

Date: **April 20, 2021**



Crown Castle
2000 Corporate Drive
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(724) 416-2000

Subject: **Structural Analysis Report**

Carrier Designation: **DISH Network Co-Locate**
Site Number: BOBDL00052A
Site Name: CT-CCI-T-806387

Crown Castle Designation: **BU Number:** 806387
Site Name: HRT 088 943629
JDE Job Number: 645650
Work Order Number: 1945872
Order Number: 553395 Rev. 0

Engineering Firm Designation: **Crown Castle Project Number:** 1945872

Site Data: **#14 Route 80, KILLINGWORTH, MIDDLESEX County, CT**
Latitude 41° 21' 26.43", Longitude -72° 31' 11.83"
160 Foot - Self Support Tower

Crown Castle is pleased to submit this "**Structural Analysis Report**" to determine the structural integrity of the above-mentioned tower.

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: Proposed Equipment Configuration

Sufficient Capacity – 80.6%

This analysis utilizes an ultimate 3-second gust wind speed of 130 mph as required by the 2018 Connecticut State Building Code. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Structural analysis prepared by: Steven Hu

Respectfully submitted by:

Maham Barimani, P.E.
Senior Project Engineer

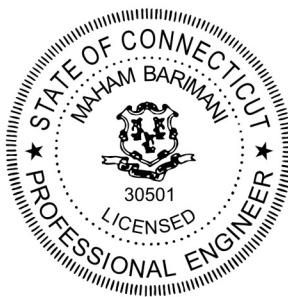


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1) INTRODUCTION

This tower is a 160 ft Self Support tower designed by ROHN. The tower has been modified multiple times to accommodate additional loading.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-H
Risk Category:	II
Wind Speed:	130 mph
Exposure Category:	B
Topographic Factor:	1
Ice Thickness:	1.5 in
Wind Speed with Ice:	50 mph
Service Wind Speed:	60 mph

Table 1 - Proposed Equipment Configuration

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
124.0	124.0	3	fujitsu	TA08025-B604	1	1-1/2
		3	fujitsu	TA08025-B605		
		3	jma wireless	MX08FRO665-20 w/ Mount Pipe		
		1	raycap	RDIDC-9181-PF-48		
		1	tower mounts	Commscope MTC3975083 (3)		

Table 2 - Other Considered Equipment

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
157.0	157.0	3	alcatel lucent	B13 RRH 4X30	8 1	7/8 1-5/8
		3	alcatel lucent	B66A RRH4X45		
		6	antel	LPA-80080/6CF w/ Mount Pipe		
		6	commscope	JAHH-65B-R3B w/ Mount Pipe		
		3	nokia	AHCA		
		1	raycap	RC3DC-3315-PF-48		
		1	tower mounts	Sitepro VFA12-HD Sector Mount (3)		
144.0	144.0	3	ericsson	AIR6449 B41_T-MOBILE w/ Mount Pipe	4	1-5/8
		3	ericsson	RADIO 4415 B66A_CCIV3		
		3	ericsson	RADIO 4424 B25_TMO		
		3	ericsson	RADIO 4449 B71 B85A_T-MOBILE		
		3	rfs celwave	APX16DWV-16DWV-S-E-A20 w/ Mount Pipe		
		3	rfs celwave	APXVAALL24_43-U-NA20_TMO w/ Mount Pipe		
		1	tower mounts	Sector Mount [SM 506-3]		

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
118.0	118.0	12	decibel	DB844H90E-XY w/ Mount Pipe	-	-
		1	tower mounts	Pipe Mount [PM 601-3]		
		1	tower mounts	Sector Mount [SM 201-3]		
109.0	115.0	1	celwave	PD1110	1	1-1/4
	109.0	1	tower mounts	Side Arm Mount [SO 308-1]		
90.0	90.0	6	ericsson	RRUS-11	1 2 12	3/8 7/16 7/8
		2	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe		
		6	powerwave technologies	7770.00 w/ Mount Pipe		
		12	powerwave technologies	LGP21401		
		1	powerwave technologies	P45-16-XLH-RR w/ Mount Pipe		
		1	raycap	DC6-48-60-18-8F		
		1	tower mounts	Sector Mount [SM 104-3]		
50.0	50.0	1	lucent	KS24019-L112A	1	1/2
		1	tower mounts	Side Arm Mount [SO 306-1]		

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Reference	Source
4-GEOTECHNICAL REPORTS	1237256	CCISITES
4-POST-MODIFICATION INSPECTION	8150390	CCISITES
4-POST-MODIFICATION INSPECTION	2450760	CCISITES
4-POST-MODIFICATION INSPECTION	1296500	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	821498	CCISITES
4-TOWER MANUFACTURER DRAWINGS	2281721	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	7235023	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	2340021	CCISITES

3.1) Analysis Method

tnxTower (version 8.0.9.0), 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. When applicable, Crown Castle has calculated and provided the effective area for panel antennas using approved methods following the intent of the TIA-222 standard.

3.2) Assumptions

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

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

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P _{allow} (K)	% Capacity	Pass / Fail
T1	160 - 156	Leg	Rohn 2.375" x 0.218" (2 EH)	3	-3.34	49.90	6.7	Pass
T2	156 - 152	Leg	Rohn 2.375" x 0.218" (2 EH)	15	-4.11	52.40	7.8	Pass
T3	152 - 148	Leg	Rohn 2.375" x 0.218" (2 EH)	24	-7.02	52.40	13.4	Pass
T4	148 - 144	Leg	Rohn 2.375" x 0.218" (2 EH)	33	-10.09	52.40	19.3	Pass
T5	144 - 140	Leg	Rohn 2.375" x 0.218" (2 EH)	42	-16.89	52.40	32.2	Pass
T6	140 - 120	Leg	Rohn 2.875" x 0.276" (2.5 EH)	49	-48.98	78.15	62.7	Pass
T7	120 - 100	Leg	ROHN 3 EH	79	-79.86	99.06	80.6	Pass
T8	100 - 80	Leg	Rohn 4" x 0.318" (3.5 EH) (GR)	100	-109.74	155.70	70.5	Pass
T9	80 - 60	Leg	ROHN 4 EH (GR)	121	-138.61	202.56	68.4	Pass
T10	60 - 40	Leg	Rohn 5.563" x 0.375" (5 EH) (GR)	142	-163.32	259.31	63.0	Pass
T11	40 - 20	Leg	Rohn 5.563" x 0.375" (5 EH) (GR)	157	-188.42	259.29	72.7	Pass
T12	20 - 0	Leg	Rohn 6.625" x 0.432" (6 EH) (GR)	172	-212.70	400.17	53.2	Pass
T1	160 - 156	Diagonal	L 1.5 x 1.5 x 1/8	9	-0.62	5.80	10.7 16.6 (b)	Pass
T2	156 - 152	Diagonal	L 1.5 x 1.5 x 1/8	19	-1.81	5.79	31.3 50.0 (b)	Pass
T3	152 - 148	Diagonal	L 1.5 x 1.5 x 1/8	27	-1.77	5.78	30.7 47.7 (b)	Pass
T4	148 - 144	Diagonal	L 1.5 x 1.5 x 1/8	37	-1.92	5.77	33.3 53.6 (b)	Pass
T5	144 - 140	Diagonal	L 2 x 2 x 1/4	45	-4.50	24.24	18.6 55.7 (b)	Pass
T6	140 - 120	Diagonal	2L 1.5 x 1.5 x 1/8 (3/16)	57	-4.15	14.33	29.0 62.9 (b)	Pass
T7	120 - 100	Diagonal	2L 2 x 2 x 3/16 (3/16)	84	-5.10	30.02	17.0 65.4 (b)	Pass
T8	100 - 80	Diagonal	2L 2.5 x 2.5 x 3/16 (3/16)	105	-5.92	40.83	14.5 44.4 (b)	Pass
T9	80 - 60	Diagonal	2L 3 x 3 x 3/16 (1/4)	124	-5.84	49.16	11.9 44.1 (b)	Pass
T10	60 - 40	Diagonal	2L 3 x 3 x 3/16 (1/4)	145	-6.78	37.89	17.9 41.8 (b)	Pass
T11	40 - 20	Diagonal	2L 3 x 3 x 1/4 (1/4)	161	-6.70	44.49	15.1 41.2 (b)	Pass
T12	20 - 0	Diagonal	2L 3.5 x 3.5 x 1/4 (1/4)	175	-7.45	57.93	12.9 44.7 (b)	Pass
T1	160 - 156	Top Girt	L 2 x 2 x 1/8	4	-0.28	4.27	6.5	Pass
T6	140 - 120	Top Girt	L 2 x 2 x 1/8	54	-0.85	4.27	19.9	Pass
							Summary	

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
						Leg (T7)	80.6	Pass
						Diagonal (T7)	65.4	Pass
						Top Girt (T6)	19.9	Pass
						Bolt Checks	65.4	Pass
						Rating =	80.6	Pass

Table 5 - Tower Component Stresses vs. Capacity - LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	52.6	Pass
1	Base Foundation (Structure)	0	32.0	Pass
1	Base Foundation (Soil Interaction)	0	57.8	Pass

Structure Rating (max from all components) =	80.6%
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Notes:

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

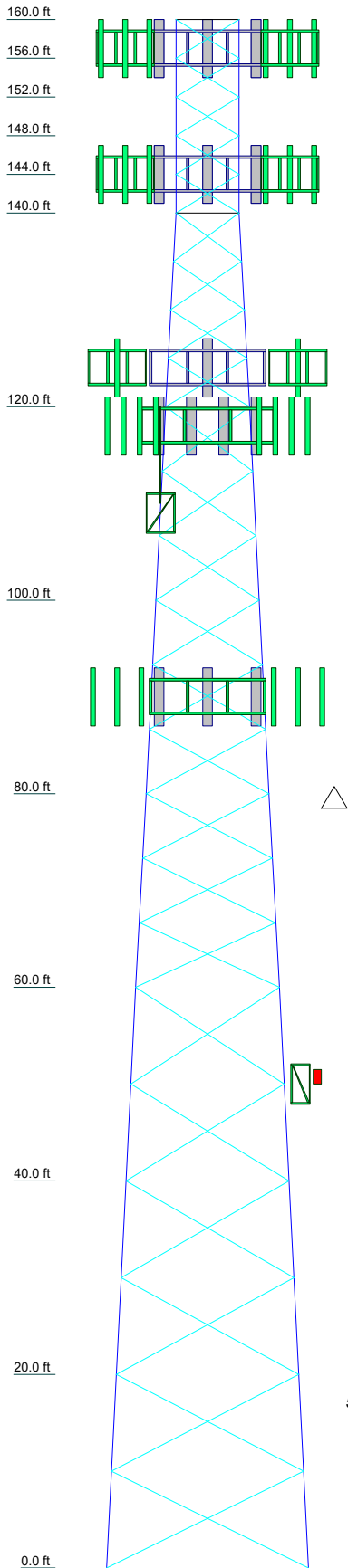
4.1) Recommendations

The tower and its foundation have sufficient capacity to carry the proposed load configuration. No modifications are required at this time.

APPENDIX A

TNXTOWER OUTPUT

Section	T12	T11	T10	T9	T8	T7	T6	T5	T4	T3	T2	T1
Legs	A	Rohn 5.563" x 0.375" (5 EH) (GR)	ROHN 4 EH (GR)	Rohn 4" x 0.318" (3.5 EH) (GR)	ROHN 3 EH	Rohn 2.875" x 0.276" (2.5 EH)	Rohn 2.375" x 0.218" (2 EH)					
Leg Grade												
Diagonals	2L 3.5 x 3.5 x 1/4 (1/4)	2L 3 x 3 x 1/4 (1/4)	2L 3 x 3 x 3/16 (1/4)	2L 2.5 x 2.5 x 3/16 (3/16)	2L 2 x 2 x 3/16 (3/16)	2L 1.5 x 1.5 x 1/8 (3/16)	2L 1.5 x 1.5 x 1/8					
Diagonal Grade												
Top Girts												
Face Width (ft)	20.8646	18.9542	16.7708	14.7708	12.6771	10.6354	8.60417	6.56255416	5.45836	5.376529	5.2083	
# Panels @ (ft)		6 @ 10				9 @ 6.66667					5 @ 4	
Weight (K)	25.6	6.6	4.9	4.2	3.7	2.8	1.6	1.0	0.2	0.1	0.1	0.2



SYMBOL LIST			
MARK	SIZE	MARK	SIZE
A	Rohn 6.625" x 0.432" (6 EH) (GR)	C	A529-50
B	L 2 x 2 x 1/4	D	L 2 x 2 x 1/8

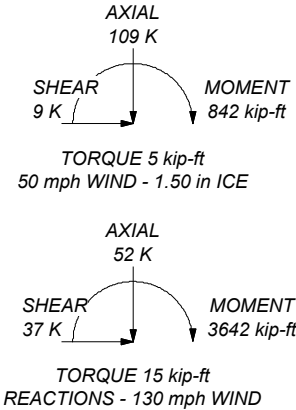
MATERIAL STRENGTH					
GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A529-50	50 ksi	65 ksi
A36	36 ksi	58 ksi			

- TOWER DESIGN NOTES**
1. Tower is located in Middlesex County, Connecticut.
 2. Tower designed for Exposure B to the TIA-222-H Standard.
 3. Tower designed for a 130 mph basic wind in accordance with the TIA-222-H Standard.
 4. Tower is also designed for a 50 mph basic wind with 1.50 in ice. Ice is considered to increase in thickness with height.
 5. Deflections are based upon a 60 mph wind.
 6. Tower Risk Category II.
 7. Topographic Category 1 with Crest Height of 0.00 ft
 8. Grouted pipe f_c is 7 ksi
 9. TOWER RATING: 80.6%

ALL REACTIONS
ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 219 K
SHEAR: 24 K

UPLIFT: -181 K
SHEAR: 20 K





CROWN CASTLE
The Pathway to Possible

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Job: 806387		
Project:		
Client: Crown Castle	Drawn by: Steven Hu	App'd:
Code: TIA-222-H	Date: 04/20/21	Scale: NTS
Path: C:\Users\SHu\Documents\WFH\806387\WO 1945872 - SA\Prod\806387_RPA.dwg		Dwg No. E-1

Tower Input Data

The main tower is a 3x free standing tower with an overall height of 160.00 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 6.52 ft at the top and 20.86 ft at the base.

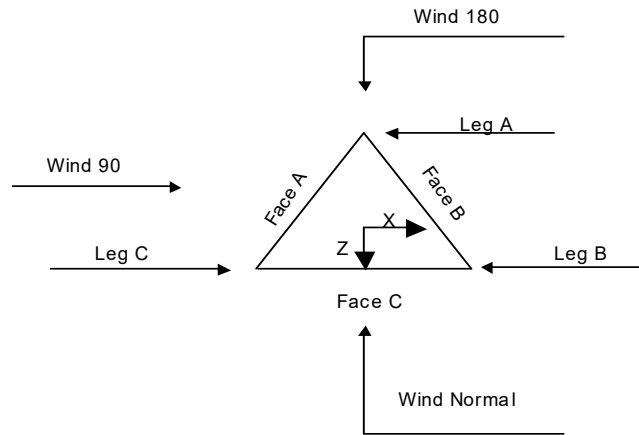
This tower is designed using the TIA-222-H standard.

