Robinson+Cole

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Also admitted in Massachusetts

April 12, 2016

Melanie A. Bachman
Acting Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Notice of Exempt Modification – Facility Modification**
50 Rockland Road, Norwalk, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the 128-foot level of the existing 180-foot tower at 50 Rockland Road in Norwalk, Connecticut (the "Property"). The tower and the Property are owned by Crown Castle. The Council approved Cellco's use of the existing tower in 1987 (Docket No. 73). Cellco now intends to modify its facility by replacing three (3) antennas with three (3) model HBX-6516DS, 1900 MHz antennas at the same 128-foot level on the tower. Included in Attachment 1 are specifications for Cellco's replacement antennas.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Harry Rilling, Mayor of the City of Norwalk and Crown Castle, the Property and tower owner.

The planned modifications to the facility fall squarely within those activities explicitly provided for in R.C.S.A. § 16-50j-72(b)(2).

1. The proposed modifications will not result in an increase in the height of the existing tower. The new antennas will be located at the 128-foot level on the 180-foot tower.

2. The proposed modifications will not involve any change to ground-mounted equipment and, therefore, will not require the extension of the site boundary.

3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.

4. The operation of the modified facility will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A cumulative worst-case RF emissions calculation for Cellco's modified facility is included in Attachment 2.

5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.

6. The tower and its foundation can support Cellco's proposed modifications. (*See* Structural Analysis Report included in Attachment 3).

For the foregoing reasons, Cellco respectfully submits that the proposed modifications to the above-referenced telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,

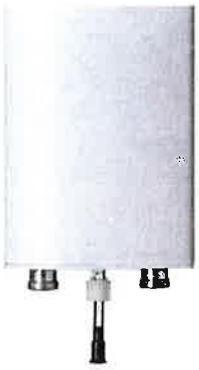
Kenneth C. Baldwin

Enclosures
Copy to:
Harry Rilling, Norwalk Mayor
Crown Castle
Tim Parks

ATTACHMENT 1

Product Specifications

COMMSCOPE®



HBX-6516DS-VTM | HBX-6516DS-A1M

Andrew® Antenna, 1710–2180 MHz, 65° horizontal beamwidth, RET compatible

- Superior azimuth tracking and pattern symmetry to minimize any sector overlap
- Rugged, reliable design with excellent passive intermodulation suppression

Electrical Specifications

Frequency Band, MHz	**1710–1880**	**1850–1990**	**1920–2180**
Gain, dBi	17.4	17.6	17.8
Beamwidth, Horizontal, degrees	66	64	66
Beamwidth, Vertical, degrees	7.4	6.9	6.4
Beam Tilt, degrees	0–10	0–10	0–10
USLS (First Lobe), dB	19	19	19
Front-to-Back Ratio at 180°, dB	35	35	35
Isolation, dB	30	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350
Polarization	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	**1710–1880**	**1850–1990**	**1920–2180**
Gain by all Beam Tilts, average, dBi	17.1	17.4	17.4
Gain by all Beam Tilts Tolerance, dB	±0.5	±0.3	±0.5
Gain by Beam Tilt, average, dBi	0 ° | 17.0 5 ° | 17.2 10 ° | 16.9	0 ° | 17.3 5 ° | 17.5 10 ° | 17.0	0 ° | 17.4 5 ° | 17.3 10 ° | 17.1
Beamwidth, Horizontal Tolerance, degrees	±3.8	±2.4	±5.2
Beamwidth, Vertical Tolerance, degrees	±0.4	±0.4	±0.6
USLS, beampeak to 20° above beampeak, dB	18	18	17
Front-to-Back Total Power at 180° ± 30°, dB	26	27	26
CPR at Boresight, dB	17	19	20
CPR at Sector, dB	9	7	7

* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, download the whitepaper Time to Raise the Bar on BSAs.

General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol®
Band	Single band
Brand	DualPol®
Operating Frequency Band	1710 – 2180 MHz
Performance Note	Outdoor usage

Product Specifications

HBX-6516DS-VTM | HBX-6516DS-A1M

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Low loss circuit board
Radome Material	PVC, UV resistant
Reflector Material	Aluminum
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	2
Wind Loading, frontal	257.0 N @ 150 km/h 57.8 lbf @ 150 km/h
Wind Loading, lateral	67.0 N @ 150 km/h 15.1 lbf @ 150 km/h
Wind Loading, rear	310.0 N @ 150 km/h 69.7 lbf @ 150 km/h
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

Depth	83.0 mm | 3.3 in
Length	1306.0 mm | 51.4 in
Width	166.0 mm | 6.5 in
Net Weight, without mounting kit	4.7 kg | 10.4 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 2.0 Actuator	HBX-6516DS-A1M

Packed Dimensions

Depth	188.0 mm | 7.4 in
Length	1442.0 mm | 56.8 in
Width	277.0 mm | 10.9 in
Shipping Weight	11.5 kg | 25.4 lb

Regulatory Compliance/Certifications

Agency	Classification
RoHS 2011/65/EU	
China RoHS SJ/T 11364-2006	Above Maximum Concentration Value (MCV)
ISO 9001:2008	Designed, manufactured and/or distributed under this quality management system

Included Products

DB390 — Pipe Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Use for narrow panel antennas. Includes two pipe mounts.

DB5098E — Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

ATTACHMENT 2

	General	Power	Density					
Site Name: Norwalk								
Tower Height: 180Ft								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*AT&T GSM	3	296	107	0.0313	880	0.5867	0.53%	
*AT&T GSM	2	427	107	0.0301	1900	1.0000	0.30%	
*AT&T UMTS	1	500	107	0.0176	880	0.5867	0.30%	
*AT&T UMTS	2	500	107	0.0353	1900	1.0000	0.35%	
*AT&T LTE	1	500	107	0.0176	740	0.4933	0.36%	
*MetroPCS	7	735	115	0.1557	2130	1.0000	1.56%	
*T-Mobile	2	2334	172	0.0609	2100	1.0000	0.61%	
*T-Mobile	1	865	172	0.0113	700	0.4667	0.24%	
*T-Mobile	2	1167	172	0.0305	1900	1.0000	0.30%	
*T-Mobile	2	1167	172	0.0305	2100	1.0000	0.30%	
*Sprint	5	693	145	0.0645	1900	1.0000	0.64%	
*Sprint	1	390	145	0.0073	850	0.5667	0.13%	
Verizon	**1**	**1233**	**129**	**0.0266**	**1970**	**1.0000**	**2.66%**	
Verizon	**9**	**317**	**129**	**0.0616**	**869**	**0.5793**	**10.64%**	
Verizon	**1**	**1794**	**129**	**0.0388**	**2145**	**1.0000**	**3.88%**	
Verizon	**1**	**593**	**129**	**0.0128**	**746**	**0.4973**	**2.58%**	
								25.39%
* Source: Siting Council								

ATTACHMENT 3

Date: **April 05, 2016**

Sean Dempsey
Crown Castle
3530 Toringdon Way Suite 300
Charlotte, NC 28277

Velocitel, Inc., d.b.a. FDH Velocitel
6521 Meridien Drive, Suite 107
Raleigh, North Carolina 27616
9197551012

Subject: **Structural Analysis Report**

Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	
	Carrier Site Name:	Norwalk
Crown Castle Designation:	**Crown Castle BU Number:**	807133
	Crown Castle Site Name:	BRG 134 943057
	Crown Castle JDE Job Number:	371347
	Crown Castle Work Order Number:	1216664
	Crown Castle Application Number:	340708 Rev. 0
Engineering Firm Designation:	**FDH Velocitel Project Number:**	16BGCG1400

Site Data: **50 ROCKLAND ROADNORWALK OFC - MTSO, SO NORWALK, Fairfield County, CT**
Latitude *41° 4' 54.44"*, Longitude *-73° 25' 49.52"*
180 Foot - Self Support Tower

Dear Sean Dempsey,

FDH Velocitel is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 888772, in accordance with application 340708, revision 0.

The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

LC7: Existing + Reserved + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

The analysis has been performed in accordance with the TIA/EIA-222-F standard based upon a wind speed of 85 mph fastest mile.

We at *FDH Velocitel* appreciate the opportunity of providing our continuing professional services to you and Crown Castle. If you have any questions or need further assistance on this or any other projects please give us a call.

Respectfully submitted by:

Zachary Shepherd, EI
Project Engineer I

Reviewed by:

Dennis D. Abel, PE
Director – Structural Engineering
CT PE License No. 23247

04-05-2016

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 180 ft Self Support tower designed by ROHN in July of 1987. The tower was originally designed for E.I.A. Zone A. This tower has been modified per reinforcement drawings prepared by Vertical Structures, Inc. in November of 2004. These modifications were considered in this analysis.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 85 mph with no ice, 37.6 mph with 0.75 inch ice thickness and 50 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
126.0	128.0	3	commscope	HBX-6516DS-VTM w/ Mount Pipe	-	-	-

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
178.0	178.0	2	-	Side Arm Mount [SO 306-1]	-	-	1
172.0	173.0	3	commscope	LNX-6515DS-VTM w/ Mount Pipe	-	-	2
		3	ericsson	RRUS 11 B12			
		3	ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	13	1-5/8	1
		3	ericsson	ERICSSON AIR 21 B4A B2P w/ Mount Pipe			
		1	ericsson	KRY 112 144/1			
	172.0	2	ericsson	KRY 112 144/1			
		1	-	Sector Mount [SM 602-3]			
157.0	157.0	2	andrew	VHLP2-18	2	1/2	1
		2	-	Side Arm Mount [SO 202-1]			
148.0	148.0	3	alcatel lucent	TD-RRH8x20-25	1	1-1/4	2
		3	rfs celwave	APXVTM14-C-120 w/ Mount Pipe			
		9	rfs celwave	ACU-A20-N	3	1-1/4	1
		3	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe			
		3	site pro	VFA12-U w/ 12' Stiff Arm			
143.0	145.0	3	alcatel lucent	800 EXTERNAL NOTCH FILTER	-	-	1

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
		3	alcatel lucent	PCS 1900MHz 4x45W-65MHz			
		3	alcatel lucent	TME-800MHZ 2X50W RRH			
	143.0	1	-	Side Arm Mount [SO 312-3]			
	142.0	3	alcatel lucent	PCS 1900MHz 4x45W-65MHz			
134.0	135.0	1	andrew	VHLP2-23	6 1	5/16 1/2	1
		3	argus tech	LLPX310R w/ Mount Pipe			
		3	samsung telecommunications	FDD_R6_RRH			
	134.0	1	-	Pipe Mount [PM 601-1]			
		1	-	Sector Mount [SM 502-3]			
126.0	130.0	3	alcatel lucent	RRH2X40-AWS	19 1	1-5/8 1/2	1
		1	gps	GPS_A			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			
	128.0	2	andrew	LNX-6514DS-T4M w/ Mount Pipe			
		4	decibel	DB844G65ZAXY w/ Mount Pipe			
		2	decibel	DB844H80-XY w/ Mount Pipe			
		1	powerwave tech	P65.16.XL.2 w/ Mount Pipe			
		3	rymsa wireless	MG D3-800TV w/ Mount Pipe			
		3	rymsa wireless	MG D3-800Tx w/ Mount Pipe	-	-	3
	126.0	1	-	Sector Mount [SM 410-3]	-	-	1
112.0	112.0	3	kathrein	800 10504 w/ Mount Pipe	6	1-5/8	1
		1	-	Sector Mount [SM 104-3]			
102.0	102.0	6	powerwave tech	LGP2140X	-	-	2
		6	ericsson	RRUS 11 B2			
		6	powerwave tech	7770.00 w/ Mount Pipe	12 1 2	1-5/8 3/8 5/8	1
		6	powerwave tech	LGP2140X			
		3	powerwave tech	P65-16-XLH-RR w/ Mount Pipe			
		1	raycap	DC6-48-60-18-8F			
		1	-	Sector Mount [SM 301-3]			
30.0	30.0	2	gps	GPS_A	2	1/2	1
		2	-	Side Arm Mount [SO 701-1]			
12.0	12.0	1	astron wireless	VG-1060	2	1/4	1
		1	gps	GPS_A			
		1	-	Pipe Mount [PM 601-1]			

Notes:
1) Existing Equipment
2) Reserved Equipment; Considered in Analysis
3) Existing Equipment to be Removed; Not Considered in Analysis

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
217	217	4	celwave	PD10017	-	-
207	207	6	celwave	PD1132	-	-
180	180	3	-	8' Dish	-	-
170	170	1	-	8' Dish	-	-
156	156	1	-	8' Dish	-	-
150	150	1	-	8' Dish	-	-
130	130	1	celwave	PD1109	-	-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	FDH Engineering, Inc.	2311843	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Paul J. Ford	821566	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Rohn	392878	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	Vertical Structures, Inc.	1257479	CCISITES
4-POST-MODIFICATION INSPECTION	All Points Technology Corp.	4065020	CCISITES

3.1) Analysis Method

tnxTower (version 7.0.5.1), 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 built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by TIA/EIA-222-F.

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

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T1	180 - 160	Leg	ROHN 3 EH	1	-9.86	96.06	10.3	Pass
T2	160 - 153.333	Leg	ROHN 4 EH	36	-14.39	139.07	10.3	Pass
T3	153.333 - 146.667	Leg	ROHN 4 EH	43	-20.97	139.07	15.1	Pass
T4	146.667 - 140	Leg	ROHN 4 EH	55	-28.84	139.07	20.7	Pass
T5	140 - 120	Leg	ROHN 5 EH	67	-59.83	206.29	29.0	Pass
T6	120 - 100	Leg	ROHN 6 EHS	88	-97.12	236.06	41.1	Pass
T7	100 - 80	Leg	ROHN 6 EH	109	-133.11	264.29	50.4	Pass
T8	80 - 70	Leg	ROHN 8 EHS	124	-151.67	338.72	44.8	Pass
T9	70 - 60	Leg	ROHN 8 EHS	133	-170.44	338.72	50.3	Pass
T10	60 - 40	Leg	ROHN 8 EHS	142	-206.84	338.72	61.1	Pass
T11	40 - 20	Leg	ROHN 8 EH	157	-242.26	435.22	55.7	Pass
T12	20 - 0	Leg	ROHN 8 EH	172	-277.09	435.22	63.7	Pass
T1	180 - 160	Diagonal	L2x2x3/16	15	-2.11	6.68	31.5 36.3 (b)	Pass
T2	160 - 153.333	Diagonal	L2 1/2x2 1/2x1/4	41	-2.62	13.09	20.0 28.2 (b)	Pass
T3	153.333 - 146.667	Diagonal	L2 1/2x2 1/2x1/4	53	-3.17	11.83	26.8 33.4 (b)	Pass
T4	146.667 - 140	Diagonal	L2 1/2x2 1/2x1/4	65	-4.55	10.74	42.4 49.3 (b)	Pass
T5	140 - 120	Diagonal	L2 1/2x2 1/2x1/4	74	-6.96	8.26	84.2	Pass
T6	120 - 100	Diagonal	L3x3x1/4	95	-8.49	11.62	73.1 83.3 (b)	Pass
T7	100 - 80	Diagonal	L3 1/2x3 1/2x1/4	112	-10.07	12.51	80.5 82.8 (b)	Pass
T8	80 - 70	Diagonal	L3 1/2x3 1/2x1/4	127	-10.41	11.69	89.1	Pass
T9	70 - 60	Diagonal	2L3 1/2x3 1/2x1/4x3/8	136	-11.10	17.99	61.7 63.1 (b)	Pass
T10	60 - 40	Diagonal	L4x4x1/4	146	-11.42	13.65	83.7 90.9 (b)	Pass
T11	40 - 20	Diagonal	L4x4x5/16	161	-11.90	14.28	83.3	Pass
T12	20 - 0	Diagonal	2L4x4x5/16x3/8	176	-12.85	20.68	62.1 73.1 (b)	Pass
T1	180 - 160	Top Girt	L2x2x1/8	4	-0.11	2.79	4.0	Pass
T3	153.333 - 146.667	Top Girt	L2x2x1/8	46	-0.21	1.36	15.8	Pass
T4	146.667 - 140	Top Girt	L2x2x1/8	60	0.12	8.50	1.4 2.9 (b)	Pass
T1	180 - 160	Mid Girt	L2x2x1/8	7	-0.25	2.05	12.3	Pass
							Summary	
						Leg (T12)	63.7	Pass
						Diagonal (T10)	90.9	Pass
						Top Girt (T3)	15.8	Pass
						Mid Girt (T1)	12.3	Pass
						Bolt Checks	90.9	Pass
						RATING =	90.9	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	55.0	Pass
1	Base Foundation	0	71.8	Pass

