33.4 67.0 (b)	Pass	
T14	65 - 50	Top Guy Pull-Off@58.875	Double 7/8 SR	519	12.77	38.96	32.8 65.7 (b)	Pass	
							Summary		
							Leg (T14)	72.3	Pass
							Diagonal (T12)	100.8	Okay
							Horizontal (T18)	45.0	Pass
							Top Girt (T17)	40.3	Pass
							Bottom Girt (T22)	13.8	Pass
							Guy A (T9)	59.4	Pass
							Guy B (T9)	58.0	Pass
							Guy C (T9)	59.8	Pass
							Top Guy Pull-Off (T9)	75.3	Pass
							Bolt Checks	100.8	Okay
							Rating =	100.8	Okay

Table 5 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Base Foundation	0	1.7	Pass
1	Base Foundation Soil Interaction	0	60.6	Pass
1	Guy Anchor Shaft	0	30.9	Pass
1	Guy Anchor Foundation Structural	0	73.0	Pass
1	Guy Anchor Foundation Soil Interaction	0	48.5	Pass

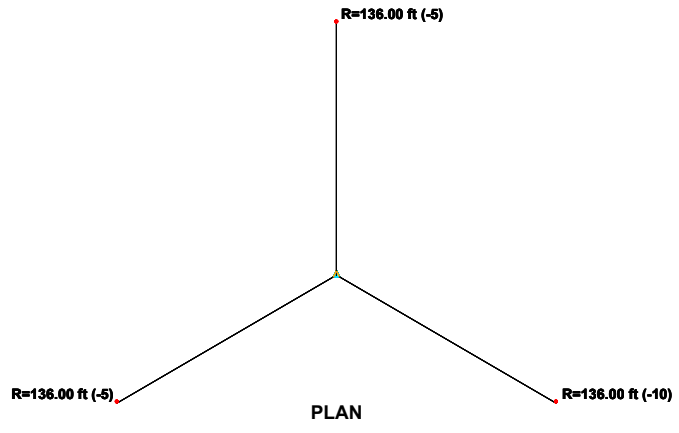
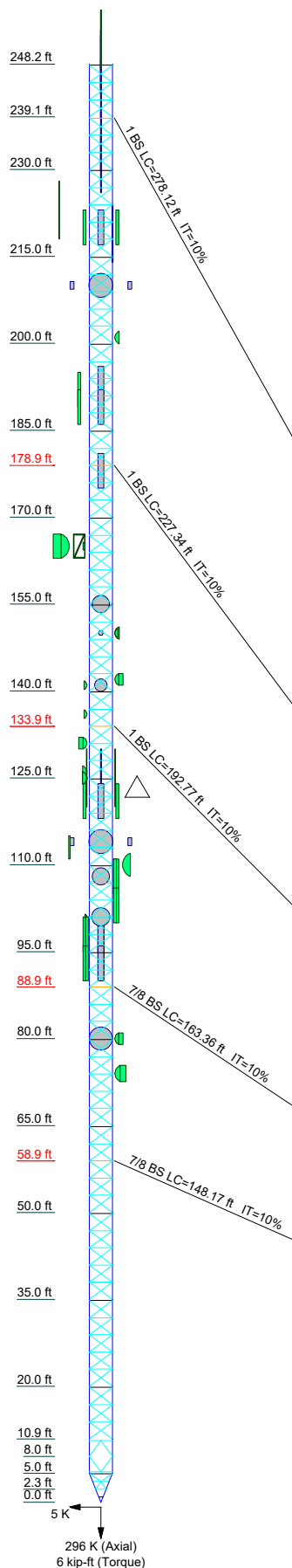
Structure Rating (max from all components) =	100.8%
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Notes:

- 1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.
- 2) Capacities up to 105% are considered acceptable based on analysis methods used.

APPENDIX A
TNXTOWER OUTPUT

Section	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15	T16	T17	T18	T19	T20
Legs	SR 2 1/4" solid																			
Leg Grade	A572-50																			
Diagonals	2L 1.5 x 1.5 x 1/8 (3/8)																			
Diagonal Grade	A36																			
Top Girts	SR 7/8" solid																			
Bottom Girts	N.A.																			
Horizontals	SR 7/8" solid																			
Top Guy Pull-Offs	Double 7/8 SR																			
Face Width (ft)	2.85																			
# Panels @ (ft)	19.9 @ 2.95833																			
Weight (K)	79 @ 2.95833																			



SYMBOL LIST

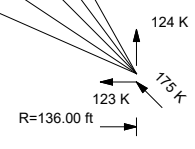
MARK	SIZE	MARK	SIZE
A	SR 3/4" solid	F	2L 1.5 x 1.5 x 1/8 (3/8)
B	N.A.	G	Double 7/8 SR
C	A572-50	H	2 @ 2.75
D	SR 7/8" solid	I	4 @ 1.3125
E	6 x 1/2		

MATERIAL STRENGTH


GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

1. Tower designed for Exposure D to the TIA-222-G Standard.
2. Tower designed for a 133 mph basic wind in accordance with the TIA-222-G Standard.
3. Deflections are based upon a 60 mph wind.
4. Tower Structure Class III.
5. Topographic Category 1 with Crest Height of 0.00 ft
6. Tower is located in Bermuda
7. TOWER RATING: 100.8%



ALL REACTIONS ARE FACTORED

 Paul J. Ford and Company 250 E. Broad St., Ste 600 Columbus, OH 43215 Phone: 614-221-6679 FAX:	Job: 250 ft Guyed Tower / Warwick, Bermuda		
	Project: PJF# 00021-0064		
	Client: Horizon Communications	Drawn by: Chrissy Hedges	App'd:
	Code: TIA-222-G	Date: 03/24/21	Scale: NTS
	Path:	Dwg No. E-1	

G:\TOWER\000 Misc\2021\00021-0064_Warwick Camp\00021-0064_001.8700_SAI\00021-0064_001.en

Tower Input Data

The main tower is a 3x guyed tower with an overall height of 248.17 ft above the ground line.

The base of the tower is set at an elevation of 0.00 ft above the ground line.

The face width of the tower is 4.00 ft at the top and tapered at the base.

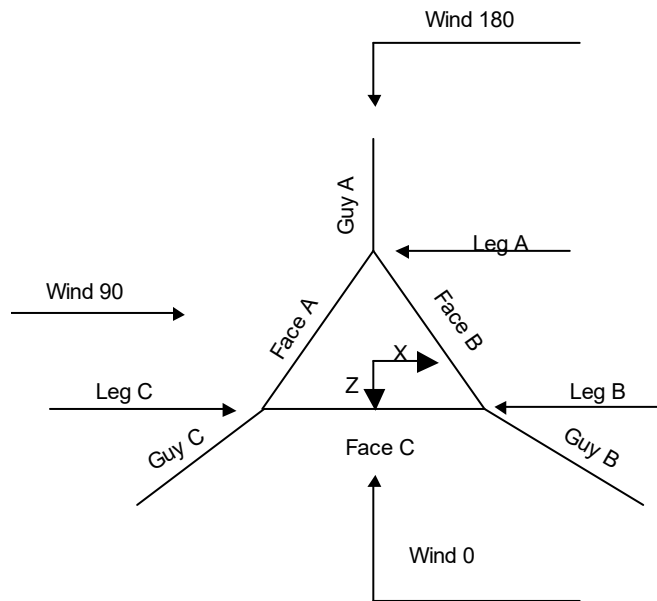
This tower is designed using the TIA-222-G standard.

The following design criteria apply:

- 1) ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).
- 2) Basic wind speed of 133 mph.
- 3) Structure Class III.
- 4) Exposure Category D.
- 5) Topographic Category 1.
- 6) Crest Height 0.00 ft.
- 7) Deflections calculated using a wind speed of 60 mph.
- 8) Tower is located in Bermuda.
- 9) Pressures are calculated at each section.
- 10) Safety factor used in guy design is 1.
- 11) Stress ratio used in tower member design is 1.
- 12) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs Consider Moments - Horizontals Consider Moments - Diagonals Use Moment Magnification ✓ Use Code Stress Ratios ✓ Use Code Safety Factors - Guys Escalate Ice Always Use Max Kz Use Special Wind Profile ✓ Include Bolts In Member Capacity Leg Bolts Are At Top Of Section ✓ Secondary Horizontal Braces Leg Use Diamond Inner Bracing (4 Sided) SR Members Have Cut Ends SR Members Are Concentric	Distribute Leg Loads As Uniform Assume Legs Pinned Assume Rigid Index Plate Use Clear Spans For Wind Area ✓ Use Clear Spans For KL/r ✓ Retension Guys To Initial Tension ✓ Bypass Mast Stability Checks ✓ Use Azimuth Dish Coefficients ✓ Project Wind Area of Appurt. ✓ Autocalc Torque Arm Areas Add IBC .6D+W Combination ✓ Sort Capacity Reports By Component Triangulate Diamond Inner Bracing Treat Feed Line Bundles As Cylinder Ignore KL/ry For 60 Deg. Angle Legs	Use ASCE 10 X-Brace Ly Rules ✓ Calculate Redundant Bracing Forces Ignore Redundant Members in FEA SR Leg Bolts Resist Compression All Leg Panels Have Same Allowable Offset Girt At Foundation ✓ Consider Feed Line Torque ✓ Include Angle Block Shear Check Use TIA-222-G Bracing Resist. Exemption Use TIA-222-G Tension Splice Exemption <div style="background-color: #e0e0e0; text-align: center; padding: 2px; margin: 5px 0;">Poles</div> Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets Pole Without Linear Attachments Pole With Shroud Or No Appurtenances Outside and Inside Corner Radii Are Known
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Corner & Starmount Guyed Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	248.17-239.08			4.00	1	9.08
T2	239.08-230.00			4.00	1	9.08
T3	230.00-215.00			4.00	1	15.00
T4	215.00-200.00			4.00	1	15.00
T5	200.00-185.00			4.00	1	15.00
T6	185.00-170.00			4.00	1	15.00
T7	170.00-155.00			4.00	1	15.00
T8	155.00-140.00			4.00	1	15.00
T9	140.00-125.00			4.00	1	15.00
T10	125.00-110.00			4.00	1	15.00
T11	110.00-95.00			4.00	1	15.00
T12	95.00-80.00			4.00	1	15.00
T13	80.00-65.00			4.00	1	15.00
T14	65.00-50.00			4.00	1	15.00
T15	50.00-35.00			4.00	1	15.00
T16	35.00-20.00			4.00	1	15.00
T17	20.00-10.92			4.00	1	9.08
T18	10.92-7.96			4.00	1	2.96
T19	7.96-5.00			4.00	1	2.96
T20	5.00-3.56			4.00	1	1.44
T21	3.56-2.25			2.85	1	1.31
T22	2.25-0.00			1.80	1	2.25

Tower Section Geometry (cont'd)

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T1	248.17-239.08	2.96	X Brace	No	Steps	2.500	0.000
T2	239.08-230.00	2.96	X Brace	No	Steps	2.500	0.000
T3	230.00-215.00	2.96	X Brace	No	Steps	2.500	0.000
T4	215.00-200.00	2.96	X Brace	No	Steps	2.500	0.000
T5	200.00-185.00	2.96	X Brace	No	Steps	2.500	0.000
T6	185.00-170.00	2.96	X Brace	No	Steps	2.500	0.000
T7	170.00-155.00	2.96	X Brace	No	Steps	2.500	0.000
T8	155.00-140.00	2.96	X Brace	No	Steps	2.500	0.000
T9	140.00-125.00	2.96	X Brace	No	Steps	2.500	0.000
T10	125.00-110.00	2.96	X Brace	No	Steps	2.500	0.000
T11	110.00-95.00	2.96	X Brace	No	Steps	2.500	0.000
T12	95.00-80.00	2.96	X Brace	No	Steps	2.500	0.000
T13	80.00-65.00	2.96	X Brace	No	Steps	2.500	0.000
T14	65.00-50.00	2.96	X Brace	No	Steps	2.500	0.000
T15	50.00-35.00	2.96	X Brace	No	Steps	2.500	0.000
T16	35.00-20.00	2.96	X Brace	No	Steps	2.500	0.000
T17	20.00-10.92	2.96	X Brace	No	Steps	2.500	0.000
T18	10.92-7.96	2.75	K Brace Down	No	Yes	2.500	0.000
T19	7.96-5.00	2.75	K Brace Up	No	Yes	0.000	2.500
T20	5.00-3.56	1.31	K Brace Up	No	Yes	1.500	0.000
T21	3.56-2.25	1.31	K Brace Down	No	Yes	0.000	0.000
T22	2.25-0.00	1.31	X Brace	No	Yes	0.000	11.250

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 248.17-239.08	Solid Round	2 1/4" solid	A572-50 (50 ksi)	Double Angle	2L 1.5 x 1.5 x 1/8 (3/8)	A36 (36 ksi)
T2 239.08-230.00	Solid Round	2 1/4" solid	A572-50 (50 ksi)	Double Angle	2L 1.5 x 1.5 x 1/8 (3/8)	A36 (36 ksi)
T3 230.00-215.00	Solid Round	2 1/4" solid	A572-50 (50 ksi)	Double Angle	2L 1.5 x 1.5 x 1/8 (3/8)	A36 (36 ksi)
T4 215.00-200.00	Solid Round	2 1/4" solid	A572-50 (50 ksi)	Double Angle	2L 1.5 x 1.5 x 1/8 (3/8)	A36 (36 ksi)
T5 200.00-185.00	Solid Round	2 1/4" solid	A572-50 (50 ksi)	Double Angle	2L 1.5 x 1.5 x 1/8 (3/8)	A36 (36 ksi)
T6 185.00-170.00	Solid Round	2 1/4" solid	A572-50 (50 ksi)	Double Angle	2L 1.5 x 1.5 x 1/8 (3/8)	A36 (36 ksi)
T7 170.00-155.00	Solid Round	2 1/4" solid	A572-50 (50 ksi)	Double Angle	2L 1.5 x 1.5 x 1/8 (3/8)	A36 (36 ksi)
T8 155.00-140.00	Solid Round	2 1/2" solid	A572-50 (50 ksi)	Double Angle	2L 1.5 x 1.5 x 1/8 (3/8)	A36 (36 ksi)
T9 140.00-125.00	Solid Round	2 1/2" solid	A572-50 (50 ksi)	Double Angle	2L 1.5 x 1.5 x 1/8 (3/8)	A36 (36 ksi)
T10 125.00-110.00	Solid Round	2 1/2" solid	A572-50 (50 ksi)	Double Angle	2L 1.5 x 1.5 x 1/8 (3/8)	A36 (36 ksi)
T11 110.00-95.00	Solid Round	2 1/2" solid	A572-50 (50 ksi)	Double Angle	2L 1.5 x 1.5 x 1/8 (3/8)	A36 (36 ksi)
T12 95.00-80.00	Solid Round	2 1/2" solid	A572-50 (50 ksi)	Double Angle	2L 1.5 x 1.5 x 1/8 (3/8)	A36 (36 ksi)
T13 80.00-65.00	Solid Round	2 1/2" solid	A572-50 (50 ksi)	Double Angle	2L 1.5 x 1.5 x 1/8 (3/8)	A36 (36 ksi)
T14 65.00-50.00	Solid Round	2 1/2" solid	A572-50 (50 ksi)	Double Angle	2L 1.5 x 1.5 x 1/8 (3/8)	A36 (36 ksi)
T15 50.00-35.00	Solid Round	2 1/2" solid	A572-50 (50 ksi)	Double Angle	2L 1.5 x 1.5 x 1/8 (3/8)	A36 (36 ksi)
T16 35.00-20.00	Solid Round	2 1/2" solid	A572-50 (50 ksi)	Double Angle	2L 1.5 x 1.5 x 1/8 (3/8)	A36 (36 ksi)
T17 20.00-10.92	Solid Round	2 1/2" solid	A572-50 (50 ksi)	Double Angle	2L 1.5 x 1.5 x 1/8 (3/8)	A36 (36 ksi)
T18 10.92-7.96	Solid Round	2 1/2" solid	A572-50 (50 ksi)	Double Angle	2L 1.5 x 1.5 x 1/8 (3/8)	A36 (36 ksi)
T19 7.96-5.00	Solid Round	2 1/2" solid	A572-50 (50 ksi)	Double Angle	2L 1.5 x 1.5 x 1/8 (3/8)	A36 (36 ksi)

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T20 5.00-3.56	Solid Round	2 1/2" solid	(50 ksi) A572-50	Solid Round	3/4" solid	(36 ksi) A572-50
T21 3.56-2.25	Solid Round	2 1/2" solid	(50 ksi) A572-50	Solid Round	3/4" solid	(50 ksi) A572-50
T22 2.25-0.00	Solid Round	2 1/2" solid	(50 ksi) A572-50	Solid Round		(50 ksi) A572-50

Tower Section Geometry (cont'd)