The following design criteria apply:

- Tower is located in Middlesex County, Connecticut.
- Tower base elevation above sea level: 417.00 ft.
- Basic wind speed of 130 mph.
- Risk Category II.
- Exposure Category B.
- Simplified Topographic Factor Procedure for wind speed-up calculations is used.
- Topographic Category: 1.
- Crest Height: 0.00 ft.
- Nominal ice thickness of 1.50 in.
- Ice thickness is considered to increase with height.
- Ice density of 56 pcf.
- A wind speed of 50 mph is used in combination with ice.
- Deflections calculated using a wind speed of 60 mph.
- A non-linear (P-delta) analysis was used.
- Grouted pipe f'_c is 7 ksi.
- Pressures are calculated at each section.
- Stress ratio used in tower member design is 1.05.
- Tower analysis based on target reliabilities in accordance with Annex S.
- Load Modification Factors used: $K_{es}(F_w) = 0.95$, $K_{es}(t_i) = 0.85$.
- Maximum demand-capacity ratio is: 1.
- 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-H Bracing Resist.
✓ Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Exemption
Leg Bolts Are At Top Of Section		Use TIA-222-H Tension Splice
✓ Secondary Horizontal Braces Leg	Add IBC .6D+W Combination	Exemption
Use Diamond Inner Bracing (4 Sided)	✓ Sort Capacity Reports By Component	
SR Members Have Cut Ends	Triangulate Diamond Inner Bracing	Poles
SR Members Are Concentric	Treat Feed Line Bundles As Cylinder	Include Shear-Torsion Interaction
	Ignore KL/ry For 60 Deg. Angle Legs	Always Use Sub-Critical Flow
		Use Top Mounted Sockets
		Pole Without Linear Attachments
		Pole With Shroud Or No
		Appurtenances
		Outside and Inside Corner Radii Are
		Known



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	160.00-156.00			6.52	1	4.00
T2	156.00-152.00			6.53	1	4.00
T3	152.00-148.00			6.54	1	4.00
T4	148.00-144.00			6.55	1	4.00
T5	144.00-140.00			6.55	1	4.00
T6	140.00-120.00			6.56	1	20.00
T7	120.00-100.00			8.60	1	20.00
T8	100.00-80.00			10.64	1	20.00
T9	80.00-60.00			12.68	1	20.00
T10	60.00-40.00			14.77	1	20.00
T11	40.00-20.00			16.77	1	20.00
T12	20.00-0.00			18.85	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	160.00-156.00	4.00	X Brace	No	No	0.00	0.00
T2	156.00-152.00	4.00	X Brace	No	No	0.00	0.00
T3	152.00-148.00	4.00	X Brace	No	No	0.00	0.00
T4	148.00-144.00	4.00	X Brace	No	No	0.00	0.00
T5	144.00-140.00	4.00	X Brace	No	No	0.00	0.00
T6	140.00-120.00	5.00	X Brace	No	No	0.00	0.00
T7	120.00-100.00	6.67	X Brace	No	No	0.00	0.00
T8	100.00-80.00	6.67	X Brace	No	No	0.00	0.00
T9	80.00-60.00	6.67	X Brace	No	No	0.00	0.00
T10	60.00-40.00	10.00	X Brace	No	No	0.00	0.00
T11	40.00-20.00	10.00	X Brace	No	No	0.00	0.00

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
T12	20.00-0.00	10.00	X Brace	No	No	0.00	0.00

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 160.00-156.00	Pipe	Rohn 2.375" x 0.218" (2 EH)	A572-50 (50 ksi)	Single Angle	L 1.5 x 1.5 x 1/8	A36 (36 ksi)
T2 156.00-152.00	Pipe	Rohn 2.375" x 0.218" (2 EH)	A572-50 (50 ksi)	Single Angle	L 1.5 x 1.5 x 1/8	A36 (36 ksi)
T3 152.00-148.00	Pipe	Rohn 2.375" x 0.218" (2 EH)	A572-50 (50 ksi)	Single Angle	L 1.5 x 1.5 x 1/8	A36 (36 ksi)
T4 148.00-144.00	Pipe	Rohn 2.375" x 0.218" (2 EH)	A572-50 (50 ksi)	Single Angle	L 1.5 x 1.5 x 1/8	A36 (36 ksi)
T5 144.00-140.00	Pipe	Rohn 2.375" x 0.218" (2 EH)	A572-50 (50 ksi)	Single Angle	L 2 x 2 x 1/4	A529-50 (50 ksi)
T6 140.00-120.00	Pipe	Rohn 2.875" x 0.276" (2.5 EH)	A572-50 (50 ksi)	Double Angle	2L 1.5 x 1.5 x 1/8 (3/16)	A36 (36 ksi)
T7 120.00-100.00	Pipe	ROHN 3 EH	A572-50 (50 ksi)	Double Angle	2L 2 x 2 x 3/16 (3/16)	A36 (36 ksi)
T8 100.00-80.00	Grouted Pipe	Rohn 4" x 0.318" (3.5 EH)	A572-50 (50 ksi)	Double Angle	2L 2.5 x 2.5 x 3/16 (3/16)	A36 (36 ksi)
T9 80.00-60.00	Grouted Pipe	ROHN 4 EH	A572-50 (50 ksi)	Double Angle	2L 3 x 3 x 3/16 (1/4)	A36 (36 ksi)
T10 60.00-40.00	Grouted Pipe	Rohn 5.563" x 0.375" (5 EH)	A572-50 (50 ksi)	Double Angle	2L 3 x 3 x 3/16 (1/4)	A36 (36 ksi)
T11 40.00-20.00	Grouted Pipe	Rohn 5.563" x 0.375" (5 EH)	A572-50 (50 ksi)	Double Angle	2L 3 x 3 x 1/4 (1/4)	A36 (36 ksi)
T12 20.00-0.00	Grouted Pipe	Rohn 6.625" x 0.432" (6 EH)	A572-50 (50 ksi)	Double Angle	2L 3.5 x 3.5 x 1/4 (1/4)	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 160.00-156.00	Equal Angle	L 2 x 2 x 1/8	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T6 140.00-120.00	Equal Angle	L 2 x 2 x 1/8	A36 (36 ksi)	Single Angle		A36 (36 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	Gusset Area (per face) ft ²	Gusset Thickness in	Gusset Grade	Adjust. Factor A _r	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 160.00-156.00	0.00	0.19	A36 (36 ksi)	1.03	1	1.05	30.00	30.00	36.00
T2 156.00-152.00	0.00	0.19	A36 (36 ksi)	1.03	1	1.05	30.00	30.00	36.00
T3 152.00-148.00	0.00	0.19	A36 (36 ksi)	1.03	1	1.05	30.00	30.00	36.00
T4 148.00-	0.00	0.19	A36	1.03	1	1.05	30.00	30.00	36.00

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A_r	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
ft	ft ²	in							
144.00			(36 ksi)						
T5 144.00-140.00	0.00	0.19	A36	1.03	1	1.05	30.00	30.00	36.00
T6 140.00-120.00	0.00	0.19	(36 ksi) A36	1.03	1	1.05	Mid-Pt	30.00	36.00
T7 120.00-100.00	0.00	0.19	(36 ksi) A36	1.03	1	1.05	Mid-Pt	30.00	36.00
T8 100.00-80.00	0.00	0.44	(36 ksi) A36	1.03	1	1.05	Mid-Pt	30.00	36.00
T9 80.00-60.00	0.00	0.44	(36 ksi) A36	1.03	1	1.05	Mid-Pt	30.00	36.00
T10 60.00-40.00	0.00	0.25	(36 ksi) A36	1.03	1	1.05	Mid-Pt	30.00	36.00
T11 40.00-20.00	0.00	0.25	(36 ksi) A36	1.03	1	1.05	Mid-Pt	30.00	36.00
T12 20.00-0.00	0.00	0.25	(36 ksi) A36	1.03	1	1.05	Mid-Pt	30.00	36.00

Tower Section Geometry (cont'd)

Tower Elevation	Calc K Single Angles	Calc K Solid Rounds	Legs	K Factors ¹						
				X Brace Diags	K Brace Diags	Single Diags	Girts	Horiz.	Sec. Horiz.	Inner Brace
				X Y	X Y	X Y	X Y	X Y	X Y	X Y
ft										
T1 160.00-156.00	Yes	No	1	1	1	1	1	1	1	1
T2 156.00-152.00	Yes	No	1	1	1	1	1	1	1	1
T3 152.00-148.00	Yes	No	1	1	1	1	1	1	1	1
T4 148.00-144.00	Yes	No	1	1	1	1	1	1	1	1
T5 144.00-140.00	Yes	No	1	1	1	1	1	1	1	1
T6 140.00-120.00	Yes	No	1	1	1	1	1	1	1	1
T7 120.00-100.00	Yes	No	1	1	1	1	1	1	1	1
T8 100.00-80.00	Yes	No	1	1	1	1	1	1	1	1
T9 80.00-60.00	Yes	No	1	1	1	1	1	1	1	1
T10 60.00-40.00	Yes	No	1	1	1	1	1	1	1	1
T11 40.00-20.00	Yes	No	1	1	1	1	1	1	1	1
T12 20.00-0.00	Yes	No	1	1	1	1	1	1	1	1

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

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 160.00-156.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T2 156.00-152.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T3 152.00-148.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T4 148.00-144.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T5 144.00-140.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T6 140.00-120.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T7 120.00-100.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T8 100.00-80.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T9 80.00-60.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T10 60.00-40.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T11 40.00-20.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T12 20.00-0.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75

Tower Elevation ft	Redundant Horizontal		Redundant Diagonal		Redundant Sub-Diagonal		Redundant Sub-Horizontal		Redundant Vertical		Redundant Hip		Redundant Hip Diagonal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 160.00-156.00	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T2 156.00-152.00	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T3 152.00-148.00	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T4 148.00-144.00	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T5 144.00-140.00	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T6 140.00-120.00	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T7 120.00-100.00	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T8 100.00-80.00	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T9 80.00-60.00	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T10 60.00-40.00	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T11 40.00-20.00	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T12 20.00-0.00	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75

Tower Section Geometry (cont'd)

Tower Elevation ft	Connection Offsets							
	Diagonal				K-Bracing			
	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.
	in	in	in	in	in	in	in	in
T1 160.00-156.00	2.50	3.50	2.50	3.50	0.00	0.00	0.00	0.00
T2 156.00-152.00	2.50	3.50	2.50	3.50	0.00	0.00	0.00	0.00
T3 152.00-148.00	2.50	3.50	2.50	3.50	0.00	0.00	0.00	0.00
T4 148.00-144.00	2.50	3.50	2.50	3.50	0.00	0.00	0.00	0.00
T5 144.00-140.00	2.50	3.50	2.50	3.50	0.00	0.00	0.00	0.00
T6 140.00-120.00	2.50	4.40	2.50	4.40	0.00	0.00	0.00	0.00
T7 120.00-100.00	2.50	4.90	2.50	4.90	0.00	0.00	0.00	0.00
T8 100.00-80.00	2.50	4.90	2.50	4.90	0.00	0.00	0.00	0.00
T9 80.00-60.00	2.50	4.80	2.50	4.80	0.00	0.00	0.00	0.00
T10 60.00-40.00	2.50	5.30	2.50	5.30	0.00	0.00	0.00	0.00
T11 40.00-20.00	2.50	5.40	2.50	5.40	0.00	0.00	0.00	0.00
T12 20.00-0.00	2.50	5.40	2.50	5.40	0.00	0.00	0.00	0.00

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	No.	Bolt Size	No.	Bolt Size	No.	Bolt Size	No.	Bolt Size	No.	Bolt Size	No.	Bolt Size	No.
		in		in		in		in		in		in		in	
T1 160.00-156.00	Flange	0.63	4	0.50	1	0.50	1	0.00	0	0.63	0	0.63	0	0.63	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T2 156.00-152.00	Flange	0.63	0	0.50	1	0.63	0	0.00	0	0.63	0	0.63	0	0.63	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T3 152.00-148.00	Flange	0.63	0	0.50	1	0.63	0	0.00	0	0.63	0	0.63	0	0.63	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T4 148.00-144.00	Flange	0.63	0	0.50	1	0.63	0	0.00	0	0.63	0	0.63	0	0.63	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T5 144.00-140.00	Flange	0.63	0	0.50	1	0.63	0	0.63	0	0.63	0	0.63	0	0.63	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T6 140.00-120.00	Flange	0.63	4	0.50	1	0.50	1	0.63	0	0.63	0	0.63	0	0.63	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T7 120.00-100.00	Flange	0.75	4	0.50	1	0.63	0	0.63	0	0.63	0	0.63	0	0.63	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T8 100.00-80.00	Flange	0.88	4	0.50	1	0.63	0	0.63	0	0.63	0	0.63	0	0.50	1
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T9 80.00-60.00	Flange	1.00	6	0.50	1	0.63	0	0.63	0	0.63	0	0.63	0	0.50	1
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T10 60.00-40.00	Flange	1.00	6	0.63	1	0.63	0	0.63	0	0.63	0	0.63	0	0.63	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T11 40.00-20.00	Flange	1.00	6	0.63	1	0.63	0	0.63	0	0.63	0	0.63	0	0.50	1
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T12 20.00-0.00	Flange	1.00	6	0.63	1	0.63	0	0.63	0	0.63	0	0.63	0	0.63	0
		A449		A325N		A325N		A325N		A325N		A325N		A325N	

Grouted Pipe Properties

Size	F_y ksi	A_s in ²	A_c in ²	W/t plf	E_c ksi	E_m ksi	F_{ym} ksi
Rohn 4" x 0.318" (3.5 EH) (GR)	50	3.68	8.89	31	4769	38218	64
ROHN 4 EH (GR)	50	4.41	11.50	39	4769	38952	66
Rohn 5.563" x 0.375" (5 EH) (GR)	50	6.11	18.19	59	4769	40357	68
Rohn 6.625" x 0.432" (6 EH) (GR)	50	8.40	26.07	83	4769	40832	68

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Componen t Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacin g in	Width or Diameter in	Perimete r in	Weight plf
FACE A													
HB158- 21U6S24- xxM_TMO(1- 5/8)	A	No	No	Ar (CaAa)	144.00 - 0.00	0.00	0.4	4	4	0.50	2.00		3
1.5" flat Cable Ladder Rail ***	A	No	No	Af (CaAa)	150.00 - 0.00	0.00	0.42	1	1	12.00 1.50	1.50		2
FACE B													
LDF5- 50A(7/8)	B	No	No	Ar (CaAa)	157.00 - 0.00	0.00	0.45	8	8	0.50	1.09		0
HB158-1- 08U8- S8J18(1-5/8)	B	No	No	Ar (CaAa)	157.00 - 0.00	0.00	0.4	1	1	0.50	1.98		1
1.5" flat Cable Ladder Rail ***	B	No	No	Af (CaAa)	160.00 - 0.00	0.00	0.42	1	1	12.00 1.50	1.50		2
FACE C													
HB114-1- 08U4-M5F(1- 1/4)	C	No	No	Ar (CaAa)	109.00 - 0.00	0.00	-0.42	1	1	1.54	1.54		1
LDF4- 50A(1/2)	C	No	No	Ar (CaAa)	50.00 - 0.00	0.00	-0.4	1	1	0.63	0.63		0
1.5" flat Cable Ladder Rail ***	C	No	No	Af (CaAa)	150.00 - 0.00	0.00	-0.4	1	1	12.00 1.50	1.50		2
LEG C													
LDF5- 50A(7/8")	C	No	No	Ar (CaAa)	90.00 - 0.00	-2.00	0.45	12	4	0.50	1.09		0
2" (Nominal) Conduit	C	No	No	Ar (CaAa)	90.00 - 0.00	-2.00	0.45	1	1	2.38	2.38		1
FB-L98B- 002- 75000(3/8)	C	No	No	Ar (CaAa)	90.00 - 0.00	-2.00	0.45	1	1	0.39	0.39		0
WR- VG122ST- BRDA(7/16)	C	No	No	Ar (CaAa)	90.00 - 0.00	-2.00	0.45	2	2	0.46	0.46		0
T-Brackets (Af) ***	C	No	No	Af (CaAa)	90.00 - 0.00	-2.00	0.45	1	1	1.00	1.00		8
Safety Line 3/8 ***	B	No	No	Ar (CaAa)	160.00 - 0.00	0.00	0.5	1	1	0.38	0.38		0
CU12PSM9P 6XXX(1-1/2)	B	No	No	Ar (CaAa)	124.00 - 0.00	0.00	-0.5	1	1	1.60	1.60		2

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	C _A A _A ft ² /ft	Weight plf