Structure Rating (max from all components) =	90.9%

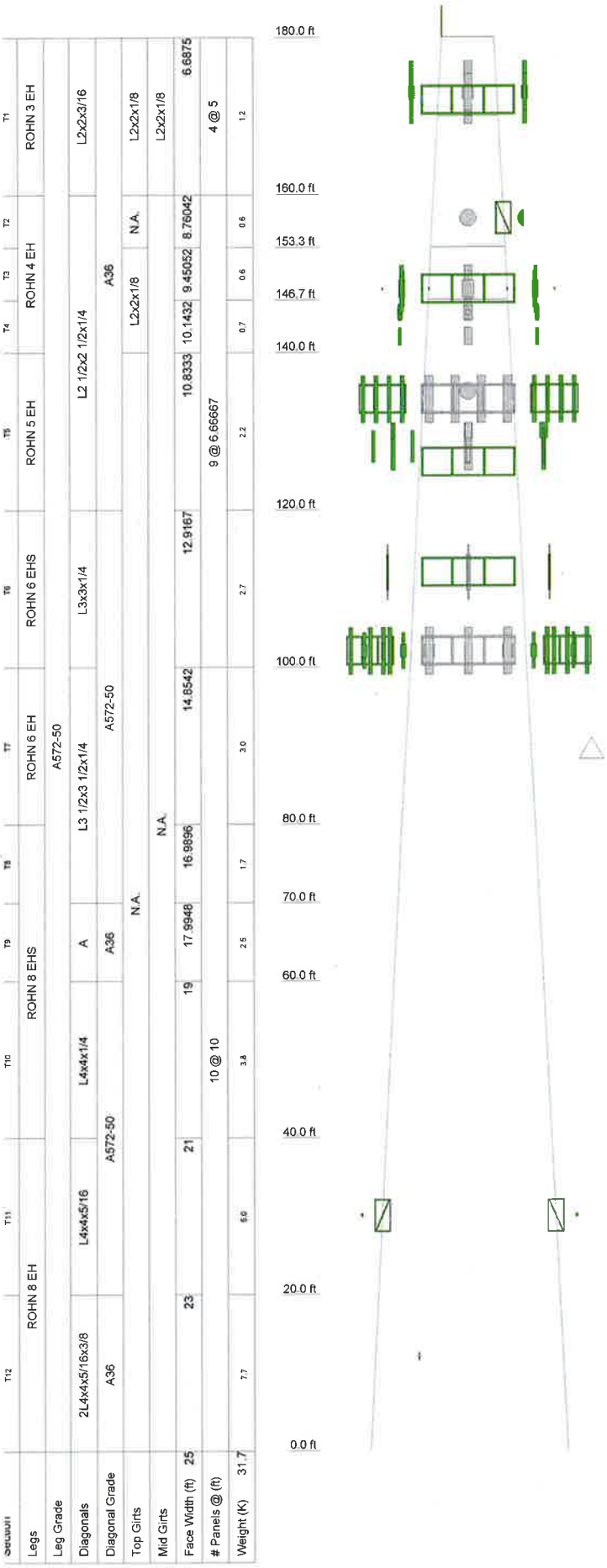
Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

4.1) Recommendations

The tower and its foundations have sufficient capacity to carry the existing, reserved, and proposed loads. No modifications are required at this time.

APPENDIX A

TNXTOWER OUTPUT



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod	180	FDD_R6_RRH	134
Empty Pipe Mount	178	FDD_R6_RRH	134
Empty Pipe Mount	178	Pipe Mount [PM 601-1]	134
Side Arm Mount [SO 306-1]	178	Sector Mount [SM 502-3]	134
Side Arm Mount [SO 306-1]	178	LLPX310R w/ Mount Pipe	134
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	172	LLPX310R w/ Mount Pipe	134
		VHLP2-23	134
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	172	DB844G65ZAXY w/ Mount Pipe	126
		DB844G65ZAXY w/ Mount Pipe	126
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	172	(2) DB844G65ZAXY w/ Mount Pipe	126
		LNX-6514DS-T4M w/ Mount Pipe	126
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	172	LNX-6514DS-T4M w/ Mount Pipe	126
		MG D3-800TV w/ Mount Pipe	126
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	172	MG D3-800TV w/ Mount Pipe	126
		MG D3-800TV w/ Mount Pipe	126
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	172	DB844H80-XY w/ Mount Pipe	126
		DB844H80-XY w/ Mount Pipe	126
LNX-6515DS-VTM w/ Mount Pipe	172	GPS_A	126
LNX-6515DS-VTM w/ Mount Pipe	172	P65.16.XL.2 w/ Mount Pipe	126
LNX-6515DS-VTM w/ Mount Pipe	172	RRH2X40-AWS	126
KRY 112 144/1	172	RRH2X40-AWS	126
KRY 112 144/1	172	RRH2X40-AWS	126
KRY 112 144/1	172	DB-T1-6Z-8AB-0Z	126
RRUS 11 B12	172	Sector Mount [SM 410-3]	126
RRUS 11 B12	172	HBX-6516DS-VTM w/ Mount Pipe	126
RRUS 11 B12	172	HBX-6516DS-VTM w/ Mount Pipe	126
Sector Mount [SM 602-3]	172	HBX-6516DS-VTM w/ Mount Pipe	126
Empty Pipe Mount	172	Sector Mount [SM 104-3]	112
Empty Pipe Mount	172	Empty Mount Pipe	112
Side Arm Mount [SO 202-1]	157	Empty Mount Pipe	112
Side Arm Mount [SO 202-1]	157	Empty Mount Pipe	112
VHLP2-18	157	800 10504 w/ Mount Pipe	112
VHLP2-18	157	800 10504 w/ Mount Pipe	112
APXVSPP18-C-A20 w/ Mount Pipe	148	800 10504 w/ Mount Pipe	112
APXVTM14-C-120 w/ Mount Pipe	148	P65-16-XLH-RR w/ Mount Pipe	102
APXVTM14-C-120 w/ Mount Pipe	148	P65-16-XLH-RR w/ Mount Pipe	102
APXVTM14-C-120 w/ Mount Pipe	148	P65-16-XLH-RR w/ Mount Pipe	102
(3) ACU-A20-N	148	(2) LGP2140X	102
(3) ACU-A20-N	148	(2) LGP2140X	102
(3) ACU-A20-N	148	(2) LGP2140X	102
TD-RRH8x20-25	148	(2) LGP2140X	102
TD-RRH8x20-25	148	(2) LGP2140X	102
TD-RRH8x20-25	148	(2) LGP2140X	102
(3) Site Pro VFA12-U w/ 12' Stiff Arm	148	(2) RRUS 11 B2	102
APXVSPP18-C-A20 w/ Mount Pipe	148	(2) RRUS 11 B2	102
APXVSPP18-C-A20 w/ Mount Pipe	148	(2) RRUS 11 B2	102
PCS 1900MHz 4x45W-65MHz	143	DC6-48-60-18-8F	102
PCS 1900MHz 4x45W-65MHz	143	Sector Mount [SM 301-3]	102
PCS 1900MHz 4x45W-65MHz	143	Empty Mount Pipe	102
PCS 1900MHz 4x45W-65MHz	143	Empty Mount Pipe	102
TME-800MHZ 2X50W RRH	143	Empty Mount Pipe	102
TME-800MHZ 2X50W RRH	143	(2) 7770.00 w/ Mount Pipe	102
TME-800MHZ 2X50W RRH	143	(2) 7770.00 w/ Mount Pipe	102
800 EXTERNAL NOTCH FILTER	143	(2) 7770.00 w/ Mount Pipe	102
800 EXTERNAL NOTCH FILTER	143	Side Arm Mount [SO 701-1]	30
800 EXTERNAL NOTCH FILTER	143	GPS_A	30
Side Arm Mount [SO 312-3]	143	GPS_A	30
PCS 1900MHz 4x45W-65MHz	143	Side Arm Mount [SO 701-1]	30
PCS 1900MHz 4x45W-65MHz	143	VG-1060	12
LLPX310R w/ Mount Pipe	134	GPS_A	12
FDD_R6_RRH	134	Pipe Mount [PM 601-1]	12

SYMBOL LIST

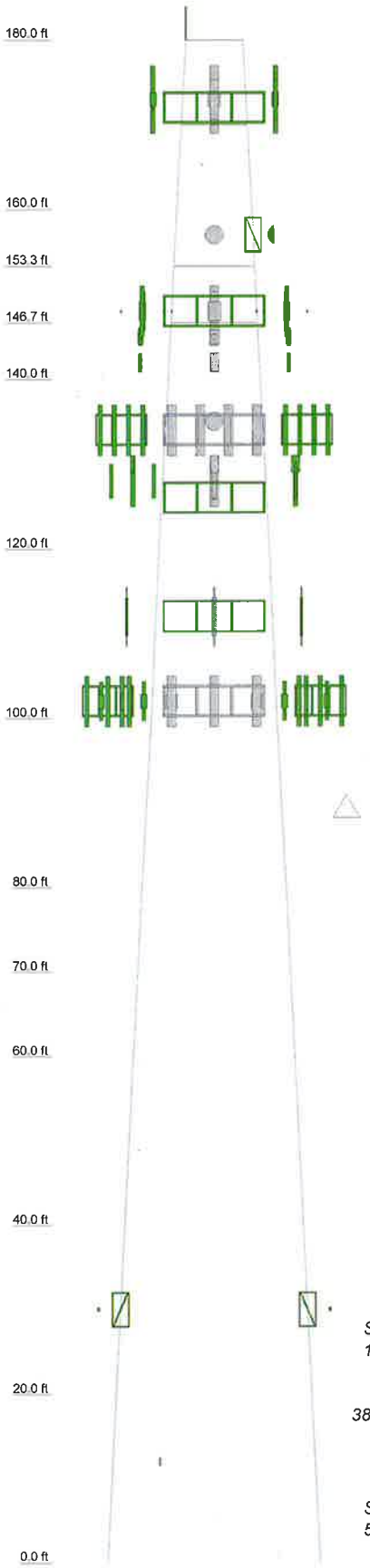
MARK	SIZE	MARK	SIZE
A	2L3 1/2x3 1/2x1/4x3/8		

Velocitel, Inc., d.b.a. FDH Velocitel
6521 Meridien Drive, Suite 107
Raleigh, North Carolina 27616
Phone: 9197551012
FAX: 9197551031

Tower Analysis

Job: BRG 134 943057 - BU# 807133			
Project: 16BGCG1400			
Client: Crown Castle	Drawn by: ZShepherd	App'd:	
Code: TIA/EIA-222-F	Date: 04/05/16	Scale: N	
Path:		Dwg No.	

Section	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12
Legs	ROHN 3 EH		ROHN 4 EH		ROHN 5 EH	ROHN 6 EHS	ROHN 6 EH		ROHN 8 EHS		ROHN 8 EH	
Leg Grade	A572-50											
Diagonals	L2x2x3/16		L2 1/2x2 1/2x1/4			L3x3x1/4	L3 1/2x3 1/2x1/4		A	L4x4x1/4	L4x4x5/16	2L4x4x5/16x3/8
Diagonal Grade	A36				A572-50				A36		A572-50	A36
Top Girts	L2x2x1/8	N.A.	L2x2x1/8				N.A.					
Mid Girts	L2x2x1/8						N.A.					
Face Width (ft)	6.6875	8.76042	9.45052	10.1432	10.8333	12.9167	14.8542	16.9896	17.9948	19	21	23
# Panels @ (ft)	4 @ 5				9 @ 6.66667					10 @ 10		
Weight (K)	1.2	0.6	0.6	0.7	2.2	2.7	3.0	1.7	2.5	3.8	5.0	7.7



SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	2L3 1/2x3 1/2x1/4x3/8		

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 90.9%

MAX. CORNER REACTIONS AT BASE:
DOWN: 286 K
SHEAR: 35 K

UPLIFT: -235 K
SHEAR: 30 K

AXIAL
111 K

SHEAR
16 K

MOMENT
1737 kip-ft

TORQUE 11 kip-ft
38 mph WIND - 0.7500 in ICE

AXIAL
61 K

SHEAR
56 K

MOMENT
5749 kip-ft

TORQUE 44 kip-ft
REACTIONS - 85 mph WIND

FDH VELOCITEL
Tower Analysis

Velocitel, Inc., d.b.a. FDH Velocitel
6521 Meridien Drive, Suite 107
Raleigh, North Carolina 27616
Phone: 9197551012
FAX: 9197551031

Job:	BRG 134 943057 - BU# 807133		
Project:	16BGCG1400		
Client: Crown Castle	Drawn by: ZShepherd	App'd:	
Code: TIA/EIA-222-F	Date: 04/05/16	Scale: N	
Path:		Dwg No.	

tnxTower	Job	Page
	BRG 134 943057 - BU# 807133	1 of 34
Velocitel, Inc., d.b.a. FDH Velocitel 6521 Meridien Drive, Suite 107 Raleigh, North Carolina 27616 Phone: 9197551012 FAX: 9197551031	**Project** 16BGCG1400	**Date** 16:24:16 04/05/16
	Client Crown Castle	**Designed by** ZShepherd

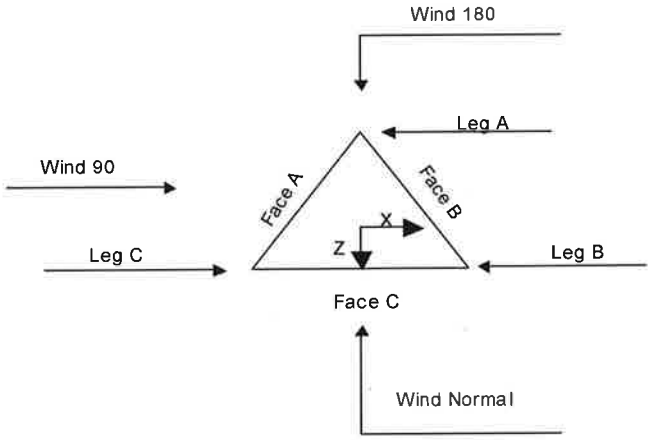
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 180.00 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 6.69 ft at the top and 25.00 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Tower is located in Fairfield County, Connecticut.
Basic wind speed of 85 mph.
Nominal ice thickness of 0.7500 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 38 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.333.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs	Distribute Leg Loads As Uniform	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Horizontals	Assume Legs Pinned	√ Calculate Redundant Bracing Forces
Consider Moments - Diagonals	√ Assume Rigid Index Plate	Ignore Redundant Members in FEA
Use Moment Magnification	√ Use Clear Spans For Wind Area	√ SR Leg Bolts Resist Compression
√ Use Code Stress Ratios	√ Use Clear Spans For KL/r	√ All Leg Panels Have Same Allowable
√ Use Code Safety Factors - Guys	Retension Guys To Initial Tension	Offset Girt At Foundation
√ Escalate Ice	√ Bypass Mast Stability Checks	√ Consider Feed Line Torque
Always Use Max Kz	√ Use Azimuth Dish Coefficients	√ Include Angle Block Shear Check
Use Special Wind Profile	√ Project Wind Area of Appurt.	Use TIA-222-G Bracing Resist. Exemption
√ Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Use TIA-222-G Tension Splice Exemption
Leg Bolts Are At Top Of Section	Add IBC .6D+W Combination	Poles
√ Secondary Horizontal Braces Leg	√ Sort Capacity Reports By Component	Include Shear-Torsion Interaction
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Always Use Sub-Critical Flow
SR Members Have Cut Ends	Treat Feed Line Bundles As Cylinder	Use Top Mounted Sockets
SR Members Are Concentric		



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	180.00-160.00			6.69	1	20.00
T2	160.00-153.33			8.76	1	6.67
T3	153.33-146.67			9.45	1	6.67
T4	146.67-140.00			10.14	1	6.67
T5	140.00-120.00			10.83	1	20.00
T6	120.00-100.00			12.92	1	20.00
T7	100.00-80.00			14.85	1	20.00
T8	80.00-70.00			16.99	1	10.00
T9	70.00-60.00			17.99	1	10.00
T10	60.00-40.00			19.00	1	20.00
T11	40.00-20.00			21.00	1	20.00
T12	20.00-0.00			23.00	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	180.00-160.00	5.00	X Brace	No	No	0.0000	0.0000
T2	160.00-153.33	6.67	X Brace	No	No	0.0000	0.0000
T3	153.33-146.67	6.67	X Brace	No	No	0.0000	0.0000