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 248.17-239.08	Solid Round	7/8" solid	(50 ksi) A572-50	Solid Round		A36 (36 ksi)
T2 239.08-230.00	Solid Round	7/8" solid	(50 ksi) A572-50	Solid Round		A36 (36 ksi)
T3 230.00-215.00	Solid Round	7/8" solid	(50 ksi) A572-50	Solid Round		A36 (36 ksi)
T4 215.00-200.00	Solid Round	7/8" solid	(50 ksi) A572-50	Solid Round		A36 (36 ksi)
T5 200.00-185.00	Solid Round	7/8" solid	(50 ksi) A572-50	Solid Round		A36 (36 ksi)
T6 185.00-170.00	Solid Round	7/8" solid	(50 ksi) A572-50	Solid Round		A36 (36 ksi)
T7 170.00-155.00	Solid Round	7/8" solid	(50 ksi) A572-50	Solid Round		A36 (36 ksi)
T8 155.00-140.00	Solid Round	7/8" solid	(50 ksi) A572-50	Solid Round		A36 (36 ksi)
T9 140.00-125.00	Solid Round	7/8" solid	(50 ksi) A572-50	Solid Round		A36 (36 ksi)
T10 125.00-110.00	Solid Round	7/8" solid	(50 ksi) A572-50	Solid Round		A36 (36 ksi)
T11 110.00-95.00	Solid Round	7/8" solid	(50 ksi) A572-50	Solid Round		A36 (36 ksi)
T12 95.00-80.00	Solid Round	7/8" solid	(50 ksi) A572-50	Solid Round		A36 (36 ksi)
T13 80.00-65.00	Solid Round	7/8" solid	(50 ksi) A572-50	Solid Round		A36 (36 ksi)
T14 65.00-50.00	Solid Round	7/8" solid	(50 ksi) A572-50	Solid Round		A36 (36 ksi)
T15 50.00-35.00	Solid Round	7/8" solid	(50 ksi) A572-50	Solid Round		A36 (36 ksi)
T16 35.00-20.00	Solid Round	7/8" solid	(50 ksi) A572-50	Solid Round		A36 (36 ksi)
T17 20.00-10.92	Solid Round	7/8" solid	(50 ksi) A572-50	Solid Round		A36 (36 ksi)
T20 5.00-3.56	Flat Bar	6 x 1/2	A36 (36 ksi)	Flat Bar		A36 (36 ksi)
T22 2.25-0.00	Flat Bar		A36 (36 ksi)	Flat Bar	6 x 1/2	A36 (36 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T1 248.17-239.08	None	Single Angle		A36 (36 ksi)	Solid Round	7/8" solid	A572-50 (50 ksi)

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T2 239.08-230.00	None	Single Angle		A36 (36 ksi)	Solid Round	7/8" solid	A572-50 (50 ksi)
T3 230.00-215.00	None	Single Angle		A36 (36 ksi)	Solid Round	7/8" solid	A572-50 (50 ksi)
T4 215.00-200.00	None	Single Angle		A36 (36 ksi)	Solid Round	7/8" solid	A572-50 (50 ksi)
T5 200.00-185.00	None	Single Angle		A36 (36 ksi)	Solid Round	7/8" solid	A572-50 (50 ksi)
T6 185.00-170.00	None	Single Angle		A36 (36 ksi)	Solid Round	7/8" solid	A572-50 (50 ksi)
T7 170.00-155.00	None	Single Angle		A36 (36 ksi)	Solid Round	7/8" solid	A572-50 (50 ksi)
T8 155.00-140.00	None	Single Angle		A36 (36 ksi)	Solid Round	7/8" solid	A572-50 (50 ksi)
T9 140.00-125.00	None	Single Angle		A36 (36 ksi)	Solid Round	7/8" solid	A572-50 (50 ksi)
T10 125.00-110.00	None	Single Angle		A36 (36 ksi)	Solid Round	7/8" solid	A572-50 (50 ksi)
T11 110.00-95.00	None	Single Angle		A36 (36 ksi)	Solid Round	7/8" solid	A572-50 (50 ksi)
T12 95.00-80.00	None	Single Angle		A36 (36 ksi)	Solid Round	7/8" solid	A572-50 (50 ksi)
T13 80.00-65.00	None	Single Angle		A36 (36 ksi)	Solid Round	7/8" solid	A572-50 (50 ksi)
T14 65.00-50.00	None	Single Angle		A36 (36 ksi)	Solid Round	7/8" solid	A572-50 (50 ksi)
T15 50.00-35.00	None	Single Angle		A36 (36 ksi)	Solid Round	7/8" solid	A572-50 (50 ksi)
T16 35.00-20.00	None	Single Angle		A36 (36 ksi)	Solid Round	7/8" solid	A572-50 (50 ksi)
T17 20.00-10.92	None	Single Angle		A36 (36 ksi)	Solid Round	7/8" solid	A572-50 (50 ksi)
T18 10.92-7.96	None	Single Angle		A36 (36 ksi)	Double Angle	2L 1.5 x 1.5 x 1/8 (3/8)	A36 (36 ksi)
T19 7.96-5.00	None	Single Angle		A36 (36 ksi)	Double Angle	2L 1.5 x 1.5 x 1/8 (3/8)	A36 (36 ksi)
T20 5.00-3.56	None	Flat Bar		A36 (36 ksi)	Flat Bar	6 x 1/2	A36 (36 ksi)
T21 3.56-2.25	None	Flat Bar		A36 (36 ksi)	Flat Bar	6 x 1/2	A36 (36 ksi)
T22 2.25-0.00	None	Flat Bar		A36 (36 ksi)	Flat Bar	6 x 1/2	A36 (36 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	Gusset Area (per face) ft ²	Gusset Thickness in	Gusset Grade	Adjust. Factor A _f	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 248.17-239.08	0.00	0.375	A36 (36 ksi)	1	1	1.05	27.240	Mid-Pt	Mid-Pt
T2 239.08-230.00	0.00	0.375	A36 (36 ksi)	1	1	1.05	27.240	Mid-Pt	Mid-Pt
T3 230.00-215.00	0.00	0.375	A36 (36 ksi)	1	1	1.05	27.240	Mid-Pt	Mid-Pt
T4 215.00-200.00	0.00	0.375	A36 (36 ksi)	1	1	1.05	27.240	Mid-Pt	Mid-Pt
T5 200.00-185.00	0.00	0.375	A36 (36 ksi)	1	1	1.05	27.240	Mid-Pt	Mid-Pt
T6 185.00-170.00	0.00	0.375	A36 (36 ksi)	1	1	1.05	27.240	Mid-Pt	Mid-Pt
T7 170.00-	0.00	0.375	A36	1	1	1.05	27.240	Mid-Pt	Mid-Pt

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A_r	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
ft	ft ²	in							
155.00-140.00	0.00	0.375	(36 ksi) A36	1	1	1.05	27.240	Mid-Pt	Mid-Pt
T8 155.00-140.00	0.00	0.375	(36 ksi) A36	1	1	1.05	27.240	Mid-Pt	Mid-Pt
T9 140.00-125.00	0.00	0.375	(36 ksi) A36	1	1	1.05	27.240	Mid-Pt	Mid-Pt
T10 125.00-110.00	0.00	0.375	(36 ksi) A36	1	1	1.05	27.240	Mid-Pt	Mid-Pt
T11 110.00-95.00	0.00	0.375	(36 ksi) A36	1	1	1.05	27.240	Mid-Pt	Mid-Pt
T12 95.00-80.00	0.00	0.375	(36 ksi) A36	1	1	1.05	27.240	Mid-Pt	Mid-Pt
T13 80.00-65.00	0.00	0.375	(36 ksi) A36	1	1	1.05	27.240	Mid-Pt	Mid-Pt
T14 65.00-50.00	0.00	0.375	(36 ksi) A36	1	1	1.05	27.240	Mid-Pt	Mid-Pt
T15 50.00-35.00	0.00	0.375	(36 ksi) A36	1	1	1.05	27.240	Mid-Pt	Mid-Pt
T16 35.00-20.00	0.00	0.375	(36 ksi) A36	1	1	1.05	27.240	Mid-Pt	Mid-Pt
T17 20.00-10.92	0.00	0.375	(36 ksi) A36	1	1	1.05	27.240	Mid-Pt	Mid-Pt
T18 10.92-7.96	0.00	0.375	(36 ksi) A36	1	1	1.05	19.380	24.000	Mid-Pt
T19 7.96-5.00	0.00	0.375	(36 ksi) A36	1	1	1.05	19.380	24.000	Mid-Pt
T20 5.00-3.56	0.00	0.000	(36 ksi) A36	1	1	1	28.296	Mid-Pt	Mid-Pt
T21 3.56-2.25	0.00	0.000	(36 ksi) A36	1	1	1	28.296	Mid-Pt	Mid-Pt
T22 2.25-0.00	0.00	0.000	(36 ksi) A36	1	1	1	28.296	Mid-Pt	Mid-Pt

Tower Section Geometry (cont'd)

Tower Elevation	Calc K Single Angles	Calc K Solid Rounds	Legs	K Factors ¹							
				X Brace Diags	K Brace Diags	Single Diags	Girts	Horiz.	Sec. Horiz.	Inner Brace	
											X Y
T1 248.17-239.08	Yes	No	1	1	1	1	1	1	1	1	1
T2 239.08-230.00	Yes	No	1	1	1	1	1	1	1	1	1
T3 230.00-215.00	Yes	No	1	1	1	1	1	1	1	1	1
T4 215.00-200.00	Yes	No	1	1	1	1	1	1	1	1	1
T5 200.00-185.00	Yes	No	1	1	1	1	1	1	1	1	1
T6 185.00-170.00	Yes	No	1	1	1	1	1	1	1	1	1
T7 170.00-155.00	Yes	No	1	1	1	1	1	1	1	1	1
T8 155.00-140.00	Yes	No	1	1	1	1	1	1	1	1	1
T9 140.00-125.00	Yes	No	1	1	1	1	1	1	1	1	1
T10 125.00-110.00	Yes	No	1	1	1	1	1	1	1	1	1
T11 110.00-95.00	Yes	No	1	1	1	1	1	1	1	1	1
T12 95.00-	Yes	No	1	1	1	1	1	1	1	1	1

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	Legs	K Factors ¹							
				X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y	
80.00				1	1	1	1	1	1	1	1
T13 80.00-65.00	Yes	No	1	1	1	1	1	1	1	1	1
T14 65.00-50.00	Yes	No	1	1	1	1	1	1	1	1	1
T15 50.00-35.00	Yes	No	1	1	1	1	1	1	1	1	1
T16 35.00-20.00	Yes	No	1	1	1	1	1	1	1	1	1
T17 20.00-10.92	Yes	No	1	1	1	1	1	1	1	1	1
T18 10.92-7.96	Yes	No	1	1	1	1	1	1	1	1	1
T19 7.96-5.00	Yes	No	1	1	1	1	1	1	1	1	1
T20 5.00-3.56	No	Yes	1	1	1	1	1	1	1	1	1
T21 3.56-2.25	No	Yes	1	1	1	1	1	1	1	1	1
T22 2.25-0.00	No	Yes	1	1	1	1	1	1	0.5	0.5	1

¹Note: K factors are applied to member segment lengths. K-braces without inner supporting members will have the K factor in the out-of-plane direction applied to the overall length.

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 248.17-239.08	0.000	1	0.000	0.75	0.000	1	0.000	1	0.000	0.75	0.000	1	0.000	0.75
T2 239.08-230.00	0.000	1	0.000	0.75	0.000	1	0.000	1	0.000	0.75	0.000	1	0.000	0.75
T3 230.00-215.00	0.000	1	0.000	0.75	0.000	1	0.000	1	0.000	0.75	0.000	1	0.000	0.75
T4 215.00-200.00	0.000	1	0.000	0.75	0.000	1	0.000	1	0.000	0.75	0.000	1	0.000	0.75
T5 200.00-185.00	0.000	1	0.000	0.75	0.000	1	0.000	1	0.000	0.75	0.000	1	0.000	0.75
T6 185.00-170.00	0.000	1	0.000	0.75	0.000	1	0.000	1	0.000	0.75	0.000	1	0.000	0.75
T7 170.00-155.00	0.000	1	0.000	0.75	0.000	1	0.000	1	0.000	0.75	0.000	1	0.000	0.75
T8 155.00-140.00	0.000	1	0.000	0.75	0.000	1	0.000	1	0.000	0.75	0.000	1	0.000	0.75
T9 140.00-125.00	0.000	1	0.000	0.75	0.000	1	0.000	1	0.000	0.75	0.000	1	0.000	0.75
T10 125.00-110.00	0.000	1	0.000	0.75	0.000	1	0.000	1	0.000	0.75	0.000	1	0.000	0.75
T11 110.00-95.00	0.000	1	0.000	0.75	0.000	1	0.000	1	0.000	0.75	0.000	1	0.000	0.75
T12 95.00-80.00	0.000	1	0.000	0.75	0.000	1	0.000	1	0.000	0.75	0.000	1	0.000	0.75
T13 80.00-65.00	0.000	1	0.000	0.75	0.000	1	0.000	1	0.000	0.75	0.000	1	0.000	0.75
T14 65.00-50.00	0.000	1	0.000	0.75	0.000	1	0.000	1	0.000	0.75	0.000	1	0.000	0.75

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T15 50.00-35.00	0.000	1	0.000	0.75	0.000	1	0.000	1	0.000	0.75	0.000	1	0.000	0.75
T16 35.00-20.00	0.000	1	0.000	0.75	0.000	1	0.000	1	0.000	0.75	0.000	1	0.000	0.75
T17 20.00-10.92	0.000	1	0.000	0.75	0.000	1	0.000	1	0.000	0.75	0.000	1	0.000	0.75
T18 10.92-7.96	0.000	1	0.000	0.75	0.000	1	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75
T19 7.96-5.00	0.000	1	0.000	0.75	0.000	1	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75
T20 5.00-3.56	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.75	0.000	1	0.000	0.75
T21 3.56-2.25	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.75	0.000	1	0.000	0.75
T22 2.25-0.00	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.75	0.000	1	0.000	0.75

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 248.17-239.08	Flange	0.750	4	0.500	1	0.500	1	0.500	0	0.625	0	0.500	1	0.625	0
		A325N		A325X		A325X		A325X		A325X		A325X		A325X	
T2 239.08-230.00	Flange	0.750	4	0.500	1	0.500	1	0.500	0	0.625	1	0.500	1	0.625	0
		A325N		A325X		A325X		A325X		A325X		A325X		A325X	
T3 230.00-215.00	Flange	0.750	4	0.500	1	0.500	1	0.500	0	0.625	0	0.500	1	0.625	0
		A325N		A325X		A325X		A325X		A325X		A325X		A325X	
T4 215.00-200.00	Flange	0.750	4	0.500	1	0.500	1	0.500	0	0.625	0	0.500	1	0.625	0
		A325N		A325X		A325X		A325X		A325X		A325X		A325X	
T5 200.00-185.00	Flange	0.750	4	0.500	1	0.500	1	0.500	0	0.625	0	0.500	1	0.625	0
		A325N		A325X		A325X		A325X		A325X		A325X		A325X	
T6 185.00-170.00	Flange	0.750	4	0.500	1	0.500	1	0.500	0	0.625	0	0.500	1	0.625	0
		A325N		A325X		A325X		A325X		A325X		A325X		A325X	
T7 170.00-155.00	Flange	0.750	4	0.500	1	0.500	1	0.500	0	0.625	0	0.500	1	0.625	0
		A325N		A325X		A325X		A325X		A325X		A325X		A325X	
T8 155.00-140.00	Flange	0.750	4	0.500	1	0.500	1	0.500	0	0.625	0	0.500	1	0.625	0
		A325N		A325X		A325X		A325X		A325X		A325X		A325X	
T9 140.00-125.00	Flange	0.750	4	0.500	1	0.500	1	0.500	0	0.625	0	0.500	1	0.625	0
		A325N		A325X		A325X		A325X		A325X		A325X		A325X	
T10 125.00-110.00	Flange	0.750	4	0.500	1	0.500	1	0.500	0	0.625	0	0.500	1	0.625	0
		A325N		A325X		A325X		A325X		A325X		A325X		A325X	
T11 110.00-95.00	Flange	0.750	4	0.500	1	0.500	1	0.500	0	0.625	0	0.500	1	0.625	0
		A325N		A325X		A325X		A325X		A325X		A325X		A325X	
T12 95.00-80.00	Flange	0.750	4	0.500	1	0.500	1	0.500	0	0.625	0	0.500	1	0.625	0
		A325N		A325X		A325X		A325X		A325X		A325X		A325X	
T13 80.00-65.00	Flange	0.750	4	0.500	1	0.500	1	0.500	0	0.625	0	0.500	1	0.625	0
		A325N		A325X		A325X		A325X		A325X		A325X		A325X	
T14 65.00-50.00	Flange	0.750	4	0.500	1	0.500	1	0.500	0	0.625	0	0.500	1	0.625	0
		A325N		A325X		A325X		A325X		A325X		A325X		A325X	
T15 50.00-35.00	Flange	0.750	4	0.500	1	0.500	1	0.500	0	0.625	0	0.500	1	0.625	0
		A325N		A325X		A325X		A325X		A325X		A325X		A325X	
T16 35.00-20.00	Flange	0.750	4	0.500	1	0.500	1	0.500	0	0.625	0	0.500	1	0.625	0
		A325N		A325X		A325X		A325X		A325X		A325X		A325X	
T17 20.00-10.92	Flange	0.000	0	0.500	1	0.500	1	0.500	0	0.625	0	0.500	1	0.625	0
		A325N		A325X		A325X		A325X		A325X		A325X		A325X	
T18 10.92-7.96	Flange	0.000	0	0.500	1	0.500	0	0.500	0	0.625	0	0.500	1	0.625	0
		A325N		A325X		A325X		A325X		A325X		A325X		A325X	
T19 7.96-5.00	Flange	0.750	4	0.500	1	0.500	0	0.500	0	0.625	0	0.500	0	0.625	0
		A325N		A325X		A325X		A325X		A325X		A325X		A325X	
T20 5.00-3.56	Flange	0.000	0	0.000	0	0.000	0	0.000	0	0.625	0	0.000	0	0.625	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T21 3.56-2.25	Flange	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.625 A325N	0	0.000 A325N	0	0.625 A325N	0
T22 2.25-0.00	Flange	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.625 A325N	0	0.000 A325N	0	0.625 A325N	0