Feed Line/Linear Appurtenances Section Areas

Tower Section n	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
T1	160.00-156.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	2.220	0.000	0.01
		C	0.000	0.000	0.000	0.000	0.00
T2	156.00-152.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	5.430	0.000	0.02
		C	0.000	0.000	0.000	0.000	0.00
T3	152.00-148.00	A	0.000	0.000	0.500	0.000	0.00
		B	0.000	0.000	5.430	0.000	0.02
		C	0.000	0.000	0.500	0.000	0.00
T4	148.00-144.00	A	0.000	0.000	1.000	0.000	0.01
		B	0.000	0.000	5.430	0.000	0.02
		C	0.000	0.000	1.000	0.000	0.01
T5	144.00-140.00	A	0.000	0.000	4.194	0.000	0.05
		B	0.000	0.000	5.430	0.000	0.02
		C	0.000	0.000	1.000	0.000	0.01
T6	140.00-120.00	A	0.000	0.000	20.968	0.000	0.24
		B	0.000	0.000	27.790	0.000	0.13
		C	0.000	0.000	5.000	0.000	0.04
T7	120.00-100.00	A	0.000	0.000	20.968	0.000	0.24
		B	0.000	0.000	30.350	0.000	0.17
		C	0.000	0.000	6.386	0.000	0.05
T8	100.00-80.00	A	0.000	0.000	20.968	0.000	0.24
		B	0.000	0.000	30.350	0.000	0.17
		C	0.000	0.000	26.515	0.000	0.20
T9	80.00-60.00	A	0.000	0.000	20.968	0.000	0.24
		B	0.000	0.000	30.350	0.000	0.17
		C	0.000	0.000	44.951	0.000	0.33
T10	60.00-40.00	A	0.000	0.000	20.968	0.000	0.24
		B	0.000	0.000	30.350	0.000	0.17
		C	0.000	0.000	45.581	0.000	0.33
T11	40.00-20.00	A	0.000	0.000	20.968	0.000	0.24
		B	0.000	0.000	30.350	0.000	0.17
		C	0.000	0.000	46.211	0.000	0.33
T12	20.00-0.00	A	0.000	0.000	20.968	0.000	0.24
		B	0.000	0.000	30.350	0.000	0.17
		C	0.000	0.000	46.211	0.000	0.33

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section n	Tower Elevation ft	Face or Leg	Ice Thickness in	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
T1	160.00-156.00	A	1.491	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	5.999	0.000	0.08

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft ²	A_F ft ²	C_{AA} In Face ft ²	C_{AA} Out Face ft ²	Weight K
T2	156.00-152.00	C	1.487	0.000	0.000	0.000	0.000	0.00
		A		0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	13.376	0.000	0.17
T3	152.00-148.00	C	1.483	0.000	0.000	0.000	0.000	0.00
		A		0.000	0.000	1.093	0.000	0.02
		B		0.000	0.000	13.362	0.000	0.17
T4	148.00-144.00	C	1.479	0.000	0.000	1.093	0.000	0.02
		A		0.000	0.000	2.184	0.000	0.03
		B		0.000	0.000	13.347	0.000	0.17
T5	144.00-140.00	C	1.475	0.000	0.000	2.184	0.000	0.03
		A		0.000	0.000	8.871	0.000	0.14
		B		0.000	0.000	13.333	0.000	0.17
T6	140.00-120.00	C	1.462	0.000	0.000	2.180	0.000	0.03
		A		0.000	0.000	44.221	0.000	0.70
		B		0.000	0.000	68.238	0.000	0.86
T7	120.00-100.00	C	1.438	0.000	0.000	10.849	0.000	0.17
		A		0.000	0.000	43.967	0.000	0.70
		B		0.000	0.000	74.942	0.000	0.97
T8	100.00-80.00	C	1.410	0.000	0.000	14.727	0.000	0.22
		A		0.000	0.000	43.668	0.000	0.68
		B		0.000	0.000	74.310	0.000	0.95
T9	80.00-60.00	C	1.375	0.000	0.000	52.917	0.000	0.80
		A		0.000	0.000	43.301	0.000	0.67
		B		0.000	0.000	73.537	0.000	0.92
T10	60.00-40.00	C	1.329	0.000	0.000	85.286	0.000	1.27
		A		0.000	0.000	42.825	0.000	0.66
		B		0.000	0.000	72.533	0.000	0.89
T11	40.00-20.00	C	1.263	0.000	0.000	87.026	0.000	1.27
		A		0.000	0.000	42.134	0.000	0.63
		B		0.000	0.000	71.073	0.000	0.85
T12	20.00-0.00	C	1.132	0.000	0.000	87.796	0.000	1.24
		A		0.000	0.000	40.764	0.000	0.59
		B		0.000	0.000	68.179	0.000	0.76
		C		0.000	0.000	82.798	0.000	1.13

Feed Line Center of Pressure

Section	Elevation ft	CP_x in	CP_z in	CP_x Ice in	CP_z Ice in
T1	160.00-156.00	3.15	2.08	5.40	3.14
T2	156.00-152.00	8.22	5.64	10.57	6.45
T3	152.00-148.00	8.46	5.04	10.79	5.54
T4	148.00-144.00	8.69	4.49	10.97	4.73
T5	144.00-140.00	6.59	-1.83	9.18	-0.63
T6	140.00-120.00	7.89	-2.46	10.48	-1.18
T7	120.00-100.00	9.16	-3.59	12.79	-2.66
T8	100.00-80.00	4.67	-0.85	8.58	0.51
T9	80.00-60.00	0.64	1.15	4.11	2.86
T10	60.00-40.00	1.01	1.58	5.50	3.86
T11	40.00-20.00	1.32	1.90	6.52	4.66
T12	20.00-0.00	1.29	1.91	6.17	4.58

Shielding Factor K_a

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	8	LDF5-50A(7/8)	156.00 -	0.6000	0.5889

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice
T1	9	HB158-1-08U8-S8J18(1-5/8)	157.00 156.00 - 157.00	0.6000	0.5889
T1	10	1.5" flat Cable Ladder Rail	156.00 - 160.00	0.6000	0.5889
T1	24	Safety Line 3/8	156.00 - 160.00	0.6000	0.5889
T2	8	LDF5-50A(7/8)	152.00 - 156.00	0.6000	0.6000
T2	9	HB158-1-08U8-S8J18(1-5/8)	152.00 - 156.00	0.6000	0.6000
T2	10	1.5" flat Cable Ladder Rail	152.00 - 156.00	0.6000	0.6000
T2	24	Safety Line 3/8	152.00 - 156.00	0.6000	0.6000
T3	5	1.5" flat Cable Ladder Rail	148.00 - 150.00	0.6000	0.6000
T3	8	LDF5-50A(7/8)	148.00 - 152.00	0.6000	0.6000
T3	9	HB158-1-08U8-S8J18(1-5/8)	148.00 - 152.00	0.6000	0.6000
T3	10	1.5" flat Cable Ladder Rail	148.00 - 152.00	0.6000	0.6000
T3	15	1.5" flat Cable Ladder Rail	148.00 - 150.00	0.6000	0.6000
T3	24	Safety Line 3/8	148.00 - 152.00	0.6000	0.6000
T4	5	1.5" flat Cable Ladder Rail	144.00 - 148.00	0.6000	0.6000
T4	8	LDF5-50A(7/8)	144.00 - 148.00	0.6000	0.6000
T4	9	HB158-1-08U8-S8J18(1-5/8)	144.00 - 148.00	0.6000	0.6000
T4	10	1.5" flat Cable Ladder Rail	144.00 - 148.00	0.6000	0.6000
T4	15	1.5" flat Cable Ladder Rail	144.00 - 148.00	0.6000	0.6000
T4	24	Safety Line 3/8	144.00 - 148.00	0.6000	0.6000
T5	2	HB158-21U6S24-xxM_TMO(1-5/8)	140.00 - 144.00	0.6000	0.6000
T5	5	1.5" flat Cable Ladder Rail	140.00 - 144.00	0.6000	0.6000
T5	8	LDF5-50A(7/8)	140.00 - 144.00	0.6000	0.6000
T5	9	HB158-1-08U8-S8J18(1-5/8)	140.00 - 144.00	0.6000	0.6000
T5	10	1.5" flat Cable Ladder Rail	140.00 - 144.00	0.6000	0.6000
T5	15	1.5" flat Cable Ladder Rail	140.00 - 144.00	0.6000	0.6000
T5	24	Safety Line 3/8	140.00 - 144.00	0.6000	0.6000
T6	2	HB158-21U6S24-xxM_TMO(1-5/8)	120.00 - 140.00	0.6000	0.6000
T6	5	1.5" flat Cable Ladder Rail	120.00 - 140.00	0.6000	0.6000
T6	8	LDF5-50A(7/8)	120.00 - 140.00	0.6000	0.6000
T6	9	HB158-1-08U8-S8J18(1-5/8)	120.00 - 140.00	0.6000	0.6000
T6	10	1.5" flat Cable Ladder Rail	120.00 - 140.00	0.6000	0.6000
T6	15	1.5" flat Cable Ladder Rail	120.00 - 140.00	0.6000	0.6000
T6	24	Safety Line 3/8	120.00 - 140.00	0.6000	0.6000
T6	29	CU12PSM9P6XXX(1-1/2)	120.00 - 124.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice
T7	2	HB158-21U6S24-xxM_TMO(1-5/8)	100.00 - 120.00	0.6000	0.6000
T7	5	1.5" flat Cable Ladder Rail	100.00 - 120.00	0.6000	0.6000
T7	8	LDF5-50A(7/8)	100.00 - 120.00	0.6000	0.6000
T7	9	HB158-1-08U8-S8J18(1-5/8)	100.00 - 120.00	0.6000	0.6000
T7	10	1.5" flat Cable Ladder Rail	100.00 - 120.00	0.6000	0.6000
T7	13	HB114-1-08U4-M5F(1-1/4)	100.00 - 109.00	0.6000	0.6000
T7	15	1.5" flat Cable Ladder Rail	100.00 - 120.00	0.6000	0.6000
T7	24	Safety Line 3/8	100.00 - 120.00	0.6000	0.6000
T7	29	CU12PSM9P6XXX(1-1/2)	100.00 - 120.00	0.6000	0.6000
T8	2	HB158-21U6S24-xxM_TMO(1-5/8)	80.00 - 100.00	0.6000	0.6000
T8	5	1.5" flat Cable Ladder Rail	80.00 - 100.00	0.6000	0.6000
T8	8	LDF5-50A(7/8)	80.00 - 100.00	0.6000	0.6000
T8	9	HB158-1-08U8-S8J18(1-5/8)	80.00 - 100.00	0.6000	0.6000
T8	10	1.5" flat Cable Ladder Rail	80.00 - 100.00	0.6000	0.6000
T8	13	HB114-1-08U4-M5F(1-1/4)	80.00 - 100.00	0.6000	0.6000
T8	15	1.5" flat Cable Ladder Rail	80.00 - 100.00	0.6000	0.6000
T8	18	LDF5-50A(7/8")	80.00 - 90.00	0.6000	0.6000
T8	19	2" (Nominal) Conduit	80.00 - 90.00	0.6000	0.6000
T8	20	FB-L98B-002-75000(3/8)	80.00 - 90.00	0.0000	0.0000
T8	21	WR-VG122ST-BRDA(7/16)	80.00 - 90.00	0.0000	0.0000
T8	22	T-Brackets (Af)	80.00 - 90.00	0.6000	0.6000
T8	24	Safety Line 3/8	80.00 - 100.00	0.6000	0.6000
T8	29	CU12PSM9P6XXX(1-1/2)	80.00 - 100.00	0.6000	0.6000
T9	2	HB158-21U6S24-xxM_TMO(1-5/8)	60.00 - 80.00	0.6000	0.6000
T9	5	1.5" flat Cable Ladder Rail	60.00 - 80.00	0.6000	0.6000
T9	8	LDF5-50A(7/8)	60.00 - 80.00	0.6000	0.6000
T9	9	HB158-1-08U8-S8J18(1-5/8)	60.00 - 80.00	0.6000	0.6000
T9	10	1.5" flat Cable Ladder Rail	60.00 - 80.00	0.6000	0.6000
T9	13	HB114-1-08U4-M5F(1-1/4)	60.00 - 80.00	0.6000	0.6000
T9	15	1.5" flat Cable Ladder Rail	60.00 - 80.00	0.6000	0.6000
T9	18	LDF5-50A(7/8")	60.00 - 80.00	0.6000	0.6000
T9	19	2" (Nominal) Conduit	60.00 - 80.00	0.6000	0.6000
T9	20	FB-L98B-002-75000(3/8)	60.00 - 80.00	0.0000	0.0000
T9	21	WR-VG122ST-BRDA(7/16)	60.00 - 80.00	0.0000	0.0000
T9	22	T-Brackets (Af)	60.00 -	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice
T9	24	Safety Line 3/8	80.00 60.00 - 80.00	0.6000	0.6000
T9	29	CU12PSM9P6XXX(1-1/2)	60.00 - 80.00	0.6000	0.6000
T10	2	HB158-21U6S24-xxM_TMO(1-5/8)	40.00 - 60.00	0.6000	0.6000
T10	5	1.5" flat Cable Ladder Rail	40.00 - 60.00	0.6000	0.6000
T10	8	LDF5-50A(7/8)	40.00 - 60.00	0.6000	0.6000
T10	9	HB158-1-08U8-S8J18(1-5/8)	40.00 - 60.00	0.6000	0.6000
T10	10	1.5" flat Cable Ladder Rail	40.00 - 60.00	0.6000	0.6000
T10	13	HB114-1-08U4-M5F(1-1/4)	40.00 - 60.00	0.6000	0.6000
T10	14	LDF4-50A(1/2)	40.00 - 50.00	0.6000	0.6000
T10	15	1.5" flat Cable Ladder Rail	40.00 - 60.00	0.6000	0.6000
T10	18	LDF5-50A(7/8")	40.00 - 60.00	0.6000	0.6000
T10	19	2" (Nominal) Conduit	40.00 - 60.00	0.6000	0.6000
T10	20	FB-L98B-002-75000(3/8)	40.00 - 60.00	0.0000	0.0000
T10	21	WR-VG122ST-BRDA(7/16)	40.00 - 60.00	0.0000	0.0000
T10	22	T-Brackets (Af)	40.00 - 60.00	0.6000	0.6000
T10	24	Safety Line 3/8	40.00 - 60.00	0.6000	0.6000
T10	29	CU12PSM9P6XXX(1-1/2)	40.00 - 60.00	0.6000	0.6000
T11	2	HB158-21U6S24-xxM_TMO(1-5/8)	20.00 - 40.00	0.6000	0.6000
T11	5	1.5" flat Cable Ladder Rail	20.00 - 40.00	0.6000	0.6000
T11	8	LDF5-50A(7/8)	20.00 - 40.00	0.6000	0.6000
T11	9	HB158-1-08U8-S8J18(1-5/8)	20.00 - 40.00	0.6000	0.6000
T11	10	1.5" flat Cable Ladder Rail	20.00 - 40.00	0.6000	0.6000
T11	13	HB114-1-08U4-M5F(1-1/4)	20.00 - 40.00	0.6000	0.6000
T11	14	LDF4-50A(1/2)	20.00 - 40.00	0.6000	0.6000
T11	15	1.5" flat Cable Ladder Rail	20.00 - 40.00	0.6000	0.6000
T11	18	LDF5-50A(7/8")	20.00 - 40.00	0.6000	0.6000
T11	19	2" (Nominal) Conduit	20.00 - 40.00	0.6000	0.6000
T11	20	FB-L98B-002-75000(3/8)	20.00 - 40.00	0.0000	0.0000
T11	21	WR-VG122ST-BRDA(7/16)	20.00 - 40.00	0.0000	0.0000
T11	22	T-Brackets (Af)	20.00 - 40.00	0.6000	0.6000
T11	24	Safety Line 3/8	20.00 - 40.00	0.6000	0.6000
T11	29	CU12PSM9P6XXX(1-1/2)	20.00 - 40.00	0.6000	0.6000
T12	2	HB158-21U6S24-xxM_TMO(1-5/8)	0.00 - 20.00	0.6000	0.6000
T12	5	1.5" flat Cable Ladder Rail	0.00 - 20.00	0.6000	0.6000
T12	8	LDF5-50A(7/8)	0.00 - 20.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice
T12	9	HB158-1-08U8-S8J18(1-5/8)	0.00 - 20.00	0.6000	0.6000
T12	10	1.5" flat Cable Ladder Rail	0.00 - 20.00	0.6000	0.6000
T12	13	HB114-1-08U4-M5F(1-1/4)	0.00 - 20.00	0.6000	0.6000
T12	14	LDF4-50A(1/2)	0.00 - 20.00	0.6000	0.6000
T12	15	1.5" flat Cable Ladder Rail	0.00 - 20.00	0.6000	0.6000
T12	18	LDF5-50A(7/8")	0.00 - 20.00	0.6000	0.6000
T12	19	2" (Nominal) Conduit	0.00 - 20.00	0.6000	0.6000
T12	20	FB-L98B-002-75000(3/8)	0.00 - 20.00	0.0000	0.0000
T12	21	WR-VG122ST-BRDA(7/16)	0.00 - 20.00	0.0000	0.0000
T12	22	T-Brackets (Af)	0.00 - 20.00	0.6000	0.6000
T12	24	Safety Line 3/8	0.00 - 20.00	0.6000	0.6000
T12	29	CU12PSM9P6XXX(1-1/2)	0.00 - 20.00	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustmen t °	Placement ft		C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K
(2) LPA-80080/6CF w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.00	157.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.56 5.11 5.61 6.65	10.26 11.43 12.31 14.13	0.05 0.11 0.19 0.36
(2) LPA-80080/6CF w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.00	157.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.56 5.11 5.61 6.65	10.26 11.43 12.31 14.13	0.05 0.11 0.19 0.36
(2) LPA-80080/6CF w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.00	157.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.56 5.11 5.61 6.65	10.26 11.43 12.31 14.13	0.05 0.11 0.19 0.36
(2) JAHH-65B-R3B w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.00	157.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.50 5.97 6.45 7.44	4.38 4.84 5.30 6.26	0.10 0.17 0.25 0.46
(2) JAHH-65B-R3B w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.00	157.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.50 5.97 6.45 7.44	4.38 4.84 5.30 6.26	0.10 0.17 0.25 0.46
(2) JAHH-65B-R3B w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.00	157.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.50 5.97 6.45 7.44	4.38 4.84 5.30 6.26	0.10 0.17 0.25 0.46
B66A RRH4X45	A	From Leg	4.00 0.00 0.00	0.00	157.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.58 2.79 3.01 3.48	1.63 1.81 2.00 2.40	0.07 0.09 0.11 0.17
B66A RRH4X45	B	From Leg	4.00 0.00 0.00	0.00	157.00	No Ice 1/2" Ice 1" Ice	2.58 2.79 3.01 3.48	1.63 1.81 2.00 2.40	0.07 0.09 0.11 0.17