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
T4	146.67-140.00	6.67	X Brace	No	No	0.0000	0.0000
T5	140.00-120.00	6.67	X Brace	No	No	0.0000	0.0000
T6	120.00-100.00	6.67	X Brace	No	No	0.0000	0.0000
T7	100.00-80.00	10.00	X Brace	No	No	0.0000	0.0000
T8	80.00-70.00	10.00	X Brace	No	No	0.0000	0.0000
T9	70.00-60.00	10.00	X Brace	No	No	0.0000	0.0000
T10	60.00-40.00	10.00	X Brace	No	No	0.0000	0.0000
T11	40.00-20.00	10.00	X Brace	No	No	0.0000	0.0000
T12	20.00-0.00	10.00	X Brace	No	No	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 180.00-160.00	Pipe	ROHN 3 EH	A572-50 (50 ksi)	Single Angle	L2x2x3/16	A36 (36 ksi)
T2 160.00-153.33	Pipe	ROHN 4 EH	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x1/4	A36 (36 ksi)
T3 153.33-146.67	Pipe	ROHN 4 EH	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x1/4	A36 (36 ksi)
T4 146.67-140.00	Pipe	ROHN 4 EH	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x1/4	A36 (36 ksi)
T5 140.00-120.00	Pipe	ROHN 5 EH	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x1/4	A36 (36 ksi)
T6 120.00-100.00	Pipe	ROHN 6 EHS	A572-50 (50 ksi)	Single Angle	L3x3x1/4	A572-50 (50 ksi)
T7 100.00-80.00	Pipe	ROHN 6 EH	A572-50 (50 ksi)	Single Angle	L3 1/2x3 1/2x1/4	A572-50 (50 ksi)
T8 80.00-70.00	Pipe	ROHN 8 EHS	A572-50 (50 ksi)	Single Angle	L3 1/2x3 1/2x1/4	A572-50 (50 ksi)
T9 70.00-60.00	Pipe	ROHN 8 EHS	A572-50 (50 ksi)	Double Equal Angle	2L3 1/2x3 1/2x1/4x3/8	A36 (36 ksi)
T10 60.00-40.00	Pipe	ROHN 8 EHS	A572-50 (50 ksi)	Single Angle	L4x4x1/4	A572-50 (50 ksi)
T11 40.00-20.00	Pipe	ROHN 8 EH	A572-50 (50 ksi)	Single Angle	L4x4x5/16	A572-50 (50 ksi)
T12 20.00-0.00	Pipe	ROHN 8 EH	A572-50 (50 ksi)	Double Equal Angle	2L4x4x5/16x3/8	A36 (36 ksi)

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 180.00-160.00	Equal Angle	L2x2x1/8	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T3 153.33-146.67	Equal Angle	L2x2x1/8	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T4 146.67-140.00	Single Angle	L2x2x1/8	A36 (36 ksi)	Single Angle		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 180.00-160.00	1	Equal Angle	L2x2x1/8	A36 (36 ksi)	Single Angle		A36 (36 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	Gusset Area (per face) ft²	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 180.00-160.00	0.00	0.2500	A36 (36 ksi)	1	1	1	30.0000	30.0000	36.0000
T2 160.00-153.33	0.00	0.2500	A36 (36 ksi)	1	1	1	30.0000	30.0000	36.0000
T3 153.33-146.67	0.00	0.2500	A36 (36 ksi)	1	1	1	30.0000	30.0000	36.0000
T4 146.67-140.00	0.00	0.2500	A36 (36 ksi)	1	1	1	30.0000	30.0000	36.0000
T5 140.00-120.00	0.00	0.2500	A36 (36 ksi)	1	1	1	30.0000	30.0000	36.0000
T6 120.00-100.00	0.00	0.2500	A36 (36 ksi)	1	1	1	30.0000	30.0000	36.0000
T7 100.00-80.00	0.00	0.3750	A36 (36 ksi)	1	1	1	30.0000	30.0000	36.0000
T8 80.00-70.00	0.00	0.3750	A36 (36 ksi)	1	1	1	30.0000	30.0000	36.0000
T9 70.00-60.00	0.00	0.3750	A36 (36 ksi)	1	1	1	123.1250	30.0000	36.0000
T10 60.00-40.00	0.00	0.3750	A36 (36 ksi)	1	1	1	30.0000	30.0000	36.0000
T11 40.00-20.00	0.00	0.3750	A36 (36 ksi)	1	1	1	30.0000	30.0000	36.0000
T12 20.00-0.00	0.00	0.3750	A36 (36 ksi)	1	1	1	155.6250	30.0000	36.0000

Tower Section Geometry (cont'd)

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	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
T1	Yes	No	1	1	1	1	1	1	1	1

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X	X Brace Diags Y	K Brace Diags X	K Brace Diags Y	Single Diags X	Single Diags Y	Girts X	Girts Y	Horiz. X	Horiz. Y	Sec. Horiz. X	Sec. Horiz. Y	Inner Brace X	Inner Brace Y
180.00-160.00				1	1	1	1	1	1	1	1	1	1	1	1	1	1
T2	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
160.00-153.33				1	1	1	1	1	1	1	1	1	1	1	1	1	1
T3	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
153.33-146.67				1	1	1	1	1	1	1	1	1	1	1	1	1	1
T4	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
146.67-140.00				1	1	1	1	1	1	1	1	1	1	1	1	1	1
T5	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
140.00-120.00				1	1	1	1	1	1	1	1	1	1	1	1	1	1
T6	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
120.00-100.00				1	1	1	1	1	1	1	1	1	1	1	1	1	1
T7	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
100.00-80.00				1	1	1	1	1	1	1	1	1	1	1	1	1	1
T8	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
80.00-70.00				1	1	1	1	1	1	1	1	1	1	1	1	1	1
T9	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
70.00-60.00				1	1	1	1	1	1	1	1	1	1	1	1	1	1
T10	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
60.00-40.00				1	1	1	1	1	1	1	1	1	1	1	1	1	1
T11	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
40.00-20.00				1	1	1	1	1	1	1	1	1	1	1	1	1	1
T12	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
20.00-0.00				1	1	1	1	1	1	1	1	1	1	1	1	1	1

[1]*Note: 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 Net Width Deduct in	Leg U	Diagonal Net Width Deduct in	Diagonal U	Top Girt Net Width Deduct in	Top Girt U	Bottom Girt Net Width Deduct in	Bottom Girt U	Mid Girt Net Width Deduct in	Mid Girt U	Long Horizontal Net Width Deduct in	Long Horizontal U	Short Horizontal Net Width Deduct in	Short Horizontal U
T1	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
180.00-160.00														
T2	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
160.00-153.33														
T3	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
153.33-146.67														
T4	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
146.67-140.00														
T5	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
140.00-120.00														
T6	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
120.00-100.00														
T7	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
100.00-80.00														
T8 80.00-70.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T9 70.00-60.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T10	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
60.00-40.00														

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
T11 40.00-20.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T12 20.00-0.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	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 180.00-160.00	Flange	0.8750 A325X	4	0.6250 A325X	1	0.6250 A325X	1	0.0000 A325X	0	0.6250 A325X	1	0.6250 A325X	0	0.6250 A325N	0
T2 160.00-153.33	Flange	0.0000 A325X	0	0.6250 A325X	1	0.0000 A325X	0	0.0000 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325N	0
T3 153.33-146.67	Flange	0.0000 A325X	0	0.6250 A325X	1	0.6250 A325X	1	0.0000 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325N	0
T4 146.67-140.00	Flange	1.0000 A325X	4	0.6250 A325X	1	0.6250 A325X	1	0.0000 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325N	0
T5 140.00-120.00	Flange	1.0000 A325X	6	0.6250 A325X	1	0.0000 A325X	0	0.0000 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325N	0
T6 120.00-100.00	Flange	1.0000 A325X	6	0.6250 A325X	1	0.0000 A325X	0	0.0000 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325N	0
T7 100.00-80.00	Flange	1.0000 A325X	8	0.7500 A325X	1	0.0000 A325X	0	0.0000 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325N	0
T8 80.00-70.00	Flange	0.0000 A325X	0	0.7500 A325X	1	0.0000 A325X	0	0.0000 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325N	0
T9 70.00-60.00	Flange	1.0000 A325X	8	0.7500 A325X	1	0.0000 A325X	0	0.0000 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325N	0
T10 60.00-40.00	Flange	1.0000 A325X	8	0.7500 A325X	1	0.0000 A325X	0	0.0000 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325N	0
T11 40.00-20.00	Flange	1.0000 A325X	8	0.7500 A325X	1	0.0000 A325X	0	0.0000 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325N	0
T12 20.00-0.00	Flange	1.0000 A449	10	0.7500 A325X	1	0.0000 A325X	0	0.0000 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight klf
Safety Line 3/8	B	No	Ar (Leg)	180.00 - 0.00	0.0000	0	1	1	0.3750	0.3750		0.00
Feedline Ladder (Af)	A	Yes	Af (CfAe)	157.00 - 0.00	0.0000	-0.4	2	2	24.0000 1.5000	1.5000	6.0000	0.00
1.5" Feedline Ladder (Af)	A	Yes	Af (CfAe)	172.00 - 0.00	0.0000	0	2	2	24.0000 1.5000	1.5000	6.0000	0.00

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight klf
1.5" Feedline Ladder (Af)	B	Yes	Af (CfAe)	112.00 - 0.00	0.0000	0.35	2	2	24.0000 1.5000	1.5000	6.0000	0.00
1.5" Feedline Ladder (Af)	C	Yes	Af (CfAe)	126.00 - 0.00	-1.0000	-0.3	4	2	24.0000 1.5000	1.5000	6.0000	0.00
1.5" 2" Rigid Conduit	A	Yes	Ar (CfAe)	134.00 - 0.00	0.0000	-0.4	1	1	2.0000	2.0000		0.00
********** ********** ********												
MLE Hybrid 9Power/18Fiber RL 2(1 5/8)	A	Yes	Ar (CfAe)	172.00 - 0.00	4.0000	-0.05	1	1	0.5000	1.6250		0.00
LCF158-50JA-A0(1 5/8") ***	A	Yes	Ar (CfAe)	172.00 - 0.00	0.0000	0	12	9	0.5000	1.9800		0.00
7983A(1/2") ***	A	Yes	Ar (CfAe)	157.00 - 0.00	0.0000	-0.47	2	2	0.5000	0.5800		0.00
HB114-21U3M12-XXXF(1-1/4") ***	A	Yes	Ar (CfAe)	148.00 - 0.00	0.0000	-0.375	4	4	0.5000	1.5400		0.00
LDF4-50A(1/2")	A	Yes	Ar (CfAe)	134.00 - 0.00	0.0000	-0.47	1	1	0.5000	0.6300		0.00
9207(5/16")	A	Yes	Ar (CfAe)	134.00 - 0.00	0.0000	0	6	6	0.3300	0.0000		0.00
2" Rigid Conduit ***	A	Yes	Ar (CfAe)	134.00 - 0.00	0.0000	-0.45	2	2	0.5000	2.0000		0.00
561(1-5/8")	C	Yes	Ar (CfAe)	126.00 - 0.00	-4.0000	-0.3	19	10	0.5000	1.6250		0.00
LDF4-50A(1/2") ***	C	Yes	Ar (CfAe)	126.00 - 0.00	-1.0000	-0.345	1	1	0.5000	0.6300		0.00
LDF7-50A(1-5/8") ***	B	Yes	Ar (CfAe)	112.00 - 0.00	0.0000	0.35	6	6	0.5000	1.9800		0.00
CR 50 1873(1-5/8")	C	Yes	Ar (CfAe)	102.00 - 0.00	0.0000	0.425	12	8	0.5000	1.9800		0.00
2" Rigid Conduit	C	Yes	Ar (CfAe)	102.00 - 0.00	2.0000	0.435	1	1	0.5000	2.0000		0.00
FB-L98-002-XXX(3/8)	C	Yes	Ar (CfAe)	102.00 - 0.00	0.0000	0.425	1	1	0.5000	0.0000		0.00
WR-VG82ST-BRDA(5/8") ***	C	Yes	Ar (CfAe)	102.00 - 0.00	0.0000	0.425	2	2	0.5000	0.0000		0.00
LDF4-50A(1/2") ***	C	Yes	Ar (CfAe)	30.00 - 0.00	0.0000	0.35	2	2	0.5000	0.6300		0.00
LDF1-50A(1/4")	A	Yes	Ar (CfAe)	12.00 - 0.00	0.0000	0.42	2	2	0.3450	0.3450		0.00

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	180.00-160.00	A	19.445	3.000	0.000	0.000	0.22
		B	0.625	0.000	0.000	0.000	0.00
		C	0.625	0.000	0.000	0.000	0.00
T2	160.00-153.33	A	11.157	2.583	0.000	0.000	0.15
		B	0.208	0.000	0.000	0.000	0.00
		C	0.208	0.000	0.000	0.000	0.00
T3	153.33-146.67	A	12.132	3.333	0.000	0.000	0.18
		B	0.208	0.000	0.000	0.000	0.00
		C	0.208	0.000	0.000	0.000	0.00
T4	146.67-140.00	A	14.869	3.333	0.000	0.000	0.21
		B	0.208	0.000	0.000	0.000	0.00
		C	0.208	0.000	0.000	0.000	0.00
T5	140.00-120.00	A	52.343	10.000	0.000	0.000	0.80
		B	0.625	0.000	0.000	0.000	0.00
		C	9.065	1.500	0.000	0.000	0.26
T6	120.00-100.00	A	55.658	10.000	0.000	0.000	0.87
		B	12.505	3.000	0.000	0.000	0.16
		C	31.732	5.000	0.000	0.000	0.88
T7	100.00-80.00	A	55.658	10.000	0.000	0.000	0.87
		B	20.425	5.000	0.000	0.000	0.27
		C	58.492	5.000	0.000	0.000	1.12
T8	80.00-70.00	A	27.829	5.000	0.000	0.000	0.44
		B	10.213	2.500	0.000	0.000	0.14
		C	29.246	2.500	0.000	0.000	0.56
T9	70.00-60.00	A	27.829	5.000	0.000	0.000	0.44
		B	10.213	2.500	0.000	0.000	0.14
		C	29.246	2.500	0.000	0.000	0.56
T10	60.00-40.00	A	55.658	10.000	0.000	0.000	0.87
		B	20.425	5.000	0.000	0.000	0.27
		C	58.492	5.000	0.000	0.000	1.12
T11	40.00-20.00	A	55.658	10.000	0.000	0.000	0.87
		B	20.425	5.000	0.000	0.000	0.27
		C	59.542	5.000	0.000	0.000	1.12
T12	20.00-0.00	A	56.348	10.000	0.000	0.000	0.88
		B	20.425	5.000	0.000	0.000	0.27
		C	60.592	5.000	0.000	0.000	1.13

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	180.00-160.00	A	0.913	7.257	25.275	0.000	0.000	0.66
		B		3.668	0.000	0.000	0.000	0.03
		C		3.668	0.000	0.000	0.000	0.00
T2	160.00-153.33	A	0.904	4.742	16.012	0.000	0.000	0.43
		B		1.213	0.000	0.000	0.000	0.01
		C		1.213	0.000	0.000	0.000	0.00
T3	153.33-146.67	A	0.899	5.694	18.301	0.000	0.000	0.50
		B		1.208	0.000	0.000	0.000	0.01
		C		1.208	0.000	0.000	0.000	0.00
T4	146.67-140.00	A	0.895	7.156	21.006	0.000	0.000	0.57
		B		1.202	0.000	0.000	0.000	0.01
		C		1.202	0.000	0.000	0.000	0.00
T5	140.00-120.00	A	0.884	34.983	67.767	0.000	0.000	2.04
		B		3.572	0.000	0.000	0.000	0.03
		C		6.468	12.241	0.000	0.000	0.52
T6	120.00-100.00	A	0.867	40.367	69.686	0.000	0.000	2.16