Guy Data

Guy Elevation ft	Guy Grade	Guy Size	Initial Tension K	%	Guy Modulus ksi	Guy Weight plf	L _u ft	Anchor Radius ft	Anchor Azimuth Adj. °	Anchor Elevation ft	End Fitting Efficiency %
238.875	BS	A	1	12.20	10%	24000	2.10	277.88	136.00	0.000	100%
		B	1	12.20	10%	24000	2.10	282.27	136.00	0.000	100%
		C	1	12.20	10%	24000	2.10	277.88	136.00	0.000	100%
178.875	BS	A	1	12.20	10%	24000	2.10	227.15	136.00	0.000	100%
		B	1	12.20	10%	24000	2.10	231.21	136.00	0.000	100%
		C	1	12.20	10%	24000	2.10	227.15	136.00	0.000	100%
133.875	BS	A	1	12.20	10%	24000	2.10	192.61	136.00	0.000	100%
		B	1	12.20	10%	24000	2.10	196.24	136.00	0.000	100%
		C	1	12.20	10%	24000	2.10	192.61	136.00	0.000	100%
88.875	BS	A	7/8	9.20	10%	24000	1.61	163.22	136.00	0.000	100%
		B	7/8	9.20	10%	24000	1.61	166.14	136.00	0.000	100%
		C	7/8	9.20	10%	24000	1.61	163.22	136.00	0.000	100%
58.875	BS	A	7/8	9.20	10%	24000	1.61	148.05	136.00	0.000	100%
		B	7/8	9.20	10%	24000	1.61	150.27	136.00	0.000	100%
		C	7/8	9.20	10%	24000	1.61	148.05	136.00	0.000	100%

Guy Data(cont'd)

Guy Elevation ft	Mount Type	Torque-Arm Spread ft	Torque-Arm Leg Angle °	Torque-Arm Style	Torque-Arm Grade	Torque-Arm Type	Torque-Arm Size
238.875	Corner						
178.875	Corner						
133.875	Corner						
88.875	Corner						
58.875	Corner						

Guy Data (cont'd)

Guy Elevation ft	Diagonal Grade	Diagonal Type	Upper Diagonal Size	Lower Diagonal Size	Is Strap.	Pull-Off Grade	Pull-Off Type	Pull-Off Size
238.87	A36 (36 ksi)	Double Angle			No	A36 (36 ksi)	Arbitrary Shape	Double 7/8 SR
178.88	A36 (36 ksi)	Double Angle			No	A36 (36 ksi)	Arbitrary Shape	Double 7/8 SR
133.88	A36 (36 ksi)	Double Angle			No	A36 (36 ksi)	Arbitrary Shape	Double 7/8 SR
88.88	A36 (36 ksi)	Double Angle			No	A36 (36 ksi)	Arbitrary Shape	Double 7/8 SR
58.88	A36	Double Angle			No	A36	Arbitrary	Double 7/8 SR

Guy Elevation ft	Diagonal Grade	Diagonal Type	Upper Diagonal Size	Lower Diagonal Size	Is Strap.	Pull-Off Grade	Pull-Off Type	Pull-Off Size
	(36 ksi)					(36 ksi)	Shape	

Guy Data (cont'd)

Guy Elevation ft	Cable Weight A K	Cable Weight B K	Cable Weight C K	Cable Weight D K	Tower Intercept A ft	Tower Intercept B ft	Tower Intercept C ft	Tower Intercept D ft
238.875	0.58	0.59	0.58		6.52 4.4 sec/pulse	6.72 4.5 sec/pulse	6.52 4.4 sec/pulse	
178.875	0.48	0.49	0.48		4.38 3.6 sec/pulse	4.53 3.7 sec/pulse	4.38 3.6 sec/pulse	
133.875	0.40	0.41	0.40		3.16 3.1 sec/pulse	3.28 3.1 sec/pulse	3.16 3.1 sec/pulse	
88.875	0.26	0.27	0.26		2.31 2.6 sec/pulse	2.40 2.7 sec/pulse	2.31 2.6 sec/pulse	
58.875	0.24	0.24	0.24		1.91 2.4 sec/pulse	1.97 2.4 sec/pulse	1.91 2.4 sec/pulse	

Guy Data (cont'd)

Guy Elevation ft	Calc K Single Angles	Calc K Solid Rounds	Torque Arm		Pull Off		Diagonal	
			K _x	K _y	K _x	K _y	K _x	K _y
238.875	No	No			1	1	1	1
178.875	No	No			1	1	1	1
133.875	No	No			1	1	1	1
88.875	No	No			1	1	1	1
58.875	No	No			1	1	1	1

Guy Data (cont'd)

Guy Elevation ft	Torque-Arm				Pull Off				Diagonal			
	Bolt Size in	Number	Net Width Deduct in	U	Bolt Size in	Number	Net Width Deduct in	U	Bolt Size in	Number	Net Width Deduct in	U
238.875	0.750 A325X	2	0.000	0.75	0.500 A325X	2	0.000	1	0.000 A325N	0	0.000	0.75
178.875	0.000 A325X	0	0.000	1	0.500 A325X	2	0.000	1	0.000 A325N	0	0.000	0.75
133.875	0.000 A325N	0	0.000	1	0.500 A325X	2	0.000	1	0.000 A325N	0	0.000	0.75
88.875	0.625 A325N	0	0.000	0.75	0.500 A325X	2	0.000	1	0.000 A325N	0	0.000	0.75
58.875	0.625 A325N	0	0.000	0.75	0.500 A325X	2	0.000	1	0.000 A325N	0	0.000	0.75

Guy Pressures

Guy Elevation ft	Guy Location	z ft	q _z psf	q _z Ice psf	Ice Thickness in
238.875	A	116.94	56.68		
	B	114.44	56.46		
	C	116.94	56.68		
178.875	A	86.94	53.83		
	B	84.44	53.56		
	C	86.94	53.83		
133.875	A	64.44	51.10		
	B	61.94	50.75		
	C	64.44	51.10		
88.875	A	41.94	47.42		
	B	39.44	46.91		
	C	41.94	47.42		
58.875	A	26.94	43.91		
	B	24.44	43.17		
	C	26.94	43.91		

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Componen t Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacin g in	Width or Diameter in	Perimete r in	Weight plf

LDF1-50 (1/4" foam) ***	A	No	No	Ar (CaAa)	244.00 - 5.00	0.000	0.49	2	2	0.345	0.345		0.06
LDF2-50 (3/8" foam)	B	No	No	Ar (CaAa)	91.00 - 5.00	0.000	-0.25	1	1	0.440	0.440		0.08
LDF2-50 (3/8" foam)	B	No	No	Ar (CaAa)	80.00 - 5.00	0.000	0.15	5	3	0.440	0.440		0.08
LDF2-50 (3/8" foam)	B	No	No	Ar (CaAa)	101.00 - 80.00	0.000	0.15	3	3	0.440	0.440		0.08
LDF2-50 (3/8" foam)	B	No	No	Ar (CaAa)	141.00 - 101.00	0.000	0.15	1	1	0.440	0.440		0.08
LDF4-50A (1/2" foam)	B	No	No	Ar (CaAa)	106.00 - 5.00	0.000	0.2	4	4	0.630	0.630		0.15
LDF4-50A (1/2" foam)	B	No	No	Ar (CaAa)	108.00 - 106.00	0.000	0.2	3	3	0.630	0.630		0.15
LDF4-50A (1/2" foam)	B	No	No	Ar (CaAa)	230.00 - 108.00	0.000	0.2	1	1	0.630	0.630		0.15
LDF6-50 (1 1/4" foam)	B	No	No	Ar (CaAa)	110.00 - 5.00	0.000	0.25	6	4	1.550	1.550		0.66
LDF6-50 (1 1/4" foam)	B	No	No	Ar (CaAa)	174.00 - 110.00	0.000	0.25	5	5	1.550	1.550		0.66
LDF6-50 (1 1/4" foam)	B	No	No	Ar (CaAa)	206.00 - 174.00	0.000	0.25	4	4	1.550	1.550		0.66
LDF6-50 (1 1/4" foam)	B	No	No	Ar (CaAa)	214.00 - 206.00	0.000	0.25	3	3	1.550	1.550		0.66
LDF6-50 (1 1/4" foam)	B	No	No	Ar (CaAa)	219.00 - 214.00	0.000	0.25	2	2	1.550	1.550		0.66
LDF6-50 (1 1/4" foam)	B	No	No	Ar (CaAa)	231.00 - 219.00	0.000	0.25	1	1	1.550	1.550		0.66
CAT5	B	No	No	Ar (CaAa)	201.00 - 5.00	0.000	0.3	1	1	0.250	0.190		0.02

AVA5- 50(7/8")	C	No	No	Ar (CaAa)	219.00 - 5.00	0.000	-0.3	24	8	0.500	1.102		0.30
LDF2-50 (3/8" foam)	C	No	No	Ar (CaAa)	89.00 - 5.00	0.000	0.25	17	4	0.440	0.440		0.08
LDF2-50 (3/8" foam)	C	No	No	Ar (CaAa)	114.00 - 89.00	0.000	0.25	16	4	0.440	0.440		0.08
LDF2-50	C	No	No	Ar (CaAa)	131.00 -	0.000	0.25	14	4	0.440	0.440		0.08

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
(3/8" foam) LDF2-50	C	No	No	Ar (CaAa)	114.00 - 136.00	0.000	0.25	13	4	0.440	0.440		0.08
(3/8" foam) LDF2-50	C	No	No	Ar (CaAa)	131.00 - 138.00	0.000	0.25	12	4	0.440	0.440		0.08
(3/8" foam) LDF2-50	C	No	No	Ar (CaAa)	136.00 - 141.00	0.000	0.25	10	4	0.440	0.440		0.08
(3/8" foam) LDF2-50	C	No	No	Ar (CaAa)	138.00 - 142.00	0.000	0.25	9	4	0.440	0.440		0.08
(3/8" foam) LDF2-50	C	No	No	Ar (CaAa)	141.00 - 146.00	0.000	0.25	8	4	0.440	0.440		0.08
(3/8" foam) LDF2-50	C	No	No	Ar (CaAa)	142.00 - 146.00	0.000	0.25	6	4	0.440	0.440		0.08
(3/8" foam) LDF2-50	C	No	No	Ar (CaAa)	146.00 - 192.00	0.000	0.25	4	4	0.440	0.440		0.08
(3/8" foam) LDF2-50	C	No	No	Ar (CaAa)	142.00 - 165.00	0.000	0.25	3	3	0.440	0.440		0.08
(3/8" foam) LDF2-50	C	No	No	Ar (CaAa)	165.00 - 192.00	0.000	0.25	2	2	0.440	0.440		0.08
(3/8" foam) LDF1-50	C	No	No	Ar (CaAa)	192.00 - 193.00	0.000	0.3	4	2	0.345	0.345		0.06
(1/4" foam) **** AVA5-50(7/8")	A	No	No	Ar (CaAa)	89.00 - 75.00	0.000	-0.3	6	2	0.500	1.102		0.30
AVA5-50(7/8")	A	No	No	Ar (CaAa)	5.00 - 95.50	0.000	-0.3	2	2	0.500	1.102		0.30
AVA5-50(7/8")	A	No	No	Ar (CaAa)	75.00 - 113.00	0.000	-0.25	4	2	0.500	1.102		0.30
AVA5-50(7/8")	A	No	No	Ar (CaAa)	5.00 - 155.00	0.000	-0.25	2	2	0.500	1.102		0.30
AVA5-50(7/8")	A	No	No	Ar (CaAa)	113.00 - 150.00	0.000	-0.2	2	2	0.345	0.345		0.06
LDF1-50	A	No	No	Ar (CaAa)	150.00 - 5.00	0.000	-0.1	2	2	0.250	0.190		0.02
(1/4" foam) CAT5	A	No	No	Ar (CaAa)	5.00 - 74.00	0.000	0.05	2	2	0.440	0.440		0.08
LDF2-50	A	No	No	Ar (CaAa)	74.00 - 5.00	0.000	0.25	12	4	0.500	1.102		0.30
(3/8" foam) AVA5-50(7/8")	A	No	No	Ar (CaAa)	5.00 - 165.00	0.000	0.25	6	4	0.500	1.102		0.30
AVA5-50(7/8")	A	No	No	Ar (CaAa)	165.00 - 80.00	0.000	0	8	4	0.630	0.630		0.15
LDF4-50A	B	No	No	Ar (CaAa)	80.00 - 5.00	0.000	0	7	4	0.630	0.630		0.15
(1/2" foam) LDF4-50A	B	No	No	Ar (CaAa)	93.00 - 80.00	0.000	0	5	4	0.630	0.630		0.15
LDF4-50A	B	No	No	Ar (CaAa)	98.00 - 93.00	0.000	0	4	4	0.630	0.630		0.15
(1/2" foam) LDF4-50A	B	No	No	Ar (CaAa)	103.00 - 98.00	0.000	0	2	2	0.630	0.630		0.15
LDF4-50A	B	No	No	Ar (CaAa)	108.00 - 103.00	0.000	0	1	1	0.630	0.630		0.15
(1/2" foam) LDF4-50A	B	No	No	Ar (CaAa)	126.00 - 108.00	0.000	0.49	1	1	0.795	0.795		0.58
(1/2" foam) *** WR-VG86ST-BRD(3/4")	C	No	No	Ar (CaAa)	150.00 - 5.00	0.000	0.49	1	1	0.795	0.795		0.58

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft	CAAA Front ft ²	CAAA Side ft ²	Weight K
2.375" OD x 9 ft lightning extender	C	From Face	0.00 0.00 4.50	0.000	248.00	No Ice 2.00	2.00	0.03
Strobe Light	A	From Leg	0.00 0.00 0.00	0.000	249.00	No Ice 1.08	1.08	0.05
Obstruction light	A	From Leg	0.50 0.00 0.00	0.000	125.00	No Ice 0.50	0.50	0.01
Obstruction light	B	From Leg	0.50 0.00 0.00	0.000	125.00	No Ice 0.50	0.50	0.01
Obstruction light	C	From Leg	0.50 0.00 0.00	0.000	125.00	No Ice 0.50	0.50	0.01
** 8 ft x 2" omni whip	A	From Leg	6.00 0.00 4.00	0.000	244.00	No Ice 1.60	1.60	0.02
TMA (12" x 8" x 6")	A	From Leg	6.00 0.00 0.00	0.000	244.00	No Ice 0.80	0.41	0.02
Generic 3.5' x 6' sidearm	A	From Leg	3.00 0.00 0.00	0.000	244.00	No Ice 3.00	6.00	0.40
*** 8 ft x 2" omni whip	A	From Leg	6.00 0.00 4.00	0.000	231.00	No Ice 1.60	1.60	0.02
TMA (18" x 6" x 4")	A	From Leg	6.00 0.00 0.00	0.000	231.00	No Ice 1.20	0.64	0.03
Generic 3.5' x 6' sidearm	A	From Leg	3.00 0.00 0.00	0.000	231.00	No Ice 3.00	6.00	0.40
**** 8 ft x 2" omni whip	C	From Leg	6.00 0.00 4.00	0.000	219.00	No Ice 1.60	1.60	0.02
Generic 3.5' x 6' sidearm	C	From Leg	3.00 0.00 0.00	0.000	219.00	No Ice 3.00	6.00	0.40
**** ODI-065R16M18JJ-GQ w/ Mount Pipe	A	From Leg	1.00 0.00 0.00	0.000	220.00	No Ice 10.47	7.98	0.09
ODI-065R16M18JJ-GQ w/ Mount Pipe	B	From Leg	1.00 0.00 0.00	0.000	220.00	No Ice 10.47	7.98	0.09
ODI-065R16M18JJ-GQ w/ Mount Pipe	C	From Leg	1.00 0.00 0.00	0.000	220.00	No Ice 10.47	7.98	0.09
Pipe Mount [PM 601-3] ***	B	None		0.000	220.00	No Ice 3.17	3.17	0.20
10 ft x 2" omni whip	A	From Leg	6.00 0.00 5.00	0.000	214.00	No Ice 2.00	2.00	0.02
Generic 1' x 2' sidearm	A	From Leg	3.00 0.00 0.00	0.000	214.00	No Ice 1.00	2.00	0.13
*** (2) Airpair ODU	A	From Leg	4.00 0.00 0.00	0.000	210.00	No Ice 1.01	0.46	0.01
Generic 3' x 4' sidearm	A	From Leg	2.00	0.000	210.00	No Ice 1.50	3.00	0.19