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustmen t °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
B66A RRH4X45	C	From Leg	4.00 0.00 0.00	0.00	157.00	2" Ice No Ice 1/2" Ice 1" Ice	2.58 2.79 3.01 3.48	1.63 1.81 2.00 2.40	0.07 0.09 0.11 0.17
AHCA	A	From Leg	4.00 0.00 0.00	0.00	157.00	2" Ice No Ice 1/2" Ice 1" Ice	1.29 1.43 1.58 1.90	0.72 0.83 0.96 1.22	0.04 0.05 0.06 0.09
AHCA	B	From Leg	4.00 0.00 0.00	0.00	157.00	2" Ice No Ice 1/2" Ice 1" Ice	1.29 1.43 1.58 1.90	0.72 0.83 0.96 1.22	0.04 0.05 0.06 0.09
AHCA	C	From Leg	4.00 0.00 0.00	0.00	157.00	2" Ice No Ice 1/2" Ice 1" Ice	1.29 1.43 1.58 1.90	0.72 0.83 0.96 1.22	0.04 0.05 0.06 0.09
RC3DC-3315-PF-48	A	From Leg	4.00 0.00 0.00	0.00	157.00	2" Ice No Ice 1/2" Ice 1" Ice	3.79 4.04 4.30 4.84	2.51 2.72 2.94 3.41	0.03 0.06 0.10 0.18
B13 RRH 4X30	A	From Leg	4.00 0.00 0.00	0.00	157.00	2" Ice No Ice 1/2" Ice 1" Ice	2.06 2.24 2.43 2.84	1.32 1.48 1.64 2.00	0.06 0.07 0.09 0.14
B13 RRH 4X30	B	From Leg	4.00 0.00 0.00	0.00	157.00	2" Ice No Ice 1/2" Ice 1" Ice	2.06 2.24 2.43 2.84	1.32 1.48 1.64 2.00	0.06 0.07 0.09 0.14
B13 RRH 4X30	C	From Leg	4.00 0.00 0.00	0.00	157.00	2" Ice No Ice 1/2" Ice 1" Ice	2.06 2.24 2.43 2.84	1.32 1.48 1.64 2.00	0.06 0.07 0.09 0.14
Sitepro VFA12-HD Sector Mount (3)	C	None		0.00	157.00	2" Ice No Ice 1/2" Ice 1" Ice	25.20 38.36 51.52 77.84	25.20 38.36 51.52 77.84	1.97 2.41 2.85 3.73
2.4" Dia. x 6-ft	A	From Leg	4.00 0.00 0.00	0.00	157.00	2" Ice No Ice 1/2" Ice 1" Ice	1.43 1.92 2.29 3.06	1.43 1.92 2.29 3.06	0.02 0.03 0.05 0.09
2.4" Dia. x 6-ft	B	From Leg	4.00 0.00 0.00	0.00	157.00	2" Ice No Ice 1/2" Ice 1" Ice	1.43 1.92 2.29 3.06	1.43 1.92 2.29 3.06	0.02 0.03 0.05 0.09
2.4" Dia. x 6-ft	C	From Leg	4.00 0.00 0.00	0.00	157.00	2" Ice No Ice 1/2" Ice 1" Ice	1.43 1.92 2.29 3.06	1.43 1.92 2.29 3.06	0.02 0.03 0.05 0.09
*** APX16DWV-16DWV-S-E- A20 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.00	144.00	No Ice 1/2" Ice	6.29 6.86 7.45	2.76 3.27 3.79	0.06 0.11 0.16

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustmen t °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
APX16DWV-16DWV-S-E- A20 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.00	144.00	1" Ice	8.68	4.90	0.29
						2" Ice			
						No Ice	6.29	2.76	0.06
						1/2" Ice	6.86	3.27	0.11
APX16DWV-16DWV-S-E- A20 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.00	144.00	1" Ice	7.45	3.79	0.16
						2" Ice	8.68	4.90	0.29
						No Ice	6.29	2.76	0.06
						1/2" Ice	6.86	3.27	0.11
APXVAALL24_43-U- NA20_TMO w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.00	144.00	1" Ice	7.45	3.79	0.16
						2" Ice	8.68	4.90	0.29
						No Ice	14.69	6.87	0.18
						1/2" Ice	15.46	7.55	0.31
APXVAALL24_43-U- NA20_TMO w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.00	144.00	1" Ice	16.23	8.25	0.45
						2" Ice	17.82	9.67	0.78
						No Ice	14.69	6.87	0.18
						1/2" Ice	15.46	7.55	0.31
APXVAALL24_43-U- NA20_TMO w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.00	144.00	1" Ice	16.23	8.25	0.45
						2" Ice	17.82	9.67	0.78
						No Ice	14.69	6.87	0.18
						1/2" Ice	15.46	7.55	0.31
AIR6449 B41_T-MOBILE w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.00	144.00	1" Ice	16.23	8.25	0.45
						2" Ice	17.82	9.67	0.78
						No Ice	5.19	2.71	0.13
						1/2" Ice	5.59	3.04	0.17
AIR6449 B41_T-MOBILE w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.00	144.00	1" Ice	6.02	3.38	0.23
						2" Ice	6.90	4.12	0.35
						No Ice	5.19	2.71	0.13
						1/2" Ice	5.59	3.04	0.17
AIR6449 B41_T-MOBILE w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.00	144.00	1" Ice	6.02	3.38	0.23
						2" Ice	6.90	4.12	0.35
						No Ice	5.19	2.71	0.13
						1/2" Ice	5.59	3.04	0.17
RADIO 4415 B66A_CCIV3	A	From Leg	4.00 0.00 0.00	0.00	144.00	1" Ice	6.02	3.38	0.23
						2" Ice	6.90	4.12	0.35
						No Ice	1.64	0.68	0.05
						1/2" Ice	1.80	0.79	0.06
RADIO 4415 B66A_CCIV3	B	From Leg	4.00 0.00 0.00	0.00	144.00	1" Ice	1.97	0.91	0.07
						2" Ice	2.32	1.18	0.11
						No Ice	1.64	0.68	0.05
						1/2" Ice	1.80	0.79	0.06
RADIO 4415 B66A_CCIV3	C	From Leg	4.00 0.00 0.00	0.00	144.00	1" Ice	1.97	0.91	0.07
						2" Ice	2.32	1.18	0.11
						No Ice	1.64	0.68	0.05
						1/2" Ice	1.80	0.79	0.06
RADIO 4449 B71 B85A_T- MOBILE	A	From Leg	4.00 0.00 0.00	0.00	144.00	1" Ice	1.97	0.91	0.07
						2" Ice	2.32	1.18	0.11
						No Ice	1.97	1.59	0.07
						1/2" Ice	2.15	1.75	0.09
RADIO 4449 B71 B85A_T- MOBILE	B	From Leg	4.00 0.00 0.00	0.00	144.00	1" Ice	2.33	1.92	0.12
						2" Ice	2.72	2.28	0.17
						No Ice	1.97	1.59	0.07
						1/2" Ice	2.15	1.75	0.09
RADIO 4449 B71 B85A_T- MOBILE	B	From Leg	4.00 0.00	0.00	144.00	1" Ice	2.33	1.92	0.12
						Ice			

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustmen t °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
						1" Ice	2.72	2.28	0.17
						2" Ice			
RADIO 4449 B71 B85A_T-MOBILE	C	From Leg	4.00	0.00	144.00	No Ice	1.97	1.59	0.07
			0.00			1/2"	2.15	1.75	0.09
			0.00			Ice	2.33	1.92	0.12
						1" Ice	2.72	2.28	0.17
						2" Ice			
RADIO 4424 B25_TMO	A	From Leg	4.00	0.00	144.00	No Ice	2.05	1.61	0.09
			0.00			1/2"	2.23	1.77	0.11
			0.00			Ice	2.42	1.94	0.13
						1" Ice	2.81	2.30	0.19
						2" Ice			
RADIO 4424 B25_TMO	B	From Leg	4.00	0.00	144.00	No Ice	2.05	1.61	0.09
			0.00			1/2"	2.23	1.77	0.11
			0.00			Ice	2.42	1.94	0.13
						1" Ice	2.81	2.30	0.19
						2" Ice			
RADIO 4424 B25_TMO	C	From Leg	4.00	0.00	144.00	No Ice	2.05	1.61	0.09
			0.00			1/2"	2.23	1.77	0.11
			0.00			Ice	2.42	1.94	0.13
						1" Ice	2.81	2.30	0.19
						2" Ice			
Sector Mount [SM 506-3]	C	None		0.00	144.00	No Ice	35.47	35.47	1.74
						1/2"	50.60	50.60	2.35
						Ice	65.73	65.73	2.95
						1" Ice	95.99	95.99	4.16
						2" Ice			
2.4" Dia. x 6-ft	A	From Leg	4.00	0.00	144.00	No Ice	1.43	1.43	0.02
			0.00			1/2"	1.92	1.92	0.03
			0.00			Ice	2.29	2.29	0.05
						1" Ice	3.06	3.06	0.09
						2" Ice			
2.4" Dia. x 6-ft	A	From Leg	4.00	0.00	144.00	No Ice	1.43	1.43	0.02
			0.00			1/2"	1.92	1.92	0.03
			0.00			Ice	2.29	2.29	0.05
						1" Ice	3.06	3.06	0.09
						2" Ice			
2.4" Dia. x 6-ft	A	From Leg	4.00	0.00	144.00	No Ice	1.43	1.43	0.02
			0.00			1/2"	1.92	1.92	0.03
			0.00			Ice	2.29	2.29	0.05
						1" Ice	3.06	3.06	0.09
						2" Ice			

MX08FRO665-20 w/ Mount Pipe	A	From Leg	4.00	0.00	124.00	No Ice	8.01	4.23	0.10
			0.00			1/2"	8.52	4.69	0.18
			0.00			Ice	9.04	5.16	0.28
						1" Ice	10.11	6.12	0.51
						2" Ice			
MX08FRO665-20 w/ Mount Pipe	B	From Leg	4.00	0.00	124.00	No Ice	8.01	4.23	0.10
			0.00			1/2"	8.52	4.69	0.18
			0.00			Ice	9.04	5.16	0.28
						1" Ice	10.11	6.12	0.51
						2" Ice			
MX08FRO665-20 w/ Mount Pipe	C	From Leg	4.00	0.00	124.00	No Ice	8.01	4.23	0.10
			0.00			1/2"	8.52	4.69	0.18
			0.00			Ice	9.04	5.16	0.28
						1" Ice	10.11	6.12	0.51
						2" Ice			
TA08025-B604	A	From Leg	4.00	0.00	124.00	No Ice	1.96	0.98	0.06
			0.00			1/2"	2.14	1.11	0.08
			0.00			Ice	2.32	1.25	0.10
						1" Ice	2.71	1.55	0.15
						2" Ice			
TA08025-B604	B	From Leg	4.00	0.00	124.00	No Ice	1.96	0.98	0.06
			0.00			1/2"	2.14	1.11	0.08

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustmen t °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
			0.00			Ice	2.32	1.25	0.10
						1" Ice	2.71	1.55	0.15
						2" Ice			
TA08025-B604	C	From Leg	4.00	0.00	124.00	No Ice	1.96	0.98	0.06
			0.00			1/2"	2.14	1.11	0.08
			0.00			Ice	2.32	1.25	0.10
						1" Ice	2.71	1.55	0.15
						2" Ice			
TA08025-B605	A	From Leg	4.00	0.00	124.00	No Ice	1.96	1.13	0.08
			0.00			1/2"	2.14	1.27	0.09
			0.00			Ice	2.32	1.41	0.11
						1" Ice	2.71	1.72	0.16
						2" Ice			
TA08025-B605	B	From Leg	4.00	0.00	124.00	No Ice	1.96	1.13	0.08
			0.00			1/2"	2.14	1.27	0.09
			0.00			Ice	2.32	1.41	0.11
						1" Ice	2.71	1.72	0.16
						2" Ice			
TA08025-B605	C	From Leg	4.00	0.00	124.00	No Ice	1.96	1.13	0.08
			0.00			1/2"	2.14	1.27	0.09
			0.00			Ice	2.32	1.41	0.11
						1" Ice	2.71	1.72	0.16
						2" Ice			
RDIDC-9181-PF-48	A	From Leg	4.00	0.00	124.00	No Ice	2.31	1.29	0.02
			0.00			1/2"	2.50	1.45	0.04
			0.00			Ice	2.70	1.61	0.06
						1" Ice	3.12	1.96	0.12
						2" Ice			
Commscope MTC3975083 (3)	C	None		0.00	124.00	No Ice	23.85	23.85	1.26
						1/2"	34.12	34.12	1.80
						Ice	44.39	44.39	2.35
						1" Ice	64.93	64.93	3.43
						2" Ice			
(2) 8' x 2" Mount Pipe	A	From Leg	4.00	0.00	124.00	No Ice	1.90	1.90	0.03
			0.00			1/2"	2.73	2.73	0.04
			0.00			Ice	3.40	3.40	0.06
						1" Ice	4.40	4.40	0.12
						2" Ice			
(2) 8' x 2" Mount Pipe	B	From Leg	4.00	0.00	124.00	No Ice	1.90	1.90	0.03
			0.00			1/2"	2.73	2.73	0.04
			0.00			Ice	3.40	3.40	0.06
						1" Ice	4.40	4.40	0.12
						2" Ice			
(2) 8' x 2" Mount Pipe	C	From Leg	4.00	0.00	124.00	No Ice	1.90	1.90	0.03
			0.00			1/2"	2.73	2.73	0.04
			0.00			Ice	3.40	3.40	0.06
						1" Ice	4.40	4.40	0.12
						2" Ice			
**									
(4) DB844H90E-XY w/ Mount Pipe	A	From Leg	4.00	0.00	118.00	No Ice	2.24	3.34	0.04
			0.00			1/2"	2.61	3.73	0.08
			0.00			Ice	2.99	4.13	0.12
						1" Ice	3.78	4.97	0.23
						2" Ice			
(4) DB844H90E-XY w/ Mount Pipe	B	From Leg	4.00	0.00	118.00	No Ice	2.24	3.34	0.04
			0.00			1/2"	2.61	3.73	0.08
			0.00			Ice	2.99	4.13	0.12
						1" Ice	3.78	4.97	0.23
						2" Ice			
(4) DB844H90E-XY w/ Mount Pipe	C	From Leg	4.00	0.00	118.00	No Ice	2.24	3.34	0.04
			0.00			1/2"	2.61	3.73	0.08
			0.00			Ice	2.99	4.13	0.12
						1" Ice	3.78	4.97	0.23
						2" Ice			
Sector Mount [SM 201-3]	C	None		0.00	118.00	No Ice	26.69	26.69	1.08