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		B		7.227	17.711	0.000	0.000	0.44
		C		14.868	43.703	0.000	0.000	1.82
T7	100.00-80.00	A	0.846	39.817	69.503	0.000	0.000	2.13
		B		9.565	29.426	0.000	0.000	0.71
		C		30.756	70.401	0.000	0.000	2.58
T8	80.00-70.00	A	0.828	19.665	34.670	0.000	0.000	1.05
		B		4.721	14.673	0.000	0.000	0.35
		C		15.164	35.160	0.000	0.000	1.28
T9	70.00-60.00	A	0.814	19.477	34.607	0.000	0.000	1.04
		B		4.674	14.641	0.000	0.000	0.35
		C		15.000	35.129	0.000	0.000	1.27
T10	60.00-40.00	A	0.788	38.281	68.991	0.000	0.000	2.05
		B		9.181	29.170	0.000	0.000	0.68
		C		29.411	70.145	0.000	0.000	2.50
T11	40.00-20.00	A	0.750	37.258	68.650	0.000	0.000	1.99
		B		8.925	29.000	0.000	0.000	0.66
		C		30.292	70.917	0.000	0.000	2.47
T12	20.00-0.00	A	0.750	39.103	69.340	0.000	0.000	2.01
		B		8.925	29.000	0.000	0.000	0.66
		C		32.067	71.858	0.000	0.000	2.49

Feed Line Shielding

Section	Elevation ft	Face	A_R ft^2	A_R Ice ft^2	A_F ft^2	A_F Ice ft^2
T1	180.00-160.00	A	0.000	2.966	2.161	3.249
		B	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000
T2	160.00-153.33	A	0.000	1.221	1.064	1.688
		B	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000
T3	153.33-146.67	A	0.000	1.947	1.556	2.548
		B	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000
T4	146.67-140.00	A	0.000	2.222	1.803	2.921
		B	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000
T5	140.00-120.00	A	0.000	5.412	4.472	7.652
		B	0.000	0.000	0.000	0.000
		C	0.000	0.798	0.713	1.128
T6	120.00-100.00	A	0.000	5.477	5.465	9.480
		B	0.000	1.086	1.238	1.879
		C	0.000	2.740	3.005	4.743
T7	100.00-80.00	A	0.000	3.767	4.525	7.792
		B	0.000	1.247	1.709	2.579
		C	0.000	3.318	4.332	6.863
T8	80.00-70.00	A	0.000	1.785	2.206	3.774
		B	0.000	0.592	0.833	1.251
		C	0.000	1.575	2.112	3.329
T9	70.00-60.00	A	0.000	1.723	2.177	3.706
		B	0.000	0.572	0.822	1.230
		C	0.000	1.522	2.084	3.273
T10	60.00-40.00	A	0.000	3.255	4.895	8.258
		B	0.000	1.083	1.849	2.747
		C	0.000	2.881	4.687	7.310
T11	40.00-20.00	A	0.000	3.000	4.809	8.001

Section	Elevation	Face	A_R	A_R Ice	A_F	A_F Ice
	ft		ft^2	ft^2	ft^2	ft^2
		B	0.000	1.002	1.816	2.671
		C	0.000	2.740	4.681	7.306
T12	20.00-0.00	A	0.000	3.028	4.792	8.073
		B	0.000	0.988	1.791	2.634
		C	0.000	2.775	4.692	7.401

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T1	180.00-160.00	-5.1427	-2.8854	-2.5642	-1.3859
T2	160.00-153.33	-9.2967	-3.7281	-6.3629	-2.2404
T3	153.33-146.67	-10.1323	-2.6069	-6.5205	-1.3916
T4	146.67-140.00	-12.7244	-1.5275	-7.8890	-0.8462
T5	140.00-120.00	-13.6862	1.9905	-9.2895	1.7789
T6	120.00-100.00	-4.6038	8.1280	-2.7153	6.7207
T7	100.00-80.00	-9.3874	14.5673	-7.0952	12.2217
T8	80.00-70.00	-9.4171	14.6769	-7.3168	12.6303
T9	70.00-60.00	-9.8600	15.4042	-7.6834	13.2765
T10	60.00-40.00	-10.0737	15.7925	-7.9135	13.7470
T11	40.00-20.00	-11.1128	17.2714	-8.6803	14.9572
T12	20.00-0.00	-12.0958	18.3214	-9.3215	15.8131

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
**********									
**********									
Lightning Rod	C	From Leg	0.00 0.00 2.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.25 0.66 0.97 1.49 2.68	0.25 0.66 0.97 1.49 2.68	0.03 0.03 0.04 0.06 0.14
***									
Empty Pipe Mount	A	From Leg	4.00 0.00 0.00	0.0000	178.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.00 1.39 1.70 2.35 3.78	1.00 1.39 1.70 2.35 3.78	0.01 0.02 0.03 0.06 0.18
Empty Pipe Mount	B	From Leg	4.00 0.00 0.00	0.0000	178.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.00 1.39 1.70 2.35 3.78	1.00 1.39 1.70 2.35 3.78	0.01 0.02 0.03 0.06 0.18
Side Arm Mount [SO 306-1]	A	From Leg	0.00	0.0000	178.00	No Ice	0.98	2.18	0.04

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00 0.00			1/2" Ice 1" Ice 2" Ice 4" Ice	1.70 2.42 3.86 6.74	3.80 5.42 8.66 15.14	0.06 0.08 0.12 0.20
Side Arm Mount [SO 306-1]	B	From Leg	0.00 0.00 0.00	0.0000	178.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.98 1.70 2.42 3.86 6.74	2.18 3.80 5.42 8.66 15.14	0.04 0.06 0.08 0.12 0.20
***									
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.83 7.35 7.86 8.93 11.18	5.64 6.48 7.26 8.86 12.29	0.11 0.17 0.23 0.38 0.81
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.83 7.35 7.86 8.93 11.18	5.64 6.48 7.26 8.86 12.29	0.11 0.17 0.23 0.38 0.81
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	C	From Leg	4.00 0.00 1.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.83 7.35 7.86 8.93 11.18	5.64 6.48 7.26 8.86 12.29	0.11 0.17 0.23 0.38 0.81
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.83 7.35 7.86 8.93 11.18	5.64 6.48 7.26 8.86 12.29	0.11 0.17 0.23 0.38 0.81
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.83 7.35 7.86 8.93 11.18	5.64 6.48 7.26 8.86 12.29	0.11 0.17 0.23 0.38 0.81
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Leg	4.00 0.00 1.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.83 7.35 7.86 8.93 11.18	5.64 6.48 7.26 8.86 12.29	0.11 0.17 0.23 0.38 0.81
LNX-6515DS-VTM w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	11.68 12.40 13.14 14.60 17.87	9.84 11.37 12.91 15.27 20.14	0.08 0.17 0.27 0.51 1.15
LNX-6515DS-VTM w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	11.68 12.40 13.14 14.60 17.87	9.84 11.37 12.91 15.27 20.14	0.08 0.17 0.27 0.51 1.15
LNX-6515DS-VTM w/ Mount Pipe	C	From Leg	4.00 0.00 1.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	11.68 12.40 13.14 14.60 17.87	9.84 11.37 12.91 15.27 20.14	0.08 0.17 0.27 0.51 1.15
KRY 112 144/1	A	From Leg	4.00 0.00	0.0000	172.00	No Ice 1/2" Ice	0.41 0.50	0.19 0.26	0.01 0.01

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			1.00			1" Ice	0.60	0.33	0.02
						2" Ice	0.82	0.51	0.03
						4" Ice	1.36	0.97	0.08
KRY 112 144/1	B	From Leg	4.00	0.0000	172.00	No Ice	0.41	0.19	0.01
			0.00			1/2" Ice	0.50	0.26	0.01
			0.00			1" Ice	0.60	0.33	0.02
						2" Ice	0.82	0.51	0.03
						4" Ice	1.36	0.97	0.08
KRY 112 144/1	C	From Leg	4.00	0.0000	172.00	No Ice	0.41	0.19	0.01
			0.00			1/2" Ice	0.50	0.26	0.01
			0.00			1" Ice	0.60	0.33	0.02
						2" Ice	0.82	0.51	0.03
						4" Ice	1.36	0.97	0.08
RRUS 11 B12	A	From Leg	4.00	0.0000	172.00	No Ice	3.31	1.36	0.05
			0.00			1/2" Ice	3.55	1.54	0.07
			1.00			1" Ice	3.80	1.73	0.10
						2" Ice	4.33	2.13	0.15
						4" Ice	5.50	3.04	0.31
RRUS 11 B12	B	From Leg	4.00	0.0000	172.00	No Ice	3.31	1.36	0.05
			0.00			1/2" Ice	3.55	1.54	0.07
			1.00			1" Ice	3.80	1.73	0.10
						2" Ice	4.33	2.13	0.15
						4" Ice	5.50	3.04	0.31
RRUS 11 B12	C	From Leg	4.00	0.0000	172.00	No Ice	3.31	1.36	0.05
			0.00			1/2" Ice	3.55	1.54	0.07
			1.00			1" Ice	3.80	1.73	0.10
						2" Ice	4.33	2.13	0.15
						4" Ice	5.50	3.04	0.31
Sector Mount [SM 602-3]	C	None		0.0000	172.00	No Ice	33.11	33.11	1.54
						1/2" Ice	44.90	44.90	2.16
						1" Ice	56.69	56.69	2.78
						2" Ice	80.27	80.27	4.01
						4" Ice	127.43	127.43	6.49
Empty Pipe Mount	A	From Leg	4.00	0.0000	172.00	No Ice	1.05	1.05	0.02
			0.00			1/2" Ice	1.67	1.67	0.03
			0.00			1" Ice	2.09	2.09	0.04
						2" Ice	2.85	2.85	0.08
						4" Ice	4.48	4.48	0.21
Empty Pipe Mount	B	From Leg	4.00	0.0000	172.00	No Ice	1.05	1.05	0.02
			0.00			1/2" Ice	1.67	1.67	0.03
			0.00			1" Ice	2.09	2.09	0.04
						2" Ice	2.85	2.85	0.08
						4" Ice	4.48	4.48	0.21
Empty Pipe Mount	C	From Leg	4.00	0.0000	172.00	No Ice	1.05	1.05	0.02
			0.00			1/2" Ice	1.67	1.67	0.03
			0.00			1" Ice	2.09	2.09	0.04
						2" Ice	2.85	2.85	0.08
						4" Ice	4.48	4.48	0.21
***									
Side Arm Mount [SO 202-1]	A	From Leg	0.00	0.0000	157.00	No Ice	2.96	2.53	0.11
			0.00			1/2" Ice	4.10	3.51	0.13
			0.00			1" Ice	5.24	4.49	0.16
						2" Ice	7.52	6.45	0.20
						4" Ice	12.08	10.37	0.30
Side Arm Mount [SO 202-1]	B	From Leg	0.00	0.0000	157.00	No Ice	2.96	2.53	0.11
			0.00			1/2" Ice	4.10	3.51	0.13
			0.00			1" Ice	5.24	4.49	0.16

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice	7.52	6.45	0.20
						4" Ice	12.08	10.37	0.30
***									
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	148.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.50 9.15 9.77 11.03 13.68	6.95 8.13 9.02 10.84 14.85	0.08 0.15 0.23 0.41 0.91
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	148.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.50 9.15 9.77 11.03 13.68	6.95 8.13 9.02 10.84 14.85	0.08 0.15 0.23 0.41 0.91
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	148.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.50 9.15 9.77 11.03 13.68	6.95 8.13 9.02 10.84 14.85	0.08 0.15 0.23 0.41 0.91
APXVTM14-C-120 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	148.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.13 7.66 8.18 9.26 11.53	4.96 5.75 6.47 8.01 11.41	0.08 0.13 0.19 0.34 0.75
APXVTM14-C-120 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	148.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.13 7.66 8.18 9.26 11.53	4.96 5.75 6.47 8.01 11.41	0.08 0.13 0.19 0.34 0.75
APXVTM14-C-120 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	148.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.13 7.66 8.18 9.26 11.53	4.96 5.75 6.47 8.01 11.41	0.08 0.13 0.19 0.34 0.75
(3) ACU-A20-N	A	From Leg	4.00 0.00 0.00	0.0000	148.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.08 0.12 0.17 0.30 0.67	0.14 0.19 0.25 0.40 0.80	0.00 0.00 0.00 0.01 0.04
(3) ACU-A20-N	B	From Leg	4.00 0.00 0.00	0.0000	148.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.08 0.12 0.17 0.30 0.67	0.14 0.19 0.25 0.40 0.80	0.00 0.00 0.00 0.01 0.04
(3) ACU-A20-N	C	From Leg	4.00 0.00 0.00	0.0000	148.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.08 0.12 0.17 0.30 0.67	0.14 0.19 0.25 0.40 0.80	0.00 0.00 0.00 0.01 0.04
TD-RRH8x20-25	A	From Leg	4.00 0.00 0.00	0.0000	148.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.72 5.01 5.32 5.95 7.31	1.70 1.92 2.14 2.62 3.68	0.07 0.10 0.13 0.20 0.40
TD-RRH8x20-25	B	From Leg	4.00 0.00 0.00	0.0000	148.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.72 5.01 5.32 5.95	1.70 1.92 2.14 2.62	0.07 0.10 0.13 0.20

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						4" Ice	7.31	3.68	0.40
TD-RRH8x20-25	C	From Leg	4.00 0.00 0.00	0.0000	148.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.72 5.01 5.32 5.95 7.31	1.70 1.92 2.14 2.62 3.68	0.07 0.10 0.13 0.20 0.40
(3) Site Pro VFA12-U w/ 12' Stiff Arm	C	None		0.0000	148.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	33.02 47.36 61.70 90.38 147.74	33.02 47.36 61.70 90.38 147.74	1.67 2.22 2.77 3.88 6.08
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PCS 1900MHz 4x45W-65MHz	A	From Leg	4.00 0.00 2.00	0.0000	143.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.71 2.95 3.20 3.72 4.86	2.61 2.85 3.09 3.61 4.74	0.06 0.08 0.11 0.17 0.35
PCS 1900MHz 4x45W-65MHz	A	From Leg	4.00 0.00 -1.00	0.0000	143.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.71 2.95 3.20 3.72 4.86	2.61 2.85 3.09 3.61 4.74	0.06 0.08 0.11 0.17 0.35
PCS 1900MHz 4x45W-65MHz	B	From Leg	4.00 0.00 2.00	0.0000	143.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.71 2.95 3.20 3.72 4.86	2.61 2.85 3.09 3.61 4.74	0.06 0.08 0.11 0.17 0.35
PCS 1900MHz 4x45W-65MHz	B	From Leg	4.00 0.00 -1.00	0.0000	143.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.71 2.95 3.20 3.72 4.86	2.61 2.85 3.09 3.61 4.74	0.06 0.08 0.11 0.17 0.35
PCS 1900MHz 4x45W-65MHz	C	From Leg	4.00 0.00 2.00	0.0000	143.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.71 2.95 3.20 3.72 4.86	2.61 2.85 3.09 3.61 4.74	0.06 0.08 0.11 0.17 0.35
PCS 1900MHz 4x45W-65MHz	C	From Leg	4.00 0.00 -1.00	0.0000	143.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.71 2.95 3.20 3.72 4.86	2.61 2.85 3.09 3.61 4.74	0.06 0.08 0.11 0.17 0.35
TME-800MHZ 2X50W RRH	A	From Leg	4.00 0.00 2.00	0.0000	143.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.49 2.71 2.93 3.41 4.46	2.07 2.27 2.48 2.93 3.93	0.05 0.07 0.10 0.16 0.32
TME-800MHZ 2X50W RRH	B	From Leg	4.00 0.00 2.00	0.0000	143.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.49 2.71 2.93 3.41 4.46	2.07 2.27 2.48 2.93 3.93	0.05 0.07 0.10 0.16 0.32
TME-800MHZ 2X50W RRH	C	From Leg	4.00 0.00 2.00	0.0000	143.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.49 2.71 2.93 3.41 4.46	2.07 2.27 2.48 2.93 3.93	0.05 0.07 0.10 0.16 0.32