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
			0.00 0.00						
*** 5 ft x 2" omni whip	C	From Leg	6.00 0.00 2.50	0.000	206.00	No Ice	1.00	1.00	0.02
Generic 3.5' x 6' sidearm	C	From Leg	3.00 0.00 0.00	0.000	206.00	No Ice	3.00	6.00	0.40
*** RAU 2	C	From Leg	0.25 0.00 0.00	0.000	201.00	No Ice	1.07	0.40	0.01
*** AFS-DBG-0360-01 w/ Mount Pipe	A	From Leg	2.00 0.00 4.00	0.000	189.00	No Ice	1.97	0.77	0.02
RDL-3000 ELLIPSE	A	From Leg	2.00 0.00 0.00	0.000	189.00	No Ice	0.91	0.26	0.01
AFS-DBG-0360-01 w/ Mount Pipe	C	From Leg	2.00 0.00 3.00	0.000	189.00	No Ice	1.97	0.77	0.02
RDL-3000 ELLIPSE	C	From Leg	2.00 0.00 0.00	0.000	189.00	No Ice	0.91	0.26	0.01
Generic 1' x 2' sidearm	C	From Leg	1.00 0.00 0.00	0.000	189.00	No Ice	1.00	2.00	0.13
*** BCD-87010-NE-3-25	A	From Leg	4.00 0.00 4.00	0.000	174.00	No Ice	2.56	2.56	0.03
Generic 1' x 2' sidearm	A	From Leg	2.00 0.00 0.00	0.000	174.00	No Ice	1.00	2.00	0.13
*** (2) Airpair ODU	C	From Leg	4.00 0.00 0.00	0.000	165.00	No Ice	1.01	0.46	0.01
Generic 3' x 4' sidearm	C	From Leg	2.00 0.00 0.00	0.000	165.00	No Ice	1.50	3.00	0.19
***** TMA (8" x 6" x 4")	A	From Leg	0.50 0.00 0.00	0.000	150.00	No Ice	0.40	0.27	0.02
*** KP-5HVX8-65	C	From Leg	3.00 0.00 0.00	0.000	146.00	No Ice	3.18	1.34	0.01
A5c	C	From Leg	3.00 0.00 0.00	0.000	146.00	No Ice	1.22	0.34	0.00
Generic 2' x 3' sidearm	C	From Leg	1.50 0.00 0.00	0.000	146.00	No Ice	1.50	3.00	0.19
*** B11	C	From Leg	3.00 0.00 0.00	0.000	142.00	No Ice	0.82	0.25	0.05
**** KPPA-5GHZHV4P65S-17	A	From Leg	0.50 0.00 0.00	0.000	138.00	No Ice	0.99	0.47	10.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
A5c	A	From Leg	0.50 0.00 0.00	0.000	138.00	No Ice	1.22	0.34	0.00
Generic 1' x 2' sidearm	A	From Leg	1.50 0.00 0.00	0.000	138.00	No Ice	1.00	2.00	0.13
KPPA-5GHZHV4P65S-17	C	From Leg	0.50 0.00 0.00	0.000	138.00	No Ice	0.99	0.47	10.00
A5c	C	From Leg	0.50 0.00 0.00	0.000	138.00	No Ice	1.22	0.34	0.00
Generic 1' x 2' sidearm	C	From Leg	1.00 0.00 0.00	0.000	138.00	No Ice	1.00	2.00	0.13

B11	C	From Leg	3.00 0.00 0.00	0.000	131.00	No Ice	0.82	0.25	0.05

ODI-065R16M18JJ-GQ w/ Mount Pipe	A	From Leg	1.00 0.00 0.00	0.000	121.00	No Ice	10.48	8.07	0.09
ODI-065R16M18JJ-GQ w/ Mount Pipe	B	From Leg	1.00 0.00 0.00	0.000	121.00	No Ice	10.48	8.07	0.09
ODI-065R16M18JJ-GQ w/ Mount Pipe	C	From Leg	1.00 0.00 0.00	0.000	121.00	No Ice	10.48	8.07	0.09
Pipe Mount [PM 601-3] ****	B	None		0.000	121.00	No Ice	3.17	3.17	0.20
(2) Airpair ODU	A	From Leg	4.00 0.00 0.00	0.000	114.00	No Ice	1.01	0.46	0.01
Generic 3' x 4' sidearm	A	From Leg	2.00 0.00 0.00	0.000	114.00	No Ice	1.50	3.00	0.19

48" x 6" x 6" Panel Antennas w/ mount pipe	C	From Leg	4.00 0.00 0.00	0.000	113.00	No Ice	3.58	4.53	0.08

Generic 1' x 2' sidearm	B	From Leg	1.00 0.00 0.00	0.000	110.00	No Ice	1.00	2.00	0.13
(2) ODU (10" x 10" x 5")	A	From Leg	0.50 0.00 0.00	0.000	108.00	No Ice	0.83	0.33	0.04
Generic 1' x 2' sidearm	C	From Leg	1.00 0.00 0.00	0.000	106.00	No Ice	1.00	2.00	0.13

RAU 2	C	From Leg	0.25 0.00 0.00	0.000	101.00	No Ice	1.07	0.40	0.01
(2) RAU 2	A	From Leg	0.25 0.00 0.00	0.000	101.00	No Ice	1.07	0.40	0.01

1' square panel	A	From Leg	3.00 0.00 3.00	0.000	91.00	No Ice	1.20	0.23	0.03

RAU1 N	B	From Leg	0.25 0.00	0.000	80.00	No Ice	1.73	0.79	0.02

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
DC6-48-60-0-8F	B	From Leg	0.00 0.25 0.00 0.00	0.000	74.00	No Ice	0.92	0.92	0.02

BXA-80090/8CF w/ Mount Pipe	B	From Leg	0.50 0.00 0.00	0.000	95.50	No Ice	8.53	8.56	0.06
BXA-80090/8CF w/ Mount Pipe	A	From Leg	0.50 0.00 0.00	0.000	75.00	No Ice	8.53	8.56	0.06
BXA-80090/8CF w/ Mount Pipe	C	From Leg	0.50 0.00 0.00	0.000	75.00	No Ice	8.53	8.56	0.06
BXA-70090-4CF-EDIN-X	A	From Leg	0.50 0.00 0.00	0.000	31.00	No Ice	3.57	2.79	0.01
BXA-70090-4CF-EDIN-X	C	From Leg	0.50 0.00 0.00	0.000	31.00	No Ice	3.57	2.79	0.01
RRUS 11 B12	A	From Leg	0.25 0.00 0.00	0.000	31.00	No Ice	2.83	1.18	0.05
RRUS 11 B12	C	From Leg	0.25 0.00 0.00	0.000	31.00	No Ice	2.83	1.18	0.05

80010965_TIA w/ Mount Pipe	A	From Leg	1.00 0.00 0.00	0.000	98.00	No Ice	14.05	7.63	0.14
80010965_TIA w/ Mount Pipe	B	From Leg	1.00 0.00 0.00	0.000	108.00	No Ice	14.05	7.63	0.14
80010965_TIA w/ Mount Pipe	C	From Leg	1.00 0.00 0.00	0.000	98.00	No Ice	14.05	7.63	0.14
Kathrein 800 250911 w/Mount Pipe	A	From Leg	1.00 0.00 0.00	0.000	93.00	No Ice	3.58	2.36	0.04
Kathrein 800 250911 w/Mount Pipe	B	From Leg	1.00 0.00 0.00	0.000	103.00	No Ice	3.58	2.36	0.04
Kathrein 800 250911 w/Mount Pipe	C	From Leg	1.00 0.00 0.00	0.000	93.00	No Ice	3.58	2.36	0.04
AHLOA	A	From Leg	0.50 0.00 0.00	0.000	98.00	No Ice	2.23	1.39	0.08
AHLOA	B	From Leg	0.50 0.00 0.00	0.000	108.00	No Ice	2.23	1.39	0.08
AHLOA	C	From Leg	0.50 0.00 0.00	0.000	98.00	No Ice	2.23	1.39	0.08
AHFIB	A	From Leg	0.50 0.00 0.00	0.000	98.00	No Ice	3.68	2.31	0.09
AHFIB	B	From Leg	0.50 0.00 0.00	0.000	108.00	No Ice	3.68	2.31	0.09
AHFIB	C	From Leg	0.50 0.00 0.00	0.000	98.00	No Ice	3.68	2.31	0.09
AWHQF RRR 4T4R n78	A	From Leg	0.50 0.00	0.000	93.00	No Ice	1.03	0.11	0.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft		C _{AA} _{Front} ft ²	C _{AA} _{Side} ft ²	Weight K
AWHQF RRH 4T4R n78	B	From Leg	0.00 0.50 0.00	0.000	103.00	No Ice	1.03	0.11	0.00
AWHQF RRH 4T4R n78	C	From Leg	0.00 0.50 0.00	0.000	93.00	No Ice	1.03	0.11	0.00

(2) KPP-2S3SX8-65 w/Mount Pipe	C	From Leg	0.00 0.50 0.00	0.000	125.00	No Ice	4.68	2.83	0.04
(2) KPP-2S3SX8-65 w/Mount Pipe	B	From Leg	0.00 0.50 0.00	0.000	150.00	No Ice	4.68	2.82	0.04
(2) AIRHARMONY 4000	C	From Leg	0.00 0.50 0.00	0.000	125.00	No Ice	1.55	1.38	0.04
(2) AIRHARMONY 4000	C	From Leg	0.00 0.50 0.00	0.000	125.00	No Ice	0.00	1.38	0.04
(2) AIRHARMONY 4000	B	From Leg	0.00 0.50 0.00	0.000	150.00	No Ice	1.55	1.38	0.04
(2) AIRHARMONY 4000	B	From Leg	0.00 0.50 0.00	0.000	150.00	No Ice	0.00	1.38	0.04
B5C	C	From Leg	0.00 0.50 0.00	0.000	125.00	No Ice	0.54	0.27	0.00
B5C	B	From Leg	0.00 0.50 0.00	0.000	150.00	No Ice	0.54	0.27	0.00

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft	Aperture Area ft ²	Weight K
VHLPX4-18	A	Paraboloid w/Shroud (HP)	From Leg	4.00 0.00 0.00	60.000		210.00	4.23	No Ice 14.08	0.10
ANT2 0.6 13 HP (TR)	B	Paraboloid w/o Radome	From Leg	0.50 0.00 0.00	-50.000		201.00	2.17	No Ice 3.72	0.02
VHLPX4-18	C	Paraboloid w/Shroud (HP)	From Leg	4.00 0.00 0.00	50.000		165.00	4.23	No Ice 14.08	0.10
3 ft standard	A	Paraboloid w/o Radome	From Leg	0.50 0.00 0.00	-90.000		155.00	3.00	No Ice 7.06	0.10
ANT2 0.2 28 HP	A	Paraboloid w/o Radome	From Leg	0.50 0.00 0.00	-90.000		150.00	0.97	No Ice 0.74	0.01
MMS2-11V	B	Paraboloid w/Shroud (HP)	From Leg	0.50 0.00 0.00	-50.000		142.00	2.04	No Ice 3.27	0.03
ANT2 0.6 23HP	A	Paraboloid w/o Radome	From Leg	0.50 0.00 0.00	-90.000		141.00	2.17	No Ice 3.69	0.02
B5	C	Paraboloid w/o Radome	From Leg	0.50	40.000		141.00	1.45	No Ice 1.65	0.01

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft	Aperture Area ft ²	Weight K
		Radome	Leg	0.00						
B5	C	Paraboloid w/o Radome	From Leg	0.00 0.50 0.00	20.000		136.00	1.45	No Ice	1.65
MMS2-11V	C	Paraboloid w/Shroud (HP)	From Leg	0.00 0.50 0.00	90.000		131.00	2.04	No Ice	3.27
VHLPX4-18	A	Paraboloid w/Shroud (HP)	From Leg	0.00 4.00 0.00	60.000		114.00	4.23	No Ice	14.08
4 ft Grid	B	Grid	From Leg	0.00 2.00 0.00	-60.000		110.00	4.00	No Ice	12.57
3 ft standard	A	Paraboloid w/o Radome	From Leg	0.00 0.50 0.00	70.000		108.00	3.00	No Ice	7.06
ANT2 0.2 28 HP	C	Paraboloid w/o Radome	From Leg	0.00 0.50 0.00	35.000		101.00	0.97	No Ice	0.74
ANT2 0.9 6 HPX	A	Paraboloid w/o Radome	From Leg	0.00 0.50 0.00	0.000		101.00	3.25	No Ice	8.32
HP2-5.9	B	Paraboloid w/Shroud (HP)	From Leg	0.00 0.50 0.00	-60.000		80.00	2.04	No Ice	3.27
VHLP2.5-11C81	B	Paraboloid w/Shroud (HP)	From Leg	0.00 0.50 0.00	-60.000		74.00	2.80	No Ice	6.16

VHLPX4-11W-4WH	A	Paraboloid w/Shroud (HP)	From Leg	0.00 0.50 0.00	80.000		80.00	4.11	No Ice	13.26
VHLPX2-11-6WH	C	Paraboloid w/o Radome	From Leg	0.00 0.50 0.00	80.000		126.00	2.17	No Ice	3.72

AF60-LR-US	C	Grid	From Leg	0.00 0.50 0.00	10.000		125.00	1.43	No Ice	1.61
AF60-LR-US	B	Grid	From Leg	0.00 0.50 0.00	-76.000		150.00	1.43	No Ice	1.61
KP-5PDN-2	C	Paraboloid w/o Radome	From Leg	0.00 0.50 0.00	10.000		125.00	2.08	No Ice	3.41
KP-5PDN-2	B	Paraboloid w/o Radome	From Leg	0.00 0.50 0.00	-76.000		150.00	2.08	No Ice	3.41
EH-ANT-2ft-DL5 w/EH-8010FX-ODU	C	Paraboloid w/o Radome	From Leg	0.00 0.50 0.00	10.000		125.00	2.22	No Ice	3.88
EH-ANT-2ft-DL5 w/EH-8010FX-ODU	B	Paraboloid w/o Radome	From Leg	0.00 0.50 0.00	-76.000		150.00	2.22	No Ice	3.88

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice+1.0 Guy
3	1.2 Dead+1.6 Wind 30 deg - No Ice+1.0 Guy
4	1.2 Dead+1.6 Wind 60 deg - No Ice+1.0 Guy

Comb. No.	Description
5	1.2 Dead+1.6 Wind 90 deg - No Ice+1.0 Guy
6	1.2 Dead+1.6 Wind 120 deg - No Ice+1.0 Guy
7	1.2 Dead+1.6 Wind 150 deg - No Ice+1.0 Guy
8	1.2 Dead+1.6 Wind 180 deg - No Ice+1.0 Guy
9	1.2 Dead+1.6 Wind 210 deg - No Ice+1.0 Guy
10	1.2 Dead+1.6 Wind 240 deg - No Ice+1.0 Guy
11	1.2 Dead+1.6 Wind 270 deg - No Ice+1.0 Guy
12	1.2 Dead+1.6 Wind 300 deg - No Ice+1.0 Guy
13	1.2 Dead+1.6 Wind 330 deg - No Ice+1.0 Guy
14	Dead+Wind 0 deg - Service+Guy
15	Dead+Wind 30 deg - Service+Guy
16	Dead+Wind 60 deg - Service+Guy
17	Dead+Wind 90 deg - Service+Guy
18	Dead+Wind 120 deg - Service+Guy
19	Dead+Wind 150 deg - Service+Guy
20	Dead+Wind 180 deg - Service+Guy
21	Dead+Wind 210 deg - Service+Guy
22	Dead+Wind 240 deg - Service+Guy
23	Dead+Wind 270 deg - Service+Guy
24	Dead+Wind 300 deg - Service+Guy
25	Dead+Wind 330 deg - Service+Guy

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Mast	Max. Vert	2	295.73	0.07	4.21
	Max. H _x	11	273.65	4.07	0.69
	Max. H _z	2	295.73	0.07	4.21
	Max. M _x	1	0	0.03	0.04
	Max. M _z	1	0	0.03	0.04
	Max. Torsion	5	5	-4.15	0.65
	Min. Vert	1	172.58	0.03	0.04
	Min. H _x	4	249.71	-4.16	2.84
	Min. H _z	8	250.18	-0.16	-5.05
	Min. M _x	1	0	0.03	0.04
	Min. M _z	1	0	0.03	0.04
Guy C @ 136 ft Elev -5 ft Azimuth 240 deg	Min. Torsion	11	-6	4.07	0.69
	Max. Vert	10	-8.98	-3.97	2.29
Guy B @ 136 ft Elev -10 ft Azimuth 120 deg	Max. H _x	10	-8.98	-3.97	2.29
	Max. H _z	3	-124.04	-105.62	63.14
	Min. Vert	3	-124.04	-105.62	63.14
	Min. H _x	3	-124.04	-105.62	63.14
	Min. H _z	10	-8.98	-3.97	2.29
Guy A @ 136 ft Elev -5 ft Azimuth 0 deg	Max. Vert	6	-9.89	4.31	2.49
	Max. H _x	11	-123.95	103.37	57.55
	Max. H _z	13	-121.59	99.05	59.29
	Min. Vert	11	-123.95	103.37	57.55
	Min. H _x	6	-9.89	4.31	2.49
Guy A @ 136 ft Elev -5 ft Azimuth 0 deg	Min. H _z	6	-9.89	4.31	2.49
	Max. Vert	2	-8.83	0.00	-4.48
	Max. H _x	11	-68.58	3.83	-66.03
	Max. H _z	2	-8.83	0.00	-4.48
	Min. Vert	9	-123.46	1.94	-122.86
	Min. H _x	5	-67.06	-3.80	-64.38
	Min. H _z	9	-123.46	1.94	-122.86