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustmen t °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
						1/2" Ice	37.60 48.51	37.60 48.51	1.49 1.90
						1" Ice	70.33	70.33	2.71
Pipe Mount [PM 601-3]	C	None		0.00	118.00	2" Ice			
						No Ice	4.39	4.39	0.20
						1/2"	5.48	5.48	0.24
						Ice	6.57	6.57	0.28
						1" Ice	8.75	8.75	0.36
						2" Ice			

PD1110	C	From Leg	0.00	0.00	109.00	No Ice	2.50	2.50	0.02
			0.00			1/2"	3.84	3.84	0.04
			6.00			Ice	5.20	5.20	0.07
						1" Ice	7.97	7.97	0.15
						2" Ice			
Side Arm Mount [SO 308-1]	C	From Leg	0.00	0.00	109.00	No Ice	0.98	3.03	0.05
			0.00			1/2"	1.70	5.22	0.08
			0.00			Ice	2.42	7.41	0.10
						1" Ice	3.86	11.79	0.16
						2" Ice			

(2) 7770.00 w/ Mount Pipe	A	From Leg	4.00	0.00	90.00	No Ice	5.75	4.25	0.06
			0.00			1/2"	6.18	5.01	0.10
			0.00			Ice	6.61	5.71	0.16
						1" Ice	7.49	7.16	0.29
						2" Ice			
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.00	0.00	90.00	No Ice	5.75	4.25	0.06
			0.00			1/2"	6.18	5.01	0.10
			0.00			Ice	6.61	5.71	0.16
						1" Ice	7.49	7.16	0.29
						2" Ice			
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.00	0.00	90.00	No Ice	5.75	4.25	0.06
			0.00			1/2"	6.18	5.01	0.10
			0.00			Ice	6.61	5.71	0.16
						1" Ice	7.49	7.16	0.29
						2" Ice			
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Leg	4.00	0.00	90.00	No Ice	4.63	3.27	0.07
			0.00			1/2"	5.06	3.69	0.13
			0.00			Ice	5.51	4.12	0.20
						1" Ice	6.43	5.00	0.38
						2" Ice			
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Leg	4.00	0.00	90.00	No Ice	4.63	3.27	0.07
			0.00			1/2"	5.06	3.69	0.13
			0.00			Ice	5.51	4.12	0.20
						1" Ice	6.43	5.00	0.38
						2" Ice			
P45-16-XLH-RR w/ Mount Pipe	C	From Leg	4.00	0.00	90.00	No Ice	8.24	4.83	0.04
			0.00			1/2"	8.70	5.57	0.10
			0.00			Ice	9.16	6.27	0.17
						1" Ice	10.09	7.67	0.34
						2" Ice			
(4) LGP21401	A	From Leg	4.00	0.00	90.00	No Ice	1.10	0.21	0.01
			0.00			1/2"	1.24	0.27	0.02
			0.00			Ice	1.38	0.35	0.03
						1" Ice	1.69	0.52	0.05
						2" Ice			
(4) LGP21401	B	From Leg	4.00	0.00	90.00	No Ice	1.10	0.21	0.01
			0.00			1/2"	1.24	0.27	0.02
			0.00			Ice	1.38	0.35	0.03
						1" Ice	1.69	0.52	0.05
						2" Ice			
(4) LGP21401	C	From Leg	4.00	0.00	90.00	No Ice	1.10	0.21	0.01
			0.00			1/2"	1.24	0.27	0.02
			0.00			Ice	1.38	0.35	0.03
						1" Ice	1.69	0.52	0.05

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustmen t °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
(2) RRUS-11	A	From Leg	4.00 0.00 0.00	0.00	90.00	2" Ice No Ice 1/2" Ice 1" Ice	2.78 2.99 3.21 3.66	1.19 1.33 1.49 1.83	0.05 0.07 0.09 0.15
(2) RRUS-11	B	From Leg	4.00 0.00 0.00	0.00	90.00	2" Ice No Ice 1/2" Ice 1" Ice	2.78 2.99 3.21 3.66	1.19 1.33 1.49 1.83	0.05 0.07 0.09 0.15
(2) RRUS-11	C	From Leg	4.00 0.00 0.00	0.00	90.00	2" Ice No Ice 1/2" Ice 1" Ice	2.78 2.99 3.21 3.66	1.19 1.33 1.49 1.83	0.05 0.07 0.09 0.15
DC6-48-60-18-8F	C	From Leg	4.00 0.00 0.00	0.00	90.00	2" Ice No Ice 1/2" Ice 1" Ice	1.21 1.89 2.11 2.57	1.21 1.89 2.11 2.57	0.02 0.04 0.07 0.13
Sector Mount [SM 104-3]	C	None		0.00	90.00	2" Ice No Ice 1/2" Ice 1" Ice 2" Ice	30.21 38.12 46.01 62.03	30.21 38.12 46.01 62.03	0.95 1.43 2.03 3.58

KS24019-L112A	B	From Leg	4.00 0.00 0.00	0.00	50.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.10 0.18 0.26 0.42	0.10 0.18 0.26 0.42	0.01 0.01 0.01 0.01
Side Arm Mount [SO 306-1]	B	From Leg	2.00 0.00 0.00	0.00	50.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.98 1.70 2.42 3.86	2.18 3.80 5.42 8.66	0.04 0.06 0.08 0.12

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice
3	0.9 Dead+1.0 Wind 0 deg - No Ice
4	1.2 Dead+1.0 Wind 30 deg - No Ice
5	0.9 Dead+1.0 Wind 30 deg - No Ice
6	1.2 Dead+1.0 Wind 60 deg - No Ice
7	0.9 Dead+1.0 Wind 60 deg - No Ice
8	1.2 Dead+1.0 Wind 90 deg - No Ice
9	0.9 Dead+1.0 Wind 90 deg - No Ice
10	1.2 Dead+1.0 Wind 120 deg - No Ice
11	0.9 Dead+1.0 Wind 120 deg - No Ice
12	1.2 Dead+1.0 Wind 150 deg - No Ice
13	0.9 Dead+1.0 Wind 150 deg - No Ice
14	1.2 Dead+1.0 Wind 180 deg - No Ice
15	0.9 Dead+1.0 Wind 180 deg - No Ice
16	1.2 Dead+1.0 Wind 210 deg - No Ice

Comb. No.	Description
17	0.9 Dead+1.0 Wind 210 deg - No Ice
18	1.2 Dead+1.0 Wind 240 deg - No Ice
19	0.9 Dead+1.0 Wind 240 deg - No Ice
20	1.2 Dead+1.0 Wind 270 deg - No Ice
21	0.9 Dead+1.0 Wind 270 deg - No Ice
22	1.2 Dead+1.0 Wind 300 deg - No Ice
23	0.9 Dead+1.0 Wind 300 deg - No Ice
24	1.2 Dead+1.0 Wind 330 deg - No Ice
25	0.9 Dead+1.0 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	160 - 156	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	27	-3.34	0.11	-0.00
			Max. Mx	14	-1.44	0.63	0.01
			Max. My	8	-1.45	0.00	-0.68
			Max. Vy	2	-1.04	0.41	-0.00
			Max. Vx	8	-1.05	0.00	0.37
		Diagonal	Max Tension	9	0.61	0.00	0.00
			Max. Compression	8	-0.62	0.00	0.00
			Max. Mx	29	-0.21	0.01	-0.00
			Max. My	8	-0.30	0.00	0.00
			Max. Vy	29	0.02	0.01	-0.00
			Max. Vx	8	-0.00	0.00	0.00
		Top Girt	Max Tension	14	0.28	0.00	0.00
			Max. Compression	3	-0.28	0.00	0.00
			Max. Mx	26	0.01	-0.05	0.00
			Max. My	28	0.01	0.00	0.00
			Max. Vy	26	-0.03	0.00	0.00
			Max. Vx	28	0.00	0.00	0.00
T2	156 - 152	Leg	Max Tension	7	0.93	-0.49	0.01
			Max. Compression	27	-4.11	-0.06	-0.00
			Max. Mx	2	-3.52	0.51	-0.01
			Max. My	21	-1.11	0.00	-0.39
			Max. Vy	2	0.20	0.51	-0.01
			Max. Vx	16	0.14	0.01	0.38
		Diagonal	Max Tension	12	1.82	0.00	0.00
			Max. Compression	24	-1.81	0.00	0.00
			Max. Mx	31	0.14	0.01	-0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T3	152 - 148	Leg	Max. My	24	-1.81	0.00	-0.00
			Max. Vy	31	-0.02	0.01	-0.00
			Max. Vx	24	-0.00	0.00	0.00
			Max Tension	7	4.30	0.02	-0.01
			Max. Compression	2	-7.02	0.00	-0.01
			Max. Mx	2	-7.00	-0.04	-0.01
		Diagonal	Max. My	7	-3.84	-0.02	-0.04
			Max. Vy	10	-0.03	-0.00	0.00
			Max. Vx	16	-0.04	0.01	0.02
			Max Tension	24	1.74	0.00	0.00
			Max. Compression	12	-1.77	0.00	0.00
			Max. Mx	28	0.24	0.01	-0.00
			Max. My	2	-1.35	0.00	-0.00
			Max. Vy	28	-0.02	0.01	-0.00
T4	148 - 144	Leg	Max. Vx	2	0.00	0.00	0.00
			Max Tension	7	7.15	-0.12	-0.01
			Max. Compression	2	-10.09	-0.11	-0.00
			Max. Mx	18	-10.02	0.14	0.01
			Max. My	16	-1.63	0.01	0.09
			Max. Vy	18	0.08	0.14	0.01
		Diagonal	Max. Vx	16	0.06	0.01	0.09
			Max Tension	12	1.95	0.00	0.00
			Max. Compression	3	-1.92	0.00	0.00
			Max. Mx	30	0.59	0.01	-0.00
			Max. My	16	-1.83	0.00	0.00
			Max. Vy	30	-0.01	0.01	-0.00
		Leg	Max. Vx	16	-0.00	0.00	0.00
			Max Tension	7	11.33	0.08	-0.00
			Max. Compression	2	-16.89	-0.07	-0.01
			Max. Mx	6	10.62	-0.16	-0.01
			Max. My	6	-9.73	0.07	-0.08
			Max. Vy	14	-0.10	-0.16	0.01
T5	144 - 140	Leg	Max. Vx	4	-0.07	-0.01	-0.08
			Max Tension	24	4.39	0.00	0.00
			Max. Compression	10	-4.50	0.00	0.00
			Max. Mx	27	0.60	0.03	-0.00
			Max. My	12	-4.45	-0.01	0.00
			Max. Vy	27	-0.03	0.03	-0.00
		Diagonal	Max. Vx	12	0.00	0.00	0.00
			Max Tension	7	41.13	-0.10	0.00
			Max. Compression	18	-48.98	0.60	0.01
			Max. Mx	14	38.56	-0.65	0.03
			Max. My	4	-4.44	-0.03	-0.57
			Max. Vy	14	-0.43	-0.11	0.00
		Leg	Max. Vx	8	0.43	-0.02	0.13
			Max Tension	12	4.13	0.00	0.00
			Max. Compression	12	-4.15	0.00	0.00
			Max. Mx	27	0.68	-0.03	0.00
			Max. My	22	-3.58	-0.00	0.00
			Max. Vy	29	-0.03	-0.03	-0.00
T6	140 - 120	Leg	Max. Vx	28	-0.00	0.00	0.00
			Max Tension	6	0.78	0.00	0.00
			Max. Compression	3	-0.68	0.00	0.00
			Max. Mx	26	0.03	-0.05	0.00
			Max. My	28	0.02	0.00	0.00
			Max. Vy	26	0.03	0.00	0.00
		Diagonal	Max. Vx	28	-0.00	0.00	0.00
			Max Tension	7	68.09	0.22	-0.01
			Max. Compression	18	-79.86	0.43	0.02
			Max. Mx	10	-58.44	0.95	0.02
			Max. My	4	-5.32	-0.01	-0.57
			Max. Vy	14	0.37	-0.92	0.02
		Leg	Max. Vx	4	-0.44	-0.04	-0.29
			Max Tension	12	5.15	0.00	0.00
			Max. Compression	12	-5.21	0.00	0.00
			Max. Mx	31	1.04	-0.06	0.01
			Max. My	34	-0.64	-0.05	-0.01
			Max. Vy	29	-0.05	-0.06	0.01
T7	120 - 100	Leg	Max. Vx	34	0.00	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T8	100 - 80	Leg	Max Tension	7	93.39	-0.51	-0.01
			Max. Compression	18	-109.74	0.26	0.01
			Max. Mx	18	-89.58	0.92	0.02
			Max. My	12	-7.50	-0.03	0.80
			Max. Vy	6	0.50	-0.79	-0.01
			Max. Vx	4	0.49	-0.03	-0.77
		Diagonal	Max Tension	12	5.78	0.00	0.00
			Max. Compression	12	-5.92	0.00	0.00
			Max. Mx	31	1.33	-0.11	0.01
			Max. My	22	-4.59	-0.01	0.01
			Max. Vy	29	-0.07	-0.10	0.01
			Max. Vx	29	-0.00	0.00	0.00
T9	80 - 60	Leg	Max Tension	7	117.93	-0.39	-0.01
			Max. Compression	18	-138.61	0.39	0.02
			Max. Mx	6	108.08	-0.45	-0.01
			Max. My	4	-8.82	-0.03	-0.41
			Max. Vy	6	-0.11	-0.45	-0.01
			Max. Vx	4	0.10	-0.00	-0.35
		Diagonal	Max Tension	20	5.75	0.00	0.00
			Max. Compression	20	-5.84	0.00	0.00
			Max. Mx	31	1.29	-0.16	-0.02
			Max. My	29	-1.06	-0.13	0.02
			Max. Vy	29	-0.10	-0.15	0.02
			Max. Vx	29	-0.01	0.00	0.00
T10	60 - 40	Leg	Max Tension	7	138.42	0.13	-0.01
			Max. Compression	18	-163.32	1.35	0.04
			Max. Mx	18	-163.32	1.35	0.04
			Max. My	4	-10.55	-0.05	-1.05
			Max. Vy	10	-0.23	1.34	0.02
			Max. Vx	4	0.19	-0.05	-1.05
		Diagonal	Max Tension	8	6.49	0.00	0.00
			Max. Compression	20	-6.78	0.00	0.00
			Max. Mx	31	1.37	-0.21	0.03
			Max. My	28	1.37	-0.20	0.03
			Max. Vy	29	-0.11	-0.21	0.03
			Max. Vx	29	-0.01	0.00	0.00
T11	40 - 20	Leg	Max Tension	7	158.24	-0.08	-0.01
			Max. Compression	18	-188.42	1.14	0.03
			Max. Mx	18	-188.42	1.14	0.03
			Max. My	4	-12.52	-0.07	-1.14
			Max. Vy	10	-0.19	1.13	0.01
			Max. Vx	4	0.19	-0.07	-1.14
		Diagonal	Max Tension	8	6.40	0.00	0.00
			Max. Compression	8	-6.70	0.00	0.00
			Max. Mx	31	1.39	-0.28	0.04
			Max. My	28	1.41	-0.28	0.04
			Max. Vy	30	-0.13	-0.28	-0.04
			Max. Vx	28	-0.01	0.00	0.00
T12	20 - 0	Leg	Max Tension	7	176.25	-0.63	-0.02
			Max. Compression	18	-212.70	0.20	0.00
			Max. Mx	6	163.80	-0.89	-0.03
			Max. My	4	-14.98	-0.10	-1.63
			Max. Vy	6	-0.15	-0.68	-0.02
			Max. Vx	4	0.27	-0.10	-1.63
		Diagonal	Max Tension	8	6.93	0.00	0.00
			Max. Compression	18	-7.45	0.00	0.00
			Max. Mx	30	0.62	-0.37	0.05
			Max. My	28	1.50	-0.37	0.05
			Max. Vy	30	-0.16	-0.37	-0.05
			Max. Vx	28	-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	18	218.84	20.56	-11.55
	Max. H _x	18	218.84	20.56	-11.55
	Max. H _z	7	-180.58	-17.34	9.67
	Min. Vert	7	-180.58	-17.34	9.67
	Min. H _x	7	-180.58	-17.34	9.67
	Min. H _z	18	218.84	20.56	-11.55
Leg B	Max. Vert	10	217.15	-20.20	-11.84
	Max. H _x	23	-179.24	16.98	9.97
	Max. H _z	23	-179.24	16.98	9.97
	Min. Vert	23	-179.24	16.98	9.97
	Min. H _x	10	217.15	-20.20	-11.84
	Min. H _z	10	217.15	-20.20	-11.84
Leg A	Max. Vert	2	215.55	0.14	23.16
	Max. H _x	21	13.21	2.22	1.06
	Max. H _z	2	215.55	0.14	23.16
	Min. Vert	15	-176.68	-0.15	-19.42
	Min. H _x	9	13.16	-2.22	1.06
	Min. H _z	15	-176.68	-0.15	-19.42