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
800 EXTERNAL NOTCH FILTER	A	From Leg	4.00 0.00 2.00	0.0000	143.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.77 0.89 1.02 1.30 1.97	0.37 0.46 0.56 0.79 1.34	0.01 0.02 0.02 0.04 0.11
800 EXTERNAL NOTCH FILTER	B	From Leg	4.00 0.00 2.00	0.0000	143.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.77 0.89 1.02 1.30 1.97	0.37 0.46 0.56 0.79 1.34	0.01 0.02 0.02 0.04 0.11
800 EXTERNAL NOTCH FILTER	C	From Leg	4.00 0.00 2.00	0.0000	143.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.77 0.89 1.02 1.30 1.97	0.37 0.46 0.56 0.79 1.34	0.01 0.02 0.02 0.04 0.11
Side Arm Mount [SO 312-3]	C	None		0.0000	143.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.87 11.82 15.77 23.67 39.47	7.87 11.82 15.77 23.67 39.47	0.21 0.32 0.43 0.65 1.08
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LLPX310R w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	0.0000	134.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.07 5.48 5.91 6.79 8.70	2.98 3.53 4.09 5.31 8.13	0.05 0.08 0.13 0.23 0.54
LLPX310R w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	0.0000	134.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.07 5.48 5.91 6.79 8.70	2.98 3.53 4.09 5.31 8.13	0.05 0.08 0.13 0.23 0.54
LLPX310R w/ Mount Pipe	C	From Leg	4.00 0.00 1.00	0.0000	134.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.07 5.48 5.91 6.79 8.70	2.98 3.53 4.09 5.31 8.13	0.05 0.08 0.13 0.23 0.54
FDD_R6_RRH	A	From Leg	4.00 0.00 1.00	0.0000	134.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.79 1.97 2.16 2.57 3.49	0.78 0.92 1.07 1.39 2.14	0.03 0.04 0.06 0.09 0.20
FDD_R6_RRH	B	From Leg	4.00 0.00 1.00	0.0000	134.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.79 1.97 2.16 2.57 3.49	0.78 0.92 1.07 1.39 2.14	0.03 0.04 0.06 0.09 0.20
FDD_R6_RRH	C	From Leg	4.00 0.00 1.00	0.0000	134.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.79 1.97 2.16 2.57 3.49	0.78 0.92 1.07 1.39 2.14	0.03 0.04 0.06 0.09 0.20
Pipe Mount [PM 601-1]	A	From Leg	4.00 0.00 0.00	0.0000	134.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.00 3.74 4.48 5.96 8.92	0.90 1.12 1.34 1.78 2.66	0.07 0.08 0.09 0.12 0.18
Sector Mount [SM 502-3]	C	None		0.0000	134.00	No Ice	33.02	33.02	1.67

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1/2" Ice	47.36	47.36	2.22
						1" Ice	61.70	61.70	2.77
						2" Ice	90.38	90.38	3.88
						4" Ice	147.74	147.74	6.08
***									
HBX-6516DS-VTM w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	126.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.56 3.96 4.38 5.32 7.31	3.24 3.91 4.56 5.91 8.88	0.03 0.06 0.10 0.20 0.50
HBX-6516DS-VTM w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	126.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.56 3.96 4.38 5.32 7.31	3.24 3.91 4.56 5.91 8.88	0.03 0.06 0.10 0.20 0.50
HBX-6516DS-VTM w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	126.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.56 3.96 4.38 5.32 7.31	3.24 3.91 4.56 5.91 8.88	0.03 0.06 0.10 0.20 0.50
DB844G65ZAXY w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	126.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.90 5.35 5.80 6.73 8.73	4.92 5.60 6.28 7.71 10.83	0.03 0.08 0.13 0.26 0.62
DB844G65ZAXY w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	126.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.90 5.35 5.80 6.73 8.73	4.92 5.60 6.28 7.71 10.83	0.03 0.08 0.13 0.26 0.62
(2) DB844G65ZAXY w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	126.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.90 5.35 5.80 6.73 8.73	4.92 5.60 6.28 7.71 10.83	0.03 0.08 0.13 0.26 0.62
LNX-6514DS-T4M w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	126.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.57 9.22 9.84 11.10 13.75	7.00 8.19 9.08 10.90 14.93	0.06 0.13 0.20 0.38 0.89
LNX-6514DS-T4M w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	126.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.57 9.22 9.84 11.10 13.75	7.00 8.19 9.08 10.90 14.93	0.06 0.13 0.20 0.38 0.89
MG D3-800TV w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	126.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.57 3.98 4.39 5.33 7.34	3.42 4.12 4.78 6.16 9.18	0.04 0.07 0.11 0.21 0.52
MG D3-800TV w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	126.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.57 3.98 4.39 5.33 7.34	3.42 4.12 4.78 6.16 9.18	0.04 0.07 0.11 0.21 0.52
MG D3-800TV w/ Mount Pipe	C	From Leg	4.00 0.00	0.0000	126.00	No Ice 1/2" Ice	3.57 3.98	3.42 4.12	0.04 0.07

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			2.00			1" Ice	4.39	4.78	0.11
						2" Ice	5.33	6.16	0.21
						4" Ice	7.34	9.18	0.52
DB844H80-XY w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	126.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.10 3.48 3.88 4.76 6.66	5.15 5.83 6.52 7.96 11.09	0.03 0.07 0.11 0.22 0.55
DB844H80-XY w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	126.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.10 3.48 3.88 4.76 6.66	5.15 5.83 6.52 7.96 11.09	0.03 0.07 0.11 0.22 0.55
GPS_A	B	From Leg	4.00 0.00 4.00	0.0000	126.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.30 0.37 0.46 0.65 1.15	0.30 0.37 0.46 0.65 1.15	0.00 0.00 0.01 0.02 0.08
P65.16.XL.2 w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	126.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.64 9.29 9.91 11.18 13.83	5.78 6.95 7.83 9.63 13.44	0.06 0.12 0.19 0.36 0.84
RRH2X40-AWS	A	From Leg	4.00 0.00 4.00	0.0000	126.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.52 2.75 2.99 3.50 4.61	1.59 1.80 2.01 2.46 3.48	0.04 0.06 0.08 0.13 0.28
RRH2X40-AWS	B	From Leg	4.00 0.00 4.00	0.0000	126.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.52 2.75 2.99 3.50 4.61	1.59 1.80 2.01 2.46 3.48	0.04 0.06 0.08 0.13 0.28
RRH2X40-AWS	C	From Leg	4.00 0.00 4.00	0.0000	126.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.52 2.75 2.99 3.50 4.61	1.59 1.80 2.01 2.46 3.48	0.04 0.06 0.08 0.13 0.28
DB-T1-6Z-8AB-0Z	B	From Leg	4.00 0.00 4.00	0.0000	126.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.60 5.92 6.24 6.91 8.37	2.33 2.56 2.79 3.28 4.37	0.04 0.08 0.12 0.21 0.45
Sector Mount [SM 410-3]	C	None		0.0000	126.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	23.96 34.06 44.16 64.36 104.76	23.96 34.06 44.16 64.36 104.76	1.10 1.60 2.10 3.10 5.09
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800 10504 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	112.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.59 4.01 4.42 5.34 7.38	3.18 3.91 4.58 5.98 8.98	0.04 0.07 0.11 0.21 0.51
800 10504 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	112.00	No Ice 1/2" Ice 1" Ice	3.59 4.01 4.42	3.18 3.91 4.58	0.04 0.07 0.11

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice	5.34	5.98	0.21
						4" Ice	7.38	8.98	0.51
800 10504 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	112.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.59 4.01 4.42 5.34 7.38	3.18 3.91 4.58 5.98 8.98	0.04 0.07 0.11 0.21 0.51
Sector Mount [SM 104-3]	C	None		0.0000	112.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	30.02 40.48 50.94 71.86 113.70	30.02 40.48 50.94 71.86 113.70	0.95 1.40 1.86 2.76 4.57
Empty Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	112.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.40 2.13 2.68 3.56 5.42	1.40 2.13 2.68 3.56 5.42	0.03 0.04 0.06 0.10 0.26
Empty Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	112.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.40 2.13 2.68 3.56 5.42	1.40 2.13 2.68 3.56 5.42	0.03 0.04 0.06 0.10 0.26
Empty Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	112.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.40 2.13 2.68 3.56 5.42	1.40 2.13 2.68 3.56 5.42	0.03 0.04 0.06 0.10 0.26
***									
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	102.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.12 6.63 7.13 8.16 10.36	4.25 5.01 5.71 7.16 10.41	0.06 0.10 0.16 0.29 0.66
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	102.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.12 6.63 7.13 8.16 10.36	4.25 5.01 5.71 7.16 10.41	0.06 0.10 0.16 0.29 0.66
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	102.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.12 6.63 7.13 8.16 10.36	4.25 5.01 5.71 7.16 10.41	0.06 0.10 0.16 0.29 0.66
P65-16-XLH-RR w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	102.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.64 9.29 9.91 11.18 13.83	6.36 7.54 8.43 10.24 14.10	0.08 0.14 0.22 0.39 0.89
P65-16-XLH-RR w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	102.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.64 9.29 9.91 11.18 13.83	6.36 7.54 8.43 10.24 14.10	0.08 0.14 0.22 0.39 0.89
P65-16-XLH-RR w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	102.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.64 9.29 9.91 11.18	6.36 7.54 8.43 10.24	0.08 0.14 0.22 0.39

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						4" Ice	13.83	14.10	0.89
(2) LGP2140X	A	From Leg	4.00 0.00 0.00	0.0000	102.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.26 1.42 1.58 1.94 2.75	0.38 0.49 0.62 0.89 1.54	0.01 0.02 0.03 0.05 0.13
(2) LGP2140X	B	From Leg	4.00 0.00 0.00	0.0000	102.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.26 1.42 1.58 1.94 2.75	0.38 0.49 0.62 0.89 1.54	0.01 0.02 0.03 0.05 0.13
(2) LGP2140X	C	From Leg	4.00 0.00 0.00	0.0000	102.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.26 1.42 1.58 1.94 2.75	0.38 0.49 0.62 0.89 1.54	0.01 0.02 0.03 0.05 0.13
(2) LGP2140X	A	From Leg	4.00 0.00 0.00	0.0000	102.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.26 1.42 1.58 1.94 2.75	0.38 0.49 0.62 0.89 1.54	0.01 0.02 0.03 0.05 0.13
(2) LGP2140X	B	From Leg	4.00 0.00 0.00	0.0000	102.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.26 1.42 1.58 1.94 2.75	0.38 0.49 0.62 0.89 1.54	0.01 0.02 0.03 0.05 0.13
(2) LGP2140X	C	From Leg	4.00 0.00 0.00	0.0000	102.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.26 1.42 1.58 1.94 2.75	0.38 0.49 0.62 0.89 1.54	0.01 0.02 0.03 0.05 0.13
(2) RRUS 11 B2	A	From Leg	4.00 0.00 0.00	0.0000	102.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.31 3.55 3.80 4.33 5.50	1.36 1.54 1.73 2.13 3.04	0.05 0.07 0.10 0.15 0.31
(2) RRUS 11 B2	B	From Leg	4.00 0.00 0.00	0.0000	102.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.31 3.55 3.80 4.33 5.50	1.36 1.54 1.73 2.13 3.04	0.05 0.07 0.10 0.15 0.31
(2) RRUS 11 B2	C	From Leg	4.00 0.00 0.00	0.0000	102.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.31 3.55 3.80 4.33 5.50	1.36 1.54 1.73 2.13 3.04	0.05 0.07 0.10 0.15 0.31
DC6-48-60-18-8F	C	From Leg	4.00 0.00 0.00	0.0000	102.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.57 2.80 3.04 3.54 4.66	4.32 4.60 4.88 5.49 6.80	0.03 0.06 0.10 0.18 0.40
Sector Mount [SM 301-3]	C	None		0.0000	102.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	29.61 39.80 49.99 70.37 111.13	1.00 1.20 1.40 1.80 2.60	1.30 1.84 2.38 3.46 5.63
Empty Mount Pipe	A	From Leg	4.00	0.0000	102.00	No Ice	1.40	1.40	0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1/2" Ice	2.13	2.13	0.04
			0.00			1" Ice	2.68	2.68	0.06
						2" Ice	3.56	3.56	0.10
						4" Ice	5.42	5.42	0.26
Empty Mount Pipe	B	From Leg	4.00	0.0000	102.00	No Ice	1.40	1.40	0.03
			0.00			1/2" Ice	2.13	2.13	0.04
			0.00			1" Ice	2.68	2.68	0.06
						2" Ice	3.56	3.56	0.10
						4" Ice	5.42	5.42	0.26
Empty Mount Pipe	C	From Leg	4.00	0.0000	102.00	No Ice	1.40	1.40	0.03
			0.00			1/2" Ice	2.13	2.13	0.04
			0.00			1" Ice	2.68	2.68	0.06
						2" Ice	3.56	3.56	0.10
						4" Ice	5.42	5.42	0.26
***									
GPS_A	B	From Leg	3.00	0.0000	30.00	No Ice	0.30	0.30	0.00
			0.00			1/2" Ice	0.37	0.37	0.00
			0.00			1" Ice	0.46	0.46	0.01
						2" Ice	0.65	0.65	0.02
						4" Ice	1.15	1.15	0.08
GPS_A	C	From Leg	3.00	0.0000	30.00	No Ice	0.30	0.30	0.00
			0.00			1/2" Ice	0.37	0.37	0.00
			0.00			1" Ice	0.46	0.46	0.01
						2" Ice	0.65	0.65	0.02
						4" Ice	1.15	1.15	0.08
Side Arm Mount [SO 701-1]	B	From Leg	0.00	0.0000	30.00	No Ice	0.85	1.67	0.07
			0.00			1/2" Ice	1.14	2.34	0.08
			0.00			1" Ice	1.43	3.01	0.09
						2" Ice	2.01	4.35	0.12
						4" Ice	3.17	7.03	0.18
Side Arm Mount [SO 701-1]	C	From Leg	0.00	0.0000	30.00	No Ice	0.85	1.67	0.07
			0.00			1/2" Ice	1.14	2.34	0.08
			0.00			1" Ice	1.43	3.01	0.09
						2" Ice	2.01	4.35	0.12
						4" Ice	3.17	7.03	0.18
***									
VG-1060	A	From Face	0.50	0.0000	12.00	No Ice	0.13	0.13	0.00
			0.00			1/2" Ice	0.22	0.22	0.00
			0.00			1" Ice	0.31	0.31	0.01
						2" Ice	0.53	0.53	0.01
						4" Ice	1.11	1.11	0.05
GPS_A	A	From Face	0.50	0.0000	12.00	No Ice	0.30	0.30	0.00
			0.00			1/2" Ice	0.37	0.37	0.00
			0.00			1" Ice	0.46	0.46	0.01
						2" Ice	0.65	0.65	0.02
						4" Ice	1.15	1.15	0.08
Pipe Mount [PM 601-1]	A	From Face	0.00	0.0000	12.00	No Ice	3.00	0.90	0.07
			0.00			1/2" Ice	3.74	1.12	0.08
			0.00			1" Ice	4.48	1.34	0.09
						2" Ice	5.96	1.78	0.12
						4" Ice	8.92	2.66	0.18

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral / Vert	Azimuth Adjustment	3 dB Beam Width	Elevation	Outside Diameter		Aperture Area	Weight
				ft	°	°	ft	ft		ft^2	K
**********											
**********											
*											
VHLP2-18	A	Paraboloid w/o Radome	From Leg	2.00 0.00 0.00	-10.0000		157.00	2.17	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.72 4.01 4.30 4.88 6.04	0.03 0.05 0.07 0.11 0.20
VHLP2-18	B	Paraboloid w/o Radome	From Leg	2.00 0.00 0.00	-40.0000		157.00	2.17	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.72 4.01 4.30 4.88 6.04	0.03 0.05 0.07 0.11 0.20
***											
VHLP2-23	A	Paraboloid w/o Radome	From Leg	4.00 0.00 1.00	0.0000		134.00	2.17	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.72 4.01 4.30 4.88 6.04	0.03 0.05 0.07 0.11 0.20

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	15.12					
Bracing Weight	16.60					
Total Member Self-Weight	31.72			43.29	9.72	
Total Weight	60.67			43.29	9.72	
Wind 0 deg - No Ice		0.01	-56.23	-5640.28	4.19	-30.33
Wind 30 deg - No Ice		26.99	-46.75	-4716.99	-2740.23	-9.29
Wind 60 deg - No Ice		46.10	-26.64	-2679.76	-4695.06	12.87
Wind 90 deg - No Ice		53.98	0.11	55.93	-5484.32	31.69
Wind 120 deg - No Ice		48.64	28.42	2926.62	-4901.86	44.39
Wind 150 deg - No Ice		26.99	46.95	4828.77	-2734.64	41.08
Wind 180 deg - No Ice		-0.02	53.42	5501.39	16.45	27.48
Wind 210 deg - No Ice		-27.02	46.94	4830.16	2765.12	7.80
Wind 240 deg - No Ice		-48.70	28.33	2920.11	4934.72	-14.49
Wind 270 deg - No Ice		-54.04	-0.03	42.52	5513.09	-32.21
Wind 300 deg - No Ice		-46.25	-26.59	-2664.12	4733.38	-41.35
Wind 330 deg - No Ice		-27.18	-46.76	-4714.06	2781.84	-40.82
Member Ice	17.96					
Total Weight Ice	111.41			93.79	40.45	
Wind 0 deg - Ice		0.00	-16.22	-1546.87	38.53	-6.34
Wind 30 deg - Ice		7.57	-13.12	-1247.50	-734.70	-1.20
Wind 60 deg - Ice		12.80	-7.40	-666.93	-1273.88	3.66
Wind 90 deg - Ice		15.14	0.02	95.94	-1507.38	7.68
Wind 120 deg - Ice		14.03	8.18	922.82	-1377.72	10.53
Wind 150 deg - Ice		7.57	13.16	1440.04	-732.29	8.90
Wind 180 deg - Ice		-0.01	14.83	1616.74	42.62	5.40
Wind 210 deg - Ice		-7.58	13.16	1441.03	816.81	0.87
Wind 240 deg - Ice		-14.05	8.16	922.53	1462.29	-4.29