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	248.167 - 239.083	1.03	24	0.032	0.335
T2	239.083 - 230	1.06	24	0.031	0.332
T3	230 - 215	1.09	24	0.025	0.329
T4	215 - 200	1.10	24	0.007	0.318
T5	200 - 185	1.07	24	0.017	0.296
T6	185 - 170	1.00	24	0.021	0.272
T7	170 - 155	0.94	24	0.021	0.250
T8	155 - 140	0.86	24	0.031	0.233
T9	140 - 125	0.75	24	0.039	0.221
T10	125 - 110	0.65	14	0.029	0.213
T11	110 - 95	0.59	16	0.028	0.208
T12	95 - 80	0.50	18	0.029	0.193
T13	80 - 65	0.42	20	0.026	0.178
T14	65 - 50	0.35	21	0.023	0.160
T15	50 - 35	0.30	22	0.017	0.144
T16	35 - 20	0.25	22	0.022	0.129
T17	20 - 10.9167	0.16	22	0.032	0.114
T18	10.9167 - 7.95833	0.09	22	0.037	0.104
T19	7.95833 - 5	0.07	22	0.038	0.099
T20	5 - 3.5625	0.04	22	0.039	0.093
T21	3.5625 - 2.25	0.03	22	0.039	0.089
T22	2.25 - 0	0.02	22	0.040	0.083

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
249.00	Strobe Light	24	1.03	0.032	0.335	202858
248.00	2.375" OD x 9 ft lightning extender	24	1.03	0.032	0.335	202858
244.00	8 ft x 2" omni whip	24	1.04	0.032	0.334	202858
238.87	Guy	24	1.06	0.031	0.332	173046
231.00	8 ft x 2" omni whip	24	1.08	0.026	0.330	57597
220.00	ODI-065R16M18JJ-GQ w/ Mount Pipe	24	1.10	0.011	0.323	40798
219.00	8 ft x 2" omni whip	24	1.10	0.010	0.322	40230
214.00	10 ft x 2" omni whip	24	1.10	0.007	0.317	39082
210.00	VHLPX4-18	24	1.10	0.008	0.311	40955
206.00	5 ft x 2" omni whip	24	1.09	0.011	0.305	43591
201.00	ANT2 0.6 13 HP (TR)	24	1.07	0.016	0.297	48956
189.00	AFS-DBG-0360-01 w/ Mount Pipe	24	1.02	0.021	0.279	294591
178.88	Guy	24	0.97	0.020	0.263	131154
174.00	BCD-87010-NE-3-25	24	0.95	0.020	0.256	185045
165.00	VHLPX4-18	24	0.91	0.023	0.244	94537
155.00	3 ft standard	24	0.86	0.031	0.233	53667
150.00	ANT2 0.2 28 HP	24	0.82	0.035	0.228	88038
146.00	KP-5HVX8-65	24	0.79	0.038	0.225	116530
142.00	MMS2-11V	24	0.76	0.039	0.222	76911
141.00	ANT2 0.6 23HP	24	0.75	0.039	0.221	74234
138.00	KPPA-5GHZHV4P65S-17	24	0.73	0.038	0.219	80021
136.00	B5	24	0.72	0.037	0.218	94526
133.88	Guy	24	0.70	0.036	0.217	102225
131.00	MMS2-11V	14	0.68	0.033	0.216	95072
126.00	VHLPX2-11-6WH	14	0.66	0.030	0.214	70528
125.00	AF60-LR-US	14	0.65	0.029	0.213	63864
121.00	ODI-065R16M18JJ-GQ w/ Mount Pipe	14	0.64	0.027	0.212	53277
114.00	VHLPX4-18	16	0.61	0.027	0.210	46325

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
113.00	48" x 6" x 6" Panel Antennas w/ mount pipe	16	0.61	0.027	0.210	45697
110.00	4 ft Grid	16	0.59	0.028	0.208	46914
108.00	3 ft standard	18	0.58	0.028	0.207	52478
106.00	Generic 1' x 2' sidearm	18	0.57	0.028	0.205	63684
103.00	Kathrein 800 250911 w/Mount Pipe	18	0.56	0.028	0.202	99047
101.00	ANT2 0.2 28 HP	18	0.54	0.028	0.200	157516
98.00	80010965_TIA w/ Mount Pipe	18	0.52	0.029	0.196	182032
95.50	BXA-80090/8CF w/ Mount Pipe	18	0.51	0.029	0.194	126866
93.00	Kathrein 800 250911 w/Mount Pipe	20	0.49	0.029	0.191	119397
91.00	1' square panel	20	0.48	0.029	0.189	129681
88.88	Guy	20	0.47	0.028	0.187	149810
80.00	HP2-5.9	20	0.42	0.026	0.178	288908
75.00	BXA-80090/8CF w/ Mount Pipe	21	0.39	0.025	0.173	197908
74.00	VHLP2.5-11C81	21	0.39	0.025	0.171	178502
58.88	Guy	22	0.32	0.020	0.153	124831
31.00	BXA-70090-4CF-EDIN-X	22	0.23	0.024	0.125	67456

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	248.167 - 239.083	19.71	2	0.050	2.082
T2	239.083 - 230	19.67	2	0.052	2.062
T3	230 - 215	19.65	2	0.055	2.042
T4	215 - 200	19.31	2	0.189	1.962
T5	200 - 185	18.47	2	0.333	1.799
T6	185 - 170	17.22	2	0.403	1.623
T7	170 - 155	15.94	2	0.415	1.462
T8	155 - 140	14.55	2	0.474	1.344
T9	140 - 125	12.97	2	0.491	1.267
T10	125 - 110	11.51	2	0.464	1.231
T11	110 - 95	10.01	2	0.507	1.216
T12	95 - 80	8.32	2	0.522	1.124
T13	80 - 65	6.74	2	0.462	1.034
T14	65 - 50	5.36	2	0.406	0.923
T15	50 - 35	4.23	2	0.339	0.826
T16	35 - 20	3.20	2	0.361	0.739
T17	20 - 10.9167	1.98	2	0.426	0.651
T18	10.9167 - 7.95833	1.12	2	0.461	0.597
T19	7.95833 - 5	0.82	2	0.470	0.568
T20	5 - 3.5625	0.51	2	0.475	0.530
T21	3.5625 - 2.25	0.36	2	0.478	0.507
T22	2.25 - 0	0.23	2	0.482	0.475

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
249.00	Strobe Light	2	19.71	0.050	2.082	34192
248.00	2.375" OD x 9 ft lightning extender	2	19.71	0.051	2.082	34192
244.00	8 ft x 2" omni whip	2	19.69	0.056	2.073	34192
238.87	Guy	2	19.67	0.051	2.062	35511
231.00	8 ft x 2" omni whip	2	19.65	0.049	2.045	8261

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
220.00	ODI-065R16M18JJ-GQ w/ Mount Pipe	2	19.48	0.139	1.999	5409
219.00	8 ft x 2" omni whip	2	19.45	0.149	1.992	5305
214.00	10 ft x 2" omni whip	2	19.27	0.199	1.953	5021
210.00	VHLPX4-18	2	19.09	0.240	1.914	5136
206.00	5 ft x 2" omni whip	2	18.87	0.280	1.870	5319
201.00	ANT2 0.6 13 HP (TR)	2	18.54	0.325	1.811	5738
189.00	AFS-DBG-0360-01 w/ Mount Pipe	2	17.57	0.393	1.669	39738
178.88	Guy	2	16.70	0.408	1.554	19721
174.00	BCD-87010-NE-3-25	2	16.29	0.410	1.502	37644
165.00	VHLPX4-18	2	15.50	0.431	1.418	15204
155.00	3 ft standard	2	14.55	0.474	1.344	9790
150.00	ANT2 0.2 28 HP	2	14.03	0.488	1.314	20037
146.00	KP-5HVX8-65	2	13.61	0.494	1.293	26239
142.00	MMS2-11V	2	13.18	0.494	1.275	11729
141.00	ANT2 0.6 23HP	2	13.08	0.493	1.271	10778
138.00	KPPA-5GHZHV4P65S-17	2	12.77	0.488	1.260	10649
136.00	B5	2	12.57	0.483	1.253	12386
133.88	Guy	2	12.36	0.478	1.247	15781
131.00	MMS2-11V	2	12.08	0.471	1.240	21646
126.00	VHLPX2-11-6WH	2	11.60	0.464	1.232	28142
125.00	AF60-LR-US	2	11.51	0.464	1.231	23154
121.00	ODI-065R16M18JJ-GQ w/ Mount Pipe	2	11.12	0.469	1.230	14375
114.00	VHLPX4-18	2	10.43	0.492	1.226	8958
113.00	48" x 6" x 6" Panel Antennas w/ mount pipe	2	10.32	0.496	1.224	8568
110.00	4 ft Grid	2	10.01	0.507	1.216	8400
108.00	3 ft standard	2	9.79	0.513	1.208	9622
106.00	Generic 1' x 2' sidearm	2	9.57	0.518	1.197	12472
103.00	Kathrein 800 250911 w/Mount Pipe	2	9.23	0.524	1.179	24227
101.00	ANT2 0.2 28 HP	2	9.00	0.526	1.165	63831
98.00	80010965_TIA w/ Mount Pipe	2	8.66	0.526	1.145	25009
95.50	BXA-80090/8CF w/ Mount Pipe	2	8.37	0.523	1.127	15270
93.00	Kathrein 800 250911 w/Mount Pipe	2	8.10	0.517	1.111	13322
91.00	1' square panel	2	7.88	0.510	1.100	13544
88.88	Guy	2	7.65	0.502	1.087	14337
80.00	HP2-5.9	2	6.74	0.462	1.034	17314
75.00	BXA-80090/8CF w/ Mount Pipe	2	6.26	0.443	0.999	13183
74.00	VHLP2.5-11C81	2	6.16	0.440	0.991	12356
58.88	Guy	2	4.87	0.375	0.881	10090
31.00	BXA-70090-4CF-EDIN-X	2	2.90	0.377	0.714	9680

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load Allowable	Allowable Ratio	Criteria
T1	248.167	Leg	A325N	0.750	4	0.52	29.82	0.017 ✓	1	Bolt Tension
		Diagonal	A325X	0.500	1	1.85	7.45	0.249 ✓	1	Member Block Shear
		Horizontal	A325X	0.500	1	0.68	9.72	0.070 ✓	1	Bolt Shear
		Top Girt	A325X	0.500	1	0.26	9.72	0.027 ✓	1	Bolt Shear
T2	239.083	Leg	A325N	0.750	4	3.80	29.82	0.127 ✓	1	Bolt Tension
		Diagonal	A325X	0.500	1	3.29	7.45	0.442 ✓	1	Member Block Shear
		Horizontal	A325X	0.500	1	1.57	9.72	0.161 ✓	1	Bolt Shear
		Top Guy Pull-	A325X	0.500	2	4.41	9.72	0.454 ✓	1	Bolt Shear

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load Allowable	Allowable Ratio	Criteria
T3	230	Off@238.875 Leg	A325N	0.750	4	6.42	29.82	0.215 ✓	1	Bolt Tension
		Diagonal	A325X	0.500	1	2.86	7.45	0.385 ✓	1	Member Block Shear
		Horizontal	A325X	0.500	1	2.30	9.72	0.236 ✓	1	Bolt Shear
		Top Girt	A325X	0.500	1	1.56	9.72	0.161 ✓	1	Bolt Shear
T4	215	Leg	A325N	0.750	4	4.30	29.82	0.144 ✓	1	Bolt Tension
		Diagonal	A325X	0.500	1	4.49	7.45	0.602 ✓	1	Member Block Shear
		Horizontal	A325X	0.500	1	2.27	9.72	0.233 ✓	1	Bolt Shear
		Top Girt	A325X	0.500	1	2.01	9.72	0.207 ✓	1	Bolt Shear
T5	200	Leg	A325N	0.750	4	2.40	29.82	0.080 ✓	1	Bolt Tension
		Diagonal	A325X	0.500	1	5.87	7.45	0.789 ✓	1	Member Block Shear
		Horizontal	A325X	0.500	1	1.83	9.72	0.188 ✓	1	Bolt Shear
		Top Girt	A325X	0.500	1	1.95	9.72	0.201 ✓	1	Bolt Shear
T6	185	Leg	A325N	0.750	4	4.57	29.82	0.153 ✓	1	Bolt Tension
		Diagonal	A325X	0.500	1	6.66	7.45	0.894 ✓	1	Member Block Shear
		Horizontal	A325X	0.500	1	2.46	9.72	0.253 ✓	1	Bolt Shear
		Top Girt	A325X	0.500	1	1.42	9.72	0.146 ✓	1	Bolt Shear
		Top Guy Pull-Off@178.875	A325X	0.500	2	6.12	9.72	0.629 ✓	1	Bolt Shear
T7	170	Leg	A325N	0.750	4	4.80	29.82	0.161 ✓	1	Bolt Tension
		Diagonal	A325X	0.500	1	2.76	7.45	0.371 ✓	1	Member Block Shear
		Horizontal	A325X	0.500	1	2.69	9.72	0.277 ✓	1	Bolt Shear
		Top Girt	A325X	0.500	1	2.21	9.72	0.228 ✓	1	Bolt Shear
T8	155	Leg	A325N	0.750	4	4.46	29.82	0.150 ✓	1	Bolt Tension
		Diagonal	A325X	0.500	1	4.31	7.45	0.578 ✓	1	Member Block Shear
		Horizontal	A325X	0.500	1	2.12	9.72	0.218 ✓	1	Bolt Shear
		Top Girt	A325X	0.500	1	2.20	9.72	0.226 ✓	1	Bolt Shear
T9	140	Leg	A325N	0.750	4	6.81	29.82	0.228 ✓	1	Bolt Tension
		Diagonal	A325X	0.500	1	6.03	7.45	0.809 ✓	1	Member Block Shear
		Horizontal	A325X	0.500	1	2.91	9.72	0.300 ✓	1	Bolt Shear
		Top Girt	A325X	0.500	1	1.82	9.72	0.187 ✓	1	Bolt Shear
T10	125	Top Guy Pull-Off@133.875	A325X	0.500	2	7.32	9.72	0.753 ✓	1	Bolt Shear
		Leg	A325N	0.750	4	7.54	29.82	0.253 ✓	1	Bolt Tension
		Diagonal	A325X	0.500	1	3.46	7.45	0.464 ✓	1	Member Block Shear
		Horizontal	A325X	0.500	1	3.34	9.72	0.344 ✓	1	Bolt Shear
		Top Girt	A325X	0.500	1	2.87	9.72	0.295 ✓	1	Bolt Shear
T11	110	Leg	A325N	0.750	4	6.96	29.82	0.233 ✓	1	Bolt Tension
		Diagonal	A325X	0.500	1	5.95	7.45	0.799 ✓	1	Member Block Shear
		Horizontal	A325X	0.500	1	3.28	9.72	0.338 ✓	1	Bolt Shear
		Top Girt	A325X	0.500	1	3.09	9.72	0.318 ✓	1	Bolt Shear
T12	95	Leg	A325N	0.750	4	8.83	29.82	0.296 ✓	1	Bolt Tension
		Diagonal	A325X	0.500	1	7.51	7.45	1.008 ✗	1	Member Block Shear
		Horizontal	A325X	0.500	1	3.33	9.72	0.343 ✓	1	Bolt Shear

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load Allowable	Allowable Ratio	Criteria
T13	80	Top Girt	A325X	0.500	1	2.73	9.72	0.281 ✓	1	Bolt Shear
		Top Guy Pull-Off@88.875	A325X	0.500	2	6.51	9.72	0.670 ✓	1	Bolt Shear
		Leg	A325N	0.750	4	9.52	29.82	0.319 ✓	1	Bolt Tension
		Diagonal	A325X	0.500	1	3.42	7.45	0.459 ✓	1	Member Block Shear
		Horizontal	A325X	0.500	1	3.37	9.72	0.347 ✓	1	Bolt Shear
T14	65	Top Girt	A325X	0.500	1	3.04	9.72	0.312 ✓	1	Bolt Shear
		Leg	A325N	0.750	4	8.89	29.82	0.298 ✓	1	Bolt Tension
		Diagonal	A325X	0.500	1	4.92	7.45	0.660 ✓	1	Member Block Shear
		Horizontal	A325X	0.500	1	3.66	9.72	0.376 ✓	1	Bolt Shear
T15	50	Top Girt	A325X	0.500	1	3.20	9.72	0.329 ✓	1	Bolt Shear
		Top Guy Pull-Off@58.875	A325X	0.500	2	6.39	9.72	0.657 ✓	1	Bolt Shear
		Leg	A325N	0.750	4	9.08	29.82	0.305 ✓	1	Bolt Tension
		Diagonal	A325X	0.500	1	3.63	7.45	0.487 ✓	1	Member Block Shear
		Horizontal	A325X	0.500	1	3.93	9.72	0.405 ✓	1	Bolt Shear
T16	35	Top Girt	A325X	0.500	1	3.34	9.72	0.344 ✓	1	Bolt Shear
		Leg	A325N	0.750	4	9.54	29.82	0.320 ✓	1	Bolt Tension
		Diagonal	A325X	0.500	1	4.67	13.92	0.335 ✓	1	Member Bearing
T17	20	Horizontal	A325X	0.500	1	4.20	9.72	0.432 ✓	1	Bolt Shear
		Top Girt	A325X	0.500	1	3.73	9.72	0.383 ✓	1	Bolt Shear
		Diagonal	A325X	0.500	1	3.10	7.45	0.416 ✓	1	Member Block Shear
T18	10.9167	Horizontal	A325X	0.500	1	4.38	9.72	0.450 ✓	1	Bolt Shear
		Top Girt	A325X	0.500	1	3.92	9.72	0.403 ✓	1	Bolt Shear
T19	7.95833	Diagonal	A325X	0.500	1	3.03	7.45	0.407 ✓	1	Member Block Shear
		Horizontal	A325X	0.500	1	3.35	7.45	0.450 ✓	1	Member Block Shear
		Leg	A325N	0.750	4	8.60	29.82	0.288 ✓	1	Bolt Tension
		Diagonal	A325X	0.500	1	3.78	7.45	0.507 ✓	1	Member Block Shear