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	43.18	-0.00	0.00	-4.41	1.73	-0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	51.81	0.01	-35.86	-3582.71	2.48	5.32
0.9 Dead+1.0 Wind 0 deg - No Ice	38.86	0.01	-35.86	-3576.89	1.97	5.32
1.2 Dead+1.0 Wind 30 deg - No Ice	51.81	17.36	-30.12	-3044.26	-1747.32	14.53
0.9 Dead+1.0 Wind 30 deg - No Ice	38.86	17.36	-30.12	-3039.10	-1745.63	14.53
1.2 Dead+1.0 Wind 60 deg - No Ice	51.81	29.98	-17.35	-1759.37	-3027.50	10.28
0.9 Dead+1.0 Wind 60 deg - No Ice	38.86	29.98	-17.35	-1755.81	-3024.20	10.28
1.2 Dead+1.0 Wind 90 deg - No Ice	51.81	35.74	-0.01	-5.15	-3584.30	0.01
0.9 Dead+1.0 Wind 90 deg - No Ice	38.86	35.74	-0.01	-3.80	-3580.32	0.02
1.2 Dead+1.0 Wind 120 deg - No Ice	51.81	31.43	18.18	1806.79	-3127.27	-5.32
0.9 Dead+1.0 Wind 120 deg - No Ice	38.86	31.43	18.18	1805.87	-3123.88	-5.31
1.2 Dead+1.0 Wind 150 deg - No Ice	51.81	17.04	29.60	2981.35	-1717.17	-2.48
0.9 Dead+1.0 Wind 150 deg - No Ice	38.86	17.04	29.60	2978.93	-1715.52	-2.47
1.2 Dead+1.0 Wind 180 deg - No Ice	51.81	-0.01	33.92	3429.61	1.57	-5.32
0.9 Dead+1.0 Wind 180 deg - No Ice	38.86	-0.01	33.92	3426.62	1.06	-5.32
1.2 Dead+1.0 Wind 210 deg - No Ice	51.81	-17.36	30.12	3033.86	1750.96	-14.53
0.9 Dead+1.0 Wind 210 deg - No Ice	38.86	-17.36	30.12	3031.37	1748.25	-14.53
1.2 Dead+1.0 Wind 240 deg - No Ice	51.81	-31.66	18.32	1819.93	3154.93	-10.28
0.9 Dead+1.0 Wind 240 deg - No Ice	38.86	-31.66	18.32	1818.99	3150.47	-10.28
1.2 Dead+1.0 Wind 270 deg - No Ice	51.81	-35.74	0.01	-6.06	3588.43	-0.01
0.9 Dead+1.0 Wind 270 deg - No Ice	38.86	-35.74	0.01	-4.71	3583.42	-0.02

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
1.2 Dead+1.0 Wind 300 deg	51.81	-29.75	-17.21	-1746.35	3008.03	5.32
- No Ice						
0.9 Dead+1.0 Wind 300 deg	38.86	-29.75	-17.21	-1742.81	3003.73	5.31
- No Ice						
1.2 Dead+1.0 Wind 330 deg	51.81	-17.04	-29.60	-2991.86	1721.60	2.48
- No Ice						
0.9 Dead+1.0 Wind 330 deg	38.86	-17.04	-29.60	-2986.76	1718.92	2.47
- No Ice						
1.2 Dead+1.0 Ice	109.08	-0.00	0.00	2.96	-11.98	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice	109.08	-0.00	-8.27	-810.90	-11.38	3.08
1.2 Dead+1.0 Wind 30 deg+1.0 Ice	109.08	4.11	-7.15	-703.29	-417.93	5.33
1.2 Dead+1.0 Wind 60 deg+1.0 Ice	109.08	7.23	-4.18	-410.23	-726.04	4.77
1.2 Dead+1.0 Wind 90 deg+1.0 Ice	109.08	8.43	0.00	3.76	-842.13	0.91
1.2 Dead+1.0 Wind 120 deg+1.0 Ice	109.08	7.32	4.24	419.01	-729.54	-1.82
1.2 Dead+1.0 Wind 150 deg+1.0 Ice	109.08	4.04	7.02	697.00	-412.02	-2.03
1.2 Dead+1.0 Wind 180 deg+1.0 Ice	109.08	0.00	8.02	798.72	-13.12	-3.08
1.2 Dead+1.0 Wind 210 deg+1.0 Ice	109.08	-4.11	7.15	709.03	393.45	-5.33
1.2 Dead+1.0 Wind 240 deg+1.0 Ice	109.08	-7.45	4.31	424.96	717.07	-4.77
1.2 Dead+1.0 Wind 270 deg+1.0 Ice	109.08	-8.43	-0.00	2.02	817.63	-0.91
1.2 Dead+1.0 Wind 300 deg+1.0 Ice	109.08	-7.10	-4.12	-404.29	689.51	1.82
1.2 Dead+1.0 Wind 330 deg+1.0 Ice	109.08	-4.04	-7.02	-691.26	387.49	2.03
Dead+Wind 0 deg - Service	43.18	0.00	-8.11	-808.32	1.82	1.18
Dead+Wind 30 deg - Service	43.18	3.92	-6.81	-687.39	-391.36	3.25
Dead+Wind 60 deg - Service	43.18	6.78	-3.92	-398.60	-679.06	2.31
Dead+Wind 90 deg - Service	43.18	8.08	-0.00	-4.35	-804.17	0.01
Dead+Wind 120 deg - Service	43.18	7.10	4.11	402.75	-701.45	-1.18
Dead+Wind 150 deg - Service	43.18	3.85	6.69	666.74	-384.69	-0.54
Dead+Wind 180 deg - Service	43.18	-0.00	7.67	767.48	1.62	-1.18
Dead+Wind 210 deg - Service	43.18	-3.92	6.81	678.50	394.79	-3.25
Dead+Wind 240 deg - Service	43.18	-7.16	4.14	405.68	710.17	-2.31
Dead+Wind 270 deg - Service	43.18	-8.08	0.00	-4.55	807.61	-0.01
Dead+Wind 300 deg - Service	43.18	-6.73	-3.89	-395.68	677.22	1.18
Dead+Wind 330 deg - Service	43.18	-3.85	-6.69	-675.64	388.13	0.54

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-43.18	0.00	0.00	43.18	-0.00	0.000%
2	0.01	-51.81	-35.86	-0.01	51.81	35.86	0.001%
3	0.01	-38.86	-35.86	-0.01	38.86	35.86	0.001%
4	17.36	-51.81	-30.12	-17.36	51.81	30.12	0.001%
5	17.36	-38.86	-30.12	-17.36	38.86	30.12	0.001%
6	29.98	-51.81	-17.35	-29.98	51.81	17.35	0.001%
7	29.98	-38.86	-17.35	-29.98	38.86	17.35	0.001%

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
8	35.74	-51.81	-0.01	-35.74	51.81	0.01	0.001%
9	35.74	-38.86	-0.01	-35.74	38.86	0.01	0.001%
10	31.43	-51.81	18.18	-31.43	51.81	-18.18	0.001%
11	31.43	-38.86	18.18	-31.43	38.86	-18.18	0.001%
12	17.04	-51.81	29.60	-17.04	51.81	-29.60	0.001%
13	17.04	-38.86	29.60	-17.04	38.86	-29.60	0.001%
14	-0.01	-51.81	33.92	0.01	51.81	-33.92	0.001%
15	-0.01	-38.86	33.92	0.01	38.86	-33.92	0.001%
16	-17.36	-51.81	30.12	17.36	51.81	-30.12	0.001%
17	-17.36	-38.86	30.12	17.36	38.86	-30.12	0.001%
18	-31.66	-51.81	18.32	31.66	51.81	-18.32	0.001%
19	-31.66	-38.86	18.32	31.66	38.86	-18.32	0.001%
20	-35.74	-51.81	0.01	35.74	51.81	-0.01	0.001%
21	-35.74	-38.86	0.01	35.74	38.86	-0.01	0.001%
22	-29.75	-51.81	-17.21	29.75	51.81	17.21	0.001%
23	-29.75	-38.86	-17.21	29.75	38.86	17.21	0.001%
24	-17.04	-51.81	-29.60	17.04	51.81	29.60	0.001%
25	-17.04	-38.86	-29.60	17.04	38.86	29.60	0.001%
26	0.00	-109.08	0.00	0.00	109.08	-0.00	0.001%
27	-0.00	-109.08	-8.27	0.00	109.08	8.27	0.000%
28	4.11	-109.08	-7.15	-4.11	109.08	7.15	0.000%
29	7.23	-109.08	-4.18	-7.23	109.08	4.18	0.000%
30	8.43	-109.08	0.00	-8.43	109.08	-0.00	0.000%
31	7.32	-109.08	4.24	-7.32	109.08	-4.24	0.000%
32	4.04	-109.08	7.02	-4.04	109.08	-7.02	0.000%
33	0.00	-109.08	8.02	-0.00	109.08	-8.02	0.000%
34	-4.11	-109.08	7.15	4.11	109.08	-7.15	0.000%
35	-7.45	-109.08	4.31	7.45	109.08	-4.31	0.000%
36	-8.43	-109.08	-0.00	8.43	109.08	0.00	0.000%
37	-7.10	-109.08	-4.12	7.10	109.08	4.12	0.000%
38	-4.04	-109.08	-7.02	4.04	109.08	7.02	0.000%
39	0.00	-43.18	-8.11	-0.00	43.18	8.11	0.000%
40	3.92	-43.18	-6.81	-3.92	43.18	6.81	0.000%
41	6.78	-43.18	-3.92	-6.78	43.18	3.92	0.000%
42	8.08	-43.18	-0.00	-8.08	43.18	0.00	0.000%
43	7.10	-43.18	4.11	-7.10	43.18	-4.11	0.000%
44	3.85	-43.18	6.69	-3.85	43.18	-6.69	0.000%
45	-0.00	-43.18	7.67	0.00	43.18	-7.67	0.000%
46	-3.92	-43.18	6.81	3.92	43.18	-6.81	0.000%
47	-7.16	-43.18	4.14	7.16	43.18	-4.14	0.000%
48	-8.08	-43.18	0.00	8.08	43.18	-0.00	0.000%
49	-6.73	-43.18	-3.89	6.73	43.18	3.89	0.000%
50	-3.85	-43.18	-6.69	3.85	43.18	6.69	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00003031
2	Yes	10	0.00000001	0.00007057
3	Yes	10	0.00000001	0.00005918
4	Yes	10	0.00000001	0.00007384
5	Yes	10	0.00000001	0.00006230
6	Yes	10	0.00000001	0.00007678
7	Yes	10	0.00000001	0.00006509
8	Yes	10	0.00000001	0.00007376
9	Yes	10	0.00000001	0.00006224
10	Yes	10	0.00000001	0.00007047
11	Yes	10	0.00000001	0.00005910
12	Yes	10	0.00000001	0.00007378
13	Yes	10	0.00000001	0.00006227
14	Yes	10	0.00000001	0.00007669
15	Yes	10	0.00000001	0.00006503
16	Yes	10	0.00000001	0.00007378
17	Yes	10	0.00000001	0.00006228

18	Yes	10	0.00000001	0.00007041
19	Yes	10	0.00000001	0.00005905
20	Yes	10	0.00000001	0.00007372
21	Yes	10	0.00000001	0.00006221
22	Yes	10	0.00000001	0.00007669
23	Yes	10	0.00000001	0.00006503
24	Yes	10	0.00000001	0.00007379
25	Yes	10	0.00000001	0.00006227
26	Yes	6	0.00000001	0.00011863
27	Yes	10	0.00000001	0.00009381
28	Yes	10	0.00000001	0.00009558
29	Yes	10	0.00000001	0.00009713
30	Yes	10	0.00000001	0.00009647
31	Yes	10	0.00000001	0.00009488
32	Yes	10	0.00000001	0.00009283
33	Yes	10	0.00000001	0.00009196
34	Yes	10	0.00000001	0.00009148
35	Yes	10	0.00000001	0.00009183
36	Yes	10	0.00000001	0.00009195
37	Yes	10	0.00000001	0.00009228
38	Yes	10	0.00000001	0.00009235
39	Yes	10	0.00000001	0.00006049
40	Yes	10	0.00000001	0.00006110
41	Yes	10	0.00000001	0.00006167
42	Yes	10	0.00000001	0.00006109
43	Yes	10	0.00000001	0.00006034
44	Yes	10	0.00000001	0.00006061
45	Yes	10	0.00000001	0.00006116
46	Yes	10	0.00000001	0.00006069
47	Yes	10	0.00000001	0.00006024
48	Yes	10	0.00000001	0.00006090
49	Yes	10	0.00000001	0.00006142
50	Yes	10	0.00000001	0.00006084

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	160 - 156	2.98	39	0.18	0.01
T2	156 - 152	2.84	39	0.18	0.01
T3	152 - 148	2.69	39	0.18	0.01
T4	148 - 144	2.54	39	0.17	0.01
T5	144 - 140	2.39	39	0.17	0.01
T6	140 - 120	2.25	47	0.17	0.01
T7	120 - 100	1.58	47	0.14	0.00
T8	100 - 80	1.04	47	0.11	0.00
T9	80 - 60	0.63	47	0.08	0.00
T10	60 - 40	0.35	47	0.05	0.00
T11	40 - 20	0.15	47	0.03	0.00
T12	20 - 0	0.04	47	0.01	0.00

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
157.00	(2) LPA-80080/6CF w/ Mount Pipe	39	2.87	0.18	0.01	68846
144.00	APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	39	2.39	0.17	0.01	73554
124.00	MX08FRO665-20 w/ Mount Pipe	47	1.70	0.14	0.00	35413
118.00	(4) DB844H90E-XY w/ Mount Pipe	47	1.52	0.14	0.00	29969