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Wind 270 deg - Ice		-15.15	-0.00	94.29	1590.35	-7.79
Wind 300 deg - Ice		-12.83	-7.38	-662.26	1358.31	-9.28
Wind 330 deg - Ice		-7.61	-13.11	-1246.18	819.38	-8.84
Total Weight	60.67			43.29	9.72	
Wind 0 deg - Service		0.00	-19.46	-1967.08	-2.38	-10.50
Wind 30 deg - Service		9.34	-16.18	-1647.60	-952.01	-3.22
Wind 60 deg - Service		15.95	-9.22	-942.68	-1628.42	4.45
Wind 90 deg - Service		18.68	0.04	3.92	-1901.52	10.97
Wind 120 deg - Service		16.83	9.83	997.24	-1699.98	15.36
Wind 150 deg - Service		9.34	16.25	1655.43	-950.08	14.21
Wind 180 deg - Service		-0.01	18.48	1888.17	1.86	9.51
Wind 210 deg - Service		-9.35	16.24	1655.91	952.96	2.70
Wind 240 deg - Service		-16.85	9.80	994.99	1703.68	-5.01
Wind 270 deg - Service		-18.70	-0.01	-0.72	1903.81	-11.15
Wind 300 deg - Service		-16.00	-9.20	-937.27	1634.02	-14.31
Wind 330 deg - Service		-9.40	-16.18	-1646.59	958.74	-14.12

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice
9	Dead+Wind 210 deg - No Ice
10	Dead+Wind 240 deg - No Ice
11	Dead+Wind 270 deg - No Ice
12	Dead+Wind 300 deg - No Ice
13	Dead+Wind 330 deg - No Ice
14	Dead+Ice+Temp
15	Dead+Wind 0 deg+Ice+Temp
16	Dead+Wind 30 deg+Ice+Temp
17	Dead+Wind 60 deg+Ice+Temp
18	Dead+Wind 90 deg+Ice+Temp
19	Dead+Wind 120 deg+Ice+Temp
20	Dead+Wind 150 deg+Ice+Temp
21	Dead+Wind 180 deg+Ice+Temp
22	Dead+Wind 210 deg+Ice+Temp
23	Dead+Wind 240 deg+Ice+Temp
24	Dead+Wind 270 deg+Ice+Temp
25	Dead+Wind 300 deg+Ice+Temp
26	Dead+Wind 330 deg+Ice+Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service

Comb. No.	Description
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	180 - 160	Leg	Max Tension	4	6.87	0.13	0.01
			Max. Compression	10	-9.86	0.16	-0.01
			Max. Mx	8	0.16	1.08	-0.01
			Max. My	7	-1.11	-0.02	1.08
			Max. Vy	8	0.82	-0.55	-0.01
			Max. Vx	13	-0.82	-0.02	0.53
		Diagonal	Max Tension	9	2.21	0.00	0.00
			Max. Compression	9	-2.25	0.00	0.00
			Max. Mx	25	0.47	0.02	-0.00
			Max. My	23	0.05	0.02	-0.00
			Max. Vy	25	0.02	0.02	-0.00
			Max. Vx	23	0.00	0.00	0.00
		Top Girt	Max Tension	8	0.09	0.00	0.00
			Max. Compression	2	-0.11	0.00	0.00
			Max. Mx	14	-0.02	-0.03	0.00
			Max. My	20	-0.02	0.00	0.00
			Max. Vy	14	0.02	0.00	0.00
			Max. Vx	20	-0.00	0.00	0.00
		Mid Girt	Max Tension	6	0.27	0.00	0.00
			Max. Compression	8	-0.25	0.00	0.00
			Max. Mx	14	0.02	-0.04	0.00
			Max. My	20	0.02	0.00	0.00
			Max. Vy	14	-0.02	0.00	0.00
			Max. Vx	20	-0.00	0.00	0.00
T2	160 - 153.333	Leg	Max Tension	12	10.87	-0.16	0.01
			Max. Compression	2	-14.39	0.26	0.01
			Max. Mx	8	10.54	-0.30	0.01
			Max. My	9	-1.52	-0.02	0.36
			Max. Vy	8	0.13	-0.30	0.01
			Max. Vx	9	-0.16	-0.02	0.36
		Diagonal	Max Tension	3	2.55	0.00	0.00
			Max. Compression	3	-2.62	0.00	0.00
			Max. Mx	25	0.53	0.03	0.00
			Max. My	24	-0.31	0.03	-0.00
			Max. Vy	25	0.03	0.03	0.00
			Max. Vx	19	-0.00	0.00	0.00
T3	153.333 - 146.667	Leg	Max Tension	4	15.84	-0.29	0.02
			Max. Compression	10	-20.97	0.59	-0.02
			Max. Mx	4	14.96	-0.64	0.02
			Max. My	13	-2.77	-0.03	0.57
			Max. Vy	4	0.86	-0.64	0.02
			Max. Vx	7	0.82	-0.03	-0.57
		Diagonal	Max Tension	3	3.03	0.00	0.00
			Max. Compression	3	-3.17	0.00	0.00
			Max. Mx	25	0.59	0.03	0.00
			Max. My	19	0.04	0.03	0.01
			Max. Vy	24	0.03	0.03	-0.00
			Max. Vx	19	-0.00	0.00	0.00
		Top Girt	Max Tension	4	0.34	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	2	-0.21	0.00	0.00
			Max. Mx	14	0.13	-0.06	0.00
			Max. My	20	0.13	0.00	0.00
			Max. Vy	14	0.03	0.00	0.00
			Max. Vx	20	-0.00	0.00	0.00
T4	146.667 - 140	Leg	Max Tension	12	21.62	-0.63	0.01
			Max. Compression	10	-28.84	0.23	-0.04
			Max. Mx	4	21.52	-0.64	0.02
			Max. My	13	-3.09	-0.03	0.57
			Max. Vy	4	-0.26	-0.64	0.02
			Max. Vx	13	0.25	-0.03	0.57
		Diagonal	Max Tension	3	4.47	0.00	0.00
			Max. Compression	3	-4.55	0.00	0.00
			Max. Mx	25	0.95	0.04	-0.00
			Max. My	17	-1.03	0.03	0.01
			Max. Vy	25	0.03	0.04	-0.00
			Max. Vx	17	-0.00	0.00	0.00
		Top Girt	Max Tension	24	0.12	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	14	0.11	-0.07	0.00
			Max. My	20	0.11	0.00	0.00
			Max. Vy	14	0.03	0.00	0.00
			Max. Vx	20	0.00	0.00	0.00
T5	140 - 120	Leg	Max Tension	12	46.62	-0.40	0.02
			Max. Compression	10	-59.83	0.42	0.00
			Max. Mx	2	-59.19	0.42	0.03
			Max. My	7	-6.08	0.00	-0.65
			Max. Vy	4	-1.03	-0.40	0.01
			Max. Vx	3	-0.97	-0.02	-0.21
		Diagonal	Max Tension	3	6.95	0.00	0.00
			Max. Compression	3	-6.96	0.00	0.00
			Max. Mx	25	1.52	0.05	0.01
			Max. My	21	-1.54	0.05	-0.01
			Max. Vy	25	0.04	0.05	0.01
			Max. Vx	20	0.00	0.00	0.00
T6	120 - 100	Leg	Max Tension	8	77.97	-0.72	-0.02
			Max. Compression	10	-97.12	1.17	0.02
			Max. Mx	12	76.72	-1.22	0.09
			Max. My	7	-8.03	-0.02	-0.94
			Max. Vy	12	0.93	-1.22	0.09
			Max. Vx	7	0.89	-0.03	-0.91
		Diagonal	Max Tension	3	8.46	0.00	0.00
			Max. Compression	3	-8.49	0.00	0.00
			Max. Mx	23	2.17	0.08	0.01
			Max. My	15	0.18	0.07	0.01
			Max. Vy	21	0.05	0.08	-0.01
			Max. Vx	15	0.00	0.00	0.00
T7	100 - 80	Leg	Max Tension	8	108.86	-0.25	-0.05
			Max. Compression	10	-133.11	0.53	0.03
			Max. Mx	12	91.01	-1.22	0.09
			Max. My	7	-9.51	-0.03	-0.91
			Max. Vy	4	-0.18	-1.21	-0.02
			Max. Vx	13	0.15	-0.03	0.91
		Diagonal	Max Tension	3	10.08	0.00	0.00
			Max. Compression	3	-10.23	0.00	0.00
			Max. Mx	21	2.36	0.12	0.02
			Max. My	3	-10.20	0.02	0.02
			Max. Vy	21	0.06	0.12	0.02
			Max. Vx	19	-0.00	0.00	0.00
T8	80 - 70	Leg	Max Tension	8	125.15	-0.60	-0.03
			Max. Compression	10	-151.67	2.01	0.04

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Mx	2	-149.30	2.01	0.13
			Max. My	7	-12.10	0.05	-1.86
			Max. Vy	2	-0.25	2.01	0.13
			Max. Vx	7	0.29	0.05	-1.86
		Diagonal	Max Tension	11	10.23	0.00	0.00
			Max. Compression	11	-10.41	0.00	0.00
			Max. Mx	21	2.02	0.14	-0.02
			Max. My	19	-0.07	0.12	-0.02
			Max. Vy	21	0.06	0.14	0.02
			Max. Vx	19	-0.00	0.00	0.00
T9	70 - 60	Leg	Max Tension	8	141.14	-1.79	-0.12
			Max. Compression	10	-170.45	0.15	0.01
			Max. Mx	2	-167.64	2.01	0.13
			Max. My	7	-12.84	0.05	-1.86
			Max. Vy	2	0.28	2.01	0.13
			Max. Vx	13	0.29	0.06	1.85
		Diagonal	Max Tension	11	10.87	0.00	0.00
			Max. Compression	11	-11.10	0.00	0.00
			Max. Mx	21	2.29	-0.25	0.03
			Max. My	25	-2.26	-0.21	-0.04
			Max. Vy	21	-0.12	-0.25	-0.03
			Max. Vx	25	0.01	0.00	0.00
T10	60 - 40	Leg	Max Tension	8	171.95	-1.11	-0.04
			Max. Compression	10	-206.84	1.44	0.03
			Max. Mx	17	21.35	-2.52	-0.02
			Max. My	7	-14.69	-0.02	-1.22
			Max. Vy	17	0.38	-2.52	-0.02
			Max. Vx	7	0.22	-0.02	-1.22
		Diagonal	Max Tension	11	11.08	0.00	0.00
			Max. Compression	11	-11.42	0.00	0.00
			Max. Mx	21	1.91	0.19	-0.02
			Max. My	19	0.39	0.17	-0.02
			Max. Vy	21	0.08	0.18	0.02
			Max. Vx	19	-0.00	0.00	0.00
T11	40 - 20	Leg	Max Tension	8	201.11	-0.75	-0.01
			Max. Compression	10	-242.26	2.39	0.07
			Max. Mx	17	24.28	-5.89	-0.02
			Max. My	7	-17.09	-0.17	-1.27
			Max. Vy	17	0.98	-5.89	-0.02
			Max. Vx	7	-0.18	-0.17	-1.27
		Diagonal	Max Tension	5	11.57	0.00	0.00
			Max. Compression	5	-11.90	0.00	0.00
			Max. Mx	21	1.21	0.27	0.03
			Max. My	19	-1.50	0.26	-0.03
			Max. Vy	21	0.10	0.27	0.03
			Max. Vx	19	0.01	0.00	0.00
T12	20 - 0	Leg	Max Tension	8	227.92	-0.99	-0.03
			Max. Compression	10	-277.09	0.00	-0.00
			Max. Mx	17	31.00	-5.89	-0.02
			Max. My	7	-19.98	-0.23	-2.50
			Max. Vy	17	-1.16	-5.89	-0.02
			Max. Vx	7	-0.37	-0.23	-2.50
		Diagonal	Max Tension	11	12.59	0.00	0.00
			Max. Compression	5	-12.85	0.00	0.00
			Max. Mx	21	-1.52	-0.67	0.06
			Max. My	11	-12.27	-0.22	-0.08
			Max. Vy	21	-0.20	-0.67	0.06
			Max. Vx	24	0.01	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	10	285.75	30.32	-17.10
	Max. H_x	10	285.75	30.32	-17.10
	Max. H_z	3	-198.90	-20.99	14.90
	Min. Vert	4	-230.13	-25.64	14.49
	Min. H_x	4	-230.13	-25.64	14.49
	Min. H_z	10	285.75	30.32	-17.10
Leg B	Max. Vert	6	284.58	-30.64	-16.49
	Max. H_x	12	-231.30	26.04	13.96
	Max. H_z	12	-231.30	26.04	13.96
	Min. Vert	12	-231.30	26.04	13.96
	Min. H_x	6	284.58	-30.64	-16.49
	Min. H_z	6	284.58	-30.64	-16.49
Leg A	Max. Vert	2	281.43	-0.70	34.67
	Max. H_x	10	-115.01	3.59	-14.87
	Max. H_z	2	281.43	-0.70	34.67
	Min. Vert	8	-234.55	0.63	-29.63
	Min. H_x	5	17.63	-3.60	1.68
	Min. H_z	8	-234.55	0.63	-29.63

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	60.67	0.00	0.00	43.30	9.72	-0.00
Dead+Wind 0 deg - No Ice	60.67	0.01	-56.23	-5655.24	4.25	-30.37
Dead+Wind 30 deg - No Ice	60.67	26.99	-46.75	-4729.54	-2747.50	-9.29
Dead+Wind 60 deg - No Ice	60.67	46.10	-26.64	-2686.90	-4707.54	12.94
Dead+Wind 90 deg - No Ice	60.67	53.98	0.11	56.08	-5498.88	31.81
Dead+Wind 120 deg - No Ice	60.67	48.64	28.42	2934.40	-4914.81	44.50
Dead+Wind 150 deg - No Ice	60.67	26.99	46.95	4841.60	-2741.86	41.14
Dead+Wind 180 deg - No Ice	60.67	-0.02	53.42	5515.97	16.53	27.51
Dead+Wind 210 deg - No Ice	60.67	-27.02	46.94	4842.95	2772.48	7.80
Dead+Wind 240 deg - No Ice	60.67	-48.70	28.33	2927.84	4947.79	-14.56
Dead+Wind 270 deg - No Ice	60.67	-54.04	-0.03	42.63	5527.74	-32.34
Dead+Wind 300 deg - No Ice	60.67	-46.25	-26.59	-2671.17	4746.00	-41.45
Dead+Wind 330 deg - No Ice	60.67	-27.18	-46.76	-4726.57	2789.30	-40.88
Dead+Ice+Temp	111.41	0.00	-0.00	93.90	40.53	-0.00
Dead+Wind 0 deg+Ice+Temp	111.41	0.00	-16.22	-1554.39	38.72	-6.38
Dead+Wind 30 deg+Ice+Temp	111.41	7.57	-13.12	-1253.68	-738.27	-1.21
Dead+Wind 60 deg+Ice+Temp	111.41	12.80	-7.40	-670.29	-1280.07	3.69
Dead+Wind 90 deg+Ice+Temp	111.41	15.14	0.02	96.29	-1514.69	7.74
Dead+Wind 120 deg+Ice+Temp	111.41	14.03	8.18	927.11	-1384.30	10.60
Dead+Wind 150 deg+Ice+Temp	111.41	7.57	13.16	1446.90	-735.84	8.96
Dead+Wind 180 deg+Ice+Temp	111.41	-0.01	14.83	1624.47	42.83	5.44
Dead+Wind 210 deg+Ice+Temp	111.41	-7.58	13.16	1447.89	820.78	0.87
Dead+Wind 240 deg+Ice+Temp	111.41	-14.05	8.16	926.81	1469.26	-4.32
Dead+Wind 270 deg+Ice+Temp	111.41	-15.15	-0.00	94.63	1598.06	-7.85
Dead+Wind 300 deg+Ice+Temp	111.41	-12.83	-7.38	-665.60	1364.92	-9.35
Dead+Wind 330 deg+Ice+Temp	111.41	-7.61	-13.11	-1252.34	823.36	-8.90
Dead+Wind 0 deg - Service	60.67	0.00	-19.46	-1928.47	7.84	-10.51
Dead+Wind 30 deg - Service	60.67	9.34	-16.18	-1608.14	-944.31	-3.22
Dead+Wind 60 deg - Service	60.67	15.95	-9.22	-901.36	-1622.54	4.48