Guy Design Data

Section No.	Elevation ft	Size	Initial Tension K	Breaking Load K	Actual T_u K	Allowable ϕT_n K	Required S.F.	Actual S.F.
T2	238.87 (A) (698)	1 BS	12.20	122.00	36.69	73.20	1.000	1.995 ✓
	238.87 (B) (697)	1 BS	12.20	122.00	37.23	73.20	1.000	1.966 ✓
	238.87 (C) (696)	1 BS	12.20	122.00	36.84	73.20	1.000	1.987 ✓
T6	178.88 (A) (703)	1 BS	12.20	122.00	42.32	73.20	1.000	1.730 ✓
	178.88 (B) (702)	1 BS	12.20	122.00	41.89	73.20	1.000	1.747 ✓
	178.88 (C) (699)	1 BS	12.20	122.00	42.49	73.20	1.000	1.723 ✓

Section No.	Elevation ft	Size	Initial Tension K	Breaking Load K	Actual T_u K	Allowable ϕT_n K	Required S.F.	Actual S.F.
T9	133.88 (A) (708)	1 BS	12.20	122.00	43.51	73.20	1.000	1.682 ✓
	133.88 (B) (707)	1 BS	12.20	122.00	42.42	73.20	1.000	1.726 ✓
	133.88 (C) (704)	1 BS	12.20	122.00	43.80	73.20	1.000	1.671 ✓
T12	88.88 (A) (713)	7/8 BS	9.20	92.00	30.94	55.20	1.000	1.784 ✓
	88.88 (B) (712)	7/8 BS	9.20	92.00	29.70	55.20	1.000	1.859 ✓
	88.88 (C) (709)	7/8 BS	9.20	92.00	30.77	55.20	1.000	1.794 ✓
T14	58.88 (A) (718)	7/8 BS	9.20	92.00	26.46	55.20	1.000	2.086 ✓
	58.88 (B) (717)	7/8 BS	9.20	92.00	25.47	55.20	1.000	2.168 ✓
	58.88 (C) (714)	7/8 BS	9.20	92.00	26.18	55.20	1.000	2.109 ✓

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	248.167 - 239.083	2 1/4" solid	9.08	2.96	63.1 K=1.00	3.976	-4.35	133.72	0.033 ¹ ✓
T2	239.083 - 230	2 1/4" solid	9.08	2.96	63.1 K=1.00	3.976	-45.56	133.72	0.341 ¹ ✓
T3	230 - 215	2 1/4" solid	15.00	2.96	63.1 K=1.00	3.976	-61.81	133.72	0.462 ¹ ✓
T4	215 - 200	2 1/4" solid	15.00	2.96	63.1 K=1.00	3.976	-62.33	133.72	0.466 ¹ ✓
T5	200 - 185	2 1/4" solid	15.00	2.96	63.1 K=1.00	3.976	-46.43	133.72	0.347 ¹ ✓
T6	185 - 170	2 1/4" solid	15.00	2.96	63.1 K=1.00	3.976	-54.84	133.72	0.410 ¹ ✓
T7	170 - 155	2 1/4" solid	15.00	2.96	63.1 K=1.00	3.976	-58.56	133.72	0.438 ¹ ✓
T8	155 - 140	2 1/2" solid	15.00	2.96	56.8 K=1.00	4.909	-56.84	174.48	0.326 ¹ ✓
T9	140 - 125	2 1/2" solid	15.00	2.96	56.8 K=1.00	4.909	-84.37	174.48	0.484 ¹ ✓
T10	125 - 110	2 1/2" solid	15.00	2.96	56.8 K=1.00	4.909	-91.83	174.48	0.526 ¹ ✓
T11	110 - 95	2 1/2" solid	15.00	2.96	56.8 K=1.00	4.909	-89.03	174.48	0.510 ¹ ✓
T12	95 - 80	2 1/2" solid	15.00	2.96	56.8 K=1.00	4.909	-111.71	174.48	0.640 ¹ ✓
T13	80 - 65	2 1/2" solid	15.00	2.96	56.8 K=1.00	4.909	-114.29	174.48	0.655 ¹ ✓
T14	65 - 50	2 1/2" solid	15.00	2.96	56.8 K=1.00	4.909	-126.19	174.48	0.723 ¹ ✓
T15	50 - 35	2 1/2" solid	15.00	2.96	56.8 K=1.00	4.909	-109.01	174.48	0.625 ¹ ✓
T16	35 - 20	2 1/2" solid	15.00	2.96	56.8	4.909	-116.61	174.48	0.668 ¹ ✓

Section No.	Elevation ft	Size	L ft	L _u ft	KI/r	A in ²	P _u K	φP _n K	Ratio P _u / φP _n
T17	20 - 10.9167	2 1/2" solid	9.08	2.96	K=1.00 56.8	4.909	-113.51	174.48	0.651 ¹
T18	10.9167 - 7.95833	2 1/2" solid	2.96	2.75	K=1.00 52.8	4.909	-108.06	180.16	0.600 ¹
T19	7.95833 - 5	2 1/2" solid	2.96	2.75	K=1.00 52.8	4.909	-103.15	180.16	0.573 ¹
T20	5 - 3.5625	2 1/2" solid	1.58	1.45	K=1.00 27.8	4.909	-109.45	208.79	0.524 ¹
T21	3.5625 - 2.25	2 1/2" solid	1.45	1.45	K=1.00 27.8	4.909	-107.10	208.79	0.513 ¹
T22	2.25 - 0	2 1/2" solid	2.48	1.45	K=1.00 27.8	4.909	-113.68	208.79	0.544 ¹

¹ P_u / φP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	KI/r	A in ²	P _u K	φP _n K	Ratio P _u / φP _n
T1	248.167 - 239.083	2L 1.5 x 1.5 x 1/8 (3/8)	4.98	2.25	97.6 K=1.00	0.719	-1.24	14.11	0.088 ¹
T2	239.083 - 230	2L 'a' > 12.870 in - 9 2L 1.5 x 1.5 x 1/8 (3/8)	4.98	2.25	97.6 K=1.00	0.719	-3.73	14.11	0.264 ¹
T3	230 - 215	2L 'a' > 12.870 in - 41 2L 1.5 x 1.5 x 1/8 (3/8)	4.98	2.25	97.6 K=1.00	0.719	-3.99	14.11	0.283 ¹
T4	215 - 200	2L 'a' > 12.870 in - 88 2L 1.5 x 1.5 x 1/8 (3/8)	4.98	2.25	97.6 K=1.00	0.719	-4.85	14.11	0.344 ¹
T5	200 - 185	2L 'a' > 12.870 in - 103 2L 1.5 x 1.5 x 1/8 (3/8)	4.98	2.25	97.6 K=1.00	0.719	-6.15	14.11	0.436 ¹
T6	185 - 170	2L 'a' > 12.870 in - 144 2L 1.5 x 1.5 x 1/8 (3/8)	4.98	2.25	97.6 K=1.00	0.719	-6.79	14.11	0.481 ¹
T7	170 - 155	2L 'a' > 12.870 in - 212 2L 1.5 x 1.5 x 1/8 (3/8)	4.98	2.25	97.6 K=1.00	0.719	-5.08	14.11	0.360 ¹
T8	155 - 140	2L 'a' > 12.870 in - 248 2L 1.5 x 1.5 x 1/8 (3/8)	4.98	2.23	97.0 K=1.00	0.719	-4.78	14.19	0.337 ¹
T9	140 - 125	2L 'a' > 12.796 in - 263 2L 1.5 x 1.5 x 1/8 (3/8)	4.98	2.23	97.0 K=1.00	0.719	-5.96	14.19	0.420 ¹
T10	125 - 110	2L 'a' > 12.796 in - 306 2L 1.5 x 1.5 x 1/8 (3/8)	4.98	2.23	97.0 K=1.00	0.719	-4.66	14.19	0.328 ¹
T11	110 - 95	2L 'a' > 12.796 in - 369 2L 1.5 x 1.5 x 1/8 (3/8)	4.98	2.23	97.0 K=1.00	0.719	-7.18	14.19	0.506 ¹
T12	95 - 80	2L 'a' > 12.796 in - 384 2L 1.5 x 1.5 x 1/8 (3/8)	4.98	2.23	97.0 K=1.00	0.719	-7.66	14.19	0.539 ¹
T13	80 - 65	2L 'a' > 12.796 in - 452 2L 1.5 x 1.5 x 1/8 (3/8)	4.98	2.23	97.0	0.719	-4.17	14.19	0.294 ¹

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
					K=1.00				✓
T14	65 - 50	2L 'a' > 12.796 in - 464 2L 1.5 x 1.5 x 1/8 (3/8)	4.98	2.23	97.0 K=1.00	0.719	-7.21	14.19	0.508 ¹
T15	50 - 35	2L 'a' > 12.796 in - 507 2L 1.5 x 1.5 x 1/8 (3/8)	4.98	2.23	97.0 K=1.00	0.719	-6.65	14.19	0.468 ¹
T16	35 - 20	2L 'a' > 12.796 in - 568 2L 1.5 x 1.5 x 1/8 (3/8)	4.98	2.23	97.0 K=1.00	0.719	-4.67	14.19	0.329 ¹
T17	20 - 10.9167	2L 'a' > 12.796 in - 608 2L 1.5 x 1.5 x 1/8 (3/8)	4.98	2.23	97.0 K=1.00	0.719	-3.71	14.19	0.261 ¹
T18	10.9167 - 7.95833	2L 'a' > 12.796 in - 620 2L 1.5 x 1.5 x 1/8 (3/8)	3.40	2.97	80.3 K=1.00	0.719	-3.09	16.58	0.186 ¹
T19	7.95833 - 5	2L 'a' > 17.038 in - 647 2L 1.5 x 1.5 x 1/8 (3/8)	3.40	2.97	80.3 K=1.00	0.719	-3.80	16.58	0.229 ¹
T20	5 - 3.5625	2L 'a' > 17.038 in - 661 3/4" solid	2.37	2.24	100.6 K=0.70	0.442	-4.97	9.49	0.524 ¹
T21	3.5625 - 2.25	3/4" solid	1.62	1.44	90.2 K=0.98	0.442	-5.62	10.97	0.513 ¹

¹ P_u / φP_n controls

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	248.167 - 239.083	7/8" solid	4.00	3.81	209.1 K=1.00	0.601	-0.68	3.11	0.219 ¹
T3	230 - 215	KL/R > 200 (C) - 13 7/8" solid	4.00	3.81	209.1 K=1.00	0.601	-0.30	3.11	0.097 ¹
T4	215 - 200	KL/R > 200 (C) - 72 7/8" solid	4.00	3.81	209.1 K=1.00	0.601	-0.15	3.11	0.048 ¹
T18	10.9167 - 7.95833	KL/R > 200 (C) - 119 2L 1.5 x 1.5 x 1/8 (3/8)	4.00	2.72	83.4 K=1.00	0.719	-1.87	16.14	0.116 ¹
T19	7.95833 - 5	2L 'a' > 10.148 in - 645 2L 1.5 x 1.5 x 1/8 (3/8)	4.00	2.84	88.8 K=1.00	0.719	-1.79	15.38	0.116 ¹
T21	3.5625 - 2.25	2L 'a' > 10.864 in - 654 6 x 1/2	2.85	1.98	164.7 K=1.00	3.000	-2.03	24.98	0.081 ¹

¹ P_u / φP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	248.167 - 239.083	7/8" solid	4.00	3.81	209.1 K=1.00	0.601	-0.26	3.11	0.084 ¹ ✓
T4	215 - 200	KL/R > 200 (C) - 5 7/8" solid	4.00	3.81	209.1 K=1.00	0.601	-0.10	3.11	0.032 ¹ ✓
		KL/R > 200 (C) - 96							

¹ P_u / φP_n controls

Bottom Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T22	2.25 - 0	6 x 1/2	0.75	0.54	45.0 K=1.00	3.000	-0.52	87.36	0.006 ¹ ✓

¹ P_u / φP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	248.167 - 239.083	2 1/4" solid	9.08	2.96	63.1	3.976	2.08	178.92	0.012 ¹ ✓
T2	239.083 - 230	2 1/4" solid	9.08	2.96	63.1	3.976	7.22	178.92	0.040 ¹ ✓
T3	230 - 215	2 1/4" solid	15.00	2.96	63.1	3.976	25.70	178.92	0.144 ¹ ✓
T4	215 - 200	2 1/4" solid	15.00	2.96	63.1	3.976	26.20	178.92	0.146 ¹ ✓
T5	200 - 185	2 1/4" solid	15.00	0.21	4.4	3.976	13.43	178.92	0.075 ¹ ✓

¹ P_u / φP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	248.167 - 239.083	2L 1.5 x 1.5 x 1/8 (3/8)	4.98	2.25	61.2	0.422	1.85	18.35	0.101 ¹ ✓
T2	239.083 - 230	2L 'a' > 12.870 in - 12 2L 1.5 x 1.5 x 1/8 (3/8)	4.98	2.25	61.2	0.422	3.29	18.35	0.179 ¹ ✓
		2L 'a' > 12.870 in - 47							

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T3	230 - 215	2L 1.5 x 1.5 x 1/8 (3/8)	4.98	2.25	61.2	0.422	2.86	18.35	0.156 ¹ ✓
T4	215 - 200	2L 'a' > 12.870 in - 87 2L 1.5 x 1.5 x 1/8 (3/8)	4.98	2.25	61.2	0.422	4.49	18.35	0.245 ¹ ✓
T5	200 - 185	2L 'a' > 12.870 in - 103 2L 1.5 x 1.5 x 1/8 (3/8)	4.98	2.25	61.2	0.422	5.87	18.35	0.320 ¹ ✓
T6	185 - 170	2L 'a' > 12.870 in - 143 2L 1.5 x 1.5 x 1/8 (3/8)	4.98	2.25	61.2	0.422	6.66	18.35	0.363 ¹ ✓
T7	170 - 155	2L 'a' > 12.870 in - 204 2L 1.5 x 1.5 x 1/8 (3/8)	4.98	2.25	61.2	0.422	2.76	18.35	0.151 ¹ ✓
T8	155 - 140	2L 'a' > 12.870 in - 247 2L 1.5 x 1.5 x 1/8 (3/8)	4.98	2.23	60.8	0.422	4.31	18.35	0.235 ¹ ✓
T9	140 - 125	2L 'a' > 12.796 in - 264 2L 1.5 x 1.5 x 1/8 (3/8)	4.98	2.23	60.8	0.422	6.03	18.35	0.329 ¹ ✓
T10	125 - 110	2L 'a' > 12.796 in - 325 2L 1.5 x 1.5 x 1/8 (3/8)	4.98	2.23	60.8	0.422	3.46	18.35	0.188 ¹ ✓
T11	110 - 95	2L 'a' > 12.796 in - 370 2L 1.5 x 1.5 x 1/8 (3/8)	4.98	2.23	60.8	0.422	5.95	18.35	0.324 ¹ ✓
T12	95 - 80	2L 'a' > 12.796 in - 383 2L 1.5 x 1.5 x 1/8 (3/8)	4.98	2.23	60.8	0.422	7.51	18.35	0.409 ¹ ✓
T13	80 - 65	2L 'a' > 12.796 in - 444 2L 1.5 x 1.5 x 1/8 (3/8)	4.98	2.23	60.8	0.422	3.42	18.35	0.186 ¹ ✓
T14	65 - 50	2L 'a' > 12.796 in - 470 2L 1.5 x 1.5 x 1/8 (3/8)	4.98	2.23	60.8	0.422	4.92	18.35	0.268 ¹ ✓
T15	50 - 35	2L 'a' > 12.796 in - 509 2L 1.5 x 1.5 x 1/8 (3/8)	4.98	2.23	60.8	0.422	3.63	18.35	0.198 ¹ ✓
T16	35 - 20	2L 'a' > 12.796 in - 562 2L 1.5 x 1.5 x 1/8 (3/8)	4.98	2.23	60.8	0.422	2.03	18.35	0.110 ¹ ✓
T17	20 - 10.9167	2L 'a' > 12.796 in - 588 2L 1.5 x 1.5 x 1/8 (3/8)	4.98	2.23	60.8	0.422	3.10	18.35	0.169 ¹ ✓
T18	10.9167 - 7.95833	2L 'a' > 12.796 in - 628 2L 1.5 x 1.5 x 1/8 (3/8)	3.40	2.97	83.1	0.422	3.03	18.35	0.165 ¹ ✓
T19	7.95833 - 5	2L 'a' > 17.038 in - 646 2L 1.5 x 1.5 x 1/8 (3/8)	3.40	2.97	83.1	0.422	3.78	18.35	0.206 ¹ ✓
		2L 'a' > 17.038 in - 659							✓