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
109.00	PD1110	47	1.26	0.12	0.00	31884
90.00	(2) 7770.00 w/ Mount Pipe	47	0.82	0.09	0.00	37149
50.00	KS24019-L112A	47	0.24	0.04	0.00	56710

Maximum Tower Deflections - Design Wind

Section No.	Elevation	Horz. Deflection	Gov. Load Comb.	Tilt	Twist
	ft	in		°	°
T1	160 - 156	13.34	18	0.79	0.03
T2	156 - 152	12.70	18	0.79	0.03
T3	152 - 148	12.03	18	0.78	0.03
T4	148 - 144	11.37	18	0.78	0.03
T5	144 - 140	10.72	18	0.76	0.03
T6	140 - 120	10.08	18	0.74	0.03
T7	120 - 100	7.05	18	0.62	0.02
T8	100 - 80	4.63	18	0.48	0.02
T9	80 - 60	2.83	18	0.35	0.01
T10	60 - 40	1.54	18	0.24	0.01
T11	40 - 20	0.67	18	0.15	0.00
T12	20 - 0	0.17	18	0.06	0.00

Critical Deflections and Radius of Curvature - Design Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
157.00	(2) LPA-80080/6CF w/ Mount Pipe	18	12.86	0.79	0.03	15406
144.00	APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	18	10.72	0.76	0.03	16748
124.00	MX08FRO665-20 w/ Mount Pipe	18	7.62	0.65	0.02	8042
118.00	(4) DB844H90E-XY w/ Mount Pipe	18	6.78	0.61	0.02	6769
109.00	PD1110	18	5.64	0.54	0.02	7189
90.00	(2) 7770.00 w/ Mount Pipe	18	3.66	0.41	0.01	8339
50.00	KS24019-L112A	18	1.06	0.19	0.01	12666

Bolt Design Data

Section No.	Elevation	Component Type	Bolt Grade	Bolt Size	Number Of Bolts	Maximum Load per Bolt	Allowable Load per Bolt	Ratio Load Allowable	Allowable Ratio	Criteria
	ft			in		K	K			
T1	160	Leg Diagonal	A325N	0.63	4	0.28	20.34	0.014	1	Bolt Tension Member Block Shear Member Bearing
			A325N	0.50	1	0.61	3.47	0.175	1.05	
		Top Girt	A325N	0.50	1	0.28	4.13	0.067	1.05	
T2	156	Diagonal	A325N	0.50	1	1.82	3.47	0.525	1.05	Member Block Shear
T3	152	Diagonal	A325N	0.50	1	1.74	3.47	0.501	1.05	Member Block Shear
T4	148	Diagonal	A325N	0.50	1	1.95	3.47	0.563	1.05	Member Block Shear
T5	144	Diagonal	A325N	0.50	1	4.39	7.50	0.585	1.05	Gusset Bearing

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load Allowable	Allowable Ratio	Criteria
T6	140	Leg	A325N	0.63	4	10.28	20.34	0.505	1.05	Bolt Tension
		Diagonal	A325N	0.50	1	4.13	6.25	0.660	1.05	Member Block Shear
		Top Girt	A325N	0.50	1	0.85	4.13	0.206	1.05	Member Bearing
T7	120	Leg	A325N	0.75	4	17.02	30.10	0.565	1.05	Bolt Tension
		Diagonal	A325N	0.50	1	5.15	7.50	0.687	1.05	Gusset Bearing
T8	100	Leg	A325N	0.88	4	23.35	41.56	0.562	1.05	Bolt Tension
		Diagonal	A325N	0.50	1	5.78	12.40	0.466	1.05	Member Bearing
T9	80	Leg	A325N	1.00	6	19.66	54.52	0.361	1.05	Bolt Tension
		Diagonal	A325N	0.50	1	5.75	12.40	0.463	1.05	Member Bearing
T10	60	Leg	A325N	1.00	6	23.07	54.52	0.423	1.05	Bolt Tension
		Diagonal	A325N	0.63	1	6.49	14.79	0.439	1.05	Gusset Bearing
T11	40	Leg	A325N	1.00	6	26.37	54.52	0.484	1.05	Bolt Tension
		Diagonal	A325N	0.63	1	6.40	14.79	0.433	1.05	Gusset Bearing
T12	20	Leg	A449	1.00	6	29.37	54.52	0.539	1.05	Bolt Tension
		Diagonal	A325N	0.63	1	6.93	14.79	0.469	1.05	Gusset Bearing

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	KI/r	A in ²	P _u K	φP _n K	Ratio P _u / φP _n
T1	160 - 156	Rohn 2.375" x 0.218" (2 EH)	4.00	4.00	62.6 K=1.00	1.48	-3.34	49.90	0.067 ¹
T2	156 - 152	Rohn 2.375" x 0.218" (2 EH)	4.00	4.00	62.6 K=1.00	1.48	-4.11	49.90	0.082 ¹
T3	152 - 148	Rohn 2.375" x 0.218" (2 EH)	4.00	4.00	62.6 K=1.00	1.48	-7.02	49.90	0.141 ¹
T4	148 - 144	Rohn 2.375" x 0.218" (2 EH)	4.00	4.00	62.6 K=1.00	1.48	-10.09	49.90	0.202 ¹
T5	144 - 140	Rohn 2.375" x 0.218" (2 EH)	4.00	4.00	62.6 K=1.00	1.48	-16.89	49.90	0.338 ¹
T6	140 - 120	Rohn 2.875" x 0.276" (2.5 EH)	20.03	5.01	65.0 K=1.00	2.25	-48.98	74.43	0.658 ¹
T7	120 - 100	ROHN 3 EH	20.03	6.68	70.5 K=1.00	3.02	-79.86	94.34	0.847 ¹
T8	100 - 80	Rohn 4" x 0.318" (3.5 EH) (GR)	20.03	6.68	61.3 K=1.00	3.68	-109.74	148.29	0.740 ¹
T9	80 - 60	ROHN 4 EH (GR)	20.04	6.68	54.3 K=1.00	4.41	-138.61	192.91	0.719 ¹
T10	60 - 40	Rohn 5.563" x 0.375" (5 EH) (GR)	20.03	10.02	65.4 K=1.00	6.11	-163.32	246.97	0.661 ¹
T11	40 - 20	Rohn 5.563" x 0.375" (5 EH) (GR)	20.04	10.02	65.4 K=1.00	6.11	-188.42	246.94	0.763 ¹
T12	20 - 0	Rohn 6.625" x 0.432" (6 EH) (GR)	20.03	10.02	54.8 K=1.00	8.40	-212.70	381.11	0.558 ¹

* DL controls

¹ P_u / φP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	160 - 156	L 1.5 x 1.5 x 1/8	6.94	3.37	136.4 K=1.00	0.36	-0.62	5.53	0.113 ¹
T2	156 - 152	L 1.5 x 1.5 x 1/8	6.95	3.37	136.6 K=1.00	0.36	-1.81	5.51	0.328 ¹
T3	152 - 148	L 1.5 x 1.5 x 1/8	6.95	3.37	136.7 K=1.00	0.36	-1.77	5.50	0.322 ¹
T4	148 - 144	L 1.5 x 1.5 x 1/8	6.96	3.38	136.9 K=1.00	0.36	-1.92	5.49	0.350 ¹
T5	144 - 140	L 2 x 2 x 1/4	6.97	3.38	107.8 K=1.04	0.94	-4.50	23.09	0.195 ¹
T6	140 - 120	2L 1.5 x 1.5 x 1/8 (3/16)	8.89	4.48	119.2 K=1.00	0.72	-4.15	13.64	0.304 ¹
T7	120 - 100	2L 'a' > 25.65 in - 57 2L 2 x 2 x 3/16 (3/16)	11.36	5.76	116.3 K=1.00	1.43	-5.10	28.59	0.178 ¹
T8	100 - 80	2L 'a' > 33.07 in - 84 2L 2.5 x 2.5 x 3/16 (3/16)	13.11	6.63	107.8 K=1.00	1.80	-5.92	38.88	0.152 ¹
T9	80 - 60	2L 'a' > 37.95 in - 105 2L 3 x 3 x 3/16 (1/4)	14.99	7.57	102.3 K=1.00	2.18	-5.84	46.82	0.125 ¹
T10	60 - 40	2L 'a' > 43.26 in - 124 2L 3 x 3 x 3/16 (1/4)	18.13	9.22	124.6 K=1.00	2.18	-6.78	36.09	0.188 ¹
T11	40 - 20	2L 'a' > 52.70 in - 145 2L 3 x 3 x 1/4 (1/4)	19.90	10.11	136.6 K=1.00	2.88	-6.70	42.37	0.158 ¹
T12	20 - 0	2L 'a' > 57.94 in - 161 2L 3.5 x 3.5 x 1/4 (1/4)	21.70	11.00	127.9 K=1.00	3.38	-7.45	55.17	0.135 ¹
		2L 'a' > 62.90 in - 175							

¹ P_u / φP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	160 - 156	L 2 x 2 x 1/8	6.52	6.11	184.6 K=1.00	0.48	-0.28	4.07	0.068 ¹
T6	140 - 120	L 2 x 2 x 1/8	6.56	6.11	184.6 K=1.00	0.48	-0.85	4.07	0.209 ¹

¹ P_u / φP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T2	156 - 152	Rohn 2.375" x 0.218" (2 EH)	4.00	4.00	62.6	1.48	0.93	66.48	0.014 ¹
T3	152 - 148	Rohn 2.375" x 0.218" (2 EH)	4.00	4.00	62.6	1.48	4.30	66.48	0.065 ¹

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T4	148 - 144	EH) Rohn 2.375" x 0.218" (2	4.00	4.00	62.6	1.48	7.15	66.48	0.108 ¹
T5	144 - 140	EH) Rohn 2.375" x 0.218" (2	4.00	4.00	62.6	1.48	11.33	66.48	0.170 ¹
T6	140 - 120	EH) Rohn 2.875" x 0.276" (2.5	20.03	5.01	65.0	2.25	41.13	101.41	0.406 ¹
T7	120 - 100	EH) ROHN 3 EH	20.03	6.68	70.5	3.02	68.09	135.72	0.502 ¹
T8	100 - 80	Rohn 4" x 0.318" (3.5 EH)	20.03	6.68	61.3	3.68	93.39	165.53	0.564 ¹
T9	80 - 60	(GR) ROHN 4 EH (GR)	20.04	6.68	54.3	4.41	117.93	198.34	0.595 ¹
T10	60 - 40	Rohn 5.563" x 0.375" (5	20.03	10.02	65.4	6.11	138.43	275.04	0.503 ¹
T11	40 - 20	EH) (GR) Rohn 5.563" x 0.375" (5	20.04	10.02	65.4	6.11	158.24	275.04	0.575 ¹
T12	20 - 0	EH) (GR) Rohn 6.625" x 0.432" (6	20.03	10.02	54.8	8.40	176.25	378.22	0.466 ¹
		EH) (GR)							

¹ P_u / φP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	160 - 156	L 1.5 x 1.5 x 1/8	6.94	3.37	89.6	0.21	0.61	9.18	0.066 ¹
T2	156 - 152	L 1.5 x 1.5 x 1/8	6.95	3.37	89.6	0.21	1.82	9.18	0.198 ¹
T3	152 - 148	L 1.5 x 1.5 x 1/8	6.95	3.37	89.7	0.21	1.74	9.18	0.189 ¹
T4	148 - 144	L 1.5 x 1.5 x 1/8	6.96	3.38	89.8	0.21	1.95	9.18	0.213 ¹
T5	144 - 140	L 2 x 2 x 1/4	6.97	3.38	68.7	0.59	4.39	28.58	0.154 ¹
T6	140 - 120	2L 1.5 x 1.5 x 1/8 (3/16)	8.89	4.48	118.2	0.42	4.13	18.35	0.225 ¹
		2L 'a' > 25.65 in - 58							
T7	120 - 100	2L 2 x 2 x 3/16 (3/16)	10.80	5.48	108.6	0.90	5.15	39.00	0.132 ¹
		2L 'a' > 31.49 in - 91							
T8	100 - 80	2L 2.5 x 2.5 x 3/16 (3/16)	13.11	6.63	103.8	1.18	5.78	51.23	0.113 ¹
		2L 'a' > 37.95 in - 106							
T9	80 - 60	2L 3 x 3 x 3/16 (1/4)	14.99	7.57	98.1	1.46	5.75	63.47	0.091 ¹
		2L 'a' > 43.26 in - 125							
T10	60 - 40	2L 3 x 3 x 3/16 (1/4)	17.29	8.81	114.0	1.42	6.49	61.94	0.105 ¹
		2L 'a' > 50.32 in - 151							
T11	40 - 20	2L 3 x 3 x 1/4 (1/4)	19.90	10.11	132.0	1.88	6.40	81.56	0.078 ¹
		2L 'a' > 57.94 in - 160							
T12	20 - 0	2L 3.5 x 3.5 x 1/4 (1/4)	21.70	11.00	122.2	2.25	6.93	97.88	0.071 ¹
		2L 'a' > 62.90 in - 175							

¹ P_u / φP_n controls

Top Girt Design Data (Tension)

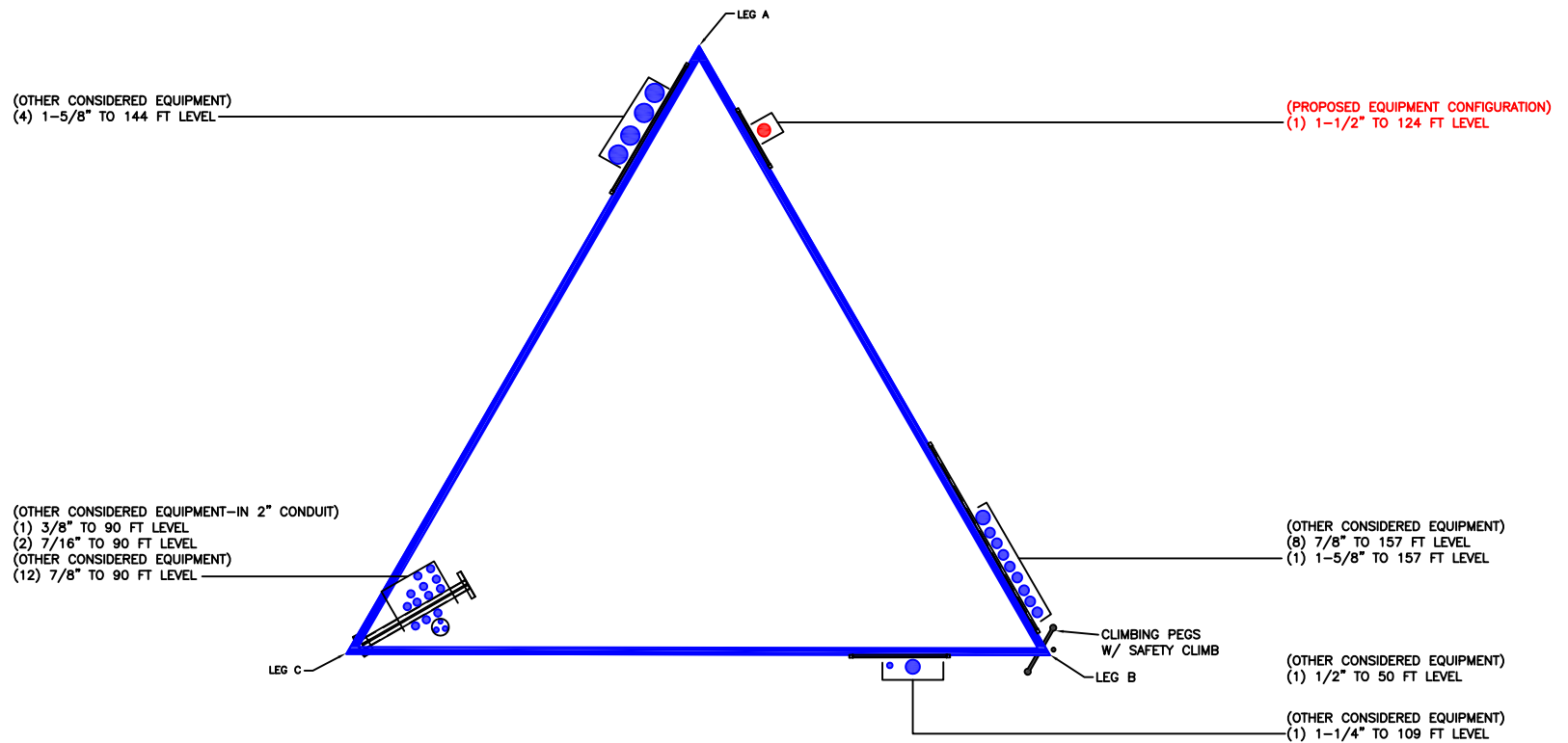
Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	160 - 156	L 2 x 2 x 1/8	6.52	6.11	121.2	0.30	0.28	13.25	0.021 ¹
T6	140 - 120	L 2 x 2 x 1/8	6.56	6.11	121.2	0.30	0.85	13.25	0.064 ¹