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 90 deg - Service	60.67	18.68	0.04	47.77	-1896.35	11.01
Dead+Wind 120 deg - Service	60.67	16.83	9.83	1043.72	-1694.26	15.40
Dead+Wind 150 deg - Service	60.67	9.34	16.25	1703.67	-942.38	14.23
Dead+Wind 180 deg - Service	60.67	-0.01	18.48	1937.02	12.09	9.52
Dead+Wind 210 deg - Service	60.67	-9.35	16.24	1704.12	965.71	2.70
Dead+Wind 240 deg - Service	60.67	-16.85	9.80	1041.46	1718.42	-5.04
Dead+Wind 270 deg - Service	60.67	-18.70	-0.01	43.12	1919.08	-11.19
Dead+Wind 300 deg - Service	60.67	-16.00	-9.20	-895.93	1648.60	-14.34
Dead+Wind 330 deg - Service	60.67	-9.40	-16.18	-1607.14	971.53	-14.14

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-60.67	0.00	0.00	60.67	0.00	0.000%
2	0.01	-60.67	-56.23	-0.01	60.67	56.23	0.000%
3	26.99	-60.67	-46.75	-26.99	60.67	46.75	0.000%
4	46.10	-60.67	-26.64	-46.10	60.67	26.64	0.000%
5	53.98	-60.67	0.11	-53.98	60.67	-0.11	0.000%
6	48.64	-60.67	28.42	-48.64	60.67	-28.42	0.000%
7	26.99	-60.67	46.95	-26.99	60.67	-46.95	0.000%
8	-0.02	-60.67	53.42	0.02	60.67	-53.42	0.000%
9	-27.02	-60.67	46.94	27.02	60.67	-46.94	0.000%
10	-48.70	-60.67	28.33	48.70	60.67	-28.33	0.000%
11	-54.04	-60.67	-0.03	54.04	60.67	0.03	0.000%
12	-46.25	-60.67	-26.59	46.25	60.67	26.59	0.000%
13	-27.18	-60.67	-46.76	27.18	60.67	46.76	0.000%
14	0.00	-111.41	0.00	0.00	111.41	0.00	0.000%
15	0.00	-111.41	-16.22	-0.00	111.41	16.22	0.000%
16	7.57	-111.41	-13.12	-7.57	111.41	13.12	0.000%
17	12.80	-111.41	-7.40	-12.80	111.41	7.40	0.000%
18	15.14	-111.41	0.02	-15.14	111.41	-0.02	0.000%
19	14.03	-111.41	8.18	-14.03	111.41	-8.18	0.000%
20	7.57	-111.41	13.16	-7.57	111.41	-13.16	0.000%
21	-0.01	-111.41	14.83	0.01	111.41	-14.83	0.000%
22	-7.58	-111.41	13.16	7.58	111.41	-13.16	0.000%
23	-14.05	-111.41	8.16	14.05	111.41	-8.16	0.000%
24	-15.15	-111.41	-0.00	15.15	111.41	0.00	0.000%
25	-12.83	-111.41	-7.38	12.83	111.41	7.38	0.000%
26	-7.61	-111.41	-13.11	7.61	111.41	13.11	0.000%
27	0.00	-60.67	-19.46	-0.00	60.67	19.46	0.000%
28	9.34	-60.67	-16.18	-9.34	60.67	16.18	0.000%
29	15.95	-60.67	-9.22	-15.95	60.67	9.22	0.000%
30	18.68	-60.67	0.04	-18.68	60.67	-0.04	0.000%
31	16.83	-60.67	9.83	-16.83	60.67	-9.83	0.000%
32	9.34	-60.67	16.25	-9.34	60.67	-16.25	0.000%
33	-0.01	-60.67	18.48	0.01	60.67	-18.48	0.000%
34	-9.35	-60.67	16.24	9.35	60.67	-16.24	0.000%
35	-16.85	-60.67	9.80	16.85	60.67	-9.80	0.000%
36	-18.70	-60.67	-0.01	18.70	60.67	0.01	0.000%
37	-16.00	-60.67	-9.20	16.00	60.67	9.20	0.000%
38	-9.40	-60.67	-16.18	9.40	60.67	16.18	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00000001
3	Yes	4	0.00000001	0.00000001
4	Yes	4	0.00000001	0.00000001
5	Yes	4	0.00000001	0.00000001
6	Yes	4	0.00000001	0.00000001
7	Yes	4	0.00000001	0.00000001
8	Yes	4	0.00000001	0.00000001
9	Yes	4	0.00000001	0.00000001
10	Yes	4	0.00000001	0.00000001
11	Yes	4	0.00000001	0.00000001
12	Yes	4	0.00000001	0.00000001
13	Yes	4	0.00000001	0.00000001
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00000001
16	Yes	4	0.00000001	0.00000001
17	Yes	4	0.00000001	0.00000001
18	Yes	4	0.00000001	0.00000001
19	Yes	4	0.00000001	0.00000001
20	Yes	4	0.00000001	0.00000001
21	Yes	4	0.00000001	0.00000001
22	Yes	4	0.00000001	0.00000001
23	Yes	4	0.00000001	0.00000001
24	Yes	4	0.00000001	0.00000001
25	Yes	4	0.00000001	0.00000001
26	Yes	4	0.00000001	0.00000001
27	Yes	4	0.00000001	0.00000001
28	Yes	4	0.00000001	0.00000001
29	Yes	4	0.00000001	0.00000001
30	Yes	4	0.00000001	0.00000001
31	Yes	4	0.00000001	0.00000001
32	Yes	4	0.00000001	0.00000001
33	Yes	4	0.00000001	0.00000001
34	Yes	4	0.00000001	0.00000001
35	Yes	4	0.00000001	0.00000001
36	Yes	4	0.00000001	0.00000001
37	Yes	4	0.00000001	0.00000001
38	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	3.381	35	0.1405	0.0135
T2	160 - 153.333	2.783	35	0.1379	0.0134
T3	153.333 - 146.667	2.587	35	0.1356	0.0134
T4	146.667 - 140	2.395	35	0.1325	0.0133
T5	140 - 120	2.204	35	0.1285	0.0131
T6	120 - 100	1.659	35	0.1154	0.0115
T7	100 - 80	1.173	35	0.0970	0.0096
T8	80 - 70	0.768	35	0.0779	0.0075
T9	70 - 60	0.595	35	0.0686	0.0065
T10	60 - 40	0.451	35	0.0585	0.0058

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T11	40 - 20	0.211	35	0.0370	0.0034
T12	20 - 0	0.059	35	0.0192	0.0012

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
180.00	Lightning Rod	35	3.381	0.1405	0.0135	817956
178.00	Empty Pipe Mount	35	3.321	0.1404	0.0135	817956
172.00	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	35	3.140	0.1400	0.0135	511224
157.00	VHLP2-18	35	2.694	0.1370	0.0134	165661
148.00	APXVSPP18-C-A20 w/ Mount Pipe	35	2.433	0.1332	0.0134	332182
143.00	PCS 1900MHz 4x45W-65MHz	35	2.290	0.1304	0.0132	212420
135.00	VHLP2-23	35	2.064	0.1254	0.0128	115141
134.00	LLPX310R w/ Mount Pipe	35	2.036	0.1248	0.0127	112324
126.00	HBX-6516DS-VTM w/ Mount Pipe	35	1.818	0.1198	0.0121	93934
112.00	800 10504 w/ Mount Pipe	35	1.456	0.1086	0.0108	67824
102.00	(2) 7770.00 w/ Mount Pipe	35	1.218	0.0990	0.0098	55190
30.00	GPS_A	35	0.122	0.0279	0.0022	46171
12.00	VG-1060	35	0.028	0.0117	0.0007	67750

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	9.686	10	0.4025	0.0391
T2	160 - 153.333	7.973	10	0.3949	0.0387
T3	153.333 - 146.667	7.413	10	0.3883	0.0387
T4	146.667 - 140	6.862	10	0.3795	0.0386
T5	140 - 120	6.317	10	0.3678	0.0379
T6	120 - 100	4.754	10	0.3304	0.0333
T7	100 - 80	3.362	10	0.2776	0.0278
T8	80 - 70	2.202	10	0.2227	0.0218
T9	70 - 60	1.706	10	0.1963	0.0187
T10	60 - 40	1.293	10	0.1672	0.0169
T11	40 - 20	0.607	10	0.1058	0.0099
T12	20 - 0	0.169	10	0.0548	0.0036

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
180.00	Lightning Rod	10	9.686	0.4025	0.0391	287796
178.00	Empty Pipe Mount	10	9.514	0.4022	0.0390	287796
172.00	ERICSSON AIR 21 B4A B2P w/	10	8.997	0.4009	0.0390	179873

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
	Mount Pipe					
157.00	VHLP2-18	10	7.720	0.3923	0.0388	58180
148.00	APXVSPP18-C-A20 w/ Mount Pipe	10	6.972	0.3815	0.0386	115445
143.00	PCS 1900MHz 4x45W-65MHz	10	6.561	0.3732	0.0383	74314
135.00	VHLP2-23	10	5.914	0.3590	0.0370	40235
134.00	LLPX310R w/ Mount Pipe	10	5.834	0.3572	0.0368	39253
126.00	HBX-6516DS-VTM w/ Mount Pipe	10	5.209	0.3427	0.0349	32836
112.00	800 10504 w/ Mount Pipe	10	4.173	0.3108	0.0311	23688
102.00	(2) 7770.00 w/ Mount Pipe	10	3.491	0.2833	0.0284	19260
30.00	GPS_A	10	0.351	0.0797	0.0064	16111
12.00	VG-1060	10	0.080	0.0336	0.0019	23621

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	180	Leg	A325X	0.8750	4	1.72	26.46	0.065	1.333	Bolt Tension
		Diagonal	A325X	0.6250	1	2.21	4.55	0.484	1.333	Member Block Shear
		Top Girt	A325X	0.6250	1	0.09	3.04	0.031	1.333	Member Block Shear
		Mid Girt	A325X	0.6250	1	0.27	3.04	0.089	1.333	Member Block Shear
T2	160	Diagonal	A325X	0.6250	1	2.55	6.80	0.376	1.333	Member Bearing
T3	153.333	Diagonal	A325X	0.6250	1	3.03	6.80	0.445	1.333	Member Bearing
		Top Girt	A325X	0.6250	1	0.34	3.04	0.112	1.333	Member Block Shear
T4	146.667	Leg	A325X	1.0000	4	5.41	34.56	0.156	1.333	Bolt Tension
		Diagonal	A325X	0.6250	1	4.47	6.80	0.657	1.333	Member Bearing
		Top Girt	A325X	0.6250	1	0.12	3.04	0.038	1	Member Block Shear
T5	140	Leg	A325X	1.0000	6	7.77	34.56	0.225	1.333	Bolt Tension
		Diagonal	A325X	0.6250	1	6.95	6.80	1.023	1.333	Member Bearing
T6	120	Leg	A325X	1.0000	6	13.00	34.56	0.376	1.333	Bolt Tension
		Diagonal	A325X	0.6250	1	8.46	7.62	1.110	1.333	Member Bearing
T7	100	Leg	A325X	1.0000	8	13.61	34.56	0.394	1.333	Bolt Tension
		Diagonal	A325X	0.7500	1	10.08	9.14	1.103	1.333	Member Bearing
T8	80	Diagonal	A325X	0.7500	1	10.23	9.14	1.119	1.333	Member Bearing
T9	70	Leg	A325X	1.0000	8	17.64	34.56	0.511	1.333	Bolt Tension
		Diagonal	A325X	0.7500	1	10.87	12.91	0.842	1.333	Gusset Bearing
T10	60	Leg	A325X	1.0000	8	21.49	34.56	0.622	1.333	Bolt Tension
		Diagonal	A325X	0.7500	1	11.08	9.14	1.212	1.333	Member Bearing
T11	40	Leg	A325X	1.0000	8	25.14	34.56	0.727	1.333	Bolt Tension
		Diagonal	A325X	0.7500	1	11.57	11.43	1.013	1.333	Member Bearing
T12	20	Leg	A449	1.0000	10	22.79	31.10	0.733	1.333	Bolt Tension
		Diagonal	A325X	0.7500	1	12.59	12.91	0.975	1.333	Gusset Bearing

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	180 - 160	ROHN 3 EH	20.04	5.01	52.9 K=1.00	23.893	3.0159	-9.86	72.06	0.137
T2	160 - 153.333	ROHN 4 EH	6.68	6.68	54.3 K=1.00	23.671	4.4074	-14.39	104.33	0.138
T3	153.333 - 146.667	ROHN 4 EH	6.68	6.68	54.3 K=1.00	23.671	4.4074	-20.97	104.33	0.201
T4	146.667 - 140	ROHN 4 EH	6.68	6.68	54.3 K=1.00	23.671	4.4074	-28.84	104.33	0.276
T5	140 - 120	ROHN 5 EH	20.04	6.68	43.6 K=1.00	25.320	6.1120	-59.83	154.75	0.387
T6	120 - 100	ROHN 6 EHS	20.03	6.68	36.0 K=1.00	26.380	6.7133	-97.12	177.09	0.548
T7	100 - 80	ROHN 6 EH	20.04	10.02	54.8 K=1.00	23.589	8.4049	-133.11	198.26	0.671
T8	80 - 70	ROHN 8 EHS	10.02	10.02	40.6 K=1.00	25.754	9.8666	-151.67	254.10	0.597
T9	70 - 60	ROHN 8 EHS	10.02	10.02	40.6 K=1.00	25.754	9.8666	-170.44	254.10	0.671
T10	60 - 40	ROHN 8 EHS	20.03	10.02	40.6 K=1.00	25.754	9.8666	-206.84	254.10	0.814
T11	40 - 20	ROHN 8 EH	20.03	10.02	41.8 K=1.00	25.582	12.7627	-242.26	326.50	0.742
T12	20 - 0	ROHN 8 EH	20.03	10.02	41.8 K=1.00	25.582	12.7627	-277.09	326.50	0.849

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	180 - 160	L2x2x3/16	9.86	4.79	146.0 K=1.00	7.007	0.7150	-2.11	5.01	0.420
T2	160 - 153.333	L2 1/2x2 1/2x1/4	11.29	5.51	134.5 K=1.00	8.249	1.1900	-2.62	9.82	0.267
T3	153.333 - 146.667	L2 1/2x2 1/2x1/4	11.85	5.79	141.5 K=1.00	7.461	1.1900	-3.17	8.88	0.357
T4	146.667 - 140	L2 1/2x2 1/2x1/4	12.43	6.08	148.5 K=1.00	6.769	1.1900	-4.55	8.06	0.565
T5	140 - 120	L2 1/2x2 1/2x1/4	14.23	6.93	169.3 K=1.00	5.207	1.1900	-6.96	6.20	1.123
T6	120 - 100	L3x3x1/4	15.99	7.75	157.1 K=1.00	6.053	1.4400	-8.49	8.72	0.975
T7	100 - 80	L3 1/2x3 1/2x1/4	19.26	9.48	164.0 K=1.00	5.554	1.6900	-10.07	9.39	1.073
T8	80 - 70	L3 1/2x3 1/2x1/4	20.15	9.81	169.6 K=1.00	5.190	1.6900	-10.41	8.77	1.187
T9	70 - 60	2L3 1/2x3 1/2x1/4x3/8	21.03	10.25	193.4 K=1.00	3.993	3.3800	-11.10	13.50	0.822
T10	60 - 40	2L 'a' > 58.7386 in - 136 L4x4x1/4	22.81	11.14	168.2 K=1.00	5.279	1.9400	-11.42	10.24	1.115
T11	40 - 20	L4x4x5/16	24.62	12.06	182.9	4.463	2.4000	-11.90	10.71	1.111