¹ P_u / φP_n controls

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
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Section No.	Elevation ft	Size	L ft	L _u ft	KI/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	248.167 - 239.083	7/8" solid	4.00	3.81	209.1	0.601	0.20	27.06	0.007 ¹
T2	239.083 - 230	7/8" solid	4.00	3.81	209.1	0.601	1.57	27.06	0.058 ¹
T3	230 - 215	7/8" solid	4.00	3.81	209.1	0.601	2.30	27.06	0.085 ¹
T4	215 - 200	7/8" solid	4.00	3.81	209.1	0.601	2.27	27.06	0.084 ¹
T5	200 - 185	7/8" solid	4.00	3.81	209.1	0.601	1.83	27.06	0.068 ¹
T6	185 - 170	7/8" solid	4.00	3.81	209.1	0.601	2.46	27.06	0.091 ¹
T7	170 - 155	7/8" solid	4.00	3.81	209.1	0.601	2.69	27.06	0.099 ¹
T8	155 - 140	7/8" solid	4.00	3.79	208.0	0.601	2.12	27.06	0.078 ¹
T9	140 - 125	7/8" solid	4.00	3.79	208.0	0.601	2.91	27.06	0.108 ¹
T10	125 - 110	7/8" solid	4.00	3.79	208.0	0.601	3.34	27.06	0.124 ¹
T11	110 - 95	7/8" solid	4.00	3.79	208.0	0.601	3.28	27.06	0.121 ¹
T12	95 - 80	7/8" solid	4.00	3.79	208.0	0.601	3.33	27.06	0.123 ¹
T13	80 - 65	7/8" solid	4.00	3.79	208.0	0.601	3.37	27.06	0.125 ¹
T14	65 - 50	7/8" solid	4.00	3.79	208.0	0.601	3.66	27.06	0.135 ¹
T15	50 - 35	7/8" solid	4.00	3.79	208.0	0.601	3.93	27.06	0.145 ¹
T16	35 - 20	7/8" solid	4.00	3.79	208.0	0.601	4.20	27.06	0.155 ¹
T17	20 - 10.9167	7/8" solid	4.00	3.79	208.0	0.601	4.38	27.06	0.162 ¹
T18	10.9167 - 7.95833	2L 1.5 x 1.5 x 1/8 (3/8)	4.00	2.72	48.9	0.422	3.35	18.35	0.183 ¹
T19	7.95833 - 5	2L 'a' > 10.148 in - 642 2L 1.5 x 1.5 x 1/8 (3/8)	4.00	2.84	48.9	0.719	10.07	23.29	0.432 ¹
T21	3.5625 - 2.25	2L 'a' > 10.864 in - 657 6 x 1/2	2.85	1.98	164.7	3.000	2.03	97.20	0.021 ¹
T22	2.25 - 0	6 x 1/2	1.80	1.59	132.3	3.000	3.19	97.20	0.033 ¹



¹ P_u / φP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	KI/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	248.167 - 239.083	7/8" solid	4.00	3.81	209.1	0.601	0.02	27.06	0.001 ¹
T3	230 - 215	7/8" solid	4.00	3.81	209.1	0.601	1.56	27.06	0.058 ¹
T4	215 - 200	7/8" solid	4.00	3.81	209.1	0.601	2.01	27.06	0.074 ¹

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T5	200 - 185	7/8" solid	4.00	3.81	209.1	0.601	1.95	27.06	0.072 ¹
T6	185 - 170	7/8" solid	4.00	3.81	209.1	0.601	1.42	27.06	0.053 ¹
T7	170 - 155	7/8" solid	4.00	3.81	209.1	0.601	2.21	27.06	0.082 ¹
T8	155 - 140	7/8" solid	4.00	3.79	208.0	0.601	2.20	27.06	0.081 ¹
T9	140 - 125	7/8" solid	4.00	3.79	208.0	0.601	1.82	27.06	0.067 ¹
T10	125 - 110	7/8" solid	4.00	3.79	208.0	0.601	2.87	27.06	0.106 ¹
T11	110 - 95	7/8" solid	4.00	3.79	208.0	0.601	3.09	27.06	0.114 ¹
T12	95 - 80	7/8" solid	4.00	3.79	208.0	0.601	2.73	27.06	0.101 ¹
T13	80 - 65	7/8" solid	4.00	3.79	208.0	0.601	3.04	27.06	0.112 ¹
T14	65 - 50	7/8" solid	4.00	3.79	208.0	0.601	3.20	27.06	0.118 ¹
T15	50 - 35	7/8" solid	4.00	3.79	208.0	0.601	3.34	27.06	0.124 ¹
T16	35 - 20	7/8" solid	4.00	3.79	208.0	0.601	3.73	27.06	0.138 ¹
T17	20 - 10.9167	7/8" solid	4.00	3.79	208.0	0.601	3.92	27.06	0.145 ¹
T20	5 - 3.5625	6 x 1/2	3.90	2.77	230.2	3.000	21.77	97.20	0.224 ¹

¹ P_u / φP_n controls

Top Guy Pull-Off Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T2	239.083 - 230	Double 7/8 SR	4.00	3.81	209.4	1.203	8.82	38.96	0.226
T6	185 - 170	Double 7/8 SR	4.00	3.81	209.4	1.203	12.23	38.96	0.314 ¹
T9	140 - 125	Double 7/8 SR	4.00	3.79	208.2	1.203	14.64	38.96	0.376 ¹
T12	95 - 80	Double 7/8 SR	4.00	3.79	208.2	1.203	13.02	38.96	0.334 ¹
T14	65 - 50	Double 7/8 SR	4.00	3.79	208.2	1.203	12.77	38.96	0.328 ¹

¹ P_u / φP_n controls

Top Guy Pull-Off Bending Design Data

Section No.	Elevation ft	Size	M _{ux} kip-ft	φM _{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M _{uy} kip-ft	φM _{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T2	239.083 - 230	Double 7/8 SR	0	0	0.039	0	0	0.000
T6	185 - 170	Double 7/8 SR	0	0	0.000	0	0	0.000
T9	140 - 125	Double 7/8 SR	0	0	0.000	0	0	0.000
T12	95 - 80	Double 7/8 SR	0	0	0.000	0	0	0.000
T14	65 - 50	Double 7/8 SR	0	0	0.000	0	0	0.000

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
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Top Guy Pull-Off Interaction Design Data

Section No.	Elevation ft	Size	Ratio P_u ϕP_n	Ratio M_{ux} ϕM_{nx}	Ratio M_{uy} ϕM_{ny}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T2	239.083 - 230	Double 7/8 SR	0.226	0.039	0.000	0.236	1.000	4.8.1 ✓
T6	185 - 170	Double 7/8 SR	0.314	0.000	0.000	0.314 ¹	1.000	4.8.1 ✓
T9	140 - 125	Double 7/8 SR	0.376	0.000	0.000	0.376 ¹	1.000	4.8.1 ✓
T12	95 - 80	Double 7/8 SR	0.334	0.000	0.000	0.334 ¹	1.000	4.8.1 ✓
T14	65 - 50	Double 7/8 SR	0.328	0.000	0.000	0.328 ¹	1.000	4.8.1 ✓

¹ $P_u / \phi P_n$ controls

Section Capacity Table

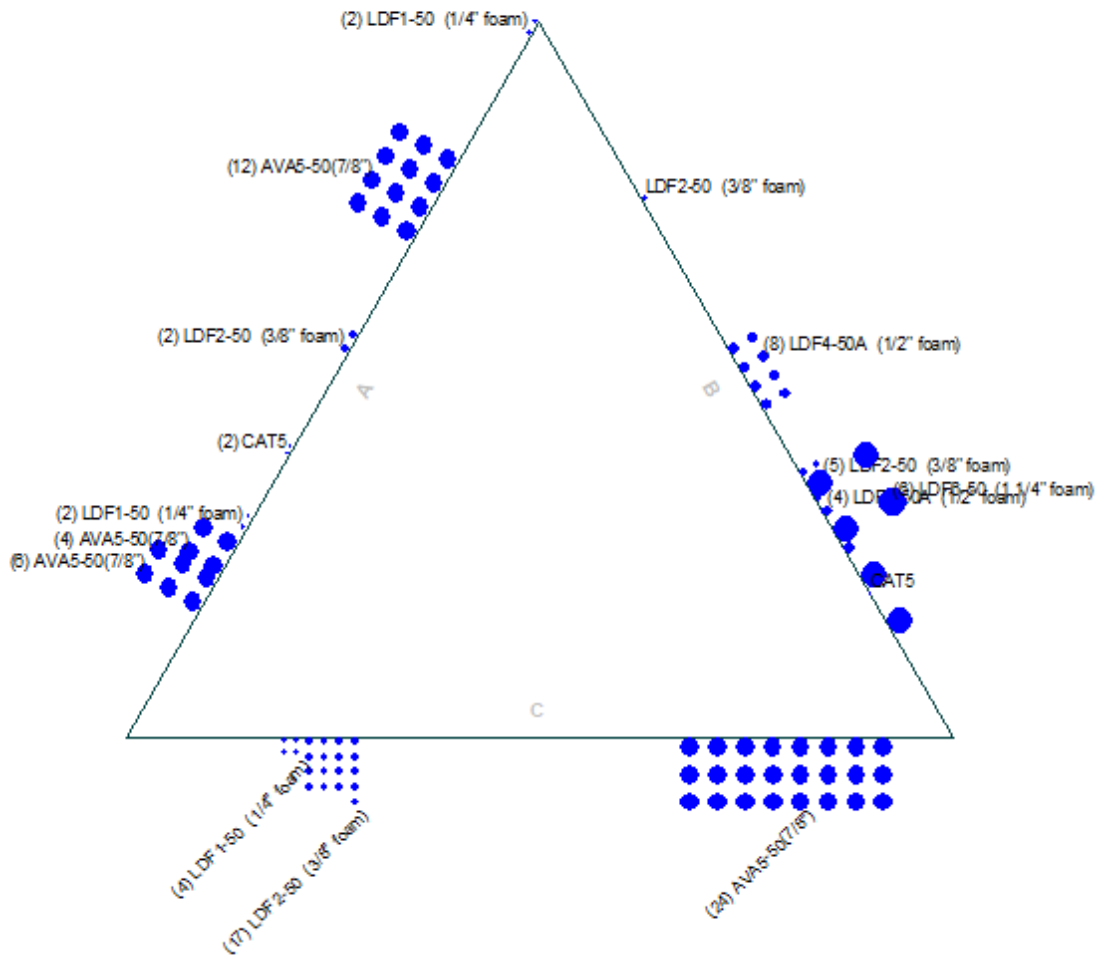
Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	248.167 - 239.083	Leg	2 1/4" solid	3	-4.35	133.72	3.3	Pass
T2	239.083 - 230	Leg	2 1/4" solid	29	-45.56	133.72	34.1	Pass
T3	230 - 215	Leg	2 1/4" solid	55	-61.81	133.72	46.2	Pass
T4	215 - 200	Leg	2 1/4" solid	95	-62.33	133.72	46.6	Pass
T5	200 - 185	Leg	2 1/4" solid	135	-46.43	133.72	34.7	Pass
T6	185 - 170	Leg	2 1/4" solid	174	-54.84	133.72	41.0	Pass
T7	170 - 155	Leg	2 1/4" solid	214	-58.56	133.72	43.8	Pass
T8	155 - 140	Leg	2 1/2" solid	254	-56.84	174.48	32.6	Pass
T9	140 - 125	Leg	2 1/2" solid	295	-84.37	174.48	48.4	Pass
T10	125 - 110	Leg	2 1/2" solid	335	-91.83	174.48	52.6	Pass
T11	110 - 95	Leg	2 1/2" solid	375	-89.03	174.48	51.0	Pass
T12	95 - 80	Leg	2 1/2" solid	415	-111.71	174.48	64.0	Pass
T13	80 - 65	Leg	2 1/2" solid	455	-114.29	174.48	65.5	Pass
T14	65 - 50	Leg	2 1/2" solid	495	-126.19	174.48	72.3	Pass
T15	50 - 35	Leg	2 1/2" solid	535	-109.01	174.48	62.5	Pass
T16	35 - 20	Leg	2 1/2" solid	575	-116.61	174.48	66.8	Pass
T17	20 - 10.9167	Leg	2 1/2" solid	615	-113.51	174.48	65.1	Pass
T18	10.9167 - 7.95833	Leg	2 1/2" solid	641	-108.06	180.16	60.0	Pass
T19	7.95833 - 5	Leg	2 1/2" solid	652	-103.15	180.16	57.3	Pass
T20	5 - 3.5625	Leg	2 1/2" solid	664	-109.45	208.79	52.4	Pass
T21	3.5625 - 2.25	Leg	2 1/2" solid	679	-107.10	208.79	51.3	Pass
T22	2.25 - 0	Leg	2 1/2" solid	688	-113.68	208.79	54.4	Pass
T1	248.167 - 239.083	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	12	1.85	18.35	10.1	Pass
T2	239.083 - 230	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	41	-3.73	14.11	24.9 (b) 26.4	Pass
T3	230 - 215	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	88	-3.99	14.11	44.2 (b) 28.3	Pass
T4	215 - 200	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	103	-4.85	14.11	38.5 (b) 34.4	Pass
T5	200 - 185	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	144	-6.15	14.11	60.2 (b) 43.6	Pass
T6	185 - 170	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	212	-6.79	14.11	78.9 (b) 48.1 89.4 (b)	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T7	170 - 155	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	248	-5.08	14.11	36.0	Pass
T8	155 - 140	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	263	-4.78	14.19	37.1 (b) 33.7	Pass
T9	140 - 125	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	306	-5.96	14.19	57.8 (b) 42.0	Pass
T10	125 - 110	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	369	-4.66	14.19	80.9 (b) 32.8	Pass
T11	110 - 95	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	384	-7.18	14.19	46.4 (b) 50.6	Pass
T12	95 - 80	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	452	-7.66	14.19	79.9 (b) 53.9	Fail X
T13	80 - 65	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	464	-4.17	14.19	100.8 (b) 29.4	Pass
T14	65 - 50	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	507	-7.21	14.19	45.9 (b) 50.8	Pass
T15	50 - 35	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	568	-6.65	14.19	66.0 (b) 46.8	Pass
T16	35 - 20	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	608	-4.67	14.19	48.7 (b) 32.9	Pass
T17	20 - 10.9167	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	620	-3.71	14.19	33.5 (b) 26.1	Pass
T18	10.9167 - 7.95833	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	647	-3.09	16.58	41.6 (b) 18.6	Pass
T19	7.95833 - 5	Diagonal	2L 1.5 x 1.5 x 1/8 (3/8)	661	-3.80	16.58	40.7 (b) 22.9	Pass
T20	5 - 3.5625	Diagonal	3/4" solid	673	-4.97	9.49	50.7 (b) 52.4	Pass
T21	3.5625 - 2.25	Diagonal	3/4" solid	682	-5.62	10.97	51.3	Pass
T1	248.167 - 239.083	Horizontal	7/8" solid	13	-0.68	3.11	21.9	Pass
T2	239.083 - 230	Horizontal	7/8" solid	39	1.57	27.06	5.8	Pass
T3	230 - 215	Horizontal	7/8" solid	72	-0.30	3.11	16.1 (b) 9.7	Pass
T4	215 - 200	Horizontal	7/8" solid	119	2.27	27.06	23.6 (b) 8.4	Pass
T5	200 - 185	Horizontal	7/8" solid	166	1.83	27.06	23.3 (b) 6.8	Pass
T6	185 - 170	Horizontal	7/8" solid	185	2.46	27.06	18.8 (b) 9.1	Pass
T7	170 - 155	Horizontal	7/8" solid	239	2.69	27.06	25.3 (b) 9.9	Pass
T8	155 - 140	Horizontal	7/8" solid	279	2.12	27.06	27.7 (b) 7.8	Pass
T9	140 - 125	Horizontal	7/8" solid	305	2.91	27.06	21.8 (b) 10.8	Pass
T10	125 - 110	Horizontal	7/8" solid	345	3.34	27.06	30.0 (b) 12.4	Pass
T11	110 - 95	Horizontal	7/8" solid	406	3.28	27.06	34.4 (b) 12.1	Pass
T12	95 - 80	Horizontal	7/8" solid	425	3.33	27.06	33.8 (b) 12.3	Pass
T13	80 - 65	Horizontal	7/8" solid	465	3.37	27.06	34.3 (b) 12.5	Pass
T14	65 - 50	Horizontal	7/8" solid	505	3.66	27.06	34.7 (b) 13.5	Pass
T15	50 - 35	Horizontal	7/8" solid	545	3.93	27.06	37.6 (b) 14.5	Pass
T16	35 - 20	Horizontal	7/8" solid	606	4.20	27.06	40.5 (b) 15.5	Pass
T17	20 - 10.9167	Horizontal	7/8" solid	625	4.38	27.06	43.2 (b) 16.2	Pass
T18	10.9167 - 7.95833	Horizontal	2L 1.5 x 1.5 x 1/8 (3/8)	642	3.35	18.35	45.0 (b) 18.3	Pass
T19	7.95833 - 5	Horizontal	2L 1.5 x 1.5 x 1/8 (3/8)	657	10.07	23.29	43.2	Pass
T21	3.5625 - 2.25	Horizontal	6 x 1/2	669	-2.03	24.98	8.1	Pass
T22	2.25 - 0	Horizontal	6 x 1/2	690	3.19	97.20	3.3	Pass
T1	248.167 - 239.083	Top Girt	7/8" solid	5	-0.26	3.11	8.4	Pass
T3	230 - 215	Top Girt	7/8" solid	56	1.56	27.06	5.8	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail	
T4	215 - 200	Top Girt	7/8" solid	96	2.01	27.06	16.1 (b) 7.4	Pass	
T5	200 - 185	Top Girt	7/8" solid	136	1.95	27.06	20.7 (b) 7.2	Pass	
T6	185 - 170	Top Girt	7/8" solid	176	1.42	27.06	20.1 (b) 5.3	Pass	
T7	170 - 155	Top Girt	7/8" solid	216	2.21	27.06	14.6 (b) 8.2	Pass	
T8	155 - 140	Top Girt	7/8" solid	256	2.20	27.06	22.8 (b) 8.1	Pass	
T9	140 - 125	Top Girt	7/8" solid	296	1.82	27.06	22.6 (b) 6.7	Pass	
T10	125 - 110	Top Girt	7/8" solid	336	2.87	27.06	18.7 (b) 10.6	Pass	
T11	110 - 95	Top Girt	7/8" solid	376	3.09	27.06	29.5 (b) 11.4	Pass	
T12	95 - 80	Top Girt	7/8" solid	416	2.73	27.06	31.8 (b) 10.1	Pass	
T13	80 - 65	Top Girt	7/8" solid	456	3.04	27.06	28.1 (b) 11.2	Pass	
T14	65 - 50	Top Girt	7/8" solid	496	3.20	27.06	31.2 (b) 11.8	Pass	
T15	50 - 35	Top Girt	7/8" solid	536	3.34	27.06	32.9 (b) 12.4	Pass	
T16	35 - 20	Top Girt	7/8" solid	576	3.73	27.06	34.4 (b) 13.8	Pass	
T17	20 - 10.9167	Top Girt	7/8" solid	616	3.92	27.06	38.3 (b) 14.5	Pass	
T20	5 - 3.5625	Top Girt	6 x 1/2	666	21.77	97.20	40.3 (b) 22.4	Pass	
T22	2.25 - 0	Bottom Girt	6 x 1/2	694	-0.51	87.36	22.4	Pass	
T2	239.083 - 230	Guy A@238.875	1	698	36.69	73.20	13.8	Pass	
T6	185 - 170	Guy A@178.875	1	703	42.32	73.20	50.1	Pass	
T9	140 - 125	Guy A@133.875	1	708	43.51	73.20	57.8	Pass	
T12	95 - 80	Guy A@88.875	7/8	713	30.94	55.20	59.4	Pass	
T14	65 - 50	Guy A@58.875	7/8	718	26.46	55.20	56.0	Pass	
T2	239.083 - 230	Guy B@238.875	1	697	37.23	73.20	47.9	Pass	
T6	185 - 170	Guy B@178.875	1	702	41.89	73.20	50.9	Pass	
T9	140 - 125	Guy B@133.875	1	707	42.42	73.20	57.2	Pass	
T12	95 - 80	Guy B@88.875	7/8	712	29.70	55.20	58.0	Pass	
T14	65 - 50	Guy B@58.875	7/8	717	25.47	55.20	53.8	Pass	
T2	239.083 - 230	Guy C@238.875	1	696	36.84	73.20	46.1	Pass	
T6	185 - 170	Guy C@178.875	1	699	42.49	73.20	50.3	Pass	
T9	140 - 125	Guy C@133.875	1	704	43.80	73.20	58.0	Pass	
T12	95 - 80	Guy C@88.875	7/8	709	30.77	55.20	59.8	Pass	
T14	65 - 50	Guy C@58.875	7/8	714	26.18	55.20	55.7	Pass	
T2	239.083 - 230	Top Guy Pull-Off@238.875	Double 7/8 SR	31	8.82	38.96	47.4	Pass	
T6	185 - 170	Top Guy Pull-Off@178.875	Double 7/8 SR	199	12.23	38.96	23.6	Pass	
T9	140 - 125	Top Guy Pull-Off@133.875	Double 7/8 SR	319	14.64	38.96	45.4 (b) 31.4	Pass	
T12	95 - 80	Top Guy Pull-Off@88.875	Double 7/8 SR	439	13.02	38.96	62.9 (b) 37.6	Pass	
T14	65 - 50	Top Guy Pull-Off@58.875	Double 7/8 SR	519	12.77	38.96	75.3 (b) 33.4	Pass	
							67.0 (b) 32.8	Pass	
							65.7 (b)	Pass	
							Summary		
							Leg (T14)	72.3	Pass
							Diagonal (T12)	100.8	Fail X
							Horizontal (T18)	45.0	Pass
							Top Girt (T17)	40.3	Pass
							Bottom Girt (T22)	13.8	Pass
							Guy A (T9)	59.4	Pass
							Guy B (T9)	58.0	Pass
							Guy C (T9)	59.8	Pass
							Top Guy	75.3	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
						Pull-Off (T9) Bolt Checks	100.8	Fail X
						RATING =	100.8	Fail X