¹ P_u / φP_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	160 - 156	Leg	Rohn 2.375" x 0.218" (2 EH)	3	-3.34	49.90	6.7	Pass
T2	156 - 152	Leg	Rohn 2.375" x 0.218" (2 EH)	15	-4.11	52.40	7.8	Pass
T3	152 - 148	Leg	Rohn 2.375" x 0.218" (2 EH)	24	-7.02	52.40	13.4	Pass
T4	148 - 144	Leg	Rohn 2.375" x 0.218" (2 EH)	33	-10.09	52.40	19.3	Pass
T5	144 - 140	Leg	Rohn 2.375" x 0.218" (2 EH)	42	-16.89	52.40	32.2	Pass
T6	140 - 120	Leg	Rohn 2.875" x 0.276" (2.5 EH)	49	-48.98	78.15	62.7	Pass
T7	120 - 100	Leg	ROHN 3 EH	79	-79.86	99.06	80.6	Pass
T8	100 - 80	Leg	Rohn 4" x 0.318" (3.5 EH) (GR)	100	-109.74	155.70	70.5	Pass
T9	80 - 60	Leg	ROHN 4 EH (GR)	121	-138.61	202.56	68.4	Pass
T10	60 - 40	Leg	Rohn 5.563" x 0.375" (5 EH) (GR)	142	-163.32	259.31	63.0	Pass
T11	40 - 20	Leg	Rohn 5.563" x 0.375" (5 EH) (GR)	157	-188.42	259.29	72.7	Pass
T12	20 - 0	Leg	Rohn 6.625" x 0.432" (6 EH) (GR)	172	-212.70	400.17	53.2	Pass
T1	160 - 156	Diagonal	L 1.5 x 1.5 x 1/8	9	-0.62	5.80	10.7	Pass
T2	156 - 152	Diagonal	L 1.5 x 1.5 x 1/8	19	-1.81	5.79	16.6 (b)	Pass
T3	152 - 148	Diagonal	L 1.5 x 1.5 x 1/8	27	-1.77	5.78	31.3	Pass
T4	148 - 144	Diagonal	L 1.5 x 1.5 x 1/8	37	-1.92	5.77	50.0 (b)	Pass
T5	144 - 140	Diagonal	L 2 x 2 x 1/4	45	-4.50	24.24	30.7	Pass
T6	140 - 120	Diagonal	2L 1.5 x 1.5 x 1/8 (3/16)	57	-4.15	14.33	47.7 (b)	Pass
T7	120 - 100	Diagonal	2L 2 x 2 x 3/16 (3/16)	84	-5.10	30.02	33.3	Pass
T8	100 - 80	Diagonal	2L 2.5 x 2.5 x 3/16 (3/16)	105	-5.92	40.83	53.6 (b)	Pass
T9	80 - 60	Diagonal	2L 3 x 3 x 3/16 (1/4)	124	-5.84	49.16	18.6	Pass
T10	60 - 40	Diagonal	2L 3 x 3 x 3/16 (1/4)	145	-6.78	37.89	55.7 (b)	Pass
T11	40 - 20	Diagonal	2L 3 x 3 x 1/4 (1/4)	161	-6.70	44.49	29.0	Pass
T12	20 - 0	Diagonal	2L 3.5 x 3.5 x 1/4 (1/4)	175	-7.45	57.93	62.9 (b)	Pass
T1	160 - 156	Top Girt	L 2 x 2 x 1/8	4	-0.28	4.27	17.0	Pass
T6	140 - 120	Top Girt	L 2 x 2 x 1/8	54	-0.85	4.27	65.4 (b)	Pass
							44.4 (b)	
							11.9	
							44.1 (b)	
							17.9	
							41.8 (b)	
							15.1	
							41.2 (b)	
							12.9	
							44.7 (b)	
							6.5	
							19.9	
							Summary	
							Leg (T7)	80.6
							Diagonal (T7)	65.4
							Top Girt (T6)	19.9
							Bolt	65.4
							Checks	
							RATING =	80.6
								Pass

APPENDIX B
BASE LEVEL DRAWING



APPENDIX C

ADDITIONAL CALCULATIONS

Self Support Anchor Rod Capacity

Site Info		
BU #	806387	
Site Name	HRT 088 943629	
Order #	553395 Rev. 0	

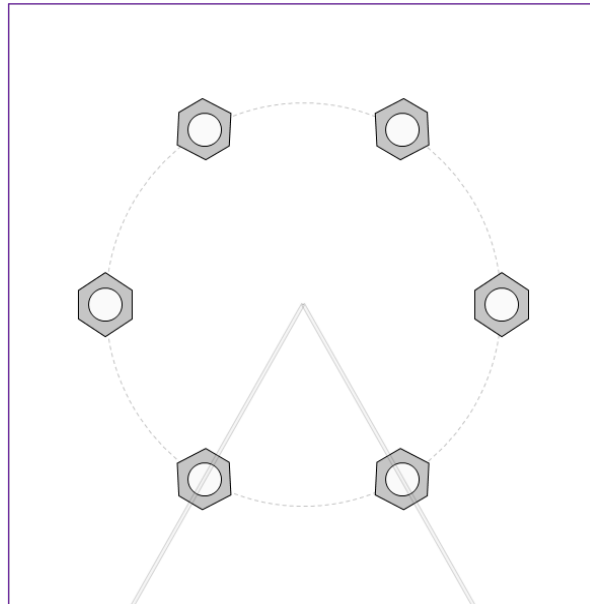
Analysis Considerations		
TIA-222 Revision	H	
Grout Considered:	Yes	
l_{ar} (in)	0	

Applied Loads		
	Comp.	Uplift
Axial Force (kips)	218.84	180.58
Shear Force (kips)	23.58	19.85

*TIA-222-H Section 15.5 Applied

Considered Eccentricity		
Leg Mod Eccentricity (in)	0.000	
Anchor Rod N.A Shift (in)	0.000	
Total Eccentricity (in)	0.000	

*Anchor Rod Eccentricity Applied



Connection Properties		Analysis Results	
Anchor Rod Data		Anchor Rod Summary	
(6) 1" ϕ bolts (A449 N; Fy=92 ksi, Fu=120 ksi)		(units of kips, kip-in)	
l_{ar} (in): 0		$Pu_t = 30.1$	$\phi Pn_t = 54.54$
		$Vu = 3.31$	$\phi Vn = 35.34$
		$Mu = n/a$	$\phi Mn = n/a$
			Stress Rating
			52.6%
			Pass

Pier and Pad Foundation



BU # : 806387
 Site Name: HRT 088 943629
 App. Number: 553395 Rev. 0

TIA-222 Revision: H
 Tower Type: Self Support

Top & Bot. Pad Rein. Different?:	☐
Block Foundation?:	☐
Rectangular Pad?:	☐

Superstructure Analysis Reactions		
Compression, P_{comp} :	218.84	kips
Compression Shear, V_{u_comp} :	23.58	kips
Uplift, P_{uplift} :	180.58	kips
Uplift Shear, V_{u_uplift} :	19.85	kips
Tower Height, H :	160	ft
Base Face Width, BW :	20.86	ft
BP Dist. Above Fdn, bp_{dist} :	3	in

Pier Properties		
Pier Shape:	Circular	
Pier Diameter, $dpier$:	3.5	ft
Ext. Above Grade, E :	0.5	ft
Pier Rebar Size, Sc :	8	
Pier Rebar Quantity, mc :	16	
Pier Tie/Spiral Size, St :	3	
Pier Tie/Spiral Quantity, mt :	10	
Pier Reinforcement Type:	Tie	
Pier Clear Cover, cc_{pier} :	3	in

Pad Properties		
Depth, D :	12	ft
Pad Width, W_1 :	9.4	ft
Pad Thickness, T :	2	ft
Pad Rebar Size (Bottom dir. 2), Sp_2 :	7	
Pad Rebar Quantity (Bottom dir. 2), mp_2 :	11	
Pad Clear Cover, cc_{pad} :	3	in

Material Properties		
Rebar Grade, F_y :	60	ksi
Concrete Compressive Strength, F'_c :	3	ksi
Dry Concrete Density, δ_c :	150	pcf

Soil Properties		
Total Soil Unit Weight, γ :	115	pcf
Ultimate Net Bearing, Q_{net} :	16.000	ksf
Cohesion, C_u :	0.000	ksf
Friction Angle, ϕ :	35	degrees
SPT Blow Count, N_{blows} :	53	
Base Friction, μ :		
Neglected Depth, N :	4.00	ft
Foundation Bearing on Rock?	No	
Groundwater Depth, gw :	N/A	ft

Foundation Analysis Checks				
	Capacity	Demand	Rating*	Check
Uplift (kips)	297.77	180.58	57.8%	Pass
Lateral (Sliding) (kips)	112.61	19.85	16.8%	Pass
Bearing Pressure (ksf)	13.04	4.27	31.2%	Pass
Pier Flexure (Comp.) (kip*ft)	1094.92	247.59	21.5%	Pass
Pier Flexure (Tension) (kip*ft)	713.54	208.43	27.8%	Pass
Pier Compression (kip)	2214.70	237.02	10.2%	Pass
Pad Flexure (kip*ft)	564.27	103.57	17.5%	Pass
Pad Shear - 1-way (kips)	182.45	31.17	16.3%	Pass
Pad Shear - 2-way (Comp) (ksi)	0.164	0.046	26.5%	Pass
Flexural 2-way (Comp) (kip*ft)	1128.55	148.55	12.5%	Pass
Pad Shear - 2-way (Uplift) (ksi)	0.164	0.055	32.0%	Pass
Flexural 2-way (Tension) (kip*ft)	1128.55	125.06	10.6%	Pass

*Rating per TIA-222-H Section 15.5

Soil Rating*:	57.8%
Structural Rating*:	32.0%

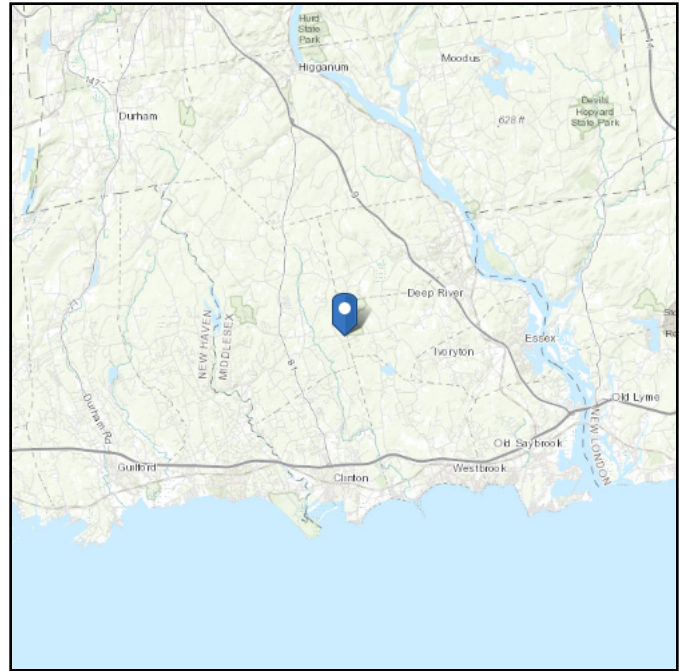
<-- Toggle between Gross and Net

ASCE 7 Hazards Report

Address:
No Address at This
Location

Standard: ASCE/SEI 7-10
Risk Category: II
Soil Class: D - Stiff Soil

Elevation: 416.51 ft (NAVD 88)
Latitude: 41.357342
Longitude: -72.519953



Wind

Results:

Wind Speed:	130 Vmph Per Jurisdiction
10-year MRI	78 Vmph
25-year MRI	88 Vmph
50-year MRI	96 Vmph
100-year MRI	106 Vmph

Data Source: ASCE/SEI 7-10, Fig. 26.5-1A and Figs. CC-1–CC-4, incorporating errata of March 12, 2014

Date Accessed: Tue Feb 02 2021

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-10 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is in a hurricane-prone region as defined in ASCE/SEI 7-10 Section 26.2. Glazed openings need not be protected against wind-borne debris.

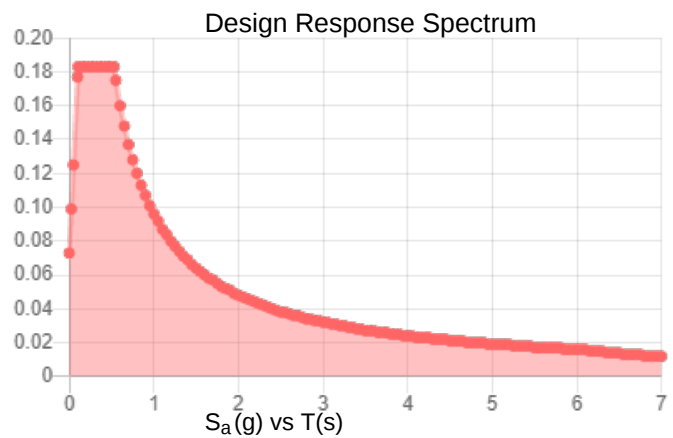
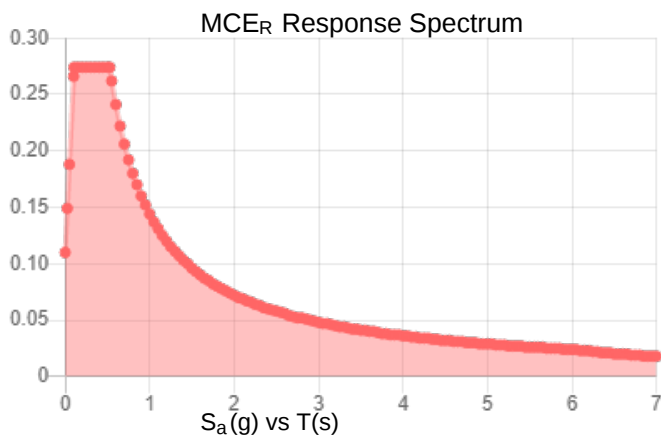
Mountainous terrain, gorges, ocean promontories, and special wind regions should be examined for unusual wind conditions.

Site Soil Class: D - Stiff Soil

Results:

S_S :	0.171	S_{DS} :	0.183
S_1 :	0.06	S_{D1} :	0.096
F_a :	1.6	T_L :	6
F_v :	2.4	PGA :	0.087
S_{MS} :	0.274	PGA_M :	0.138
S_{M1} :	0.144	F_{PGA} :	1.6
		I_e :	1

Seismic Design Category B



Data Accessed:

Tue Feb 02 2021

Date Source:

USGS Seismic Design Maps based on ASCE/SEI 7-10, incorporating Supplement 1 and errata of March 31, 2013, and ASCE/SEI 7-10 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-10 Ch. 21 are available from USGS.

Results:

Ice Thickness: 0.75 in.
Concurrent Temperature: 15 F
Gust Speed: 50 mph

Data Source: Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8

Date Accessed: Tue Feb 02 2021

Ice thicknesses on structures in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 50-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from local meteorological studies. Ice thicknesses in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

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