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T12	20 - 0	2L4x4x5/16x3/8	26.46	12.98	K=1.00 214.9 K=1.00	3.233	4.8000	-12.85	15.52	0.828
		2L 'a' > 74.5105 in - 176								

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	180 - 160	L2x2x1/8	6.69	6.16	185.8 K=1.00	4.324	0.4844	-0.11	2.09	0.054
T3	153.333 - 146.667	L2x2x1/8	9.45	8.84	266.7 K=1.00	2.099	0.4844	-0.21	1.02	0.211
		KL/R > 200 (C) - 46								

Mid Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	180 - 160	L2x2x1/8	7.72	7.19	217.1 K=1.00	3.168	0.4844	-0.25	1.53	0.164
		KL/R > 200 (C) - 7								

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	180 - 160	ROHN 3 EH	20.04	5.01	52.9	30.000	3.0159	6.87	90.48	0.076
T2	160 - 153.333	ROHN 4 EH	6.68	6.68	54.3	30.000	4.4074	10.87	132.22	0.082
T3	153.333 - 146.667	ROHN 4 EH	6.68	6.68	54.3	30.000	4.4074	15.84	132.22	0.120
T4	146.667 - 140	ROHN 4 EH	6.68	6.68	54.3	30.000	4.4074	21.62	132.22	0.164
T5	140 - 120	ROHN 5 EH	20.04	6.68	43.6	30.000	6.1120	46.62	183.36	0.254
T6	120 - 100	ROHN 6 EHS	20.03	6.68	36.0	30.000	6.7133	77.97	201.40	0.387
T7	100 - 80	ROHN 6 EH	20.04	10.02	54.8	30.000	8.4049	108.86	252.15	0.432
T8	80 - 70	ROHN 8 EHS	10.02	10.02	40.6	30.000	9.8666	125.15	296.00	0.423
T9	70 - 60	ROHN 8 EHS	10.02	10.02	40.6	30.000	9.8666	141.14	296.00	0.477
T10	60 - 40	ROHN 8 EHS	20.03	10.02	40.6	30.000	9.8666	171.95	296.00	0.581
T11	40 - 20	ROHN 8 EH	20.03	10.02	41.8	30.000	12.7627	201.11	382.88	0.525
T12	20 - 0	ROHN 8 EH	20.03	10.02	41.8	30.000	12.7627	227.92	382.88	0.595

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	180 - 160	L2x2x3/16	9.42	4.57	91.3	29.000	0.4308	2.21	12.49	0.177
T2	160 - 153.333	L2 1/2x2 1/2x1/4	11.29	5.51	87.8	29.000	0.7519	2.55	21.80	0.117
T3	153.333 - 146.667	L2 1/2x2 1/2x1/4	11.85	5.79	92.2	29.000	0.7519	3.03	21.80	0.139
T4	146.667 - 140	L2 1/2x2 1/2x1/4	12.43	6.08	96.7	29.000	0.7519	4.47	21.80	0.205
T5	140 - 120	L2 1/2x2 1/2x1/4	14.23	6.93	110.0	29.000	0.7519	6.95	21.80	0.319
T6	120 - 100	L3x3x1/4	15.99	7.75	101.5	32.500	0.9394	8.46	30.53	0.277
T7	100 - 80	L3 1/2x3 1/2x1/4	19.26	9.48	105.9	32.500	1.1034	10.08	35.86	0.281
T8	80 - 70	L3 1/2x3 1/2x1/4	20.15	9.81	109.5	32.500	1.1034	10.23	35.86	0.285
T9	70 - 60	2L3 1/2x3 1/2x1/4x3/8 2L 'a' > 58.7386 in - 137	21.03	10.25	114.3	29.000	2.2069	10.87	64.00	0.170
T10	60 - 40	L4x4x1/4	22.81	11.14	108.3	32.500	1.2909	11.08	41.96	0.264
T11	40 - 20	L4x4x5/16	23.71	11.60	113.6	32.500	1.5949	11.57	51.84	0.223
T12	20 - 0	2L4x4x5/16x3/8 2L 'a' > 74.5105 in - 176	26.46	12.98	126.9	29.000	3.1898	12.59	92.51	0.136

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	180 - 160	L2x2x1/8	6.69	6.16	122.6	29.000	0.2930	0.09	8.50	0.011
T3	153.333 - 146.667	L2x2x1/8	9.45	8.84	173.9	29.000	0.2930	0.34	8.50	0.040
T4	146.667 - 140	L2x2x1/8	10.14	9.53	187.2	29.000	0.2930	0.12	8.50	0.014*

* DL controls

Mid Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	180 - 160	L2x2x1/8	7.72	7.19	142.4	29.000	0.2930	0.27	8.50	0.032

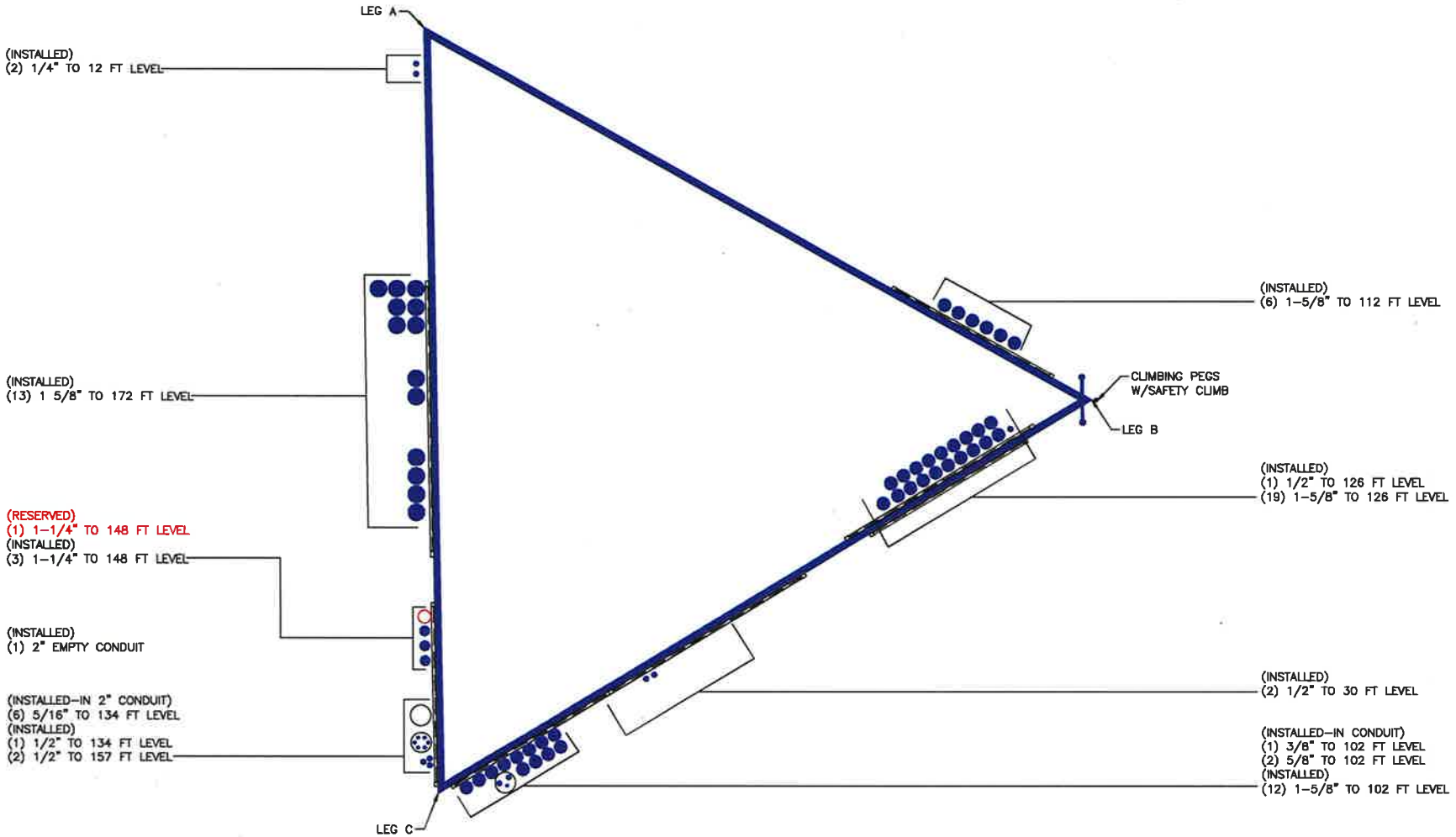
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T1	180 - 160	Leg	ROHN 3 EH	1	-9.86	96.06	10.3	Pass
T2	160 - 153.333	Leg	ROHN 4 EH	36	-14.39	139.07	10.3	Pass
T3	153.333 -	Leg	ROHN 4 EH	43	-20.97	139.07	15.1	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
	146.667							
T4	146.667 - 140	Leg	ROHN 4 EH	55	-28.84	139.07	20.7	Pass
T5	140 - 120	Leg	ROHN 5 EH	67	-59.83	206.29	29.0	Pass
T6	120 - 100	Leg	ROHN 6 EHS	88	-97.12	236.06	41.1	Pass
T7	100 - 80	Leg	ROHN 6 EH	109	-133.11	264.29	50.4	Pass
T8	80 - 70	Leg	ROHN 8 EHS	124	-151.67	338.72	44.8	Pass
T9	70 - 60	Leg	ROHN 8 EHS	133	-170.44	338.72	50.3	Pass
T10	60 - 40	Leg	ROHN 8 EHS	142	-206.84	338.72	61.1	Pass
T11	40 - 20	Leg	ROHN 8 EH	157	-242.26	435.22	55.7	Pass
T12	20 - 0	Leg	ROHN 8 EH	172	-277.09	435.22	63.7	Pass
T1	180 - 160	Diagonal	L2x2x3/16	15	-2.11	6.68	31.5	Pass
							36.3 (b)	
T2	160 - 153.333	Diagonal	L2 1/2x2 1/2x1/4	41	-2.62	13.09	20.0	Pass
							28.2 (b)	
T3	153.333 - 146.667	Diagonal	L2 1/2x2 1/2x1/4	53	-3.17	11.83	26.8	Pass
							33.4 (b)	
T4	146.667 - 140	Diagonal	L2 1/2x2 1/2x1/4	65	-4.55	10.74	42.4	Pass
							49.3 (b)	
T5	140 - 120	Diagonal	L2 1/2x2 1/2x1/4	74	-6.96	8.26	84.2	Pass
T6	120 - 100	Diagonal	L3x3x1/4	95	-8.49	11.62	73.1	Pass
							83.3 (b)	
T7	100 - 80	Diagonal	L3 1/2x3 1/2x1/4	116	-10.07	12.51	80.5	Pass
							82.8 (b)	
T8	80 - 70	Diagonal	L3 1/2x3 1/2x1/4	127	-10.41	11.69	89.1	Pass
T9	70 - 60	Diagonal	2L3 1/2x3 1/2x1/4x3/8	136	-11.10	17.99	61.7	Pass
							63.1 (b)	
T10	60 - 40	Diagonal	L4x4x1/4	145	-11.42	13.65	83.7	Pass
							90.9 (b)	
T11	40 - 20	Diagonal	L4x4x5/16	161	-11.90	14.28	83.3	Pass
T12	20 - 0	Diagonal	2L4x4x5/16x3/8	176	-12.85	20.68	62.1	Pass
							73.1 (b)	
T1	180 - 160	Top Girt	L2x2x1/8	4	-0.11	2.79	4.0	Pass
T3	153.333 - 146.667	Top Girt	L2x2x1/8	46	-0.21	1.36	15.8	Pass
T4	146.667 - 140	Top Girt	L2x2x1/8	60	0.12	8.50	1.4	Pass
							2.9 (b)	
T1	180 - 160	Mid Girt	L2x2x1/8	7	-0.25	2.05	12.3	Pass
							Summary	
						Leg (T12)	63.7	Pass
						Diagonal (T10)	90.9	Pass
						Top Girt (T3)	15.8	Pass
						Mid Girt (T1)	12.3	Pass
						Bolt Checks	90.9	Pass
						RATING =	**90.9**	**Pass**

APPENDIX B

BASE LEVEL DRAWING


LEG A
(INSTALLED)
(2) 1/4" TO 12 FT LEVEL
(INSTALLED)
(13) 1 5/8" TO 172 FT LEVEL
(RESERVED)
(1) 1-1/4" TO 148 FT LEVEL
(INSTALLED)
(3) 1-1/4" TO 148 FT LEVEL
(INSTALLED)
(1) 2" EMPTY CONDUIT
(INSTALLED-IN 2" CONDUIT)
(6) 5/16" TO 134 FT LEVEL
(INSTALLED)
(1) 1/2" TO 134 FT LEVEL
(2) 1/2" TO 157 FT LEVEL
LEG C
(INSTALLED)
(6) 1-5/8" TO 112 FT LEVEL
CLIMBING PEGS
W/SAFETY CLIMB
LEG B
(INSTALLED)
(1) 1/2" TO 126 FT LEVEL
(19) 1-5/8" TO 126 FT LEVEL
(INSTALLED)
(2) 1/2" TO 30 FT LEVEL
(INSTALLED-IN CONDUIT)
(1) 3/8" TO 102 FT LEVEL
(2) 5/8" TO 102 FT LEVEL
(INSTALLED)
(12) 1-5/8" TO 102 FT LEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

FDH Velocitel Project No. 16BGCG1400
Site ID: BU# 807133
Site Name: BRG 134 943057
Date: 4/5/2016
By: Zachary Shepherd, EI

FDH VELOCITEL
ENGINEERING INNOVATION

Rock Anchor Foundation Calculations

TNX Reactions:

$P_{uplift} := 235\ \textbf{kip}$ $P_{comp} := 286\ \textbf{kip}$

Concrete Bearing Check:

$w_c := (6.25\ \textbf{ft} \cdot 8.75\ \textbf{ft} \cdot 9\ \textbf{ft}) \cdot 150\ \textbf{pcf} = 73.828\ \textbf{kip}$

$q_{ult} := 30\ \textbf{ksf}$ (Ultimate bearing pressure per FDH Project No. 08-07100E G1)

$A_{bearing} := 6.25\ \textbf{ft} \cdot 8.75\ \textbf{ft} = 54.688\ \textbf{ft}^2$

$P_{total} := P_{comp} + w_c = 359.828\ \textbf{kip}$

$q_n := \frac{P_{total}}{A_{bearing}} = 6.58\ \textbf{ksf}$

$Capacity := \frac{q_n}{0.5 \cdot q_{ult}} \cdot 100 = 43.865\ \%$

Tensile Yielding Check: (4) #11 A615 Gr. 60 Anchor Bars

$\Omega := 1.67$ $N := 4$ $d := 1.410\ \textbf{in}$ $F_y := 60\ \textbf{ksi}$ $A_g := \left(\frac{\pi}{4}\right) \cdot d^2 = 1.561\ \textbf{in}^2$

$P_u := \frac{P_{uplift} - w_c}{N} = 40.293\ \textbf{kip}$

$P_n := \frac{F_y \cdot A_g}{\Omega} = 56.1\ \textbf{kip}$

$Capacity := \frac{P_u}{P_n} \cdot 100 = 71.823\ \%$

FDH Velocitel Project No. 16BGCG1400
Site ID: BU# 807133
Site Name: BRG 134 943057
Date: 4/5/2016
By: Zachary Shepherd, EI

FDH VELOCITEL
ENGINEERING INNOVATION

Tensile Rupture Check: (4) #11 A615 Gr. 60 Anchor Bars

$\Omega := 2.0$ $N := 4$ $d := 1.410\ in$ $F_u := 80\ ksi$ $A_e := \left(\frac{\pi}{4}\right) \cdot d^2 = 1.561\ in^2$

$$P_u := \frac{P_{uplift} - w_c}{N} = 40.293\ kip$$

$$P_n := \frac{F_u \cdot A_e}{\Omega} = 62.458\ kip$$

Browse for Image...

$$Capacity := \frac{P_u}{P_n} \cdot 100 = 64.512\ \%$$

Uplift Check / Soil-Grout Interaction:

$\Omega := 2.0$ $Q_{ult} := 16.0\ ksf$ (Ultimate skin friction from FDH Project No. 08-07100 E G1)

$$P_u := \frac{P_{uplift} - w_c}{N} = 40.293\ kip$$

$$P_n := \frac{\pi \cdot (2.25\ in) \cdot 14.0\ ft \cdot Q_{ult}}{\Omega} = 65.973\ kip$$

$$Capacity := \frac{P_u}{P_n} \cdot 100 = 61.075\ \%$$ Passing