APPENDIX B
BASE LEVEL DRAWING



APPENDIX C
ADDITIONAL CALCULATIONS

PJF job no. _____

Project name _____

foundation loads

Limit states Tower or Pole Weight = 296 kips
 limit states total horizontal force = 5 kips
 limit states overturning moment = 0 ft-kips
 limit states (LRFD) leg compression = 296 kips
 limit states (LRFD) leg tension = _____

soil properties

Safety factor against overturning = 1
 Soil Density = 100 pcf
 Ultimate soil bearing = 10 ksf
 Depth to water table = 99 ft

mat dimensions

Depth to Bottom of Footing = 4.4167 ft
 Footing Thickness = 4.9167 ft
 Footing Width = 9.8333 ft
 Footing Length = 9.8333 ft
 Base Plate Diameter = 0 inches
 Anchor Plate Diameter = _____
 Depth of Anchor Plate = _____
 Tower Base Width = _____
 Tower Center Offset = 0 ft

Summary of analysis results

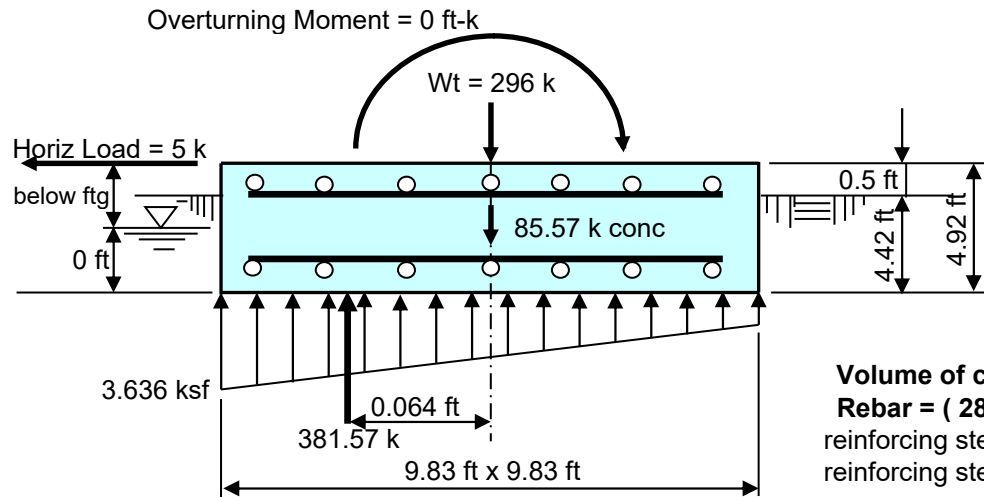
Overturning Moment: (Stress Ratio = 0.017)
 Calculated Ultimate Overturning Moment = 24.6 ft-kips
 Resisting Moment = 1407.1 ft-kips
 Factor of Safety against overturning = 57.236 **> 1 okay**

Soil Bearing (Stress Ratio = 0.606) **< CONTROLLING CRITERIA**
 Limit States Maximum Net Soil Bearing = 6 ksf
 Ultimate Bearing Pressure = 3.636 **ksf < 6 ksf okay**

Bending Moment (Stress Ratio = 0.012)
 Ultimate Bending Moment Resistance = 1067 ft-kips
 Calculated Ultimate Bending Moment = 12 **ft-kips < 1067 ft-kips okay**

Bending Shear (Stress Ratio = 0.007)
 Ultimate Bending Shear Resistance = 534 kips
 Calculated Ultimate Bending Shear = 4 **kips < 534 kips okay**

Punching Shear (Stress Ratio = 0.189)
 Ultimate Punching Shear Resistance = 1565 kips
 Calculated Ultimate Punching Shear = 296 **kips < 1565 kips okay**



Concrete strength = $f'_c = \underline{3}$ (ksi)
 Rebar strength = $F_y = \underline{60}$ (ksi)
 minimum cover over rebar = 3 inches

Volume of concrete = 17.608 yd³
Rebar = (28) #5 x 9.33 ft long plus (28) #5 x 9.33 ft long
 reinforcing steel = (14) #5 by 9.33333 long @ 8.62 in o.c. top and bot short bars
 reinforcing steel = (14) #5 by 9.33333 long @ 8.62 in o.c. top and bot long bars

Deadman Guy Anchor Analysis (LRFD)

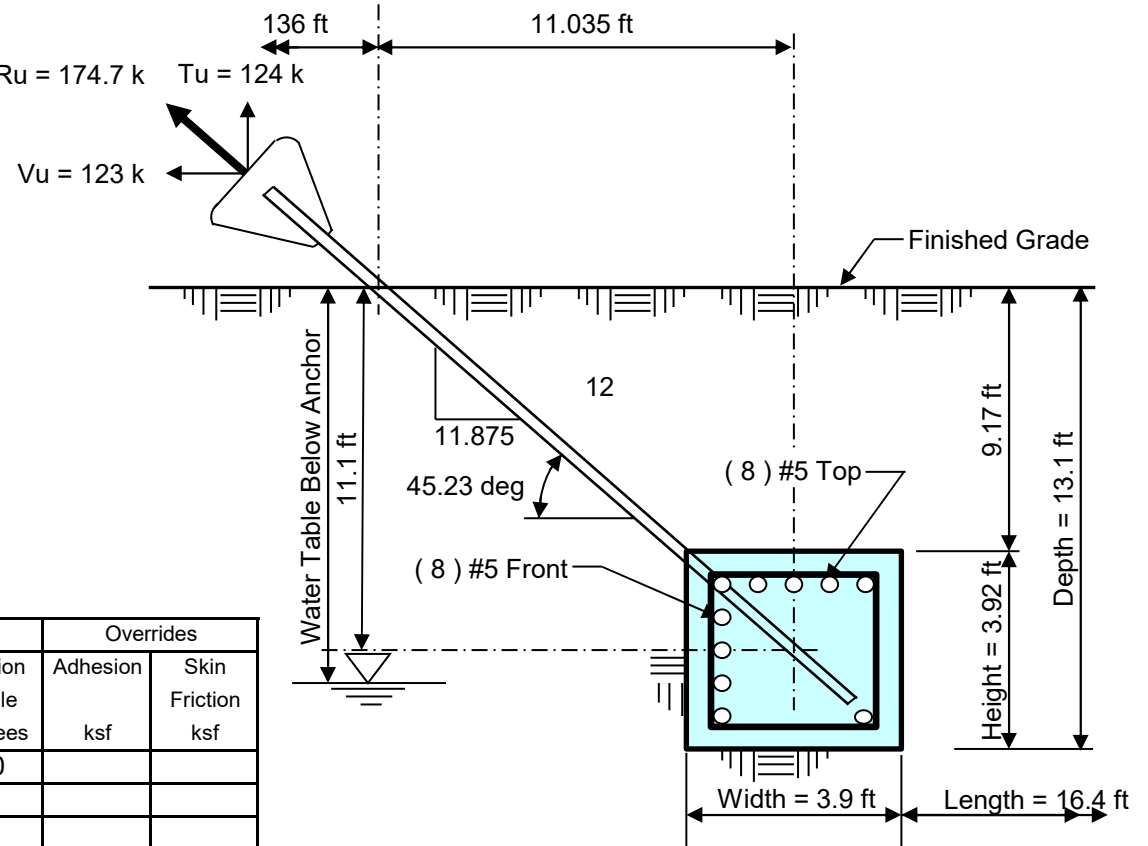
Guy Anchor

PJF Job No. **00021-0064**

Project Name: **Warwick Camp**

Engineer: **MRB**

Uplift Force =	<u>124</u>	k
Horizontal Force =	<u>123</u>	k
Load Factor, Concrete Weight =	<u>0.9</u>	
Φ, Soil Weight =	<u>0.75</u>	
Depth to Water Table =	<u>99</u>	ft
Toe Width (If Any) =	<u>0</u>	in
Toe Height (If Any) =	<u>0</u>	in
Depth to Bottom of Deadman =	<u>13.083</u>	ft
Deadman Block Height =	<u>3.9167</u>	ft
Deadman Block Width =	<u>3.9167</u>	ft
Deadman Block Length =	<u>16.417</u>	ft
Guy Rod Steel Strength, Fy =	<u>50</u>	ksi
Guy Rod Cross-Sectional Area =	<u>14.137</u>	in ²
Concrete Strength, f'c =	<u>3</u>	ksi
Rebar Strength, Fy =	<u>60</u>	ksi
Minimum Cover Over Rebar =	<u>3</u>	in
Horiz. Ult. Passive Press. Override =		ksf/ft



Layer Thk ft	Dry Soil Density pcf	Sat Soil Density pcf	Uplift		Horizontal		Overrides	
			Cohesion ksf	Friction Angle degrees	Cohesion ksf	Friction Angle degrees	Adhesion ksf	Skin Friction ksf
9	100	120		30		30		
4.083	110	125	3.0		3.0			

Uplift Based on:

Soil Cone

Concrete Volume per Anchor =	<u>9.33</u>	yd ³
Concrete Volume for (3) Anchors =	<u>27.98</u>	yd ³

Inverted pyramid of soil in uplift will be taken from the top of the anchor.

Summary Results:

	Required	Available	
Guy Rod Tensile Force =	<u>174.66</u>	<u>565.5</u>	Capacity Ratio = <u>30.9%</u> in Tensile Force
Soil, Horizontal Resistance =	<u>123.0</u>	<u>364.6</u>	Capacity Ratio = <u>33.7%</u> in Horiz Resistance
Soil, Uplift Resistance =	<u>124.0</u>	<u>255.9</u>	Capacity Ratio = <u>48.5%</u> in Uplift Resistance
Steel, Uplift Bending Moment =	<u>324.5</u>	<u>444.5</u>	Capacity Ratio = <u>73.0%</u> in Bending Moment
Steel, Horizontal Bending Moment =	<u>266.7</u>	<u>444.5</u>	Capacity Ratio = <u>60.0%</u> in Bending Moment
Toe Shear =			Capacity Ratio = _____ in Shear

STANDARD CONDITIONS FOR FURNISHING OF PROFESSIONAL ENGINEERING SERVICES ON
EXISTING STRUCTURES BY PAUL J. FORD AND COMPANY

- 1) Paul J. Ford and Company has not made a field inspection to verify the tower member sizes or the antenna/coax loading. If the existing conditions are not as represented on these drawings, we should be contacted immediately to evaluate the significance of the deviation.
- 2) No allowance was made for any damaged, missing, or rusted members. The analysis of this tower assumes that no physical deterioration has occurred in any of the structural components of the tower and that all the tower members have the same load carrying capacity as the day the tower was erected.
- 3) It is not possible to have all the detailed information to perform a thorough analysis of every structural sub-component of an existing tower. The structural analysis by Paul J. Ford and Company verifies the adequacy of the main structural members of the tower. Paul J. Ford and Company provides a limited scope of service in that we cannot verify the adequacy of every weld, plate connection detail, etc.
- 4) This tower has been analyzed according to the minimum design wind loads recommended by the Telecommunications Industry Association Standard ANSI/TIA-222-G. If the owner or local or state agencies require a higher design wind load, Paul J. Ford and Company should be made aware of this requirement.
- 5) The enclosed sketches are a schematic representation of the tower that we have analyzed. If any material is fabricated from these sketches, the contractor shall be responsible for field verifying the existing conditions and for the proper fit and clearance in the field.
- 6) Miscellaneous items such as antenna mounts etc. have not been designed or detailed as a part of our work. We recommend that material of adequate size and strength be purchased from a reputable tower manufacturer.